Health Equity Assessment Toolkit Plus

Upload Database Edition

USER MANUAL

World Health Organization

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1. Introduction

In the Sustainable Development Goals (SDG) era, the world has committed to "leave no-one behind." This requires a continuing focus on equity, reflected across multiple SDG goals and targets. Health inequality monitoring is critical to understand many aspects of who is being left behind (and where): it can identify differences in health indicators between different population subgroups. This is essential for the development of equity-oriented interventions, especially those on the path to universal health coverage, serving as the basis for the design and re-orientation of rights-based, gender-responsive and equitable health systems.

1.1 What is HEAT Plus?

The Health Equity Assessment Toolkit Plus (HEAT Plus) is a software application that facilitates the assessment of within-country health inequalities. Users can upload their own data and assess inequalities at the national or subnational level (e.g. within a state or province) for a range of health indicators (e.g. antenatal care coverage or under-five mortality rate) and dimensions of inequality (e.g. age, sex or place of residence). Databases have to be in a specified format in order to be uploaded to HEAT Plus (please refer to section 2 of the user manual and the template for more information). Once uploaded, these data can be used to explore inequalities within a setting of choice and compare inequalities between different settings. Disaggregated data and 19 summary measures of inequality are presented in a variety of different ways, including customized tables and graphs. Results can be exported and saved in different formats.

The following two sections give a brief overview over what HEAT Plus can and cannot do (sections 1.2 and 1.3). Section 2 provides information on how to prepare for an assessment with HEAT Plus and section 3 on how to assess health inequalities in HEAT Plus. Section 4 answers Frequently Asked Questions (FAQs). For more information about HEAT – the built-in database edition - please visit http://www.who.int/gho/health_equity/assessment_toolkit/en/.

1.2 What HEAT Plus can do

- HEAT Plus **allows you to upload your own disaggregated data** in a specified format (following the HEAT Plus template) in order to assess health inequalities using disaggregated data and summary measures of inequality. Figure 1 illustrates the process of carrying out health equity assessments using HEAT Plus.

- HEAT Plus **allows the assessment of data from a wide range of data sources**. Population-based survey data may be used, such as data from Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) like they are used in HEAT, but HEAT Plus can also assess census data, Civil Registration and Vital Statistics (CRVS) data, or administrative and health facility data.

- HEAT Plus **allows you to assess inequalities in different settings**. Inequalities can be assessed at the national level or at the subnational level (e.g. within a province or district).

- HEAT Plus **allows you to choose what indicators will be assessed**. You can assess indicators from within the health sector or beyond. For instance, HEAT Plus can be used to assess inequalities in reproductive, maternal, newborn and child health or non-communicable diseases. It can also be used to assess inequalities in health personnel or out-of-pocket expenditure. Beyond the realm of health, it can be used to look at indicators related to, for example, dropout from

school among adolescent girls, access to safe drinking water, province-level voter turnout and a range of other health and development indicators of your choosing.

- HEAT Plus **allows customised inequality dimensions to be assessed**. Commonly used dimensions in health inequality monitoring include
    - o Economic status
    - o Education
    - o Place of residence
    - o Sex
    - o Age
    - o Subnational region
    - o Country-specific or context-specific factors (e.g. occupation, district, caste)

    You are free to choose any inequality dimension that distinguishes disadvantaged population subgroups and that is relevant to your specific research or programme context.

For more information, tips and insights, please refer to section 4 (FAQs).

Figure 1 The process of carrying out health equity assessments using HEAT Plus
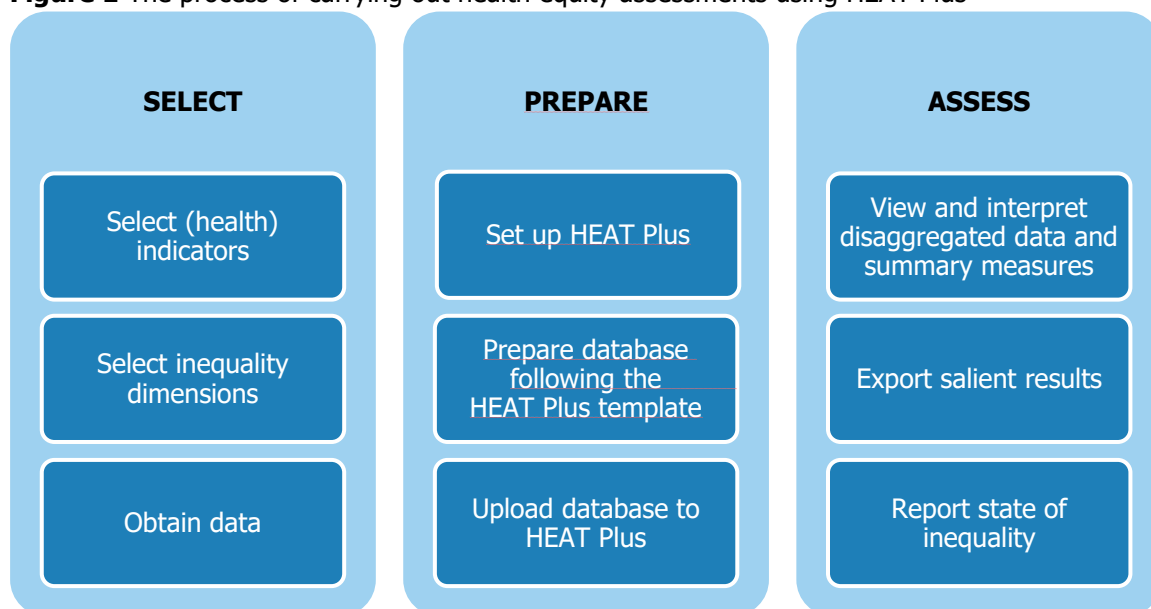
1.3   **What HEAT Plus cannot do**

- HEAT Plus **cannot improve the quality of data**. For example, if you wish to assess data from multiple health facilities and data are missing, incomplete or inaccurate for some of those facilities, HEAT Plus cannot adjust or correct for this. In such a case, it is recommended that you turn attention to sourcing data with greater quality and completeness for the assessment.

- HEAT Plus **cannot calculate disaggregated data from a raw dataset**, i.e. it does not automatically generate estimates for population subgroups (defined by inequality dimensions, like age, sex and place of residence). To calculate disaggregated data, you must use statistical software packages, such as R, SAS, SPSS or Stata. Codes for calculating disaggregated data using household survey data are available at
http://www.who.int/gho/health_equity/statistical_codes/en/.

- HEAT Plus **cannot calculate summary measures and their 95% confidence intervals if there are missing data**. For example, complex measures of inequality can only be calculated if subgroup estimates are available for all population subgroups of a dimension. Moreover, for many complex measures, the size of the population in each subgroup is required. HEAT Plus will use this information to generate the population share for each subgroup and calculate weighted summary measures, i.e. summary measures that take into account the population share of each subgroup. Similarly, if standard errors of subgroup estimates are not included, HEAT Plus will not be able to generate 95% confidence intervals of summary measures either.

- HEAT Plus **cannot calculate estimates for intersections of inequality dimensions**, unless appropriately entered in the template. For example, if your template includes data disaggregated by sex and data disaggregated by economic status, HEAT Plus will not be able to calculate data that are simultaneously disaggregated by sex and economic status. If such an assessment is important to you, ensure that you enter data in your template accordingly. Please refer to question 14 in section 4 (FAQs) for more information.

For more information, tips and insights, please refer to section 4 (FAQs).

2. Preparing for an assessment with HEAT Plus

2.1 Setting up HEAT Plus

HEAT Plus is available as a standalone version for use offline. The latest version can be accessed at http://www.who.int/gho/health_equity/assessment_toolkit/.

The standalone version of HEAT Plus can be used on all computers with a Windows or Macintosh operating system. In order to open the standalone version on your device, you require the "R" statistical software and a web browser. In the standalone package, WHO has provided a portable version of "R" and the portable edition of the web browser Mozilla Firefox. This does not imply in any manner that the use of these products is endorsed or recommended by the World Health Organization in preference to others of a similar nature. R Portable and Firefox Portable do not require any installation.

2.1.1 Windows

To run HEAT Plus on your Windows machine, select the "HEAT Plus for Windows" folder and double-click the "Start_HEATPlus.bat" file. The toolkit will automatically open in a Firefox Portable browser window.

To refresh HEAT Plus, click the circular arrow on the right of the address bar in the open browser window. To restart HEAT Plus, make sure you close both the browser window and the command window, before double-clicking the "Start_HEATPlus.bat" file again.

2.1.2 Macintosh

To run HEAT Plus on your Macintosh, select the "HEAT Plus for Mac" folder and double-click the "Start_HEATPlus.command" file. The toolkit should automatically open in a Firefox Portable browser window.

If HEAT Plus does not open automatically, you may have to change your computer's security settings. Settings can be changed by pressing the Control key, then clicking the "Start_HEATPlus.command" file

and then choosing Open from the shortcut menu. This will save HEAT Plus as an exception to your security settings, and you can open the toolkit in the future by double-clicking the "Start_HEATPlus.command" file.

Alternatively, you can change your security settings in System Preferences: Open System Preferences (by clicking the Apple logo on the top left corner of your screen) and click the Security & Privacy icon. In the General tab you may see a note saying that HEAT Plus was blocked from opening. Click the "Open Anyway" button to open HEAT Plus. If you don't see this note, you can change your settings by setting "Allow apps downloaded from" to "Anywhere". Note that you may have to unlock your settings by clicking the lock on the bottom left corner of the window and entering your administrative username and password in order to make this change. You will now be able to run HEAT Plus by double-clicking the "Start_HEATPlus.command" file.

To refresh HEAT Plus, click the circular arrow on the right of the address bar in the open browser window. To restart HEAT Plus, make sure to close both the browser window and the command window, before double-clicking the "Start_HEATPlus.command" file again.

2.2   Preparing disaggregated data

HEAT Plus requires disaggregated data to be generated for population subgroups defined by inequality dimensions, using statistical software. Further information on how to generate disaggregated data using household survey data in R, SAS, SPSS and Stata is available at http://www.who.int/gho/health_equity/statistical_codes/en/.

2.3   Preparing database for upload

HEAT Plus requires that disaggregated data be stored in a comma separated values (csv) or Microsoft Excel (xls or xlsx) file following the HEAT Plus template. The software recognises the variables and data in the template based on their placement and order. Certain variables are mandatory, while others are recommended or optional (see table 1).

Mandatory variables are those without which data cannot be uploaded. These variables are: setting (which can be the name of a country, province, district, facility or other, as appropriate), year, source, indicator abbreviation, indicator name, dimension of inequality, population subgroup, subgroup estimate, specification of whether the indicator is favourable or not, indicator scale, specification of whether the dimension is ordered or not, subgroup order for ordered dimensions and reference subgroup for non-ordered dimensions.

Recommended variables are required for the calculation of 95% confidence intervals of summary measures or for using certain functionalities in HEAT Plus. These include: standard errors of subgroup estimates, size of the population in each subgroup, the setting average (e.g. the national average for country-level data) and the ISO3 country code for country-level data (required for the benchmarking function).

Optional variables include 95% confidence intervals (lower and upper bounds) of subgroup estimates and flag/notes.

💡 **TIP**

See section 4 (FAQs) to avoid common mistakes in preparing data.

Table 1 Overview of variables in the HEAT Plus template

Variable	Definition	Note
Mandatory variables		
setting	Setting name (e.g. a country like "Indonesia," or a province like "Bali")	If this variable is missing, data cannot be uploaded.
year	Year (e.g. "2016")	Must be a four-digit number. If this variable is missing, data cannot be uploaded.
source	Data source (e.g. "DHS")	If this variable is missing, data cannot be uploaded.
indicator_abbr	Indicator abbreviation (e.g. "anc")	If this variables is missing, data cannot be uploaded.
indicator_name	Indicator name (e.g. "Antenatal care coverage")	If this variables is missing, data cannot be uploaded.
dimension	Dimension of inequality (e.g. "Education")	If this variables is missing, data cannot be uploaded.
subgroup	Population subgroup (e.g. "Primary school")	If this variables is missing, data cannot be uploaded.
estimate	Subgroup estimate	If this variable is missing for one subgroup (or more), complex summary measures cannot be calculated. Simple measures may be calculated, depending on which estimates are missing.
favourable_indicator	This dummy variable indicates the indicator type. It must be 1 for favourable indicators and 0 for non-favourable (adverse) indicators. *Favourable indicators* measure desirable health events that are promoted through public health action. They include health intervention indicators, such as antenatal care coverage, and desirable health outcome indicators, such as life expectancy. For these indicators, the ultimate goal is to achieve a maximum level, either in health intervention coverage or health outcome (e.g. complete coverage of antenatal care or the highest possible life expectancy). *Adverse indicators* measure undesirable health events that are to be reduced or eliminated through public health action. They include undesirable health outcome indicators, such as stunting prevalence in children aged less than five years or under-five mortality rate. Here, the ultimate goal is to achieve a minimum level (e.g. theoretically 0 deaths per 1000 live births).	Must be zero or one. If this variable is missing, data cannot be uploaded.
indicator_scale	This variable indicates the scale of the indicator, such as "100" for indicators reported as percentages or "1000" for indicators reported as rates per 1000 population.	Must be greater than zero. If this variable is missing, data cannot be uploaded.
ordered_dimension	This dummy variable indicates the dimension type. It must be 0 for dimensions with two subgroups (binary dimensions). For dimensions with more than two subgroups, it must be 1 for ordered dimensions and 0 for non-ordered dimensions. *Binary dimensions* compare the situation in two population subgroups (e.g. males and females). *Ordered dimensions* have (more than two) ordered subgroups that have an inherent positioning and can be ranked. For example, education has an inherent ordering in the sense that those with less education have less of something compared to those with more education. *Non-ordered dimensions* have (more than two) non-ordered subgroups that are not based on criteria that can be logically ranked. Subnational regions are an example of non-ordered groupings.	Must be zero or one. If this variable is missing, data cannot be uploaded.
subgroup_order	This variable indicates the order of subgroups for ordered dimensions. *For ordered dimensions* (i.e. if ordered_dimension=1), this variable must be an increasing sequence of integers	Must be zero or an increasing sequence of integers starting with 1. If this variable is missing, data cannot be uploaded.

	starting with the value 1 for the most-disadvantaged subgroup. For example, for education with three subgroups, the most-disadvantaged subgroup "No education" will be assigned the value 1, "Primary school" will be assigned the value 2 and the most-advantaged subgroup "Secondary school +" will be assigned the value 3. *For non-ordered dimensions* and *binary dimensions* (i.e. if ordered_dimension=0), this variable must be 0.	
reference_subgroup	This variable indicates the reference subgroup for non-ordered dimensions and binary dimensions. *For ordered dimensions* (i.e. if ordered_dimension=1), this variable must be 0. *For non-ordered dimensions* and *binary dimensions* (i.e. if ordered_dimension=0), you have the option to choose a reference subgroup. A reference subgroup can be chosen by assigning the value 1 to that subgroup and 0 to all other subgroups. For example, for subnational regions (with more than two subgroups), the capital city can be chosen as the reference subgroup. For place of residence (urban vs. rural), urban can be chosen as the reference subgroup.	Must be zero or one. The selection of a reference subgroup impacts on the calculation of the following summary measures: D, MDB, PAF, PAR and R. If this variable is missing, data cannot be uploaded.
Recommended variables		
se	Standard error of subgroup estimate	If this variable is missing for one subgroup (or more), 95% confidence intervals for some (or all) summary measures cannot be calculated.
population	The number of people affected or at risk within that subgroup (e.g. weighted sample size by subgroup in household surveys).	Must be greater than zero. If this variable is missing for one subgroup (or more), complex summary measures cannot be calculated.
setting_average	Average estimate for that setting, year, source, indicator combination.	If this variable is missing, benchmark data cannot be displayed in a scatterplot.
iso3	ISO3 country code for country-level data (e.g. "IDN" for Indonesia). Please refer to supplementary table 1 for a list of WHO member states and corresponding ISO3 country codes (as well as corresponding WHO regions and country income groups).	Must be a three-character string. If this variable is missing, country-level benchmark data cannot be filtered by country income group or WHO region.
Optional variables		
ci_lb	95% confidence interval lower bound of subgroup estimate	
ci_ub	95% confidence interval upper bound of subgroup estimate	
flag	Flag of subgroup estimate, indicating notes or observations relevant to the analysis. For example if a subgroup estimate is based on a very small number of cases, this could be indicated in the flag.	

2.4 Uploading database to HEAT Plus

Once you have prepared your database according to the HEAT Plus template, you can go on and upload your database to HEAT Plus. Section 3 provides further information on how to assess health inequalities in HEAT Plus.

3. Assessing health inequalities in HEAT Plus

3.1 Home

The Home page provides an introduction to HEAT Plus. Here, you can choose to upload a new database or open an existing database, following the instructions below.

Once the database has been uploaded or opened successfully, you can go on to explore inequality in a selected setting of interest (*Explore Inequality* tab) and to compare the situation in a setting of interest with the situation in other settings (*Compare Inequality* tab). Please note that if neither a new or existing database is chosen, none of these tabs will be functional. You can also choose to view the tool in another language: click on the language menu in the top right corner (English (EN) by default) and select your language of choice (French (FR), Portuguese (PT) or Spanish (ES)). Note that the tool will be translated into Arabic, Chinese and Russian in the future.

3.1.1 Uploading a new database

In order to upload a new database, choose the **upload new database** option on the homepage. You can then select the database using the *Browse* function and choose a database name. HEAT Plus uses the chosen database name to store the following five data files in the Software\HEATPlus\data\user-data folder on your machine:

- **[database_name]_maindata.RDS**, which contains the uploaded database of disaggregated data,
- **[database_name]_years.RDS**, which contains information about all unique combinations of setting, year and source in the uploaded database,
- **[database_name]_strata.RDS**, which contains information about all unique combinations of country, year, source, indicator and dimension in the uploaded database,
- **[database_name]_dimensions.RDS**, which contains information about the dimensions in the uploaded database, including the dimension name, (maximum) number of categories and whether the dimension is ordered or not, and
- **[database_name]_inequals.RDS**, which contains the summary measures of inequality, that have been calculated automatically based on the uploaded database.

Please note that if the name already exists, HEAT Plus automatically replaces older databases with the latest one uploaded.

Following the selection of your database, you must click the **upload database** button. If the software loads correctly, summary measures will be calculated and a confirmation message will appear. This means that you may now go to the other tabs (*Explore Inequality* or *Compare Inequality*).

If the software does not load correctly, you will be informed of what variables are missing or have to be corrected. You may then correct/revise the template and re-upload the database following the aforementioned procedure.

3.1.2 Opening an existing database

In order to open an existing database, choose the **open existing database** option on the homepage. The previously uploaded database will be available in a dropdown menu for selection. If no

> 💡 **TIP**
>
> If you wish to carry out assessments with multiple datasets, choose unique database names. Using the same name will result in the database being replaced with the one most recently uploaded.

databases have been uploaded before, the dropdown will read "No existing data available."

Following the selection of your database, click the **open database** button. When data is opened, you will receive a confirmation. This means that you may now go to the other tabs (*Explore Inequality* or *Compare Inequality*).

3.1.3 Deleting an existing database

Existing databases may be deleted permanently by opening the HEAT Plus folder on your machine, navigating to the Software\HEATPlus\data\user-data folder and deleting the files with the name of the database to be deleted. Note that there are five files for each database:

- [database_name]_dimensions.RDS,
- [database_name]_inequals.RDS,
- [database_name]_maindata.RDS,
- [database_name]_strata.RDS, and
- [database_name]_years.RDS.

All files have to be deleted to fully delete an existing database.

3.2   Explore Inequality

Under **Explore Inequality**, you can assess the situation within a setting of interest. Inequalities can be explored using disaggregated data in graphs (*Disaggregated data (graphs)* tab), detailed bar graphs (*Disaggregated data (detailed bar graph)* tab) and tables (*Disaggregated data (tables)* tab) as well as using summary measures of inequality in graphs (*Summary measures (graphs)* tab) and tables (*Summary measures (tables)* tab).

Note that multiple settings may not be viewed at the same time in the *Explore Inequality* tab. Benchmarking may be done, however, using the *Compare Inequality* tab.

Tips for exploring inequality

💡 Whether looking at disaggregated data or summary measures in table or graph form, it is recommended to start exploring inequality by selecting one health indicator and one dimension of inequality at a time – rather than selecting multiple health indicators and multiple dimensions of inequality.

💡 It is not recommended to visualize favourable and adverse indicators together on one graph. The interpretation of these is different: for favourable indicators, a high value is desirable, while for adverse indicators, a low value is preferred.

💡 It is also not recommended to visualize indicators that are reported on different scales on one graph.

💡 When looking at multiple indicators together on one graph, it may be difficult to assess the situation correctly if there is a large difference in health levels between the indicators. For example, when looking at two health intervention indicators, one with high coverage and one with low coverage, they will both be visualized on the same scale covering a large range of values. This may make it difficult to discover smaller variations. In situations like this, it may be a good idea to look at each indicator individually before visualizing a number of indicators together on one graph.

3.2.1 Disaggregated data (graphs)

What you see

The graph presents health data for population subgroups in a selected setting of interest. By default, a (horizontal) line graph is displayed showing subgroup estimates (on the x-axis) for each year (on the y-axis). Alternatively, a (vertical) bar graph can be displayed showing subgroup estimates (on the y-axis) for each year (on the x-axis). If more than one health indicator and dimension of inequality are selected at the same time, multiple graphs are shown – one for each indicator and dimension.

In line graphs, coloured shapes indicate population subgroups – each health indicator, dimension of inequality and year is represented on the graph by multiple coloured shapes (one for each subgroup). Black horizontal lines indicate the difference between minimum and maximum subgroup estimates.

In bar graphs, coloured bars indicate population subgroups – each health indicator, dimension of inequality and year is represented on the graph by multiple coloured bars (one for each subgroup). Numbers above bars indicate the respective subgroup estimates. 95% confidence intervals for each subgroup estimate can be displayed in the form of vertical lines (or whiskers).

How to explore

Hover over a shape or bar to see additional information about the data point, including about the setting, source, year, subgroup, population share of the subgroup, subgroup estimate, 95% confidence intervals of the subgroup estimate and setting average.

Use the panel on the left to select what data is to be displayed in graphs:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select years** to show data for one or more years. Select **Most recent year** to limit the view to the most recent year. Alternatively, click into the box to see all the available years and make your selection. Delete selected years by clicking on the year and then pressing the *Delete* key.
- Use **Select health indicators** to choose one or more indicators. Click into the box to see all the available indicators and make your selection. Delete selected indicators by clicking on the indicator and then pressing the *Delete* key.
- Use **Select inequality dimensions** to choose one or more dimensions of inequality. Click into the box to see all the available dimensions and make your selection. Delete selected dimensions by clicking on the dimension and then pressing the *Delete* key.
- Use **Select graph type** to display the data in a bar graph or line graph.

Click on **Graph options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Select **Include 95% confidence interval** to show 95% confidence intervals for subgroup estimates in the graph. Note that this feature is only available for bar graphs.
- Use **Select axis range** to change the limits of the main axis. Click into the boxes to enter minimum and/or maximum values.
- Use **Select graph names** to customize the display of the graph: Click into the boxes to enter the main title, horizontal axis title and vertical axis title.

> 💡 **TIP**
>
> See section 4 (FAQs) for tips on how to assess data.

Click the **Download data** button to download a file with the data displayed in the graph(s) in the main panel view. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Click the **Download graph** button to download the graph(s) displayed in the main panel view. A pop-up window will appear with the option to select your preferred output format (png or jpg). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

If you only wish to download one graph (for one indicator and one dimension) at a time, click the arrows in the top right corner of the selected graph. A pop-up window will appear with a full-screen view of the graph. Click the three small horizontal bars in the top right corner of the full-screen view to download the displayed graph (png, jpg or svg vector image). Close the view by clicking the **Close** button in the bottom right corner or by clicking the **X** button in the top right corner.

3.2.2 Disaggregated data (detailed bar graphs)

What you see

The (horizontal) bar graph presents health data for population subgroups in a selected setting of interest. If more than one health indicator is selected at the same time, multiple bar graphs are shown – one for each indicator. Importantly, as opposed to the *Disaggregated data (graphs)* tab, only one dimension can be viewed at the same time, but in more detail.

Coloured bars indicate population subgroups – each health indicator is represented on the graph by multiple coloured bars (one for each subgroup). Setting average and median values can be displayed in the form of vertical lines.

For non-ordered dimensions with more than 30 subgroups, additional summary measures are calculated, which can be viewed by clicking the **Summary measures** button that appears above the graph in that case.

How to explore

Hover over a bar to see additional information about the data point, including about the setting, source, year, subgroup, population share of the subgroup, subgroup estimate, 95% confidence intervals of the subgroup estimate and setting average.

Use the panel on the left to select what data is to be displayed in graphs:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select year** to show data for the year of your choice. Select **Most recent year** to limit the view to the most recent year.
- Use **Select health indicators** to choose one or more indicators. Click into the box to see all the available indicators and make your selection. Delete selected indicators by clicking on the indicator and then pressing the *Delete* key. Note that a maximum of three health indicators can be selected at the same time.

- Use **Select inequality dimension** to choose a dimension of inequality. Click the down arrow to see all the available dimensions and make your selection. Alternatively, search for a particular dimension by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the dimension you are looking for.

Click on **Graph options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Select **Sort by subgroup** to order bars by subgroup (according to subgroup order for ordered dimensions and according to subgroup name for non-ordered dimensions) or select **Sort by indicator value** to order bars by subgroup estimates.
- Select **Sort order** to rearrange bars in ascending or descending sequence.
- Select **Show setting average** to show the setting average value in the graph (in the form of a vertical black line, with the value displayed along the line).
- Select **Show median** to show the median value in the graph (in the form of a vertical orange line, with the value displayed along the line).
- Use **Highlight subgroup** to choose one or more subgroups to be highlighted in red in the graph. Click into the box to see all the available subgroups and make your selection. Delete selected subgroups by clicking on the subgroup and then pressing the *Delete* key.
- Use **Select axis range** to change the limits of the main axis. Click into the boxes to enter minimum and/or maximum values.
- Use **Select graph names** to customize the display of the graph: Click into the boxes to enter the main title, horizontal axis title and vertical axis title.

Click the **Summary measures** button above the graph in the main panel to view the following summary measure estimates for non-ordered dimensions with

- more than 30 subgroups:
    - Difference between percentile 80 and percentile 20
    - Ratio of percentile 80 to percentile 20
    - Difference between the mean estimates in quintile 5 and quintile 1
    - Ratio of the mean estimates in quintile 5 to quintile 1
- more than 60 subgroups:
    - Difference between percentile 90 and percentile 10
    - Ratio of percentile 90 to percentile 10
    - Difference between the mean estimates in decile 10 and decile 1
    - Ratio of the mean estimates in decile 10 to decile 1
- more than 100 subgroups:
    - Difference between percentile 95 and percentile 5
    - Ratio of percentile 95 to percentile 5
    - Difference between the mean estimates in the top 5% and the bottom 5%
    - Ratio of the mean estimates in the top 5% to the bottom 5%

How to extract for further use

Click the **Download data** button to download a file with the data displayed in the graph(s) in the main panel view. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Click the **Download graph** button to download the graph(s) displayed in the main panel view. A pop-up window will appear with the option to select your preferred output format (png or jpg). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

If you only wish to download one graph (for one indicator and one dimension) at a time, click the arrows in the top right corner of the selected graph. A pop-up window will appear with a full-screen view of the graph. Click the three small horizontal bars in the top right corner of the full-screen view to download the displayed graph (png, jpg or svg vector image). Close the view by clicking the **Close** button in the bottom right corner or by clicking the **X** button in the top right corner.

3.2.3 Disaggregated data (tables)

What you see

The table presents health data for population subgroups in a selected setting of interest. By default, the table displays information about the setting, year, health indicator, inequality dimension, population subgroup, subgroup estimate and population share.

How to explore

Use the panel on the left to select what data is to be displayed in tables:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select years** to show data for one or more years. Select **Most recent year** to limit the view to the most recent year. Alternatively, click into the box to see all the available years and make your selection. Delete selected years by clicking on the year and then pressing the *Delete* key.
- Use **Select health indicators** to choose one or more indicators. Click into the box to see all the available indicators and make your selection. Delete selected indicators by clicking on the indicator and then pressing the *Delete* key.
- Use **Select inequality dimensions** to choose one or more dimensions of inequality. Click into the box to see all the available dimensions and make your selection. Delete selected dimensions by clicking on the dimension and then pressing the *Delete* key.

Click on **Table options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Use **Select table content** to select the columns that are displayed in the table. Click into the box to see all the available variables and make your selection. Delete selected variables by clicking on the variable and then pressing the *Delete* key.
- Use **Select number of decimals** to change the number of decimals for estimates displayed in the table.

Use the table features in the main panel to customize the view:

- Use the **Search** option at the top right of the table to search for a key term. The table will automatically be filtered according to the selected search term.
- Click on a column heading to order the data in ascending order by the selected column. Click again on the same column heading to order the data in descending order.

How to extract for further use

Click the **Download data** button to download the data displayed in the table. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

3.2.4 Summary measures (graphs)

What you see

The graph presents a selected summary measure of inequality for a selected setting of interest. By default, a bar graph is displayed showing summary measure estimates (on the y-axis) for each year (on the x-axis). Alternatively, a line graph can be displayed. If more than one health indicator and dimension of inequality are selected at the same time, multiple graphs are shown – one bar graph for each indicator and dimension and one line graph for each dimension of inequality.

In bar graphs, numbers above bars indicate the respective summary measure estimates. Vertical lines (or whiskers) indicate the 95% confidence interval for each summary measure estimate.

How to explore

Hover over a bar or shape to see additional information about the data point, including about the setting, source, year, summary measure, summary measure estimate and 95% confidence intervals of the summary measure estimate.

Use the panel on the left to select what data is to be displayed in graphs:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select years** to show data for one or more years. Select **Most recent year** to limit the view to the most recent year. Alternatively, click into the box to see all the available years and make your selection. Delete selected years by clicking on the year and then pressing the *Delete* key.
- Use **Select health indicators** to choose one or more indicators. Click into the box to see all the available indicators and make your selection. Delete selected indicators by clicking on the indicator and then pressing the *Delete* key.
- Use **Select inequality dimensions** to choose one or more dimensions of inequality. Click into the box to see all the available dimensions and make your selection. Delete selected dimensions by clicking on the dimension and then pressing the *Delete* key.
- Use **Select summary measure** to choose a summary measure of inequality. Click the down arrow to see all the available summary measures and make your selection. Alternatively, search for a particular summary measure by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the summary measure you are looking for.
- Use **Select graph type** to display the data in a bar graph or line graph.

Click on **Graph options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Select **Include 95% confidence intervals** to show 95% confidence intervals for summary measure estimates in the graph.
- Use **Select axis range** to change the limits of the main axis. Click into the boxes to enter minimum and/or maximum values.
- Use **Select graph names** to customize the display of the graph: Click into the boxes to enter the main title, horizontal axis title and vertical axis title.

Click the **Download data** button to download the data displayed in the graph(s) in the main panel view. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Click the **Download graph** button to download the graph(s) displayed in the main panel view. A pop-up window will appear with the option to select your preferred output format (png or jpg). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

If you only wish to download one graph (for one indicator and one dimension) at a time, click the arrows in the top right corner of the selected graph. A pop-up window will appear with a full-screen view of the graph. Click the three small horizontal bars in the top right corner of the full-screen view to download the displayed graph (png, jpg or svg vector image). Close the view by clicking the **Close** button in the bottom right corner or by clicking the **X** button in the top right corner.

3.2.5 Summary measures (tables)

What you see

The table presents summary measures of inequality for a selected setting of interest. By default, the table displays information about the setting, year, health indicator, dimension of inequality, summary measure and summary measure estimate.

How to explore

Use the panel on the left to select what data is to be displayed in tables:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select years** to show data for one or more years. Select **Most recent year** to limit the view to the most recent year. Alternatively, click into the box to see all the available years and make your selection. Delete selected years by clicking on the year and then pressing the *Delete* key.
- Use **Select health indicators** to choose one or more indicators. Click into the box to see all the available indicators and make your selection. Delete selected indicators by clicking on the indicator and then pressing the *Delete* key.
- Use **Select inequality dimensions** to choose one or more dimensions of inequality. Click into the box to see all the available dimensions and make your selection. Delete selected dimensions by clicking on the dimension and then pressing the *Delete* key.
- Use **Select summary measures** to display one or more summary measures of inequality. Click into the box to see all the available summary measures and make your selection. Delete selected summary measures by clicking on the summary measure and then pressing the *Delete* key.

Click on **Table options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Use **Select table content** to select the columns that are displayed in the table. Click into the box to see all the available variables and make your selection. Delete selected variables by clicking on the variable and then pressing the *Delete* key.

- Use **Select number of decimals** to change the number of decimals for estimates displayed in the table.

Use the table features in the main panel to customize the view:

- Use the search option at the top right of the table to search for a key term. The table will automatically be filtered according to the selected search term.
- Click on a column heading to order the data in ascending order by the selected column. Click again on the same column heading to order the data in descending order.

How to extract for further use

Click the **Download data** button to download the data displayed in the table. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

3.3   Compare Inequality

Under **Compare Inequality**, you can benchmark, i.e. compare the situation in one setting with the situation in other settings. Benchmarking can be done using disaggregated data (*Disaggregated data (graphs)* tab) and summary measures of inequality (*Summary measures (graphs)* tab) in graphs.

3.3.1 Disaggregated data (graphs)

What you see

The (horizontal) line graph presents health data for population subgroups in a selected setting of interest (displayed at the top of the graph) and selected benchmark settings.

Coloured shapes indicate population subgroups within settings – each setting is represented on the graph by multiple coloured shapes (one for each subgroup). Black horizontal lines indicate the difference between minimum and maximum subgroup estimates.

How to explore

Hover over a shape to see additional information about the data point, including about the setting, source, year, subgroup, population share of the subgroup, subgroup estimate, 95% confidence intervals of the subgroup estimate and setting average.

Use the panel on the left to select what data is to be displayed in graphs:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select year** to show data for the year of your choice. Select **Most recent year** to limit the view to the most recent year.
- Use **Select health indicator** to choose an indicator. Click the down arrow to see all the available indicators and make your selection. Alternatively, search for a particular indicator by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the indicator you are looking for.

- Use **Select inequality dimension** to choose a dimension of inequality. Click the down arrow to see all the available dimensions and make your selection. Alternatively, search for a particular dimension by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the dimension you are looking for.

Use the **Benchmark options** in the panel on the left to customize the benchmark data:

- Use **Filter by country-income group** to limit benchmark settings to low-income, middle-income and/or high-income countries. Please note that this option is only activated for country-level data and if an ISO3 country code was entered in the template. If you are not looking at country-level data or if the ISO3 country code was not entered for country-level data in the template you will see "No income group defined." If the ISO3 code was entered, click into the box to see all the available income groups and make your selection. Delete selected income groups by clicking on the income group and then pressing the *Delete* key. By default, all countries from the same country income group as the country of interest are selected.
Please note that country income group was determined using the current World Bank classification released in July 2018, which is based on gross national income per capita in 2017. For some countries, the current income group may not match the country's income group at the time when the survey was conducted.
- Use **Filter by WHO Region** to limit benchmark settings to countries from one or more selected regions. Please note that this option is only activated for country-level data and if an ISO3 country code was entered in the template. If you are not looking at country-level data or if the ISO3 country code was not entered for country-level data in the template you will see "No WHO region defined." If the ISO3 code was entered, click into the box to see all the available WHO Regions and make your selection. Delete selected WHO Regions by clicking on the WHO Region and then pressing the *Delete* key. By default, all countries from the same WHO Region as the country of interest are selected.
- Use **Select benchmark settings** to manually choose settings for benchmarking. Click into the box to see all the available benchmark settings and make your selection. Available for selection are settings from the country income group(s) and WHO Region(s) selected in the filters above. Delete selected benchmark settings by clicking on the setting and then pressing the *Delete* key.
- Use **Select years** to specify the number of years by which benchmark settings' data can vary from the selected year of the main setting of interest.

Click on **Graph options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Use **Select axis range** to change the limits of the main axis. Click into the boxes to enter minimum and/or maximum values.
- Use **Select graph names** to customize the display of the graph: Click into the boxes to enter the main title, horizontal axis title and vertical axis title.

How to extract for further use

Click the **Download data** button to download the data displayed in the graph. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Click the **Download graph** button to download the displayed graph. A pop-up window will appear with the option to select your preferred output format (png or jpg). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Alternatively, click the arrows in the top right corner of the graph. A pop-up window will appear with a full-screen view of the graph. Click the three small horizontal bars in the top right corner of the full-screen view to download the displayed graph (png, jpg or svg vector image). Close the view by clicking the **Close** button in the bottom right corner or by clicking the **X** button in the top right corner.

3.3.2 Summary measures (graphs)

What you see

The scatterplot presents the setting average (on the x-axis) and the level of within-setting inequality as measured by the selected summary measure, (on the y-axis) for the selected health indicator and dimension of inequality for each setting.

Coloured shapes indicate settings – each setting is represented on the graph by one shape. Benchmark settings are shown in blue, while the setting of interest is highlighted in red.

How to explore

Hover over a shape to see additional information about the data point, including about the setting, source, year, summary measure, summary measure estimate and setting average.

Use the panel on the left to select what data is to be displayed in graphs:

- Use **Select setting (e.g. country, province, district)** to choose a setting of interest. Click the down arrow to see all the available settings and make your selection. Alternatively, replace an already chosen setting of interest by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the setting you are looking for.
- Use **Select data sources** to explore data from one or more data sources. Delete selected data sources by clicking on the source and then pressing the *Delete* key.
- Use **Select year** to show data for the year of your choice. Select **Most recent year** to limit the view to the most recent year.
- Use **Select health indicator** to choose an indicator. Click the down arrow to see all the available indicators and make your selection. Alternatively, search for a particular indicator by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the indicator you are looking for.
- Use **Select inequality dimension** to choose a dimension of inequality. Click the down arrow to see all the available dimensions and make your selection. Alternatively, search for a particular dimension by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the dimension you are looking for.
- Use **Select summary measure** to choose a summary measure of inequality. Click the down arrow to see all the available summary measures and make your selection. Alternatively, search for a particular summary measure by clicking the down arrow, pressing the *Delete* key and typing (part of) the name of the summary measure you are looking for.

Use the **Benchmark options** in the panel on the left to customize the benchmark data:

- Use **Filter by country-income group** to limit benchmark settings to low-income, middle-income and/or high-income countries. Please note that this option is only activated for country-level data and if an ISO3 country code was entered in the template. If you are not looking at country-level data or if the ISO3 country code was not entered for country-level data in the template you will see "No income group defined." If the ISO3 code was entered, click into the box to see all the available income groups and make your selection. Delete selected income groups by clicking on the income group and then pressing the *Delete* key. By default, all countries from the same country income group as the country of interest are selected.

Please note that country income group was determined using the current World Bank classification released in July 2018, which is based on gross national income per capita in 2017. For some countries, the current income group may not match the country's income group at the time when the survey was conducted.

- Use **Filter by WHO Region** to limit benchmark settings to countries from one or more selected regions. Please note that this option is only activated for country-level data and if an ISO3 country code was entered in the template. If you are not looking at country-level data or if the ISO3 country code was not entered for country-level data in the template you will see "No WHO region defined." If the ISO3 code was entered, click into the box to see all the available WHO Regions and make your selection. Delete selected WHO Regions by clicking on the WHO Region and then pressing the *Delete* key. By default, all countries from the same WHO Region as the country of interest are selected.
- Use **Select benchmark settings** to manually choose settings for benchmarking. Click into the box to see all the available benchmark settings and make your selection. Available for selection are settings from the country income group(s) and WHO Region(s) selected in the filters above. Delete selected benchmark settings by clicking on the setting and then pressing the *Delete* key.
- Use **Select years** to specify the number of years by which benchmark settings' data can vary from the selected year of the main setting of interest.
- Use **Select graph style** to display data points or data labels (ISO3 country codes for country-level data) in the graph.

Click on **Graph options** in the panel on the left to open a drop-down menu with the following options to customize the view:

- Use **Select axis range** to change the limits of the horizontal and vertical axes. Click into the boxes to enter minimum and/or maximum values.
- Use **Select graph names** to customize the display of the graph: Click into the boxes to enter the main title, horizontal axis title and vertical axis title.

How to extract for further use

Click the **Download data** button to download the data displayed in the graph. A pop-up window will appear with the option to select your preferred field separator (comma or tab). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Click the **Download graph** button to download the displayed graph. A pop-up window will appear with the option to select your preferred output format (png or jpg). When you have made your selection, click the **Start** button to commence the download. Close the pop-up window by clicking on the **X** button in the top right corner.

Alternatively, click the arrows in the top right corner of the graph. A pop-up window will appear with a full-screen view of the graph. Click the three small horizontal bars in the top right corner of the full-screen view to download the displayed graph (png, jpg or svg vector image). Close the view by clicking the **Close** button in the bottom right corner or by clicking the **X** button in the top right corner.

3.4   About

Further information about HEAT Plus is listed under the About tab, including the user manual, technical notes, software information, version information, license information, feedback information and acknowledgements.

4. Frequently Asked Questions (FAQs) about HEAT Plus

1. What is the minimum I have to enter in the HEAT Plus template?
2. What types of data sources can I use in HEAT Plus?
3. Can I combine multiple data sources in one HEAT Plus dataset?
4. Can I carry out assessments in different settings / at different levels?
5. Can I include indicators not related to health?
6. Can I include indicators with different units?
7. What is meant by "affected population"?
8. Do I have to enter an ISO3 country code?
9. How do I correctly enter information for the variable "favourable_indicator" in the template?
10. How do I correctly enter information for the variable "indicator_scale" in the template?
11. How do I correctly enter information for the variable "ordered_dimension" in the template?
12. How do I correctly enter information for the variable "subgroup_order" in the template ?
13. How do I correctly enter information for the variable "reference_subgroup" in the template ?
14. Can I look at double disaggregation or intersections of inequality dimensions?
15. Can I look at both the average and the level of inequality according to a selected dimension at the same time?
16. How can I refresh or restart HEAT Plus?

1. What is the minimum I have to enter in the HEAT Plus template?

In order to upload data to HEAT Plus, you must include information on mandatory variables. Mandatory variables include: setting, year, source, indicator_abbreviation, indicator_name, dimension, subgroup, estimate, favourable_indicator, indicator_scale, ordered_dimension, subgroup_order and reference_subgroup. Please refer to section 2.3 of the user manual or to the template for a detailed explanation of these variables.

2. What types of data sources can I use in HEAT Plus?

Various types of data sources may be used (separately or jointly) in HEAT Plus. Population-based survey data may be used, such as data from Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS) like they are used in HEAT, but HEAT Plus can also assess census data, Civil Registration and Vital Statistics (CRVS) data or administrative and health facility data .

3. Can I combine multiple data sources in one HEAT Plus dataset?

Yes. Data from multiple sources may be combined in one dataset. For example, in your template of disaggregated data, you can have data on immunization coverage disaggregated by district from health facilities and data on immunization coverage disaggregated by economic status from household surveys.

4. Can I carry out assessments in different settings / at different levels?

Yes. HEAT Plus allows you to assess inequalities in different settings. Inequalities can be assessed at the national level or at the subnational level (e.g. within a province or district), provided disaggregated data for the level of interest are available and uploaded correctly.

5. Can I include indicators not related to health?

Yes. You can upload any indicator disaggregated by any dimension of inequality as long as your database complies with the template specifications. For instance, HEAT Plus can be used to assess inequalities in reproductive, maternal, newborn and child health or non-communicable diseases. It can also be used to assess inequalities in health personnel or out-of-pocket expenditure. Beyond the realm of health, it can be used to look at indicators related to, for example, dropout from school among adolescent girls, or access to safe drinking water, province-level voter turnout, and a range of other health and development indicators of your choosing. For example, beyond the realm of health, HEAT Plus could be used to look at dropout from school among adolescent girls access to safe drinking water or any other health or development indicator of your choosing.

6. Can I include indicators with different units?

Yes. You can upload indicators with different units, provided you enter the correct indicator scale for each indicator in the template. For example, for total fertility rate, which is usually reported as the number of children per woman, the indicator scale would be 1, while for coverage of skilled birth attendance, which is reported as a percentage, the indicator scale would be 100, and for neonatal mortality rate, which is reported as the number of deaths per 1000 live births, the indicator scale would be 1000.

7. What is meant by "affected population"?

Affected population refers to the number of individuals at risk or affected within a population subgroup (defined by inequality dimension, e.g. quintile of economic status).

It basically represents the denominator of an indicator in each population subgroup. Providing this information allows HEAT Plus to take account of the proportion of the population represented in that population subgroup for certain summary measures (like Slope Index of Inequality).

For example, for births attended by skilled health personnel disaggregated by economic status, the affected population is the number of live births in each economic status quintile or subgroup. For household survey data, this variable can easily be calculated in R, SAS, SPSS, or Stata using statistical codes available at http://www.who.int/gho/health_equity/statistical_codes/en/.

8. Do I have to enter an ISO3 country code?

It is recommended that you enter an ISO3 country code for country-level data. Entering an ISO3 code will activate the benchmark options in the Compare Inequality tab. Based on the ISO3 code, HEAT Plus will recognize the World Bank income group and WHO Region of the countries in your dataset (as long as your country is one of the 194 WHO Member States). In HEAT Plus you can use this information and filter countries by World Bank income group and WHO Region and thus select your benchmark countries. Please refer to supplementary table 1 for a list of WHO member states and corresponding ISO3 country codes (as well as corresponding WHO regions and country income groups).

9. How do I correctly enter information for the variable "favourable_indicator" in the template?

The variable "favourable_indicators" indicates the indicator type. It must be 1 for favourable indicators and 0 for non-favourable (adverse) indicators.

Favourable indicators measure desirable health events that are public health action promotes. They include health intervention indicators, such as antenatal care coverage, and desirable health outcome indicators, such as life expectancy. For these indicators, the ultimate goal is to achieve a maximum level, either in health intervention coverage or health outcome (e.g. complete coverage of antenatal care or the highest possible life expectancy).

Adverse indicators measure undesirable health events that are to be reduced or eliminated through public health action. They include undesirable health outcome indicators, such as stunting prevalence in children aged less than five years or under-five mortality rate. Here, the ultimate goal is to achieve a minimum level (e.g. theoretically 0 deaths per 1000 live births).

10. How do I correctly enter information for the variable "indicator_scale" in the template?

The variable "indicator_scale" indicates the scale of the indicator, such as "100" for indicators reported as percentages or "1000" for indicators reported as rates per 1000 population.

11. How do I correctly enter information for the variable "ordered_dimension" in the template?

This dummy variable indicates the dimension type. It must be 0 for dimensions with two subgroups (binary dimensions). For dimensions with more than two subgroups, it must be 1 for ordered dimensions and 0 for non-ordered dimensions.

Binary dimensions compare the situation in two population subgroups (e.g. males and females).

Ordered dimensions have (more than two) ordered subgroups that have an inherent positioning and can be ranked. For example, education has an inherent ordering in the sense that those with less education unequivocally have less of something compared to those with more education.

Non-ordered dimensions have (more than two) non-ordered subgroups that are not based on criteria that can be logically ranked. Subnational regions are an example of non-ordered groupings.

12. How do I correctly enter information for the variable "subgroup_order" in the template?

The variable "subgroup_order" indicates the order of subgroups for ordered dimensions.

For ordered dimensions (i.e. if ordered_dimension=1), this variable must be an increasing sequence of integers starting with the value 1 for the most-disadvantaged subgroup. For example, for education with three subgroups, the most-disadvantaged subgroup "No education" will be assigned the value 1, "Primary school" will be assigned the value 2 and the most-advantaged subgroup "Secondary school +" will be assigned the value 3.

For non-ordered dimensions and *binary dimensions* (i.e. if ordered_dimension=0), this variable must be 0.

13. How do I correctly enter information for the variable "reference_subgroup" in the template?

The variable "reference_subgroup" indicates the reference subgroup for non-ordered dimensions and binary dimensions.

For ordered dimensions (i.e. if ordered_dimension=1), this variable must be 0.

For non-ordered dimensions and *binary dimensions* (i.e. if ordered_dimension=0), you have the option to choose a reference subgroup. A reference subgroup can be chosen by assigning the value 1 to that subgroup and 0 to all other subgroups. For example, for subnational regions (with more than two subgroups), the capital city can be chosen as the reference subgroup. For place of residence (urban vs. rural), urban can be chosen as the reference subgroup.

14. Can I look at double disaggregation or intersections of inequality dimensions?

If you wish to look at intersections of inequality dimensions (like sex-economic status), the data will have to be entered in the template for these separate subgroups. If the data is entered by single inequality dimensions, HEAT Plus cannot automatically look at intersections of inequality dimensions.

15. Can I look at both the average and the level of inequality according to a selected dimension at the same time?

Yes. In the HEAT Plus template, you can enter the average for a given setting. In HEAT Plus, you can look at the average in the *Disaggregated data (detailed bar graphs)*, *Disaggregated data (tables)*, and *Summary measures (tables)* tabs under Explore Inequality and in the *Summary measures (graphs)* tab under Compare Inequality.

16. How can I refresh or restart HEAT Plus?

To refresh HEAT Plus, click the circular arrow on the right of the address bar in the open browser window. To restart HEAT Plus, make sure you close both the browser window and the command window, before double-clicking the "Start_HEATPlus" file again.

Supplementary table 1 WHO member states: Name, ISO3 country code, WHO region and country income group

Name	ISO3 country code	WHO region	Country income group*
Afghanistan	AFG	Eastern Mediterranean	Low-income
Albania	ALB	European	Middle-income
Algeria	DZA	African	Middle-income
Andorra	AND	European	High-income
Angola	AGO	African	Middle-income
Antigua and Barbuda	ATG	Americas	High-income
Argentina	ARG	Americas	High-income
Armenia	ARM	European	Middle-income
Australia	AUS	Western Pacific	High-income
Austria	AUT	European	High-income
Azerbaijan	AZE	European	Middle-income
Bahamas	BHS	Americas	High-income
Bahrain	BHR	Eastern Mediterranean	High-income
Bangladesh	BGD	South-East Asia	Middle-income
Barbados	BRB	Americas	High-income
Belarus	BLR	European	Middle-income
Belgium	BEL	European	High-income
Belize	BLZ	Americas	Middle-income
Benin	BEN	African	Low-income
Bhutan	BTN	South-East Asia	Middle-income
Bolivia (Plurinational State of)	BOL	Americas	Middle-income
Bosnia and Herzegovina	BIH	European	Middle-income
Botswana	BWA	African	Middle-income
Brazil	BRA	Americas	Middle-income
Brunei Darussalam	BRN	Western Pacific	High-income
Bulgaria	BGR	European	Middle-income
Burkina Faso	BFA	African	Low-income
Burundi	BDI	African	Low-income
Cabo Verde	CPV	African	Middle-income
Cambodia	KHM	Western Pacific	Middle-income
Cameroon	CMR	African	Middle-income
Canada	CAN	Americas	High-income
Central African Republic	CAF	African	Low-income
Chad	TCD	African	Low-income
Chile	CHL	Americas	High-income
China	CHN	Western Pacific	Middle-income
Colombia	COL	Americas	Middle-income
Comoros	COM	African	
Congo	COG	African	Middle-income
Cook Islands	COK	Western Pacific	
Costa Rica	CRI	Americas	Middle-income

Côte d'Ivoire	CIV	African	Middle-income
Croatia	HRV	European	High-income
Cuba	CUB	Americas	Middle-income
Cyprus	CYP	European	High-income
Czechia	CZE	European	High-income
Democratic People's Republic of Korea	PRK	South-East Asia	Low-income
Democratic Republic of the Congo	COD	African	Low-income
Denmark	DNK	European	High-income
Djibouti	DJI	Eastern Mediterranean	Middle-income
Dominica	DMA	Americas	Middle-income
Dominican Republic	DOM	Americas	Middle-income
Ecuador	ECU	Americas	Middle-income
Egypt	EGY	Eastern Mediterranean	Middle-income
El Salvador	SLV	Americas	Middle-income
Equatorial Guinea	GNQ	African	Middle-income
Eritrea	ERI	African	Low-income
Estonia	EST	European	High-income
Eswatini	SWZ	African	Middle-income
Ethiopia	ETH	African	Low-income
Fiji	FJI	Western Pacific	Middle-income
Finland	FIN	European	High-income
France	FRA	European	High-income
Gabon	GAB	African	Middle-income
Gambia	GMB	African	Low-income
Georgia	GEO	European	Middle-income
Germany	DEU	European	High-income
Ghana	GHA	African	Middle-income
Greece	GRC	European	High-income
Grenada	GRD	Americas	Middle-income
Guatemala	GTM	Americas	Middle-income
Guinea	GIN	African	Low-income
Guinea-Bissau	GNB	African	Low-income
Guyana	GUY	Americas	Middle-income
Haiti	HTI	Americas	Low-income
Honduras	HND	Americas	Middle-income
Hungary	HUN	European	High-income
Iceland	ISL	European	High-income
India	IND	South-East Asia	Middle-income
Indonesia	IDN	South-East Asia	Middle-income
Iran (Islamic Republic of)	IRN	Eastern Mediterranean	Middle-income
Iraq	IRQ	Eastern Mediterranean	Middle-income
Ireland	IRL	European	High-income
Israel	ISR	European	High-income
Italy	ITA	European	High-income
Jamaica	JAM	Americas	Middle-income

Japan	JPN	Western Pacific	High-income
Jordan	JOR	Eastern Mediterranean	Middle-income
Kazakhstan	KAZ	European	Middle-income
Kenya	KEN	African	Middle-income
Kiribati	KIR	Western Pacific	Middle-income
Kuwait	KWT	Eastern Mediterranean	High-income
Kyrgyzstan	KGZ	European	Middle-income
Lao People's Democratic Republic	LAO	Western Pacific	Middle-income
Latvia	LVA	European	High-income
Lebanon	LBN	Eastern Mediterranean	Middle-income
Lesotho	LSO	African	Middle-income
Liberia	LBR	African	Low-income
Libya	LBY	Eastern Mediterranean	Middle-income
Lithuania	LTU	European	High-income
Luxembourg	LUX	European	High-income
Madagascar	MDG	African	Low-income
Malawi	MWI	African	Low-income
Malaysia	MYS	Western Pacific	Middle-income
Maldives	MDV	South-East Asia	Middle-income
Mali	MLI	African	Low-income
Malta	MLT	European	High-income
Marshall Islands	MHL	Western Pacific	Middle-income
Mauritania	MRT	African	Middle-income
Mauritius	MUS	African	Middle-income
Mexico	MEX	Americas	Middle-income
Micronesia (Federated States of)	FSM	Western Pacific	Middle-income
Monaco	MCO	European	High-income
Mongolia	MNG	Western Pacific	Middle-income
Montenegro	MNE	European	Middle-income
Morocco	MAR	Eastern Mediterranean	Middle-income
Mozambique	MOZ	African	Low-income
Myanmar	MMR	South-East Asia	Middle-income
Namibia	NAM	African	Middle-income
Nauru	NRU	Western Pacific	Middle-income
Nepal	NPL	South-East Asia	Low-income
Netherlands	NLD	European	High-income
New Zealand	NZL	Western Pacific	High-income
Nicaragua	NIC	Americas	Middle-income
Niger	NER	African	Low-income
Nigeria	NGA	African	Middle-income
Niue	NIU	Western Pacific	
Norway	NOR	European	High-income
Oman	OMN	Eastern Mediterranean	
Pakistan	PAK	Eastern Mediterranean	Middle-income
Palau	PLW	Western Pacific	High-income

Panama	PAN	Americas	High-income
Papua New Guinea	PNG	Western Pacific	Middle-income
Paraguay	PRY	Americas	Middle-income
Peru	PER	Americas	Middle-income
Philippines	PHL	Western Pacific	Middle-income
Poland	POL	European	High-income
Portugal	PRT	European	High-income
Qatar	QAT	Eastern Mediterranean	High-income
Republic of Korea	KOR	Western Pacific	High-income
Republic of Moldova	MDA	European	Middle-income
Romania	ROU	European	Middle-income
Russian Federation	RUS	European	Middle-income
Rwanda	RWA	African	Low-income
Saint Kitts and Nevis	KNA	Americas	High-income
Saint Lucia	LCA	Americas	Middle-income
Saint Vincent and the Grenadines	VCT	Americas	Middle-income
Samoa	WSM	Western Pacific	Middle-income
San Marino	SMR	European	High-income
Sao Tome and Principe	STP	African	Middle-income
Saudi Arabia	SAU	Eastern Mediterranean	High-income
Senegal	SEN	African	Low-income
Serbia	SRB	European	Middle-income
Seychelles	SYC	African	High-income
Sierra Leone	SLE	African	Low-income
Singapore	SGP	Western Pacific	High-income
Slovakia	SVK	European	High-income
Slovenia	SVN	European	High-income
Solomon Islands	SLB	Western Pacific	Middle-income
Somalia	SOM	Eastern Mediterranean	Low-income
South Africa	ZAF	African	Middle-income
South Sudan	SSD	African	Low-income
Spain	ESP	European	High-income
Sri Lanka	LKA	South-East Asia	Middle-income
Sudan	SDN	Eastern Mediterranean	Middle-income
Suriname	SUR	Americas	Middle-income
Sweden	SWE	European	High-income
Switzerland	CHE	European	High-income
Syrian Arab Republic	SYR	Eastern Mediterranean	Low-income
Tajikistan	TJK	European	Low-income
Thailand	THA	South-East Asia	Middle-income
The former Yugoslav Republic of Macedonia	MKD	European	Middle-income
Timor-Leste	TLS	South-East Asia	Middle-income
Togo	TGO	African	Low-income
Tonga	TON	Western Pacific	Middle-income
Trinidad and Tobago	TTO	Americas	High-income

Tunisia	TUN	Eastern Mediterranean	Middle-income
Turkey	TUR	European	Middle-income
Turkmenistan	TKM	European	Middle-income
Tuvalu	TUV	Western Pacific	Middle-income
Uganda	UGA	African	Low-income
Ukraine	UKR	European	Middle-income
United Arab Emirates	ARE	Eastern Mediterranean	High-income
United Kingdom	GBR	European	High-income
United Republic of Tanzania	TZA	African	Low-income
United States of America	USA	Americas	High-income
Uruguay	URY	Americas	High-income
Uzbekistan	UZB	European	Middle-income
Vanuatu	VUT	Western Pacific	Middle-income
Venezuela (Bolivarian Republic of)	VEN	Americas	Middle-income
Viet Nam	VNM	Western Pacific	Middle-income
Yemen	YEM	Eastern Mediterranean	Low-income
Zambia	ZMB	African	Middle-income
Zimbabwe	ZWE	African	Low-income

* Country income group was determined using the current World Bank classification released in July 2018, which is based on the 2017 gross national income per capita, calculated using the Atlas method (available from: https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups, accessed 15 August 2018).