How to use the antimalarial drug efficacy maps

Map orientation

The introductory screen shows the four parameters available for customizing the maps:

1. Indicator
2. Treatment
3. Geographic area (sentinel site, country, or WHO region)
4. Year

Note: data will only appear on the map according to the criteria selected.
Customizing the maps

A. Select an indicator

Map 1: Therapeutic efficacy of antimalarial treatment against *P. falciparum*

a) **The percentage of patients positive on day 3** is an indicator used for the early detection of artemisinin resistance in therapeutic efficacy studies. This indicator is calculated by dividing the number of patients with parasites on day 3 by the number of patients included in the study on day 3.

b) **The percentage of patients with treatment failure** is calculated according to the per-protocol analysis. This analysis includes only those patients who complete the entire study follow-up and have a clear outcome of either treatment success or failure. Patients who do not complete follow-up, deviate from the study protocol, or withdraw, are excluded from the analysis. Where available, treatment failure rates using the Kaplan-Meier analysis are provided in the site specific text box. The difference between these two values is small when the number of patients who are lost to follow-up or excluded is very low.

Map 2: Therapeutic efficacy of antimalarial treatment against *P. vivax*

a) **The percentage of patients with confirmed resistance** represents those patients who failed treatment despite having adequate drug concentrations of hydroxychloroquine in blood. This indicator is available for the maps of *P. vivax* and studies of chloroquine only.

b) **The percentage of patients with treatment failure** is calculated according to the per-protocol analysis, in the same way as described for the maps of efficacy of treatment against *P. falciparum* (see 1b, above).

B. Select a drug

Maps show studies conducted on the following antimalarial medicines:

**Map 1 (P. falciparum)**
- artemether–lumefantrine
- artemether–mefloquine
- artesunate–mefloquine
- artesunate + sulfadoxine-pyrimethamine
- artesunate–pyronaridine
- dihydroartemisinin-piperaquine

**Map 2 (P. vivax)**
- artemether–lumefantrine
- chloroquine
- chloroquine–primaquine
- dihydroartemisinin-piperaquine
C. Select a region (study site, country, or WHO region)

Following the selection of the indicator and the drug, a geographic area can be selected. It is possible to select individual sites, a specific country, or a WHO region.

After selecting a country or a WHO region, the panel list will show all study sites for which data is available for the selected indicator, year and drug.

Clicking on a site selects them for inclusion in the trend and cross-sectional analysis (see Analysis, below).

Here, individual sites can be selected.

- [ ] Creates a custom selection based on selected the sites
- [ ] Clears the selection
- [ ] Selects all sites in the list

Since studies were not conducted every year, it may be necessary to adjust the drug and year selection to retrieve data about therapeutic efficacy studies conducted in a given geographic area.

D. Select the year

The timeline at the bottom of the screen allows for selection of a specific year between 2005 and 2014.
Example 1. Percentage of patients with *P. falciparum* treatment failure after treatment with dihydroartemisinin-piperaquine, Cambodia, 2008-2014

The circles on the map (map points) represent study (TES) sites. A coloured map point indicates that a therapeutic efficacy study was conducted on the selected drug, during the selected year. The colour of the map point reflects the value of the indicator for that study, as shown in the legend. A purple map point indicates that a study was conducted for the selected year and drug, however data was unavailable for the selected indicator. A transparent map points indicate that no study was conducted at that location for the selected year and drug.

Detailed study information

Placing the cursor over a coloured map point produces a text box with a more detailed description of the study, including: the number of patients who completed the study, the number of follow-up days, the value for the alternate indicators, and the institution affiliated with the study.

Links to further details

When available, a link is provided to the abstract of the published article which describes the study in more detail. The abstract can be accessed by double clicking on the map point.
E. Map navigation

Zoom in or out using the dial in the bottom right corner

Switch to full screen mode to maximize the map to the whole screen (see bottom left).

Click and drag the cursor to pan across the screen to go to a different part of the map.

F. Data analysis

Two types of graphs can be created:

1. **Time series analysis**

   Following the selection of sites from the selection panel, this graph will show a line for each site selected, depicting changes in indicator values over time, as shown in Example 1.

2. **Column chart**

   Following the selection of sites from the selection panel, this graph will show a bar for each site, allowing the user to compare site values for the selected year, as shown in Example 2.
Example 2. Percentage of patients with *P. falciparum* treatment failure after treatment with dihydroartemisinin-piperaquine, 2014

To view the graph in a full screen, select the extend option.

3. **Exporting data**

Following the selection of drug, geographic area, and year, the data can be exported.

The export icon can be used to export data from the selected year, drug and area, to:

1) exports to a data file (csv file)
2) exports to an image of the map (png file)
3) exports to an image of the graph (png file)