Malaria Economic Research Literature Scan Tool

User Guide

Health Finance and Governance Project

The Health Finance and Governance (HFG) project works to address some of the greatest challenges facing health systems today. Drawing on the latest research, the project implements strategies to help countries increase their domestic resources for health, manage those precious resources more effectively, and make wise purchasing decisions. The project also assists countries in developing robust governance systems to ensure that financial investments for health achieve their intended results.

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To learn more, visit www.hfgproject.org

Malaria Economic Research Community of Practice

The Malaria Economic Research Community of Practice (CoP), convened by the Health Finance and Governance project, facilitates communication and coordination among stakeholders of malaria economic research to enhance the targeting and efficiency of research efforts and the usability of results. Acknowledging the importance of involving all "users" and "producers" of malaria economic research in this collaboration, the CoP is comprised of implementers, program planners, policy makers, researchers, and funders of malaria programs and malaria economic research.
To learn more, visit http://malaria-econ-research-community-of-practice.org

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Contents

Purpose of this guide

This guide is designed to help users better understand the Malaria Economic Research (MER) Lit Scan Tool and its key features, and to facilitate use of the tool based on their research or programmatic interests.

Background

Why conduct a scan of MER? Why create this tool?

The Malaria Economic Research Community of Practice (CoP) was established in June 2016 with the goal of facilitating communication among a broad range of MER users, including non-economists. During the initial establishment of the CoP, members acknowledged the usefulness of scanning and collating existing MER, and this task was included in the CoP work plan.

Determining *how much* and *what type* of MER exists could help in many different capacities, such as:

- Assessing what evidence is missing or lacking—what areas of MER are in need of further study
- Identifying the most common sources of data and methods of data analysis for malaria economic research
- Identifying MER that supports decision making in priority areas, such as resource allocation, elimination, etc

In addition to scanning the MER, the team also envisioned an interactive, user-friendly tool which allows users to search, filter, and visualize the MER database.

Generating the MER Database

The first step to create the MER database was to develop a search strategy. Another CoP deliverable, a matrix of questions that MER could address, was used to generate a list of search terms to capture the relevant literature.

PubMed, Web of Science, and Embase were searched for the following terms in the Title and Abstract fields:

> **Malaria** AND **economic** OR **cost** OR **cost benefit** OR **resource mobilization** OR **cost effectiveness** OR **rate of return** OR **budgeting** OR **cost data** OR **return on investment** OR **economic burden of disease** OR **efficiency** OR **technical efficiency** OR **allocative efficiency** OR **economic impact** OR **economic evaluation** OR **sustainable financing** OR **health financing** OR **household expenditure** OR **financing** OR **sustainability**

The results of the searches were downloaded and compiled in Excel to create a master database of MER. Articles before 2000 were excluded given that major developments in the field of malaria (the initiation of the Global Fund and PMI) occurred after this point in time. Based on the date that the search was conducted, the database contains articles published from January 1, 2000 to December 11, 2017.

For each article, the following information was captured:

- Author(s)
- Title of Article
- Journal Name or Book Title
- Year of Publication
- Full Citation
- Abstract Text
- Name of Database where the article was found
- URL if available

To allow for more robust analysis of this MER database, each article was "tagged" by several additional criteria, including:

- Country(ies)
- Region (Africa, Asia, Europe, Americas, and Oceania)
- Subregion of Africa (if applicable)
- Type of Malaria Economic Research
- Research Bucket
- Intervention Type
- Scale of Intervention
- Target Audience
- Study Design/Methods
- Study Measures

The categories defined for each criterion can be found in Annex 1. It should be noted that type of MER is the only criterion for which all articles included in the database were tagged for. Four categories were defined for type of MER: 1) Allocative efficiency and effectiveness, 2) Program costs and technical efficiency, 3) Sustainable financing/resource mobilization, and 4) Economic impact. These categories of MER were agreed upon by the Community of Practice. For the remaining criteria, not all articles could be classified in one of its categories. For example, some articles might not belong to a given "intervention type" category.

Once the database was finalized, Excel built-in algorithms were written in macros to create a scan-and-review function, which allows a user to manipulate the MER database using the various pre-defined criteria. The tool is similar to a dashboard and is designed to be as user-friendly and intuitive as possible.

MER Scan Tool

Purpose of the tool

At the most basic level, the Scan Tool allows the user to analyze the MER database– it can be used to search for articles about a particular topic, or filter by various criteria such as geographic focus, intervention type, or type of MER, and generate a list of relevant articles. The tool also allows the user to adjust visualizations which summarize the available MER articles based on selected criteria.

Note: The MER Scan Tool is an open-source tool. Users take note that any changes in the structure or formulas may result in errors.

Expected users of the tool

The expected audience, as with all Community of Practice deliverables, are users, producers, and funders of malaria economic research and programs. More specifically, this includes:

- Funders of Malaria Economic Research and Programs
    - Local
        - e.g. National Malaria Control/Elimination Programs (NMCPs/NMEPs), Ministries of Health/Finance (MOH/MOF)
    - International
        - e.g. Global Fund, USAID/PMI, Centers for Disease Control, Development Banks
- Malaria Economic Researchers (e.g. academic institutions, universities and implementing partners)
- Malaria Planners/Implementers (e.g. NMCPs/NMEPs, local and international non-governmental organizations)
- Policymakers in Malaria-Endemic Countries (e.g. NMCPs/NMEPs, MOH/MOF)
- Private Sector

Structure and key features of the tool

The MER Lit Scan tool is an Excel-based tool which includes eight (8) tabs:

- One (1) Overview tab
- One (1) Instructions & Troubleshooting tab
- One (1) Scan Engine tab and two (2) Scan Results tabs – one General, and one Advanced
- Three (3) Data Visualization tabs.

The Scan Engine enables the user to apply general search criterions and further explore the database by using self-defined key words. The visualization solutions provided in the tool can be used to visualize the MER database and identify the trend and distribution of MER publications: one type of visualization characterizes MER by looking at the descriptive information (such as geographic focus), the other type cross-tabulates two different criterions. Future versions of the model may include additional visualizations or search engines within the default setup.

The following sections describe the purpose and how to use each tab.

"Overview" Tab

This tab provides an overview of the tool, highlighting the two key ways that the tool can be used:

1. To generate a list of relevant MER articles which matches criteria selected
2. To customize MER data visualizations and see patterns and trends in MER at an aggregate level.

The figure below, which is included in the Overview tab, illustrates how the two major functions of the tool correspond to the tabs within the tool.
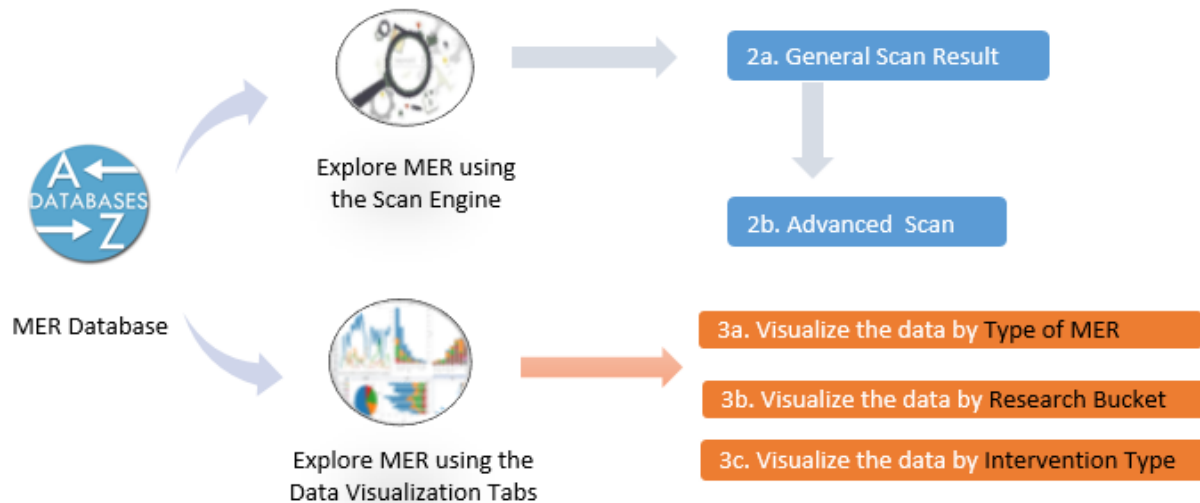
## "Instructions & Troubleshooting" Tab

This tab provides detailed instructions on how to adjust your Excel settings to ensure the tool's functionality, as well as directions for troubleshooting common errors.

How to Enable Macros

The MER Scan Tool is a Microsoft Excel-based application designed for Excel 2010/2013/2016. All the built-in algorithms and UDF (user defined function) were written in VBA Macros. Macros are disabled by default in Excel. Therefore, the user needs to enable the Macros in Excel before using the MER Scan Tool.

Option 1: Enable Macros when the Message Bar appears

1. When you open the MER Scan Tool, a yellow message bar with a shield icon and the Enable Content button may automatically appear.
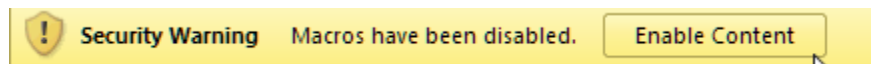

2. If it does, simply click *Enable Content* to enable the required Macros for the tool.

Troubleshooting: If you cannot see the yellow bar to enable the content, sometimes exiting the tool and reopening it will resolve the issue. Or you can manually enable Macros:

Option 2: Enable Macros Manually

If the yellow message bar above does not automatically appear, follow these instructions to enable Macros manually:

1. Click **File** in the top left corner of Excel.
2. Under **Info**, in the **Security Warning** area, click the dropdown arrow for **Enable Content**.
3. Click "**Always enable this document's active content**".
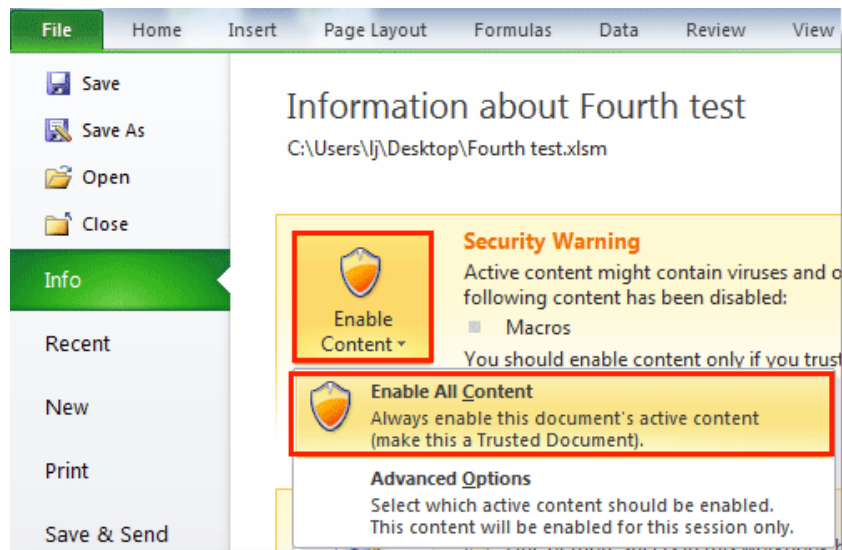
Troubleshooting: Excel Macro Compile Error

When trying to use the Scan Engine or Data Visualization tabs, some users have reported receiving the following error message: "Compile error: Can't find project or library", along with the opening of several windows (see below screenshot).
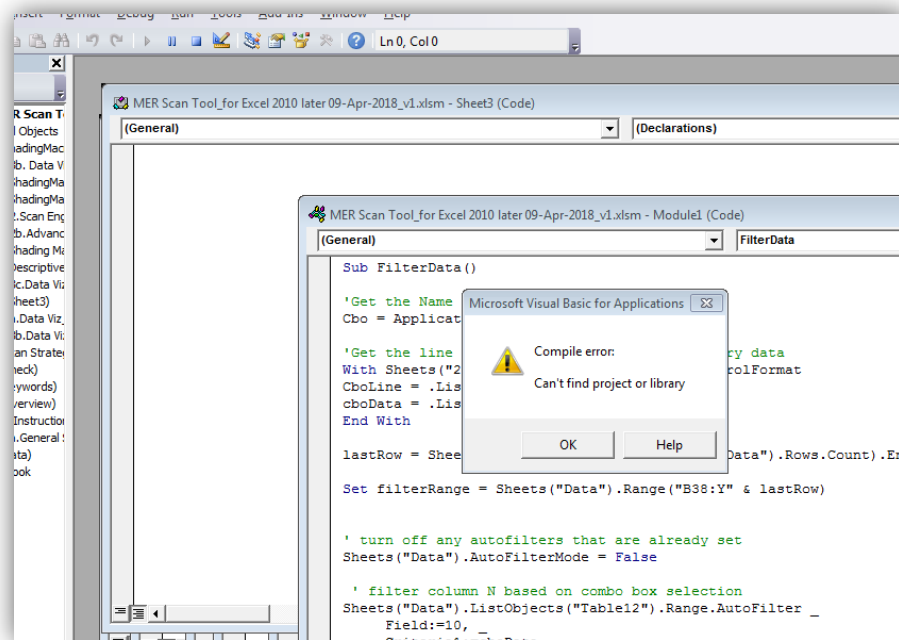

The error is caused when the Microsoft Visual Basic compiler is unable to locate the Solver reference file. To resolve this issue, you must manually input the Solver reference file path using the following steps:

1. After closing the pop up and error windows, ensure the **Developer** tab is visible in the Excel toolbar. If it is visible, skip to Step 2. If it is not visible, follow the steps below:

a) Click **File,** then **Options** from the drop down menu.
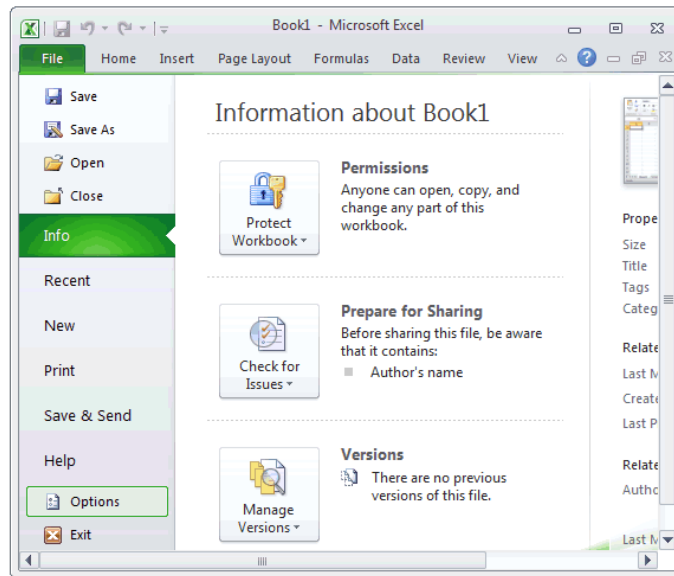
b) Click **Customize Ribbon** on the left.
c) Click on the **Developer** checkbox under the list of Main Tabs on the right.
d) Click OK. The Developer tab should now be displayed in Excel.

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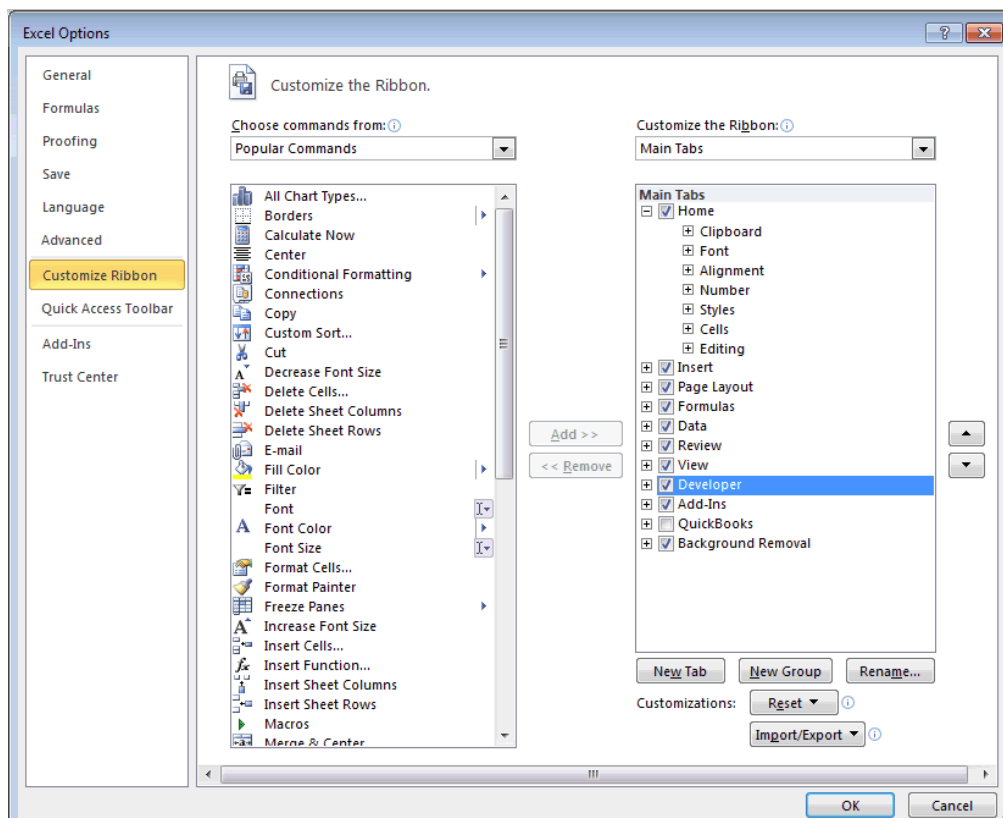
2. Open Excel's "Visual Basic" (VBA) environment by selecting the Developer tab from the toolbar at the top of the screen. Click on the **Visual Basic** option in the Code group.
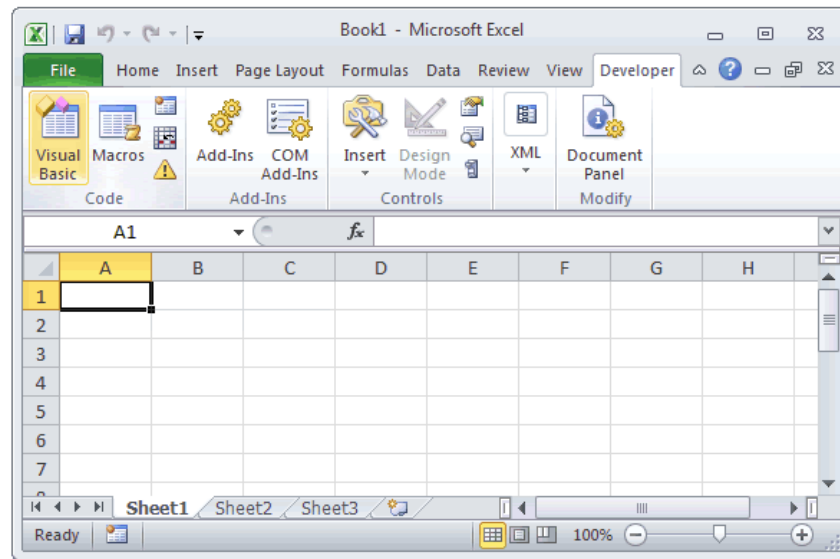

3. Now the Microsoft Visual Basic editor should appear and you can view your VBA code. Click **Tools** from the toolbar on the top then select **References**.
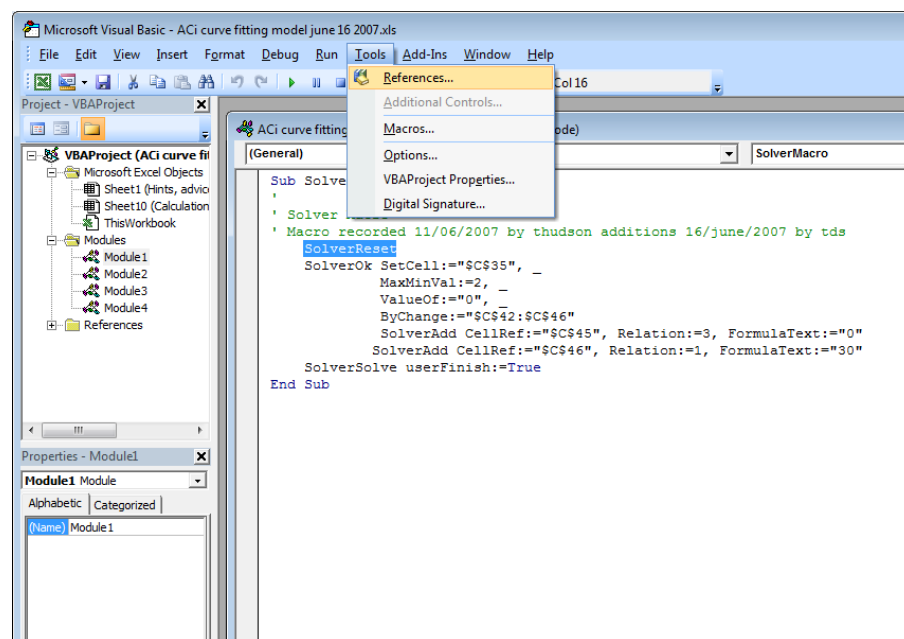

4. A References dialogue box will display on the screen. Look for missing items or object libraries, indicated by "**MISSING:**" followed by the name of the missing item or object library (e.g. "MISSING: Microsoft Excel 10.0 Object Library"). If there is a checkmark in the checkbox next to the missing type or object library, then un-check the check box.

5. Click **OK** > Exit the **Visual Basic Editor.** Save the original Excel file. Try using the buttons or functions in question that previously didn't work and they should now work normally.
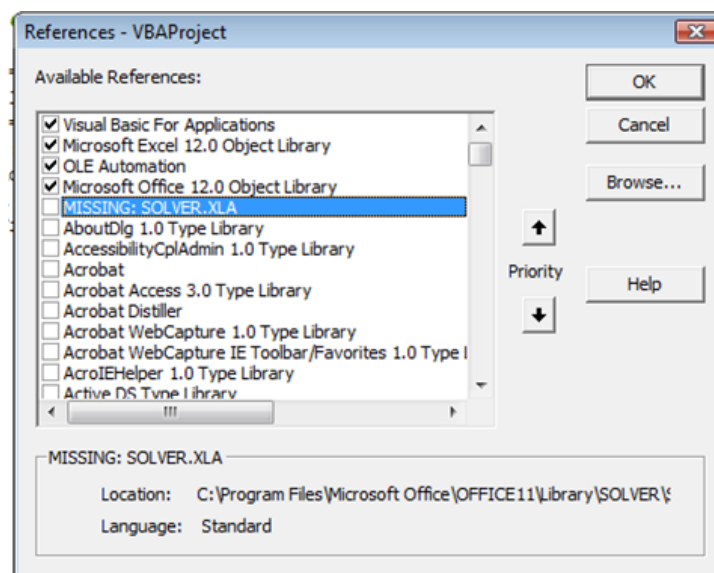
Troubleshooting: Excel VBA Runtime Errors:

The Macro in the tool has been tested in Excel versions 2010, 2013 and 2016. However, a VBA runtime error might still occur when it is not compatible with your Microsoft Office settings. If an error message shows up, click "End" to ignore it and continue using the Tool. **Do not click "Debug".**
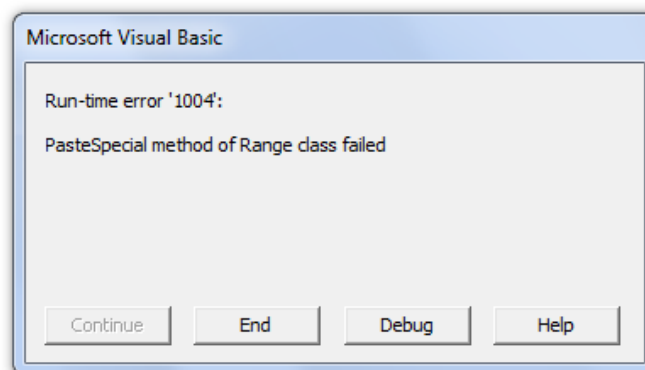
"Scan Engine" and Results Tabs

The Scan Engine allows the user to generate a list of relevant MER articles which matches the criteria selected. The Scan Engine is divided into two groups of criteria:

1) General Search Criteria and;
2) Advanced Search Criteria.

General Search Criteria and General Scan Results

The General Search, located at the top of the "Scan Engine" tab, allows users to select options from drop-down menus (see screenshot below) for various criteria including: **Region, Subregion of Africa,**

Type of MER, Research Bucket, and **Target Audience**. These criteria were determined by the team to be the most basic/general parameters by which MER could be organized.

> *Note that "Subregion of Africa" (as opposed to other continents) is included because of the focused attention of MER (and malaria research in general) in African nations and the recognized regional variation of malaria endemicity and interventions in Africa.*

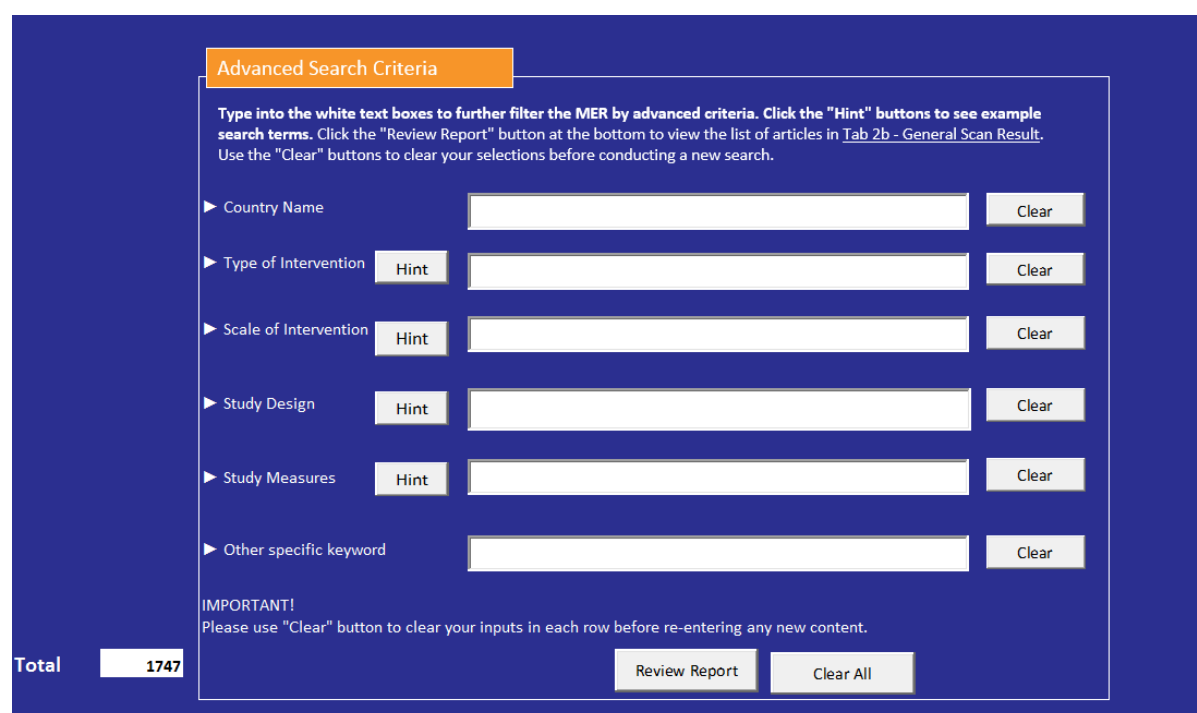
How to conduct a General Search:

1. Select options from one or multiple drop-down menus. Note that the **Total** box in the bottom left hand corner refers to the number of MER articles related to your selection and will update as selections are made or changed, giving you a sense of how many MER articles relate to your selections.

2. After making one or more selections, click "**Review Report**" to view the results. This will automatically take you to **Tab 3a – General Scan Result**.

   - In the "**General Scan Result**" tab, each result (article) is one row. For each article, information is provided on the author(s), title, journal name, citation, publication date, the database found in, country, region, subregion of Africa (if applicable), type of MER etc.

   - Output can be then easily be copied and pasted into another Excel file and reviewed in more detail.

3. If you are interested in running a new search, return to the "Scan Engine" tab, clear unwanted selections—either individually using the "**Clear**" button, or all at once by selecting the "**Clear All**" button. Then, select new parameters of interest, and click "**Review Report**".

   - *NOTE* Your new search results will automatically replace your original research results in the General Scan Result tab.

Advanced Search Criteria

The Advanced Search section (below the General Search Criteria section in the "Scan Engine" tab) features six additional parameters by which MER articles can be filtered:

1. **Country**
2. **Type of Intervention**
3. **Scale of Intervention**
4. **Study Design**
5. **Study Measures**
6. **Other specific keyword**

Advanced Search allows the user to type their own keywords to answer a research or programmatic question.

For example, if a user wants to find MER conducted in "Senegal", they would begin typing in "Senegal" in the text box next to "Country Name". The advanced search will then display all the articles that contain "Senegal". In certain cases, not typing the entire name of the intervention or country results in more articles. To get a more accurate result, type the entire word or phrase into the Search field.

How to conduct an Advanced Search:

1. Type keywords into one or more of the text boxes. Click the **Hint** button for suggested keywords. Here too, the **Total** box in the bottom left hand corner refers to the number of MER articles related to the selection and will update as keywords are added, giving a sense of how many MER articles relate to the selections.

2. After typing in one or more of the boxes, click "**Review Report**" to view the results. This will automatically take you to **Tab 3b – Advanced Scan Result**.

   - As in the General Scan Result tab, each result (article) on the "**Advanced Scan Result**" tab is one row. For each article, information is provided on the author(s), title, journal name, citation, publication date, the database found in, country, region, subregion of Africa (if applicable), type of MER etc.
   - Output can be copied and pasted into another Excel file and reviewed in more detail.

3. If you are interested in running a new search, return to the "Scan Engine" tab, clear unwanted selections—either individually using the "**Clear**" button, or all at once by selecting the "**Clear All**" button. Then, type in new keywords of interest, and click "Review Report".
   - *NOTE* Your new search results will automatically replace your original research results in the "**Advanced Scan Result**" tab.

"Data Viz_MER Type" tab

This tab is the first of the three visualization tabs within the tool and allows the user to view the MER articles by the four types of MER: 1) Allocative efficiency and effectiveness, 2) Program costs and technical efficiency, 3) Sustainable financing/resource mobilization, and 4) Economic impact.
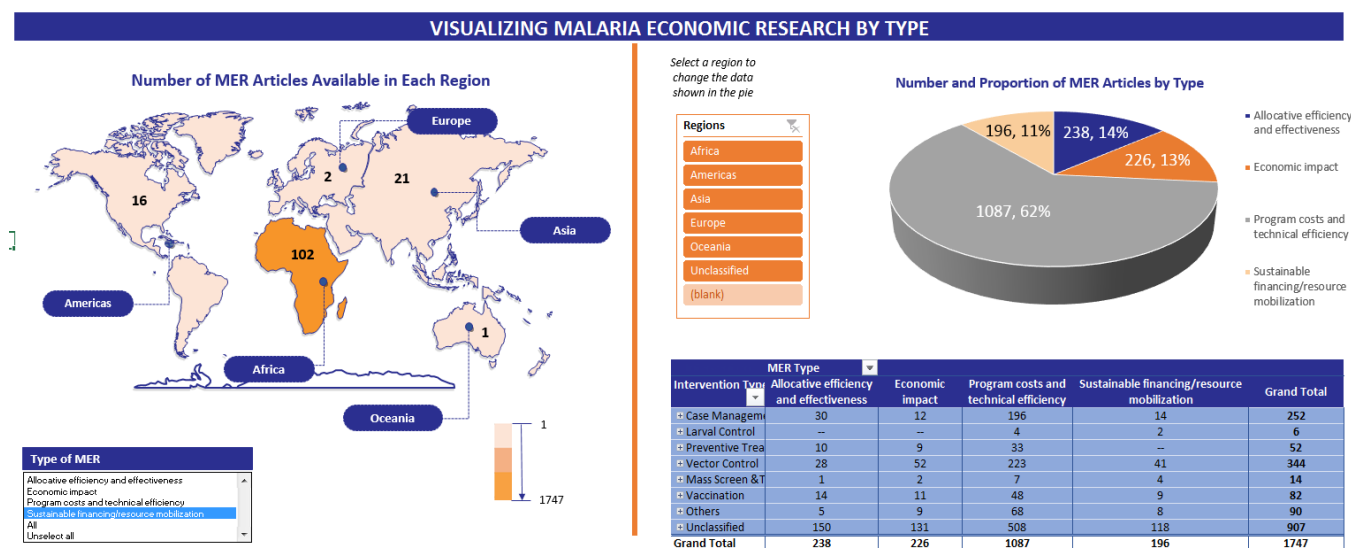
This tab contains three main visual components:

1. A map which identifies the MER articles by region. The box below the map contains the four types of MER. Once a type of MER is selected from the list, the map automatically updates, indicating the number of MER articles in that category that are also tagged by a particular region.
   a. Selecting "All" from the list sums all four categories of articles and displays the results by region.
   b. "Unselect All" clears the map of any selection previously made.

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2. A pie chart which allows users to select the region that they are interested in (from the list to the left of the pie chart) and see the breakdown of MER articles by type *within that region.* Once a region is selected, the pie chart will be updated automatically to reflect the number and percentage of each type of MER in the selected region.

3. A cross tabulation of Type of MER and intervention type. As with the pie chart, selection of a region (from the list to the left of the pie chart) automatically updates the breakdown of MER articles by type of MER and type of intervention *within that region.*
   a. A "Clear" filter button is located in the top right of the list (denoted with red circle on the right). Clicking on it after selecting a region will clear the selection and return the pie chart and cross tabulation to their original size and shape.

"Data Viz_Research Bucket" tab

This is the second visualization tab. and allows the user to view the MER articles by five MER "research buckets": 1) Extension of malaria intervention coverage, especially to the poorest, 2) Costs and consequences of various interventions for control and elimination, 3) Formulation and implementation of policies at both national and international levels, 4) Sustainability of financing at global and national levels, and 5) Economic consequences of malaria control and eradication.

These research buckets come from a 2008 Mill et al paper which proposed five areas of future research for the malaria economic research community.
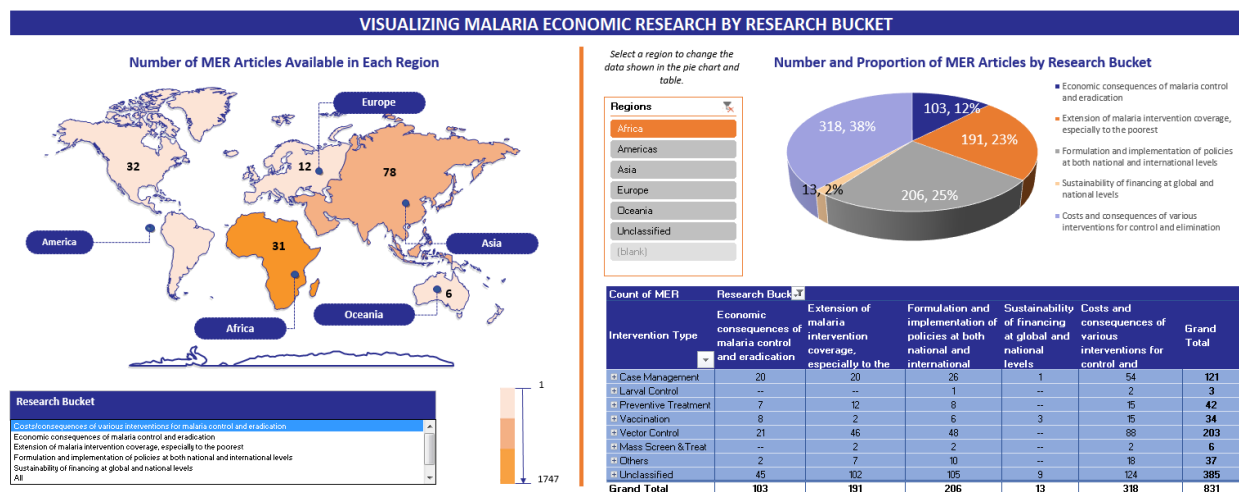
There are three main components:
1. A map which identifies the MER articles by region. The box below the map contains the five Research Buckets. Once a Research Bucket is selected from the list, the map automatically updates, indicating the number of MER articles in that category that are also tagged by a particular region.
   a. Selecting "All" from the list sums all five categories of articles and displays the results by region.
   b. "Unselect All" clears the map of any selection previously made.

2. A pie chart which allows users to select the region that they are interested in (from the list to the left of the pie chart) and see the breakdown of MER articles by Research Bucket *within that region.* Once a region is selected, the pie chart will be updated automatically to reflect the number and percentage of each Research Bucket in the selected region.

3. A cross tabulation of Research Bucket and Intervention Type. As with the pie chart, selection of a region (from the list to the left of the pie chart) automatically updates the breakdown of MER articles by Research Bucket and type of intervention *within that region.*
   a. A "Clear" filter button is located in the top right of the list (denoted with red circle on the right). Clicking on it after selecting a region will clear the selection and return the pie chart and cross tabulation to their original size and shape.

"Data Viz_Intervention Type" tab

This is the third visualization tab. and allows the user to view the MER articles by intervention type: case management, larval control, preventative treatment, vaccination, vector control, and mass screen and treat.
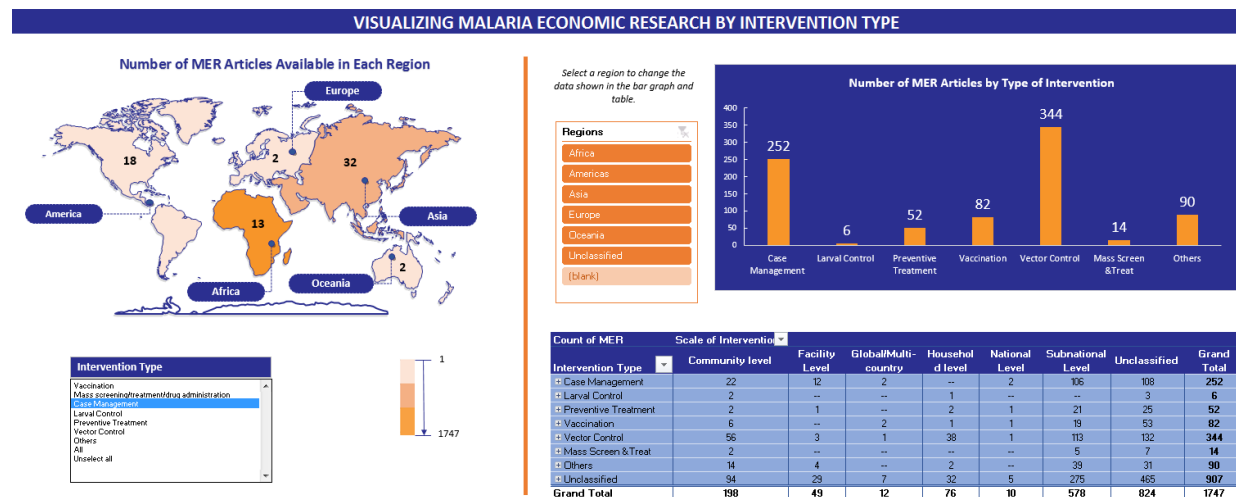
There are three main components:
1. A map which identifies the MER articles by region. The box below the map contains the six main Intervention Types. Once an Intervention Type is selected from the list, the map automatically updates, indicating the number of MER articles in that category that are also tagged by a particular region.
   a. Selecting "All" from the list sums all six categories of articles and displays the results by region.
   b. "Unselect All" clears the map of any selection previously made.

2. A bar graph which allows users to select the region that they are interested in (from the list to the left of the pie chart) and see the breakdown of MER articles

by Intervention Type *within that region.* Once a region is selected, the bar graph will be updated automatically to reflect the number of each Intervention Type in the selected region.

3. A cross tabulation of Scale of Intervention and Intervention Type. As with the pie chart, selection of a region (from the list to the left of the pie chart) automatically updates the breakdown of MER articles by Intervention Type and Scale *within that region.*
    a. A "Clear" filter button is located in the top right of the list (denoted with red circle on the right). Clicking on it after selecting a region will clear the selection and return the bar graph and cross tabulation to their original size and shape.

Limitations

This tool help solve a critical gap in terms of assessing and visualizing the current MER literature but there are some limitations related to the Tool worth noting. Many of them are inherent either to the limited resources (time and funding) available for building this tool or to the method used for developing the tool. While limitations were addressed to the extent possible, those that remain may be addressed during future iterations of this tool, as outlined in the next section, "Future Opportunities".

1. **Articles included in the database/tool are not exhaustive of the Malaria Economic Research that exists:** New research is being published constantly, which means this tool must be regularly updated in order to stay relevant. Moreover, the database/tool only includes articles published in English found in a limited number of selected databases. An update guide has been created and will be shared with the institution or organization who will take the tool forward to allow for new research and research not previously included from other databases or languages to be added.
2. **The process of "tagging" articles was imperfect:** the tagging was done from the articles' abstract, as it was not possible to download and use the full text of each article. So it is not excluded that an abstract could for example mention "larval control" and be tagged for that type of intervention while the actual article is not necessarily about larval control. In addition, limited categories were used for a given tagging criterion. For example we used did not use all possible types of interventions but just kept the broadest ones and hence for the "intervention type" criteria, the category "Others" may contain a large number of articles.

Future Opportunities

During the 2017 Annual Meeting of the American Society for Tropical Medicine and Hygiene, members of the Community of Practice met at a side meeting to discuss the tool and review preliminary visualizations and ideas for organizing the data.

At the meeting, COP members provided extensive feedback and suggestions for what to include in the tool. These are listed here in order to provide potential next steps for the organization or organizations who will take the work of the Community of Practice and tool forward.

Additional data sources for articles:

- Gray literature (e.g. reports from UNTAID, World Bank, implementing partners, white papers academic institutions such as the London School of Tropical Medicine and Hygiene, Liverpool School of Tropical Medicine, abstracts and presentations from ASTMH, APHA, iHEA and HSR conferences
- Other databases: POPLINE, journals like Malaria Journal, BioMed Central, PCDC Datasets, Global Burden of Disease datasets, JSTOR, EconLit, Google Scholar, other econ/policy journals

Additional criteria for tagging:
- Type of parasite: e.g. *P. vivax*, *P. falciparum*
- Peer-reviewed/non-peer reviewed
- Number of times cited in other works
- Funder

Additional cross tabulations/data visualizations:
- MER research articles by country with burden of malaria indicated (map or cross tabulation)
- Funders of MER articles by country

Other suggestions:

- Conduct similar search for other disease areas (TB, HIV/AIDS, etc) to compare economic research available in various categories and inform both the field of economic research in TB or HIV/AIDS as well as the field of malaria economic research
- Make PDFs of articles downloadable (if open source)
- Web interface of tool in addition to downloadable Excel file

Annex 1: Categories of MER Criterion

General Tags

cost-effectiveness	economic evaluation	resource allocation	elimination
technical efficiency	marginal analysis	economic burden of	eradication
cost-utility	program cost	disease	malaria control
cost analysis	retrospective cost	labor productivity	malaria control
costing analysis	cost of disease	reductions in morbidity	program
cost per capita	cost of sickness	reductions in absenteeism	intensified control
cost per PAR	marginal analysis	economic return	coverage
cost-benefit	marginal cost	economic impact	sustainable financing
cost benefit ratio	allocative efficiency	household spending	resource mobilization
cost savings	allocative effectiveness	household consumption	sustainability
		gross domestic product	scale-up

Type of Malaria Econ Research (as defined by Mills et al 2008 paper)

Allocative efficiency/macro-economic modelling
Costs and consequences of tools in control and eradication
Issues concerning extension of coverage, especially to the poorest
Research on formulating and implementing malaria control/eradication policies
Research on financing issues, at global and national levels

Intervention Types

Vector Control
Indoor Residual Spraying (IRS)
Insecticide Treated Nets (ITNs) / Long-Lasting Insecticide-treated
Nets (LLINs)
Larval control
Source Reduction
Chemical Larviciding
Biological Control
Fogging or Area Spraying
Intermittent preventive treatment in infants (IPTi)
Intermittent screening and treatment in pregnancy (ISTp)
Seasonal Malaria Chemoprevention (SMC) / Intermittent Preventive
Treatment in children (IPTc)
Intermittent preventive treatment in pregnancy (IPTp)
Malaria vaccine
Artemisinin-based Combination Therapies (ACTs)
Rapid Diagnostic tests (RDTs)
Mass drug administration (MDA)
Microscopy
Mass screening and treatment (MSAT)
Mass fever treatment (MFT)
Surveillance / Monitoring and Evaluation
Community Engagement
Community Mobilization
Health Worker Training
Policy development
Drug names were also included but are not listed here.

Type of Malaria Economic Research (as defined by CoP)

Program costs and technical efficiency
Allocative efficiency and effectiveness
Economic impact
Sustainable financing/resource mobilization

Cited Target Audience

Funders of malaria economic research
Funders of malaria economic research
Funders of malaria programs
Malaria economics researchers
Malaria planners/implementers
Policymakers
Private sector

Study Endpoint	Source of Data
program costs	interview
cost per capita	qualitative interviews
programmatic costs	survey
cost per PAR	patient interview
cost of intervention	data collection
cost of control	dataset
cost of elimination	meta-analysis
cost of eradication	case study
cost of illness	government report
cost of sickness	consultative workshop
GMAP cost	consultative meeting
benefit cost ratio	systematic review
BCR	literature review
labor productivity	health information system
cost saving	household survey
case averted	survey data
DALYs	Demographic and Health Surveillance (DHS)
morbidity	Malaria Indicator Survey (MIS)
mortality	GFATM grant data
work year saved	World Development Indicators
health utility	Joins Lutheran Malaria Initiative
"incremental	MEASURE Evaluation
cost-effectiveness ratio"	Demographic and Health Survey
ICER	Millennium Development Goals Database
drug coverage	Mapping Malaria Risk in Africa
ACT coverage	WHO data
ACT availability	Conley, McCord and Sachs Malaria Dataset
service availability	logistics management information system (LMIS)
household spending	health management information system (HMIS)
household expenditure	
infection averted ratio	