World Health Organization
Measles Programmatic Risk Assessment Tool
Setup Guide

V 1.5
Background of the Measles Risk Assessment Tool

- Identifies areas not meeting measles programmatic targets in order to guide and strengthen measles elimination program activities and reduce the risk of outbreaks.
- Assesses subnational programmatic risk for the year of risk assessment as the sum of indicator scores in 4 categories:
  - Population immunity
  - Surveillance quality
  - Program performance
  - Threat
- Each district is assigned to a risk category of low, medium, high, or very high risk based on the overall risk score.
The Risk Indicators

1. Population immunity
   - Assesses measles susceptibility using administrative vaccination coverage data and case-based surveillance data
   - Indicators include first-dose (MCV1) and second-dose (MCV2) measles-containing vaccine; coverage achieved during measles supplemental immunization activities (SIAs) conducted within the past 3 years; proportion of suspected measles cases with unknown vaccination status or who were unvaccinated
   - Total possible points = 40

2. Surveillance quality
   - Evaluates the ability of a district to detect and confirm cases rapidly and accurately
   - Indicators include non-measles discarded rate; proportion of suspected measles cases with adequate investigation (investigation within 48 hours of notification and inclusion of 10 core variables); proportion of cases with adequate specimen collection (within 28 days of rash onset); and proportion of cases for whom laboratory results were available in a timely manner
   - Total possible points = 20
3. Program performance
   - Assesses specific aspects of routine immunization services
   - Indicators include trends in MCV1 and MCV2 coverage, dropout rates from MCV1 to MCV2 and from first dose of diphtheria, pertussis, and tetanus vaccine (DPT1 or Penta1) to MCV1 based on administrative vaccination coverage data
   - Total possible points = 16

4. Threat assessment
   - Accounts for factors that might influence the risk for measles virus exposure and transmission in the population
   - Indicators include reported measles cases among specific age groups, recent measles cases reported in a bordering district, population density, and presence of vulnerable groups
   - Total possible points = 24
Use of the Measles Risk Assessment Tool

- The Risk Assessment Tool is intended to be used annually by national program managers
  - To monitor implementation of measles elimination strategies within a country
  - The Risk Assessment Tool is not meant to be used for predicting outbreaks, but rather for preventing them
  - Results from the Risk Assessment Tool should not be used for planning measles SIA campaigns, but rather to strengthen a country’s immunization and surveillance programs
- The required data inputs include readily-available and routinely collected data from the immunization and surveillance programs
- Results are shown in table and map formats, with districts color-coded by risk category
  - District risk scores can be displayed by indicator category, facilitating better understanding of programmatic weaknesses that are driving the overall risk score
The Risk Assessment Tool will estimate risk for the selected “Year of Risk Assessment”. You will need to use the following data from the 3 years prior to the Year of Risk Assessment.

For example, if you want to estimate risk for 2015 [“Year of Risk Assessment”], you will need data from 2012 [“year 1”], 2013 [“year 2”], and 2014 [“year 3”].

<table>
<thead>
<tr>
<th>Data</th>
<th>Details</th>
<th>Notes</th>
</tr>
</thead>
</table>
| Administrative vaccine coverage data      | 1. MCV1, for years 1, 2, 3  
2. MCV2 (if introduced), for years 1, 2, 3  
3. DPT1 or Penta1, for year 3              | If coverage survey estimates are available at the district level, were conducted within the past 3 years, and include birth cohorts of the past 3 years, these can be used in place of administrative coverage for MCV1 and MCV2. |
| Measles Supplementary Immunization Activity (SIA) campaign data | 1. Coverage (for each district)  
2. Target age group for SIA  
3. Year in which SIA was conducted | If no nationwide SIA was conducted in the past 3 years but an outbreak response immunization (ORI) campaign was performed for an entire district, you can report ORI coverage in place of SIA coverage. If post-SIA coverage survey estimates are available at the district level, these can replace administrative coverage for an SIA. |
| Measles case-based surveillance data      | For years 1, 2, 3                                                        | Include the surveillance data dictionary                              |
| Total population (for each district)      | For years 1, 2, 3                                                        |                                                                      |
| Geographic area (in km²)                  | Year 3, for each district                                                | Geographic area of districts may be included in the shape file, or may be listed in a separate file. |
| Shape file of country                    | For year 3, at the district level                                        | Create a zip file that contains the .dbf, .shp, and .shx files        |
| Completed ‘Vulnerable Groups by District’ spreadsheet | Complete this excel spreadsheet to determine the vulnerable groups that are present in each district in the country. For each vulnerable group present in a district, enter ‘Y’ in the appropriate cell on the spreadsheet. We recommend including several experts who have good programmatic knowledge of the districts (e.g., EPI manager, surveillance officers, cold chain officer, others with local knowledge) in a discussion to complete this spreadsheet. |
Summary of Steps to Use the Measles Risk Assessment Tool

1. Collect and prepare your data
2. Complete initial setup
3. Input data
4. View risk assessment results
5. Generate the country report
6. Risk Assessment Tool customization (optional)
Step 1. Collect Your Data

Use this list to collect your data before beginning to use the Risk Assessment Tool.

<table>
<thead>
<tr>
<th>Data</th>
<th>Details</th>
<th>Additional Notes</th>
</tr>
</thead>
</table>
| Administrative vaccine coverage data (for each district)| 1. MCV1, for years 1, 2, 3  
2. MCV2 (if introduced), for years 1, 2, 3  
3. DPT1 or Penta1, for year 3 | If coverage survey estimates are available at the district level, were conducted within the past 3 years, and include birth cohorts of the past 3 years, these can be used in place of administrative coverage for MCV1 and MCV2. |
| Measles Supplementary Immunization Activity (SIA) campaign data (for each district), if any SIA was conducted in the past 3 years | 1. Coverage (for each district)  
2. Target age group for SIA  
3. Year in which SIA was conducted | If no nationwide SIA was conducted in the past 3 years but an outbreak response immunization (ORI) campaign was performed for an entire district, you can report ORI coverage in place of SIA coverage. If post-SIA coverage survey estimates are available at the district level, these can replace administrative coverage for an SIA. |
| Measles case-based surveillance data                     | For years 1, 2, 3                                                      | Include the surveillance data dictionary                                                                                                         |
| Total population (for each district)                    | For years 1, 2, 3                                                      |                                                                                                                                                  |
| Geographic area (in km²)                               | Year 3, for each district                                             | Geographic area of districts may be included in the shape file, or may be listed in a separate file.                                              |
| Shape file of country                                  | For year 3, at the district level                                     | Create a zip file that contains the .dbf, .shp, and .shx files                                                                                  |
| Completed ‘Vulnerable Groups by District’ spreadsheet    | Complete this excel spreadsheet to determine the vulnerable groups that are present in each district in the country. For each vulnerable group present in a district, enter ‘Y’ in the appropriate cell on the spreadsheet. We recommend including several experts who have good programmatic knowledge of the districts (e.g., EPI manager, surveillance officers, cold chain officer, others with local knowledge) in a discussion to complete this spreadsheet. |
Step 1. Collect Your Data

Look at the names of the districts in each of the data files that you have collected (the coverage data, campaign data, case-based surveillance data, population data, geographic area data, and vulnerable groups data).

Compare the district names in those data sets to the district names in the shape files. If there are any discrepancies in district names due to spelling or punctuation, change district names in the data files so that they match those in the shape files.

(Note: If you do not catch all of them and some discrepancies remain, a later step in the data entry will manage any discrepancies in district names)
Step 2. Initial Setup

(a) Enter global reference data and country flag

1. Open the **Measles Risk Assessment Tool** excel file
2. If you see a Security Warning at the top of the Excel file, click on “Enable Content”
3. In the “**Setup&Configuration**” sheet, fill in the “**Global reference data**” section by entering:
   a) The country name
   b) The year of risk assessment (the year for which you want to estimate risk, e.g. if you have data for 2012, 2013, and 2014, you will estimate risk for 2015)
   c) The document language (choose English, French, or Spanish)
   d) Has an SIA been conducted in the last 3 years in all districts? (choose Yes or No)
   e) Is the country in post-elimination for measles or high-income? (choose Yes or No)
   f) MCV age eligibility (the age in months at which the first dose of measles vaccine [MCV1] is administered)
   g) The position of the legend
4. “**Calculated fields**” and “**Geo-items**” are calculated automatically
5. Load the “**Country Flag**” picture:
   a) Click on “**Click to Load Country Flag**” button
   b) Select the country flag picture from your local drive and click “**Open**” button
6. Remember to **SAVE** the Risk Assessment Tool file frequently
Step 3. Initial Setup 
(b) Import maps from a ZIP file

1. In “Setup&Configuration” sheet, click “Setup and configure Geo-Data” link, or select “_GeoData_Maps” sheet
2. Click “1 – Import Map & Init.” button
3. Select the zip file containing the shapefile file from your local files
   a) The zip file must contain the .dbf, .shp, and .shx files
4. Fill in the “Map Import & Initialization” form with the following information from the shape file:
   a) Admin1_Id field* [Province level]
   b) Admin1_Label field* [Province level]
   c) Admin2_Id field* [District level]
   d) Admin2_Label field* [District level]
   e) Population field (if exists)
   f) Area_km2 field (if exists)
5. Click “Next” button to import the map and the geo-data

The zip file must contain the following files: “.dbf”, “.shp” and “.shx” file

*Fields a-d are required and must be filled in. If the shape file does not have a separate field for Admin1_Id, you can fill this field in using the Admin1_Label. Similarly, if the shape file does not have a separate field for Admin2_Id, you can fill this field in using the Admin2_Label. Population and Area_km2 fields are optional.
Step 3. Initial Setup

(b) Import maps from a GeoJson file

1. In “Setup&Configuration” sheet, click “Setup and configure Geo-Data” link, or select “_GeoData_Maps” sheet
2. Click “1 – Import Map & Init.” button
3. Select the GeoJson file of the shapefile file from your local files
   a) Make sure to select “GeoJSON Files” file
4. Fill in the “Map Import & Initialization” form with the following information from the shape file:
   a) Admin1_Id field* [Province level]
   b) Admin1_Label field* [Province level]
   c) Admin2_Id field* [District level]
   d) Admin2_Label field* [District level]
   e) Population field (if exists)
   f) Area_km2 field (if exists)
5. Click “Next” button to import the map and the geo-data

*Fields a-d are required and must be filled in. If the shape file does not have a separate field for Admin1_Id, you can fill this field in using the Admin1_Label. Similarly, if the shape file does not have a separate field for Admin2_Id, you can fill this field in using the Admin2_Label. Population and Area_km2 fields are optional.
Step 3. Initial Setup

(b) Import maps

5. The country map and the geo-data are imported and inserted into the Excel sheet.

6. Click “Finish” button to continue with the next step, which detects all neighbouring districts in the country.

7. You will see a warning the neighbouring detection may take several minutes to complete. Click “Yes” to continue to the neighbouring detection. This may take up to 30-40 minutes depending on the number of districts, granularity of the shape files, and your internet speed.
Step 3. Initial Setup

(b) Import maps

8. A message is displayed to show the number of detected neighbours for all the districts (Admin2 level)

9. Click "OK" button to continue with the next step, which will fill in each sheet in the Risk Assessment Tool with the imported geo-data (the province and district names)

Note: The neighbouring detection could take several minutes depending on the number of districts and the granularity of the shape files (number of vertices of each shape)

→ To reduce the time required for neighbouring detection, the number of map vertices could be reduced using the “Simplify” feature available on the www.mapshaper.org website.
Step 3. Initial Setup  
(c) Fill in the district names

1. A message is displayed to confirm the map and geo-data import. This message box indicates that there might be aliases for district names that need to be managed prior to further data import (if yes, you will see errors when you try to import data; see pages #16-17 for instructions for managing aliases for district names)

2. Click "OK" button

3. Check that the following sheets in the Risk Assessment Tool contain the list of district and province names:
   a) IndicatorMaps
   b) PopulationImmunity
   c) SurveillanceQuality
   d) ProgramDeliveryPerformance
   e) VulnerableGroups
   f) ThreatAssessment

Note: If there are aliases for Province names (Admin1) or District names (Admin2), aliases must be managed prior to importing population, geographic area, case-based data, administrative coverage, and other data. See “Manage Aliases for Province and District Names” (pages #16-17) for instructions for managing aliases. If aliases are not managed before importing data, the Risk Assessment Tool will not be able to match imported data with the correct districts.
Step 3. Initial Setup

(d) Import population data

1. In “_GeoData_Maps” sheet, click “2 - Import Population” button to import the population data:
   1. Click on ‘…’ button, then browse to select the file that contains the population data
   2. Enter the columns for Admin level 1 (Provinces) and Admin level 2 (Districts) (Note: if there is no column in the data source for Admin level 1 [Province], this cell can be left blank)
   3. Enter the data start row and the data end row
   4. Enter the column containing the population data
   5. Click “Next”

2. A summary is displayed. If you receive an error message after importing data, then please refer to the “Manage Aliases for Province and District Names” slides (pages #17-18) in order to account for province and/or district aliases

Note: If there are aliases for Province names (Admin1) or District names (Admin2), aliases must be managed prior to importing population, geographic area, case-based data, administrative coverage, and other data. See “Manage Aliases for Province and District Names” (pages #17-18) for instructions for managing aliases. If aliases are not managed before importing data, the Risk Assessment Tool will not be able to match imported data with the correct districts.
Step 3. Initial Setup
(e) Manage aliases for province and district names

The names of some districts and/or provinces might be different between the shape file and those stored in the other data source files (e.g., population data, geographic areas, case-based data, vulnerable groups, and administrative coverage data).

If the names of districts and/or provinces do not match exactly between ALL data sources (including exact spelling and punctuation), you must list all versions of the district/province names (district/province “aliases”) on the _GeoData_Maps sheet.

Aliases must be added into the “_GeoData_Maps” sheet prior to all data import and/or Copy-Paste of population, geographic areas, case-based data, vulnerable groups, and all other administrative data.

⇒ The next slide shows how to list aliases for districts and/or provinces.
Step 3. Initial Setup  
(e) Manage aliases for province and district names

When importing data, the Risk Assessment Tool detects and displays any provinces/districts with a name that does not match up with the province/district names in the map.

After importing data, the error display box will show any areas with unmatching names. You must add any province or district aliases in the _GeoData_Maps sheet.

In the example shown to the right, the district “Vilcea” is not recognized by the Risk Assessment Tool (error display box at right). Indeed, the alternate version of the district name that was imported from the shape file is “Vâlcea” (see geo-data box below). “Vilcea” must be added as an alias for “Vâlcea” in the Admin2_Alternate column (below).

*When the error display box appears, make a note of the districts with errors, then follow the next steps to enter aliases*

To do so:
1. Finish the Data Import action by clicking the “Finish” button
2. On the _GeoData_Maps sheet, in the “Vâlcea” row, enter “Vilcea” in the “Admin2_Alternate” column
3. If 2 or more aliases exist for a district, they can be listed with a comma separating the aliases: Vilcea, Vilsea
4. Complete the steps to import the data again. The Risk Assessment Tool will use the new alias to match the district name and import all data
Step 3. Initial Setup

(f) Import geographic area data

1. In “_GeoData_Maps” sheet, click “3 - Import Area (km2)” button to import the geographic area data:
   1. Click on ‘…’ button, then browse to select the file that contains the geographic area data
   2. Select the worksheet containing the geographic area data to import
   3. Enter the columns for Admin level 1 (Provinces) and Admin level 2 (Districts) (Note: if there is no column in the data source for Admin 1 [Province], this cell can be left blank)
   4. Enter the data start row and the data end row
   5. Enter the column containing the geographic area (in km²) data
   6. Click “Next”

2. A summary is displayed. If you receive an error message after importing data, then please refer to the “Manage Aliases for Province and District Names” slides (pages #17-18) in order to account for province and/or district aliases

3. Remember to SAVE the Risk Assessment Tool file frequently

Note: If there are aliases for Province names (Admin1) or District names (Admin2), aliases must be managed prior to importing population, geographic area, case-based data, administrative coverage, and other data. See “Manage Aliases for Province and District Names” (pages #17-18) for instructions for managing aliases. If aliases are not managed before importing data, the Risk Assessment Tool will not be able to match imported data with the correct districts.
Step 3. Initial Setup

(g) Check setup & configuration steps are complete

Is the Risk Assessment Tool ready for use?

Initial Setup is completed when all the “Done” values are turned to “OK” (green color) in the “Setup&Configuration” sheet.

If all values are not turned to “OK” (green), go to the “Population Immunity” worksheet and press the “Recalculate all” button on the top right of the screen, then check again for all values turned to “OK” (green).

The Risk Assessment Tool is now ready to be used for importing the case-based surveillance data, vulnerable groups, administrative coverage data, and all other necessary data.
Step 4. Input Data

(a) Input case-based surveillance data

1. In the “Setup&Configuration” sheet, click the “Case based data” link or select the “Case-Based-Data” sheet

2. Prepare the case-based data within a spreadsheet outside the risk tool with the following requirements (see next page for sample case-based data):
   a) Order the data columns in the exact same order as in the “Case-Based-Data” sheet:
      A. Year
      B. Admin 1 (province)
      C. Reporting District
      D. Case ID
      E. Final Classification
      F. Age in Years
      G. Age in Months
      H. Sex
      I. Place of Residence
      J. Date of Rash Onset
      K. Vaccination Status
      L. Number of Vaccine Doses
      M. Date of Notification
      N. Date of Investigation
      O. Date of Blood Sample Collection
      P. Date District Received Lab Result
      Q. Place of Infection or Travel History
### Step 4. Input Data

(a) Input case-based surveillance data

Prepare your case-based surveillance data in a spreadsheet so that it looks like the sample data below:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>O</th>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2012</td>
<td>Province 1</td>
<td>District A</td>
<td>CO-P1-DA-1201</td>
<td>Discarded</td>
<td>27</td>
<td>0</td>
<td>M</td>
<td>District A</td>
<td>1/15/12</td>
<td>N</td>
<td>0</td>
<td>1/20/12</td>
<td>1/20/12</td>
<td>1/20/12</td>
<td>1/27/12</td>
</tr>
<tr>
<td>3</td>
<td>2012</td>
<td>Province 3</td>
<td>District F</td>
<td>CO-P3-DH-1202</td>
<td>Confirmed Rubella</td>
<td>5</td>
<td>0</td>
<td>F</td>
<td>District F</td>
<td>2/3/12</td>
<td>Y</td>
<td>1</td>
<td>2/4/12</td>
<td>2/4/12</td>
<td>2/4/12</td>
<td>2/10/12</td>
</tr>
<tr>
<td>4</td>
<td>2012</td>
<td>Province 3</td>
<td>District F</td>
<td>CO-P3-DH-1203</td>
<td>Confirmed Rubella</td>
<td>6</td>
<td>0</td>
<td>F</td>
<td>District F</td>
<td>4/1/12</td>
<td>Y</td>
<td>1</td>
<td>4/2/12</td>
<td>4/2/12</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>2012</td>
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<td>District B</td>
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<td>6</td>
<td>M</td>
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<td>10/12/12</td>
<td>10/13/12</td>
<td>10/13/12</td>
<td>10/16/12</td>
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<td>10/18/12</td>
<td>10/19/12</td>
<td>10/19/12</td>
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</tr>
<tr>
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<td>District H</td>
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<td>F</td>
<td>District A</td>
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<td>1/10/13</td>
<td>1/10/13</td>
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</tr>
<tr>
<td>10</td>
<td>2013</td>
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<td>2/1/13</td>
<td>2/10/13</td>
</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>2014</td>
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<td>District B</td>
<td>CO-P1-DB-1402</td>
<td>Confirmed Rubella</td>
<td>0</td>
<td>7</td>
<td>M</td>
<td>District B</td>
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<td>9/2/14</td>
<td>9/2/14</td>
<td>9/2/14</td>
<td>9/12/14</td>
</tr>
</tbody>
</table>
Step 4. Input Data

(a) Input case-based surveillance data

3. Prepare the case-based data continued:
   a) The data format for each variable must be compliant with the formats stated in the “Case-Based-Data” sheet
      i. E.g., Year variable must be formatted as a number, not text; Age variables must be formatted as numbers, not text; Sex variable must be formatted as M/F; Date variables must be formatted as dates, not text
      ii. Any values that were not collected as part of the case investigation should be left blank
      iii. Date variables such as Date of Notification, Date of Investigation, etc. may be in MM/DD/YYYY or DD/MM/YYYY format
Step 4. Input Data
(a) Input case-based surveillance data

b) Pay special attention to the following 4 variables. The only values that are allowed for these variables are listed below. Edit your case-based data so that these 4 variables contain only the **exact** allowed values listed here:

<table>
<thead>
<tr>
<th>Final Classification</th>
<th>Sex</th>
<th>Vaccination Status</th>
<th>Number of Vaccine Doses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab-Confirmed Measles</td>
<td>M</td>
<td>VACCIN</td>
<td>0</td>
</tr>
<tr>
<td>Epi-Linked Measles</td>
<td>F</td>
<td>NOTVACC</td>
<td>1</td>
</tr>
<tr>
<td>Clinically Compatible Measles</td>
<td></td>
<td>N</td>
<td>2</td>
</tr>
<tr>
<td>Confirmed Rubella</td>
<td></td>
<td>Y</td>
<td>3</td>
</tr>
<tr>
<td>Discarded</td>
<td></td>
<td>U</td>
<td>More than 3</td>
</tr>
<tr>
<td>Pending</td>
<td></td>
<td>No</td>
<td>Unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unknown</td>
<td></td>
</tr>
</tbody>
</table>

Note: If Vaccination Status was not collected as part of the case investigation, leave this variable blank.

Use the [Show “Accepted Values”] button to view the values for the 4 variables.
Step 4. Input Data
(a) Input case-based surveillance data

3. Prepare the case-based data continued:
   c) Combine the 3 years of case-based data within a single spreadsheet
   d) Do **not** edit or modify the additional “Calculated” columns on the right of the “Case-Based-Data” sheet (column R through column AH of the “Case-Based-Data” sheet). They contain formulas and will be calculated based on your case-based data once you copy and paste it there
   e) Aliases for district and province names must be added into the “_GeoData_Maps” sheet prior to the copying and pasting the case-based data into the risk tool spreadsheet (see pages #16-17 for instructions for managing aliases)
   f) When pasting data, use the “Past Values” paste option to avoid keeping references to the external spreadsheet
Step 4. Input Data
(a) Input case-based surveillance data

4. Copy all case-based data from your prepared case-based data spreadsheet
5. Select Cell “A13” of the “Case-Based-Data” sheet
6. Paste the data using the “Past Values” paste option

Note: If there are aliases for Province names (Admin1) or District names (Admin2), aliases must be managed prior to importing population, geographic area, case-based data, administrative coverage, and other data. See “Manage Aliases for Province or District Names” (pages #16-17) for instructions for managing aliases. If aliases are not managed before importing data, the Risk Assessment Tool will not be able to match imported data with the correct districts.
Step 4. Input Data

(b) Input administrative coverage data

1. In the “PopulationImmunity” sheet, click “Import…” buttons at the top of the columns for MCV1 coverage, MCV2 coverage (if MCV2 has not been introduced, leave these cells blank), and Measles SIA coverage to import these data.

   **NOTE:** Coverage numbers must be formatted as whole numbers, not as percentages. For example, if a District has coverage of 94 percent, it must be listed as 94, not 94%, in the data spreadsheet.

2. Click on the ‘…’ button, then browse to select the file that contains the MCV1 coverage data. Select the worksheet containing the MCV1 coverage data to import.

**Note on MCV1 and MCV2 coverage data:** If coverage survey estimates are available at the district level, were conducted within the past 3 years, and include birth cohorts of the past 3 years, these can be used in place of administrative coverage for MCV1 and MCV2.
Step 4. Input Data

(b) Input administrative coverage data

3. Import the data for MCV1 coverage:
   a) Enter the columns for Admin level 1 (Provinces) and Admin level 2 (Districts) (Note: if there is no column in the data source for Admin 1 [Province], this cell can be left blank)
   b) Enter the data start row and the data end row
   c) Enter the column containing the MCV1 coverage data
   d) Check the boxes for ‘Cap value to minimum (0)’ and ‘Cap value to maximum (100)’

4. Click “Next” button

5. If there are errors because of district aliases, an error display box will show any areas with unmatched names

6. If there are no errors, click “Finish” button

7. If you receive an error message after importing data, then please refer to the “Manage Aliases for Province and District Names” slides (pages #16-17) in order to account for province and/or district aliases
Step 4. Input Data

(b) Input administrative coverage data

8. Repeat the steps for entering administrative coverage data (pages #27-28) to enter MCV1 coverage data and MCV2 coverage data (if applicable) for all 3 years. 
   
   **Note:** Remember to check the boxes for ‘Cap value to minimum (0)’ and ‘Cap value to maximum (100)’. 

9. Repeat the steps for entering administrative coverage data (pages #27-28) to enter SIA coverage data for the most recent SIA (if applicable). 
   
   **Note:** Remember to check the boxes for ‘Cap value to minimum (0)’ and ‘Cap value to maximum (100)’. 

10. Enter the year of the most recent measles SIA 

11. Remember to **SAVE** the Risk Assessment Tool file frequently

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**Note on SIA coverage data:** If no nationwide SIA was conducted in the past 3 years but an outbreak response immunization (ORI) campaign was performed for an entire district, you can report ORI coverage in place of SIA coverage. If post-SIA coverage survey estimates are available at the district level, these can replace administrative coverage for an SIA.
Step 4. Input Data

(c) Input additional measles SIA data

1. In the “PopulationImmunity” sheet, fill in information for Measles SIA Target Age Group and Years Since Last Measles SIA, if there has been a SIA conducted in the last 3 years in all districts in your country

   a) Measles SIA Target Age Group – Select “N” for Narrow Age Range if SIA target age group was ≤5 birth cohorts (9m-59m or less). Select “W” for Wide Age Range if SIA target age group was >5 birth cohorts (wider than 9m-59m). If there was no SIA conducted in the past 3 years, select “N”.

   b) Years Since Last Measles SIA – Enter the number of years since the last measles SIA was conducted (e.g., if the year for which you are estimating risk is 2015, and the last SIA was conducted in 2011, the value for this indicator would be 4 years). If the SIA spanned 2 years, use the most recent year for this calculation.

   **Note on SIA coverage data:** If no nationwide SIA was conducted in the past 3 years but an outbreak response immunization (ORI) campaign was performed for an entire district, you can report ORI coverage in place of SIA coverage. If post-SIA coverage survey estimates are available at the district level, these can replace administrative coverage for an SIA.
Step 4. Input Data

(d) Input surveillance quality and program delivery data

1. The % suspected measles cases unvaccinated column of the “PopulationImmunity” sheet should be calculated automatically for each district. Check that the column has been filled with data. If the column is not filled with data, click on the “Recalculate all” button. If errors remain, check the case based surveillance data (in the “Case-Based-Data” sheet) for errors.

2. All 4 columns of the “SurveillanceQuality” sheet should be calculated automatically for each district. Check that all 4 columns have been filled with data. If there are errors, click on the “Recalculate all” button. If errors remain, check the case based surveillance data (in the “Case-Based-Data” sheet) for errors.

3. In the “ProgramDeliveryPerformance” sheet, click the “Import...” button at the top of the column for DPT1/Penta1 coverage to import coverage data for this data column. Import data using the same steps you used to import MCV1 and MCV2 coverage data (see pages #27-28). Note: Remember to check the boxes for ‘Cap value to minimum (0)’ and ‘Cap value to maximum (100)’.

   a) All other columns in the “ProgramDeliveryPerformance” sheet should be calculated automatically and filled using data that was entered in previous steps. Check that all other columns in this sheet have been filled with data. If there are errors, click on the “Recalculate all” button. If errors remain, check the data entered for MCV1 and MCV2 coverage (in the “PopulationImmunity” sheet) for errors.
Step 4. Input Data

(e) Vulnerable groups data

1. In the “VulnerableGroups” sheet, click the “Import...” buttons at the top of each column to import vulnerable groups data from your external spreadsheet.

2. Click on the ‘...’ button, then browse to select the file that contains the vulnerable groups data. Select the worksheet containing the vulnerable groups data to import.
   a) Import the vulnerable groups data:
      i. Enter the columns for Admin level 1 (Provinces) and Admin level 2 (Districts) (Note: if there is no column in the data source for Admin 1 [Province], this cell can be left blank).
      ii. Enter the data start row and the data end row.
      iii. Enter the column containing the vulnerable groups data.
   b) Click “Next” button.
   c) If there are errors because of district aliases, an error display box will show any areas with unmatching names.
   d) If there are no errors, click “Finish” button.
   e) If you receive an error message after importing data, then please refer to the “Manage Aliases for Province and District Names” slides (pages #17-18) in order to account for province and/or district aliases.

3. All columns of the “ThreatAssessment” sheet should be filled in automatically for each district. Check that all columns have been filled with data in the “ThreatAssessment” sheet. If there are errors, click on the “Recalculate all” button. If errors remain, check the case based surveillance data (in the “Case-Based-Data” sheet), and/or the population and geographic area data (in the “_GeoData_Maps” sheet) for errors.

4. Remember to SAVE the Risk Assessment Tool file frequently.
Step 5. View Risk Assessment Results

1. In “IndicatorMaps” sheet, click “Recalculate all” button in order to refresh all the formulas.
2. Select a map from the dropdown list.
3. Click a district of the map to view the details.
Step 6. Generate the Country Report

1. Before generating the Country Report, make sure you **SAVE** the current version of the Risk Assessment Tool.


3. Click “**Yes**” if you would like to regenerate the data tables and the maps before generating the country report (Recommended). In this case, a waiting message box is displayed during the generation. Click “**OK**” once the generation is completed.

4. Click “**No**” to generate the country report using the current data tables and maps.

5. Browse to select the country report template and click “**Open**” (The country report template is a Word document file that you downloaded with the Risk Assessment Tool files. Its file name is ‘MRAT Country Report ENG’).

6. A summary generation is displayed. Click “**OK**”.

7. The generated document will be opened within Microsoft Word and can be updated and customized.

8. Add your own summary of findings and recommendations based on the risk assessment results shown in the tables and maps throughout the Country Report.
Optional: Risk Assessment Tool Customization

The following parameters can be customized for the Risk Assessment Tool:

1. The color coding for each map and indicator can be customized in the "_TechData" sheet
   a) After changing any of the colors, reselect the map to display on the "IndicatorMaps" sheet to display the map using the chosen colors

<table>
<thead>
<tr>
<th>Map configuration</th>
<th>Workbook must be reloaded when this is changed</th>
<th>MapName</th>
</tr>
</thead>
<tbody>
<tr>
<td>OVERALL_RISK</td>
<td></td>
<td>Overall Measles Risk Profile</td>
</tr>
<tr>
<td>PI</td>
<td></td>
<td>Population Immunity</td>
</tr>
<tr>
<td>SQ</td>
<td></td>
<td>Surveillance Quality</td>
</tr>
<tr>
<td>PDP</td>
<td></td>
<td>Program Delivery Performance</td>
</tr>
<tr>
<td>TA</td>
<td></td>
<td>Threat Assessment</td>
</tr>
<tr>
<td>VHR</td>
<td></td>
<td>Risk Scores for Very High Risk Districts</td>
</tr>
<tr>
<td>HR</td>
<td></td>
<td>Risk Scores for High Risk Districts</td>
</tr>
<tr>
<td>MR</td>
<td></td>
<td>Risk Scores for Medium Risk Districts</td>
</tr>
<tr>
<td>LR</td>
<td></td>
<td>Risk Scores for Low Risk Districts</td>
</tr>
<tr>
<td>MCV1_AVERAGE</td>
<td></td>
<td>Average MCV1 Coverage</td>
</tr>
<tr>
<td>MCV2_AVERAGE</td>
<td></td>
<td>Average MCV2 Coverage</td>
</tr>
<tr>
<td>MEASLES_CASES</td>
<td></td>
<td>Measles Cases In the Past Year</td>
</tr>
<tr>
<td>MEASLES_INCIDENCE</td>
<td></td>
<td>Annual Confirmed Measles Incidence</td>
</tr>
</tbody>
</table>
2. In the “_GeoData_Maps” sheet, the following parameters can be customized:
   a. Default border color for the maps
   b. Default border line weight for the maps
   c. Default background color for the maps
   d. The text style and the color of the map labels
   e. The maximum distance to consider for the neighbouring detection
3. In the "_TechData" sheet, you can change the set values for the following variables:
   a) Adequate investigation delay (in days)
   b) Adequate specimen collection delay (in days)
   c) Timely availability of lab results delay (in days)

You may want to change these settings if your region or country has different guidelines for these measures
4. Prior to starting use of the Risk Assessment Tool, a password can be set in order to make the setup & configuration steps unavailable for the end user. This might be set by the regional HQ in order to prevent other settings from being modified.
   a) In the “Setup&Configuration” sheet, click “Lock the tool” button
   b) Enter a password and click “OK”
   c) Confirm the password and click “OK”

To unlock the Risk Assessment Tool:
   a) In the “Setup&Configuration” sheet, click “Unlock the tool” button
   b) Enter the password and click “OK”
5. Excel Calculation Mode: The default calculation mode could be set to \textit{Manual} in order to avoid automatic recalculation of all the formulas when data changes. A dedicated \textit{Recalculate all} button is included in the Risk Assessment Tool to allow the user to recalculate all formulas on demand. However, the calculation mode could be changed via the following menu:

\texttt{[Formulas][Calculation Options]}
Optional: Risk Assessment Tool Customization

6. Additional tags can be used within the country report template. There are three types of tag:
   a. Value (Example: \{#Value ref_country_name\})
   b. Table (Example: \{#Table table_report_risk_profile_country\})
   c. Shape (Examples: \{#Shape shp_Map_VHR\}, \{#Shape shp_Legend_VHR\})

Potentially, all defined “Names” in the Risk Assessment Tool could be added into the country report template and their “content/values” will be inserted when generating the country report.

The Name manager could be accessed using the following menu:

[Formulas][Name Manager]