



**Government of Malawi**  
**Ministry of Health**

**Standard Operating Procedure for DHIS 2 Malaria Data  
Extraction, Cleaning and Reporting**

**Version 2018**

## Acronymns

DHIS 2	District Health Information System version 2
HMIS	Health Management Information System
LA	Artemether Lumefantrine
LLIN	Long Lasting Insecticide Net
LMIS	Logistics Management Information System
Mic	Microscopy
mRDT	Malaria Rapid Diagnosis Test
NMCP	National Malaria Control Program
OPD	Out Patient Department
IP	In-Patient

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## 1.0 Introduction

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Data management is an important component in M&E and deserves extra attention and diligence. The management, access and use of malaria routine data and information is vital in the measurement of utilization and quality of care provided to the population that lead to improved performance measures and outcomes. M&E teams at all levels have to invest a significant part of their time and effort in data management because a well-functioning data management system can improve the quality of the data collected and facilitate analysis. At a minimum, they should understand the basic concepts of data management. At the top or central level and at lower levels of a data system or study, data management policies and standard operating procedures (SoP) should be defined clearly.

### **Rationale**

These SoPs are aimed to guide national and district staff on the collation, extraction from DHIS2, cleaning, analysis and interpretation of malaria data. National and district staff are expected to understand the details of DHIS2 malaria data elements, indicators and the critical steps from data collection to interpretation for decision making at all levels.

### **Scope**

These procedures apply to all malaria data users irrespective of whether they access the data from within or outside of Malawi. These are critical for the District malaria coordinators and HMIS officers because they handle data from facilities and could make necessary online changes/corrections once validation is done.

An approach consisting of specific steps that are used to help national and district staff through the process of data collation, extraction, cleaning, analysis and interpretation.

## 2.0 Definition of malaria data elements

This section defines key malaria data elements in the DHIS2 and further elaborates where to get these data elements and how they are calculated.

### 2.1 Suspected malaria cases

- Patient illness suspected by a health worker to be due to malaria. The criteria usually fever alone in under-fives and pregnant women while fever plus one or more symptoms/signs of malaria in five years and above patients.
- All patients with suspected malaria should receive a diagnostic test for malaria, by microscopy or a rapid diagnostic test
- The source of data for this is the Malaria Health Facility Monthly Reporting Form
- Suspected malaria cases = all suspected malaria cases tested + all presumed malaria cases.

### 2.2 Suspected Malaria Cases Tested

- These are cases that the clinician suspects to have malaria and tested to confirm if indeed they have malaria.
- The policy requires that all patients who are suspected to have uncomplicated malaria should be tested using mRDTs before given any antimalarial medicine.
- The policy requires that all patients who are suspected to have severe malaria should be tested using microscopy or when you suspect first line treatment failure
- The source of data for this is the Malaria Laboratory Register
- Data from all the testing points should be included
- Data is reported on the Malaria Health Facility Monthly Reporting Form

### 2.3 Confirmed Malaria Cases

- Suspected malaria cases in which malaria parasites have been demonstrated in a patient's blood by microscopy or a rapid diagnostic test
- The source for the confirmed malaria cases is the Malaria Laboratory Register
- The data is reported on the Malaria Health Facility Monthly Reporting Form

### 2.4 New Malaria Cases

- The number of malaria cases reported by facilities on the HMIS-15 reporting form (current reporting).

- These include cases that have been **confirmed through use of microscopy or mRDTs**, those that have **been clinically diagnosed** and those that have been **treated presumptively without confirmation**.
- Data for the new malaria cases is obtained from the OPD register ( 32a and 32b)
- Data is obtained from the OPD register and reported on the HMIS-15 Reporting Form

## **2.5 Presumed Malaria Cases (Not Tested but Treated)**

- Suspected malaria cases without a diagnostic test to confirm malaria but nevertheless treated presumptively as malaria cases
- The source for the presumed Malaria Cases is OPD Register
- The data is reported on the Malaria Health Facility Monthly Reporting Form

## **2.6 OPD Attendance**

- Total number of all health cases reported by facilities on the HMIS-15 reporting form (current reporting).
- These include all health cases that have been recorded in OPD register.
- Data for the OPD Attendance is obtained from the OPD register and reported on the HMIS-15 Reporting Form

## **2.7 In-Patient cases – All Causes**

- Total number of all health cases reported by facilities that were admitted.
- These include all health cases that have been recorded in In-Patient register
- Data for the IP cases – All causes is obtained from the In-Patient register and reported on the Malaria Health Facility Monthly Reporting Form

## **2.8 IP Malaria Cases**

- Total number of malaria cases reported by facilities that were admitted.
- These include malaria cases that have been recorded in In-Patient register
- Data for the IP malaria cases is obtained from the In-Patient register and reported on the Malaria Health Facility Monthly Reporting Form

## **2.9 IP Deaths All Causes**

- Total number of all deaths reported by facilities that were admitted.
- These include all deaths that have been recorded in In-Patient register
- Data for the IP deaths – All causes is obtained from the In-Patient register and reported on the Malaria Health Facility Monthly Reporting Form

### **2.10 IP Malaria Deaths**

- Total number of malaria deaths reported by facilities that were admitted.
- These include malaria deaths that have been recorded in In-Patient register
- Data for the IP malaria deaths is obtained from the In-Patient register and reported on the Malaria Health Facility Monthly Reporting Form

### **2.11 Artemether Lumefantrine (LA) Quantity Issued**

- Total number of LA tablets that have been issued from pharmacy to the dispensary and village clinics reported by facilities.
- Data for the LA tablets is obtained from the stock cards and reported on the Open LMIS Reporting Form

### **2.12 LA Quantity Dispensed**

- Total number of LA tablets that have been administered from the dispensary to patients reported by facilities.
- Data for the LA tablets is obtained from the LA Dispensing register and reported on the Malaria Health Facility Monthly Reporting Form for health facilities
- Data for LA tablets from village clinics is obtained from Form 1A and reported on Monthly Consolidated Form 1B
- LA dispensed can be derived from LA dispensing register and Form 1A

### **2.13 LLINs Quantity Distributed**

- Total number of LLINs reported by facilities that given to pregnant women and new born babies.
- These include all LLINs that have been recorded in ITN register
- Data for the LLIN quantity distributed is obtained from the ITN register and reported on the Malaria Health Facility Monthly Reporting Form



### 3.0 Core surveillance indicators

This section defines key malaria indicators that could be derived from the above mentioned data element. It also gives the numerators and denominators as well as the rates (percent, per 1000 population and per 100,000 population). The purpose of each indicator has also been given in this section.

#### 3.1 Annual Parasite Index (API)

Formula	$\frac{\text{Total number of confirmed malaria cases}}{\text{Total population at risk}}$
Numerator	Total number of confirmed malaria cases by both mRDT and Microscopy at either national, or district or health facility.
Denominator	Total number of population at risk of malaria in our case this could be national, district or health facility population
Purpose	To estimate the incidence of malaria (as proxy) in a given year
Interpretation	Trends can be affected by: <ul style="list-style-type: none"> <li>• Completeness of reporting:</li> <li>• Number of tests undertaken (slides examined, RDTs performed)</li> <li>• Changes in use of health facilities owing to greater availability of antimalarial drugs</li> <li>• Actual changes in the incidence of malaria</li> </ul>

#### 3.2 Malaria Incidence rate

Formula	$1000 * \frac{\text{Total number of confirmed malaria cases}}{\text{Total population at risk}}$
Numerator	Total number of confirmed malaria cases by both mRDT and Microscopy at either national, or district or health facility. In cases where presumed case are available should be added.
Denominator	Total number of population at risk of malaria in our case this could be national, district or health facility population
Purpose	To measure trends in malaria morbidity and to identify locations of ongoing malaria transmission. This indicator is the most important measure of progress
Interpretation	Trends can be affected by: <ul style="list-style-type: none"> <li>• Completeness of reporting:</li> <li>• Number of tests undertaken (slides examined, RDTs performed)</li> <li>• Changes in use of health facilities owing to greater availability of antimalarial drugs</li> <li>• Actual changes in the incidence of malaria</li> </ul>

### 3.3 Malaria Mortality Rate

Formula	$100,000 * \frac{\text{Total number of malaria deaths}}{\text{Total population at risk}}$
Numerator	Total number of malaria deaths at either national, or district or health facility
Denominator	Total number of population at risk of malaria in our case this could be national, district or health facility population
Purpose	<ul style="list-style-type: none"> <li>To measure trends in malaria mortality and to identify locations of ongoing malaria deaths.</li> <li>To monitor the impact of programmes on the number of malaria deaths</li> </ul>
Interpretation	<p>The trends of the death can be affected by</p> <ul style="list-style-type: none"> <li>Completeness of reporting;</li> <li>Changes in diagnostic practice e.g. the introduction of more diagnostic testing may reduce the number of malaria deaths diagnosed.</li> <li>Changes in use of health facilities owing to greater availability of antimalarial drugs</li> <li>Actual changes in the number of malaria deaths</li> </ul>

### 3.4 Test positivity rate (TPR) (mRDT and Microscopy)

Formula	$100 * \frac{\text{Number of confirmed malaria cases}}{\text{Total number of suspected cases receiving parasitological tests}}$
Numerator	Number of cases of suspected malaria confirmed by microscopy and RDT at both facility and village clinic
Denominator	Total Number of suspected malaria cases tested using microscopy and mRDT at both facility and village clinic.
Purpose	To reflect trends in malaria morbidity and identify areas with the most intense malaria transmission. Partially 'corrects' for incompleteness of reporting and RDT stock-outs
Interpretation	<p>mRDT and slide positivity rates can differ and should therefore be reported separately. RDTs reflect the presence of antigens and may remain positive after parasites have been cleared by treatment.</p> <p>Changes in test positivity rates do not reflect percentage changes in malaria cases or incidence, as the number of malaria cases is part of the denominator.</p>

### 3.5 Percentage of suspected malaria cases tested

Formula	$100 * \frac{\text{Number of patients receiving a parasitological test}}{\text{Number of suspected cases of malaria}}$
Numerator	Total number of patients with suspected malaria cases tested by both RDT and microscopy.
Denominator	Total Number of patients with suspected malaria cases attending health facilities and village clinics
Purpose	It is recommended that all suspected malaria cases should receive a diagnostic test by RDT or microscopy, regardless of age. The indicator reflects the extent to which malaria programmes are able to achieve this goal and where further effort may be required.
Interpretation	A value less than 100% may indicate problems in data recording, stock outs of RDT at national or health facility level or clinician adherence.

### 3.6 Annual blood examination rate (ABER)

Formula	$100 * \frac{\text{Number of patients receiving a parasitological test}}{\text{Total Population at risk of malaria}}$
Numerator	Total number of patients with suspected malaria cases tested by both RDT and microscopy.
Denominator	Total population at risk of malaria at either national, district or health facility.
Purpose	To reflect the extent of diagnostic testing in a population; aids interpretation of other surveillance indicators.
Interpretation	Higher annual blood examination rates generally reflect more complete malaria surveillance.

### 3.7 Reporting completeness

Formula	$100 * \frac{\text{Number of health facilities reports received}}{\text{Total number of health facilities expected}}$
Numerator	Number of monthly reports received from health facilities.
Denominator	Number of health facility reports expected
Purpose	Regular monitoring and follow-up can improve the completeness of reporting until all health facilities are consistently reporting every month. Aids interpretation of other surveillance indicators.
Interpretation	The completeness of reporting of health facilities should be near 100%. Values < 100% may indicate problems with supplies of stationary, communications, staff availability, motivation or skills.

### 3.8 Proportion of outpatient malaria cases

Formula	$100 * \frac{\text{Number of confirmed malaria cases}}{\text{All cause outpatient cases}}$
Numerator	Number of confirmed malaria cases by both mRDT and microscopy
Denominator	All cause outpatient cases attending the outpatient department
Purpose	To assess that the changes in trends of malaria over time are different compared to the other diseases. Significant reduction of proportion of malaria indicates reduction in true incidence either due to malaria interventions or other factors
Interpretation	The trends of the death can be affected by <ul style="list-style-type: none"> <li>• Completeness of reporting:</li> <li>• Changes in other disease burden.</li> <li>• Changes in use of health facilities owing to greater availability of antimalarial drugs</li> <li>• Actual changes in the number of malaria incidence</li> </ul>

### 3.9 Non-malaria outpatient cases

Formula	Number of all cause OPD cases – All confirmed malaria OPD cases
Purpose	To ensure that the changes in trends of malaria are not due to other systemic factors that equally affect other diseases. Example insurance scheme increases service utilization and increase in all diseases.
Interpretation	The trends of non-malaria outpatient cases can be affected by <ul style="list-style-type: none"> <li>• Completeness of reporting</li> <li>• Changes in other disease burden</li> </ul>

	<ul style="list-style-type: none"> <li>• Changes in use of health facilities</li> <li>• Actual changes in the number of malaria incidence</li> </ul>
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### 3.10 Non-malaria inpatient cases

Formula	Number of all cause IPD cases –All confirmed malaria IPD cases
Purpose	To ensure that the changes in trends of malaria are not due to other systemic factors that equally affect other diseases..
Interpretation	<p>The trends of severe malaria cases can be affected by</p> <ul style="list-style-type: none"> <li>• Completeness of reporting</li> <li>• Changes in other disease burden</li> <li>• Changes in use of health facilities</li> <li>• Actual changes in the number of malaria incidence</li> </ul>

### 3.11 Non-malaria deaths

Formula	Number of all cause deaths –All malaria deaths
Purpose	To ensure that the changes in trends of malaria deaths are not due to other systemic factors that equally affect other diseases..
Interpretation	<p>The trends of malaria deaths can be affected by</p> <ul style="list-style-type: none"> <li>• Completeness of reporting</li> <li>• Changes in other disease burden</li> <li>• Changes in use of health facilities</li> <li>• Actual changes in the number of malaria deaths</li> </ul>

### 3.12 Proportion of inpatient malaria cases

Formula	$10,000 * \frac{\text{Number of malaria IPD cases}}{\text{All cause IPD cases}}$
Numerator	Number of malaria inpatients cases
Denominator	Total number of all causes IPD cases
Purpose	To ensure that the changes in trends of malaria are not due to other systemic factors that equally affect other diseases.
Interpretation	<p>The trends of severe malaria cases can be affected by</p> <ul style="list-style-type: none"> <li>• Completeness of reporting</li> <li>• Changes in other disease burden</li> <li>• Changes in use of health facilities</li> <li>• Actual changes in the number of malaria incidence</li> </ul>

### 3.13 Proportion of malaria deaths

Formula	$100 * \frac{\text{Number of malaria IPD deaths}}{\text{All cause IPD deaths}}$
Numerator	Number of malaria inpatient deaths
Denominator	Total number of all causes IPD Deaths
Purpose	To ensure that the changes in trends of malaria deaths are not due to other

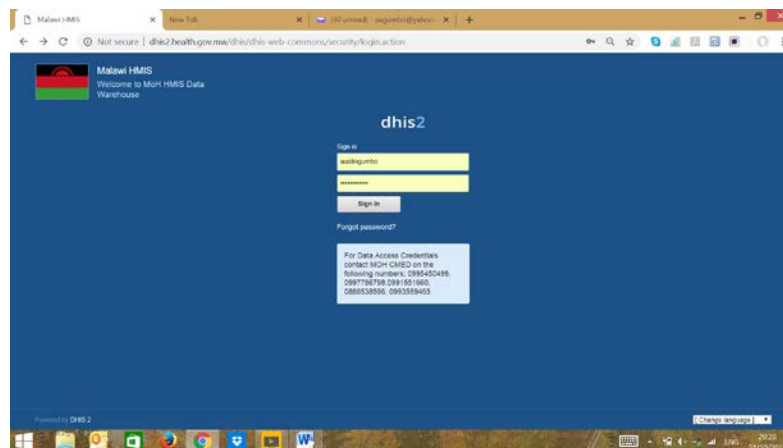
	systemic factors that equally affect other diseases.
Interpretation	<p>The trends of malaria deaths can be affected by</p> <ul style="list-style-type: none"> <li>• Completeness of reporting</li> <li>• Changes in other disease burden</li> <li>• Changes in use of health facilities</li> <li>• Actual changes in the number of malaria deaths</li> </ul>

## 4.0 Steps in data extraction, cleaning, analysis and interpretation

### 4.1 Step 1. Data extraction

This section provides details how malaria data is extracted from DHIS2 into excel sheet for offline data cleaning and analysis. Data can be extracted by different levels such as zone, district and health facility as well as by period.

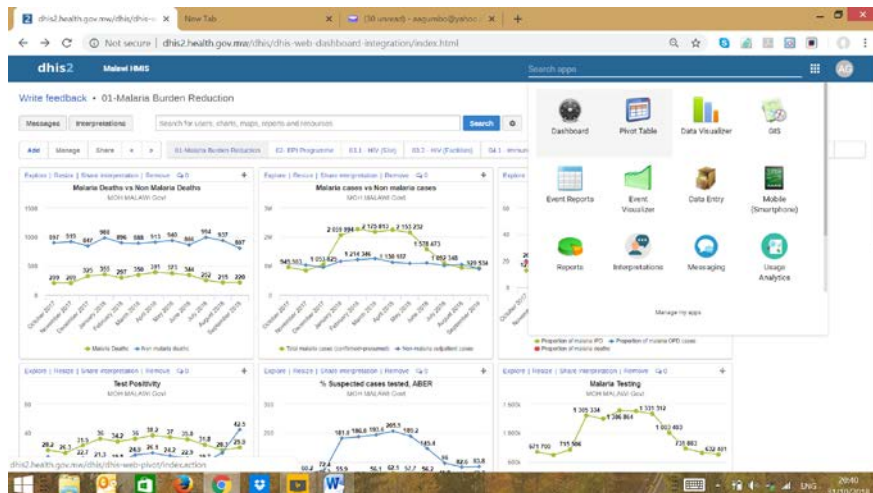
#### 4.1.1 Login into DHIS2



Login into DHIS2 using the latest link [www.dhis2.health.gov.mw/dhis](http://www.dhis2.health.gov.mw/dhis). This will take you to the window that will be used to create a pivot table.

#### 4.1.2 Creating pivot table

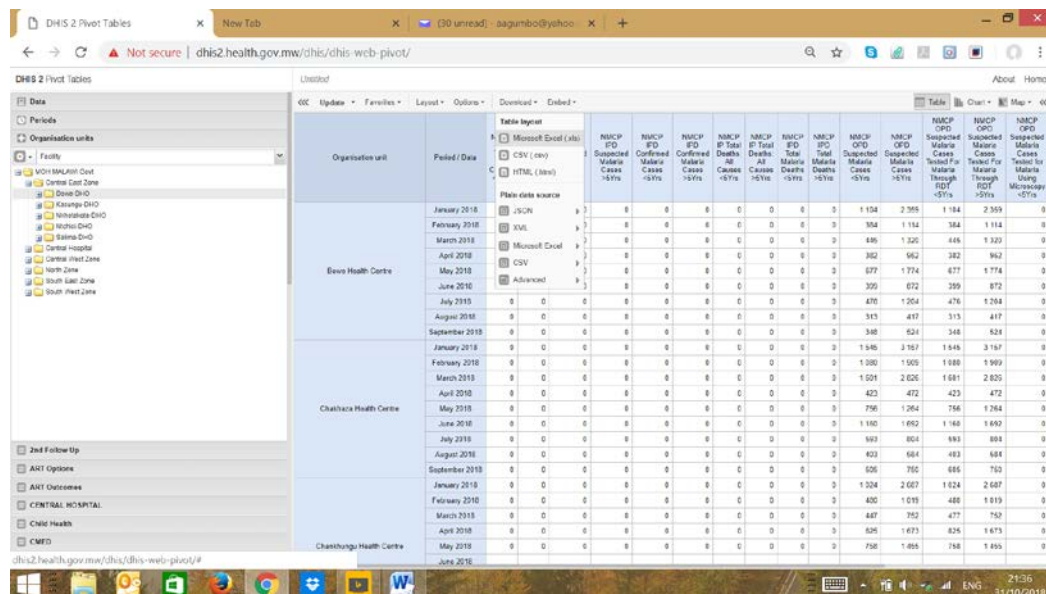
**Insert screen shot**



- a) Check and select on application for pivot table
- b) Select data element: then select data element groups. These are NMCP, IMCI and HMIS15.
- c) Selecting Data elements of NMCP from the available window to the selected window are as follows; **Take note change total to detailed from the above window.**
  - NMCP IP Total: All Causes <5Yrs
  - NMCP IP Total: All Causes >5Yrs
  - NMCP IP Suspected Malaria Cases <5Yrs
  - NMCP IP Suspected Malaria Cases >5Yrs
  - NMCP IP Confirmed Malaria Cases <5Yrs
  - NMCP IP Confirmed Malaria Cases >5Yrs
  - NMCP IP Total Deaths: All Causes <5Yrs
  - NMCP IP Total Deaths: All Causes >5Yrs
  - NMCP IPD Total Malaria Deaths <5Yrs
  - NMCP IPD Total Malaria Deaths >5Yrs
  - NMCP OPD Suspected Malaria Cases <5Yrs
  - NMCP OPD Suspected Malaria Cases >5Yrs
  - NMCP OPD Suspected Malaria Cases Tested for Malaria Through RDT <5Yrs
  - NMCP OPD Suspected Malaria Cases Tested for Malaria Through RDT >5Yrs
  - NMCP OPD Suspected Malaria Cases Tested for Malaria Using Microscopy <5Yrs
  - NMCP OPD Suspected Malaria Cases Tested for Malaria Using Microscopy >5Yrs
  - NMCP OPD Confirmed Malaria Cases Through RDT <5Yrs
  - NMCP OPD Confirmed Malaria Cases Through RDT >5Yrs
  - NMCP OPD Confirmed Malaria Cases Through Microscopy <5Yrs
  - NMCP OPD Confirmed Malaria Cases Through Microscopy >5Yrs
  - NMCP LA 1X6 Qty Dispensed
  - NMCP LA 2X6 Qty Dispensed
  - NMCP LA 3X6 Qty Dispensed
  - NMCP LA 4X6 Qty Dispensed

- d) Selecting Data elements of HMIS 15 from the available window to the selected window are as follows; **Take note change total to detailed from the above window**
- HMIS # of OPD Attendance
  - HMIS Malaria – New Case (under 5)
  - HMIS Malaria- New Cases (5 & Above)
- e) Selecting Data elements of CHD IMCI from the available window to the selected window are as follows; **Take note this should not be changed to detailed.**
- CHD IMCI Fever New Cases
  - CHD IMCI Fever Referrals Danger Signs
  - CHD IMCI mRDT Positive New Cases
  - CHD IMCI mRDT Negative New Cases
  - CHD IMCI LA 6X1 Quantity Dispensed
  - CHD IMCI LA 6X2 Quantity Dispensed)
- f) Select period  
Select monthly in the select period type window, then select months of interest from available to selected window. Take note that by default the system selects last year. Make sure deselect this before you continue.
- g) Select organization unit
- Click scroll down under organization unit, then select level
  - Select level of interest from the select organization unit level window (national, zone, district, facility and community)
  - Select facility of interest at district level
  - Select your district from your zone
- h) Go to the biggest window from your right hand side, where there is update, favourite, layout, option and download.
- Click layout, touch and hold organization unit from report filter window to row dimension window above period.
  - Click options box, the deselect show column totals, show row totals and show row subtotals.
  - Click update and wait for the pivot table to the right hand window.

### 4.1.3 Exporting pivot table



- Click download
- Select excel to export pivot table into excel sheet
- Save on desktop.
- Make sure first row in the excel sheet is not blank

## 4.2 Step 2. Data Cleaning

This section describes how to clean data off line in the excel sheet. This should help in updating data online once validation have been made. The main focus is therefore to check for completeness, consistency of data, outliers and missing data.

### 4.2.1 Review the completeness of data by district or by facility

- Create the above chart to a trend of 3-months period
- Describe the trend in reporting completeness over the months by facility.
- Identify the month with lowest reporting completeness. Do further checks to identify the admin level that led to the lowest reporting completeness.

### 4.2.2 Assess the consistency of malaria data

Consistency of data elements can be assessed over time and consistency between data elements themselves. Apart from outbreaks or epidemics, the expected seasonality in the number of malaria cases should be consistent year-to-year and month-to-month.

Consistency can be assessed between **data elements and by type and location** as per four indicators shown below:

- Total positive cases should be less or equal to total tested;



- Total suspected cases should be more or equal to total tested, assuming a near 100% confirmation rate;
- Total all cause IPD cases should be higher than total inpatient malaria cases;
- Total all cause OPD cases should be higher than total OPD confirmed malaria cases;

For example:

- Generate table with the three comparisons and identify any inconsistency.
- For each data element, drill down on inconsistent values till you discover the source of the inaccurate value.

### 4.2.3 Useful Excel formula for data cleaning

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Sometimes a column will contain multiple pieces of information e.g. number or value! or DVD/O!. Formula allow you to extract these data systematically and keep only information you need into a different column without distorting the original data.

To avoid having error in the division of cell where there is zero or missing data, the formula below should be used to remove DVD/O.

Condition:  $A2 \neq ""$  And  $A2 > 0$  (A2 must be different from empty space and greater than 0).

In Excel this will be written this way:  $AND(A2 \neq "", A2 > 0)$

Now, the complete formula will be:  $IF(AND(A2 \neq "", A2 > 0), B2/A2, "")$  in simple terms:

$=IF(AND(denominator \neq "", denominator > 0), numerator/denominator, "")$

This formula will remove all characters that have been divided by zero (DVD/O) leaving blank space.

### Removing values in the pivot table:

In order to remove the values in the table, you force or insert the blank cell to have zero but immediately delete the zero you insert in the blank space. This will leave the cell to have zero.

### 4.2.4 Assess for presence of extreme values (outliers)

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Presence of extremely low or high numbers in a given admin level for a given month is indication of data quality problem. In general, malaria data should be within the expected ranges allowing for seasonal patterns or fluctuations. Filtering and sorting data, especially numbers, can help identify outliers and inconsistencies in the data. A filter is best applied to data with only one column header. When sorting, be sure that the sorting is applied to all the

data elements in the table so that the sorting does not change only some of the information in a row.

Discuss the outliers (low or high), on how to solve the problems in terms of whether it would be possible:

- i. Contact the district or health facility for correction (look for a hard copy of monthly reporting form if not the register)
- ii. Outlier values must be edited in the DHIS 2 by district who has permission to edit the data
- iii. Agree on strategies to reduce the number of suspicious values in the future

#### **4.2.5 Assessing missing values**

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Zero values in malaria are true values, therefore missing values should be left as blank or with a specific value selected to represent missing data. Ensure that your district follows strictly the policy of non-zero as missing.

### **4.3 Data analysis and interpretation**

Data analysis could be done at health facility or at district levels in order to assess whether trends or changes in the disease burden

#### **4.3.1 Health facility level**

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Data should be reviewed at least monthly in order to check whether there are unusual changes in the number of malaria cases. The following questions can be used: Are there unusual changes in the numbers of cases? Do some areas or villages have more malaria than others?

- i. *Are there unusual changes in the numbers of cases?*

The number of confirmed malaria cases should be plotted monthly to identify any variation over time. This assessment can be made more easily if the previous 2 or 3 years of data are plotted on the same chart

If the number of cases remains stable despite an increase in malaria control interventions, such as recent distribution of ITNs, an investigation may also be merited to assess whether the ITNs have reached the target populations, are being used and are effective against the local anopheline vector population.

- ii. *Do some areas have more malaria than others?*

Annually it is useful to determine which areas or villages are reporting the most cases; malaria can be concentrated in particular areas in which the environmental conditions are particularly suitable for transmission. This information is useful in determining the control interventions that could be applied to most affected areas/villages.

### 4.3.2 District level

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In order to perform analysis at district level, five standard surveillance graphs should be updated every month to monitor trends in malaria cases and deaths. Data should be presented for the current year and the previous 3 years

Data should be reviewed at least monthly in two ways: for the district as a whole and for individual health facilities or geographical areas:

*1 Trends in malaria should be examined throughout the district.* This will enable managers to answer the following questions:

- Are testing and reporting targets being met; e.g. what percentage of suspected cases are tested, and what percentage of health facilities have submitted reports in a timely fashion?
- Are there trends in malarial disease that are of concern; e.g. a rise in the number of cases or an unusually large number of deaths in 1 month that suggest that control activities should be intensified.
- Are there unusual differences between indicators; e.g. does the number of deaths remain constant despite the number of cases falling

*2 Indicators for different health facilities or geographical areas should be compared.* This will enable managers to answer the following questions:

- Which health facilities are testing and reporting adequately and which are experiencing problems? For example, are some health facilities unable to increase the percentage of suspected cases tested?
- Are there unusual differences between health facilities for some indicators? For example, is the number of cases not decreasing despite an increase in ITN coverage

Such comparisons can be made by three methods: by examining control charts for each health facility, by constructing surveillance tables for each indicator or by constructing a summary table of surveillance indicators by health facility with trend statistics.

### 4.3.3 Developing standard graphs

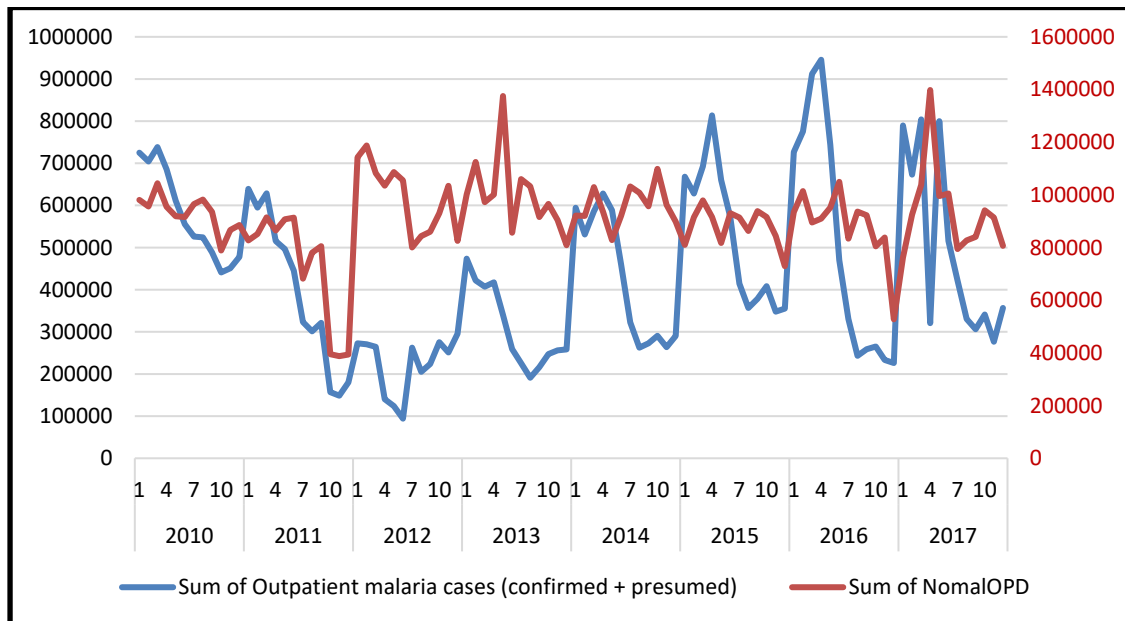
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The following standard graphs should be produced in order to monitor trends in malaria burden monthly or quarterly.

**Insert standard graphs as examples.**

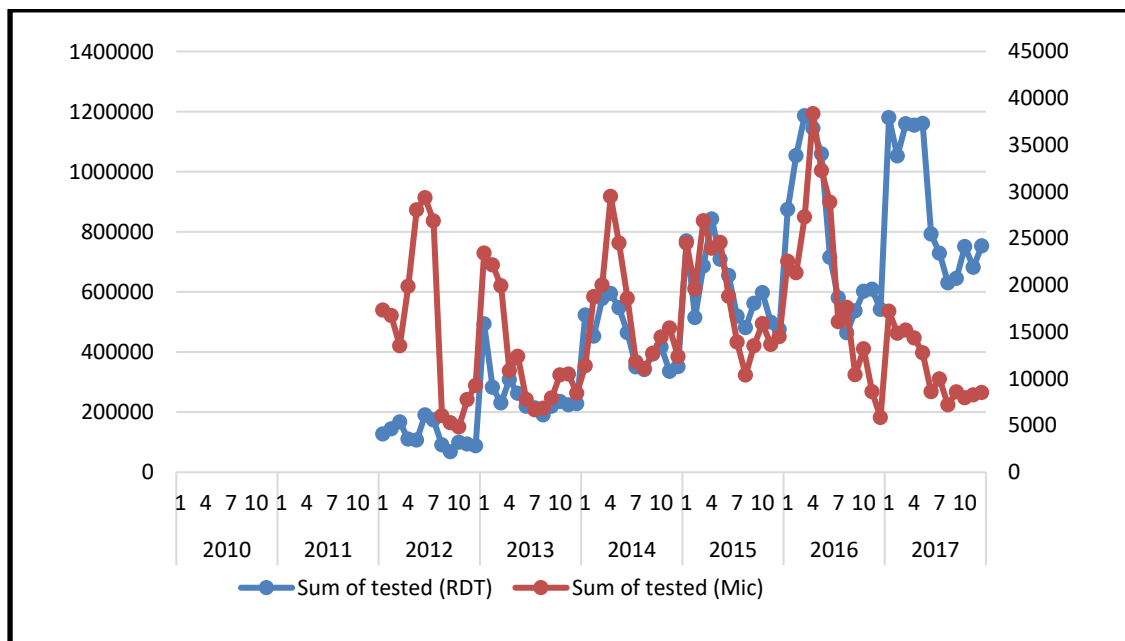
### OPD confirmed cases vs non-malaria OPD cases (double y-axis)

Some fluctuations, non-malaria OPD trends-stable, Malaria OPD –poor data quality



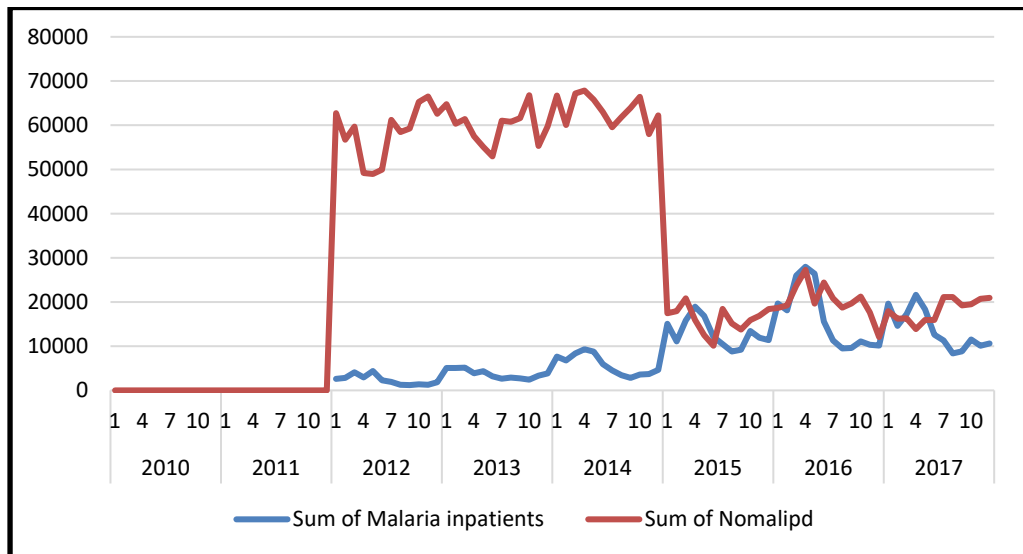
### Cases tested with microscopy and RDT (Areal graph)

mRDT is the main diagnostic method, use microscopy is only to confirm treatment failure and for severe malaria cases



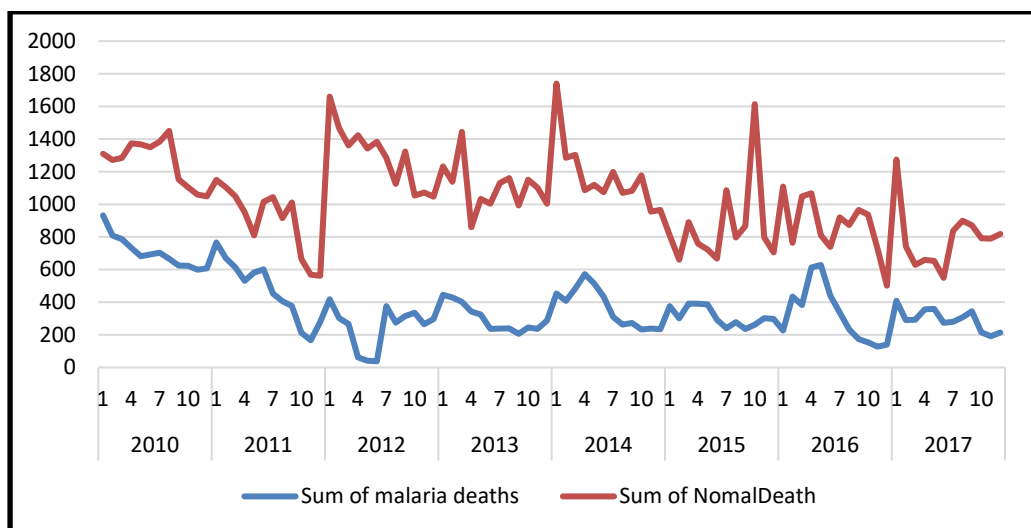
### IPD malaria vs non-malaria IPD cases

IPD malaria cases in 2016- seemed realistic, 2017-too low, again due to reporting.



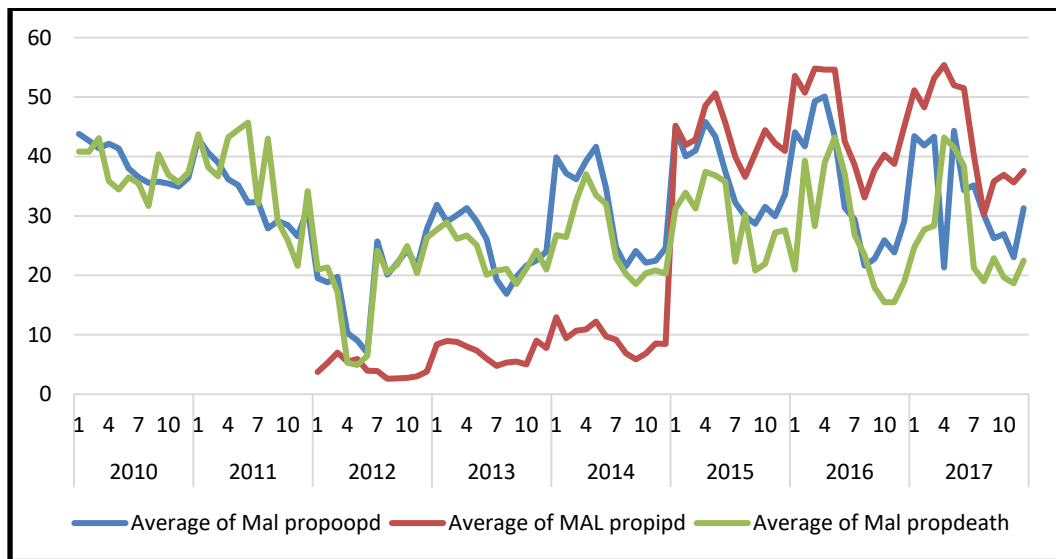
### Malaria deaths vs non-malaria deaths

Seasonal variation, malaria deaths-constant over time.



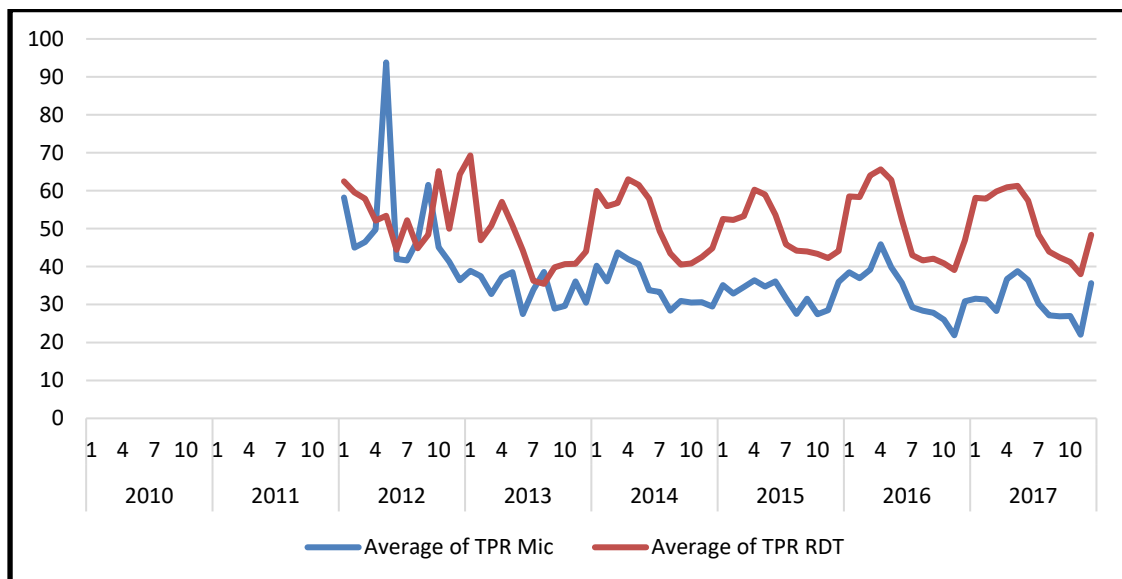
**Prop of OPD malaria cases, IPD malaria cases and malaria deaths**

Prop of OPD malaria-variable, IPD malaria-constant. Prop. of death-declining but is not clear if this is due to reporting.



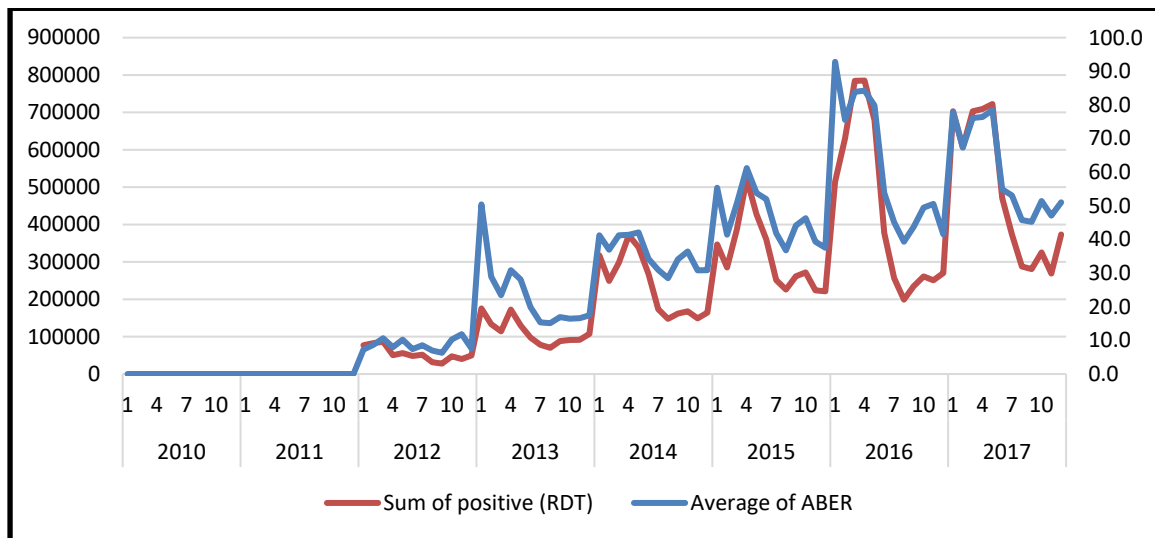
**Test positivity rate for RDT and Microscopy**

TPR with microscopy is lower than RDT except where is poor data.



**Confirmed cases vs Annual blood examination rate (ABER)**

ABER-consistent at 10-15%, % of suspected cases-increased to >70%.



**Reporting completeness by malaria indicator (OPD, IPD and malaria deaths)**

Count of HFs that have reported / count of HFs expected to report from DHIS2.

In interpretation of the graphs or tables, caution should be taken because in most cases changes could be affected by the following:

- Completeness of reporting:
- Changes in use of health facilities (improved care seeking behavior) owing to greater availability of malaria commodities
- Actual changes in the incidence of malaria
- Introduction of new interventions

