“AN INFORMATION SYSTEM APPROACH TO SUPPORT MALARIA ELIMINATION IN BHUTAN”
Chronology of Malaria Information System

- First started paper based reporting in limited districts (3 districts) 1965 – early 80s
- Integrated in overall health system – Mid 90s. Paper based data was compiled in Epi-Info software at program level for analytical purposes
- Notify malaria cases through telephone and SMS – 2005 onwards and case based surveillance/ interventions from 2013
- Developed web-based malaria information system from 2012 as pilot in Sarpang district as part of intervention through APMEN funding support 2013-2015
- Rolled in 7 malaria endemic district.
- Shift to DHSI2 incorporating all information required from WHO reporting and donors indicators
- DHSI2 piloted in 3 endemic districts in June, 2018 and incorporated their comments
- Final consultative meeting conducted with expert on 28th -30th Jan. 2019
COMPONENTS OF BFMIS

Local BFMIS Software (Installed on user computer)

Central Web & Database Server (Installed at PHL Server)

BFMIS Mobile Apps (Installed on android mobile)

Web Applications (Accessible at www.phls.gov.bt)

Bhutan Febrile & Malaria Information System
**Why DHIS2**

- Integration to single reporting platform at the national level
- Current web-based does not captured required information
- Maintenance of server and up-gradation expensive
- Free and Open Source Software (FOSS) platform, no licensing restriction.
- Flexible, easy to use, multi-lingual – customizable to different use cases.
- Supports aggregate & case based data (tracker) and their integration in one system.
- Strong data analytical dashboards integrated with GIS.
- Enables implementation of WHO reference standards (like Malaria) through standard WHO Modules customized on DHIS2.
- Integrated with Android, supporting a comprehensive Software Development Kit (SDK).
- Good backup support with developers and WHO
Problem Statement:

- Royal Kingdom of Bhutan is committed towards malaria elimination as a goal and
- This required a surveillance & monitoring system, supporting all data capture and analysis requirements in context of both malaria case-based tracking as well as foci identification, investigation & response efforts of the country.
- Required real time documentation and responses
STRATEGY AND IMPLEMENTATION – MALARIA TRACKING SYSTEM, BHUTAN

Strategy adopted:

- After an initial implementation review by WHO Geneva, DHIS2 was identified as a suitable system to cater the country specific data requirements and at the same time allowing an integration with accepted standards for Malaria specific data collection advised by WHO.
STRATEGY AND IMPLEMENTATION – MALARIA TRACKING SYSTEM, BHUTAN

Process followed:

- In-country review of entire program with national malaria team (VDCP, HMIS and RCDC) and customization according to existing country specific datasets;
- This was followed with capacity building of users and a pilot implementation in 3 high endemic districts of the country.
- After inclusion of all data capture requirements, dashboards and custom reports were developed to facilitate data analysis;
- Integrated of the system with HMIS and a full scale implementation across the country.
STRATEGY AND IMPLEMENTATION – MALARIA TRACKING SYSTEM, BHUTAN

Key challenges faced and solutions employed:

- In the older system of Malaria case registration in Bhutan (BFMIS), linking a registered case to foci was not possible. The relationships feature of DHIS2 was used to define such links, which supported “Many to One” Case-Foci relationships.
- Another challenge was the wide difference in data particulars being captured in Bhutan as against the standard WHO Malaria app. A concurrent modification of tracker program with feedbacks received during National orientation, user trainings, pilot implementation.
- Internet is a challenge in various geographies of Bhutan and to tackle this issue, DHIS2 stands a suitable solution due to its capacity to capture data offline using Android technology, which is the next plan for integration during country-wide scale-up.
A malaria elimination program relies on the relationship between **foci** and **case** at the core of analysis, which is crucial to inform all related public health actions.
DATA AND PROGRAM QUALITY ASSURANCE

- A continuous monitoring of the pilot was done by VDCP team and feedbacks shared (HISP India) to address issues concurrently.
- Remove all possible redundancy in the data being captured and avoid duplication (a single case/foci enrolment would capture all event data in line)
- Various program rules have been defined to control the quality of data being entered, which allows the users for entering data only in line with the defined logics.
- System was designed to alerts about any duplicate case entries right at the time of enrolment
- User dashboards allow a real-time monitoring of program implementation and enables the team to identify data quality issues promptly.
- **Alignment with International Standards:** This tracker program is a country customized version of the standard WHO Health App for Malaria, developed by the University of Oslo with WHO Geneva
DOCUMENTATION AND MEASUREMENT

- The system design used for development of this tracker system is based on WHO’s ‘Malaria Surveillance, Monitoring and Evaluation – A reference Manual’ for the Global Malaria Programme, which was published in 2018.

- WHO Health Apps are being increasingly used by countries to support their disease specific data needs (HIV, TB, Malaria, EPI, Cause of Death, etc) and evidence exists towards its capability in reforming data use.

- DHIS2 is an already implemented solution for MCH tracking in Bhutan and also serves the role of the country’s routine HMIS, and thus was a suitable solution for this setting.

- DHIS2 being an open source software, no funds are specifically required to be allocated towards licensing and hence the use is very cost effective (only support for an initial period of customization followed with server hosting is required).

- Considering a limited case load of Malaria in Bhutan (nearly 60 cases in 2017), such a system can ensure a comprehensive follow-up of each case and monitor the interventions effectively.

- Facility-based data entry operators/technicians were directly trained to enter data and a National level core team (from VDCP, RCDC and HMIS) was responsible for overall implementation monitoring.
PARTNERSHIPS

- Key stakeholders of the system were RCDC, HMIS-ICT team, VDCP, WHO (SEARO & Country office), UiO and HISP India; where a core national level team was responsible for the overall implementation on ground.

- **Responsibilities of external stakeholders:**
  - WHO Geneva - Initial program assessment
  - WHO SEARO - Project funding
  - HISP India - System development and configuration, Remote technical support
  - University of Oslo (UiO) - Android app development
  - The Global Fund for system implementation (training and equipment)
REPLICABILITY

- The basic design of this Malaria tracker is in line with WHO recommendation of program design in Malaria Elimination settings, and thus, can further be developed/customized to suit a similar setting.

- An attempt to replicate this system would definitely be more effective with an initial look at the country considerations for Health apps and arranging an external assessment/feasibility study of malaria program in the country.

- Based on country interests, donors like Global Fund and WHO are in good interest to provide funding for such efforts.

- Technical backup support can be taken from agencies like UiO/HISP nodes towards configuration to meet specific country requirements.
PROGRAM IMPROVEMENTS

- The system has been completely rolled-out at full scale to generate:
  - Evidence for promoting complete follow-up of all malaria cases.
  - Strengthening of vector control interventions based on the data generated.
  - A better planning and budgeting for targeted interventions based on the data outputs for distribution of cases by geography/risk population.
  - Enhanced data quality.
  - Reduced chances of data manipulation and incomplete/inconsistent reporting.
  - Reduced manual effort in data analysis as the system can compute the desired indicators from the data itself.
  - Program managers will be more equipped to conduct comprehensive review.
SUSTAINABILITY

- Migration malaria system to the Ministry of Health servers in DIT.
- Integration of Malaria tracker to the present DHIS2 system for MCH, so that same instance can capture all health-specific data in one place.
- HMIS team of MoH Bhutan is using DHIS2 for monthly district reporting since nearly the past 5 years, and thus, are in good capacity to manage this system.
- DHIS2 seems user friendly and can be used by a user with a minimal orientation to the fields to capture and dashboards.
- With its integration with Android, it supports even offline data entry and makes it further compatible to take care of internet related issues in some difficult geographies.
- DHIS2 presents various capabilities of data analysis (with apps like Pivot tables, Maps, Data Visualizer, Custom reports, etc) and hence, this system can support majorly towards sustained data use.
Way forwards

- Roll out training initiated in 7 malaria risk districts from 4\textsuperscript{th} – 18\textsuperscript{th} March, 2019.
- Roll out to rest 13 districts within June 2019
- HISP India will provide remote assistance for another one year
Thank You