TERM OF REFERENCES (TOR)
Technical Support to Digital Health for Malaria Surveillance Program

I. Background

Malaria is a current major public health problem. This infectious disease not only can reduce labor productivity but also mortality and morbidity for infants, toddlers, and pregnant women. Sustainable Development Goals (SDGs) still includes malaria elimination as one of target indicators (Goal 3.3) to achieve in 2030. As a result, the malaria program is still a priority at the national and global levels. Government of Indonesia, for example, includes malaria elimination in the RPJMN (National Mid-term Development Plan) and a strategic plan indicator of the Ministry of Health 2015-2019. The Presidential Staff Office itself will monitor progress and its achievements.

Progress in the malaria programme in Indonesia can be seen from the increasing number of districts achieving malaria elimination every year. By the end of 2019, 300 districts of 514 districts have received a certificate of malaria elimination from the Minister of Health, and 208 million (77.7%) people are living in areas free of local malaria transmission. The strategy for prevention and control of malaria in Indonesia is based on endemicity stratification. The malaria morbidity rate based on the Annual Parasite Incidence (API) in Indonesia from 2009 to 2018 has a declining trend, namely 1.85 per 1000 population with 418,439 cases in 2009 0.93 with 250,644 cases in 2019.

Surveillance as the core interventions is the leading approach in achieving malaria elimination. This is stated in the Global Technical Strategy for Malaria 2016-2030 pillar and it is translated in the document of the 2016-2030 National Action Plan for the Acceleration of Malaria Elimination. It enables program to use and analyze the continuous and systematic data in the planning, implementation, and evaluation of public health.

Surveillance was carried out by screening through blood tests. All malaria suspects must be diagnosed by microscopy confirmation, except for some cases examination carried out with Rapid Diagnostic Test (RDT), and in the elimination area, malaria diagnosis is done by PCR. The quality of testing depends on the competence and performance of laboratory personnel from the national laboratory to the peripheral health facilities. The expected target percentage of blood supply examination is above 95%. For example, surveillance in 2019 was conducted by examined 2,505,626 blood samples from 2,571,986 blood supply, resulting a blood supply examination percentage of 97%, increase continuously from 81% in 2010 (NMCP, 2020).

Several activities were carried out to improve the quality of malaria testing laboratory services. For example, Ministry of Health increases the capacity of human resources by panel tests during field supportive supervision. This requires a standard tool to determine their competency level. The number of technical personnel is also optimized as needed. Draw blood from two to three patients daily requires a minimum of 4 technical personnel. Approximately 200-250 days are required to collect all the blood to make standard slides ready for viewing under a microscope. In addition, to confirm the slide, PCR will be performed.

In addition, Malaria Standard Blood Slides are provided according to the amount needed. Ideally, each district needs 100 standard slides to carry during field surveillance, which can last for 5 years. The

standard blood sample consisted of 5 species of plasmodium (Plasmodium falciparum, P. vivax, P. malariae, P. ovale, and P. knowlesi). Indonesia has 514 districts, meaning that Indonesia needs> 50,000 slides. The probability of having a successful slide is around 70-90% from the start of slide creation to the end of the standard slide that meets the requirements. This makes the current slide demand for around 70,000 slides. However, 20,000 slides will be created each time (a year). The total slides were produced from approximately 500 malaria positive patients (1 patient = 150-200 slides).

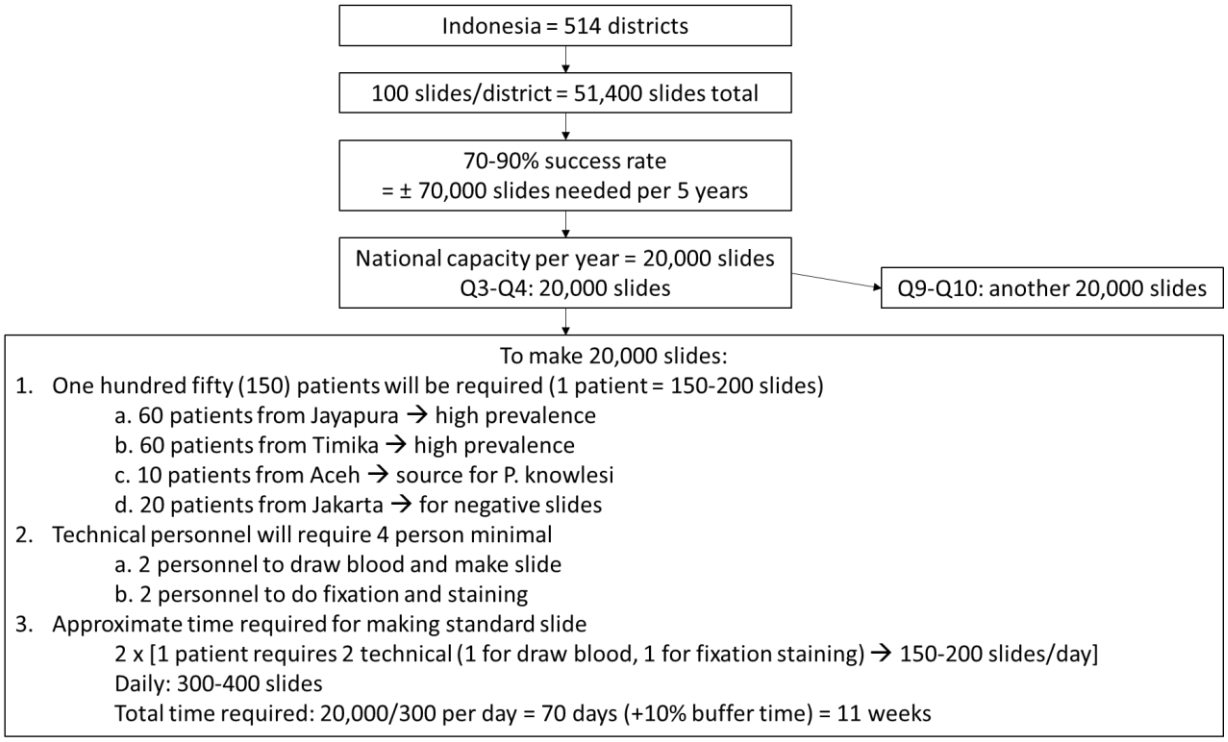

Figure 1. Illustration of developing slide standard

Data strengthen including information system and data management is another effort. Currently, Ministry of Health rely on SISMAL (Sistem Informasi Malaria/Malaria Information System) Version 2 for the malaria surveillance program. The SISMAL V2 began to be socialized in 2018 and it has fully used in 2019. A total of 9,155 health facilities have been reporting malaria data using the SISMAL V2. As a growing information system, SISMAL still need to improve to answer challenges and more friendly user for officers in health facilities and updated information can easily show up in dashboard at every level. Therefore, the MoH planned to conduct and evaluation and review the SISMAL V2 to determine the challenges and issues around the SISMAL V2 which using excel based and it will be basis for further development into SISMAL V3 using recommended platform from Data and Information Center of MoH (Pusdatin) and based on SISMAL V2 assessment results including recommendation of SIMSAL V3 architecture.

Refer to DHIS2 platform, the generic of DHIS2 modules have been developed to strengthen the collection, reporting and use of malaria entomology and vector control data to inform decision-making. The modules consist of electronic data collection forms, standard indicators and automatically generated data visualizations developed to support the following interventions areas:

- insecticide treated nets (ITN) mass distribution campaigns,
- ITN bio efficacy monitoring,
- indoor residual spraying (IRS) campaigns,
- IRS residual efficacy monitoring,
- insecticide resistance monitoring,
- adult mosquito surveillance and identification and
- monitoring of mosquito larval habitats.

All the modules have been designed in line with existing WHO standard protocols and guidance.[1]

UNDP will assist Ministry of Health as the Principal Recipients of GF Malaria Program in this surveillance effort. Technical Assistance will be provided in ensuring better data retrieval and management. Surveillance activities will enter the digital era where all data obtained in the field will be directly entered into a SISMAL V3 application. The improvement of SISMAL into V3 will improve data interoperability into the ASDK at Pusdatin. SISMAL V3 will also be developed to obtain and display logistics data at the national and district level in real time. This includes the availability, need, and expiration of medicines, bed nets, and medical kits in every district in Indonesia. It will allow the Program to monitor data in real time and analyze it in decision or policy making efforts.

II. Objective and Expected Outputs

The objective of this Technical Support to Digital Health for Malaria Program are:

1. Through collaboration between UNDP and WHO to support quality assurance for malaria microscopy by make standard slide and develop electronic malaria standard blood slide bank.
2. To upgrade of SISMAL V2 to SISMAL V3 using recommended platform from Data and Information Center of MoH (Pusdatin) and based on SISMAL V2 assessment result to improve the use of SISMAL as a malaria program information system application and improve data analysis functions. Real time information regarding the malaria situation in Indonesia will be displayed including surveillance results. The data analysis will link to ASDK afterwards.

The expected Output of this activity:

Output 1: Electronic malaria standard blood slide bank is developed.

Activities:

1. UNDP will provide management support for quality assurance for malaria microscopy by make standard slide and develop electronic malaria standard blood slide bank.
2. WHO will provide technical assistance for quality assurance for malaria microscopy by make standard slide and develop electronic malaria standard blood slide bank.
3. Product: High quality standard slide malaria (15,000-20,000 pieces) that will be handed over to the NMCP. These slides consisting of:

   Set 1: Standard Slide for identification (42 slides):
   - 20 negative slides
   - 22 positive slides with density 80-200 parasite/µL and 201-300 parasite/µL:
     - 10 slides Plasmodium falciparum
     - 4 slides mixed infection (2) species (including *P.falciparum*, each species >40 parasites/µL, co-infection species depending local prevalence
     - 8 slides *Plasmodium malariae*, *Plasmodium vivax*, and/or *Plasmodium ovale* (each depends on the local prevalence)

   Set 2: Standard slide for parasite counting (14 positive slides):
   - 6 Plasmodium falciparum (200-500 parasite/µL,)
   - 6 Plasmodium falciparum (500-2000 parasite/µL)
   - 2 Plasmodium falciparum (40,000-100 000 parasite/µL)

Output 2: SISMAL Version 3 is Developed

1. Assessment of SISMAL V2

[1] https://www.who.int/malaria/areas/vector_control/dhis-tools/en/

2. Development of architecture SISMAL V3 (web-based and app-based)
3. Trial of SISMAL V3
4. SISMAL V3 finalization
5. Data migration and meta data setup
6. SISMAL ready for rolling out

Report:

a. Final draft report of Malaria Standard Blood Slides approved by NVBZCP and review team (refers to the written responsibilities). This includes picture of activities with consents (written or video consents)
b. Report of SISMAL V2 review, evaluation, and gap analysis
c. Recommendation and action plans for SISMAL V3 development
d. Report of final SISMAL V3 (web-based and phone-based)
e. Report of SISMAL V3 implementation

III. Implementation

A. Malaria Standard Blood Slides

In close collaboration with UNDP, WHO and Sub-Directorate of malaria, Program will perform the following specific duties:

1. Collect malaria patients' blood.
2. Draw blood and prepare the standard slides ready for microscopy.
3. Do staining with Giemsa.
4. Do PCR confirmation.
5. Cover slides with slips.
6. Label the slides.
7. Coordinate with level-1 microscopist for slide validation.
8. Do packing based on desired Plasmodium composition.
9. Conduct a virtual documentation by:
   - Taking pictures from the standard slides, 1 slide for with high resolution picture that can be used as virtual slide standard (slide standard dictionary).
   - Taking minimum 1,000 pictures per Plasmodium species per stadium. There are 5 species and 3 stadiums, so total would be minimum 15,000 pictures. For 1 positive sample, 200 pictures will be taken from various angles, stadium, density of each malaria species.
10. Create a platform or cloud drive for sustainable and confidential data storage for the pictures.
11. Hand over all the slides and written clear data methodology and labeling to the NMCP.
12. At least 6 months guarantee for the data file and storage.
13. Produce and distribute 50 copies containing representative Plasmodium pictures.

B. SISMAL V3

There are three stages in implementing SISMAL V3, which are:

1. SISMAL V2 Assessment (review, evaluation, recommendations)
   PR Ministry of Health and UNDP will contract an organization / individual to assess the current SISMAL V2 for further development. In detail, the activities as follow:
   - Recruitment of organizations / individuals who have more than 5 years of experience in developing DHIS2 information systems or similar systems.
   - Implementing the results of the review and evaluation of SISMAL V2, including weaknesses and strengths, lessons learnt, and recommendations for developing SISMAL V3.
   - Provide recommendations for the SISMAL V3 architecture that is user friendly, efficient, and systematic. In addition to the information system recommendations, supporting infrastructure recommendations must also include, for example, server, computer, and other specifications.

2. Develop SISMAL hat in-line with one health data app at Centre of Data and Information.
   PR Ministry of Health and UNDP will work with 3rd Parties to develop SISMAL V3. SISMAL V3 development includes:
   - Infrastructure (Server)Development of modules according to predetermined indicators
   - Trial of SISMAL V3 in three selected cities/districts and refinement of SISMALV3
   - Write a Trial report including recommendation for system improvement, and SISMAL V3 manuals
   - Scaling up of SISMAL V3 in all intervention districts / cities
   - The Ministry of Health will have Source Code SISMAL V3, the developer will provide warranty and technical assistance for at least 3 years.

3. Implementation of SISMAL V3
   In this activity, PR Ministry of Health and UNDP will contract an organization / individual to manage SISMAL V3 as a super administrator who can maintain, repair and develop SISMAL V3 software if needed. In addition, the super administrator ensures that the system can run well from the center to end users. The contracted organization / individual is an expert in DHIS2 or similar information systems. The activities will cover:
   - Data migration from SISMAL V2 to SISMAL V3
   - Metadata development of 9,155 health facilities.
   - Trainings for PR, SRs, and SSRs

IV. Timeline

No	Activities	Q1	Q2	Q3	Q4	Q5
Malaria Standard Blood Slides						
1	Collect samples and making blood slide (1 patient = 1 sample)	×	×			
	- Aceh (Total 10 samples = 2 patients x 5 days) for P.knowlesi					
	- Jayapura (Total 60 samples = 2 patients x 30 days) for Pf, Pv, Po, Pm					
	- Timika (Total 60 samples = 2 patients x 30 days) for Pf, Pv, Po, Pm					
	- Jakarta (Total 20 samples = 2 patients x 30 days) for Pf, Pv, Po, Pm					
2	PCR confirmation for 150 samples		×			
3	Cover slides with slips (500 slides/day, 2000 slides = 40 days)	×	×			
4	Labeling		×			
5	Validation by microscopist level 1 - For 20,000 slides (*12.5%) = 2,500 slides. Level 1 requires 10 microscopists (each will read 250 slides) - For 75 slides, will need 3 days-reading. Thus, 250 slides/75 slides x 3 days		×			
6	Packing		×			
7	Photos and data storage		×			
8	Final report		×			
SISMAL V3						
1	SISMAL V2 Assessment (review, evaluation, recommendations)	×				
2	Develop SISMAL V3 that in-line with one health data app at Centre of Data and Information		×	×		
3	Implementation of SISMAL V3				×	×

V. Profile of the Ideal Candidate

Principal Investigator/Team leader of Malaria Standard Blood Slides

Educational Background:

- Essential: A degree in laboratory, biology, or parasitology related subject from a recognized institution.
- Desirable: Advanced degree in laboratory, biology, or parasitology related subject from a recognized institution.

Experiences:

- Essential: At least five years' experience in malaria microscopy and PCR.
- Desirable: Experience in making malaria standard blood slide and taking professional pictures for malaria blood slides. Have knowledge of malaria parasitology and diagnosis issues; ability to work independently, as a team member, and across teams; ability to handle a large volume of work, multi-task, and meet multiple deadlines.

Competencies:

- The institution/organization must be legal entity registered in Indonesia.
- The institution/organization must be a local institution or national institution which has strong capacity in public health, education, and parasitology.
- The team member of institution/organization should be composed of at least one senior national facilitator level-1 microscopist. Proven by recent ECAMM certificate.
- The team member has experience in undertaking in making standard blood slides.

Consultant of SISMAL V2 Assessment

Educational Background:

- Bachelor's degree in Information and Communication Technology, Database Management, or related field.

Experience:

- At least 3 years relevant experience on Data Science and Data Management Systems
- Experience in collecting, processing, visualizing, and analyzing electronic data
- Knowledge on Health System Strengthening is an advantage.
- Experience in working with any government institution

Competencies:

- Demonstrated skills in information and data management
- Demonstrated skills in product development and analysis in data system including gathering and visualization of information related to malaria
- Have basic knowledge on Malaria Information System

Consultant of SISMAL V3 Development

Educational Background:

- Master's degree in Information and Communication Technology, Database Management, or related field from a recognized institution.

Experiences:

- At least five years' experience in Data Management or Information Systems
- Experience in DHIS2, data migration, and metadata
- Knowledge on Health System Strengthening is an advantage
- Familiar with One Health Data Application (ASDK).
- Experience in working with any government institution.

Competencies:

- The institution/organization must be legal entity registered in Indonesia.
- The institution/organization must be a local institution or national institution which has strong capacity in Information and data management systems.
- Expert in DHIS2 or similar information systems.

VI. Budget

Please see allocated budget for Malaria Component

Activity Description	Payment Modality	2021	2022	2023
Produce and distribute slide standard for QA malaria di	UNDP	29,426.45	-	29,426.45
Produce and distribute slide standard for QA malaria di	UNDP	4,567.80	-	4,567.80
Evaluation and review SISMAL	UNDP	9,609.21	-	-
Develop SISMAL using DHIS2 platform that in-line with	UNDP	105,883.58	-	-
Develop SISMAL using DHIS2 platform that in-line with	UNDP	33,497.18	33,497.18	33,497.18
Financial Management Support	UNDP	219,181.33	-	-
UNDP HQ GMS Fee (7%)	UNDP	28,151.59	2,344.80	4,724.40
Total	UNDP	**430,317.15**	**35,841.98**	**72,215.83**
Grant Total				**538,374.97**