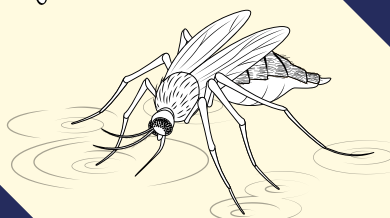
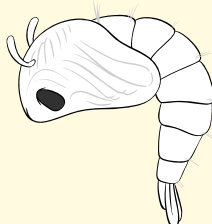
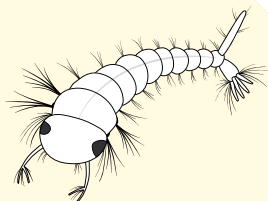
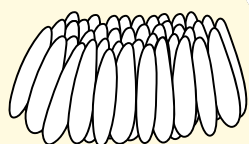




World Health
Organization

Timor-Leste

NATIONAL
STRATEGIC PLAN
FOR INTEGRATED
VECTOR-BORNE DISEASES,
TIMOR-LESTE
2021-2030





National strategic plan for Integrated Vector-borne diseases, Timor-Leste 2021-2030

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Message from the Hon'ble Minister of Health



dr. Odete Maria Freitas Belo, MPH
Minister of Health
Democratic Republic of Timor-Leste
Dili

Malaria, dengue, and lymphatic filariasis (LF) are the primary vector-borne diseases (VBDs) in Timor-Leste. According to available data, there has been a reduction in the number of malaria cases. However, eliminating the disease completely has proven to be a challenge. Despite making tremendous progress, the last mile remains difficult to cover

Dengue is a significant public health concern in the country, with a rising trend of cases. The disease is highly seasonal, with the highest number of cases occurring during the wettest and hottest months of the year. This calls for public health action to mitigate future risks caused by climate change. LF is prevalent throughout the country, with all 13 municipalities being endemic. In line with WHO recommendations, nationwide mass drug administration (MDA) to eliminate LF and control soil-transmitted helminths (STH) was reintroduced in 2015 in collaboration with WHO. In 2016, an estimated total population of 859 million were living at risk of LF requiring MDA. The country has successfully met the criteria of the first transmission assessment survey (TAS) for stopping MDA. However, post-MDA surveillance, including entomological surveillance, needs to continue, and a final TAS must be cleared to achieve the goal of elimination by 2025.

To address all VBDs under one umbrella, an integrated vector-borne disease control unit (IVBDCU) is proposed to be established at the national level. The Ministry of Health (MoH) has made the development of a policy and strategy on VBDC for integration of malaria services into VBDC structures a high-level agenda. The MoH has given high priority to the integrated VBDC framework plan, and necessary funding support towards an integrated VBDC strategy development and training plan has been secured in the current Global Fund funding cycle (2021–23).

It is heartening to note that the comprehensive National Strategic Plan for Integrated Vector-Borne Diseases, Timor-Leste (2021–2030) has been developed with crucial technical support of WHO. I eagerly look forward to the successful implementation of the national strategic plan.



dr. Odete Maria Freitas Belo, MPH
Minister of Health

Message from WHO Representative



Dr. Arvind Mathur

WHO Representative to Timor-Leste
World Health Organization
Dili

In alignment with its mission to eradicate vector-borne diseases (VBDs) such as malaria, dengue, and lymphatic filariasis in Timor-Leste, the Ministry of Health is establishing an integrated vector-borne disease control unit (IVBDCU) at the national level. This initiative is a commendable step forward.

An analysis of the malaria situation in Timor-Leste reveals that the disease has largely been contained to cross-border areas. The decrease in malaria cases over time is attributable to political commitment, universal access to malaria diagnosis, treatment, and prevention, improved surveillance and response mechanisms, quality control of malaria microscopy, behaviour change communication (BCC), the deployment of trained and dedicated malaria staff, strong technical guidance, and funding from organizations such as The Global Fund, Rotarians Against Malaria (RAM), and the WHO. However, the notification of cases in 2020 revealed a few indigenous and imported cases, which is concerning for certification of elimination.

Dengue and lymphatic filariasis are also pressing public health concerns in the country, with a rising trend of cases. To address these issues, it is necessary to bolster follow-up on these cases, entomological surveillance, and preventive measures. Timor-Leste must plan and implement comprehensive services via a skilled and dedicated workforce in partnership with all stakeholders. This approach will ensure sustainable, efficient, and quality interventions to eradicate VBDs.

I am pleased to present the National Strategic Plan for Integrated Vector-Borne Diseases, Timor-Leste (2021-2030). With the proper implementation of this plan, particularly in high endemic areas of the country, I am confident that the goal of eliminating VBDs can be accomplished.

A blue ink handwritten signature of Dr. Arvind Mathur is written over the official seal of the World Health Organization Representative to Timor-Leste. The seal is circular with the text 'WORLD HEALTH ORGANIZATION' and 'TIMOR-LESTE' around the perimeter.

Dr. Arvind Mathur
WHO Representative

Acknowledgements

We acknowledge the contribution from the expert panel members for the development of National Strategic Plan for Integrated Vector-Borne Diseases, Timor-Leste, (2021–2030): Dr Pradeep Kumar Srivastava; Dr Naveen Rai Tuli; and Dr Shampa Nag; From Ministry of Health - Sra Maria Mota; Sr Raul Sarmento; Sr Lukas; Sr Noe Gaspar; WHO Country Office Timor-Leste – Dr Mikhail Ejov, Dr Debashish Kundu; WHO SEARO NTD Unit; and above all Dr Arvind Mathur, WHO Representative for overall guidance.

Acronyms and abbreviations

ABER	annual blood examination rate
ACT	artesunate based combination therapy
API	annual parasite incidence
ASHA	accredited social health activist
BCC	behaviour change communication
CFA	circulating filarial antigen
DBC	domestic breed checkers
DOT	direct observed treatment
EDCT	early detection and complete treatment
ELISA	enzyme linked immune sorbent assay
FTS	filariasis test strips
GFATM	Global Fund for Aids, TB, Malaria
GMEP	global malaria eradication programme
GTS	global technical strategy
IEC	information education communication
IHR	international health regulations
IRM	insecticide resistance management
IRS	indoor residual spray
IVM	integrated vector management
IVMU	integrated vector management unit
LLIN	long-lasting insecticidal net
MDA	mass drug administration
M&E	monitoring & evaluation
PCT	preventive chemotherapy
Pf	plasmodium falciparum
PHC	primary health centre
POR	prevention of reintroduction
Pv	plasmodium vivax
QA	quality assurance
RAM	Rotarians Against Malaria
RDT	rapid diagnostic test

RRT	rapid response team
SP	synthetic pyrethroid

Glossary

Active surveillance: Operation carried out by the surveillance health personnel, who visits every locality in a defined area at regular intervals, in order to enquire for fever cases through individual house visits, and to test for malaria each suspected person so discovered.

Annual blood examination rate: The number of people receiving a parasitological test for malaria per unit population per year.

Annual parasite incidence: The number of reported malaria cases per 1000 population per year.

Artemisinin-based combination therapy: A combination of an artemisinin derivative with a longer-acting antimalarial drug that has a different mode of action.

Case-based surveillance: Every case is reported and investigated immediately (and is included in the reporting system).

Case confirmed: Malaria case (or infection) in which the parasite has been detected in a diagnostic test, i.e., microscopy, a rapid diagnostic test or a molecular diagnostic test.

Case, congenital: Malaria case in which malarial parasites are demonstrated in the peripheral smear of the newborn from 24 hours to 7 days of life.

Case, cryptic: A case of malaria where epidemiologic investigations fail to identify an apparent mode of acquisition.

Case imported: Malaria case or infection in which the infection was acquired outside the area in which it is diagnosed.

Case, indigenous: Any case contracted locally (i.e., within jurisdiction boundaries), without strong evidence of a direct link to an imported case. Indigenous cases include delayed first attacks of *pv* malaria due to locally acquired parasites with a long incubation period.

Case induced: A case the origin of which can be traced to a blood transfusion or other form of parenteral inoculation of the parasite, but not to transmission by a natural mosquito-borne inoculation.

Case introduced: A case contracted locally with strong epidemiological evidence linking it directly to a known imported case (first generation from an imported case, i.e., in which mosquito was infected from an imported case).

Case, locally transmitted/autochthonous: A case locally acquired by mosquito-borne transmission, i.e., an indigenous or introduced case.

Case investigation: Collection of information to allow classification of a malaria case by origin of infection. It includes, but is not limited to, administration of a standardized questionnaire to a person diagnosed with a malaria infection.

Case, malaria (as defined in elimination programmes): A person in whom, regardless of the presence or absence of clinical symptoms, malaria parasites have been confirmed by quality-controlled laboratory diagnosis.

Case management: Diagnosis, treatment, clinical care and follow-up of malaria cases.

Case notification (compulsory): Reporting of detected cases of malaria by all medical units and medical practitioners, to the Department of Health and Family Welfare.

Case presumed: Case strongly suspected clinically as malaria that is not confirmed by a diagnostic test, but nevertheless treated as malaria. (*Note: The designation “presumed case” is reserved for uncommon situations in which a diagnostic test cannot be performed in a timely manner.*)

Case suspected: Illness suspected by a health personnel to be due to malaria, generally on the basis of the presence of fever with or without other symptoms.

Chemoprophylaxis: Administration of a medicine at predefined intervals to prevent either the development of an infection or progression of an infection to manifest disease.

Drug efficacy: Capacity of an antimalarial medicine to achieve the therapeutic objective when administered at a recommended dose, which is well tolerated and has minimal toxicity.

Drug resistance: The ability of a parasite strain to survive and/or multiply despite the absorption of a medicine given in doses equal to or higher than those usually recommended.

Elimination, malaria: The total sustained interruption of local malaria transmission by mosquitoes despite a continued presence of malaria vector mosquitoes and importation of parasites from abroad through international travel and migration.

Endemic: When there is a constant measurable incidence of cases and mosquito-borne transmission in an area over a succession of years.

Epidemic: Occurrence of cases in excess of the number expected in a given place and time period.

Epidemiological investigation: Study of the environmental, human and entomological factors that determine the incidence or prevalence of infection or disease.

Eradication: Permanent reduction to zero of the worldwide incidences of infection caused by a specific agent as a result of deliberate efforts. Intervention measures are no longer needed once eradication has been achieved.

Evaluation: A process that attempts to determine as systematically and objectively as possible the relevance, effectiveness and impact of activities in relation to their objectives.

Focus: A defined, and circumscribed locality situated in a currently or former malarious area and containing the continuous or intermittent epidemiological factors necessary for malaria transmission. Foci can be classified as residual active, residual non-active, cleared up, new potential, new active, endemic or pseudo-foci.

Geographical reconnaissance: Censuses and mapping to determine the distribution of the human population and other features relevant for malaria transmission in order to guide interventions.

Gametocytes, person carrying: Person who has malaria gametocytes in the peripheral blood, making him or her, a potential source of infection.

Hot pops: Demographically discrete groups (populations) that maintain malaria transmission at higher rates than the surrounding population.

Hot spots: Geographically discrete areas within a wider area of transmission in which the transmission intensity is significantly higher than the average level in the surrounding area of that setting.

Indoor residual spray: Operational procedure and strategy for malaria vector control involving spraying interior surfaces of dwellings with a residual insecticide to kill or repel endophilic mosquitoes.

Insecticide resistance: Property of mosquitoes to survive exposure to a standard dose of insecticide; may be the result of physiological or behavioural adaptation.

Malaria free: An area where there is no continuing local mosquito-borne malaria transmission, and the risk of acquiring malaria is limited to introduced cases only.

Malaria prevalence: The number of malaria cases at any given time in a specified population, measured as positive laboratory test results.

Mass blood survey: Also known as mass blood examination. Examination of the blood of all persons in a unit of the population, which may be repeated at certain intervals. Blood specimens are commonly obtained during house-to-house visits.

Monitoring (of programmes): Periodic review of the implementation of an activity, seeking to ensure that inputs, deliveries, work schedules, targeted outputs and other required actions are proceeding according to plan.

Outbreak: Occurrence of cases in excess of what would normally be expected in a defined community, geographical area or season. (A single case long absent from a population, or case not previously recognized in that community or area, may also constitute an outbreak.)

Passive surveillance: Detection of malaria cases among patients who, on their own initiative, visit health services for diagnosis and treatment, usually for a febrile illness.

Population at risk: Population living in a geographical area in which locally acquired malaria cases occurred in the current year and/or previous years.

Receptivity: The abundant presence of anopheline vectors and the existence of other ecological and climatic factors favouring malaria transmission.

Passive surveillance: Detection of malaria cases among patients who, on their own initiative, visit health services for diagnosis and treatment, usually for a febrile illness.

Population at risk: Population living in a geographical area in which locally acquired malaria cases occurred in the current year and/or previous years.

Receptivity: The abundant presence of anopheline vectors and the existence of other ecological and climatic factors favouring malaria transmission.

Re-establishment of transmission: Renewed presence of a constant measurable incidence of cases and mosquito-borne transmission in an area over a succession of years. An indication of the possible re-establishment of transmission would be the occurrence of three or more introduced and/or indigenous malaria infections in the same geographical focus for two consecutive years for *P. falciparum* and for three consecutive years for *P. vivax*.

Sensitivity (of a test): The proportion of true positives among all the positives it detects.

Slide positivity rate : Proportion of blood smears found to be positive for *Plasmodium* among all blood smears examined.

Specificity (of a test): The proportion of true negatives among all the negatives it detects.

Spray, focal: Spray coverage by indoor residual spraying and/or space spraying of houses or habitats in a limited geographical area.

Spray, residual: Spraying the interior walls and ceilings of dwellings with a residual insecticide to kill or repel endophilic mosquito vectors of malaria.

Surveillance: Ongoing, systematic collection, analysis and interpretation of disease-specific data for use in planning, implementing and evaluating public health practice.

Treatment, directly observed: Treatment administered under the direct observation of a health care provider.

Vector control: Measures of any kind directed against a vector of disease and intended to limit its ability to transmit the disease.

Vector resistance: The degree to which a mosquito population is resistant to insecticides.

Vigilance: A function of the public health service during the programme for prevention of re-introduction of transmission, consisting of watchfulness for any occurrence of malaria in an area in which it had not existed or from which it had been eliminated, and the application of necessary measures against it.

Vulnerability: Either proximity to malarious areas or resulting from the frequent influx of infected individuals or groups and/or infective anophelines.

1. Introduction

1.1 Country profile

Timor-Leste or East Timor is the Democratic Republic of Timor-Leste, which is an island country in South-East Asia. It got recognized as a country on 20th May 2002. It comprises the eastern half of the island of Timor, the nearby islands of Atauro and Jaco, and Oecusse, an exclave on the north-western side of the island surrounded by Indonesian West Timor. The island of Timor is part of the Maritime Southeast Asia and is the largest and eastern most of the Lesser Sunda Islands. The Ombai Strait, Wetar Strait and the greater Banda Sea lie to the north of the island. The Timor Sea separates the island from Australia to the south, and the Indonesian province of East Nusa Tenggara lies to Timor-Leste's west. The country lies between latitudes 8° S and 10° S, and longitudes 124° E and 128° E. It covers an area of about 15 410 sqkm. Much of the country is mountainous with its highest peak of Tatamailau known as Mount Ramelau at 2963 metres. The climate is tropical and generally hot and humid. It can be classified as wet and dry seasons. In general, the dry season lasts from May to November, with average temperatures varying between 20 and 33 °C. The rainy season lasts from December to April. The climatic conditions are favourable for perennial malaria transmission.

Figure 1. Map of Timor-Leste



Timor-Leste is divided into 13 municipalities (formerly called districts), which includes Dili, the capital of the country, Aileu, Lautem, Ainaro, Liquica, Baucau, Manatuto, Bobonaro, Manufahi, Covalima, Oecusse, Viqueque, and Ermera. Dili is the largest city and main port, and the second-largest city is the eastern town of Baucau. Each municipality is divided into administrative posts (formerly called sub-districts), and each administrative post is divided into sucos (village); each suco comprises a few aldeias (hamlets). In total, there are 65 administrative posts, 442 sucos and 2225 aldeias (General Directorate of Statistics, 2017). The map of Timor-Leste is given in Fig. 1.

Timor-Leste has a market economy that depends on exports of a few commodities such as oil and gas, coffee, marble and sandalwood. The agriculture sector employs 80% of the active population, with a large proportion of the population being poor. In 2009, about 67 000 households grew coffee in East Timor. The population of Timor-Leste in 2010 was 10 66 409,

which increased to 11 83 643 in 2015 census and estimated as 13 40 513 in the year 2021 comprising about 51% males. The average household size is 5.8 persons, and the literacy rate is 67.3% with rates being similar among males (70.6%) and females (63.9%). The unemployment rate is 47%, and 50% of households have access to improved sanitation facilities. The adult literacy rate in 2010 was 58.3% with higher illiteracy among women. About 99.5% of the population is Christian, 0.24% is Muslim, while 0.26% belong to other religions.

1.2 Health

Medical and health care is enshrined in the constitution as a fundamental right of every citizen. The Ministry of Health (MoH) is under the purview of the minister of health. The MoH comprises two general directorates for cooperate health services and health service delivery. There are five directorates under health service delivery, namely disease control, public health, pharmacy and medicines, hospitals, and SnF (Family Health Service). The directorate of disease control governs three departments, namely the department of communicable disease control (Malaria, TB, HIV, NTDs, Dengue, PoE); department of non-communicable diseases (NCD) and department of mental health. The curative institutions are under the Directorate of Hospitals.

Medical care in Timor-Leste is provided by six hospitals (Five regional hospitals and one national hospital), 70 community health centres (CHCs) and 309 active health posts (HPs) in the public sector. In addition, there are 31 active private sector providers out of 34 registered with the national malaria control programme (NMCP). Primary health care services are provided through the municipal health service structure, with CHCs, HPs and mobile clinics servicing geographically defined populations within a framework of the basic services package (BSP), while incorporating SISCa (*Servisu Integradu Saude Komunitaria*, which means integrated community health services).

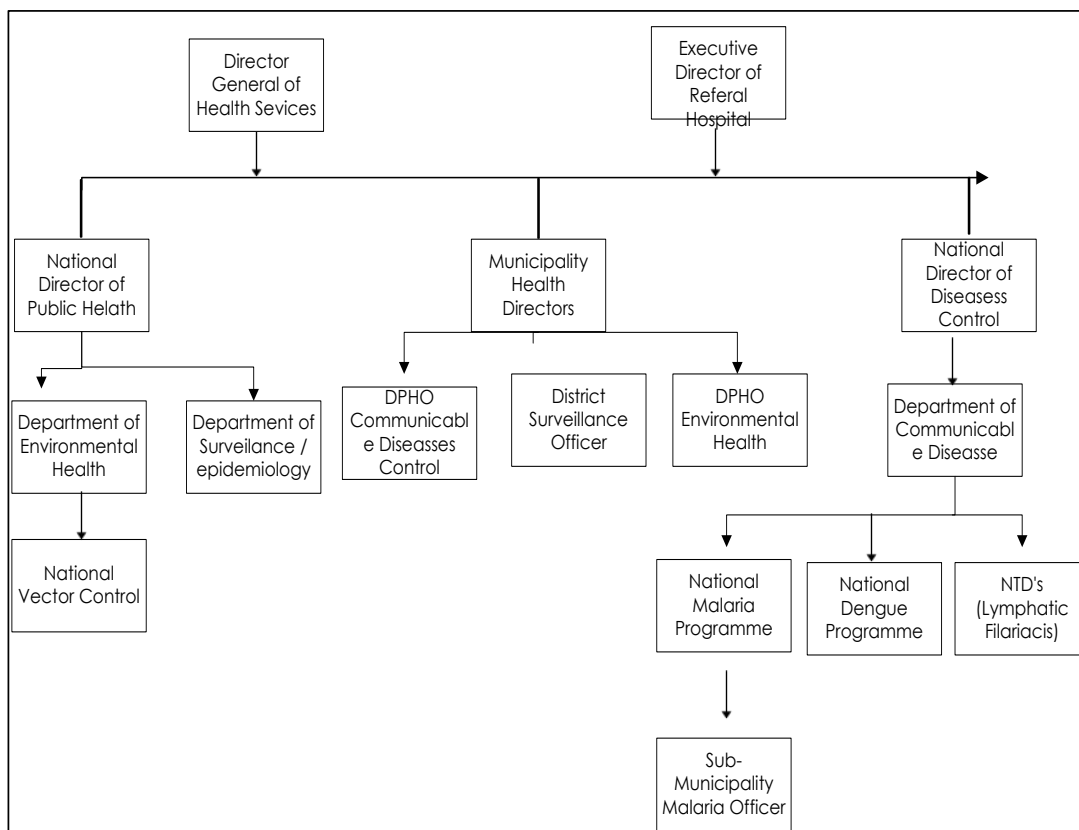
The nearest facility-based services to the community are delivered through a network of HPs that deliver a minimum package of curative and preventive/promotive care. At sub-municipality level, CHCs provide a higher level of services than the HPs. They have a wider range of staff and provide mobile clinic services and technical and managerial support to HPs. The community-based activities consist of SISCa in villages serving populations of 1000–2000; mobile services are regularly provided at other sites, e.g., schools, markets, community structures and “mop up” services in areas, which are situated far away from the nearest health institutions and in hard-to-reach areas. Health services are provided by the local administration. Power is delegated from the central to the local administration.

1.2.1 Programme stream

The NMCP was established at the national level in 2003 under the department of communicable disease control (CDC). At its inception in 2003, the national malaria unit (NMU) had only two temporary national malaria control officers supported with funding by The Global Fund to support AIDS, tuberculosis and malaria (GFATM). NMCP is responsible for planning, implementation, monitoring and evaluation (M&E) of malaria control activities in the country.

The district health teams are responsible for district health planning, coordination of the health service delivery, management of logistics, and M&E. The district health director is the head of the district health team. At the district level, one district public health officer (DPHO) attached to each district is responsible for communicable diseases (Fig.2).

Figure 2. Organogram for implementation of vector-borne disease programme in Timor-Leste



Note: According to the national policy the mosquito-borne diseases belong to the Department of Environmental Health with the responsibility for implementation of Malaria Programme and Lymphatic Filariasis, however dengue programme is fragmented into different departments such as (Case management under department of CDC, vector control under environmental health department, data information is under surveillance department and health education is under health promotion department).

NMCP received US\$ 98 00 906 from The Global Fund Round 7 for malaria control starting from April 2009, and the malaria control and prevention activities including human resources and logistics were scaled up. At the national level, there is a programme manager under whom all NMCP activities are carried out. Twenty-one staff, including four regional malaria officers, one entomology and vector control officer, two entomology assistants, three vector control assistants, three insect collectors, two data entry assistants and one monitoring, one evaluation officer and five drivers, were recruited. At district offices in malaria focal points (District malaria officers), comprising 13 districts and 29 high-risk malaria sub districts in 2009 and 36 for the other districts were recruited for effective implementation of the NMCP in 2009 and 2012. The municipality health teams work in consultation and in coordination with the regional malaria officers at the national level. Four district entomological teams were established in

2013. Furthermore, spraying supervisors and spray machine operators were recruited on temporary basis from August to December per year starting from 2010 to carry out indoor residual spray (IRS) in epidemic-prone areas of six municipalities before the malaria high transmission season. Five drivers and one driver each per district are attached to national and municipality level, respectively

1.2.2 Transition plan

The Global Fund supported malaria control programme in the country, including human resource, needs to be phased out after the year 2023. The government has in principle decided to retain the human resources and all the funding responsibility for implementation in an integrated manner with multi-disease control approach to sustain the achievements gained. An integrated vector-borne disease control unit (IVBDCU) is proposed to be established at national level to cover all the vector-borne diseases (VBD) under one umbrella. Initially the integration may be undertaken by bringing malaria and dengue together, whereas integration of lymphatic filariasis may be taken later. In view of this, a transition plan of NMCP for absorption of The Global Fund-supported malaria positions and the implementation activities along with different divisions dealing in surveillance, vector control and data management for dengue will be initiated.

The situation analysis of the disease revealed that malaria has been restricted mainly to the cross-border areas. However, notifying 14 cases during 2020 indicated the few indigenous and imported cases are of concern, especially for certification of elimination. The follow-up of the cases, entomological surveillance and preventive measures need to be strengthened immediately.

Dengue, being seasonal in Timor-Leste requires effective monitoring of potential vector breeding on regular basis, so that at the time of initial increase of vector density, it can be checked, and proactive actions can be taken for its control instead of reactive actions. The tracking of cases, follow-up, referral to hospital, use of personal protection methods from mosquito bite, use of adulticides and larvicides, capacity-building, social mobilization, community awareness, etc. have commonality, except specific diagnosis and treatment. In view of the above, the integration of these two diseases, especially prevention and control activities, becomes very important for regular monitoring and keeping a vigilance on vector abundance, and its bionics in different areas across the country.

Malaria is being tackled by other department, whereas the dengue-control operations are fragmented within itself, which is done by three departments like involvement of surveillance is by surveillance department, case management is by CDC and vector control by environmental health department. For both malaria and dengue, the vector control is being looked after by only environmental health department, as the mosquito-borne diseases in principle belongs to it.

Taking cognizance of existing fragmented and disintegrated infrastructure for control of two VBDs, it is seen that the elimination strategy in totality may not work to fulfil the desired requisites for certification of elimination. Also, it will not be technically possible to carry out the implementation activities in silos by different departments for control of vectors and VBDs.

The IVBDCU is proposed to be set up under the MoH. This unit will have different divisions namely integrated vector management unit (IVMU), malaria division, dengue division, division of data management and M&E, and supportive cell unit (SCU) with subdivisions of training and information, education and communication (IEC). Lymphatic filariasis unit (LFU) may be integrated later. The IVMU will have two subunits under the control of senior-level entomologist, who will look after the entomology and vector lab for processing the field-level data in the lab as well as issuing guidance and performing supervision for vector-control activities in the field. The other subunit of IVMU will be entomological surveillance, which will have minimum required staff of senior entomologist, junior entomologist, insect collectors, and lab technicians to regularly perform the entomological surveillance in districts or municipalities.

The malaria and dengue divisions may have three subdivisions one for surveillance, diagnosis, treatment and case management, other for data reporting and management, and the third one for M&E. The supportive cell unit should have two basic units one dealing with IEC/BCC and social mobilization, whereas the other unit can deal in training (named as training cell). Similarly, the VBD infrastructure in the district or municipality level should be headed by district malaria officer or district VBD officer supported with one assistant malaria/VBD officer and one district VBD consultant.

At CHC/PHC level, there should be also one PHC VBD unit officer supported with malaria inspector and lab technicians, and at village level there should be involvement of community workers, either supported by the government or kept on incentive based on their performance.

In urban areas, there should be one assistant malaria officer or VBD officer, who will supervise different wards or sectors divided as per the revenue system and for every one square mile area, there should be two workers for anti-larval purposes and one supervisor. The whole ward should be divided into two with the objective of monitoring the larval breeding to be supervised by two insect collectors. There should be domestic breeding checkers (DBC), who can be allotted a quota of checking 25–30 houses per day in their jurisdiction, for breeding survey in the urban areas. The number of DBCs can be restricted depending on the financial resources available in the municipal towns (Annex 1).

2. Epidemiology

2.1 History

The NMCP in Timor-Leste was established in 2003 after Independence in 2002. It is based on six imperative strategic approaches: a) enhancement of case management through early case detection and delivery of effective anti-malarial therapies; b) distribution of long-lasting insecticidal nets (LLINs) through targeted delivery to vulnerable populations (children <5 years and pregnant women and persons living in malaria risk areas); c) integrated vector management covering IRS, environmental manipulation, larval control, and personal protection for malaria prevention; d) epidemic preparedness, prevention and outbreak response in emergencies; e) undertaking behavioural change communication (BCC); and f) M&E.

The review conducted in 2012 revealed that there has been a reduction of malaria mortality by 93% (58 deaths in 2006 to four deaths in 2012 – target was 30%), malaria morbidity by 97% (223 002 cases in 2006 to 6148 cases in 2012 – target was 30%), and malaria morbidity in children under 5 by 98% (82 186 cases in 2006 to 1548 cases in 2012 – target was 30%).

2.2 Control measures

Common communicable diseases include tuberculosis (TB), malaria, dengue, and STDs/HIV/AIDS. Malaria is close to elimination in country with just a few cases being reported from risk areas (e.g., Oecussi and other areas bordering with Indonesia). While preventative interventions such as LLINs distribution and IRS are focussed on high-risk areas, uncomplicated individual cases are diagnosed and managed at all levels of the system mainly by doctors. Rapid diagnostic tests are available at all levels of the system. Cases with complications are referred to hospitals after having received pre-referral treatment.

Presumptive diagnosis of dengue can be done at any level with rapid tests available at CHCs and higher levels. Prevention through vector control and health education involves health as well as environmental professionals. Contingency plans are developed each year from the central MoH, but its implementation, except in other municipalities except Dili, is inconsistent. Severe cases are referred to RHs and high-risk cases (e.g., pregnant women, chronic patients, etc.) and patients at risk of haemorrhagic fever requiring immediate referral to national level (ICU).

2.3 Situation analysis

2.3.1 Malaria

Being the leading cause of morbidity and mortality with over 100 000 clinical and confirmed cases, malaria has been a major public health problem in Timor-Leste. There has been a dramatic decline in the incidence of malaria in the recent past from 223 002 cases reported in 2006 to 347 cases in 2014. Deaths due to malaria have been ranging between 10–58 each year during the period 2006–2010. In the year 2012, five deaths were reported due to malaria, while only one death was reported in 2014. The last indigenous case was reported in June 2017.

There have been no malaria deaths since 2015. In 2018 and 2019, eight and nine cases of imported malaria were reported, respectively. In the past, there was perennial transmission

with the incidence peaking from January to March corresponding to the monsoon showers. Even imported cases have been reported in January and February (Table 1).

A major reason for the decline in the malaria case load over the years was political commitment, the universal access to malaria diagnosis, treatment and prevention (LLINs and IRS), improved surveillance and response, quality control of malaria microscopy, BCC, posting of trained and dedicated malaria staff, strong technical guidance and availability of majority funds from The Global Fund, and other funds from Rotarians Against Malaria (RAM) and WHO.

Despite a decline in the number of infections detected, the NMCP has maintained an annual blood examination rate (ABER) of approximately 10% during the period 2016–2019. All positive cases are microscopically confirmed at the national laboratory (NL).

Table 1. Malaria situation in Timor-Leste

Year	Population	Clinically treated cases	Confirmed cases	<i>Pf</i>	<i>Pv</i>	Mixed cases	Total	Deaths	API (/1000)	Incidence (/1000)
2006	10 15 187	185 106	37 896	24 219	13 477	200	223 002	58	37	220
2007	10 47 632	168 533	46 869	34 174	12 544	161	215 402	26	45	206
2008	10 80 742	97 621	45 973	34 406	11 295	272	143 594	10	43	133
2009	11 14 534	85 799	40 999	34 517	12 246	567	133 129	56	37	119
2010	11 49 028	78 822	40 250	28 350	11 432	154	119 072	58	35	104
2011	10 92 104	16 418	19 740	14 261	3759	1,720	36 153	16	18	33
2012	11 18 429	940	5262	2016	2288	958	6202	4	5	6
2013	11 45 048	17	1025	373	512	140	1042	3	0.90	0.91
2014	11 72 529	5	342	118	139	85	347	1	0.29	0.30
2015	12 00 670	0	80	33	24	23	80	0	0.07	0.07
2016	12 29 486	1	94	51	11	32	95	0	0.08	0.08
2017	12 51 740	0	30	11	5	14	30	0	0.02	0.02
2018	12 74 396	0	8	4	2	2	8	0	0.01	0.01
2019	12 97 463	0	9	2	7	0	9	0	0.01	0.01
2020	12 94 711	0	14	10	3	1	14	0	0.001	0.001
2021	13 70 302	0	0	0	0	0	0	0	0	0

Note: *Pf*- *Plasmodium falciparum*; *Pv*- *Plasmodium vivax*; API- Annual parasite incidence

2.3.2 Dengue

Dengue prevention and control in Timor-Leste is implemented using the guidelines outlined in the Bi-regional Dengue Strategy (2008–2015) (WHO South-East Asia and Western Pacific regions). Dengue control in the country involves a multi-pronged approach based on case management through early detection and diagnosis, vector control via spraying, education on prevention and surveillance. Dengue is mostly diagnosed based on the clinical findings. While current guidelines recommend the use of rapid diagnostic test (RDT) kits, they are not widely used. Dengue cases are of obligatory notification and cases reported are collated by the department of epidemiological surveillance at the MoH. The highest number of cases is recorded from Dili municipality, which has a population of more than 200 000 (Table 2). Dengue in the country is highly seasonal, with peaks in cases occurring during the wettest and hottest months of the year (December–February). This calls for public health actions to mitigate future risks from climate change.

Table 2. Dengue cases and deaths in Timor-Leste

Municipality	2016		2017		2018		2019		2020		2021*	
	C	D	C	D	C	D	C	D	C	D	C	D
Aileu	0	0	0	0	0	0	0	0	2	0	0	0
Ainaro	0	0	0	0	0	0	5	0	6	0	7	0
Baucau	18	0	16	0	0	0	11	0	53	1	56	0
Bobonaro	9	0	23	0	6	0	0	0	14	0	41	0
Covalima	0	0	2	1	3	1	14	1	53	1	26	2
Dili	212	2	408	1	223	1	620	4	815	7	524	4
Ermera	1	0	51	0	3	0	94	1	318	0	13	0
Lautem	0	0	42	0	3	0	20	0	32	0	7	0
Liquica	1	0	0	0	1	0	126	1	74	1	7	0
Manatuto	9	1	1	0	91	0	65	0	64	0	33	0
Manufahi	1	0	3	0	0	0	18	0	7	0	15	1
Oecusse	0	0	0	0	0	0	2	1	13	0	0	0
Viqueque	0	0	4	0	0	0	1	0	0	0	8	0
Total	251	3	550	2	330	2	976	8	1451	10	737	7

Note: C= Case, D= Death.

2.3.3 Lymphatic filariasis

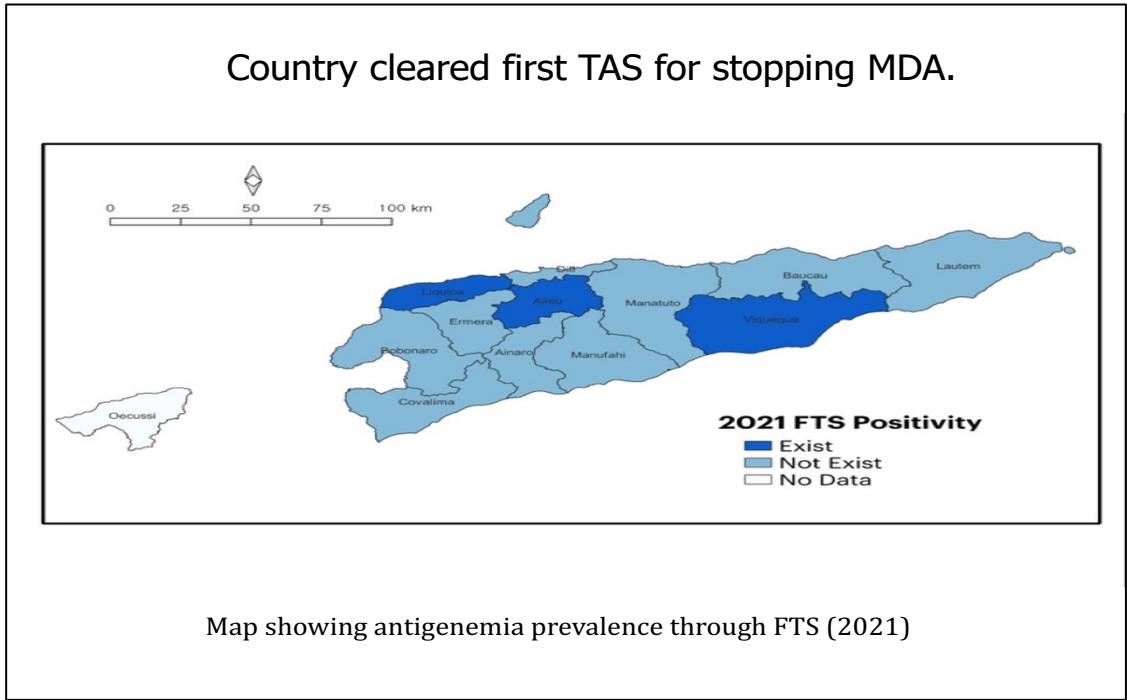
Lymphatic filariasis (LF) is prevalent in the country and all the 13 municipalities were endemic comprising the population of 13 27 038. All districts implemented the global strategy of preventive chemotherapy (PCT) for elimination of LF. LF is a mosquito-borne disease caused by three nematode worms: *Wuchereria bancrofti* (*W. bancrofti*), *Brugia malayi* (*B. malayi*) and *Brugia timori* (*B. timori*). The dominant parasite in Timor-Leste is *Brugia timori*, which is geographically restricted to Timor Island and the adjacent Indonesian islands of Alor, Pantar and Flores. The only known vector of *B. timori* in the country is *Anopheles barbirostris* (*An. barbirostris*), which also acts as a malaria vector. The vector *An. barbirostris* prefers to breed in clean water flowing from freshwater springs and in irrigated rice paddies, but it is capable of breeding in a wide range of habitats.

In 2012, a national survey of LF prevalence was undertaken in all the 13 municipalities. A total of 2164 blood specimens were tested for LF antibody using the Brugia Rapid assay. A national LF prevalence of 17.5% was detected, ranging from 10.3% in Baucau District to 35% in Covalima District. Aligned with WHO recommendation, nationwide mass drug administration (MDA) to eliminate LF and control soil-transmitted helminths (STH) was reintroduced in 2015 in collaboration with WHO. Since then, four MDA rounds have been successfully implemented in all the districts: the first round in late 2015 and early 2016, the second round in March 2017, the third round in April to May 2018, and the fourth round in May 2019.

In 2016, an estimated total population of 859 million were living at risk of LF requiring MDA. Interrupting the transmission of LF using a combination of antifilarial medications, initially with coadministration of diethylcarbamazine citrate (DEC; 6 mg/kg body weight) and albendazole (400 mg), but now with combination of three drugs DEC + Albendazole + ivermectin (200 mcg/kg), known as IDA regimen, delivered to the entire population at risk under the strategy of MDA. The programme has been implemented throughout the 13 municipalities to cover the entire population of Timor-Leste as a single implementation unit with the objectives of decreasing the LF antigen and antibody prevalence to less than 2% of the population in each of the districts and preventing/controlling disability due to LF. Three DA-based nationwide MDA rounds and one additional IDA round have been successfully conducted. The monitoring of MDA impacts completed in 2015 and 2017 showed 0 active cases of filariasis infection with microfilaria. Again, the mid-term impact assessment conducted in 2018–2019 showed the LF antigen and antibody prevalence less than 2% in most of the sites selected. After the completion of third nationwide MDA round, mid-term sentinel and spot-check site surveys were performed from December 2018 to March 2019 using WHO recommended diagnostic tools such as Brugia Rapid test for detecting the *Brugia* spp. antibodies, and filariasis test strips (FTS) for the detection of the *W. bancrofti* antigens. From 13 sentinel and 30 spot-check sites, 796 and 1841 households were visited, respectively, and approximately 3500 persons in sentinel sites and 8000 persons in spot-check sites were tested with both FTS and Brugia Rapid. Apart from Manatuto, which had 2% of antigen prevalence in the sentinel site and 2.68% in the spot-check site of the circulating filarial antigen (CFA) of *W. bancrofti*, all sites had less than 2% prevalence levels either from Brugia Rapid or FTS (Fig. 3). This had been basis for the programme to conduct the first transmission assessment survey in 2020 after the completion of 4th round with IDA in 2019. The country has successfully met the criteria of first transmission assessment survey (TAS) for stopping MDA. However, the post MDA surveillance, including entomological surveillance, needs to be

continued and final TAS is to be cleared to achieve the goal of elimination by 2025 in the country. Regarding LF morbidities, it was revealed that in all the 13 districts the total patients identified during the 2017–2019 MDA rounds were 1177, with 499 cases (478 lymphedema, 19 hydroceles, and 2 cases with both lymphedema and hydrocele) among them.

Figure 3. Map showing antigenemia prevalence through FTS, 2021



3. Programme reviews

3.1 External review

The programme has been reviewed many times. In 2018, the external review concluded that:

- The programme has been managed very well.
- It is problematic that the government has not been able to fulfil the co-financing commitments.
- At municipality level there is a need for advance notice of need for absorption of costs in their budget. The NMCP has contributed significantly to a reduction in the malaria disease burden and associated costs. The programme has already been somewhat reoriented towards a more targeted approach, but further adjustments are needed, taking into account cost-effectiveness, in order to get most health value for money.
- It would be an advantage to strengthen programme management skills further for a smooth transition.
- In preparation of the absorption of NMCP staff at municipality level, as well as all other malaria-related expenditures at some point, the municipalities should be informed about the Global Fund funding that contributes directly to the operations at district level, i.e., the budget items that would form part of the budget, if the programme were to run without the Global Fund funding.
- The further development of the NMCP for the elimination and post-elimination periods should be based on assessments of costs and likely effects – this can be qualitative and does not necessarily involve calculations.
- There is no doubt about the strong commitment of the MoH to maintain malaria elimination, which needs to be sustained.
- It needs to be recalled that even in the best case scenario, which is malaria elimination from the entire island of Timor-Leste, malaria will remain as an endemic disease in New Guinea Island, some Asian countries and tropical Africa for several decades into the future. At the same time, Timor-Leste with a large proportion of the population living in thinly populated rural areas will remain highly receptive, meaning that a single imported case could elicit an epidemic with hundreds of cases within a few months.
- To secure long-term national commitment, to secure necessary resources in the future and to strengthen intersectoral collaboration, the external review proposes the establishment of a high-level national intersectoral commission for the prevention of malaria in Timor-Leste. The membership of the commission should include, in addition to the MoH, parliamentarians, representatives of armed forces and border police, the economic development zones, extraction, civil society and the corporate sector. The terms of reference should include resource mobilization, intersectoral collaboration and cross-border/international collaboration.

3.2 Review meeting of vector-borne disease control by technical working group

The review was held on 28 March 2021 with participation of following officials:

- Sra. Marta (Head of CDC Department, MoH)
- Sr. Agostinho (Environmental Health, MoH)

- Sr. Lucas (Dengue Programme Manager, MoH)
- Sra. Maria Mota (Malaria Programme Manager, MoH)
- Dr. Debashish Kundu (Technical Officer for Communicable Disease, WHO-TLS)
- Sr. Tito de Aquino (Programme Associate for Environmental Health and Health Emergency, WHO-TLS)
- Dr. Baltazar Freitas (Malaria Programme Assistant).

The group reviewed dengue cases and malaria situation for five years. The outcomes of the review are as follow:

- Concern on increase of dengue cases was raised and it was revealed that MoH already have a plan focused on four municipalities (Ermera, Dili, Liquica and Manatuto) for the dengue vector control
- Malaria programme manager emphasized to check the data of Suco reporting more cases and such Sucos must cross-check with the health facility for confirmed dengue cases. The diagnosis methods also need to be checked whether rapid diagnosis test or Torniquet was used
- From the Environmental Health, the issue of having the correct data with details from the surveillance investigation was raised because the patient's details and address would be necessary, if intervention is required
- Recommended that technical working group (TWG) should meet every month to review the progress. The common issue of delay in data sharing was flagged, which needs to be rectified
- National Strategic Plan for Dengue Control needs to be reviewed.

3.3 Review meeting on IVBDC initiative for dengue and malaria

The first meeting towards the vision of integrating VBDC programmes, starting with malaria and dengue control programmes, was held on 28 April at the WHO Country Office, and was presided over by Sra Marta Abenia dos Santos, Head of the CDC Department, MoH. The summary of deliberation of the meeting was then followed by a briefing meeting with WHO Representative, Dr Arvind Mathur, for soliciting necessary support for an integrated vector control response.

The following officials participated in the meeting:

- Sra. Marta (Head of CDC Department, MoH)
- Sr. Agostinho (Environmental Health, MoH)
- Sr. Lucas (Dengue Programme Manager, MoH)
- Sra. Maria Mota (Malaria Programme Manager, MoH)
- Dr. Debashish Kundu (Technical Officer, Communicable Diseases, WHO)
- Sr. Tito de Aquino (Programme Associate, Environmental Health, WHO)
- Dr. Baltazar Freitas (Malaria Programme Assistant, WHO).

3.3.1 Background note of meeting

Dengue is a public health problem in Timor-Leste with a rising trend of cases --- from 975 in 2019 to 1450 in 2020 with a case fatality rate (CFR) of 0.7%, disproportionately affecting children between 1 and 4 years (0.4% CFR) and 5 and 14 years (0.2% CFR). Dengue cases are primarily reported in Dili, Baucau, Bobonaro, Covalima, Liquica and Manatuto.

Malaria cases have declined over the years and the NMCP is gearing for achieving the Malaria Elimination Certification.

Development of policy and strategy on VBDC for integration of malaria services into VBDC structures is on a high-level agenda at MoH. The MoH has accorded high priority towards the integrated VBDC framework plan, and necessary funding support towards an integrated VBDC strategy development and training plan has been secured in the current Global Fund funding cycle (2021–23). This includes development of HR and capacity development plan for absorption of Global Fund funded malaria positions into the government from domestic resources.

3.3.2 Key action points of the meeting

- Convene a monthly coordination meeting for better coordination and collaboration between all the entities involved in the vector control - CDC Department (malaria and dengue control programmes), including the Environmental Health, Health Promotion, and Surveillance departments, a national TWG on VBDC can be proposed
- The issue of weak sharing of dengue surveillance data with the dengue and environmental health unit was discussed. It is important that surveillance unit share the dengue data timely with the respective unit for validation, and timely public health response
- Experience and expertise of the NMCP can be used for streamlining dengue control initiatives. Malaria officers at the municipalities can support the dengue control activities for:
 - Joint entomological survey, and
 - Dengue surveillance data verification.
- The clinical management guideline for dengue, including diagnosis methods, may be updated
- Issue of low stock of RDT and need for dengue mosquito source reduction were highlighted both by the CDC and environmental health department
- To propose a focal point person to initiate coordination of integrated vector control management, starting with malaria and dengue cases
- Following financial supports were requested from WHO:
 - To conduct dengue control and prevention in five municipalities (Dili, Baucau, Bobonaro, Covalima and Manatuto): Source reduction (Status: Approved, US\$ 25 060.00)
 - Procurement of dengue RDT kits

- To initiate the discussion towards development of strategy for dengue and VBDC control. Dr Bhupender Nagpal, WHO Regional Entomologist, could be invited in the next meeting for soliciting his expert guidance in this direction.

4. Malaria prevention and dengue control perspective

Vision

Malaria- and LF-free and effectively control dengue in Timor-Leste

Mission

- To plan and implement comprehensive anti-malarial services through a dedicated and skilled workforce in collaboration with all stakeholders by ensuring sustainable, efficient, and quality interventions to malaria-free status and LF in the country by 2025 and further sustainability by 2030.
- To effectively control dengue with improved diagnosis, case management, and integrated vector management with the engagement of the community and all stakeholders under the overall umbrella of Integrated Vector-Borne Disease Control strategy in sync with malaria elimination.

Goals

Malaria: In line with the Global Malaria Elimination by 2030, the goals for all municipalities attaining malaria-free status are:

- Maintain malaria-zero indigenous cases throughout the country by 2025 and sustain until 2030.
- Prevent re-establishment of malaria in the state.

Dengue: In lines with the neighbouring countries

- Improved diagnosis, case management and reduce CFR.

Objectives

The country has following objectives:

- Reduction in morbidity and mortality due to dengue and its sustenance.
- No indigenous transmission

5. Vector Control Strategies

Malaria, dengue and LF are the main VBDs in Timor-Leste. Vector control of malaria is mainly relied on the use of LLIN and IRS since 2006 and use of larvicide and space spray have been applied for dengue vector control.

Conventional approaches to the control of individual VBDs have almost always worked in isolation from one another. There are many situations in which efforts can be organized and action managed for effective control of vectors of two or more VBDs at the same time. A multi-disease control approach may be considered that rationalizes judicious use of effective insecticides, use of alternative approaches ranging from provision or promoting the use of LLINs, environment management and biological control and actions aimed at personal protection. This entails the use of financial and human resources and organization structures within the existing health systems in a cost-effective manner.

The recommendations of reviews were considered in the process of drafting this document. It serves as a guideline for the district and sub-district level malaria elimination interventions and effective prevention and control measures for dengue.

5.1 Disease Surveillance

5.1.1 Objectives

- Early detection of all malaria and dengue cases and their further immediate notification
- Prompt treatment of all cases of malaria and case- and focus-based investigation and response. Similarly, the areas reporting **dengue** cases should be kept under intensified surveillance, both for suspected cases and larval breeding in the area to implement preventive measures to reduce transmission.
- Continued vigilance in low malaria situation to prevent reestablishment.

5.1.2 Current surveillance systems

Malaria surveillance: Malaria is a notifiable disease. Initially, aggregate data were reported monthly. Since January 2016 a case-based surveillance system with immediate notification by telephone was adopted. In 2017, an online data entry system for aggregate and case-based data was developed using the DHIS2 platform. However, currently, case-based surveillance data are obtained in paper-based formats.

The criteria for epidemiological stratification of malaria risk were updated based on the external review conducted in February 2020 and included in the National Strategic Plan for Prevention of Reintroduction (POR). The surveillance activities to be conducted by stratum were specified in the External Review Report. There are four strata. Stratum 1, considered as the high-risk stratum, includes Oecusse Municipality, border administrative posts/sub-municipalities of Covalima and Bobonaro municipalities and Atauro island. Strata 2 and 3 are considered as medium risk; stratum 4 is low/no risk (high altitude areas).

Dengue surveillance is hospital and clinic based, which will continue to screen the patients in public as well as private clinics. The test for dengue is done by using RDT and NS1. Currently, the positive cases are notified to surveillance department separately, which is further shared with national surveillance officer (responsible for capacity-building) and HMIS department for final report compilation. However, after integration, it will be notified to one place for VBDs following the reporting format.

Strategy 1: Strengthen disease surveillance activities

- Screening of all fever cases
- Reactive Case Detection and fortnightly active surveillance/MBSs for malaria if a malaria case reported
- Prompt and regular fortnightly active surveillance in places of new projects
- Intensification of passive case detection in all fever cases to be screened for malaria in all the health facilities, including private health facilities
- Any additional infections like dengue to be screened within 24 hours of case notification. Such screening should include contacts, neighbours, community members living in 50 houses around the index case, co-workers and people whom the index case has visited
- Fever surveillance and screening for malaria in the instance of fever outbreak
- Mass screening in the instance of newly detected foci, especially when migrants from endemic area are involved
- Proactive surveillance, irrespective of symptoms, for seasonal farm and plantation workers, and regular travellers who stay for a temporary period at a single place to ensure that parasites are detected early and treated completely to avoid secondary transmission, by visiting them on monthly basis
- All the projects, industries and all other such works, which attracts labourers should be enlisted for establishing a system for screening migrants and labourers
- Quality assurance of blood smears through regular verification, periodical reorientation trainings, and supportive supervision at district level
- Epidemiological investigation of every confirmed case to know the determinants and to classify the case as indigenous, imported, introduced, or induced. Such investigation points the foci and helps to decide the intervention measures. The case investigation shall start and complete within two days of case notification
- Given that malaria is a notified disease, the department of health should enforce routine, rapid and accurate reporting from all private health facilities
- Point of Entry (PoE): The management at PoE is the responsibility of MoH. The various activities include sensitization on VBDs for active participation and resource sharing on local bodies. Vector surveillance at PoE (airports and seaports) and land crossings (International Health Regulation) and maintaining all hospitals mosquito free are the core activities. These activities need to be monitored continuously. The municipality and CHC encompassing the area of such PoE will be responsible for the actions.

Strategy 2: Improve entomological surveillance and monitoring

In the past, routine entomological surveillance for trend observations was carried out in six sentinel sites; it was reduced to two sentinel sites, one in Oecusse, which is enclaved in West Timor and other in the mainland. On the recommendations of the External Review Team, entomological surveillance was re-aligned focusing on mapping receptivity/vulnerability and risk areas in the country. The national entomology team consisting of five entomology officers need to be maintained and strengthened to assist in control of other VBDs.

The main activities are described below:

- Strong entomological surveillance to measure and update on-going vector control interventions
- Longitudinal entomological surveillance in high-risk subcentre areas
- Periodical entomological surveillance in moderate- and low-risk sub centre areas
- Case-based entomological surveillance to identify possible receptivity and to suggest vector control measures
- Municipality-wise mapping of vectors to know the receptivity
- Equipping and upgrading entomological setup to study vector prevalence, vector efficiency and transmission intensity for proper vector control measures
- Insecticide resistance (IR) monitoring to be conducted once per year in sentinel sites and focal surveillance sites

Insecticide resistance (IR) monitoring carried out since 2007 revealed that vectors are susceptible to deltamethrin, permethrin, lambda-cyhalothrin, bendiocarb, pirimiphos-methyl, malathion and DDT.

- Organizing advanced training workshops with support of WHO or other external donors.

Strategy 3: Strengthening of epidemic preparedness and rapid response and outbreaks' prediction/forecasting/prevention

Outbreak preparedness and contingency plans of action have been developed in all municipalities. The national and municipal malaria officers are familiar with the actions needed to be performed when a malaria case is detected. The main activities are:

- Strengthening of rapid response teams (RRTs) to include epidemic preparedness as priority for both **malaria and dengue**. All RRTs to have proper plan in place to respond rapidly and appropriately to outbreaks

- Intensified case-based surveillance with immediate notification of cases within 24 hours, investigation of cases and entomology surveys within five days and response within 10 days to be practiced
- Mass blood surveys to be carried out in approximately 1 km area of the residence of malaria patient within five days as per guidelines
- Case and foci investigations started in 2016 need to be maintained for malaria
- A national case and focus register, and database should be maintained
- Collaboration with stakeholders and meteorological department to establish more accurate predictions of outbreaks and identification of hotspots in endemic areas based on climatic factors
- Dissemination of predictions to health facilities to reduce the risk of outbreaks and epidemics.

Strategy 4: Cross border collaboration

The NMCP counterparts of the Government of Indonesia and Timor-Leste have initiated a dialogue and collaboration between them mediated by WHO and RAM by signing a MOU and developing a joint action plan for malaria in February 2019. The action plan focuses on data sharing, joint planning and implementation of interventions, and M&E. The main activities are described below:

- Strict vigilance and surveillance in border areas
- Coordination between Timor-Leste and West Timor and their malaria programme provincial and central offices needs to be strengthened. This collaboration is important as Timor-Leste shares land borders with West Timor, where malaria remains a public health issue.
- Notification on unusual/outbreak situations and imported cases detected in their territories especially in border areas
- Periodical meetings of border areas for collaboration and implementation.

Strategy 5: Strengthening malaria microscopy and upscaling use of RDT

- In addition to doctors, a clinical nurse is also appointed to health posts, and it may be ensured that they are trained in using RDTs for malaria diagnosis and treatment. However, lab technician in each PHC should be ensured and they should be trained on malaria microscopy
- Diagnostic arrangements for the low-risk areas by diverting slides to the neighbouring PHCs for examination till microscopists are functional
- Supply of binocular microscopes to all the PHCs in a phased manner prioritizing the areas of concern
- Engagement of private hospitals and diagnostic centres under malaria microscopy

- Private health facilities to screen malaria patients through blood smear examination.

Strategy 6: Prompt, immediate and accurate diagnosis.

- Thrust for examination within 24 hours with special focus on high-burden areas
- Use of RDTs for screening:
 - Migrants
 - In areas where 24-hour examination is difficult
 - To screen the OPD cases in PHCs, if the lab technician post is vacant
- Mandatory collection of blood films even for RDT-performed cases in pre-elimination phase, elimination phase and prevention of re-establishment phase to determine the parasite densities and to detect gametocyte
- System to be in place for generating malaria detection report from private hospitals and diagnostic laboratories and further dissemination.

Strategy 7: Quality assured malaria microscopy and RDTs.

- Qualitative microscopy ensured through the supply of high-quality binocular microscopes and good quality reagents
- Ensuring the availability and follow up of standard operating procedures (SOPs) in all the microscopic centres
- Cross verification of blood smears at district- (municipality) and central-level laboratories
- Ensure three quality control lab analysts (Grade 1 as per the external competency assessment 2018) attached to the national laboratory
- Regular training and refresher training are provided to health workers on malaria diagnosis and treatment protocol.

Strategy 8: Malaria treatment based on an updated national treatment protocol

Early diagnosis and treatment of malaria patients with effective antimalarials are major activities in the prevention of re-establishment phase. Currently, treatment for malaria is given after confirmation of the diagnosis either by RDT or microscopy

- The **National Malaria Treatment Protocol** giving details of drugs to be used, dosing patterns and frequencies of administration is available. It was revised in 2020 based on recommendations of the external review and as per WHO guidelines
- As part of the revised treatment protocol, guidelines for effective management of uncomplicated malaria and severe and complicated malaria with specific procedures have been produced and disseminated targeting health personnel at hospitals, health posts and CHCs

- Diagnostic services and treatment are available in all public health care institutions; there are private sector institutions that carry out malaria diagnosis. Malaria treatment is only provided through public sector health care institutions through DOTs:
- Patients diagnosed in the private sector are referred to the closest public sector health care institution for treatment
- Access to malaria diagnosis and treatment for populations in hard-to-reach areas are provided through malaria volunteers (currently, there are 33 community health volunteers) posted in clusters of hamlets (villages)
- Dihydroartemisinin/piperaquine as a second-line treatment for malaria, and
- Provision of chemoprophylaxis to travellers, who travel to malaria-endemic countries were included (National Malaria Treatment Protocol Timor-Leste, 5th Edition).

Strategy 9: Monitoring drug efficacy

- WHO prequalified ACT and other antimalarials are being procured
- Integrated drug efficacy surveillance was started in 2017 to ensure clearance of parasites, complete recovery and monitoring adverse events of antimalarial medicines
- All diagnosed patients are followed up as given in the document “Actions to be performed when a malaria patient is reported” (Source: National Malaria Programme, MoH)
- As point of care testing for G6PD is not available in the country, the NMCP administers weekly doses of primaquine over eight weeks under DOTs for *vivax* infection since October 2016
- DOTs are conducted by the closest sub-municipality malaria officer under the supervision of the municipality malaria officer or by the municipality malaria officer
- Patients are visited at their homes and treatment administered in their presence. For *P. falciparum* infections, a stat dose of primaquine is given
- **Case management:** Curative care in Timor-Leste is provided by a well-structured health care system operating at different levels. Clinicians are attached to the National Hospital, five RHs and 70 CHCs and 309 active HPs. All doctors have been trained on implementation of the National Malaria Treatment Protocol, 4th edition by the NMCP
- **For dengue, case management** is done by hospital at municipality, and based on situation, the patients may be referred to national hospital. The cases are managed by clinicians.

5.4 Integrated vector management

A national entomology laboratory with entomology team was established in 2009 and four regional entomology teams were recruited and trained in early 2012. A manual for entomological laboratory and field techniques for malaria control, entomological equipment and vehicles to carry out entomological surveillance and guidelines for IRS was available. An evidenced-based vector control programme (VCP) was developed based on entomological surveillance findings. Insecticide susceptibility tests were carried out in selected sentinel sites and the status of vector susceptibility to various classes of insecticides used in the country were used for malaria vector control.

Guidelines for the free distribution of LLINs in malaria risk areas in the country targeting children under 5 and pregnant women were developed; the policy has changed since and now one LLIN

is distributed to every two persons. Distribution of LLINs to the people living in malaria risk was started in 2013.

Vector control activities include LLIN distribution, IRS, source reduction, promotion of personal protection methods, larviciding and use of larvivorous fish. Most activities are conducted with community participation.

The responsibility for vector control is assigned to the environmental health unit. However, there is not much commitment from the unit for vector control. It is suggested that NMCP should consider taking over vector control operations in order to ensure effective application. Integrated vector management (IVM) being "a rational decision-making process for the optimal use of resources for vector control" will have to be implemented in a way making it more effective, cost effective, ecologically sound and sustainable. The current vector control interventions have a limited choice of insecticides, which have to be used judiciously thus managing insecticide resistance.

5.4.1 Objectives

- Vector control and reduction of human–mosquito contact
- Community participation
- Insecticide resistance monitoring
- Quality assurance.

5.4.2 Strategies

Protecting high-risk populations was a major vector control strategy adopted by the country. LLINs and IRS are the major vector control methods used in Timor-Leste. Larviciding is done occasionally.

Strategy 1: Chemical mode of vector control

LLIN:

- According to the National Strategic Plan for the Prevention of Re-establishment of Malaria 2021–2025, mass LLINs distribution to high malaria risk areas should be carried out in Oecusse, Atauro Island and sub-municipalities in the border areas
- Continuous LLIN distribution to pregnant women in these areas to be carried out as part the services delivered by the maternal and child health programme of the MoH
- Continuous distribution of LLINs should be done to malaria risk groups by the respective municipality malaria officers in coordination with village leaders, army and police posts
- Furthermore, focal mass distribution of LLINs to be carried out in potential foci, where imported cases are reported based on the presence of malaria vectors ascertained by entomological surveillance.

IRS:

- One cycle of IRS should be routinely carried out once a year in the border area sub-municipalities, Oecusse and Atauro Island before the onset of the rainy season due to

increase of early biting secondary vector, *An. subpictus*, during the rainy season based on entomological surveillance

- IRS is planned to be phased out gradually in Oecusse and border administrative post of Covalima and selected border sucos of Bobonaro municipalities
 - Year 2020: targeted households 19 236
 - Year 2021: targeted households 17 719
 - Year 2022: targeted households 14 454
 - Year 2023: targeted households 14 715
- Withdrawal of IRS from administrative posts of Covalima should be decided based on the malaria cases in the adjacent district (Malaka district) in West Timor. Incidence of malaria in Malaka district is three per 1000 population. This should depend on the epidemiological stratification of malaria risk in the country and malaria situation in border districts of West Timor.

Focal IRS and LLIN:

It should be maintained as part of response after case and foci investigation, if required or during outbreaks. It should be carried out in potential foci where imported malaria cases have been reported to prevent local malaria transmission.

Larviciding measure:

- Larviciding should be implemented in areas where breeding sites are confined, fixed and reachable, especially in dengue-endemic areas, and
 - in urban situation, where vector breeding is reported in construction sites, wells, open water storage tanks
 - in outbreak situation, all the water bodies with vector breeding to be treated.

Fogging/space spray:

- Space spraying should be implemented confining only to the outbreak situation to knock down the infected vector
- Selection of indoor or outdoor space spraying should be determined by the vector behaviour
- Timings (dawn and dusk) and wind velocity should be considered during fogging.

Strategy 2: Biological, environmental, mechanical, and personal protection

Biological intervention should be the choice of vector control in areas under prevention of re-establishment phase or elimination phase, as implementation of vector control measure is either nil or implemented in a limited space and time in those areas. Prioritization should be given to the previously known hotspots. The activities are given below:

- Enlisting and mapping of village-wise water bodies in malaria and dengue areas

- Maintain at least one fish hatchery (natural or artificial) in all the PHCs
- Periodical release and replenishment of larvivorous fishes (Gambusia/ Puntius) in all the enlisted water bodies
- Prevention of mosquito breeding by way of mechanical methods
- Environmental manipulation and management should be carried out in collaboration with the community and community leaders depending on identified breeding places after educating the community
- Promotion of personal protection methods like screening of doors, windows, clothing, wall hangings, curtains, traditional repellents, etc. through IEC/BCC.

Strategy 3: Quality assurance of vector control measures

- Best practices (interpersonal communications, group meetings, involvement of local leaders, religious leaders, local folk methods) for participation of community in the implementation of vector control measures with special focus to use LLIN and IRS
- Mobilization of community for adoption of LLINs by designing micro level and local specific IEC and their propagation through village leader, community leaders and local NGO
- Monitoring and supervision of all vector control interventions in terms of quality and quantity and also in time and space
- Resistance management, being the crucial issue for implementation of chemical method of vector control, should be monitored closely and periodically through the entomological teams.

5.5 Capacity-building

Capacity-building is a key component of this strategic plan in order to maintain achievements made in the past as well as preparing the programme for the road to elimination of malaria as well as effective containment of dengue.

5.5.1 Objectives

- To ensure that all levels of the malaria programme have sufficient capacity to coordinate and implement malaria elimination and effectively control dengue.
- To ensure availability of trained human resource to address the challenge.

5.5.2 Activities

- Capacity-building of medical officers and all health personnel to update elimination goals, strategies, roadmaps and way forward
- Capacity-building of laboratory technicians towards quality assurance
- Orientation of decision-makers, stakeholders and political leaders
- Capacity-building of private health sector on standard diagnosis, treatment protocol, case management and case notification in perception of malaria elimination
- Educating schools on the aspects of malaria elimination and dengue control.

5.6 IEC and BCC

A robust, highly specific, target oriented, need-based, yet simple IEC is crucial for achieving malaria elimination, dengue prevention and control. As the elimination programme advances and the programme phasing changes, the IEC design has to be tailored and transformed suitably to the changing scenario. Further, as malaria cases start to decrease, several sectors of the population and stakeholders may lose interest in defensive malaria measures. By using a variety of communication channels, malaria IEC needs to be continued to ensure that communities take the necessary precautions and actions to prevent initial infection and onward transmission.

Similarly, dengue spread and its risk are to be shared with community. Their role in prevention of creating mosquito-genic conditions must be disseminated.

An extensive BCC strategy was used in the past. The last Malaria Indicator Survey (done in 2013) revealed:

- About 90% of pregnant women and 89% of children under 5 had slept under a LLIN the previous night
- 75% of children were taken for treatment to a health facility or health worker within 48 hours of the onset of symptoms and over 90% within three days of the onset of fever
- Most women had a good knowledge of the malaria symptoms and prevention methods.

The government health centres, and hospitals have been the major source of health care delivery and the major health information provider.

5.6.1 Objectives

- To ensure that the community has adequate knowledge, attitudes and practices on malaria through appropriate IEC/BCC, social mobilization and advocacy to achieve malaria elimination by 2025.

5.6.2 Strategies

Strategy 1: Strengthen advocacy with decision-makers and opinion leaders

- Eliminating malaria and preventing its reintroduction over the years is a resource-intensive exercise
- As NMCP is now in the prevention of re-establishment phase, a new communication strategy should be developed to maintain awareness among local leaders, health care providers in both public and private sectors, increase political commitment and ownership by local community leaders, and malaria prevention among malaria risk groups

- Activities like briefings for decision-makers and opinion leaders on elimination and development of an advocacy toolkit to increase awareness about elimination among decision-makers at all levels should be taken up.

Strategy 2: Strengthening of social mobilization in the community

- Social mobilization is one of the most effective health promotion interventions, ensuring important messages and information are communicated directly to community with a special focus on at-risk and mobile population
- In the prevention of re-establishment phase, the messages, materials and modes of delivery have to be changed to harness community responses and engagement
- Group advocacy or individual one-on-one sessions should be conducted with community health volunteers and health care providers. Community education campaigns, door-to-door health education, interpersonal communication and increased interaction between the health staff and the community will raise awareness about malaria elimination and increase uptake of malaria-preventive interventions
- Awareness should be spread through all available local communication media. Mobilization of the community in the area of focus for owning the programme for better delivery of services.

Strategy 3: Advocacy with private health sector

- New target groups such as travellers and travel agents are identified
- Well-designed information leaflets or brochures are developed for distribution to special risk groups or in areas where there are limited opportunities for interpersonal skills
- A new strategy is targeted to enhance community mobilization skills of field workers to maintain community engagement practices that have been developed earlier.

Private health sectors contribute significant health care services to the community not only in urban, but also in rural setup. Inputs from these sectors are of great importance in achieving the ultimate goal of malaria elimination and effective containment of dengue. The policies and strategies of the programme need to be advocated with all such organizations.

Strategy 4: Advocacy with NGOs, stakeholders and media

- The NMCP has successfully engaged the private sector in antimalarial activities. Currently, out of 34 private sector and faith-based health care providers, 33 are registered with the NMCP. RDTs for malaria diagnosis have been provided to them by the NMCP; in return, these institutions provide surveillance data to the NMCP. They also notify the NMCP of positive cases immediately. Emphasis has to be given for dengue cases.
- The NMP trains staff of private sector healthcare institutions and faith-based organizations on diagnosis (microscopy and RDTs) and updates clinicians on treatment guidelines.

Furthermore, quality control of microscopy and RDTs of private sector is carried out and to be continued. The training can be integrated by including dengue prevention and control.

5.7 Monitoring and evaluation (M&E)

M&E is an important management tool to track the progress and facilitate decision-making. Monitoring helps the programme to track achievements by regular collection of information to assist timely decision-making, ensure accountability, and provide the basis for evaluation and learning. Evaluation determines the relevance and fulfilment of objectives, development efficiency, effectiveness, impact, and sustainability. Following actions need to be focused:

- Strengthening supervision of surveillance to ensure implementation as per plan
- Routine quarterly coordination meetings at national level and semi-annual municipality meetings to be carried out to facilitate real-time reporting of malaria and dengue, and to ensure data quality. The strengths and bottlenecks also need to be identified
- An external independent programme review to be carried out at the end of the year 2022
- The programme needs to be monitored and evaluated at different levels of its implementation. The various components on which M&E is performed is tabulated in Table 3.

Table 3. Components of M&E

Inputs	Process	Output	Outcome	Impact
HR, drugs, chemicals, instruments, equipments, reporting formats, finance	Surveillance, diagnosis, treatment, IVM, training, IEC, supervision	HR in place, persons screened, persons treated, covered population with LLIN and IRS, Number-trained, and IEC campaigns organized	All positives treated and cases managed, decreased vector-human contact, reduced case incidence	No indigenous transmission

5.8 Quality assurance

The NMCP has focused on providing quality products and services. Following actions need to be considered for quality assurance:

- Ensure all antimalarial commodities procured are WHO pre-qualified products
- Quality assurance programmes for microscopy and RDTs are in place and should be strengthened
- Periodic review of microscopy quality control/assurance systems (once on every two years) to be continued, and training provided to ensure national competency in this area
- Quality assurance of case management, entomology and vector control is ensured through regular supervision, and to be continued
- Quality assurance of IRS and LLINs to be monitored by entomological surveillance. Regular training of staff to be conducted when performance has not been up to the standard.

5.9 Procurement and supply chain management

All commodities are procured based on the recommendations of the programme.

- ACTs, RDTs, LLINs, insecticides and part of laboratory reagents, equipment, spray machine parts and protective clothing are procured through TGF-pooled procurement system. It needs to be elaborated on how it should be continued
- Ensure that all procurement and distribution of medicines are done from the centre by SAMES, which is responsible for the procurement of non-ACT antimalarial medicines, 50% of laboratory reagents and equipment needed for microscopy; and for distribution of diagnostics and antimalarial medicines
- Diagnostic and treatment services to be provided at the point of care to all
- In the past, universal access to malaria prevention was provided to all persons in high-risk areas. This policy should continue; however, the risk areas should encompass border areas
- Endemic areas for **dengue** should also be identified for ensuring availability of all necessary commodities, especially for case management as part of essential health package on priority
- All services have been provided free of charge by the NMCP and it should continue to do so, and the private labs doing **malaria and dengue** tests on cost basis, should be regulated with fixed rates for each test by the government.

6. Capacity-building, BCC and M&E

6.1 Capacity-building

Timor-Leste has achieved tremendous progress towards eliminating malaria; however, covering the last mile in eliminating it is challenging. The major challenges in workforce capacity includes transition phase of absorbing skilled human resource from GFATM to the Government of Timor-Leste. Many staff have been trained in different aspects of diagnosis and treatment, M&E and in malaria elimination. Training programmes have focused on programme management, microscopy, tropical diseases epidemiology, IVM, malaria control and M&E. Regular training for different category of staff is essential to deal in prevention and control of VBDs focusing on malaria elimination and prevention, control, and clinical management of dengue. The district malaria officers, regional malaria officers, malaria assistants, entomological assistants, and insect collectors along with staff deployed for dengue surveillance and data management are the crucial health resource, whose capacity needs to be strengthened.

Training modules need to be developed and designed by a group of experts in sync with the training curriculum and finalised.

The deployment of group trainings is a challenge due to the social distancing needs of COVID. Therefore, wherever possible virtual platforms should be used for training. However, rolling out virtual training programmes for district and sub-district levels may suffer from the challenge of poor internet connectivity in most of the endemic areas.

6.2 BCC

BCC is an interactive process for developing messages and approaches using a mix of communication channels to encourage and sustain positive and appropriate behaviours. IEC programmes provide knowledge to enable individuals, families, and communities to play active roles in achieving, protecting and sustaining their own health. BCC has evolved from IEC with a focus on individual/family/community and even care providers' behaviours to be changed and employs a wider range of interventions beyond knowledge transfer, as well as for greater dialogue and ownership.

The BCC strategy document formulated for 2015–20 will remain the base, but will require modifications periodically drawing from implementation experiences, evaluations, as well as any shift in commitment. It hinges on the adherence to behavioural outcomes expected from target audience and covers a five- year time frame. The strategy for that well-coordinated, planned efforts across stakeholders would be more effective and efficient. The existing BCC strategy has been elaborated for different components like diagnosis and treatment, IRS, LLIN distribution, etc.

Each component has been broadly explained in four aspects viz., key challenges, target audience to be addressed, messages focusing on subject, and channels to be used for its spread.

The BCC strategy for malaria control should focus malaria in border areas; however, the communication should be intensified across all municipalities/districts for **dengue** prevention. Funds need to be secured for BCC activities.

6.3 M&E

M&E are the techniques used to assess the performance and effectiveness of control measures and to find out to what extent programme objectives have been achieved. It should be a continuous operational processes. The objectives of programme evaluation are:

- To measure progress and specific programme achievements
- To detect and solve problems as they emerge
- To assess programme effectiveness and efficiency
- To guide the allocation of programme resources
- To collect information for re-planning interventions.

Monitoring is the continuous collection of information during programme implementation. It carries out assessment and identifies deficiencies that can be rectified while the programme continues. It gives feedback to programme managers to issue necessary directions. Monitoring needs to be undertaken by persons involved in the programme at various levels starting from the field supervisor. They must identify their roles and responsibilities and then monitor all aspects, i.e., targets of programme, availability of resources (human resource, material and equipment), surveillance performance, IVM implementation, and utilization of resources. Monitoring indicators should be assessed to facilitate in analysis of strength, weaknesses, opportunity and threat (SWOT) of the programme. Reports and returns generated, whether on daily/weekly and monthly basis, provide an essential tool for carrying out monitoring.

Evaluation is an outcome tool. It measures current versus desired performance. Assessment of input, process and output indicators are carried out to know the outcome. Evaluation is required when the programme is failing to achieve its targets or goals. Evaluation plan should have realistic and measurable targets and based on indicators. Programme evaluation must be based on following:

- a) **Inputs:** Availability of SOP for staff, infrastructure in terms of building and other working facilities, human resource, logistic supply, and equipment. These items should be evaluated in terms of minimum norms given for a particular facility and available facilities in particular office. For example, human resource – number of sanctioned staff, number of staff posted, any crucial post lying vacant, absenteeism, monitoring, attendance monitoring, system for appraisal of work done by staff and incentives/punishments

- b) **Process:** Planning, training – if training has been organized for all categories, number of trainings organized, evaluation by pre-test and post-test, availability of expert faculty for training. Supervision – any supportive supervision provided to poorly performing staff. Community participation may include the number of community meetings organized, number of meetings organized with resident welfare associations, etc.
- c) **Output:** Services delivered, staff trained, supply chain of equipment and logistics. Output may be evaluated on the number of staff trained, and supply of budget/logistics maintained
- d) **Outcome:** Change in knowledge and behaviour of community members will determine the outcome of all activities undertaken during process. This will also evaluate the impact of components of training tools used
- e) **Impact:** Objective of the National Vector-Borne Disease Control Programme is to decrease morbidity and mortality due to VBDs and associated case fatality rate.

After data have been collected, they need to be analysed and interpreted. The interpretation needs to be presented to concerned authorities for re-planning. Evaluation can be planned at any stage or end transmission season to evaluate the success and failures of the programme during transmission season. Evaluation process needs to be unbiased and be carried out preferably by external agency.

7. Regulatory policies

Regulatory policies are one of the most important components for any programme as they create a direct link between 'Vision' and 'Goal' of the programme implementation activities. Good governance and regulatory management are crucial for achieving the desired results. If capacity and capability of government to produce or to provide, coordinate, implement and review regulatory process are not in place, there is a high risk for suboptimal performance of activities for achieving desired and ultimate goal. The following regulatory policies need to be implemented effectively for stepping towards malaria elimination goal as well as for keeping other vector-borne diseases under control so that they are not public health problems:

- Malaria elimination to be recognised at highest level of governance, i.e., at cabinet level, led by MoH and involving all relevant sectors
- Malaria elimination executive committee to be constituted, which is vested with powers to take up decisions related to administrative, human resource, technical, strategic, logistics issues, and to enforce regulatory and disciplinary measures. The decisions should be based on assessment of IVBDC technical committee
- The technical committees already constituted, namely IVBDC technical committee and dengue clinical management committee, need to be made functional and review

the progress regularly

- **Malaria and dengue** should be mandatorily reported as these are notifiable diseases. There should be a government notification in this regard after taking consent from legal department so that all public and private service providers are responsible and accountable for reporting the cases. Notification can be by telephone, WhatsApp or e-mail. For malaria, a comprehensive reporting format in form of booklet containing four carbon copies of each page are available with health facilities. Although it was supported with GFATM, it may be continued. However, if a **dengue** case is reported in any municipality, the CHC should inform the concerned surveillance officer of the concerned municipality about **dengue** case and also to environment health officer of the municipality. The municipality environment health officer should initiate the control measures either by fogging or larviciding with temephos 50% EC in containers found positive for breeding. The surveillance officer at municipality should send the report of positive case to the national surveillance officer under the Director of Public Health for further action and to HMIS. Case should also be referred to hospital as per need for case management.
- Existence of a technically competent team of programme manager, entomologist, epidemiologist, health supervisor and lab technologist is a must at national level. Initially such integration may be regulated with malaria and dengue, and later can be considered for other VBDs. The team has to analyse the progress of elimination/control activities very critically and provide feedback on strategic reforms required to the IVBDC Committee, which may be placed to malaria elimination executive committee for decision. Similarly for dengue, the progress may be reviewed by dengue clinical management committee, and if needed, it may be placed for higher committee or ministry for necessary approval. The members of this team shall be exempted from administrative shifting; however, the issue of non-shifting should be approved by the ministry
- The district/municipality level programme officer should be retained in the programme for minimum of three years. However, retention of the programme officer must be governed by the administration
- All problematic PHCs, sub-centres should have adequate human resource for implementation of programme activities
- Surveillance, implementation of control activities and reporting of a sub-centre are the responsibilities of the concerned health officials
- Early diagnosis and referral for dengue case management should be made mandatory
- If the post is vacant or not sanctioned, already engaged staff under GFATM support may be employed to take up the surveillance and such related activities. Special focus may be given to malaria surveillance in border areas and a national action plan aimed at prevention of reintroduction of malaria may be framed immediately

- At **points of entry**, immigrants from malaria-endemic countries should be provided with printed materials on malaria, including information about what to do in case of suspected malaria
- It should be the responsibility of the health assistant to administer the recommended dosage of antimalarial drugs
- Medical officers of the PHC should acquaint themselves about the strategies, policies of malaria elimination, dengue control and to implement them in their jurisdiction for achieving the goal of elimination and/or control
- Regulatory policies for ensuring the quality of antimalarial drugs at the site of manufacturing or on receipt, if imported, should be in force
- The policies on tourism, pesticide regulation, agriculture, education, IHR, health act with its related clause for vector control and prevention and control of VBDs need to be enforced
- Regulatory policies to private health sectors should follow diagnosis and treatment protocols at par with national guidelines
- Issue of 'No objection certificate (NOC) ' by the department of health to be made mandatory for registration and renewal of mining, project, road construction and building construction activities or projects which attract labour and create mosquitogenic condition. The department of health should take up health impact assessment study for issuing such certificate
- Mandatory notification of labour registration to the local health authority by the local labour department
- Establishment and implementation of civic byelaws in all the towns to regulate mosquito breeding
- Establishment of central crosschecking team in all the cities/town having population of two lakhs and above needs to be considered.

The draft regulatory policies need to be framed in view of the above so that the municipality officer or his/her authorized representative:

- may, by notice in writing, require the owner or the occupier of any place containing any collection of standing or flowing water in which mosquitoes breed or likely to breed. Within time specified in the notice, not being less than 24 hours, to take such measures with respect to the same, or to treat the same by such physical, chemical or biological method, being measures or a method, as the department of health may consider appropriate in the circumstances.
- If a notice is served on the occupier and he/she is not able to take action, then action is taken by department, but the department shall be entitled to recover from the owner the reasonable expenses incurred in taking the measures or adopting the method of treatment, specified in the notice.

8. Financial implication

In pursuit to the National Strategic Plan for Prevention of Reintroduction (POR) an IVBDC unit under the department of CDC is proposed incorporating entomology and vector control personnel of the NMCP. This unit will be entrusted to assist in other VBDC programmes such as dengue, which is a major public health problem in the country. The entomology and vector control personnel have already been trained in dengue control; other personnel in the municipalities will also be trained on dengue control and other VBDC such as filariasis and Japanese encephalitis. Costing has been done to cover various services required for elimination of malaria and prevention and control of dengue including integrated training, IEC/BCC activities and monitoring. It is tentative and based on The Global Fund proposal for malaria. Certain components for dengue control have been incorporated.

Case management: Persons living in border areas, farmers engaged in slash and burn agriculture in border areas, travellers, migrant workers, fishermen, armed forces and police personnel working in border areas should be considered as priority population. Malaria diagnostic and treatment facilities should be provided free of charge to all at the point of care.

IEC programmes specific to such activities should be conducted regularly.

Vector control: All risk populations mentioned above should be protected by LLINs. As proposed in country's plan, IRS should be done in Oecusse municipality and border district of Covalima municipality till 2023. It should be carried out in the border districts of Bobonaro municipality till 2022. IEC programmes should be conducted regularly.

LLIN distribution and IRS application should be done as response as part of case and foci investigation, if required. Pregnant mothers in stratum 1 areas should be provided with a LLIN as part of continuous distribution.

Resilient and sustainable systems for health (RSSH): Real time data are essential for prevention of re-establishment of malaria. They can be used for M&E. In addition, a KAP survey should be conducted as part of the malaria indicator survey to capture use and uptake of antimalarial interventions, including use of LLINs, acceptance of IRS, and diagnosis and treatment seeking behaviour of migratory and risk populations in border areas.

In addition, to foster and strengthen cross border collaboration, training, HR and capacity development are embedded. There is lack of capacity of the workforce in terms of programme management, forecasting and other management functions, mainly due to the staff not being trained in these functions. Consolidated budget for different activities for IVBDC is given in Table 4.

Table 4. Consolidated tentative annual budget for IVBDC strategy

Module	Intervention	Annual Budget (in US\$)
Case management	Active case detection and investigation	24 205
	Facility-based treatment	196 683
	IEC/BCC	16 500
	Integrated community case management (ICCM)	24 418
	Private sector case management	8163
	Therapeutic efficacy surveillance	15 553
Health management information systems and M&E	Analysis, evaluations, reviews and transparency	75 010
	Programme and data quality	120 477
	Routine reporting	19 403
	Survey	50 000
Vector control	Entomological monitoring	209 882
	IEC/BCC	46 199
	Indoor residual spraying (IRS)	227 792
	LLIN - Continuous distribution - ANC	13 058
	LLIN - Mass campaign - Specific risk groups	95 030
Programme management	Coordination and management of national disease control programmes	570 971
	Grant management	138 408
Total		18 51 752
HR transition		385 702
Total malaria		22 37 454
Case management	Training for health professional on dengue case management	6215
		11 655
	Procurement of rapid diagnostic test for dengue	200 000
	Production of laminating of algorithm for fluid management for dengue fever with shock	1970
	IEC/BCC (production of brochure on care seeking)	15 000
Programme management	Advocacy meeting with relevant ministry (Stakeholder meeting)	23 801
	M/E (verification of dengue data)	4130
	Office supply	5000
	Training for health professional on dengue reporting formats (Laboratory test, reporting register and stock monitoring)	19 902
	Produce of dengue monthly report	6060
	Recruitment of dengue staff	-

	International training on dengue programme management (case management, vector control and surveillance)	10 000
Vector control	Entomological monitoring at municipality (school visit)	60 000
	Entomological monitoring at municipality (Household visit)	80 000
	IEC/BCC (production of brochure on dengue prevention and control)	15 000
	Procurement of abate	75 000
	Procurement of malathion for fogging	100 000
	TV and radio mass campaign for dengue prevention during rainy season	20 000
Total dengue		653 733
Grand total		28 91 187

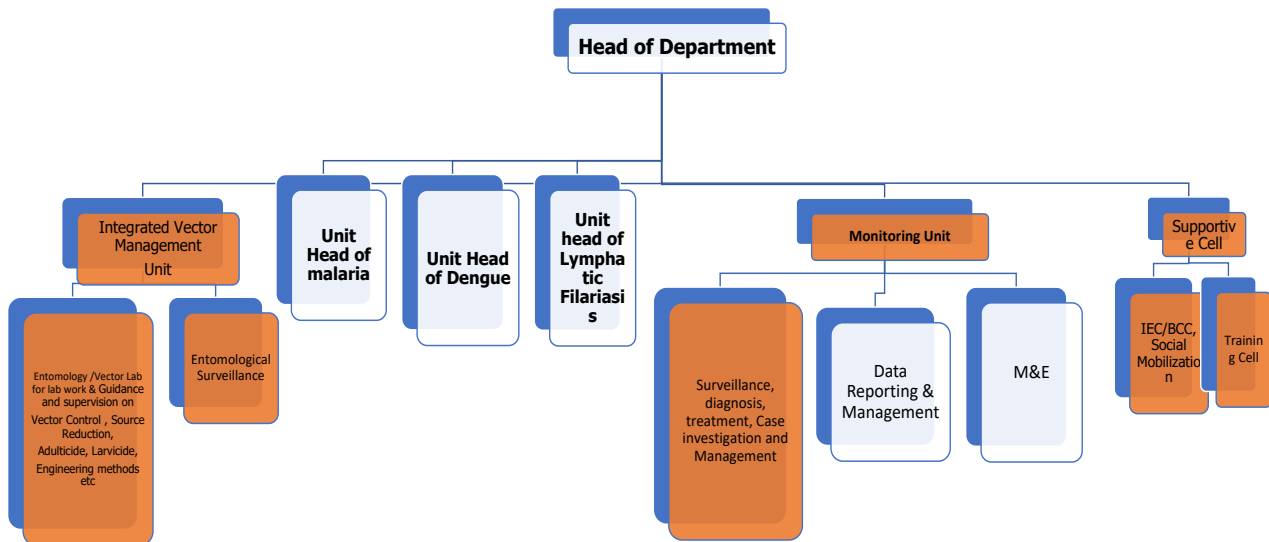
Note: For malaria, contribution of the Global Fund and Government have been clubbed. For dengue, the contribution of WHO was to the extent of US\$ 3000 000, which is included in budget provided by department's budget shared is US\$ 653 733 (double of that).

References

1. World malaria report 2015, Summary. World Health Organization, WHO/HTM/GMP/2016.2.
2. World malaria report 2016. Geneva: World Health Organization, 2016. License CC BY-NC-SA 3.0 IGO.
3. National framework for malaria elimination in India, 2016-2030: NVBDCP, DGHS, Ministry of Health and Family Welfare, Government of India.
4. Malaria situation in India: national vector borne disease control programme, Directorate General of health Services, Ministry of Health and Family Welfare website.
5. Malaria elimination: a field manual for low and moderate endemic countries, WHO, 2007.
6. Disease surveillance for malaria elimination: an operational manual, WHO 2012.
7. Malaria microscopy quality assurance manual: version 2, WHO 2016.
8. Handbook for integrated vector management: WHO/HTM/NTD/VEM/2012.3
9. Draft national policy and strategy on integrated vector management (IVM) to control malaria, dengue and other vector-borne diseases, Timor-Leste, 2014--2018: July 2013.
10. Timor-Leste malaria programme review: a report., 28 November 2011–9 December 2011.
11. Report of the national malaria control programme in Timor-Leste, 2008–2012.
12. National mosquito borne control strategy, Timor-Leste: 2005.

Annex 1. Tentative structure of integrated vector-borne disease control unit

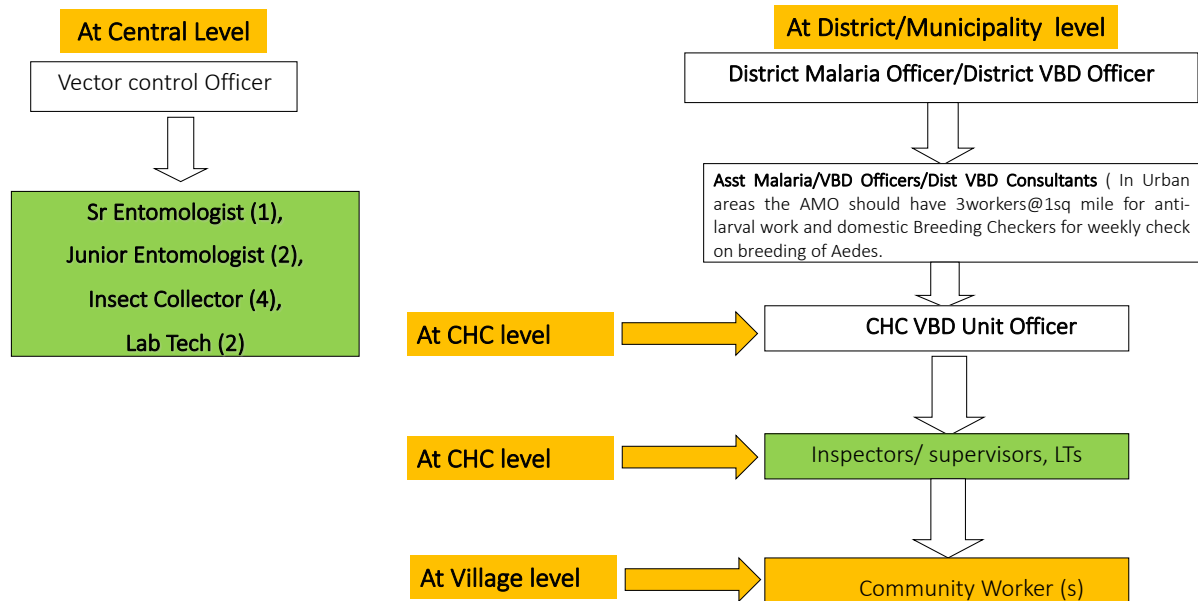
Timor-Leste: Organogram of Integrated Vector Borne Disease Control Unit (IVBDU)



Transitioning Plan of establishing a self sustained Integrated Vector-Borne Disease Control Unit by bringing different vector-borne disease control units under one umbrella is need based on assessment for synchronized actions for elimination/control of VBDs and also in view of phasing out of Global Fund Support.

Proposed VBD Infrastructure in Municipalities/Districts in Timor-Leste

A self sustained Integrated Vector-Borne Disease Control Unit initially by bringing Malaria & Dengue under one umbrella will strengthen proactive action and vigilance



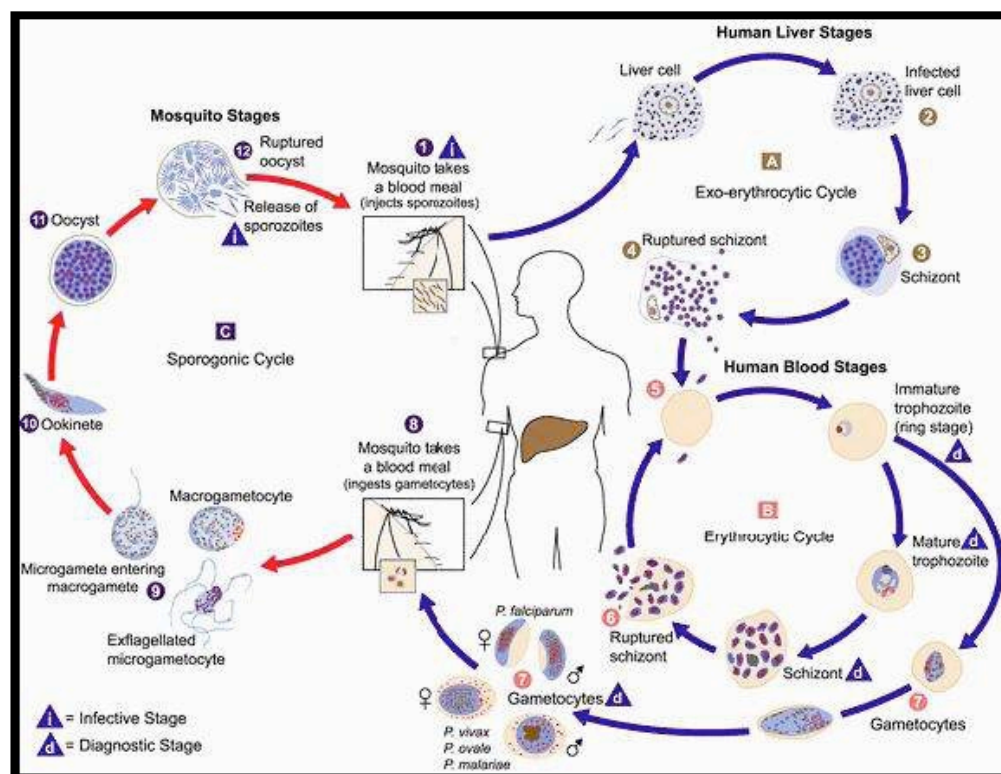
Annex 2. Malaria transmission

Malaria is transmitted by a female *Anopheles* mosquito bite, which has been infected through a blood meal taken from an infected person. A single infected vector, during her lifetime, may infect several persons.

After about a week of taking infected blood meal, mosquito can transmit malaria. The malarial parasite undergoes two cycles of development – the human cycle (asexual cycle) and the mosquito cycle (sexual cycle).

Human is the intermediate host and mosquito the definitive host. The life cycle of human malaria parasite is given in Fig. 1A2.

Figure 1 A2. Malaria Transmission Cycle



Source: Department of Communicable Disease Control (CDC)

Annex 3. Dengue transmission

After feeding on an dengue virus (DENV)-infected person, the virus replicates in the mosquito midgut, before it disseminates to secondary tissues, including the salivary glands. The time it takes from ingesting the virus to actual transmission to a new host is termed the extrinsic incubation period (EIP). The EIP takes about 8–12 days when the ambient temperature is between 25 and 28°C.

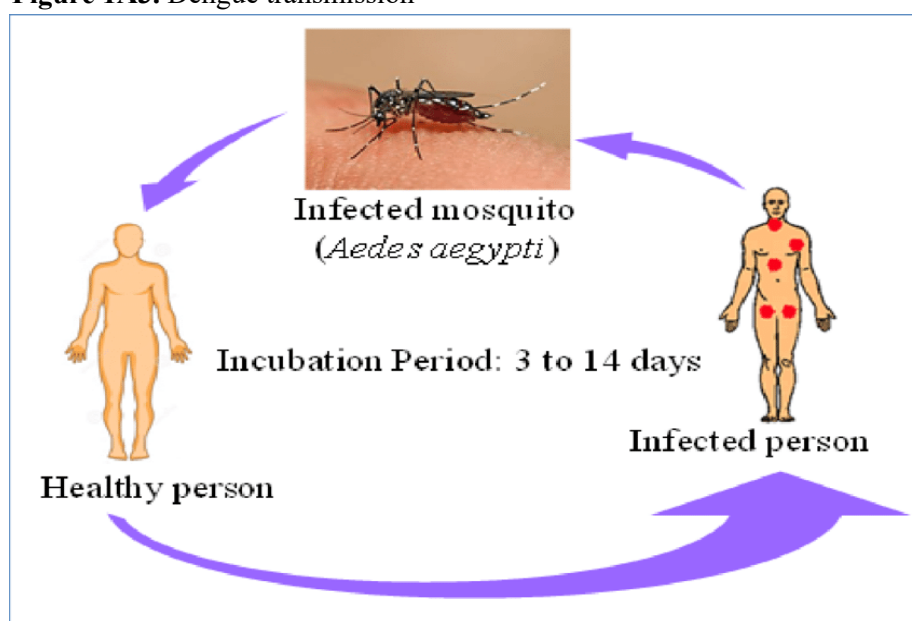
The intrinsic incubation period covers the period from the entry of virus in human host and onset of clinical manifestation.

Transovarial dengue infection in *Ae. aegypti* larvae have been reported to maintain or enhance the epidemics.

Transmission has also been reported from mother to child, where pregnant woman already infected with dengue can pass the virus to her foetus during pregnancy or around the time of birth.

Dengue transmission usually occurs during the rainy and post-monsoon season. This is attributed to ambient temperature and humidity, and multiple secondary breeding habitats created due to rainwater collection (Fig 1A3).

Figure 1A3. Dengue transmission



Source:

https://www.researchgate.net/figure/Transmission-Cycle-of-Dengue_fig4_285629217

Annex 4. Entomological parameters for malaria

Indicator	Definition	Sampling technique	Formula
Adult			
Indoor resting density	No. of adult female mosquitoes per house per night	Pyrethrum spray catch	$\text{= (No. of females} \div \text{No. of houses)} \div \text{No. of nights}$
		Aspirator	
Human-biting rate	No. of bites a person receives from a specific vector species per night	Human landing catch (collections throughout the night, i.e. 12 hours)	$\text{= No. of mosquitoes collected} \div \text{No. of collectors}$
		Human landing catch (collections for a few hours in the night)	$\text{= (No. of mosquitoes} \div \text{No. of collectors)} \div \text{No. of collection hours}$
		Pyrethrum spray catch	$\text{= No. of blood-fed females} \div \text{Total No. of occupants in rooms used for collection}$
Human blood index	Proportion of blood-fed mosquitoes that fed on humans	Pyrethrum spray catch	$\text{= No. of mosquitoes feeding on human blood} \div \text{Total No. of blood-fed mosquitoes}$
Sporozoite rate	Proportion of mosquitoes of a given species carrying sporozoites in the salivary glands	Salivary gland dissection, ELISA or PCR	$\text{= No. of positive mosquitoes} \div \text{No. of mosquitoes analysed}$
Entomological inoculation rate	No. of infective bites received per person per night	Human-landing catches	$\text{= Human-biting rate} \times \text{sporozoite rate}$
Endophagic index	Indicates preference for indoor biting	Human landing catch	$\text{= Human-biting rate indoors} \div (\text{Human-biting rate indoors} + \text{human-biting rate outdoors})$
Exophagic index	Indicates preference for outdoor biting		$\text{= Human-biting rate outdoors} \div (\text{Human-biting rate indoors} + \text{human-biting rate outdoors})$
Immature			
Mosquito breeding index	Measure of larval density		$\text{= Total No. of larvae and pupae collected} \div \text{Total No. of dips performed}$
Habitat occupancy	Percentage of positive larval habitats		$\text{= No. of habitats with larvae or pupae} \div \text{Total No. of habitats found}$

Annex 5. Entomological parameters for dengue

Surveillance method	Index	Calculation
Immatures		
Dipping for larvae or pupae	House index (HI)	No. of houses infested/No. of houses inspected x 100
	Container index (CI)	No. of positive containers/No. of containers inspected x 100
	Breteau index (BI)	No. of positive containers per 100 houses. BI is only valid when minimum 100 houses are inspected. If 100 houses are not checked, then BI is irrelevant
	Pupal index	No. of pupae No. of houses inspected x 100
Adults		
Resting collections (aspirator)	Person hour density	No. of <i>Aedes</i> mosquitoes caught x No. of minutes collected/60
Oviposition traps	Mosquitoes/trap	No. of <i>Aedes</i> mosquitoes caught/No. of traps

Adult surveys for *Aedes*

Resting collections of *Aedes spp* is slightly difficult as they are very active. However, during periods of inactivity, adult mosquitoes typically rest indoors, especially in bedrooms, and mostly in dark places, such as clothes closets and other sheltered sites. During such period, these can be collected.

Landing/biting collections on humans are a sensitive means of detecting low-level infestations, but are very labour-intensive. The collections are usually done by aspirators as mosquitoes approach or land for biting and are expressed in terms of landing counts per man hour.

As there is no prophylaxis for dengue or other viruses transmitted by *Aedes* mosquitoes, it is highly desirable, for ethical reasons, that adult captures of *Aedes* vectors should be based on “landing collections” only with the instruction to avoid being bitten by mosquitoes.

Annex 6. Roles of various stakeholders

Sl. No.	Sector	Roles
1.	Agriculture	<ul style="list-style-type: none"> • Pesticide management and judicious use of pesticides
2.	Irrigation	<ul style="list-style-type: none"> • Maintenance of canal system • Intermittent irrigation • De-weeding for proper flow • Creating small check-dams away from human settlements
3.	Water supply	<ul style="list-style-type: none"> • Repair of leakages to prevent pooling • Diversion of wastewater to ponds/pits • Staggering of water supply • Mosquito-proofing of water harvesting devices • Improved designing to avoid undue water logging
4.	Urban development	<ul style="list-style-type: none"> • Mosquito-proof design of dwellings • Safe rainwater harvesting • Issue of permission to use building after clearance from health department
5.	Industry/mining	<ul style="list-style-type: none"> • Improving drainage systems • Safe disposal of used containers • Mosquito proofing of dwellings
6.	Environment/forest	<ul style="list-style-type: none"> • Pesticide management policy • Environment management policy • Social forestry
7.	Fisheries	<ul style="list-style-type: none"> • Training in mass production of larvivorous fish
8.	Road and building sector	<ul style="list-style-type: none"> • Excavations with proper gradient • Designing for water to flow into natural depressions/pond/river • Follow up action after excavations
9.	Education	<ul style="list-style-type: none"> • Vector control teaching in educational curriculum • Monthly drive on cleaning of school premises • Cleanliness of surroundings and checking water containers for mosquito breeding
10.	Mass media	<ul style="list-style-type: none"> • IEC activities and advocacy
11.	Local government	<ul style="list-style-type: none"> • Implementation of IVBDC programme • Ensuring public participation • Ensuring regular monitoring
12.	NGOs /FBOs/ CBOs	<ul style="list-style-type: none"> • Community mobilization • Promotion of programme activities • Village-level training • Distribution of IEC material

Annex 7. External review of programme: A report

In the past, malaria transmission correlated with the rainy season generally extending from December to April. All imported infections originated in Indonesia. Timor-Leste shares a porous land border with West Timor of Indonesia where malaria is still endemic. In addition, Indonesians visit Atauro Island for fishing and many fishermen from Atauro Island visit Indonesian islands for the same purpose. Oecusse municipality/Special Administrative Region is enclaved by West Timor and is, therefore, at high risk for malaria transmission.

Diagnostic services and treatment are available in all health care facilities. In addition, malaria volunteers working in remote hard-to-reach areas are provided with RDTs and antimalarial medicines including ACT. Both RDTs and microscopy are used to detect malaria infections. Confirmation of the diagnosis is done by microscopy.

QA/QC procedures for malaria microscopy and RDTs are based on stringent SOPs and supervision. A team of microscopists at central level cross-checks 10% of negative blood slides and RDTs and all positive slides/RDTs. External competency assessments of laboratory analysts have been carried out in 2008, 2011, 2016 and 2019.

The standard first-line treatment for both uncomplicated *P. falciparum* and *P. vivax* infections is artemether/lumefantrine with a single dose of primaquine for *P. falciparum* and weekly primaquine over eight weeks for vivax infections.

A web-based surveillance system using the DHIS2 platform has been developed for aggregate data and case and focus-based data. Currently the software is used for aggregate data, but for case and focus investigation, paper-based formats are used. The surveillance system operates independent of the HIMS of the MoH.

Case and foci investigations have been conducted since 2016. Staff have been trained on outbreak response. An analysis of the outbreak of malaria in Oecusse in 2016 revealed that the response was slow due to delays in release of funds even though funds were available. Since then, malaria has become a notifiable disease, which should give easier access to government emergency funding.

Entomological surveillance carried out from 2007 to date has revealed that there are 13 species of anophelines in the country. Entomological studies have incriminated *An. barbirostris* and *An. subpictus* as the principal and secondary vectors of malaria, respectively. Insecticide susceptibility tests show that both are susceptible to the insecticides used in LLINs and IRS. The policy is to use a chemically unrelated class of insecticide for LLINs to that used for IRS.

LLINs and IRS are the major vector control methods used in Timor-Leste. LLINs are given to high-risk populations including migrant workers. Routine IRS is carried out in border areas including Oecusse municipality, border areas of Bobonaro and Covalima municipalities, Atauro Island and in a one kilometre radius of the residence of an imported malaria case. Larviciding is done occasionally.

To support LLIN distribution, there is a programme coordinated through Municipality Health Services, community health volunteers and village leaders. Health Net, a sub recipient of the

National Malaria Control Programme, assist for LLINs distribution, visit houses and help householders to hang up the nets and monitor net usage in Oecusse Municipality.

IEC and community mobilization are integral parts of the national malaria strategy, providing cross-cutting support to the implementation of the different technical strategies to prevent and control malaria. A BCC strategy has been developed for 2015–2020.

Technical capacity of staff is continuously being updated through training programmes. There is adequate documentation and guidelines for training purposes. Training needs have been identified. The National Malaria Programme is largely funded by The Global Fund and government funds. A major issue is that of 135 staff members of the NMP, only 16 have been employed on a permanent basis by the government, the rest being contracted with The Global Fund funds; this raises major concerns with regard sustainability of the NMP and the prevention of re-establishment of malaria in the country. There is also a dearth of management skills among all staff. The services of the long-term international consultant, whose inputs and oversight were pivotal for elimination of malaria in the country, have also been terminated since 2019.

The main conclusion of the review is that all available evidence indicates that malaria transmission has been interrupted in the country, and that this is due to good implementation of anti-malaria interventions through a well-developed health service infrastructure. There are many strengths of the current prevention of re-establishment of malaria strategy and the programme is functioning effectively. Well-trained staff is in place, and SOPs and guidelines for practically all aspects of the programme are available. However, the programme has so far been mainly financed by the Global Fund and most of its staff are on The Global Fund-supported contracts. For prevention of reintroduction to be recognized as sustainable, there needs to be substantial progress towards government assuming full responsibility for the programme. Technically, the programme is of high quality. There is room for improvement in specific areas, and over the coming years there is a need to increase cost-effectiveness by more restrictive targeting of interventions. These issues are addressed in the recommendations.

The recommendations of the review (some of them abbreviated) are as follows:

Case management and chemoprophylaxis

1. Diagnosis and treatment of malaria should be available any time in all health facilities
2. RDTs should be used for malaria diagnosis in all health care facilities; the training for all health personnel in using RDTs, which was last carried out countrywide in 2016, should be repeated
3. Microscopy for malaria diagnosis should be maintained in hospitals and at municipality level, but no longer at more peripheral levels. The analysts with good performance should be retained, while others should be assigned to different tasks
4. Refresher training on microscopy should be performed annually
5. A multi-head microscope with camera and computer connection should be procured for training at the central laboratory

6. New malaria microscopy bench aids should be made available at all health facilities, where malaria microscopy will be performed in the future
7. A panel of fresh positive slides should be made available with the support of WHO
8. Mechanism for maintenance of microscopy should be established and carried out annually
9. A consultant for quality assurance on microscopy and RDTs should be recruited by WHO to work in the country for about four months
10. Case definition for suspected malaria/criteria for diagnostic testing of patients seeking care should be adapted as follows:
 - a) In Stratum I, all cases of acute febrile illness should be considered as suspected malaria
 - b) In other Strata, suspected malaria should be defined as acute febrile illness with one or more of the following features:
 - i) No obvious alternative cause of the fever. History of traveling to endemic areas within one year known history of malaria within three years history of blood or blood products transfusion within three months
11. Treatment for the liver stage of vivax malaria should continue to be weekly primaquine for eight weeks
12. The case management guideline should be revised as follows: a) Warning signs/symptoms of severe malaria and related precaution should be described; and b) When prescribing primaquine, health personnel should inform the patients/relatives about the potential adverse events of this compound
13. Training for medical doctors should be performed annually
14. Defined stock levels of oral and parenteral antimalarial medicines should be standardized and maintained depending on the health care facility level and the malaria stratum
15. All medical practitioners should be trained on the need for advising on personal protection and chemoprophylaxis to all travellers going to endemic areas
16. As for the medicine for chemoprophylaxis, the most realistic option given and registered medicines available in the country is doxycycline
17. NMCP should work with armed forces and their medical officers to ensure all personal and, if possible, collective preventive measures for travel to endemic countries/areas, and, with Ministry of Foreign Affairs for exchange groups visiting African countries.
18. NMCP should work with travel agencies to educate other travellers as outlined above.

Malaria surveillance and programme monitoring

1. Regularly re-stratify the country based on risk factors, importation of cases and revised vector mapping (see below under entomology and vector control)

2. Use new case definition for suspected malaria case different for Stratum 1 and other strata. All suspected malaria cases should be tested for malaria. The main indicator for surveillance should no longer be the annual blood examination rate (ABER). The main indicator for completeness of PCD should be proportion of patients with symptomatology matching the case definition for suspected malaria who are tested
3. Discontinue proactive case detection among permanent residents in villages
4. To correct deficiencies in case and focus investigations, the M&E officer, regional malaria officers and municipality malaria officers should be supervised, and a refresher training should be organized
5. The delays in reporting verified data to the HIMS should be minimized as the number of reported cases is low at present
6. The web-based online surveillance using the DHIS2 platform should be used to provide real-time data for immediate response
7. Foci data should be updated regularly using formats and tables recommended by WHO, normally annually
8. CDC should take over and host the malaria data in the official server of the MoH.

Entomological surveillance and vector control

1. NMCP should continue to assess use, acceptability and quality of vector control interventions to ensure optimal implementation and to indicate any corrections, if required
2. NMCP should continue tracking insecticide resistance at least once a year according to the latest WHO protocol
3. Insecticide resistance monitoring plan should be updated
4. Entomological surveillance should re-orient to contribute to the refinement of the stratification by characterizing receptivity of all strata through spot surveys
5. Develop a map of receptive risk areas and update regularly depending on the dynamics between receptivity and importation risks
6. Sentinel site monitoring of composition and behaviour of mosquito vector population should be maintained in two sites
7. Sampling techniques during sentinel site monitoring should employ only those, which have been most productive during the past surveys and where information generated is most useful for decision-making
8. As the laboratory is located in an office building, it should be improved by providing double screens in the area where live mosquitos are held for rearing
9. The entrance part of the laboratory should be equipped with insect cabinets and slide boxes for storing the insect reference collection

10. Larval source management should continue to be pursued whenever and wherever it is practical to implement with the participation of the community and other relevant sectors
11. Some guidelines should be updated and include sections that should be relevant to current IRS operations using non-pyrethroids, e.g., safety precautions and first aid
12. The existing draft of the pesticide law should be revised to include provisions relating to insecticides used in public health and pest control and quality control
13. Training should be provided to the entomology team on planning of spot surveys, mapping, ELISA for malaria vector incrimination, analysis of entomology data and interpretation
14. In Stratum 1, as long as the epidemiological situation persists, LLIN mass distribution should continue; however, this should be reconsidered, if and when, West Timor approaches malaria elimination leading to a reduction in the annual number of imported cases
15. Outside Stratum 1, distribution of LLINs to pregnant women should be discontinued
16. LLIN continuous distribution or IRS, should be applied as appropriate to the situation of the targeted vulnerable groups, i.e. border police, fishermen who carry out fishing and stay in malaria endemic Indonesian Islands, migrant workers in construction or development project sites, etc.
17. Focal IRS and LLIN should be maintained as part of a response after foci investigation or during outbreaks
18. Training should be provided to the entomology and vector control officers on use of larval and biological control methods for vector control
19. Routine 1-cycle IRS in Stratum 1 should continue until all foci are classified as cleared by end of 2020; after 2020, routine IRS should be phased out as follows: Atauro Island in 2021, Bobonaro in 2022 and Covalima and Oecusse in 2023. This phased out should be revised based on the malaria situation in the border areas of West Timor and increase in the annual number of imported cases.

IEC, advocacy and community participation

1. Develop a new communication strategy for 2021–2023 in consultation with relevant partners and stakeholders; priority behaviours should include the following: a) Maintained awareness among local leaders, healthcare service providers and community members about malaria prevention and control; b) Sustained high level of LLIN ownership and use among the target populations; c) Immediate consultation of patients with fever and travel history to endemic areas or previous history of malaria; and d) Increased political commitment and ownership by the local administrative/health leaders of malaria programme
2. Include in the communication strategy an advocacy plan to enhance partnerships with local authorities and private sectors to mobilize additional resources, especially in areas with development projects, e.g. Oecusse
3. Messages and modes of delivery will need to be revised in accordance to the targeted special groups, e.g. well-designed information leaflets or brochures for distribution to special risk groups or in areas where there is limited opportunity for interpersonal communication, e.g.

border posts, harbours, construction/development project sites, etc., informing the target when and where to seek consultation, how to prevent getting malaria in the areas where they are going; materials should be made available in Tetun, English and Indonesian

4. Revitalize coordination with the health promotion department and existing collaboration with the department of education and explore the possibility of expanding the malaria health education sessions into vector control and environmental hygiene in the curricula of middle school
5. Provide regular updates and IEC materials for the health care service providers and use them to maintain patient's awareness regarding malaria, its prevention and control
6. Strengthen and maintain the social mobilization skills of health promotion staff of CHCs, malaria staff, and other partners involved in IEC activities, especially in border areas, Oecusse and Atauro, e.g. delivery of malaria and other relevant health messages in the community during SISCa and mobile clinic activities.

Cross-border and inter-sectoral collaboration

1. Detailed information about any new malaria case in Timor-Leste or in one of the four bordering districts of Indonesia should be shared with the national programme across the border in real time (e.g. within 24 hours of completion of case investigation). This should be followed up by sharing of information on any focus and on measures taken in reaction to the case/focus. A mechanism for this should be established, possibly with the support of WHO and/or RAM. It is not important whether the information is shared district to district, through national programmes, or through WHO, etc. What matters is that the information is shared immediately, through electronic means
2. The experience of Timor-Leste should be shared with the Indonesia/NTT/West Timor malaria programme staff through sharing of detailed reports, meetings, joint training and study tours in Timor-Leste
3. Epidemiological and operational information from both sides should be shared on a regular basis, for example, annually
4. The MoH should discuss with the border police, whether the collaboration on malaria and perhaps other communicable diseases could be enhanced at all transit points.

Procurement and supply chain management

1. Use of WAMBO should continue and cover all malaria commodities even after procurement transition to SAMES
2. MoH should provide training on Good Storage Practices and Good Distribution Practices to SAMES staff as well as pharmacists/logisticians in the municipalities, hospitals, CHCs and health posts. This will benefit all commodities. Training should be through training of trainers (ToTs) with master trainers training in Tetun

3. At least three more positions in NMCP should also be trained on forecasting perhaps through a live workshop/exercise in 2020 with the help of external expert
4. MoH senior leadership should drive collaboration between NMP, SAMES, municipalities etc., so that there can be greater integration of the malaria supply chain with the health system, while continued oversight and support from NMCP is maintained. This will allow the NMP to focus more on malaria prevention even with fewer human resources
5. NMCP should monitor stock levels of all essential antimalarial products. This should be part of the programme's responsibilities and not related to the source of financing for a product
6. Based on the revised treatment, diagnostic and vector control guidelines following this review, a Malaria Commodities List should be prepared, and the essential medicines list modified to include only the selected products. We have recommended reduction of antimalarial medicines from 17 to 7
7. MoH should roll out mSupply to municipalities at the earliest and later to CHCs and eventually to HPs
8. Forecasting should be adapted to the prevention of re-establishment with reduced requirements for products with documentation and tools (details, see main text)
9. Till NMCP completes its integration, there should be a PSM transition manager working with NMP, SAMES, municipalities, directorate of pharmacy and other MoH entities. This will help transfer and build processes, systems (including mSupply) and skills so that the malaria supply chain continues to be high performing and has minimum waste. The position could ideally be funded by the Global Fund and serve TB and HIV programmes too
10. In case of an outbreak there should be enough stock in the system to meet the needs of at least the initial stage of the outbreak, though local stock levels may need to be propped up.

Human resources and the essential service package for malaria

1. Consolidation of the NMCP management team at central level to include following posts:
 - National malaria programme manager
 - Deputy national malaria programme manager
 - M&E officer
 - Data entry officers (2)
 - Regional malaria officers (3)
 - Administrative officers.
2. Creation of a new Vector Control and Entomology (VCE) Unit in MoH under CDC with following staff taken over from existing NMP staff:
 - Senior entomologists (2)
 - Junior/regional entomology officers (3)

- Insect collectors (1)
 - Vector control officers (3)
 - Municipality level: Assistant municipality malaria officers as municipality entomology and vector control officers (13)
3. All municipality malaria officers (13), already MoH staff should be retained, but their responsibilities widened to include also other VBD
 4. In Stratum 1, the sub-municipality/CHC malaria officers should be absorbed as government funded MoH staff, but their responsibilities widened to include also other VBD
 5. Outside Stratum 1, all sub-municipality/CHC malaria officers should be integrated as sub-municipality/CHC CDC officers with responsibility for all communicable diseases starting from VBD control in phased manner
 6. Given the reduced occurrence of malaria everywhere in the country, whereby reporting requirements have been reduced, following posts currently funded by the Global Fund should be abolished:
 - the hospital malaria officers
 7. The transitions proposed should be implemented gradually over the period 2021–2023.

Training and capacity development

1. Training in the following areas need to be prioritized for prevention of re-establishment:
 - Analytical skills for planning, implementation and M&E of the programme should be provided to senior programme management, M&E Officer, regional and municipality malaria officers and vector control officers. The same staff categories need more training on case and focus investigation and classification and on use of DHIS case-based data system
 - Regional, municipality and sub-municipality malaria officers and vector control officers need more training in communication skills, advocacy, networking and community mobilization.
2. As malaria is now a rare disease and that all cases are imported, the following components of the training plan should not be prioritized:
 - G6PD deficiency diagnosis (it would be overly expensive in terms of human resources to establish it at this juncture)
 - PCR (idem).
3. Vigilance of the general health services should be strengthened by:
 - Annual training and re-training of clinicians. Train municipality coordinator medical officers and municipality malaria officers centrally to serve as trainers of trainers. Support with annual update and a wall-poster showing flow-chart for case management

- As all health staff was trained in RDT use last in 2016, it would be useful to repeat that campaign, drawing attention to the criteria for suspected malaria and the need for all health staff to be alert to the possibility of occurrence of a malaria case as well as of factors causing increased risk.
4. In view of the challenges in managing changes in the programme and the phasing out of the TA, the skills of the very capable programme manager should be further strengthened through high-level public health training. This could also lead to broadening of her portfolio and use of her capacity more broadly in the MoH
 5. The long-term malaria consultant should continue to support the programme for periods of four months per year and remote consultation can be provided whenever necessary. It would be extremely useful, if the consultant could be recruited for an inter-country post, working for three months per year in Timor-Leste and three months per year in West Timor or Nusa Tenggara Timor in Indonesia. A mechanism for this should be established with the support of WHO
 6. For further strengthening of quality assurance of microscopy and RDT, a consultant should be recruited by WHO for a period of about four months.

Financial and economic aspects

1. The government should fulfil co-financing commitments and show preparedness to sustain the programme achievements in the medium (absorption of staff first) and long term (taking over all commodity costs)
2. In preparation of the absorption of NMP staff as well as all other malaria-related expenditures at some point, the municipalities should be informed about The Global Fund funding that contributes directly to the operations at district level, i.e. the budget items that would form part of the budget if the programme were to run without the Global Fund funding
3. The further development of the NMCP for the elimination and post-elimination period should be based on assessments of costs and likely effects – this can be qualitative and does not necessarily involve calculations
4. The Global Fund should consider whether it would be possible to use savings from MEMTI financing for accelerating progress in West Timor.

National commitment and governance

Establishment of a high-level national, inter-sectoral commission for the prevention of malaria in Timor-Leste. The membership of the commission should include the MoH, parliamentarians, representatives of armed forces and border police, the economic development zones, extraction, civil society and the corporate sector. The terms of reference should include resource mobilization, intersectoral collaboration and cross-border/international collaboration.

Independent National Malaria Advisory Committee should be established

WHO certification of malaria-free status

Corrective action should be taken on five identified weaknesses, so that the situation will be significantly improved, before the arrival of the certification mission. In particular, the majority of the new malaria, VCE and malaria/VBD posts proposed should be created and filled by MoH before the certification mission takes place.

Annex 8. Vector-borne disease control technical working group meeting

- List of Participants:
 1. Sra. Marta (Head of CDC Department, MoH)
 2. Sr. Agostinho (Environmental Health, MoH)
 3. Sr. Lucas (Dengue Programme Manager, MoH)
 4. Sra. Maria Mota (Malaria Programme Manager, MoH)
 5. Dr. Debashish Kundu (Medical Officer for Communicable Disease, TB/HIV/Hepatitis and Malaria, WHO-TLS)
 6. Sr. Tito de Aquino (Programme Associate for Environmental Health and Health Emergency, WHO-TLS)
 7. Dr. Baltazar Freitas (Malaria Programme Assistant)
- Welcome participants to the Vector-Borne Disease Control Meeting at WHO-TLS office meeting room
- Presentation of WHO-TLS related dengue projection distribution of dengue cases by the municipalities and below the municipalities post administrative (Dengue fever, Dengue haemorrhagic and Dengue shock)
- Dengue cases data from WHO-TLS surveillance department during five years (2016, 2017, 2018, 2019, 2020, 2021)
- MoH already have a plan focused on four municipalities (Ermera, Dili, Liquica and Manatuto) for the dengue vector control, and have been discussed in February
- Sr. Lucas (Dengue Programme Manager, MoH): Based on experience last year dengue cases increased during the flooding
- Sra. Maria Mota (Malaria Programme Manager): First of all, we have to check again the data and which Suco has reported more. And for that, Suco has to cross-check with the health facility whether it is the true dengue or not. Secondly also have to check the diagnosis method, which diagnosis method that they used, rapid diagnosis test or Torniquet, because through this tool true dengue can be identified
- Sra. Maria also proposed for the next meeting to choose one director as a chairman of this technical working group—Vector-borne disease control
- During discussion, Sr. Lucas (Dengue programme manager) also raised an issue related to the Rapid Diagnosis Test that is already out of stock

- From the Environmental Health, the first point they raised was that they do not have the correct data from the surveillance investigation. Hence, when they go for case intervention, the patient is found in another municipality
- Sr. Agostinho (Environmental Health) requested for focusing on prevention part and requested WHO-TLS to support the mobile fogging machine.

Note point during the meeting:

- Technical working group should meet every month (routinely). HNGV, surveillance, MoH health promotion
- Common issue of the data and routine report is not timely available
- National Strategic Plan for dengue control needs review.

Annex 9. Review meeting on Integrated Vector-Borne Disease Control Initiative for dengue and malaria

Dengue is a public health problem in Timor-Leste with a rising trend of cases - From 975 in 2019 to 1450 in 2020 with a case fatality rate of 0.7%, disproportionately affecting children between 1 and 4 years (0.4% CFR) and 5 and 14 years (0.2% CFR). Dengue cases are primarily reported in Dili, Baucau, Bobonaro, Covalima, Liquica and Manatuto. Malaria cases have declined over the years and the National Malaria Control Programme is gearing for achieving the Malaria Elimination Certification.

Development of policy and strategy on VBDC for integration of malaria services into VBDC structures is on a high-level agenda at MoH. The MoH has accorded high priority towards the integrated VBDC framework plan, and necessary funding support towards an integrated VBDC strategy development and training plan has been secured in the current Global Fund funding cycle (2021–23). This includes development of HR and capacity development plan for absorption of Global Fund funded malaria positions into the government from domestic resources.

First meeting towards the vision of integrating VBDC programmes, starting with malaria and dengue control programmes, was held on 28 April at the WHO Country Office, and was presided over by Sra Marta Abenia dos Santos, Head of the Communicable Disease Control (CDC) Department, MoH. The summary of deliberation of the meeting was then followed by a briefing meeting with the WHO Representative, Dr Arvind Mathur, for soliciting necessary support for an integrated vector control response. The following officials participated in the meeting:

- Sra. Marta (Head of CDC Department, MoH)
- Sr. Agostinho (Environmental Health, MoH)
- Sr. Lucas (Dengue Programme Manager, MoH)
- Sra. Maria Mota (Malaria Programme Manager, MoH)
- Dr. Debashish Kundu (Technical Officer, Communicable Diseases, WHO)
- Sr. Tito de Aquino (Programme Associate, Environmental Health, WHO)
- Dr. Baltazar Freitas (Malaria Programme Assistant, WHO).

Key action points:

1. To have a monthly coordination meeting for having better coordination and collaboration between all the entities involved in the vector control - CDC Department (Malaria and Dengue Control Programmes), including the Environmental Health, Health Promotion, and Surveillance departments. A national technical working group (TWG) on VBDC can be proposed
2. The issue of weak sharing of dengue surveillance data with the Dengue and Environmental Health unit was discussed. It is important that surveillance unit share the dengue data timely with the respective unit for validation, and timely public health response

3. Experience and expertise of the National Malaria Programme can be used for streamlining dengue control initiatives. Malaria officers at the municipalities can support the dengue control activities for:
 - a) Joint entomological survey
 - b) Dengue surveillance data verification.
4. To update the clinical management guideline for dengue, including diagnosis methods
5. Issue of low stock of RDT and need for dengue mosquito source reduction were highlighted both by the CDC and Environmental Health Department
6. To propose a focal point person to initiate coordination of integrated vector control management, starting with malaria and dengue cases
7. Following financial support was requested from WHO:
 - a) To conduct dengue control and prevention in five municipalities (Dili, Baucau, Bobonaro, Covalima and Manatuto): Source reduction (Status: Approved, US\$ 25 060.00)
 - b) Procurement of dengue RDT kits (Status: Finalizing the price estimates)
 - c) To initiate the discussion towards development of strategy for dengue and VBDC control. Dr Bhupender Nagpal, WHO Regional Entomologist, could be invited in the next meeting for soliciting his expert guidance in this direction
 - d) To convene and host monthly coordination meetings.
8. Next meeting to be proposed by end of May/Early June 2021 with participation and guidance from DGHS, Director CDC and WHO Representative.

Agenda items for the next joint VBDC meeting

1. To propose for a technical working group/committee with representatives from HNGV, Surveillance, CDC, Environmental Health and Health Promotion. DGHS can be proposed as the Chairman of this technical committee
2. Discussion on MoH request to WHO on:
 - a) Dengue case management review at the referral hospitals
 - b) Discussion on MoH request on dengue RDT procurement.
3. Launch of VBDC campaign prior to commence of various field-level activities at various municipalities on mosquito source reduction
4. Way forward towards the development of VBDC strategy and dengue clinical management guideline.

Annex 10. Routine and spot entomological surveillance plan 2021–2022

Year	Month	Aileu	Ainaro	Baucau	Bobonaro	Covalima	Dili - Hera	Dili - Outer Hera	Ermera	Liquica	Los Palos	Manatuto	Manufahi	Oecusse	Viqueque	Summary
2021	J															
	F													Routine		Oecusse
	M						Routine									Dili-Hera
	A												Spot (12 days)			Manufahi (12 days)
	M				Spot (12 days)											Bobonaro (12 days)
	J					Spot (12 days)										Covalima (12 days)
	J													Routine		Oecusse
	A						Routine									Dili-Hera
	S							Spot (7 days)								Dili Outer Hera (7days)
	O		Spot (7 days)							Spot (7 days)						Ainaro (7days) + Liquica (7days)
	N			Spot (12 days)												Baucau (12 days)
	D															
2022	J															
	F													Routine		Oecusse
	M						Routine									Dili-Hera
	A	Spot (7 days)														Aileu (7 days)
	M								Spot (7 days)							Ermera (7 days)
	J															
	J													Routine		Oecusse
	A						Routine									Dili-Hera
	S										Spot (12 days)					Los Palos (12 days)
	O											Spot (12 days)				Manatuto (12 days)
	N														Spot (12 days)	Viqueque (12 days)
	D															

Annex 11. Treatment protocol

Tabela 1. Dosagen artemether 20 mg – lumefantrine 120 mg (AL), fo dala rua kada loron no durante loron 3 ho primaquina dose dala ida ba loron ida ba malariá falciparum la ho komplikasaun.

Grupu tinan	Grupu todan	Artemether 20mg-Lumefantrine 120 mg (AL)			Dosis Singel ba loron ida	
		Loron 1	Loron 2	Loron 3	Ba primaquina (15mg) uza 0.25/kg	Ba primaquina (7.5mg) uza 0.25/kg
Fulan 4-12	4 < 10 kg	1 tb ☀	1 tb ☀	1 tb ☀	-	-
		1 tb ☾	1 tb ☾	1 tb ☾	-	-
Fulan 13-Tinan 5	10-14 kg	1 tb ☀	1 tb ☀	1 tb ☀	¼ tb	½ tb
		1 tb ☾	1 tb ☾	1 tb ☾	-	-
Tinan 6-11	15 to 24 kg	2 tb ☀	2 tb ☀	2 tb ☀	½ tb	1 tb
		2 tb ☾	2 tb ☾	2 tb ☾	-	-
Tiana 12-14	25 to 34 kg	3 tb ☀	3 tb ☀	3 tb ☀	¾ tb	1 no ½ tb
		3 tb ☾	3 tb ☾	3 tb ☾	-	-
Tinan >14	>35 Kg	4 tb ☀	4 tb ☀	4 tb ☀	1 tb	2 tb
		4 tb ☾	4 tb ☾	4 tb ☾	-	-

Tabela 4. Rejime Primaquina ba pasiente ne'ebe ho defisiensia G6PD ho infesaun mono-vivax (tratamentu radikal).

Group idade	Group todan (Kg)	PRIMAQUINE (15 mg base) 0.75 mg/kg bw	PREMAQUINE (7.5 mg base) 0.75 mg/kg bw
		Hahú trata hamutuk ho ACT no fó kada semana durante seman 8	
Fulan 0 – 6	< 6	-	-
> Fulan 6 – Tinan 5	10-15	½	1
Tinan 6 - 9	16 – 20	¾	1½
Tinan 10 - 12	21 – 30	1 ¼	2 ½
Tinan 13 - 15	31 – 40	1½	3
Tinan 16 - 20	41 – 44	2	4
Tinan > 20	45+	2 ¼	4 ½

Tabela 5. Rejime Primaquina ba pasiente ne'ebe la'os defisiensia G6PD ho infesaun mono-vivax (tratamentu radikal).

Grupu tinan	*Grupu todan (kg)	PRIMAQUINA (15 mg baze) 0.25 mg/kg td	PRIMAQUINA (7.5 mg baze) 0.25 mg/kg td
		Hahú trata hamutuk ho ACT no fó kada loron 14	
Fulan 0 – 6	< 6	-	-
Fulan 6 – Tinan 5	10 – 15	¼	¼
Fulan 6 - Tinan 9	16 – 20	¼	½
Tinan 10 -12	21 – 30	½	¾
Tinan 13 - 15	31 – 40	½	1
Tinan 16 - 20	41 – 44	5/8	1 ¼
Tinan > 20	45+	¾	1 ½

Estimasaun konaba groupu idade nebe foti basea ba kalkulasaun todan husi pasiente hirak nebe tama iha Estudu Efikasiun ba Malaria. Ida ne'e sei diak liu no sampel ida ne'e mos representa ona todan populasaun TL nian. Maibe persija hetan informasaun nebe klean liu tan.

Annex 12. BCC strategic framework

Target audience segmentation, messages, and channels

Drawing from the rapid needs assessment, a list of The Messages from a Source is sent via a Channel to a Receiver with a certain Effect intended with opportunities for Feedback, all taking place in a particular Setting (Source...). Messages draw from technical policy/guidelines, evidence and importantly, from an understanding of the communities, contexts, and environment.

Component: Prevention: LLIN/ITN (appropriate use by general and key population -- pregnant women, children under 5)

- **Key challenges:** Sustained political commitment; universal coverage with LLIN in identified high-risk areas and population and replacement; correct and consistent LLIN usage by general and vulnerable population.
- **Target audience:** Policy/decision-makers (national and district levels including ministry/department other than CDC) support universal coverage through mass campaigns and routine distribution.
- **Messages:** LLINs need to be distributed @ 1 LLIN per 1.8 persons for universal coverage. LLINs are effective tools that last for 2–3 years, if used correctly and daily. LLINs are cost-effective relative to fogging.
- **Channels:** Information products: Technical/research/study/evaluation brochures, gate folders, AV capsule, and advocacy meeting.
- **Target audience:** Family/individual (including vulnerable groups) acquire/own LLINs; promote/use correctly and daily.
- **Messages:** Mosquitoes cause malaria.
 - Mosquitoes that bite at night cause malaria
 - Malaria is serious, can be fatal
 - Children under 5 and pregnant women are the most vulnerable
 - You can prevent malaria in your home, village
 - LLIN is for general population and specifically children under 5 and/or pregnant women
 - LLINs are effective tools for malaria control that last for 2–3 years, if used correctly and consistently
 - LLINs are cost-effective relative to fogging. Acquire/own LLINs (ensure listing, attend distribution venue, acquire as guided by PSF)

- Hang LLINs correctly and at sunset every day
 - Ensure vulnerable groups (pregnant women, children under 5) sleep under LLIN
 - Sleep under LLINs every night
 - Take proper care of LLINs. Wash every two months.
- **Channels:** Flip chart, poster, gate folder, billboard, community meeting, infotainment (drama), IPC, radio, TV, newspaper advt.
- **Target audience:** Health care service providers (doctors, nurses, PSF), community volunteers, others (Daia, private sector, etc.)
- Promote LLINs at every opportunity (CHC/HP/house visits, etc.)
 - Counsel on how/when/who should use LLIN
 - Distribute LLIN, and/or explain where to get LLINs
- **Messages:**
- LLINs are effective tools that last for 2–3 years, if used correctly and consistently
 - LLINs are cost-effective relative to fogging. Acquire/own
 - LLINs (ensure listing, attend distribution venue, acquire as guided by PSF)
 - Hang LLINs correctly and at sunset every day
 - Ensure vulnerable groups (pregnant women, children under five) sleep under LLIN
 - Sleep under LLINs every night
 - Take proper care of LLINs. Wash every two months.
 - LLIN is not harmful
 - Old LLINs can be used to screen doors/windows.
- **Channels:**
- Flip chart, gate folder, training/sensitization session, AV capsule.
- **Target audience:** Community leaders (Suco/Aldeia Chief), organizations
- Promote correct and daily LLIN use, ensure (ensure listing, attend distribution venue, as guided by PSF)
- **Messages:**
- LLINs are effective tools that last for 2–3 years, if used correctly and consistently.
 - LLINs are cost-effective relative to fogging
 - Acquire/own LLINs (ensure listing, attend distribution venue, acquire as guided by PSF)

- Hang LLINs correctly and at sunset every day
- Ensure vulnerable groups (pregnant women, children under 5) sleep under LLIN
- Sleep under LLINs every night
- Take proper care of LLINs. Wash every two months.

➤ **Channels:**

- Flip chart, poster, gate folder, infotainment (drama), IPC, radio, TV, stakeholder meeting, AV capsule.

➤ **Target audience: Local media**

- Promote LLIN correct and daily LLIN use.

➤ **Messages:**

- LLINs are effective tools that last for 2–3 years, if used correctly and daily
- LLINs are cost-effective relative to fogging.

➤ **Channels:**

- Information products: Brochures, gate folders, AV capsule, press release
- Source/implementing entity: NMCP, technical partners, NGOs.

Component: Prevention: IRS

➤ **Key challenges:** Sustained political commitment for appropriate vector control interventions for malaria; quality coverage with IRS in identified high-risk areas; acceptance of IRS by targeted population

➤ **Target audience:** Policy/decision-makers (national and district levels)

- Explain the rationale and implications of IRS
- Support targeted IRS.

➤ **Messages:**

- IRS needs to be carried out once a year in targeted areas only.

➤ **Channels:**

- Information products: Technical/research/study/evaluation brochures, gate folders, advocacy meeting.

➤ **Health care service providers (District staff, PSF), community volunteers**

- Explain the rationale and implications of IRS
- Provide advance information about visits by spray team so that community can be alerted/prepared
- Provide information about how to prepare
- Respond to concerns, provide feedback.

➤ **Messages:**

- IRS is effective, so allow team to spray inside every room, as required
- Do not paint/plaster immediately after IRS
- IRS is not harmful.

➤ **Channels:**

- Flip chart, poster, training/sensitization session, AV capsule

➤ **Target audience:** Community leaders (Suco/Aldeia Chief), organizations

- Facilitate planning with health system
- Provide advance information about visits by spray team so that community can be alerted/prepared
- Provide information about how to prepare
- Explain the rationale and implications of IRS.

➤ **Messages:**

- IRS is effective, so allow team to spray inside every room, as required
- IRS is not harmful.

➤ **Channels:**

- Flip chart, poster, gate folder, infotainment (drama), IPC, radio, TV, stakeholder meeting, AV capsule

➤ **Target audience:** Family/individual (including vulnerable groups)

- Allow IRS and ensure preparation per guidance

➤ **Messages:**

- IRS is effective, so allow the team to spray inside every room, as required
- Do not paint/plaster immediately after IRS
- IRS is not harmful.

➤ **Channels:**

- Flip chart, poster, gate folder, billboard, community meeting, infotainment (drama), IPC, radio, TV
- Source/implementing entity: NMCP, technical partners, NGOs
- **Component:** Early diagnosis and prompt, effective treatment
- **Key challenges:** Sustained political commitment in view of declining malaria morbidity and mortality; early diagnosis and prompt treatment; reaching out to vulnerable groups; behaviour of care provider; accessing informal private providers and unorganized private sector for appropriate treatment.
- **Target audience:** Policy/decision-makers (national and district levels including Ministry/Department other than CDC)
 - Support universal coverage of EDCT; QA of microscopy
 - Support the establishment of a quality control system for antimalarials
- **Messages:**
 - RDTs and antimalarials should be available at the grassroots and health facilities
 - Improve microscopy facilities including capacity-building
 - Sustain support for EDCT.
- **Channels:**
 - Information products: Technical/research/study/evaluation brochures, gate folders, AV capsule, advocacy meeting.
- **Target audience:** Family/individual (including vulnerable groups)
 - Recognize sign and symptoms
 - Ensure early and appropriate treatment seeking
 - Ensure treatment compliance
- **Messages:**
 - Recognize signs and symptoms of malaria – fever with chills, nausea
 - Visit health facility within 24 hours of onset of fever
 - Accept use of RDTs by health facility only
 - Accept the results as received from health facility
 - Acquire and take the right treatment, in the right dose, for the right number of days

- Do not take antimalarials, if RDT results are negative. It will be harmful
- Recognize signs of severity/failure to respond to treatment; seek help from health care provider promptly

➤ **Channels:**

- Flip chart, poster, gate folder, billboard, community meeting, infotainment (drama), IPC, radio, TV, newspaper advt.

➤ **Target audience:** Health care service providers (doctors, nurses, PSF), community volunteers, others (Daia, private sector, etc.)

- Recognize sign and symptoms
- Ensure early and appropriate treatment seeking
- Ensure treatment compliance.

➤ **Messages:**

- Recognize signs and symptoms of malaria – fever with chills, nausea
- Recognize signs of severity/failure to respond to treatment; provide appropriate help promptly --- treat or refer, according to national policy
- Ask about previous treatments (to identify treatment failures) and symptom history. Prescribe the right treatment, right doses as per national policy
- Explain clearly how to take the medication and discuss side effects; the first dose should be taken in front of you
- Encourage early and required ANC attendance.

➤ **Channels:**

- Flip chart, gate folder, training/sensitization session, AV capsule

➤ **Target audience: Community leaders (Suco/Aldeia Chief), organizations**

- Recognize sign and symptoms. Ensure early and appropriate treatment seeking
- Ensure treatment compliance

➤ **Messages:**

- Recognize signs and symptoms of malaria – fever with chills, nausea
- All fevers are not malaria
- Visit health facility within 24 hours of onset of fever
- Accept use of RDTs by health facility only
- Accept the results as received from health facility

- Acquire and take the right treatment, in the right dose, for the right number of days
- Recognize signs of severity/failure to respond to treatment; seek help from health care provider promptly
- Do not take antimalarials if RDT results are negative. It will be harmful.

➤ **Channels:**

- Flip chart, poster, gate folder, infotainment (drama), IPC, Radio, TV, stakeholder meeting, AV capsule

➤ **Target audience: Local media**

- Promote use of RDTs and ACTs to treat malaria effectively and avoid drug resistance

➤ **Messages:**

- Visit health facility within 24 hours of onset of fever
- Accept use of RDTs by health facility only
- Accept the results as received from health facility
- Acquire and take the right treatment, in the right dose, for the right number of days
- Recognize signs of severity/failure to respond to treatment; seek help from health care provider promptly
- Do not take antimalarials if RDT results are negative. It will be harmful
- Promote treatment compliance.

➤ **Channels:**

- Information products: Brochures, gate folders, AV capsule, press release

➤ **Source/implementing entity:** NMCP, technical partners, NGOs

➤ **Types of campaign:** Umbrella campaign, focused local campaign through:

- Mass Media: Broadcast: TV, radio, local cable - spots, jingles, skits, interactive programmes, phone-in programmes, quiz programmes through national/local channels; Print: Newspapers
- Multimedia: Documentaries, music videos/bands
- Outdoor publicity/other media including mid media: Hoardings/billboards, Glow Signs, Bus/taxi panels; wall paintings; pamphlets, leaflets, stickers, booklets, posters, flip books, flash cards, tickets, OPD registration forms, Official stationery, calendars, mailers, gate folders and wall charts with logo

- Other Media: Mobile vans
- Inter-personal communication/counselling; community outreach programmes; focus group discussions, meetings, interactive sessions, folk media (song and drama, etc.) SISCa/health exhibitions with public announcements (may include live demonstration of mosquitoes, mosquito larvae, use of larvivorous fish, insecticide impregnation of ITNs, source reduction through minor engineering methods, improving housing and sanitary conditions and organization of facilities for detection and treatment of malaria cases, etc.)
- School activities through quiz, painting, song and skit competitions, debates
- Consultative workshops/advocacy sessions with civil society groups/corporate sector/music & TV/radio celebrities (as brand ambassadors)
- For localized campaign, emphasis may be given on socio-cultural, economic characteristics of the target audience; local language, music, costumes; featuring of local people.

➤ **On Ground Campaign through:**

Traditional performances

- The traditional performances are important on account of reach, credibility, ability to adapt performances to the message as well as costs. The focus and venue of the show are to be selected with care, keeping in mind the socio-cultural environment of the area and target audience
- Scripts of the plays/shows should be sensitive to community, religious and social norms
- Troupes that are known to the audience of the region should be engaged. Training of the performers is a key aspect of communication through traditional media. Orientation to be held to sensitize them to the nature of the messages, preferably through role-play. Interactive sessions are necessary so as to weave the messages into compelling and entertaining scripts
- There should be element of interaction between audience and performers. The performer should elicit feedback from the audience to involve them and also gauge their level of interest and retain attention. Sometimes dummy performers may be placed in the audience and at the appropriate moment, he/she may be included in the play. Since the show is set in a Suco/Aldeias and since the performers are

familiar with the setup, it is expected to lend a lot of credibility to the messages being disseminated. In this way, the audience trusts the performers to the extent that they are willing to take their advice on the product/service being advertised. The scripts can be designed to explore every issue of concern like prevention as well as appropriate treatment. Successful performances are those whose scripts are flexible and open to on the spot improvisations, to suit local context.

➤ **SISCa**

- SISCa remain prominent flagship programme. These offer large audiences in a short span of time, who are open and more receptive to information as they are in a health seeking and/or leisure mode. SISCa are usually held once a month in a village
- These can be held for a day in conjunction with a festival, etc. and a media action plan, therefore, needs to be drawn accordingly
- During these events, public announcements with live demonstration of mosquitoes, mosquito larvae, use of larvivorous fish, insecticide impregnation of ITNs, source reduction through minor engineering methods and organization of facilities for detection and treatment of malaria cases could be arranged.

➤ **Interpersonal Communication (IPC)**

- Interpersonal communication works best when there is one-on-one contact between the health worker and the person whose behaviour is to be changed to adopt new knowledge, life skills and practices to ensure the welfare of their families and children
- One-on-one contact facilitates comprehension of new concepts and demonstration of new practices. Over a period of time, if done consistently, this method can result in adoption of new practices on a sustainable basis
- The tool kit for IPC includes aids that enable the communicator/health worker to easily demonstrate any concept through visual aids like manuals, demonstration devices such as role plays, toys, flash cards, flip books that depict the desired practices, interactive games and puzzles that familiarize users with the desired practices.

IPC materials would include:

- **Flip books, Flash cards:** To be used by PSF, health workers to counsel audiences during OPD/home visits. Illustrated booklets (predominantly visual) with stories on prevention and control of malaria, especially for children
- **Stickers:** For distribution among vulnerable groups, school children, shops, and other places to remind people about the core themes on prevention and control of malaria
- **Badge, signboards with logo:** For identification of those associated with the campaign, such as PSF and other health workers
- **Bag with logo:** For PSF, to carry all IPC material during door-to-door visits
- **Calendars:** To promote the anti-malaria messages among influencers, Suco/Aldeia members, etc.
- **Mailers, gate folders and wall charts:** For civil society, doctors, pharmacists, and PSF.

➤ PSF

PSF are critical links in malaria prevention and control at the ground level. To augment the same, there is need to:

- Institute recognition of performances and bestow rewards on yearly basis in the form of certificates and non-cash incentives
- Provide identification signboards and badges, with their names and logo
- Seek feedback for improvements on service delivery and implementation of BCC campaign
- Motivate and update knowledge on annual basis
- Share success stories/best practices at quarterly meetings.

Annex 13. Reporting system



Request Form for Laboratory Test for the Diagnosis of Dengue

- Date of Reporting from the Laboratory:
- Health Facility:
- IPD/OPD:
- Municipality:
- Medical Doctor:
- Signature of Medical Officer:

INDIVIDUAL DATA			
Date of Consultation			
Complete Name of the Patient			
Registration No./ID No. of Patient			
Sex		F/M	
Age			
Present residential address			
Permanent address			
Village			
Suco			
Administrative-Post			
Contact number			
History of recent travel			
History of previous Dengue infection		Yes/Not	
Duration of illness			
HOSPITAL RECORD			
Under treatment as IPD, from date			
Under treatment as OPD, from date			
Department			
Ward			
Bed number			
Time and data of sample collection by RDT			
Time and data of sample collection by ELISA			
INVESTIGATION			
A. CLINICAL MANIFESTATION & ANY RELATED HEALTH ISSUE			
Warning signs*		Present/Absent	
Any risk factors/Comorbidity**			
Any other complications***			
B. LABORATORY			
Test performed by ELISA		Yes/Not	
Test performed by RDT		NS1	IGM IGG
FBC (full blood count)		Yes/Not	
DENGUE CLASSIFICATION BY SEVERITY			
A/Mild/Without Warning Signs		A1/ A2	
B/Moderate/With Warning signs		B1/B2	
C/Severe/Shock / Bleeding/ & Organ Involvement		C1/C2/C3	

* **Warning Signs: Present/Absent:** Recurrent vomiting, Abdominal pain/tenderness, General weakness/lethargies/restless, Mild pleural effusion/ascites, Hepatomegaly, Increased Hct >20%, With minor bleeds. ** **Any Risk Factors/ Health Related Issues:** Infants, Old age, Diabetes, Hypertension, Pregnancy, CAD, Haemoglobinopathies, Immunocompromised patient (Patient on anticoagulants or immunosuppressants), Obesity, CHD, Coinfection, Cerebral palsy, and Failure to thrive, Malnutrition. *****Any other complications:** Please refer to the National Guidelines on Clinical Management of Dengue, 2022.

Dengue Reporting Format



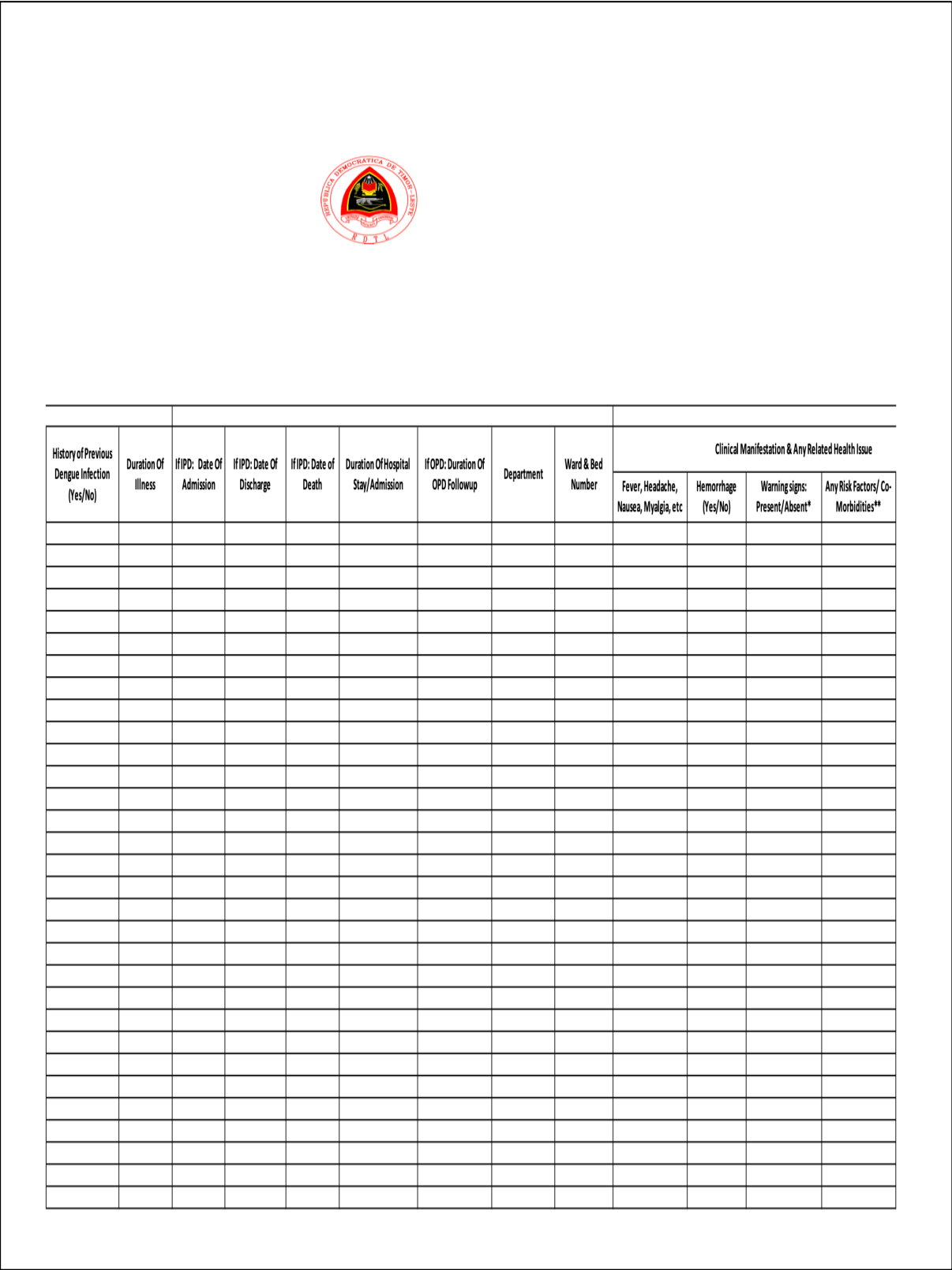
Reporting Format For Dengue
 Date of Reporting to Surveillance Dept.
 Health Facility
 IPD/OPD:
 Municipality:
 Medical Officer:
 Signature Of Medical Officer

No.	Name and Designation of the Reporting Person	Date of Consultation	Complete Name Of The Patient	Registration No./ ID No. Of Patient	Sex		Age	Present Residential Address	Individual Data					
					F	M			Permanent Address	Village	Suco	Administrative-Post	Contact Number	History of Recent Travel
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
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*Warning Signs: Present/ Recurrent vomiting, Abdominal pain/tenderness, General weakness/letharginess/restless, Mild pleural effusion/ascites, Hepatomegaly, Increased Hct >20%, With minor bleeds.

**Any Risk Factors/ Heal Infants, Old age, Diabetes, Hypertension, Pregnancy, CAD, Haemoglobinopathies, Immunocompromized patient (Patient on anticoagulants or immunosuppressants), Obesity, CHD, Co-infection, Cerebral palsy and Failure to thrive, Malnutrition

***Any other complicatic Please refer to the National Guidelines on Clinical Management of Dengue, 2022



Annex 14. Priority Actions for containment of VBDs in specific situation (To be done by vector control unit at municipality level under guidance of the central unit)

Elimination setting and prevention of re-establishment of indigenous transmission of malaria

- Track each case for case-based surveillance
- Trace the source of infection for taking foci-based vector control actions
- After elimination, monitor closely and report timely about malaria cases
- Take vector control measures to prevent re-introduction of any case
- Focal spray in and around 50 houses of Positive cases within 3–7 days (Fogging is applicable for dengue)
- Mass LLINs distribution to high malaria risk population in border areas and monitoring its use.
- Protection of all pregnant women from mosquito bite with LLIN
- Focal mass distribution of LLINs in potential foci where imported cases are reported
- Entomological surveillance for presence of malaria vectors and sporozoite positivity
- For dengue prevention, provide LLIN to positive case and all hospitals to protect patients from mosquito bite and prevent transmission from patients to others.

PoE (Air/Land)

- International transport, travel and trade contribute to economic development and welfare of populations but pose great public health risks. In the present context, high traffic at airports, ports, and ground crossings – PoE can play a key role in the international spread of diseases through persons, conveyances and goods
- For all arboviral(dengue)/vector-borne diseases, all international air/seaports and ground crossings with a perimeter of 500 metres should be kept free from vector
- The International Health Regulations (2005) provide a public health framework in the form of obligations and recommendations that enable countries to better prevent, prepare for and respond to public health events and emergencies
- Under the IHR, Member Countries are requested to maintain effective sustainable public health measures and response capacity at designated ports, airports and ground crossings, in order to:
 - protect the health of travellers and populations
 - keep ports, airports and ground crossings running
 - ships, aircrafts and ground transportation travelling in a sanitary condition
 - contain risks at source
 - respond to emergencies and implement public health measures.

Urban area (Dengue)

- Map the breeding sites

- Use larvicides temephos 50% EC at a dose of 1 ppm in containers
- Temephos granules 1% may also be used for stored unused waters or in tyres, etc.
- Do the fogging in outbreak situation considering the wind velocity at dawn or dusk.



World Health
Organization

Timor-Leste



National Strategic Plan for Integrated Vector
Borne Diseases, Timor-Leste
(2021–2030)

July 2022
Ministry of Health
Democratic Republic of Timor-Leste