



World Health
Organization
Myanmar

NATIONAL STRATEGIC PLAN FOR DENGUE PREVENTION AND CONTROL 2016 - 2020



VECTOR BORNE DISEASE CONTROL PROGRAMME
MINISTRY OF HEALTH AND SPORTS
THE UNION OF THE REPUBLIC OF MYANMAR

2016

National Strategic Plan for Dengue Prevention and Control
2016 - 2020

Vector Borne Disease Control Programme

Ministry of Health and Sports

The Union of the Republic of Myanmar

2016

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Foreword

It is essential to develop the strategy for dengue prevention and control in Myanmar. In fact, this has been developed for the very first time in the history of Vector Borne Disease Control Programme in the country.

There is a long history of dengue in our country. In 1960, sporadic cases of dengue had been reported. First dengue outbreak occurred in 1970 in Yangon with 1,654 cases and 91 deaths. Since then there were frequent reported outbreaks of the disease in different urban areas of the country. Initially it was limited to the urban areas and later on, it started to spread towards rural areas also. It is one of the major public health problems in the country. The trend of the disease is on the increase and in 2015 all States/Regions reported dengue cases. It is a notifiable disease and all health facilities irrespective of public or private should report the cases.

We would like to thank the leadership of Vector Borne Disease Control Programme under the Department of Public Health to develop such a timely costed 'National Strategic Plan for Dengue Prevention and Control 2016-2020'. We would like to express our thanks to the drafting group who worked tirelessly to develop this costed plan. Special thanks also go to WHO for their technical assistance in the development of this plan.

We hope the plan will act as a guide to support planning and implementation and be an advocacy tool to secure funding, both domestic and external. We also expect that all partners and stakeholders will use this strategy for programme planning and implementation.

Abbreviations

Ae.	<i>Aedes</i>
BCC	behavior change communication
BHS	basic health staff
CFR	case fatality rate
DENV	dengue virus
DF	dengue fever
DHF	dengue haemorrhagic fever
DSS	dengue shock syndrome
IEC	information, education and communication
KAP	knowledge, attitude, practice(s)
RNA	ribonucleic acid
SEA	South-East Asia
VBDC	vector borne diseases control

Strategy at a glance

Vision

To minimize the health, economic and social impact of the disease by reversing the rising trend of dengue

Goal

To reduce the burden of dengue and dengue hemorrhagic fever.

Objectives

- To reduce dengue morbidity by at least 25% by 2020 and 50% by 2025 in comparison to 2015 baseline
- To reduce dengue mortality by at least 50% by 2020 and 90% by 2025 in comparison to 2015 baseline
- To maintain Case Fatality Rate (CFR) < 1%

Strategic interventions

1. Increase capacity of the National Programme to strengthen dengue surveillance
2. Strengthen the capacity of the National Programme to implement effective integrated vector management
3. Increase the capacity of clinicians, nurses, BHS, laboratory technicians and laboratories to diagnose, treat and refer dengue patients
4. Increase capacity to predict, detect early and respond to outbreaks in a timely manner
5. Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COMBI) for dengue
6. Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control
7. Strengthen dengue programme management and promote inter-sectoral collaboration for effective Dengue prevention and control

Introduction

Dengue is one of the most common vector-borne diseases in Southeast Asia and has been ranked as the most important mosquito-borne viral disease with epidemic potential in the world. Some 2.5 billion people – two fifths of the world's population in tropical and subtropical countries – are at risk. An estimated 50 million dengue infections occur worldwide annually. A very large proportion (approximately 90%) of them are children aged less than five years, and about 2.5% of those affected die. Also, the epidemiology of dengue in South-East Asia is undergoing a change in the human host, the dengue virus and the vector bionomics. Shift in affected age groups, sex differences and expansion to rural areas are evident. The WHO's Global Strategy for Dengue Prevention and Control (2012-2020) highlights reducing the dengue burden by at least 50 per cent in terms of mortality and at least 25 per cent in terms of morbidity by 2020.

Epidemics of dengue are increasing in frequency. During epidemics, infection rates among those who have not been previously exposed to the virus are often 40% to 50% but can also reach 80% to 90%. Seasonal variation is observed. *Aedes (Stegomyia) aegypti* is the primary epidemic vector. Imported cases are common. Co-circulation of multiple serotypes/genotypes is evident. Dengue is primarily an urban disease, but is now spreading to rural areas worldwide. The trend is now changing due to socio economic and man-made ecological changes, It has resulted in invasion of *Ae. aegypti* mosquitoes into the rural areas, which has tremendously increased the chances of spread of the disease due to rapid urbanization.

Other features of the disease include its epidemiological patterns, including hyper-endemicity of multiple dengue virus serotypes in many countries and the alarming impact on both human health and the global and national economies.

Burden of Dengue in WHO South-East Asia Region

Of the 2.5 billion people around the world living in dengue endemic countries and at risk of contracting DF/DHF, 1.3 billion live in 10 countries of the WHO South-East Asia (SEA) Region which are dengue endemic areas. Till 2003, only eight countries in the Region had reported dengue cases. Since 2000, epidemic dengue has spread to new areas and has increased in the already affected areas of the region. In 2003, eight countries – Bangladesh, India, Indonesia, Maldives, Myanmar, Sri Lanka, Thailand and Timor-Leste – reported dengue cases. In 2004, Bhutan reported the country's first dengue outbreak. In 2005, WHO's Global Outbreak Alert and Response Network (GOARN) responded to an outbreak with a high case-fatality rate (3.55%) in Timor-Leste. In November 2006, Nepal reported indigenous dengue cases for the first time. The Democratic Peoples' Republic of Korea is the only country of the South-East Region that has no reports of indigenous dengue.

Reported case fatality rates for the region are approximately 1%, but in India, Indonesia and Myanmar, focal outbreaks away from the urban areas have reported case-fatality rates of 3–5%.

Country profile

Location and geography

The Republic of the Union of Myanmar is located in South-East Asia and is bounded by Bangladesh, India, Peoples' Republic of China, Laos PDR and Thailand on the landward side, 1760 miles of the coast line is bounded on the west by the Bay of Bengal and on the south by the Andaman Sea.

The country is divided administratively into Nay Pyi Taw Council Territory and 14 States and Regions. It consists of 74 Districts, 330 Townships, 398 Towns, 3065 Wards, 13619 Village Tracts and 64134 Villages. The main features of the country are the delta region and the central plain surrounded by mountains. It falls into three well marked natural divisions, the western hills, the central belt and the Shan plateau on the east, with a continuation of the high land in the Tanintharyi.

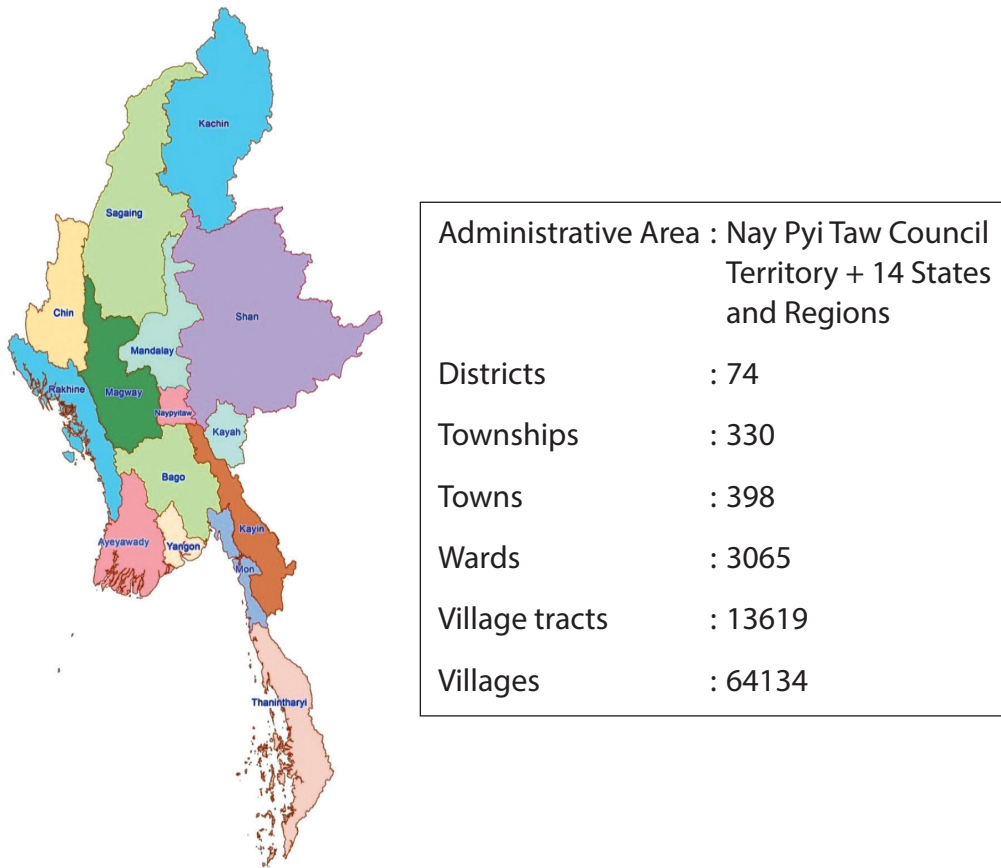


Figure: Map of Myanmar by Administrative Area, State/Region

Climate

Myanmar enjoys a tropical climate with three distinct seasons; summer, rainy and cold season. From March to mid-May are summer months; the rain falls from mid-May to the end of October and the cold season starts in November and ends at the end of February. Generally, Myanmar enjoys a tropical monsoon climate.

Demography

The Republic of the Union of Myanmar conducted its most recent census in March-April 2014. This is more than 30 years after the last census in 1983. The provisional results indicate that the population of Myanmar on the 29th March 2014 was 51,419,420 persons. The largest population are in the three regions: Yangon (14.30%), Ayeyarwady (12.01%) and Mandalay (11.95%). Population in these three Regions account for about 38.3% of the entire population in Myanmar. The least populated States/Regions are: Nay Pyi Taw (2.25%), Chin (0.93%) and Kayah (0.56%).

The population of Myanmar has steadily grown since the beginning of census taking in 1872, rising from 2.7 million persons to 10.5 million in 1901, to 13.2 million in 1921, then to 28.9 in 1973, 35.3 million persons in 1983 and 51.4 million persons in 2014. The steady increase in population size over the period has policy implications for all sectors of the economy particularly those of education, health, employment and housing.

The census results showed that the population density in Myanmar is 76 persons per square kilometer. About 30 percent of the population resides in urban areas.

Table: Distribution of population in Myanmar by State/Region and by sex

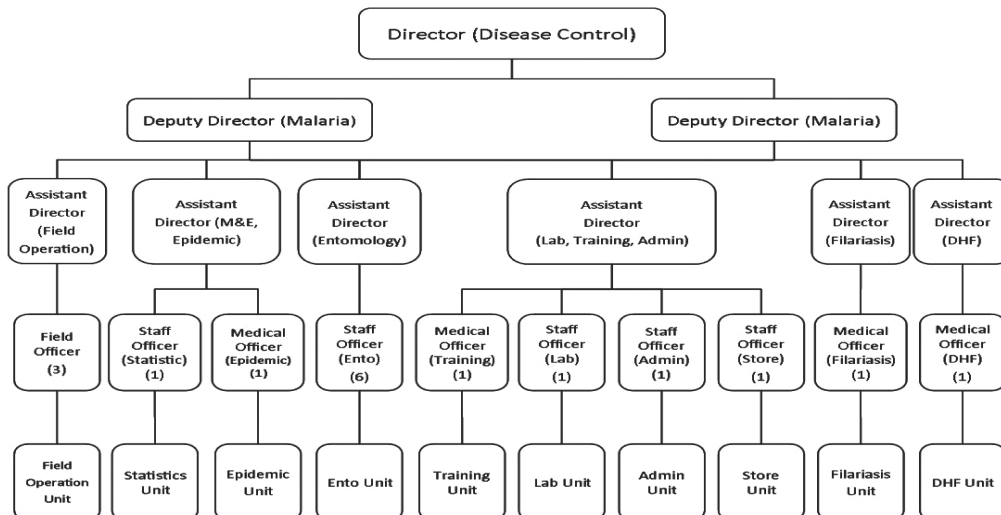
State/Region	Male	Female	Total	Proportion of Total Population
Union	24,821,176	26,598,244	51,419,420	100.00
Yangon	3,517,486	3,837,589	7,355,075	14.30
Ayeyawady	3,010,195	3,164,928	6,175,123	12.01
Mandalay	2,919,725	3,225,863	6,145,588	11.95
Shan	2,908,259	2,907,125	5,815,384	11.31
Sagaing	2,518,155	2,802,144	5,320,299	10.34
Bago	2,324,214	2,539,241	4,863,455	9.46
Magway	1,814,993	2,097,718	3,912,711	7.61

State/Region	Male	Female	Total	Proportion of Total Population
Rakhine	1,529,606	1,659,357	3,188,963	6.20
Mon	986,454	1,063,828	2,050,282	3.99
Kachin	877,664	811,990	1,689,654	3.28
Kayin	775,375	797,282	1,572,657	3.06
Tanintharyi	700,403	706,031	1,406,434	2.74
Nay Pyi Taw	565,181	593,186	1,158,367	2.25
Chin	230,005	248,685	478,690	0.93
Kayah	143,461	143,277	286,738	0.56

Source: Myanmar Population and Housing Census 2014, Provisional Results, Department of Population, Ministry of Immigration and Population

Vector Borne Disease Control Programme

The Department of Public Health under Ministry of Health and Sports consists of a section for Disease Control headed by Deputy Director General (Disease Control) and Director (Disease Control).



VBDC Programme is headed by two Deputy Directors; one for Malaria and one for dengue, Chikungunya, Zika, Japanese Encephalitis, filariasis, and other vector borne diseases. Since 1978, the VBDC programme has been integrated to Primary Health Care. At S/R level, Assistant Director or Team Leader is responsible for VBDC

programme planning and implementation. At township level, the Township Public Health Department is taking the responsibility for dengue prevention and control activities. VBDC programme is closely working with the community for dengue prevention and control activities.

The VBDC works particularly closely with the Department of Medical Services (which is responsible for medical supplies and management of hospital services) to collect hospital data on dengue morbidity and mortality.

Epidemiology of dengue fever and dengue haemorrhagic fever¹

The transmission of dengue virus depends upon biotic and abiotic factors:

Biotic factors include:	Abiotic factors include:
(1) Virus	(1) Temperature
(2) Vector	(2) Humidity
(3) Host	(3) Rainfall

The virus

Dengue viruses are members of the genus *Flavivirus* and family *Flaviviridae*. These small viruses measuring about 50 nm and contain single-stranded RNA as genome. The virion consists of a nucleocapsid with cubic symmetry enclosed in a lipoprotein envelope. The dengue virus genome is 11644 nucleotides in length, and is composed of three structural protein genes encoding the nucleocapsid or core protein (C), a membrane-associated protein (M), an envelope protein (E), and seven non-structural protein (NS) genes. Among non-structural proteins, envelope glycoprotein, NS1, is of diagnostic and pathological importance. It is 45 kDa in size and associated with viral haemagglutination and neutralization activity.

There are four dengue virus serotypes which are designated as DENV-1, DENV-2, DENV-3 and DENV-4. Infection with any one serotype confers lifelong immunity to that virus serotype. Although all four serotypes are antigenically similar, they are different enough to elicit cross-protection for only a few months after infection by any one of them. Secondary infection with another serotype or multiple infections with different serotypes leads to severe form of dengue (DHF/DSS).

¹ Comprehensive Guidelines for Prevention and Control of Dengue and Dengue Haemorrhagic Fever, WHO SEARO, 2011

Dengue viruses of all four serotypes have been associated with epidemics of dengue fever (with or without DHF) with a varying degree of severity.

Vectors of dengue

Aedes (Stegomyia) aegypti (*Ae. aegypti*) and *Aedes (Stegomyia) albopictus* (*Ae. albopictus*) are the two most important vectors of dengue. In the South-East Asia Region of WHO, *Aedes aegypti* is the principal epidemic vector of dengue viruses. *Aedes albopictus* has been recognized as a secondary vector that is also important in the maintenance of the viruses.

Vectorial competency and vectorial capacity

Both *Ae. aegypti* and *Ae. albopictus* carry “high vectorial competency” for dengue viruses. Vectorial capacity is governed by the environmental and biological characteristics of the species, and thus these two species differ in their vectorial capacity.

Ae. aegypti is a highly domesticated, strongly anthropophilic, nervous feeder (i.e. it bites more than one host to complete one blood meal) and is a discordant species (i.e. it needs more than one feed for the completion of the gonotrophic cycle). These habits epidemiologically result in the generation of multiple cases and the clustering of dengue cases in cities.

On the contrary, *Ae. albopictus* still maintains feral moorings and partly invades peripheral areas of urban cities, and thus feeds on both humans and animals. It is an aggressive feeder and a concordant species, i.e. the species can complete its blood meal in one go on one person and also does not require a second blood meal for the completion of the gonotrophic cycle. Hence, *Ae. albopictus* carries poor vectorial capacity in an urban epidemic cycle.

Host

Dengue viruses, having evolved from mosquitoes, adapted to non-human primates and later to humans in an evolutionary process. The viraemia among humans builds up high titres two days before the onset of the fever (non-febrile) and lasts 5–7 days after the onset of the fever (febrile). It is only during these two periods that the vector species gets infected. Thereafter, the humans become dead-ends for transmission. The spread of infection occurs through the movement of the host (man) as the vectors’ movements are very restricted.

The susceptibility of the human depends upon the immune status and genetic predisposition. Both monkeys and humans are amplifying hosts and the virus is

maintained by mosquitoes transovarially via eggs.

Transmission of DF/DHF

For transmission to occur the female *Ae. aegypti* must bite an infected human during the viraemic phase of the illness that manifests two days before the onset of fever and lasts 4-5 days after onset of fever. After ingestion of the infected blood meal the virus replicates in the epithelial cell lining of the midgut and escapes into haemocoel to infect the salivary glands and finally enters the saliva causing infection during probing. The genital track is also infected and the virus may enter the fully developed eggs at the time of oviposition. The extrinsic incubation period (EIP) lasts from 8 to 12 days and the mosquito remains infected for the rest of its life. The intrinsic incubation period covers five to seven days.

Dengue transmission usually occurs during the rainy season when the temperature and humidity are conducive for build-up of the vector population breeding in secondary habitats as well as for longer mosquito survival.

A number of factors that contribute to initiation and maintenance of an epidemic include:

- (1) the strain of the virus, which may influence the magnitude and duration of the viraemia in humans;
- (2) the density, behaviour and vectorial capacity of the vector population;
- (3) the susceptibility of the human population (both genetic factors and pre-existing immune profile); and
- (4) the introduction of the virus into a receptive community.

Other factors that facilitate increased transmission include:

- Climate change,
- Urbanization, and
- Increased global travel

Situation analysis of dengue in Myanmar

Burden of Dengue

In Myanmar, sporadic cases of dengue had been reported since 1960 and dengue is classified as a notifiable disease since 1964. In 1970, first dengue outbreak occurred in Yangon with 1654 cases and 91 deaths and later spread to other States/Regions in 1974. In 2015, all States and Regions in Myanmar reported dengue cases.

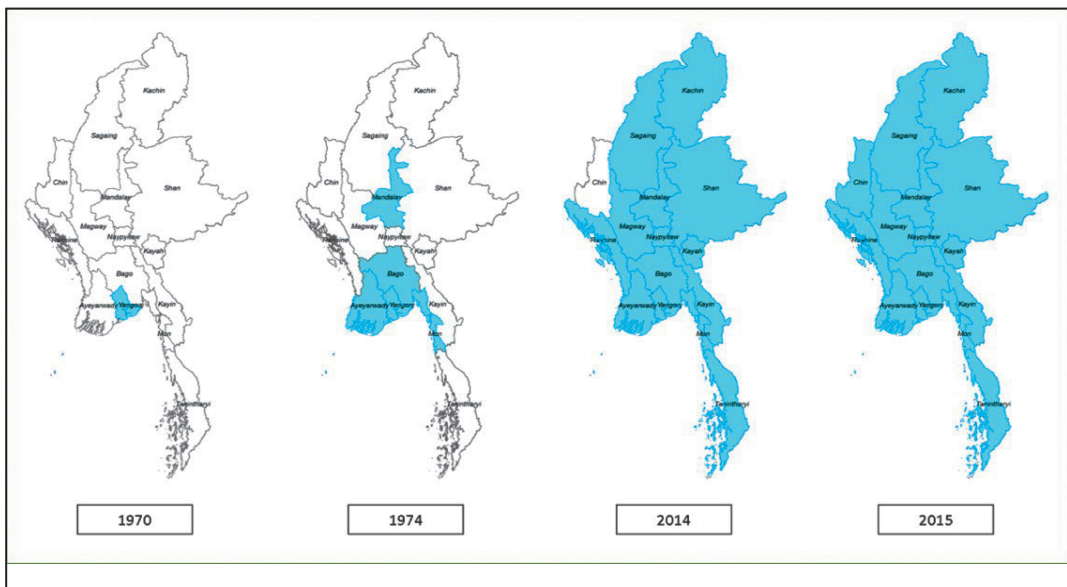


Figure: Changing in dengue incidence in different State/Regions of Myanmar

During the decade of 2000-2009, total number of reported dengue cases was 133,844. This reported number of cases was relatively high compared to those of previous 3 decades. There were 28165 reported cases during 1970-1979, 24773 cases during 1980-1989 and 55223 cases during 1990-1999. During 2010-2015, reported number of dengue cases was 104,403

Average number of reported cases per year was 2817 between 1970-1979, 2477 between 1980-1989, 5522 between 1990-1999, and 13,384 between 2000-2009. During 2010-2018, average number of reported cases per year was 17,1423.

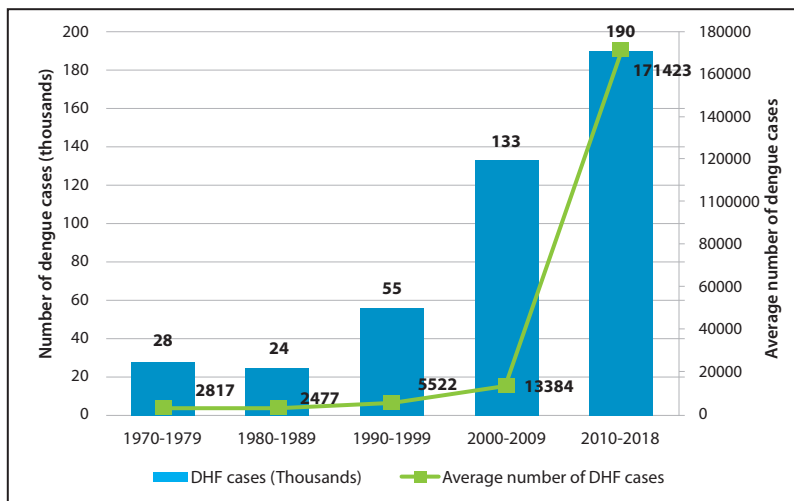


Figure: Number of reported dengue cases in Myanmar (1970-2018) (Source: VBDC)

The highest number of dengue cases and deaths recorded in Myanmar are 42913 cases in 2015 and 444 deaths in 1994. Over last 45 years, number of dengue cases reported had been increased in Myanmar. Reported number of dengue cases was increased from 1654 in 1970 to 42913 in 2015. On the other hand, CFR² was decreased from 5.50% in 1970 to 0.48% in 2018.

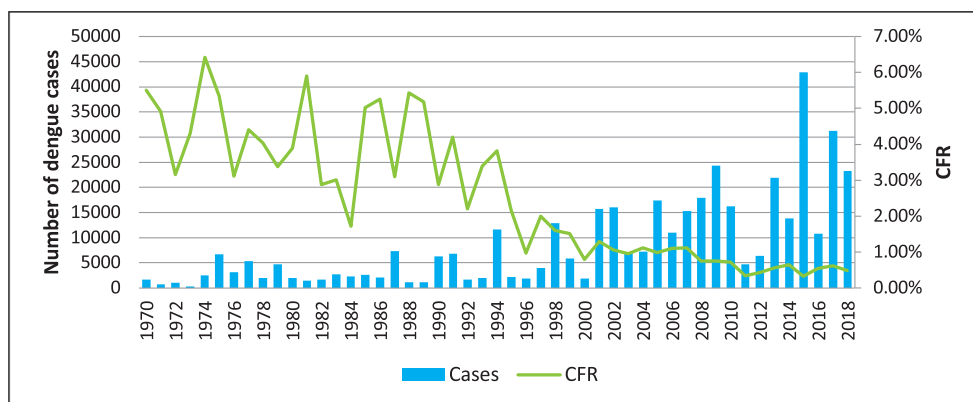


Figure: Number of dengue cases and CFR in Myanmar (1970-2018)

2 CFR, case fatality rate = (total number of dengue deaths/total number of dengue cases) x 100%

Seasonality

Generally, dengue cases are increasing during the rainy season and usually highest in July (week 27-29). Previously, there was no reported cases before March and after September but nowadays dengue incidence is throughout the year.

In most States and Regions, cyclical trend of increased cases was observed every 3-4 years.

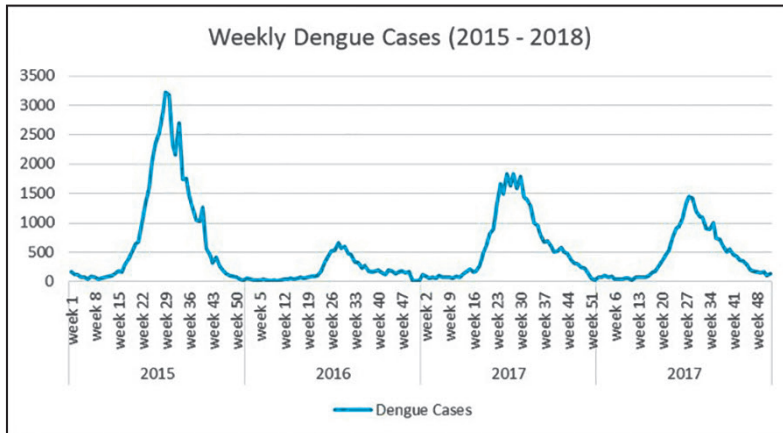


Figure: Weekly distribution of dengue cases in Myanmar during 2015-2018
(Source: VBDC)

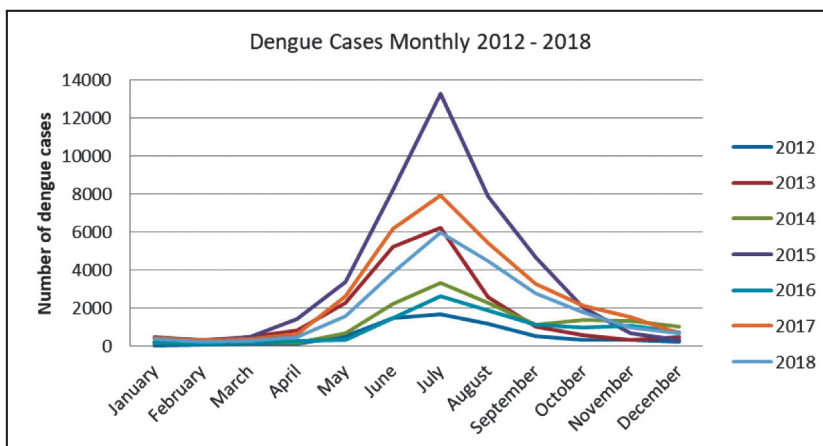


Figure: Seasonal distribution of dengue cases in Myanmar during 2012-2018
(Source: VBDC)

Urban/rural

During the last couple of years, dengue cases were more prevalent in urban areas than in rural areas. In 2007, more than 80% of dengue cases were found in urban areas. This proportion is declining over years because of rapid urbanization and other factors. In 2018, more than half of the reported dengue cases were found to be from rural areas.

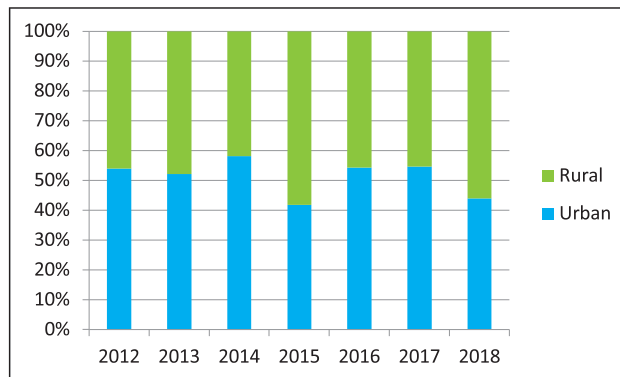


Figure: Proportion of dengue cases in urban and rural areas during 2012-2018 (Source: VBDC)

Age group and sex

Children under 15 years are mostly affected from dengue, especially 5-9 years age group. Infants under 6 months were also affected. Adult dengue cases were reported from public and private hospitals but it is estimated that adult dengue cases are under-reporting. Both males and females are equally affected from dengue.

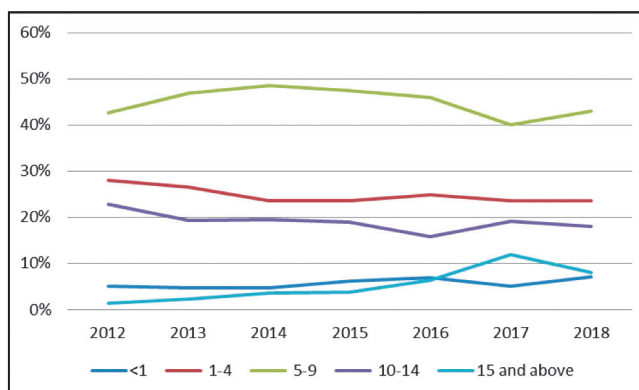


Figure: Distribution of dengue cases in different age groups during 2012-2018 (Source: VBDC)

Dengue virus serotype in Myanmar

In Myanmar, all 4 serotypes of dengue virus are circulating and changing in the country and mixed serotypes are also found. It is of clinical and public health importance because secondary infection with another serotype or multiple infections with different serotypes leads to severe form of dengue such as dengue haemorrhagic fever and dengue shock syndrome.

Table: Dengue virus serotype in Myanmar (1999-2015)

Source: Department of Medical Research & VBDC, Ministry of Health and Sports

Year	Total	DENV-1	DENV-2	DENV-3	DENV-4	Mixed
1999	11	2	5	3	1	0
2000	8	6	1	1	0	0
2001	121	115	1	3	0	2 (D1+2)
2002	72	28	24	3	12	4 (D1+2)
2003	11	3	6	0	0	2 (D1+2)
2004	5	0	1	2	0	2 (D3+1)
2005	12	3	1	5	1	2 (D1+3)
2006	5	0	1	2	0	2 (D1+3)
2007	12	2	0	9	0	1 (D1+3)
2008	16	6	3	4	2	1 (D1+3)
2009	17	11	1	3	1	1 (D1+3)
2010	31	14	5	0	12	1 (D2+4)
2011	3	3	0	0	0	0
2012	7	2	1	0	3	1 (D1+4)
2013	36	34	0	0	2	0
2014	30	14	5	2	9	0
2015	28	21	3	1	0	3 (D1+2 and D1+4)
2016	5	4	0	0	1	0
2017	5	0	0	2	3	0
2018(up to June)	28	9	0	10	9	0

Dengue situation in 2018

In 2015, reported number of dengue cases and deaths were 23273 and 112 respectively. Dengue cases were reported in all States/Regions among which Sagaing, Mandalay and Ayawaddy had highest disease burden in terms of reported dengue cases. Rakhine, Kayah and Chin were the three States with least numbers of reported dengue cases. Number of dengue deaths was highest in Yangon, Sagaing and Ayawaddy and lowest in Kayin, Kayah and Chin with no reported dengue deaths.

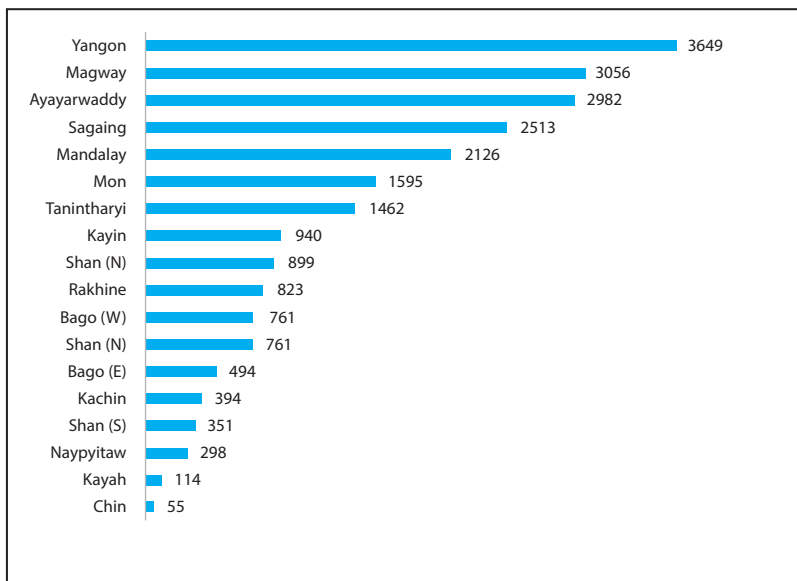


Figure: Number of reported dengue cases in different States/Regions of Myanmar in 2018 (Source: VBDC)

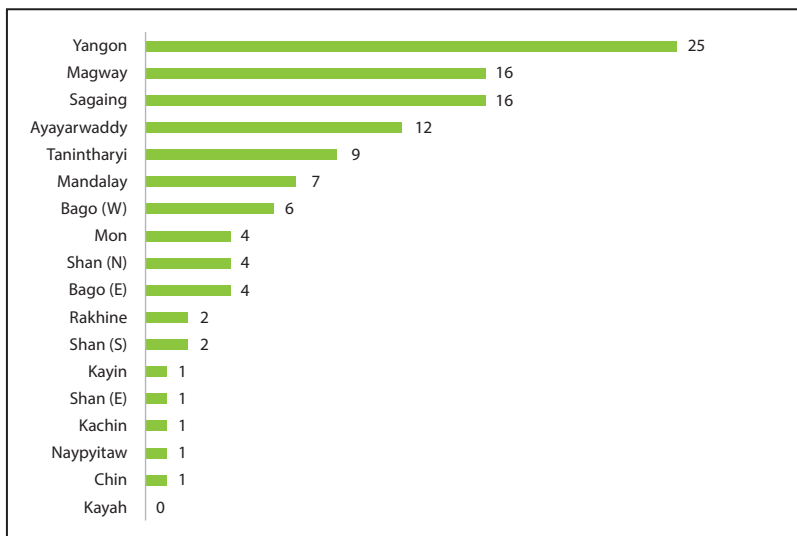


Figure: Number of reported dengue deaths in different States/Regions of Myanmar in 2018 (Source: VBDC)

About 90% of the reported cases were between the age of 1 to 14 years. However, dengue cases could also be found in all other age groups. There was no significant difference in reported dengue cases between males and females. More dengue cases were found in rural areas than in urban areas in 2015.

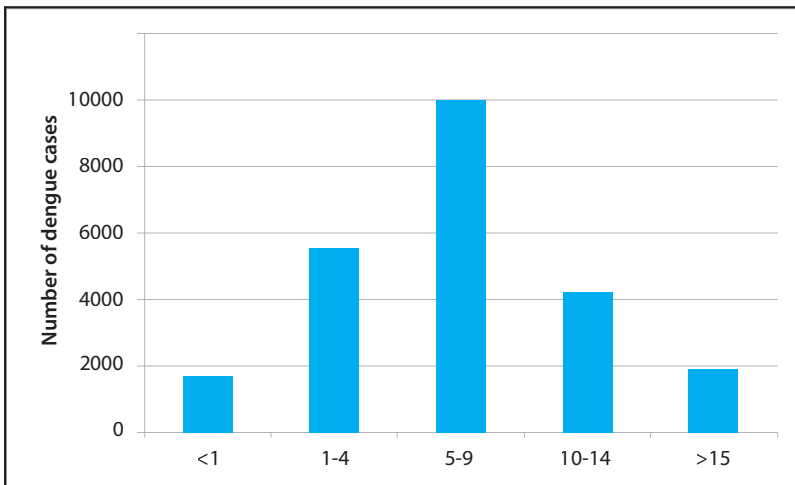


Figure: Distribution of dengue cases in different age groups in 2018 (Source: VBDC)

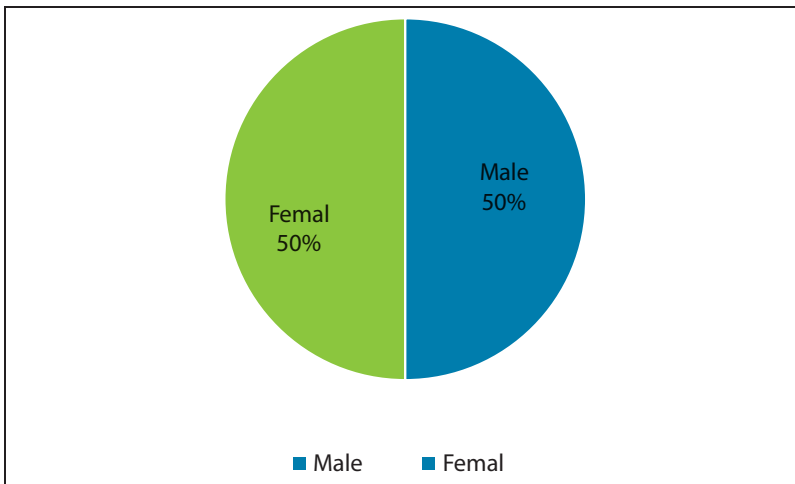


Figure: Proportion of dengue cases between males and females in 2018 (Source: VBDC)

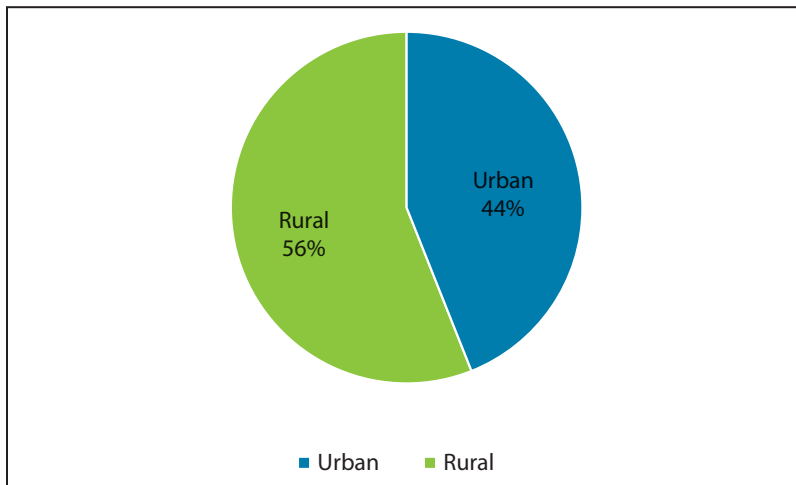


Figure: Proportion of dengue cases in urban and rural areas in 2018 (Source: VBDC)

In hospitals, severe DHF cases (G-III and DSS) were found to be 23% of all admitted dengue cases. G-I and G-II cases were 54% and 23% of admitted dengue cases respectively.

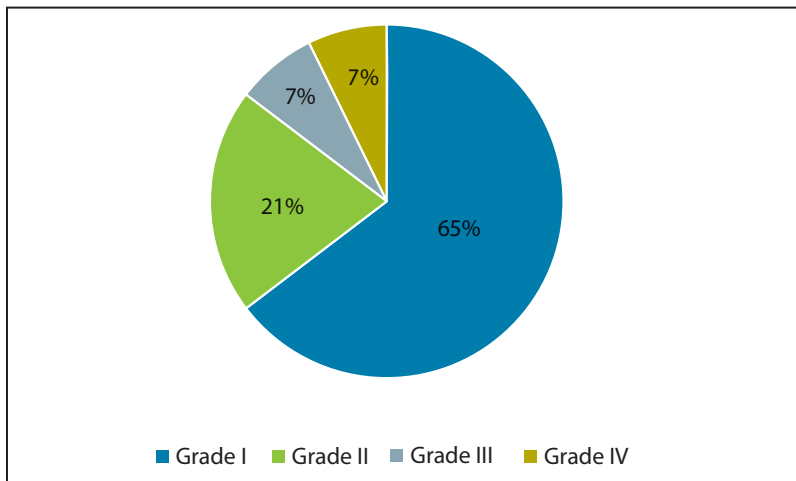


Figure: Grading in admitted dengue cases in 2018 (Source: VBDC)

National Strategic Plan for Dengue Prevention and Control

Vision, Goal and objectives

Vision

To minimize the health, economic and social impact of the disease by reversing the rising trend of dengue

Goal

To reduce the burden of dengue and dengue hemorrhagic fever.

Objectives

- To reduce dengue morbidity by at least 25% by 2020 and 50% by 2025 in comparison to 2015 baseline
- To reduce dengue mortality by at least 50% by 2020 and 90% by 2025 in comparison to 2015 baseline
- To maintain Case Fatality Rate (CFR) < 1%

Strategic interventions

1. Increase capacity of the National Programme to strengthen dengue surveillance
2. Strengthen the capacity of the National Programme to implement effective integrated vector management
3. Increase the capacity of clinicians, nurses, BHS, laboratory technicians and laboratories to diagnose, treat and refer dengue patients
4. Increase capacity to predict, detect early and respond to outbreaks in a timely manner
5. Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COMBI) for dengue
6. Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control
7. Strengthen dengue programme management and promote inter-sectoral collaboration for effective Dengue prevention and control

1. Increase capacity of the National Programme to strengthen dengue surveillance

1.1. Existing standard dengue case definition adopted

Standard case definition³ for DF/DHF/DSS and CFR endorsed and shared with all stakeholders

1.2. Laboratory surveillance strengthened

- Conduct situational analysis of the existing private and public laboratories to map the current status and identify the gaps.
- Develop SOPs for dengue surveillance viz epidemiological surveillance, entomological surveillance, serological surveillance.
- Develop dengue laboratory sections in National Vector Borne Disease Laboratory (NVBDL) and link with Regional laboratory network for QA/QC
- Provide RDTs up to Sub-rural Health centres and complete blood count (CBC) facilities at every township and selected station hospitals
- Supervision, monitoring and mentoring of the S/R laboratories by NVBDL at least once a year. Supervision, monitoring and mentoring of health facilities at township level by S/R at least once in six months.
- Strengthen the capacity of NVBDL for virus isolation and genetic characterization.
- Collaboration with other departments and/or regional for virus isolation and genetic characterization until the capacity of NVBDL has been built.
- Enhance laboratory capacity through training and human resource development

1.3. Dengue case surveillance

- Mandatory notification of all dengue cases from public and private health facilities (including GPs) within 24 hours
- Circular from National Programme in collaboration with the Department of Medical Services to all public and private health facilities for dengue alert and reporting (before the start of dengue transmission season)

³ Comprehensive guidelines for prevention and control of Dengue and DHF, WHO, Geneva 2011

- Establish fever surveillance in private and public hospital
- Initiate fever surveillance in the community
- Update and disseminate guidelines related to dengue recording, reporting and notification
- Support training on dengue recording, reporting and notification to staff in public and private sectors
- Identify focal persons for dengue case reporting at township, State/ Region, and central levels.
- Conduct central and S/R level monitoring to assess dengue case reporting
- Conduct seroprevalence survey in collaboration with Local Authorities, Regional, District, Township Public Health Department and Department of Medical Services
- Conduct routine dengue serotyping in sentinel sites of S/R
- Strengthen integrated dengue surveillance with HMIS (DHIS2)
- Conduct central, S/R and township level trainings of BHS to enhance the surveillance capacity .
- Procurement and use of software for routine data management

1.4. Vector surveillance

- Analyze and review current vector surveillance activities and availability of baseline data
- Develop vector surveillance plan at National and sub national levels (including larval survey)
- Develop comprehensive integrated training manual and guidelines including vector surveillance
- Training on vector surveillance methods including data analysis and reporting
- Conduct routine vector surveillance including larval survey in collaboration with Local Authorities, Regional, District, Township Public Health Department and NGOs

2. Strengthen the capacity of the National Programme to implement effective integrated vector management

2.1 National IVM strategy developed and adopted

- Develop, produce and disseminate national IVM strategy among programme staff and other stakeholders
- Sensitization of IVM strategies to central, S/R and township level programme staff and other stakeholders.
- Conduct intersectoral workshops with other stakeholders to support IVM
- Organize workshops on geographic information system (GIS) or basic mapping methods
- Update vector mapping annually
- Piloting of IVM strategy in selected areas and replicate to other areas based on the evidences

2.2 Capacity to implement IVM including training and recruitment of entomologists

- Mapping of the entomologists and their responsibilities to assess the national needs for entomologists
- Training of central, S/R and township level programme staff (including entomologist) and other stakeholders on IVM strategies.
- Engage communities for community vector control mechanism and larval source reduction

2.3 Facilitate community involvement for vector control mechanisms

- Engage communities for the use of larvicides in partnership with I/NGOs (mass larviciding activities)
- Develop comprehensive integrated training manual and guidelines including community and school based vector control
- Train community groups on community vector control mechanisms
- Periodic assessment of the community vector control mechanisms and scale up based on results of assessment

2.4 Rationale use of insecticide for vector controls

- Formulate national policy on rational use of insecticides according to WHOPES guidelines
- Annual reporting of the insecticide use

2.5 Vector resistance monitoring to insecticide

- Adopt WHO guidelines on vector resistance monitoring to insecticides
- Provide national training on vector resistance monitoring
- Identify monitoring sites for insecticide resistance, collect baseline data, and update at 2-3 years interval

3. Increase the capacity of clinicians, nurses, BHS and laboratory technicians to diagnose, treat and refer dengue patients

3.1 Case detection

- Passive case detection from every public and private health facilities
- Active case detection during the dengue outbreak by BHS
- Strengthen fever Surveillance (school and community)

3.2 Strengthen laboratory support for case management

- Conduct situation analysis on laboratory capacity in public and private sectors
- Strengthen capacities of public laboratories by supplying diagnostic kits and reagents
- Establish and/or strengthen capacity of blood banks to respond to the needs of DHF/DSS cases
- Develop comprehensive integrated training modules including laboratory diagnosis and QA/QC based on WHO guidelines
- Build capacity of laboratory personnel based on the developed comprehensive integrated training manuals
- Monitor implementation of the good laboratory practices

3.3 Strengthening capacity of health professionals to diagnose, treat or refer cases

- Conduct situation analysis on current Dengue diagnosis, treatment and referral services among public and private health care professionals by conducting KAP survey.
- Develop Dengue treatment guidelines for clinicians and nurses.
- Develop comprehensive integrated training modules including dengue treatment for BHS
- Train health care professionals (public and private) based on the training guidelines.
- Supervision and monitoring of health care professionals (public and private) on use of dengue treatment guidelines, management of severe cases (DHF/DSS), and reporting
- Conduct mortality review

3.4 Increase awareness among the communities on the warning signs and actions taken for dengue

- Conduct KAP survey for dengue primarily to assess constraints to early health care seeking behaviors of the communities and to formulate strategies based on the findings

3.5 Referral network system in public and private sectors

- Develop SoPs for strengthening referral network mechanisms
- Make provisions for hotline consultation and communications between township medical officers and S/R pediatricians
- Provide adequate transport facilities for complicated cases

4. Increase capacity to predict, detect early and respond to outbreaks in a timely manner

- Develop comprehensive integrated guidelines including dengue early warning systems and outbreak response
- Initiate/establish Dengue Early Warning System (DEWarS) software
- Training on dengue outbreak response guidelines and SOPs at central, S/R and township levels

- Monitoring of dengue outbreak response
- Establish dengue outbreak response team at Central, S/R and township levels to predict and respond to outbreaks
- Develop risk communication plan and incorporate into dengue comprehensive and integrated guidelines
- Training of focal points in all relevant aspects of risk communication
- Collaborate with other sectors to harmonize implementation of risk communication.
- Containment of dengue cases during outbreaks

5. Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COMBI) for dengue

- Conduct situation analysis on social mobilization and health education for dengue and other vector borne diseases
- Develop COMBI strategy and operational plan based on the outcome of the situation analysis
- Advocate and promote COMBI strategy to stakeholders at country level
- Develop COMBI training curriculum and conduct trainings at all levels
- Piloting of COMBI operational plan in selected areas and replicate to other areas
- Monitor and evaluate implementation of COMBI plan
- Identify key stakeholders (eg donor communities, private stakeholders) who can make significant contribution towards dengue control programme
- Formalize partnerships through memoranda of understanding

6. Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control

- Conduct workshops to prioritize operational research needs and research agenda

- Conduct trainings on applied and operational research for vector borne diseases
- Conduct priority operational researches to provide evidence for program implementation
- Evaluate new and other preventive and control strategies and tools
- Conduct joint meetings and workshops to disseminate research findings

7. Strengthen dengue programme management and promote intersectoral collaboration for effective Dengue prevention and control

- High level advocacy meetings for dengue prevention and control
- Observe ASEAN Dengue Day activity
- Establish coordination and collaboration among ministries (City Development Committee, Education, S/R governments, Finance & Revenue, Agriculture, Livestock and Fisheries, Transports,), other departments, I/NGOs, and other stakeholders for dengue prevention and control
- Technical Assistance (TA) support from WHO for development of strategies, guidelines, SOPs, etc.
- Conduct situation analysis on human resource for dengue program
- Build national program capacity through short- and long-term trainings/ fellowships
- Conduct periodic external and internal reviews of the program
- Establish networking with ASEAN, SEARO, WPRO etc
- Establish dengue vaccine working group
- Printing cost for guidelines, SOPs, forms and formats, IEC/BCC materials etc.
- Develop and produce annual reports along with other vector borne diseases

Cost of implementing the strategy

#	Strategic intervention	2016 total cost (in USD)	2017 total cost (in USD)	2018 total cost (in USD)	2019 total cost (in USD)	2020 total cost (in USD)	2016-2020 total cost (in USD)
1	Increase capacity of the National Programme to strengthen dengue surveillance	4,524,400	10,558,250	7,381,000	10,978,750	6,379,000	39,821,400
2	Strengthen the capacity of the National Programme to implement effective integrated vector management	-	13,097,317	5,661,467	12,936,717	5,656,217	37,351,720
3	Increase the capacity of clinicians, nurses, BHS and laboratory technicians to diagnose, treat and refer dengue patients	374,200	649,550	371,400	595,900	370,000	2,361,050
4	Increase capacity to predict, detect early and respond to outbreaks in a timely manner	12,266,813	14,100,985	13,228,953	12,458,921	12,458,921	64,514,592
5	Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COM-BI) for dengue	-	379,500	90,000	345,900	90,000	905,400
6	Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control	-	72,350	50,250	50,250	50,250	223,100
7	Strengthen dengue programme management and promote intersectoral collaboration for effective dengue prevention and control	84,100	434,100	304,100	304,100	334,100	1,460,500
	Total direct cost	17,249,513	39,292,052	27,087,170	37,670,538	25,338,488	146,637,762
	Indirect cost (7%)	1,207,466	2,750,444	1,896,102	2,636,938	1,773,694	10,264,643
	Grand total	18,456,979	42,042,496	28,983,272	40,307,476	27,112,182	156,902,405

Monitoring and Evaluation

#	Indicator	Numerator	Denominator	Multiplier	Baseline		Target							
					Value	Year	Source	2016	2017	2018	2019	2020		
1	<i>Impact indicators</i>													
1.1	Number of dengue cases reported each year (at national level)			-	42,913	2015	Routine reporting	38,622	36,476	34,330	32,185	32,185		
1.2	Number of dengue death reported each year (at national level)			-	140	2015	Routine reporting	112	98	84	70	70		
1.3	Dengue case fatality rate (at national level)	No. of DHF/DSS deaths	No. of DHF/DSS cases (probable+confirmed cases)	100	0.33	2015	Routine reporting	<1%	<1%	<1%	<1%	<1%	<1%	<1%
2	<i>Outcome indicators</i>													
2.1	Proportion of public and private health facilities with standard case management adopted	No. of public and private health facilities with standard case management adopted	No. of public and private health facilities surveyed for standard case management	100	NR	-	Survey	10%	30%	50%	55%	60%		
2.2	Proportion of public and private laboratories participating in QA/QC	No. of public and private laboratories participating in QA/QC	No. of public and private laboratories surveyed for QA/QC	100	NR	-	Survey	20%	30%	40%	50%	60%		
2.3	Proportion of public health facilities notifying dengue cases within 24 hours to VBDC	No. of public health facilities notifying dengue cases within 24 hours to VBDC	No. of public health facilities listed	100	80%	2015	Routine notification reports	85%	90%	95%	100%	100%		
2.4	Proportion of private health facilities notifying dengue cases within 24 hours to VBDC	No. of private health facilities notifying dengue cases within 24 hours to VBDC	No. of private health facilities listed	100	20%	2015	Routine notification reports	25%	40%	60%	80%	100%		
2.5	Proportion of public and private health facilities reporting dengue cases weekly to VBDC	No. of public and private health facilities reporting dengue cases weekly to VBDC	No. of public and private health facilities listed	100	60%	2015	Routine notification reports	70%	80%	90%	95%	100%		
2.6	Proportion of outbreak investigated within two weeks of first reporting at State/Region and National Level	No. of outbreak investigated within two weeks of first reporting	No. of outbreak reported	100	NA	-	Routine reporting	60%	70%	80%	90%	100%		
2.7	Breast index (BI)	No. of positive containers	No. of houses inspected	100	NA	-	Larva survey	<10%	<10%	<10%	<10%	<10%	<10%	<10%

Annexes

I. List of contributors

<i>Sr</i>	<i>Name</i>	<i>Designation</i>	<i>Department/ Organization</i>
1	Dr. Thandar Lwin	Deputy Director General (Disease Control)	DOPH, MOHS
2	Dr. Zaw Lin	Former Deputy Director	DOPH, MOHS
3	Dr. Nay Yi Yi Linn	Deputy Director	DOPH, MOHS
4	Dr. Nwe Ni Linn	Assistant Director	DOPH, MOHS
3	Dr. Aye Mon Mon Kyaw	Assistant Director	Yangon Regional Public Health Department
4	Dr. Badri Thapa	Scientist	Malaria Unit, WHO
5	Dr. Mushfiqur Rahman	Technical Officer	Malaria Unit, WHO
6	Dr. Myo Myint Naing	National Professional Officer	Malaria Unit, WHO
7	Dr. San San Win	National Technical Officer	Malaria Unit, WHO
8	Dr. Aung Khant Thu	Project Coordinator	Malaria Unit, WHO

II. Detailed budget by different strategic interventions

Strategic interventions #	Activity	Country specific sub-activity	Assumption	Increase capacity of the National Programme to strengthen dengue surveillance					2016-2020 total cost (in USD)
				2016	2017	2018	2019	2020	
1				-	-	-	-	-	-
	1.1. Existing standard dengue case definition adopted	Standard case definition for DF/DHF/DSS and CFR endorsed and shared with all stakeholders	One meeting for endorsement at the central level in 2016	5,250.00	-	-	-	-	5,250.00
	1.2. Laboratory surveillance strengthened	Consultant for situational analysis and development of SOPs and other documents related to lab and surveillance	Hiring one national consultant for two months in 2017	-	4,000.00	-	-	-	4,000.00
			Hiring one international consultant for 10 days in 2017 for initiating vector mapping	-	5,000.00	-	-	-	5,000.00
		Conduct situational analysis of the existing private and public laboratories to map the current status and identify the gaps, dengue diagnosis, and quality assurance for all laboratories	Already budgeted under consultant fees.	-	-	-	-	-	-
		Develop SOPs for dengue surveillance viz. epidemiological surveillance, entomological surveillance, viral surveillance.	Already budgeted under consultant fees.	-	-	-	-	-	-
			One central level meeting for finalization and endorsement of SOPs developed in 2017	-	5,250.00	-	-	-	5,250.00
		Develop dengue laboratory sections in National Vector Borne Disease Laboratory (NVBDL) and link with Regional laboratory network for QA/QC	Lumpsum for equipment, reagents, furnitures, and other logistics, \$50,000 in 2017 for establishment, \$25,000 every year from 2018 onwards	-	50,000.00	25,000.00	25,000.00	25,000.00	125,000.00
		Provide RDTs up to sub-rural health centres (S/C) and complete blood count (CBC) facilities at every township and selected station hospitals	Procurement of RDT, lumpsum	1,800,000.00	3,000,000.00	1,800,000.00	3,000,000.00	1,800,000.00	11,400,000.00
			Procurement of CBC machines, 100 each in 2017, 2018, 2019 and 30 in 2020	-	2,100,000.00	2,100,000.00	2,100,000.00	630,000.00	6,930,000.00

Strategic interventions	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
				2016	2017	2018	2019	2020	
			Procurement of reagents for CBC machines, \$300 per month per machine each year	-	360,000.00	720,000.00	1,080,000.00	1,188,000.00	3,348,000.00
		Supervision, monitoring and mentoring of the S/R laboratories by NVBDL at least once a year. Supervision, monitoring and mentoring of health facilities at township level by S/R at least once in six months.	Central level monitoring to S/R	7,500.00	7,500.00	7,500.00	7,500.00	7,500.00	37,500.00
		Strengthen the capacity of NVBDL for virus isolation and genetic characterization.	S/R level monitoring to townships and below	94,500.00	94,500.00	94,500.00	94,500.00	94,500.00	472,500.00
		Collaboration with other departments and/or regional for virus isolation and genetic characterization until the capacity of NVBDL has been built.	Lumpsum each year	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	100,000.00
		Enhance laboratory capacity through training and human resource development	Lumpsum for sample shipment and virus isolation and genetic characterization charge	15,000.00	15,000.00	15,000.00	15,000.00	15,000.00	75,000.00
			Training at central level	10,150.00	10,150.00	10,150.00	10,150.00	10,150.00	50,750.00
			Training at S/R level for township labs	113,400.00	113,400.00	113,400.00	113,400.00	113,400.00	567,000.00
1.3. Dengue case surveillance		Mandatory notification of all dengue cases from public and private health facilities (including GPs) within 24 hours	No budget required	-	-	-	-	-	-
		Circular from National Programme in collaboration with the Department of Medical Services to all public and private health facilities for dengue alert and reporting (before the start of dengue transmission season)	No budget required	-	-	-	-	-	-
		Establish fever surveillance in private and public hospitals	No budget required. Training on fever surveillance will be combined with case management training	-	-	-	-	-	-
		Initiate fever surveillance in the community	No budget required. Training on fever surveillance will be combined with case management training	-	-	-	-	-	-

Strategic interventions	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
				2016	2017	2018	2019	2020	
		Update and disseminate guidelines related to dengue recording, reporting and notification	Hiring a national consultant for updating the guidelines, for one month in 2017	-	2,000.00	-	-	-	2,000.00
		Support training on dengue recording, reporting and notification to staff in public and private sectors	Meeting for finalization and endorsement of guidelines, in 2017 Training at central level	-	5,250.00	-	-	-	5,250.00
			Training at S/R level	-	16,850.00	-	-	-	16,850.00
			Trainings at township level	-	225,900.00	-	-	-	225,900.00
		Identify focal persons for dengue case reporting at township, State/Region, and central levels.	No budget required	-	2,037,750.00	-	2,037,750.00	-	4,075,500.00
		Conduct central and S/R level monitoring to assess dengue case reporting	To be coupled with monitoring and supervision visit.	-	-	-	-	-	-
		Conduct seroprevalence survey in collaboration with Local Authorities, Regional, District, Township Public Health Department and Department of Medical Services	Lumpsum, once yearly	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00	250,000.00
		Conduct routine dengue serotyping in sentinel sites of S/R	Operational cost per sentinel sites, every year	18,000.00	18,000.00	18,000.00	18,000.00	18,000.00	90,000.00
		Strengthen integrated dengue surveillance with HMIS (DHIS-2)	Coordination meeting with VBDC and HMIS, lumpsum every year	100.00	100.00	100.00	100.00	100.00	500.00
		Conduct central, S/R and township level trainings of BHS to enhance the surveillance capacity	Training at central level	16,850.00	16,850.00	16,850.00	16,850.00	16,850.00	84,250.00
			Training at S/R level	225,900.00	225,900.00	225,900.00	225,900.00	225,900.00	1,129,500.00
			Training at township level	2,037,750.00	2,037,750.00	2,037,750.00	2,037,750.00	2,037,750.00	10,188,750.00
		Procurement and use of software for routine data management	Lumpsum each year	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00	100,000.00
	1.4. Vector surveillance	Analyze and review current vector surveillance activities and availability of baseline data	Hiring a national consultant for 2.5 months in 2017	-	5,000.00	-	-	-	5,000.00
		Develop vector surveillance plan at National and sub-national levels (including larva survey)	Already budgeted under consultant fees for vector surveillance activity	-	-	-	-	-	-

Strategic interventions	#	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
					2016	2017	2018	2019	2020	
			Develop comprehensive integrated training manual and guidelines including vector surveillance	Already budgeted under consultant fees for vector surveillance activity	-	-	-	-	-	-
			Training on vector surveillance methods including data analysis and reporting	Central level meeting to finalize and endorse vector surveillance plan and training manuals and guidelines	-	5,250.00	-	-	-	5,250.00
			Conduct routine vector surveillance including larva survey in collaboration with Local Authorities, Regional, District, Township Public Health Department and NGOs	One central level training each year	-	16,850.00	16,850.00	16,850.00	16,850.00	67,400.00
				Lumpsum for each S/R every year	90,000.00	90,000.00	90,000.00	90,000.00	90,000.00	450,000.00
2 Strengthen the capacity of the National Programme to implement effective integrated vector management										
		2.1. National IVM strategy developed and adopted	Develop, produce and disseminate national IVM strategy among programme staff and other stakeholders	Hiring a national consultant for development of IVM strategy, for one month in 2017	-	2,000.00	-	-	-	2,000.00
				Hiring one international consultant for development of IVM strategy, for 10 days in 2017	-	5,000.00	-	-	-	5,000.00
				Production cost will be calculated under Program Management.	-	-	-	-	-	-
				Central level meeting/workshop to finalize and endorse IVM strategy, in 2017	-	5,250.00	-	-	-	5,250.00
			Sensitization of IVM strategies to central, S/R and township level programme staff and other stakeholders	Budget for sensitization training will be included in COMBI training.	-	-	-	-	-	-
			Conduct intersectoral workshops with other stakeholders to support IVM	One central level workshop in 2017	-	5,250.00	-	-	-	5,250.00
			Organize workshops on geographic information system (GIS) or basic mapping methods	One central level workshop in 2017	-	5,250.00	-	-	-	5,250.00
				No budget required, GPS machines procured by malaria program will be used	-	-	-	-	-	-

Strategic interventions #	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
				2016 Total cost (in USD)	2017 Total cost (in USD)	2018 Total cost (in USD)	2019 Total cost (in USD)	2020 Total cost (in USD)	
		Update vector mapping annually	Hiring one international consultant for 10 days in 2017 for initiating vector mapping	-	5,000.00	-	-	-	5,000.00
			Lumpsum each year (\$40,000 in 2017, \$20,000 from 2018 onwards)	-	40,000.00	20,000.00	20,000.00	20,000.00	100,000.00
		Piloting of IVM strategy in selected areas and replicate to other areas based on the evidences	Operational cost, lumpsum per S/R, piloting in 2017	-	90,000.00	-	-	-	90,000.00
	2.2. Capacity to implement IVM including training and recruitment of entomologists	Mapping of the entomologists and their responsibilities to assess the national needs for entomologists	No budget required	-	-	-	-	-	-
		Training of central, S/R and township level programme staff (including entomologists) and other stakeholders on IVM strategies	Training at central level in 2017, refresher training in 2019	-	16,850.00	-	16,850.00	-	33,700.00
			Training at S/R level in 2017, refresher training in 2019	-	225,900.00	-	225,900.00	-	451,800.00
			Evaluation meeting for IVM strategy at central level in 2018	-	-	5,250.00	-	-	5,250.00
		Engage communities for community vector control mechanisms and larva source reduction	Procurement of in-kind materials (T shirts and caps), \$5 per community volunteer in 2017 and 2019	-	5,000,000.00	-	5,000,000.00	-	10,000,000.00
	2.3. Facilitate community involvement for vector control mechanisms established	Engage communities for the use of larvicides in partnership with I/NGOs (mass larviciding activities)	Procurement of larvicides (Abate), yearly	-	5,565,217.39	5,565,217.39	5,565,217.39	5,565,217.39	22,260,869.57
			Coordination meeting with programme and I/NGOs for community vector control, lumpsum at township health department, six monthly each year	-	66,000.00	66,000.00	66,000.00	66,000.00	264,000.00
		Develop comprehensive integrated training manual and guidelines including community and school based vector control	Hiring one national consultant for 15 days in 2017	-	1,000.00	-	-	-	1,000.00
		Train community groups on community vector control mechanisms	One township level training in 2017, one refresher training in 2019	-	2,037,750.00	-	2,037,750.00	-	4,075,500.00

Strategic interventions	#	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)				
					2016 Total cost (in USD)	2017 Total cost (in USD)	2018 Total cost (in USD)	2019 Total cost (in USD)	2020 Total cost (in USD)
			Periodic assessment of the community vector control mechanisms and scale up based on results of assessment	No budget required. Will be based on routine reporting.	-	-	-	-	-
		2.4. Rationale use of insecticide for vector controls	Formulate national policy on rational use of insecticides according to WHOPEs guidelines	No budget required.	-	-	-	-	-
			Annual reporting of the insecticide use	No budget required.	-	-	-	-	-
		2.5. Vector resistance monitoring to insecticide	Adopt WHO guidelines on vector resistance monitoring to insecticides	No budget required.	-	-	-	-	-
			Provide national training on vector resistance monitoring	One central level training in 2017	-	16,850.00	-	-	16,850.00
			Identify monitoring sites for insecticide resistance, collect baseline data, and update at 2-3 years interval	Operational cost, lumpsum, \$10,000 in 2017 and \$5,000 from 2018 onwards	-	10,000.00	5,000.00	5,000.00	25,000.00
3		Increase the capacity of clinicians, nurses, BHS and laboratory technicians to diagnose, treat and refer dengue patients							
			Consultant for development of guidelines, SOPs, training materials, etc. related to case management	Hiring one national consultant for 2 months in 2017	-	4,000.00	-	-	4,000.00
		3.1. Case detection	Passive case detection from every public and private health facilities	No budget required.	-	-	-	-	-
			Active case detection during the dengue outbreak by BHS	Operational cost, lumpsum per township each year	330,000.00	330,000.00	330,000.00	330,000.00	1,650,000.00
			Strengthen fever surveillance (school and community)	No budget required.	-	-	-	-	-
		3.2. Strengthen laboratory support for case management	Conduct situation analysis on laboratory capacity in public and private sectors	Already budgeted under consultant fees.	-	-	-	-	-
			Strengthen capacities of public laboratories by supplying diagnostic kits and reagents	Already budgeted this activity under surveillance.	-	-	-	-	-
			Establish and/or strengthen capacity of blood banks to respond to the needs of DHF/DSS cases	No budget required.	-	-	-	-	-
			Develop comprehensive integrated training modules including laboratory diagnosis and QA/QC based on WHO guidelines	Already budgeted under consultant fees.	-	-	-	-	-

Strategic interventions #	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)				
				2016 Total cost (in USD)	2017 Total cost (in USD)	2018 Total cost (in USD)	2019 Total cost (in USD)	2020 Total cost (in USD)
		Build capacity of laboratory personnel based on the developed comprehensive integrated training manuals	Already budgeted this activity under surveillance.	-	-	-	-	-
		Monitor implementation of the good laboratory practices (GLP)	Already budgeted this activity under surveillance.	-	-	-	-	-
	3.3. Strengthening capacity of health professionals to diagnose, treat or refer cases	Conduct situation analysis on current dengue diagnosis, treatment and referral services among public and private health professionals by conducting KAP survey	Already budgeted under consultant fees.	-	-	-	-	-
		Develop dengue treatment guidelines for clinicians and nurses	Already budgeted under consultant fees.	-	-	-	-	-
		Develop comprehensive integrated training modules including dengue treatment for BHS	Already budgeted under consultant fees.	-	-	-	-	-
		Train health care professionals (public and private) based on the training guidelines.	One central level TOT in 2017	-	16,850.00	-	-	16,850.00
		Supervision and monitoring of health care professionals (public and private) on use of dengue treatment guidelines, management of severe cases (DHF/DSS), and reporting	One S/R level training in 2017, one refresher training in 2019	-	225,900.00	-	225,900.00	451,800.00
		Conduct mortality review	Already budgeted this activity under surveillance.	-	-	-	-	-
		Conduct KAP survey for dengue primarily to assess constraints to early health care seeking behaviors of the communities and to formulate strategies based on the findings	Operational cost, lumpsum per review	11,200.00	9,800.00	8,400.00	7,000.00	43,400.00
	3.4. Increase awareness among the communities on the warning signs and actions taken for dengue	Develop SOP for strengthening referral network mechanisms	Lumpsum in 2017	-	30,000.00	-	-	30,000.00
	3.5. Referral network system in public and private sectors		Training at Township level, cost will be merged with community vector control trainings at township level (See Row# 52)	-	-	-	-	-

Strategic interventions #	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)				
				2016 Total cost (in USD)	2017 Total cost (in USD)	2018 Total cost (in USD)	2019 Total cost (in USD)	2020 Total cost (in USD)
			Coordination meetings with public and private hospitals, GPs, budgeted already under other coordination meetings	-	-	-	-	-
			Transportation costs related to referral, lumpsum per township each year No budget required.	33,000.00	33,000.00	33,000.00	33,000.00	33,000.00
		Make provisions for hotline consultation and communications between township medical officers and S/R pediatricians		-	-	-	-	-
		Provide adequate transport facilities for complicated cases	Already budgeted under Strengthening referral network mechanisms (Row# 79)	-	-	-	-	-
4	<i>Increase capacity to predict, detect early and respond to outbreaks in a timely manner</i>							
		Consultant for development of guidelines, SOPs, training materials, etc. related to outbreak response	Hiring one national consultant for 1 months in 2017	-	2,000.00	-	-	2,000.00
		Develop comprehensive integrated guidelines including dengue early warning systems and outbreak response	Already budgeted under consultant fees.	-	-	-	-	-
		Initiate/establish Dengue Early Warning System (DEWarS) software	Lumpsum each year	20,000.00	20,000.00	20,000.00	20,000.00	100,000.00
		Training on dengue outbreak response guidelines and SOPs at central, S/R and township levels	One central level training, combined with other central level trainings	-	-	-	-	-
			One S/R level training, combined with other S/R level trainings	-	-	-	-	-
			One township level training, combined with other township level meetings	-	-	-	-	-
		Monitoring of dengue outbreak response	Operational cost, lumpsum	16,500.00	16,500.00	16,500.00	16,500.00	82,500.00
		Establish dengue outbreak response team at central, S/R and township levels to predict and respond to outbreaks	No budget required.	-	-	-	-	-

Strategic interventions	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)				
				2016	2017	2018	2019	2020
		Develop risk communication plan and incorporate into dengue comprehensive and integrated guidelines	Already budgeted under consultant fees.	-	-	-	-	-
		Training of focal points in all relevant aspects of risk communication	Risk communication will be included in other trainings	-	-	-	-	-
		Collaborate with other sectors to harmonize implementation of risk communication	No budget required.	-	-	-	-	-
		Containment of dengue cases during outbreaks	Operational cost per case, lumpsum	1,931,085.00	1,823,802.50	1,716,520.00	1,609,237.50	1,609,237.50
			Procurement of larvicides (Abate) for outbreaks, 12.5kg (half-drum) per case, MMK100,000 per 25 kg drum	-	1,585,915.22	1,492,626.09	1,399,336.96	1,399,336.96
			Procurement of Malathion (0.46L per case) (MMK 300,000 per 25L)	185,384.16	175,085.04	164,785.92	154,486.80	154,486.80
			Procurement of diesel for fogging (2 gallon per case, MMK 605 per litre)	182,865.35	172,706.17	162,546.98	152,387.79	152,387.79
			Procurement of petrol (0.5 gallon per case, MMK 600 per litre)	45,338.52	42,819.71	40,300.90	37,782.10	37,782.10
			Procurement of LLIN (50 LLIN per case)	5,696,700.75	5,380,217.38	5,063,734.00	4,747,250.63	4,747,250.63
			Procurement of mosquito repellent for school children (1 tube per student per month for 3 months)	4,188,939.00	4,188,939.00	4,188,939.00	4,188,939.00	4,188,939.00
			Procurement of spraying/fogging equipments	-	660,000.00	330,000.00	100,000.00	100,000.00
			Procurement of PPE every year	-	33,000.00	33,000.00	33,000.00	33,000.00
5	<i>Promote collaboration among affected communities, national health and non-health departments and other stakeholders to implement communication for behavioral impact (COMBI) for dengue</i>							
		Consultant for development of guidelines, SOPs, training materials, etc. related to COMBI	Hiring one national consultant for 2 months in 2017	-	4,000.00	-	-	-
		Conduct situation analysis on social mobilization and health education for dengue and other vector borne diseases	Hiring one international consultant for 15 days in 2017	-	7,500.00	-	-	-
			Already budgeted under consultant fees.	-	-	-	-	-
								4,000.00
								7,500.00
								1,190,000.00
								132,000.00
								8,689,882.50
								5,877,215.22
								834,228.72
								822,894.09
								204,023.33
								25,635,153.38
								20,944,695.00

Strategic interventions	#	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
					2016 Total cost (in USD)	2017 Total cost (in USD)	2018 Total cost (in USD)	2019 Total cost (in USD)	2020 Total cost (in USD)	
			Develop COMBI strategy and operational plan based on the outcome of the situation analysis	Already budgeted under consultant fees.	-	-	-	-	-	-
			Advocate and promote COMBI strategy to stakeholders at country level	One central level meeting in 2017	5,250.00	-	-	-	-	5,250.00
			Develop COMBI training curriculum and conduct trainings at all levels	Budget for hiring one national consultant is already budgeted.	-	-	-	-	-	-
				One central level training in 2017	16,850.00	-	-	-	-	16,850.00
				One S/R level training in 2017, one refresher training in 2019	225,900.00	-	-	225,900.00	-	451,800.00
			Piloting of COMBI operational plan in selected areas and replicate to other areas	Operational cost, lumpsum per S/R each year	-	90,000.00	90,000.00	90,000.00	90,000.00	360,000.00
			Monitor and evaluate implementation of COMBI plan	Two assessments in 2017 (for baseline before starting COMBI) and in 2019, lumpsum	-	30,000.00	-	30,000.00	-	60,000.00
			Identify key stakeholders (e.g. donor communities, private stakeholders) who can make significant contribution towards dengue control programme	No budget required.	-	-	-	-	-	-
			Formalize partnerships through memorandum of understanding	No budget required.	-	-	-	-	-	-
6		<i>Promote and conduct dengue researches to address programmatic issues and gaps that require new or improved tools for effective dengue prevention and control</i>								
			Conduct workshops to prioritize operational research needs and research agenda	One central level workshop in 2017	-	5,250.00	-	-	-	5,250.00
			Conduct trainings on applied and operational research for vector borne diseases	One central level training in 2017	-	16,850.00	-	-	-	16,850.00
			Conduct priority operational researches to provide evidence for program implementation	Lumpsum each year, starting from 2017	-	40,000.00	40,000.00	40,000.00	40,000.00	160,000.00
			Evaluate new and other preventive and control strategies and tools	Lumpsum each year, starting from 2017	-	5,000.00	5,000.00	5,000.00	5,000.00	20,000.00
			Conduct joint meetings and workshops to disseminate research findings	One central level meeting each year	-	5,250.00	5,250.00	5,250.00	5,250.00	21,000.00
7		<i>Strengthen dengue programme management and promote intersectoral collaboration for effective dengue prevention and control</i>								

#	Strategic interventions	Activity	Country specific sub-activity	Assumption	2016-2020 total cost (in USD)					
					2016	2017	2018	2019	2020	
			High level advocacy meetings for dengue prevention and control	One central level meeting each year	5,250.00	5,250.00	5,250.00	5,250.00	5,250.00	26,250.00
			Observe ASEAN Dengue Day activity	One central level activity each year	5,250.00	5,250.00	5,250.00	5,250.00	5,250.00	26,250.00
				One S/R level activity each year	53,100.00	53,100.00	53,100.00	53,100.00	53,100.00	265,500.00
			Establish coordination and collaboration among ministries (City Development Committee, Education, S/R governments, Finance & Revenue, Agriculture, Livestock and Fisheries, Transports), other departments, / NGOs, and other stakeholders for dengue prevention and control	Already budgeted under high level advocacy meeting.						
			Technical Assistance (TA) support from WHO for development of strategies, guidelines, SOPs, etc.	Already budgeted under different interventions.						
			Conduct situation analysis on human resource for dengue program	Already budgeted and to be merged with other consultancies.						
			Build national program capacity through short- and long-term trainings/fellowships	Two fellowship per year (3 months duration)		120,000.00	120,000.00	120,000.00	120,000.00	480,000.00
			Conduct periodic external and internal reviews of the program	Internal review, lumpsum each year	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00	50,000.00
				External review every three year, one each in 2017 and 2020		30,000.00			30,000.00	60,000.00
			Establish networking with ASEAN, SEARO, WPRO, etc.	No budget required.						
			Establish Dengue Vaccine Working Group	Central level meeting, 2 times per year	10,500.00	10,500.00	10,500.00	10,500.00	10,500.00	52,500.00
			Printing cost for guidelines, SOPs, forms and formats, IEC/BCC materials, etc.	Lumpsum each year, \$200,000 in 2017 and \$100,000 from 2018 onwards		200,000.00	100,000.00	100,000.00	100,000.00	500,000.00
			Develop and produce Annual Report along with other vector borne diseases	No budget required.						
			Total direct cost		17,249,512.78	39,292,052.40	27,087,170.28	37,670,538.17	25,338,488.17	146,637,761.80
			Indirect cost (7%)		1,207,465.89	2,750,443.67	1,896,101.92	2,636,937.67	1,773,694.17	10,264,643.33
			Grand total		18,456,978.68	42,042,496.07	28,983,272.20	40,307,475.84	27,112,182.34	156,902,405.12

