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Vector Control in the Indo-Pacific: Market Access Landscape

Country Report

Myanmar

INNOVATIVE VECTOR CONTROL CONSORTIUM

November 2019

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Abbreviations

3MDG	The Three Millennium Development Goal Fund
ACT	Artemisinin-based Combination Therapy
ASEAN	Association of Southeast Asian Nations
BCC	Behaviour Change Communication
CDC	Centre for Disease Control
CPI	Consumer Price Index
DHS	Demographic and Health Support
GDP	Gross Domestic Product
GFATM	The Global Fund to Fight AIDS, Tuberculosis, and Malaria
ICMV	Integrated Community Malaria Volunteers
IRS	Indoor Residual Spray
ITC	Insecticide Treated Clothing
ITNs	Insecticide-Treated Nets
IVM	Integrated Vector Management
FETP	Field Epidemiology Training Program
JE	Japanese Encephalitis
LLINs	Long Lasting Insecticide-treated Nets
MCC	Myanmar Council of Churches
MHAA	Myanmar Health Assistant Association
MLCS	Myanmar Living Conditions Survey
MMFO	Management of Malaria Field Operations
MMP	Migrant and Mobile Populations
MoH	Ministry of Health
MPLCS	Myanmar Poverty and Living Conditions Survey
NAL	National Agricultural Laboratory
NGO	Non-government Organization
OOP	Out-of-Pocket
PMI	President's Malaria Initiative
PNG	Papua New Guinea
QA/QC	Quality Assurance / Quality Control
RAI2E	Regional Artemisinin-resistance Initiative with second phase elimination
RDT	Rapid Diagnostic Test
TDY	Temporary Duty (technical assistance visit)
TES	Therapeutic Efficacy Studies
TWG	Technical Working Group
UNICEF	United Nations Children's Fund
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VBDC	Vector Borne Disease Control
VBDs	Vector-borne Diseases
WHO	World Health Organization

1. Executive Summary

Myanmar is one of the malaria-endemic countries in the Southeast Asian Region (SEAR). According to the National Strategic Plan, the government of Myanmar aims to eliminate malaria by 2030. The Vector Borne Disease Control (VBDC) Program Directorate oversees the malaria control program in Myanmar.

Myanmar has the highest malaria incidence in the Greater Mekong Region, accounting for 75% of the total malaria cases

The National Malaria Control Program estimates that 291 out of the total 330 townships are located in malaria-endemic areas, and approximately 85% of the population lives in areas where malaria transmission occurs. Malaria cases declined from 205,568 in 2014 to 85,019 in 2017, and malaria-related deaths decreased from 1,707 in 2005 and to 30 in 2017. Malaria is concentrated in the north-eastern states of the country, and areas bordering the Mekong subregion (that share border with Myanmar). Over 80% of cases are from a geographical area representing 20% of the total population; these are tribal, located in difficult-to-reach areas. Dengue is more prevalent among the urban population as compared to the rural population, with a higher incidence in men than women.

The Global Fund, PMI and 3MDG are the major financing organization for vector control in Myanmar

The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) continues to be the major source of external funding. For malaria in Myanmar, the Global Fund donated for the New Funding Model program an amount of USD74.5 million (2013-2016) and for the RAI program an amount USD40 million (2014-2016). Other major financing organizations in Myanmar are UNICEF, USAID, WHO, CDC, UNOPS, Bill & Melinda Gates Foundation, and others. Regional or private donors include P&G, Good Ventures, and Telenor. All these bodies provide financial and human resource support for vector control and prevention activities.

The United Nations Office for Project Services (UNOPS) is the key procurement agent under the Global Fund

The procurement and supply chain systems in Myanmar are complex, due to the continuous flow of funds from donors. Several external partners work directly towards the procurement and supply chain process, along with domestic agencies and organizations. The United Nations Office for Project Services (UNOPS) is the primary source of procurement under the Global Fund. For donors other than UNOPS, such as USAID/ PMI, the procurement is done by other organizations. Myanmar supports the free mass distribution of LLINs and targeted IRS for the prevention of malaria. The country has introduced Village Malaria Workers (VMWs) and Village Health Volunteers (VHVs) to provide community-based prevention, diagnosis, and treatment, and extend the reach of services to remote and migrant populations.

The insecticide spray/aerosols are the major products of the retail market

The retail market in Myanmar for vector control products comprises of insecticide coils, insecticide sprays or aerosols, household insect repellents, electric insecticides, and others. The retail market size was ~USD45 million in 2018. Presently, insecticide sprays/aerosols are used in Myanmar, as it is the fastest and the most efficient way to eliminate mosquitoes. Leading companies in the retail market for vector control products in Myanmar are SC Johnson & Son Inc., Fumakilla Ltd., Mosfly International, among others.

Key Trends and Drivers for Vector Control Market

Currently, the people in Myanmar are largely using insecticide nets either treated or untreated owing to their ease-of-use as compared to other products. There is a huge market for such nets, and it is expected to grow by 27% in the near future. The increasing involvement of international logistics service providers like Yangon and Mandalay is expected to improve the current fragmented and unreliable distribution network. The rise in focused research towards malaria elimination and the community engagement programs that operate at the village level are the major market drivers that can be used for vector control initiatives. Additional factors driving the growth of the market include an increase in awareness programs that focus on preventive measures, and a collaboration among global partners, local NGOs, and medical associations.

Advocacy on vector control in Myanmar

Various medical programs to train the villagers to detect, treat, and monitor malaria are required on a regular basis. Along with this, the detection of malaria hotspots for the mass distribution of antimalarial medicines will effectively bring down the burden of malaria cases.

2. Introduction

Objectives of the Study:

- To study the vector control market, and market access landscape, by type of market, vector control implementing organizations, and consumers, including an understanding of regulatory pathways.
- To map and provide a better understanding of procurement channels for vector control products and their barriers.
- To perform a detailed market study for 6 countries in the Indo-Pacific region, namely, Indonesia, Myanmar, Cambodia, Vietnam, Malaysia, and Papua New Guinea (PNG).

2.1 Country Overview

Myanmar (also known as Burma) is the largest country in mainland Southeast Asia with 676,578 square kilometres of area, and Burmese as its official language.

2.1.1 Geography

The country shares its borders with Thailand, Laos, China, India, and Bangladesh, and has ~2,800 kilometres of coastline that stretch from the Bay of Bengal to the Andaman Sea. The country is divided into two parts, upper Myanmar and lower Myanmar. Lower Myanmar is composed of coastal areas with thick tropical forests, and upper Myanmar comprises interior parts of the country. Due to its highly fertile land and topological conditions, the agricultural sector is dominant in the country, which, in turn, makes Myanmar more vulnerable to vector-borne diseases.

2.1.2 Demographics

According to the latest estimates published by the United Nations, the current population of Myanmar (formerly Burma) is 54,269,807 as of May 13, 2019. The population of Myanmar is equivalent to 0.7% of the world's total population. Myanmar ranks 26th in the list of countries (and dependencies) by population, with a density of 83 persons per km2. The total land area is 653,290 km2 (252,237 sq. miles). Around 37.3% (20,259,457 people in 2019) of the population lives in urban areas. The median age of individuals in Myanmar is 27.9 years.

TABLE 1: POPULATION OF MYANMAR (2019 AND HISTORICAL)[1]

Year	Number ('000)	Yearly Change (%)	Yearly Change	Urban Population (%)	Myanmar
2019	54,336	0.89	480,403	37.3	26
2018	53,855	0.91	485,126	36.8	26
2017	53,370	0.92	485,386	36.3	26
2016	52,885	0.92	481,554	35.8	26

The country is highly diverse, with 135 ethnicities recognized by the government, and at least 108 ethnolinguistic groups. The Bamar account for about 68% of the total population, followed by Shan (10%), Kayin (7%), Rakhine (4%), and overseas Chinese (3%). Ethnic minorities in the country prefer to be called ethnic nationalities to fight against the proliferation of the dominant Bamar people. Other ethnic groups include the Mon (2%), overseas Indians (2%), and the Kachin, Chin, Anglo-Indians, Nepali, and Anglo-Burmese.

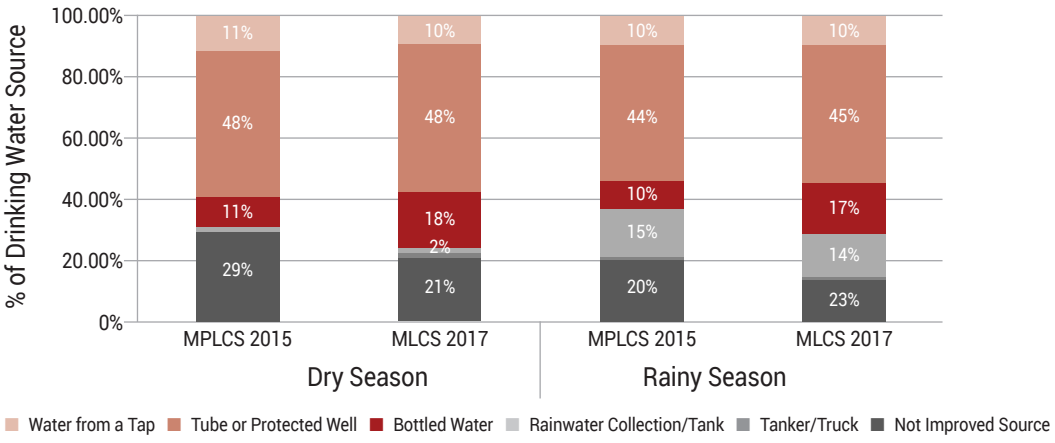
Religion in Myanmar is spread across with 87.9% Buddhist, 6.2% Christian, 4.3% Muslim, 0.8% Animist, 0.5% Hindu, 0.2% classified as other, and 0.1% that don't identify with any.

2.1.2.1 Health Indicators

Water[2]

Around 9.7 million people rely on unimproved water sources (such as an unprotected dug well or unprotected spring), of which over two-thirds, i.e., ~ 7.2 million people withdraw water from surface water sources, especially in the dry season. The use of improved water sources is substantially higher in the rainy season than in the dry season, and there has been a substantial increase in households purchasing bottled water since 2015. Ayeyarwady and Rakhine are the states with the lowest rates of improved water access.

FIGURE 1: DRINKING WATER SOURCE (%), BY SEASON (2015-2017)[2]



*Note: MLCS: Myanmar Living Conditions Survey; MPLCS: Myanmar Poverty and Living Conditions Survey

Sanitation[2]

Six in 10 people (64%) have access to improved sanitation at the union level. Kachin has the highest level of improved sanitation: 8 in 10 people (85%) have access to improved sanitation, compared to 5 in 10 people in Kayin (50%). Most households in Myanmar use flush toilets; however, there is a variation across states and regions.

[1] Worldometers Myanmar Population (CL: High)

[2] Myanmar Living Conditions Survey 2017 (CL: High)

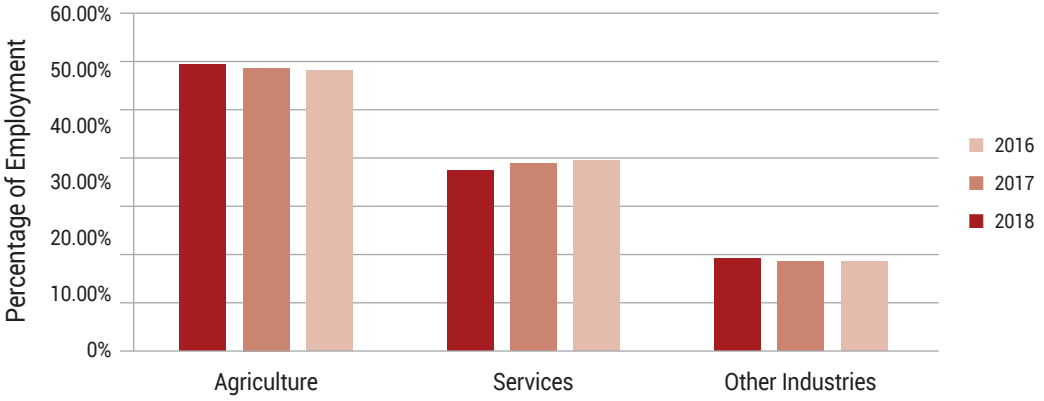
TABLE 2: MYANMAR: HOUSEHOLDS (%) WITH TYPES OF TOILETS[2]

Myanmar: Households (%) With Types of Toilets					
	Flush Toilet	Pit Latrine	None (Open Defecation)	Other	Total
MPLCS 2015	21%	20%	10%	9%	26%
MLCS 2017	16%	9%	6%	4%	20%

2.1.2.2 Employment

A majority of people are employed in the agriculture sector, which contributes to about 50% of the total population. This is followed by the services sector with 33%, and other industries with 16%.

FIGURE 2: PERCENTAGE OF EMPLOYMENT IN MYANMAR[3]



2.1.2.3 Living Conditions (Lifestyle)[4]

A joint report by the Central Statistical Organization, the United Nations Development Program (UNDP), and the World Bank reveals significant changes in living conditions in Myanmar over a period of time.

Changes in electrification taking place in the villages of Myanmar have led to an increase in solar and public grid access in rural areas. There is substantial potential to increase electrification by intensifying connections in areas already connected to the public grid.

Consumer goods have witnessed substantial growth since 2015, with the rise of small home appliances partly linked to rising electrification. Of all consumer goods, mobile phones have witnessed rapid growth, with smartphones being the most dominant technology used. A gender gap is seen in mobile phones and Internet usage, with women less likely to own a mobile phone and use the Internet. Computers are not widely used at present; however, there is evidence that these devices will be used by some population pockets, exclusively among those with high school education and above.

Access to improved water and sanitation facilities has increased since 2015. This has primarily been driven by the private sector rather than through increased and more sustainable use of piped and groundwater sources. Households in a few areas of Myanmar transport water from the source to consumption point, increasing the risk of contamination.

Steady progress has been made in education over the last decade, but substantial variation remains. Literacy has risen across generations, and gender gaps in literacy have closed at the national level, predominantly driven by women. However, progress still needs to be made in some parts of the country where the outcomes are lagging.

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[3] World Bank (CL: High)

[4] Myanmar Living Conditions Survey 2017 (CL: High)

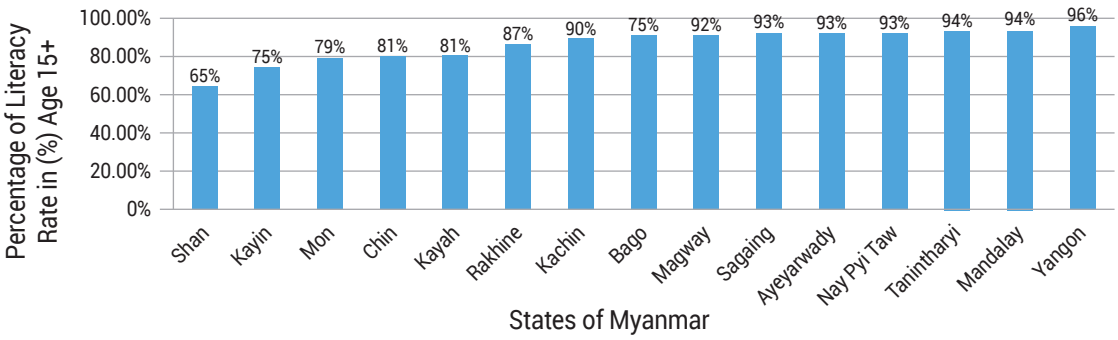
2.1.2.4 Others (Internet Usage, Education, etc.)

Literacy[5]

Myanmar's educational system has shown a significant improvement in the net total middle and high school enrolment during 2010-2017:

- In 2010 there was an 88% net total primary enrolment; *five in ten children* of middle school age were in middle school (~52%).
- In 2017 there was a 94% net total primary enrolment; *seven in ten children* of middle school age were in middle school (~71%).
- Net total middle school enrolment rate in rural areas increased by ~20% from 2010 to 2017, while the net total high school enrolment rate nearly doubled over the same period.

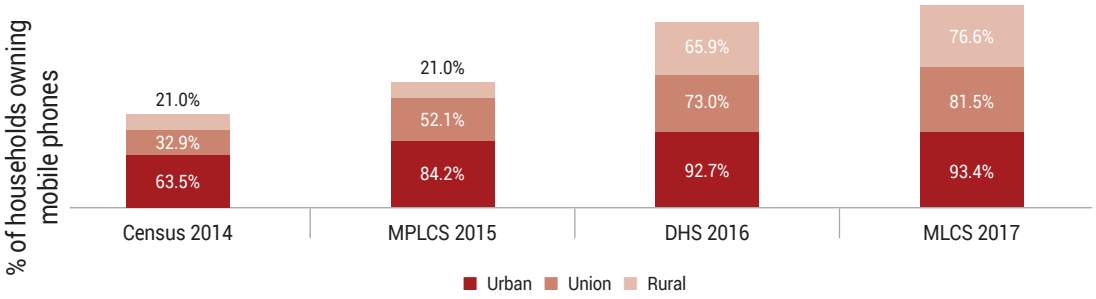
FIGURE 3: LITERACY RATE IN MYANMAR[4]



Internet Usage[4]

In Myanmar 8.2 million individuals use the Internet, entirely reliant on smartphones; of these, 7 million use the Internet at least once a day. Internet usage is the highest in the Yangon region in the country.

FIGURE 4: PERCENTAGE OF MOBILE USERS IN MYANMAR[4]



[4] Myanmar Living Conditions Survey 2017 (CL: High)

2.1.3 Economic Situation

Myanmar is a lower-middle income economy with a Gross National Income (GNI) per capita of USD1,210 in 2017. Strong economic growth translated into a reduction in poverty from 48% to 32% between 2005 and 2015. Economic growth remains strong by regional and global standards; however, it is presently witnessing a gradual decline. Myanmar's economy grew at 6.8% between 2017 and 2018, driven by strong performance in domestic trade and telecommunications, but was offset by the slow growth in manufacturing, construction, and transport sectors. The real GDP growth is projected to moderate to 6.2% in 2018/19.

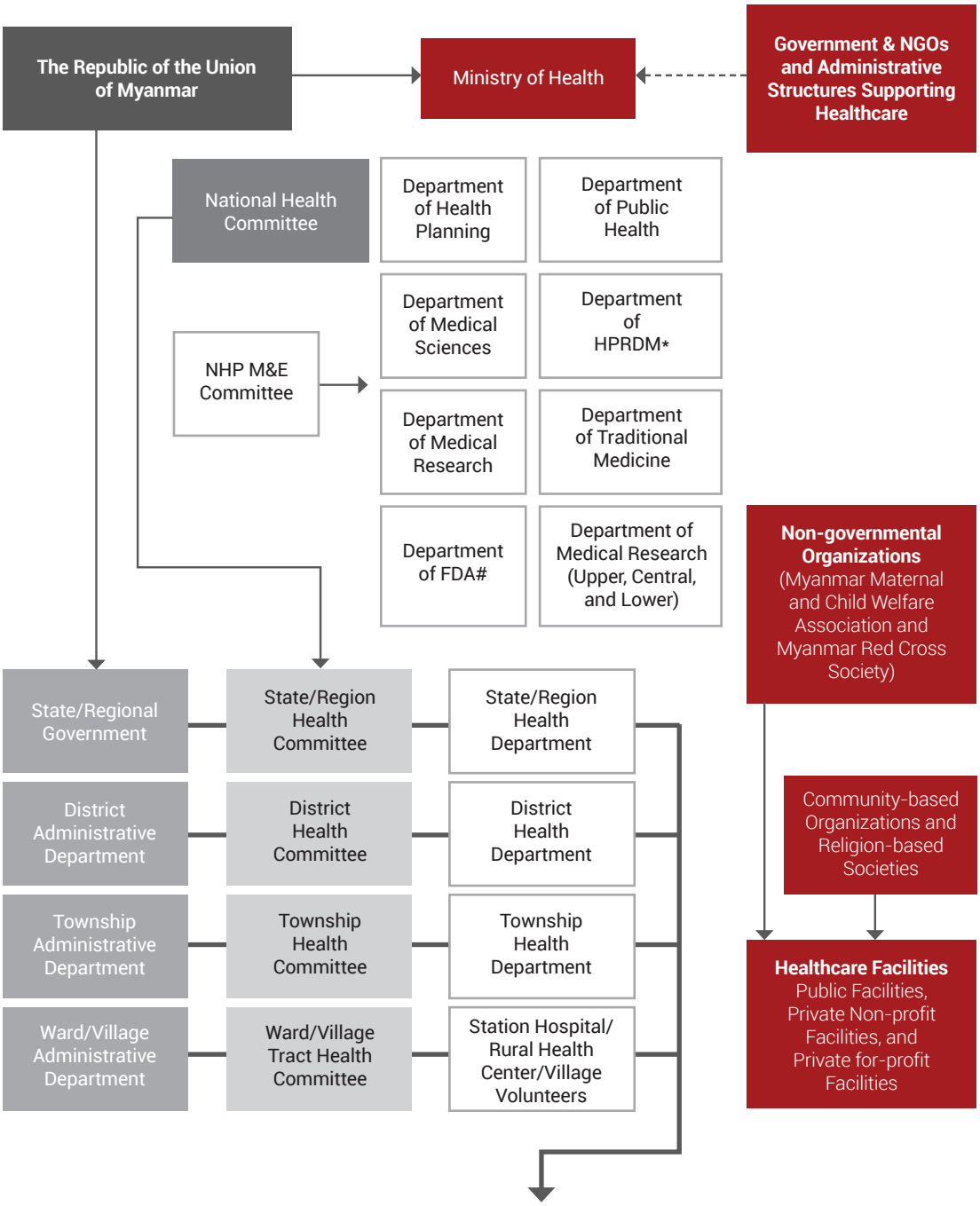
Nevertheless, the medium-term macroeconomic outlook remains positive. Economic growth is set to recover to 6.6% by 2020-2021, driven by an expected pick-up in foreign and domestic investment that responded to recent government policy measures. Building on the continuing implementation of the Myanmar Sustainable Development Plan, the government's policy intent was reflected in recent reforms, including: the implementation of the new Myanmar Companies Law, the opening of the insurance sector, and wholesale and retail markets to foreign players, a liberalization of the services sector, and the loosening restrictions on foreign bank lending.[6]

[6] World Bank (CL: High)

2.1.4 Health Status

2.1.4.1 Healthcare Structure

Government bodies and NGOs are collaboratively working to operate rural health centers[7,8,9,10]



Different Societies Working on State, Region, District, Town, Station Hospital, Health Centers, etc.
1. Ministries, 2. Myanmar Women's Affairs Federation, 3. Myanmar Maternal & Child Welfare Association, 4. Red Cross Society,
5. Medical Association, 6. Dental Association, 7. Nurses Association, 8. Health Assistant Association, 9. Traditional Medicine Practitioners Association,
10. Community Based Organization, 11. Faith Based Organization, 12. Parent-Teacher Association

7 Latt NN, et al. (2016) (CL: Medium)
8 WHO (2012) (CL: High)
9 WHO (2019) (CL: High)
10 Myanmar Malaria Control Plan (CL: High)

2.1.4.2 Healthcare Spending

Around a quarter of the population lives in poverty, and ~75-80% healthcare is paid out-of-pocket. The out-of-pocket expenditure per capita has been ~USD200 in the last 3 years.

Public spending on healthcare ,

The government spending on healthcare is limited – ~5% of the overall GDP. This results in individuals paying ~75% of the expenses out-of-pocket. Availability of insecticide-treated bed nets or IRS coverage for malaria prevention is ~53%. Overall, healthcare spending and out-of-pocket expenses have been increasing since 2014. The percentage of out-of-pocket expenses has not lowered below 70% since 2010.

TABLE 3: ANNUAL GDP VS. HEALTHCARE EXPENDITURE VS. OUT-OF-POCKET EXPENDITURE[11,12]

Year	Annual GDP (USD Million)	GDP Growth (%)	Health Expenditure (% of GDP)	Health Expenditure per capita by Government (USD)	Out-of-Pocket Expenditure per capita (USD)	% of Out-of-Pocket Expenditure
2017	69,322	6.37	-	-	-	-
2016	63,225	5.87	-	-	-	-
2015	59,687	6.99	4.95	59	198	77%
2014	65,446	7.99	4.89	62	182	75%
2013	60,270	8.43	1.97	24	58	71%

3. Vector Control Market Overview

VBD preventive products are generally classified as retail market products or donor-driven market products based on their characteristics.[13,14]

- In the retail segment, the majority of products are consumable, refillable, easy-to-access, and provide effective relief from mosquitos.
- Products that are long-lasting, durable, contactless, odourless, cover maximum area, and provide protection from mosquitos for a maximum period with minimum maintenance are considered as part of the donor-driven market.
- Donors usually look for these basic characteristics in products, such as mosquito traps/nets and insecticide-treated nets, prior to investing in them.

3.1 Vector Control Overview

Existing Vector-borne Disease Control Products Landscape in Myanmar[15]

- **Untreated Nets (UTNs):** Net materials act as a physical barrier between a person and mosquitoes, inhibiting the process of blood feeding and transmission.
- **Insecticide-treated Nets (ITNs):** These mosquito nets are used to inhibit blood feeding and eliminate mosquitoes coming into contact with netting fibres coated with insecticides by dipping the net in a solution of insecticide and water. The insecticide usually lasts 6–12 months depending on the washing mode and community practices, and thus, requires periodic re-treatment.
- **Long Lasting Insecticide-treated Nets (LLINs or LNs):** LLINs are mosquito nets with insecticides incorporated within or bound around the net fabric. The WHO defines an LLIN as a factory-treated net expected to retain its biological activity for at least 20 standard washes under laboratory conditions and three years of recommended use under field condition.

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11 SDG Profile: Myanmar (CL: High)

12 The World bank Group (CL: High)

13 Brieger WR 2017 (CL: High)

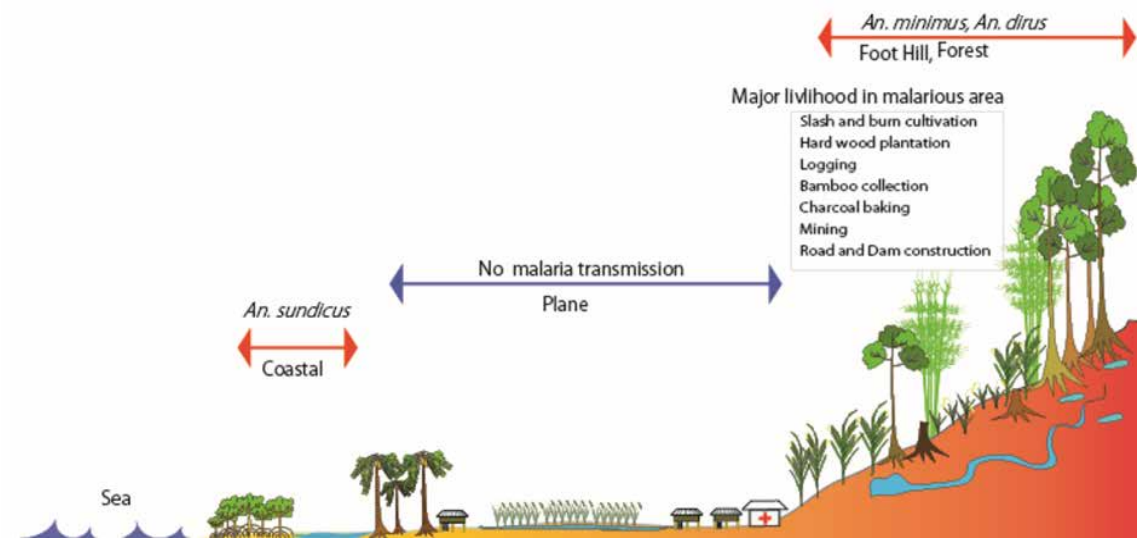
14 George S, et. al., Malaria Consortium Learning Paper Series 2014 (CL: High)

15 FutureBridge Analysis

- **Indoor Residual Spray (IRS):** IRS refers to the application of chemical insecticides on interior walls and roofs of all houses in a given area, killing vectors that rest on those surfaces.
- **Larvicidal agents:** These agents reduce vector population growth by identifying larval habitats and acting on them to reduce mosquito larvae by making use of either chemical insecticides or biological tools; however, the WHO does not recommend this approach.
- **Space Spraying:** It is the dispersion of a diluted insecticide into the air, effectively killing vectors that come into contact with the insecticide. Space spraying method has also been used for other vector-borne diseases, such as dengue; however, it is recommended only in extreme circumstances for malaria control, such as epidemics in urban areas or refugee camps.
- **Environmental Management:** Modification or manipulation of environmental factors to reduce vector breeding includes targeting water accumulation sites and house screening to prevent the entry of mosquitoes.
- **Consumer Products (Household Insecticides):** Products primarily available through the private sector are used for nuisance abatement, e.g., coils, vaporizing mats, aerosols that incorporate an insecticide or repellent, lotions, and wipes.

3.1.1 Vector Borne Diseases (VBD) Trends

FIGURE 5: DISTRIBUTION OF VECTORS BY ECOLOGICAL STRATA IN MYANMAR[16]



Malaria[17]

Although significant progress has been made in recent years, Myanmar has the highest malaria incidence and burden in the Greater Mekong Region, accounting for 75% of the total malaria cases. Malaria cases declined from 205,568 in 2014 to 85,019 in 2017, and malaria-related deaths also declined from 1,707 in 2005 and to 30 in 2017. The National Malaria Control Program estimates that 291 out of the total 330 townships are located in malaria-endemic areas, and approximately 85% of the population lives in areas where malaria transmission occurs.

Dengue[18]

Larval control: insecticide granules (temephos) are placed into domestic and peri-domestic water containers every 3 months in the wet season to kill mosquito larvae. Mosquito control: space spraying (thermal fogging) is performed using malathion insecticide. Health education organized by the VBDC teams involves conducting health education sessions, distributing pamphlets, posters, and vinyl printed materials to the general public, and transmitting information through mass media channels.

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16 External Evaluation of the National Malaria Control Programme Myanmar, 2016 (CL: High)

17 The Global Fund (CL: High)

18 Pwint M. et. al (2015) (CL: High)

Zika

The first case of Zika virus was confirmed in a foreign pregnant woman in October 2016.

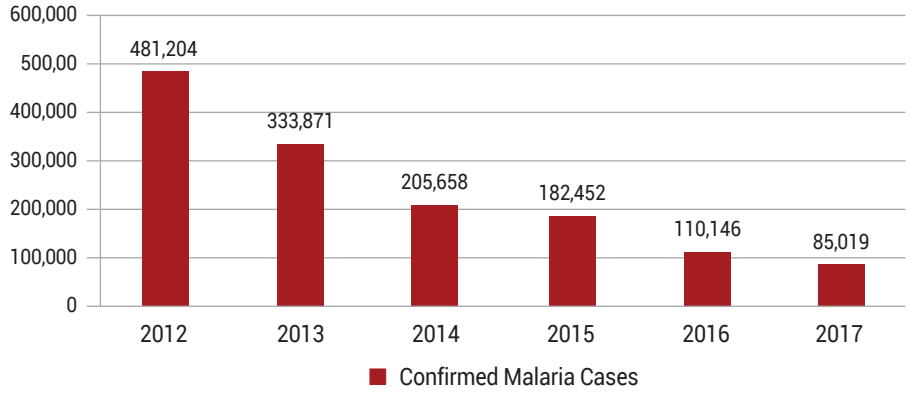
3.1.2 Burden of Disease

Malaria

There was an 81.1% decline in malaria cases from 2005 to 2014, which is 1,341.8 cases per 100,000 population to 253.3 cases per 100,000 population. During the same period, the mortality rate decreased by 93.5%.[19]

In addition, there were about 85,019 malaria cases reported in Myanmar in 2017.

FIGURE 6 REPORTED MALARIA CASES FROM 2012 TO 2017 IN MYANMAR[15]



Dengue[20]

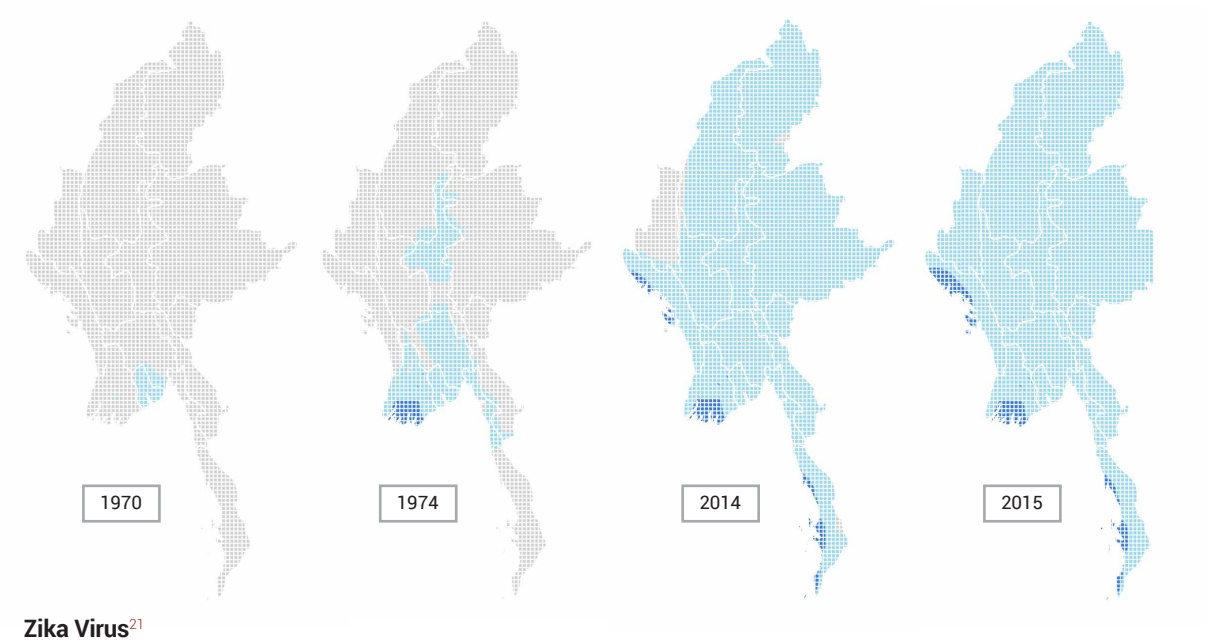
Dengue is more prevalent among the urban population as compared to the rural population. The incidence of dengue is higher in males as compared to females in Myanmar. Sporadic cases of dengue had been reported in 1960, and since 1964 it has been classified as a notifiable disease.

In 1970, the first dengue outbreak occurred in Yangon with 1,654 cases and 91 deaths, which spread to other states/regions in 1974. There were 28,165 reported cases between 1970-1979, 24,773 cases between 1980-1989, and 55,223 cases between 1990-1999. During 2000-2009, the total number of reported dengue cases was 133,844, relatively high compared to the last three decades. In 2015, all states and regions in Myanmar reported dengue cases. During 2010-2015, the reported number of dengue cases was 104,403.

[19] Mu TT et al., (2016) (CL: High)

[20] National Strategic Plan for Dengue Prevention and Control (2016 – 2020) (CL: High)

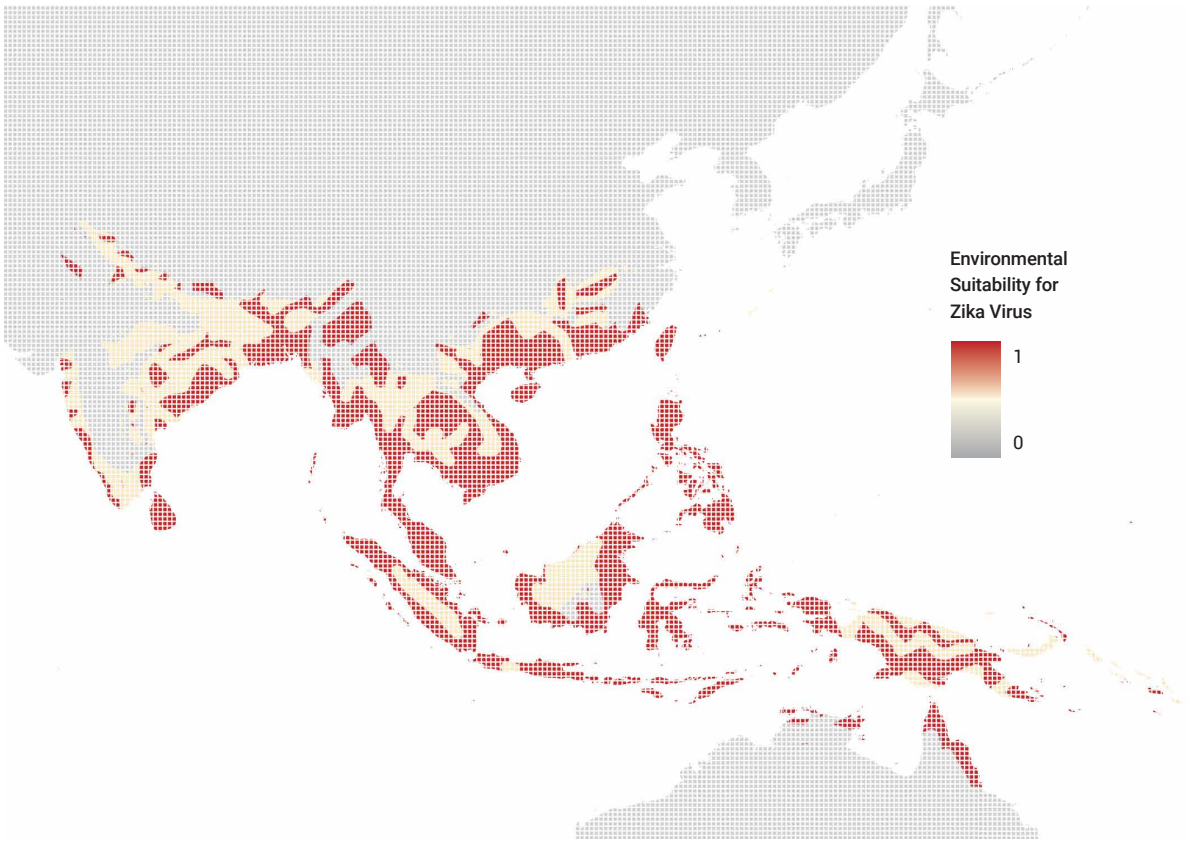
FIGURE 7: DENGUE AFFECTED GEOGRAPHICAL AREA IN MYANMAR[16]



Zika Virus[21]

Myanmar reported its first case of Zika infection in a pregnant woman who returned from a country with active Zika transmission in October 2016.

FIGURE 8: ENVIRONMENTAL SUITABILITY FOR ZIKA VIRUS IN MYANMAR[21]



[21] Win AZ (2017) (CL: High)

3.1.3 Economic Burden of VBD

Cost of Treating Inpatient Malaria in Myanmar[22]

Analysis was made from the data available in one of the studies that contain random allocation of inpatients with *P. falciparum* malaria; these patients were treated with parenteral artesunate or quinine in one of the hospitals. The total admission cost was broken down into five categories depending on medication, intravenous fluids, disposables, laboratory test, and services. It was noted that the medication costs were higher for patients treated with artesunate; however, the total admission cost for those treated with quinine was USD243, and those treated with artesunate was USD190. For cases classified as severe malaria (59%), the total cost of admission was USD298 in the quinine group as compared with USD284 in the artesunate group.

Dengue Treatment Cost[23]

From the population of 46 million as reported in 2010, the aggregate cost for direct treatment for dengue was USD6.9 million, and the indirect cost was USD7.6 million, totalling to USD14.4 million. The cost per capita per household was USD0.31.

3.1.4 Measures/Initiatives for Vector Control

Government bodies and NGOs distribute and provide subsidized products with the help of government supply shops and private distribution channels, respectively.

TABLE 4: PRODUCTS DISTRIBUTED AND USED BY GOVERNMENT AGENCIES[24]

Product Provider	Description	Actual Price (USD):	Subsidized Price (USD):
PSI	Distributes 100,000 of LLITKs, (Brand - SupaTab3) through their SUN clinic franchise and Inter-personal Communicators (IPCs)	0.99	0.06
Myanmar Burmese Government	Produce and supply nets in the private sector through special government supply shops known as "Win Thuza"	7.90	NA
IOM (Community-based Migrant Health Project)	Supply advanced Odomos (60g tubes) on the Myanmar/Burma/Thai borders; these tubes are made available free-of-cost to migrants (three tubes per month)	NA	Free

[22] Shwe Sin Kyaw et.al, 2014 (CL: High)

[23] Donald Shepard et. al, 2013 (CL: Medium)

[24] Networks Project - Malaria Prevention (CL: High)

TABLE 5: PRODUCTS DISTRIBUTED AND USED BY COMMUNITIES, HOUSEHOLDS, AND INDIVIDUALS[22]

Brand/Type	Description	Type	Price (USD)
Government Net	• Large, heavy, opaque cotton, and rectangular untreated net • Single (s) and family (f) size • All cotton roof and large borders • Available in Win Thuza and government supply shops	Single	4.94
		Family	7.90
SupaNet SM Brand	• Social Marketing of LLINs • Over branded (Yorkool) LLINs • Available in family size • Subsidized price and distribution through PSI	Family	1.45
PermaNet	• Private sector LLIN • WHOPES approved • Factory treated • Imported	Family	4.61
Polynet	• Untreated net	Family	1.32
B-52	• Family rectangular net imported from Thailand • Available in different types	Family	2.96
Local Net, Zarmani	• Coloured untreated rectangular net • Available in single and family size • Made in Mingaladon township, home industry production	Single	2.30
		Family	3.95
Good Sleep	• Produced by social enterprise • Use of colourful, patterned netting, and Cotton China Fabric (CYC), denser, opaque, colourful floral fabric - favoured for providing privacy	-	3.29
		Family	4.61
		Family	4.94

Population Services International (PSI)[25]

PSI supports ministries of health throughout Africa and Asia to achieve and sustain universal coverage.

This is achieved through mass, cost-free net campaigns, routine health facility-based distributions, and highly subsidized private sector delivery.

National Strategic Plan 2016-2020[26]

The National Strategic Plan 2016-2020 focuses on the eradication of malaria from Myanmar by distributing LLINs and ITNs. The LLIN program aims at multiple delivery strategies to maximize coverage of insecticide-treated bed nets in all stratum 3 areas nationwide.

Additional LLINs are to be distributed among established communities for use in forest/forest farms; they are also used by pregnant women, defence service personnel, seasonal agricultural workers, and others.

Yoma Strategic Holdings[27]

Yoma Strategic Holdings leads the charge for the private sector to raise awareness for malaria elimination in Myanmar by spearheading the private sector campaign - M2030, a regional movement that aims to accelerate progress against malaria and eliminate the disease in the region by 2030.

The M2030 movement aims to reach out and mobilize prominent business leaders as champions, as well as advocate them against malaria.

Yoma Strategic is partnering with APLMA to work with the Myanmar Government and other private companies in the country to raise awareness and funds to support malaria education and other antimalarial public health efforts.

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[24] Networks Project - Malaria Prevention (CL: High)

[25] PSI (CL: High)

[26] National Strategic Plan 2016 - 2020 (CL: High)

[27] APLMA (CL: High)

TABLE 6: VECTOR CONTROL AND PREVENTION CAMPAIGNS

Name of the Campaign	Time Period	Target Disease	Coverage	Organization	Digital Campaign	Impact
Community Engagement Programs	2016	Malaria	Karen/Kayin State, Myanmar	National and Local Government	No	CE is not a fixed approach or strategy defined before entering the setting, but constantly evolving based on the encounters of workers with stakeholders and people of the population.
Myanmar Council of Churches (MCC) – Community-based Malaria Prevention and Control Project	2018-2020	Malaria	National	GF-RAI2E/ UNOPS	No	The mosquito net survey conducted stated that LLINs distributed during the campaign helped prevention of malaria, the campaign is still ongoing.
One Day's Wages	NA	Malaria	Rural areas of Northern Myanmar	BusinessKind	No	Increased meaningful employment opportunities for women in Myanmar. They impacted 3021 people, 950 malaria nets were distributed and 171 were educated.
Outreach through taxi drivers for migrant and mobile population	2012	Malaria	National	USAID	No	Outreach through taxi drivers for migrant and mobile population in order to build awareness regarding prevention and control of malaria.
Zika virus awareness campaign	2017	Zika/ Dengue	National	Ministry of Health	No	Creating awareness regarding control and preventive measures for Zika virus and dengue.

Community Engagement Programs[28]

Community Engagement (CE) programs operate at two levels – government level and village level in Karen/ Kayin situated at the Thai-Myanmar border.

- At the government level, the Malaria Elimination Task Force (METF) engages the Myanmar government, local Karen Ethnic Armed Organizations (KEAOs), and informal leaders to undertake the program.
- The main aspects of CE programs operating at the village level are to create mutual understanding between team members and villagers, and gain trust regarding the program.

USAID PMI Control and Prevention of Malaria Project (CAP-Malaria)[29]

The main objective of the project is to control, treat, and prevent malaria and artemisinin-resistant malaria in the Greater Mekong Sub-region.

In Myanmar (Burma), CAP-Malaria combines Behaviour Change Communication (BCC) tactics, health systems strengthening for early diagnosis and appropriate treatment, and cost-effective vector-control interventions, to reduce malaria transmission and support effective case management for hard-to-reach and vulnerable populations.

28 Kajeechiwa L. et al., (2018) (CL: High)

29 PMI Control and Prevention of Malaria Project (CL: High)

Myanmar Council of Churches (MCC) – Community-based Malaria Prevention and Control Project[30]

This project is implemented under the Myanmar Council of Churches (MCC) from January 01, 2018 to December 31, 2020. Funds for the project are provided by the GF-RAI2E grant, and the principal recipient is the United Nations Office for Project Services (UNOPS). Following are the key activities to be carried out under this project:

- Allocation of LLINs will be to at-risk populations through mass campaigns and continuous distribution
- Training/refresher training of Integrated Community Malaria Volunteers to be provided for both prevention and case management, to strengthen community-based malaria control
- Conduction of mosquito net surveys to assess LLIN coverage in MCC project areas
- Testing to diagnose all suspected cases and treatment for all positive malaria cases in static communities, mobile, and migrant populations
- Supervision and monitoring by field medical coordinators/finance assistants/logistics (regional level) and township activity managers (township level)

One Day's Wages[31]

One Day's Wages and BusinessKind in partnership run a project to reduce malaria mortality and morbidity in Myanmar. The project aims at preventing malaria among pregnant women and children in rural villages of Northern Myanmar by creating awareness regarding disease prevention. The program undertakes distribution of 1,000 custom designed insecticide-treated bed nets. BusinessKind provides employment to women by engaging them in the task of preparing nets. These nets are designed with the community's input. They are highly valued and effectively used as compared to the standard-free nets, and are more likely to be purchased when a second or replacement net is needed.

Outreach through taxi drivers for migrant and mobile population[32]

The USAID Greater Mekong Sub-region Control and Prevention of Malaria (CAP-Malaria) implements various prevention activities, that include spreading awareness through pamphlets containing information on the use of preventive tools, such as insecticide-treated nets and their role in malaria control.

30 UNOPS (CL: High)

31 One Day's Wages (CL: Medium)

32 USAID | Asia (CL: High)

Insecticide-treated Nets (ITNs) Program[33]

Treatment of ITNs so that they can be reused for the prevention of malaria

Distribution of ITNs for prevention of malaria

Dengue prevention and control organized by the Malaria Consortium[34]

Project: Positive deviance dengue project

Funding: UKAID

Partners: Red Cross and Local Fire Brigade (fire and dengue prevention are linked: fire preventive water bags need to be changed to prevent larvae growth)

Positive deviance is a community-driven approach that identifies existing and easily replicable behaviours demonstrated by certain community members, who have found improved methods to overcome this killing disease, despite having access to limited resources. These community members are known as positive deviant role models. Volunteers, along with the community members, help share and amplify these simple behaviours among the rest of the community.

The Malaria Consortium selected about 50 volunteers to pioneer positive deviance as a technique to control dengue in the Hinthada district (Ayeyarwady region). Dr. Khin Nan Lon, National Dengue Program Manager, attended the training and offered practical advice to the volunteers on ways to control the disease and larvae production, such as putting larvicidal sand granules in standing water to prevent larvae growth. Volunteers meet monthly, supported by the Malaria Consortium, to discuss progress, share experiences, issues, and challenges, and plan for the next positive deviance activities.

Volunteers work together with village leaders, government health staff workers, teachers, and students to increase ownership and fully embed the project in several villages.

33 National Malaria Control Programme (CL: High)

34 Malaria Consortium (CL: High)

Zika virus awareness campaign[35]

This campaign is centred on the country's two largest cities, although 70% of the population lives in a rural setting. The government printed official warnings regarding Zika virus in state newspapers, helping create awareness across the country. Other functions of this campaign include:

- Monitoring birth defects at major hospitals throughout the country in cooperation with the WHO
- Organizing mosquito eradication programs under Myanmar's Ministry of Health
- Screening for Zika at airports and border checkpoints and organizing health education campaigns
- Developing anti-mosquito control measures across the country by coordinating with other ministries and the media.
- Creating awareness regarding Zika virus and anti-dengue measures

CDC and Myanmar Govt. ZIKA awareness posters

RAI2E empowering communities through ICMVs[36]

The Regional Artemisinin-resistance Initiative with second phase elimination (RAI2E) empowers people with the help of integrated community malaria volunteers (ICMV) in order to eliminate malaria from the Chin State (Myanmar's western border). RAI2E partners with the Myanmar Health Assistant Association (MHAA) for mobilizing and empowering malaria affected communities with education, skill development and equipment to fight malaria. The MHAA trained ICMVs to gain the trust of villagers, increase awareness amongst the mobile population, provide health education, and distribute LLINs. The Global Fund support the MHAA to train the ICMVs. Since January 2018, MHAA has trained 76 ICMVs in two townships of the Chin State: 53 in Paletwa and 23 in Kanpetlet.

[35] A.Z.Win (2017) (CL: High)

[36] UNOPS

3.1.5 Challenges

Challenges in devising preventive measures against Zika Virus in Myanmar[37]

Key challenges impacting the development of preventive measures against Zika virus are the gaps between the government and health workers regarding guidelines for Zika virus prevention, and the lack of funds as well as a shortage of skilled healthcare professionals for the execution of public health campaigns. Myanmar has only 0.6 physicians per 1,000 people. Restricted access to electricity and the Internet throughout the country limits the awareness of campaigns designed to prevent Zika infections. In addition, the symptoms caused by the Zika virus remain unclear, as they are similar to dengue and chikungunya. A lack of well-equipped laboratories for diagnosis and a contingency plan in Myanmar are other obstacles in Zika prevention.

Challenges of malaria prevention programs in the private sector[38]

- **Private providers are often not included in the design, planning, and implementation of public sector disease programs:** Inclusion of the private sector in this process is helpful for an effective engagement and adoption of feasible approaches.
- **Goals of national malaria programs and private providers may differ:** Private providers may not be incentivized to diagnose or report all cases. For instance, a profit-driven model may incentivize private providers to over prescribe. In contrast, national malaria programs are primarily interested in ensuring accurate case management and reporting.
- **The informal private sector is particularly difficult to address due to its size, lack of organizational skills, and lack of government engagement:** The private sector can be a large group of associations or may be linked through social franchises. However, in several places there may be hundreds of private sector stakeholders, including pharmacies and drug vendors, who provide appropriate treatment but are not linked with one another and whose behaviours are often poorly understood.
- **Many private providers do not recognize the value and importance of counting and reporting all cases:** This is mostly in terms of drug retailers, who do not document each product sale.
- **A large proportion of private providers have limited training in accurate diagnosis, prescription, and reporting:** The sustainability of private providers creates a challenge for investing in training programs. Further, literacy and numeracy issues can also act as significant factors hampering the training program.
- **New regulations and protocols may not be communicated to all private providers, and providers may choose not to follow current regulations and protocols**: Amendments in government regulations should be updated in private sector programs.

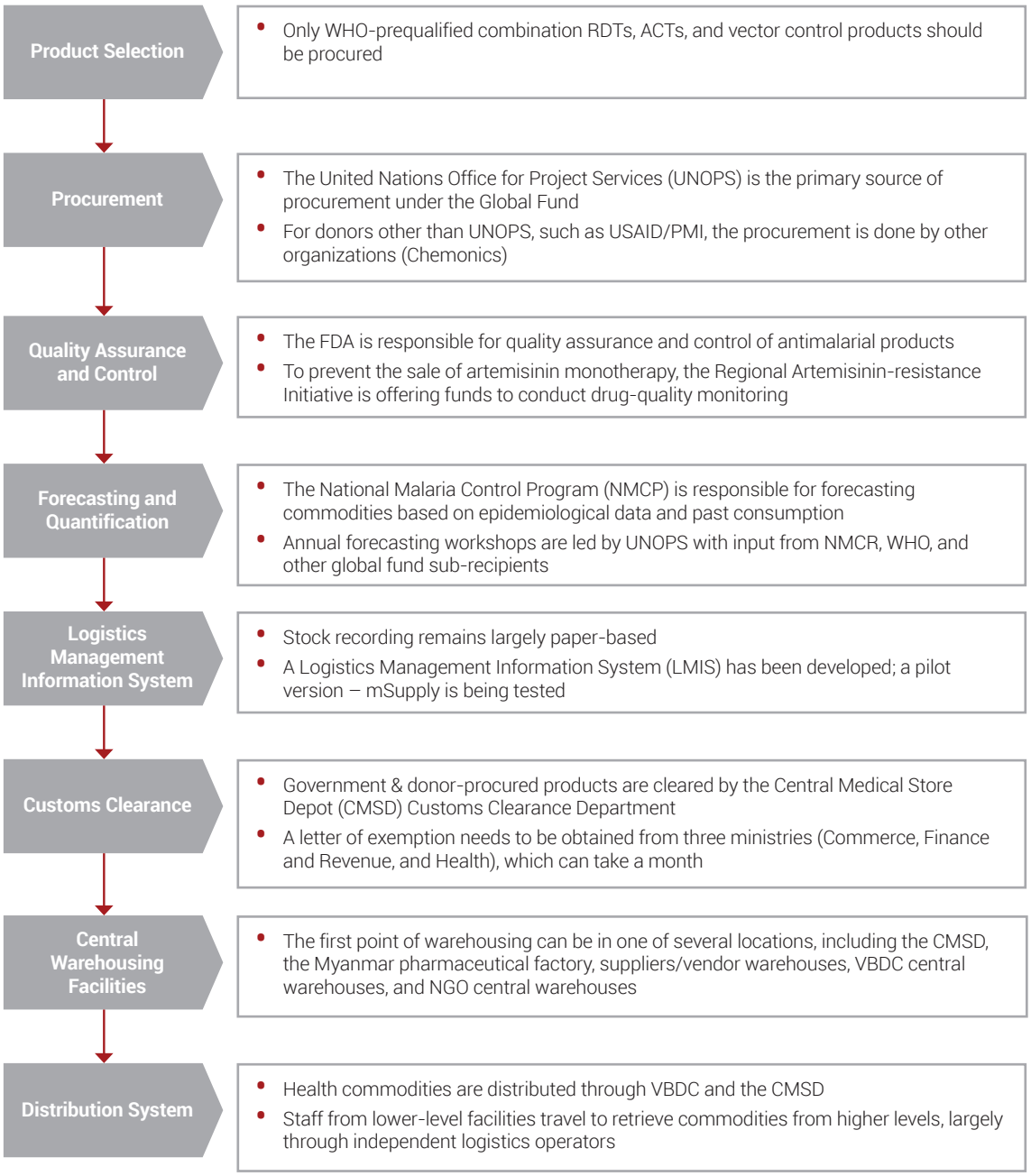
[37] A.Z.Win (2017) (CL: High)

[38] The Private Sector's Role in Malaria Surveillance (CL: High)

4. Market Analysis

4.1 Procurement Channels

Procurement Channel Overview – Myanmar[39]

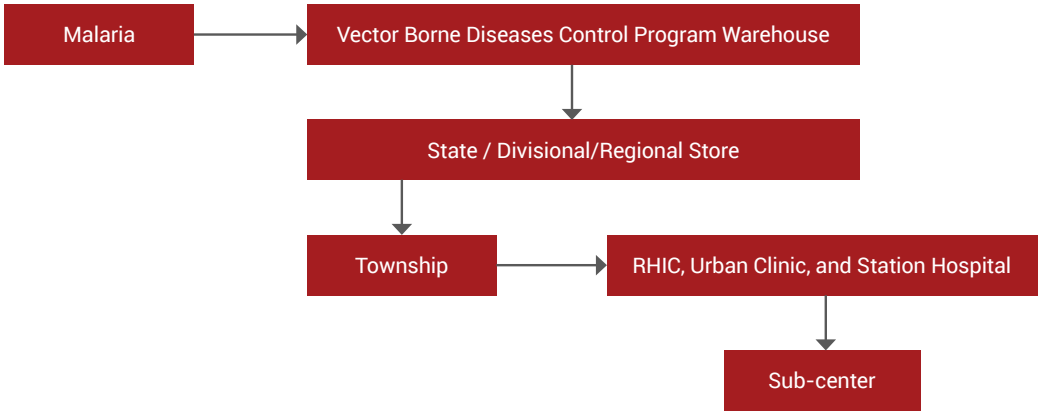


[39] Malaria Supply Chain – GMS (WHO, 2017) (CL: High)

4.1.1 Overview of Procurement Channels

The current supply chain system is complex owing to the direct intervention of external partners and NGOs[40]

Public Sector Supply and Distribution System for Malaria[40]



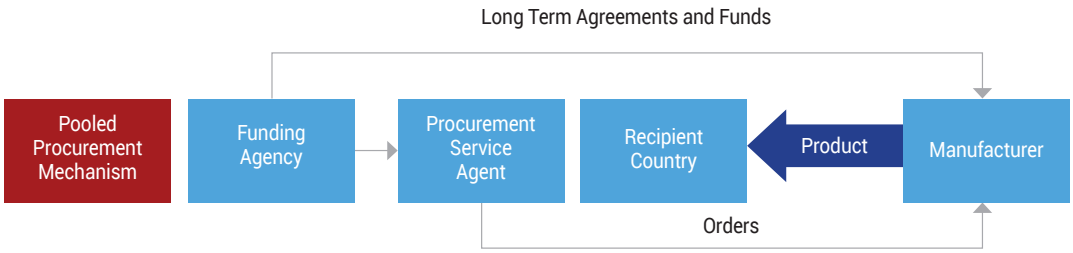
Agencies Responsible for Procurement and Supply Chain Management in Myanmar

Category	Government Organization
Forecasting	National Malaria Control Program (NMCP)
Product Selection	National Malaria Control Program (NMCP)
Procurement	United Nations Office for Project Services (UNOPS)
Warehousing	Central Medical Store Depot (CMSD)
Logistics Management Information System (LMIS)	Ministry of Health (MoH)
QA/QC	Food and Drug Administration (FDA)

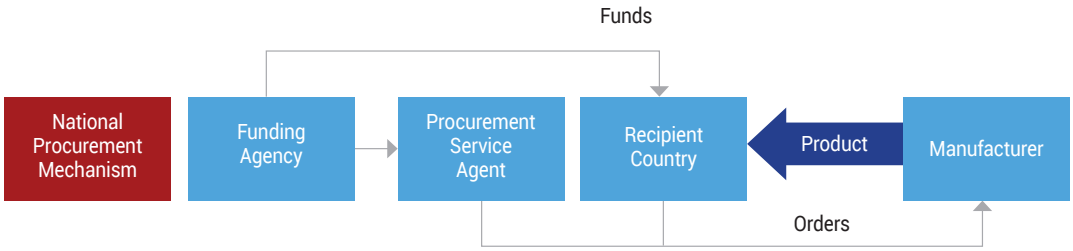
The **procurement and supply chain systems i**n Myanmar are complex, due to the continuous flow of funds from donors. Several **external partners** work directly towards the procurement and supply chain process, along with domestic agencies and organizations. Myanmar **supports free mass distribution** of LLINs and targeted IRS for the prevention of malaria. Myanmar has introduced **Village Malaria Workers** (VMWs) and **Village Health Volunteers** (VHVs) to provide community-based prevention, diagnosis, and treatment, and **extend the reach of services to remote and migrant populations**.

[40] Malaria Supply Chain in the Greater Mekong Subregion (CL: High)

The Pooled Procurement Mechanism is the most preferred route in Myanmar



~55% of the total healthcare product expenditure is routed by this mechanism.



[52] FutureBridge analysis

4.1.2 Stakeholders[41]

Global Bodies

Manufacturers

Procurement Agencies

Distributors

NGOs

Regional Bodies

Government Bodies

[41] FutureBridge Analysis

4.1.3 Procurement Channels – Gap Analysis

An estimated 6 million LLINs are required in Myanmar to address the goal of mass distribution campaign in 2019[42]

TABLE 7: LLIN GAP ANALYSIS[42]

Year	2017	2018	2019
Total Targeted Population*	16.8 Million	16.9 Million	17.1 Million
Continuous Distribution Needs			
Estimated Total Need for Continuous (through Anti-natal Care (ANC) Channels	0	1.1 Million	0.5 Million
Mass Distribution Needs			
Estimated Total Need of Nets for Campaigns**	5.1 Million	0.3 Million	5.7 Million
Total ITNs Needed	**5.1 Million**	**1.4 Million**	**6.3 Million**
Partner Contributions			
ITNs Carried Over from Previous Year	0	0.09 Million	0
ITNs from Global NFM and RAI	2.9 Million	1.0 Million	5.9 Million
ITNs from 3MDG	2.0 Million	0	0
ITNs Planned with PMI Funding	0.3 Million	0.3 Million	0.3 Million
Total ITNs Available	**5.2 Million**	**1.4 Million**	**6.2 Million**
Total ITN Surplus (Gap)	**0.09 Million**	**(0.005 Million)**	**NA**

- US President's Malaria Initiative (PMI) procured a total of 793,500 LLINs with FY 2015 funding. Of these, 553,500 LLINs were used to fill gaps identified by the NMCP.
- PMI supported the shipment, warehousing at the central level, transport at the peripheral level, and distribution of these nets to 47 townships in 11 states/regions, in collaboration with the NMCP.
- The distribution was successfully accomplished between July 2015 and December 2015. An additional 240,000 LLINs were distributed in PMI target areas to resident populations, MMPs, and communities in non-state actor areas.
- During the FY 2016 funding, PMI procured 516,000 LLINs; among them, 300,000 nets arrived in May 2017 for households and MMPs in PMI project areas.
- PMI supports an LLIN durability monitoring assessment of LLIN survivorship, attrition, physical durability, and insecticidal activity.
- PMI coordinates annually with the MOHs and Global Fund on net quantities and distributes PMI LLINs in PMI-supported areas to resident populations as well as MMPs living in these areas.
- PMI estimates LLIN needs for MMPs based on the previous year's consumption and quantities distributed by various outreach distribution channels mainly through workplaces.

[42] President's Malaria Initiative 2018 (CL: High)

4.2 Sponsors & Payers

Global Funding Agencies

The major global funding agencies in Myanmar are The Global Fund, UNICEF, WHO, UK AID, Bill & Melinda Gates Foundation, 3MDG, among others. These global organizations aim to eradicate malaria from the globe, and work together to control and prevent the disease. The resources thus received from the funding agencies are being used for the procurement and distribution of various vector prevention products such as LLINs. The funds are also used for providing education and to spread awareness amongst citizens, especially from the rural areas.

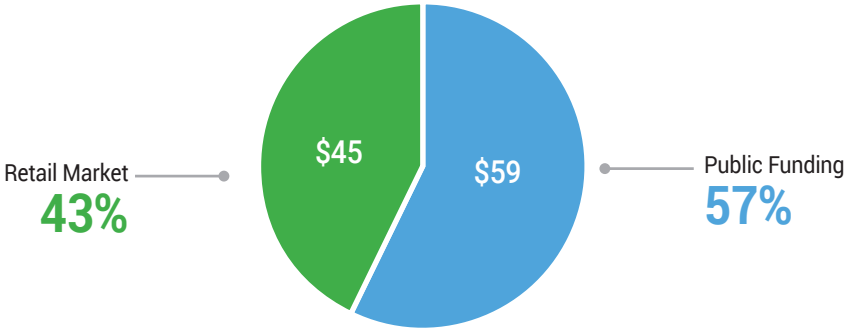
Private Donor

Apart from the global agencies, there are few private donors in Myanmar such as Procter & Gamble, Telenor, Good Ventures and Ploy Gold. These agencies also provide funds for education and distribution of products to control and prevent malaria.

4.3 Vector Control related Spending

Different types of LLINs and ITNs are distributed on a large scale in order to prevent and protect individuals from VBDs. The entry strategy for any new organization should be mass distribution of LLINs and ITNs, especially to the migrant population. As retail and public spending is equally contributing in vector control (figure 9), an organization can also focus on retail market products such as insecticide coils and insecticide spray/aerosols to prevent VBDs.

FIGURE 9: SHARE OF VECTOR CONTROL MARKET SPENDING (DMILLION), 2017-2018[43]



4.3.1 Funding

The PMI provides technical and financial support for the malaria elimination program. Key areas of focus are prevention (LLINs and malaria in pregnancy), case management, capacity building, supply chain management, and monitoring and evaluation.

TABLE 8: ESTIMATED SUMMARY BUDGET FOR 2016-2020 (USD MILLION)[44]

Intervention/Supporting Element	2016	2017	2018E	2019E	2020E	Total Funding
Case Detection and Effective Management	20.28	25.46	19.74	20.50	19.53	105.52
Malaria Prevention	37.32	46.85	21.22	23.78	2.74	131.90
Malaria Case and Entomological Surveillance	6.32	7.94	7.32	8.53	7.69	37.79
SE1. Expanding Research for Innovation and Improved Delivery of Services	1.87	2.34	2.23	2.23	2.23	10.89
SE2. Strengthening the Enabling Environment	28.59	40.01	33.61	37.15	36.29	175.65
Total	**94.38**	**122.60**	**84.11**	**92.18**	**68.47**	**461.75**

Note: E- Estimated

[43] FutureBridge Analysis

[44] National Strategic Plan 2016 - 2020 (CL: High)

4.3.1.1 National Funding

National Malaria Control Program Funding: Case detection & management, disease prevention, and malaria case and entomological surveillance are key interventions of the national strategic plan.

TABLE 9: ORGANIZATIONS PROVIDING FUNDS FOR MYANMAR

Funding Organization	Amount (Million USD)	Period	Implementing Agency
Global Fund (NFM)	74.5 Million	2013 – 2016	National program, local NGOs, international NGOs, faith-based organizations, and CBOs
Global Fund (RAI)	40 Million	2014 – 2016	National program, local NGOs, international NGOs, faith-based organizations, and CBOs
3MDG	26.9 Million	2016 – 2017	National program, local NGOs, international NGOs, faith-based organizations, and CBOs
JICA	5.8 Million	2016 – 2020	NMCP and JICA
WHO, WHO-ERAR, DFAT, BMGF	0.8 Million	2016 – 2020	National program and other stakeholders
ADB	15 Million	2016 – 2020	National program and other stakeholders
PMI	42 Million	2017 – 2020	NMCP and other stakeholders
CHAI	0.8 Million	2016 – 2019	CHAI, NMCP, and other stakeholders
UMB	23.8 Million	2017 – 2020	NMCP, DMR, and other stakeholders

*Note: CBO – Community-based organization, NMCP – National Malaria Control Program, JICA – Japan International Cooperation Agency, CHAI – Clinton Health Access Initiative

The majority of program implementation has been financed through grants provided by donor organizations, as mentioned in the table above.

- Government funding is mainly for infrastructure, payment of salaries of NMCP staff, and procurement of other supplies.
- Receiving additional funds from donor agencies is crucial to the success of Myanmar's malaria elimination program, as it will be difficult for the government to substantially increase its budget allocation for the NMCP from current levels.
- Key areas of focus are prevention (LLINs and malaria in pregnancy), case management, capacity building, supply chain management, and monitoring & evaluation.

4.3.1.2 International Funding

Funding for Malaria Prevention and Control Programs in Myanmar

The table below summarizes the funding received by UNOPS through various grants and projects of The Global Fund. The Global Fund is one of the primary providers of LLINs in 170 targeted high-risk townships in Myanmar.

TABLE 10: FUNDING FOR MALARIA PREVENTION AND CONTROL PROGRAMS IN MYANMAR[45]

Program Title	Principal Recipient	Donor	Partner	Total Budget (USD)
Intensifying Malaria Control and Accelerating Progress Towards Malaria Elimination in High Transmission and Hard-to-reach Areas	UNOPS	The Global Fund	Medical Action Myanmar (MAM)	7,200,344
National Malaria Control Program in Myanmar	UNOPS	The Global Fund	National Malaria Control Program (NMCP)	39,326,606
Empowering Community for Malaria Control Towards Malaria Elimination in Myanmar (EC – MCME)	UNOPS	The Global Fund	Myanmar Health Assistant Association (MHAA)	407,429
Community-based Malaria Prevention and Control Project	UNOPS	The Global Fund	Myanmar Council of Churches (MCC)	2,500,307
Quality Diagnosis and Standard Treatment of Malaria (QDSTM) Project	UNOPS	The Global Fund	Myanmar Medical Association (MMA malaria)	2,917,585
Community-based Program for Malaria Prevention	UNOPS	The Global Fund	Myanmar Red Cross Society (MRCS)	2,303,120

President's Malaria Initiative for Malaria Control

The PMI supports Myanmar and other countries in the Greater Mekong Sub-region (such as Cambodia, Lao People's Democratic Republic, Thailand, and Vietnam) for the elimination of malaria.

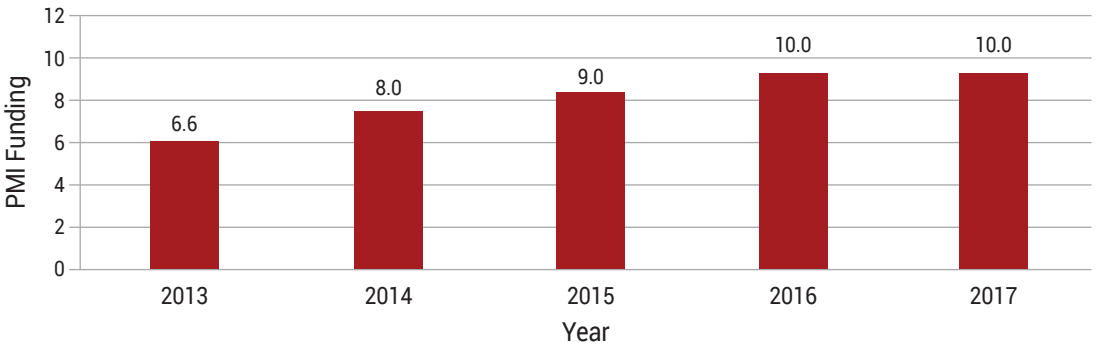
PMI supports this strategy and is funding various initiatives, such as:

- Community-based malaria prevention and treatment services; capacity building (particularly for epidemiology and entomology); efficacy monitoring of antimalarial drugs; strengthening of malaria surveillance system; procurement of long-lasting insecticide-treated mosquito nets, diagnostics and antimalarial drugs; quality assurance for malaria diagnosis; and supply chain system strengthening.

Tables below provide information on the PMI funding trend, budget breakdown of PMI, and the number of nets procured and distributed by PMI.

[45] UNOPS (CL: High)

FIGURE 10: PMI FUNDING IN MYANMAR (USD MILLION) 2013-2017[46]



Number of ITNs Procured and Distributed with PMI Support[47]

Category	2014	2015	2016	2017
ITNs Procured	100,000	793,500	-	300,000
ITNs Distributed	254,560	400,342	433,207	181,445

PMI Budget Breakdown – Planned Malaria Obligations for FY 2019[46]

TABLE 11: PMI BUDGET BREAKDOWN – PLANNED MALARIA OBLIGATIONS FOR FY 2019[46]

Mechanism	Activity	Budget (USD)
CDC IAA	IFETP and TDY support	238,000
Defeat Malaria	Entomological surveillance; LLIN distribution; community case management, MIP and private sector strengthening; surveillance strengthening; and in-country FETP	5,091,100
Essential Health Program	Township level capacity building and DHIS2 support	150,000
GHSC-PSM8 Malaria	Procurement of LLINs, Rapid Diagnostic Tests (RDTs), artemisinin-based combination therapy (ACTs), and other anti-malarial products. Strengthening of the pharmaceutical management system	1,650,900
Measure Evaluation	2020 DHS support	350,000
TBD-Central	Maintenance of accreditation of national quality control labs	250,000
WHO Umbrella	TES support	220,000
WHO Umbrella/ ACT Malaria	In-country MMFO; microscopy strengthening	150,000
USAID	Admin, staffing, and travel costs	900,000

[46] National Strategic Plan 2016-2020 (CL: High)

[47] PMI (CL: High)

PMI allocates funds for the distribution of LLINs (%), does not provide funds for IRS[48]

Proposed Activity	Mechanism	Total (USD)	Commodity (USD)	Description
Entomological monitoring and insecticide resistance management				
Monitoring	Defeat Malaria Project	110,000		Support for entomological investigation in foci; strengthening of entomology laboratory and insectary in Yangon; and support provided to organizations to conduct training courses
Technical Support	CDC IAA	58,000		Four TDYs for entomological support
Subtotal Entomological Monitoring		**168,000**	**0**	
Insecticide-treated Nets (ITNs)				
Procurement of LLINs	GHSC- PSM	1,008,000	1,008,000	Procure and supply 350,000 LLINs for migrants and mobile populations
Distribution of LLINs	Defeat Malaria Project	350,000		LLIN distribution, promotion, and BCC in PMI supported areas. Distribution will target stable populations and special vulnerable populations, including migrants and pregnant women
Net durability assessment	VectorWorks	230,000		Support monitoring of LLIN attrition, physical integrity, and insecticidal activity for Year 3
Subtotal ITNs		**1,588,000**	**1,008,000**	
Indoor Residual Spraying (IRS)				
Subtotal IRS		**0**	**0**	
Subtotal Vector Monitoring and Control		**1,756,000**	**1,008,000**	

3MDG Governance and Management Structure[49,50]

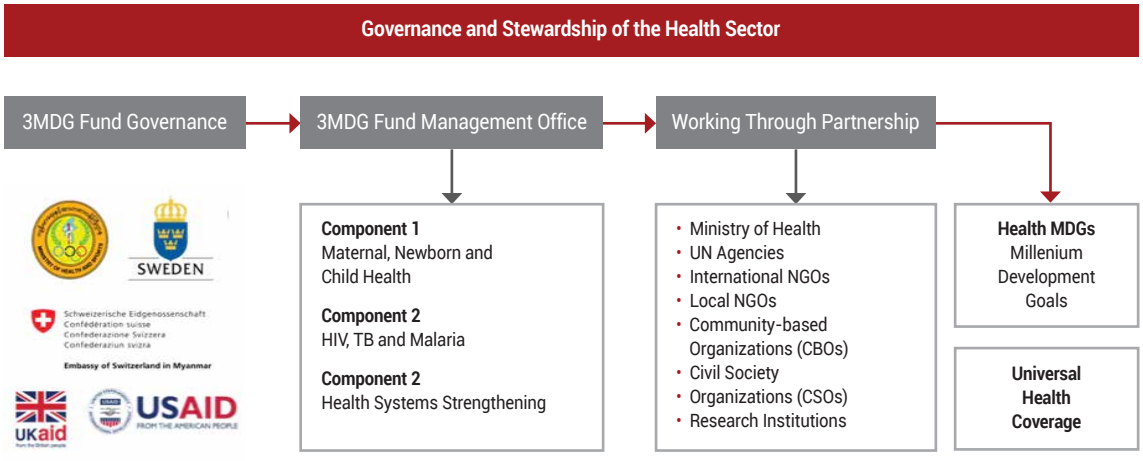
- The 3MDG fund program commenced in 2010 to improve the maternal, new-born, and child health, and reduce the burden of communicable diseases in Myanmar.
- 3MDG is the largest developmental fund in Myanmar, and the program is managed by the United Nations Office for Project Services (UNOPS), which committed a funding amount of more than USD330 million during 2012-16.
- In November 2018, four countries - The United Kingdom, Sweden, the United States, and Switzerland - have committed more than USD215 million (MMK 343 billion) to improve the health of Myanmar's most vulnerable people. This pooled funding mechanism, the Access to Health Fund, will operate from January 2019 to the end of 2023.

[48] President's Malaria Initiative - Burma (CL: High)

[49] 3MDG Annual Report 2014 (CL: High)

[50] 2018 Funding Commitment (CL: High)

FIGURE 11: 3MDG GOVERNANCE AND MANAGEMENT STRUCTURE[38,39]



4.3.2 Funding Gap

There is a substantial funding gap in Myanmar, and the present coverage of LLINs needs to be increased in several regions. Myanmar is eligible for global funds, but the government counterparts should focus on increasing domestic funding. The government should consider the rise in domestic funds in its development plans or normal budgetary allocations, which can be executed by launching the national malaria elimination program. Post-elimination of VBDs, these domestic funds can be further utilized for general health services. Greater flexibility in fund utilization is required as the epidemiology changes, and regional development, education, and employment levels may vary across regions.[51]

4.4 Market Description and Analysis

Retail Market[52]

The retail market in Myanmar for vector control products comprises insecticide coils, insecticide sprays or aerosols, household insect repellents, electric insecticides, moth proofers, and others.

Presently, insecticide sprays/aerosols are used in Myanmar, as it is the fastest and the most efficient way to eliminate mosquitoes. The retail market for vector control products was estimated to be ~USD45 million in 2018. Around 4.2 million insecticide sprays/aerosols were sold in 2018, generating a sales value of USD20-25 million. Insecticide coils rank as the second-largest segment and are used on a large-scale due to their low cost. The market for electric insecticides is anticipated to grow in the coming years due to the harmful effects of insecticide coils and insecticide aerosols/sprays on children and pregnant women.

Leading companies in the retail market for vector control products in Myanmar are SC Johnson & Son Inc., Fumakilla Ltd., Mosfly International, and others. Leading brands in the retail market are Baygon, Jumbo, Mosfly, Godzilla, and others.

[51] The National Plan for Malaria Elimination (NPME) in Myanmar 2016-2030 (CL: High)

[52] FutureBridge Analysis

TABLE 12: VOLUME AND SALES OF VECTOR CONTROL PRODUCTS IN MYANMAR[50]

Product class	Myanmar						
	Volumes 2016 (Mn)	Volumes 2017 (Mn)	Volumes 2018 (Mn)	Average Unit Price (USD)	Value 2016 (USD Mn)	Value 2017 (USD Mn)	Value 2018 (USD Mn)
Insecticide Coils	200	300	425	0.04	5-10	10-15	15-25
LLIN	3.96	5.83	NA	2.25	8.91	13.12	NA
Electric Insecticides	0.95	1.19	1.67	2.1	2-5	2-5	2-5
Spray/Aerosols	3.1	3.8	4.2	4.8	10-15	15-20	20-25
Insecticide Bait	NA	NA	NA	NA	0.1-0.3	0.1-0.3	0.1-0.3
Other Home Insecticides	NA	NA	NA	NA	0.1-0.3	0.1-0.3	0.1-0.3
Leading Brands	Baygon, Jumbo, Mosfly, Godzilla						
Leading Companies	SC Johnson & Son Inc., Mosfly International Sdn Bhd, Fumakilla Ltd.s						

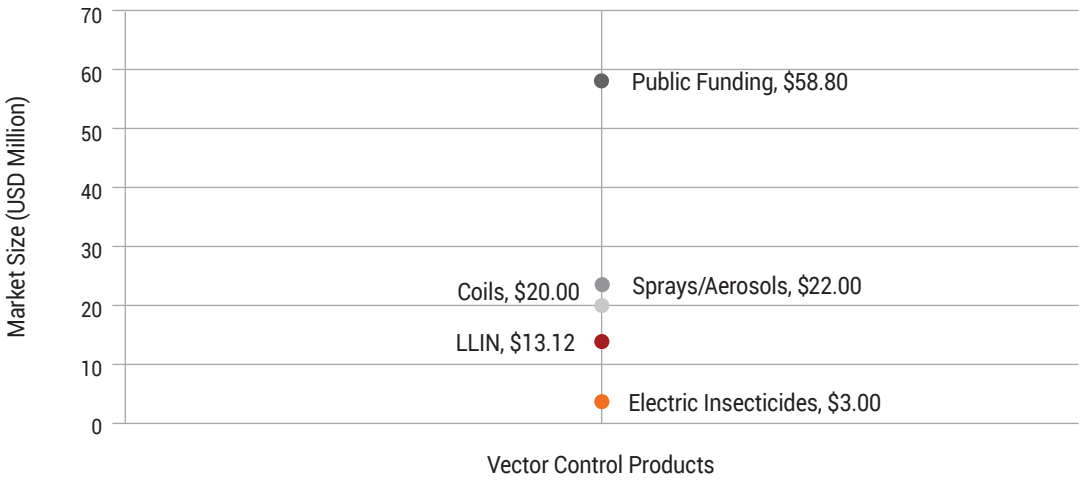
Donor Market[50]

The vector control and prevention market in Myanmar is mainly funded by The Global Fund. Other international funding agencies in Myanmar are UNICEF, USAID, UKAID, 3MDG, the World Health Organization, the Bill & Melinda Gates Foundation, and Save the Children. In 2018, The Global Fund disbursed an amount of USD127.8 million for malaria control and prevention. These funds are used for various activities, such as awareness campaigns and distribution of malaria prevention products, such as LLINs, malaria control kits, and insecticide-treated nets.

Commentary:

- The market for some of the retail products surpasses the public budget for mosquito coils in Myanmar.
- A portion of this retail market can be leveraged for disease control.

FIGURE 12: MARKET SIZE OF VECTOR CONTROL PRODUCTS[53]



[53] FutureBridge Analysis

TABLE 13: MALARIA BURDEN, DONOR, AND RETAIL MARKET[54]

Parameter	PNG
Population at Risk 2017	◒
Incidence of Malaria (2017)	○
LLINs (2017)	◒
Public Funding (2017-18)	●
Public Fund ($)/person at risk	○
Retail Market (2018)	○
Est. funding for LLINs (% of Public Fund)	◒

Note: High ● Medium ◒ Low ○

FIGURE 13: KEY RETAIL BRANDS AND PRODUCTS

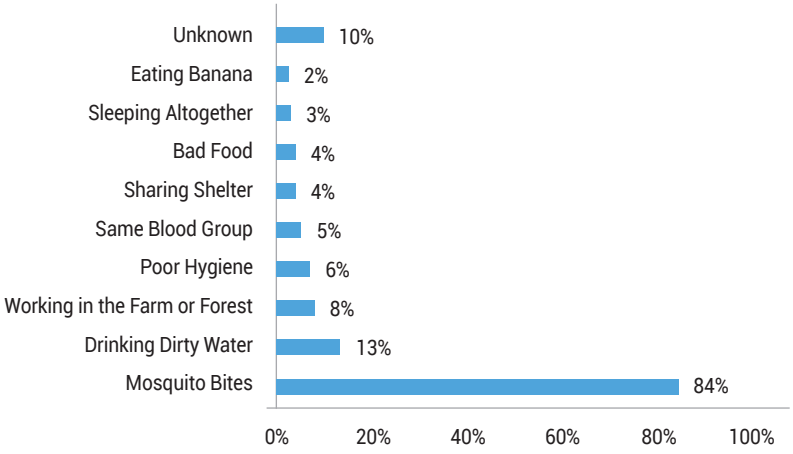
Manufacturer	Electric Insecticides	Coils	Aerosols
Mosfly		Mosfly 	Mosfly 
SC Johnson & Son Inc.	Raid 	Raid 	Raid 
Fumakilla	Vape 	Fumakilla 	Fumakilla 
Godzilla		Godzilla 	

[54] FutureBridge Analysis

4.4.1 Level and Need of Awareness of Vector Control Products

The level of awareness regarding VBDs in Myanmar is medium as compared to other countries in the Greater Mekong Sub-region. Studies have been conducted to measure the awareness level of the cause and transmission of malaria, drug resistance, and common prevention methods.

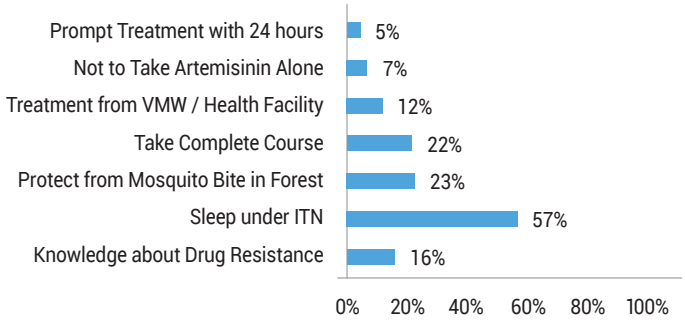
FIGURE 14: AWARENESS REGARDING THE CAUSE & TRANSMISSION OF MALARIA[55,56]



The common misconceptions around the transmission of malaria include:

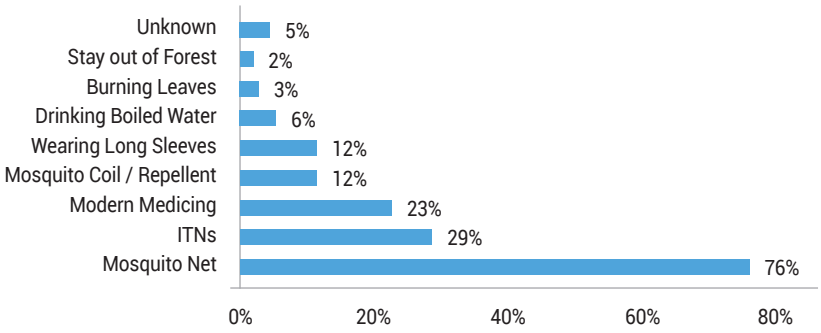
- Drinking dirty water (13%)
- Poor hygiene (6.4%)
- Same blood group (5.3%)
- Sharing shelter (4%)
- Bad food (3.8%)
- Sleeping together (3%)

FIGURE 15: AWARENESS REGARDING ANTIMALARIAL DRUG RESISTANCE & ITS PREVENTION[55,56]



About 16.3% of respondents were aware of antimalarial drug resistance. Common methods for preventing drug resistance are sleeping under ITNs (57%) that provide protection from mosquito bites in the forest (23%).

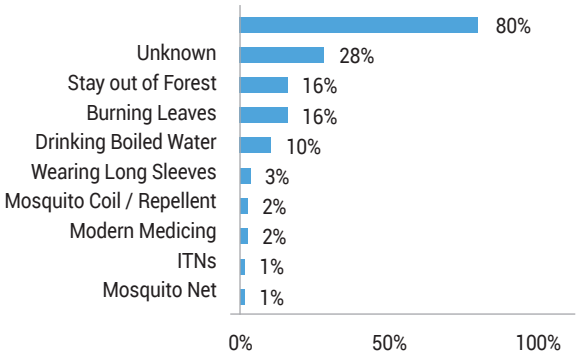
FIGURE 16: AWARENESS REGARDING COMMON METHODS OF PREVENTING MALARIA[55,56]



Nearly 90% of respondents were of the view that malaria is preventable. Malaria can be prevented using the following products reported by respondents:

- Mosquito nets (76%)
- ITNs (28.9%)

FIGURE 17: SOURCES OF INFORMATION FOR KNOWLEDGE ABOUT MALARIA[55,56]



Health facility staff (80%) were the most common source of information regarding malaria, followed by Village Health Volunteers (VHV)/Village Mid Wives (VMW) (28%) and family/friends/neighbours (16%).

5. Regulatory Pathways

Pesticides that are used for the control of vectors are regulated and registered by the Pesticide Registration Board under the Ministry of Agriculture. The regulatory authority is responsible for the registration of pesticides for use in Agriculture, Public Health, Household and Veterinary. The categories of pesticides that are regulated by the registration authority are Chemical, Microbial and Biochemical.

One of the important steps in securing registration in Myanmar is that along with the dossier, samples of the product for analytical testing need to be submitted as well. Analysis of the end use products in the National Agricultural Laboratory (NAL) is a mandatory requirement as part of the registration process. The country does not have enough efficacy testing facilities for public health pesticides, and hence test reports following internationally approved protocols from other countries are accepted.

The cost of chemical analysis in the NAL is USD200, and once completed it would be submitted to the evaluation team scrutinizing the dossier. Approval for product registration takes about 8 – 12 months. Registrations are granted for a period of 10 years and the certificate can be renewed for another 10 before the validity of registration expires. Provisional registration is also granted for a period of 5 years, and during this period commercial activities are also permitted. It is mandatory for the registrant to secure a full registration before the end of the validity of the provisional registration. An Experimental Use Permit (EUP) is granted for one (1) year and this is to facilitate the import of a limited quantity of unregistered pesticides for research purposes, or for in-country testing leading to the registration of the product for commercial use.

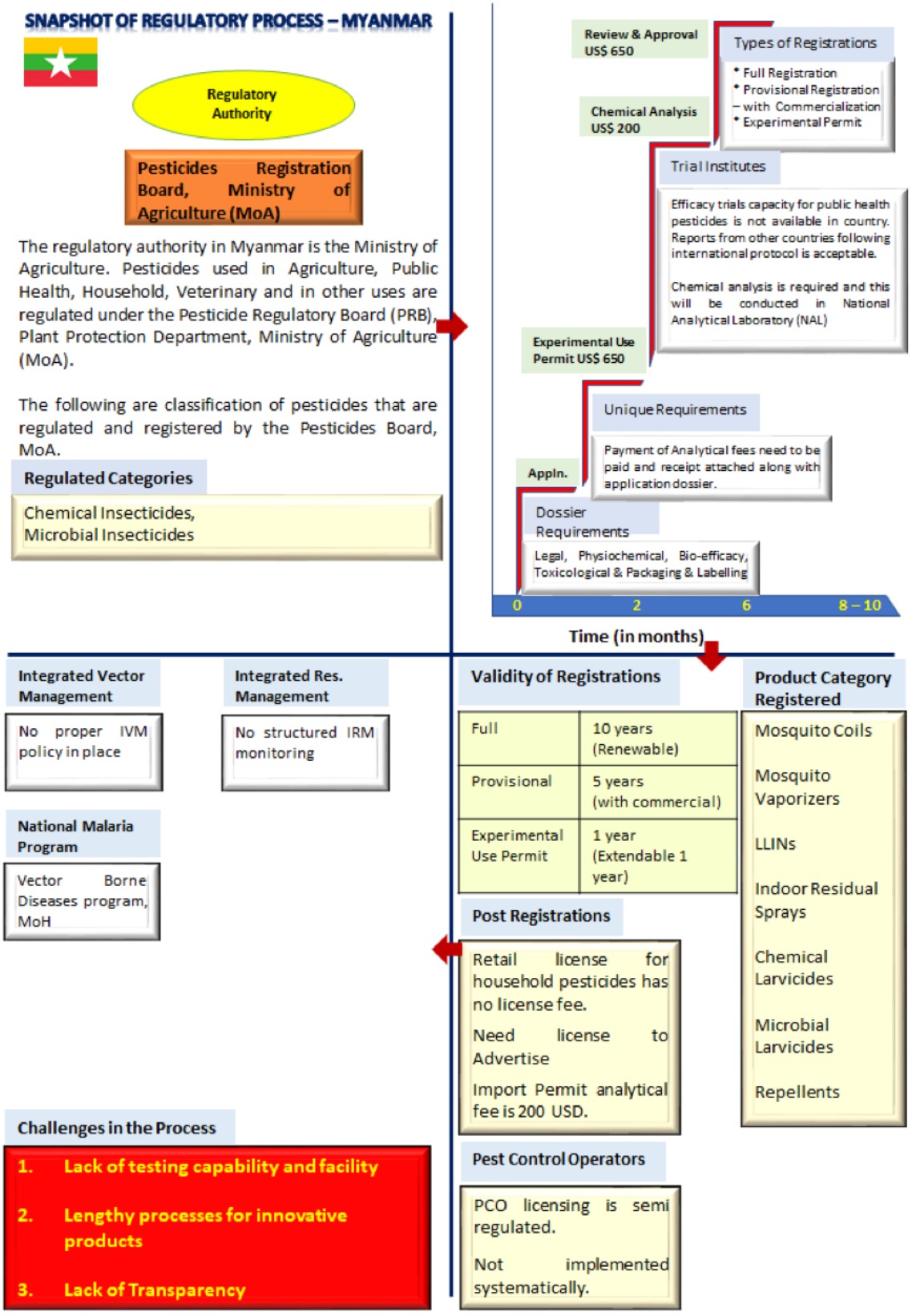
The products that are registered for commercial use are mosquito coils, emanators, LLINs, insecticides for IRS, Chemical Larvicides, Microbial Larvicides, Spatial repellents and Personal repellents.

Post-registration requirements include obtaining a retail license to allow the sale of the registered pesticides in retail outlets. For the import of pesticides, analysis of samples from the imported consignment is required for its clearance from customs. It is also mandatory to secure a permit from the Ministry of Agriculture to advertise any pesticide for household pest control in the country.

Some of the challenges of the registration process in the country are as follows:

1. The registration process is very lengthy for innovative products.
2. Lack of testing capacity and capability in the country.
3. Lack of transparency in the registration process.

FIGURE 18: SNAPSHOT OF REGULATORY PROCESS



6. Market Dynamics

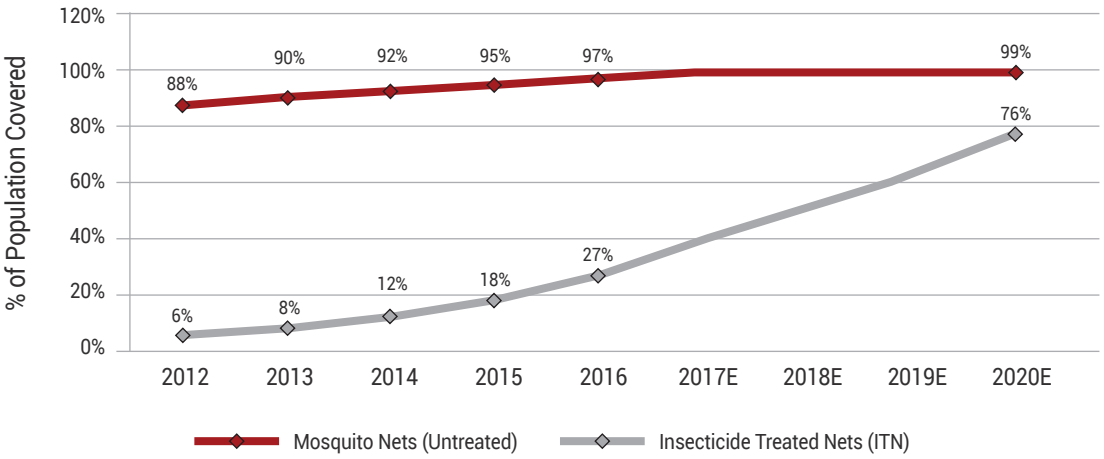
6.1 Market Trends

- The use of insecticide-treated nets (27%) is expected to grow in the near future

Despite the availability of various preventive vector control products in the market, treated and untreated nets are preferred, owing to their ease-of-use as compared to other products. In addition, these nets are available in different sizes, colours, and patterns, and are expected to last for ~2-3 years, depending on their usage.

In Myanmar, >90% of the population sleeps under nets, most of which are untreated. The use of ITNs is expected to increase in the near future; however, collaborative activities are required to promote their use. People prefer to use heavy-cotton nets in the winter and rainy seasons, while lightweight nets are preferred in summer. According to a local market study conducted in Myanmar, 75% of individuals prefer to use CYC nets over other brands (e.g., PSI is socially marketing its product, under the brand name of SupaNet; however, it is not preferred by consumers due to the changing behaviour of the users).

FIGURE 19: USAGE TREND OF UNTREATED AND TREATED INSECTICIDE NETS[57]



- **Increasing risk of VBDs among the migrant population**

In Myanmar, a majority of malaria cases occur among the population residing permanently or temporarily near the forest. Individuals living in such areas are poor, or belong to the minority ethnic groups with occupations related to forest activities, such as bamboo cutting, charcoal production, and gold panning, among others. Mobile and migrant populations are other major risk groups for malaria.

- **Improvement of the distribution network in Myanmar will enhance the supply chain for vector control products**

The distribution network in Myanmar is currently fragmented and unreliable; however, it is expected to improve in the near future due to the increasing involvement of international, both general and specialized logistic service providers. Yangon is the major distribution centre for goods imported by sea and air. Mandalay is the distribution hub for upper Myanmar, especially for goods imported by land from China and Thailand. An improvement in logistics and trade will increase the accessibility of goods for vector control in rural areas.

[57] Networks Project – Malaria Prevention (CL: High)

- **Growing acceptability of Insecticide-treated clothing will help prevent malaria amongst migrant rubber tappers in Myanmar**

Insecticide treated clothing (ITC) is used by military personnel and for outdoor recreation activities, providing protection against arthropod bites. A cluster-randomized, double-blind, non-inferiority crossover trial was performed to determine acceptability of ITC versus identical, untreated clothing (NTC) among migrant rubber tappers, in 2017. The trial showed a high acceptability of both types of clothing. ITC was proved to be equal with NTC on parameters such as look, durability, comfort to wear at night, reduction of mosquito bites, and in general were highly recommended. Around 98% of respondents reported that mosquito bites were reduced with ITC. Hence, the high level of acceptability for ITC suggests that clothing can be used for personal protection amongst migrant rubber tappers in outdoor transmission settings in Myanmar.[58]

6.2 Market Drivers

Health System Strengthening

Over the last five years, the total health expenditure has increased year-by-year, reaching USD610 million in 2016. The public healthcare system in Myanmar is highly structured, following the state/region-district-township government hierarchy, and is based on principles of primary healthcare, with medical officers overseeing all health-related activities in their designated areas. The Township Public Health Department (TPHD) is headed by the Township Public Health Officer (TPHO) with two medical officers responsible for Disease Control and Public Health. Generally, the TPHO is responsible for four to five Rural Health Centers (RHCs) and station hospitals, and four to five Sub-RHCs. Microscopy services are available at township hospitals, and some NGOs run clinics in remote areas. There is also an active national network of auxiliary midwives and community health workers, operating in close collaboration with village health committees, providing outpatient care and preventive measures. There has been a steady growth in the number of basic healthcare facilities and human resources for health in recent years. Such an integrated system provides a base for the elimination of vector control-related diseases even at the rural and remote communities.

Increase in focused research towards malaria elimination

Any research conducted should be relevant to the existing control or elimination strategy, thereby addressing not only the efficacy/effectiveness of a specific intervention but also social, economic, cultural, and behavioural factors that may affect program activities. The research agenda for malaria elimination has been well defined by the Malaria Eradication Research Agenda consultative groups (malERA). Regional oversight of research activities at the national level is required to minimize unnecessary duplication and to undertake complete advantage of opportunities for collaborative research, innovation, and synergy.

The following priority research areas to accelerate the transition towards malaria elimination in the GMS, including Myanmar, are considered as:

- Optimal vector control approaches and interventions for elimination
- Optimal approaches and interventions to identify and provide services in support of malaria elimination
- Effective and feasible strategies to ensure quality case reporting and management in the private sector
- Improvement of community engagement in malaria elimination
- Development of mass drug administration settings in relation to malaria elimination

[58] Crawshaw A F et al., (2017)

Partnership model

- **Community-based Partnership Model:** The Myanmar Council of Churches (MCC) are working towards malaria prevention and control in Myanmar/Burma. The MCC works on capacity building of community health workers by conducting health education sessions on malaria prevention and control at the community level. It is involved in empowering village health volunteers, who are making significant contributions towards malaria control. A decline in the death rate caused by malaria in the respective communities has propelled villagers to appreciate the services of these volunteers. They are employed in two key interventions: (1) prevention using ITNs and LLINs and (2) early diagnosis and appropriate treatment as per the national policy. Educating volunteers about vector control measures can further help in the acceptance of any new vector control products at the community level.
- **Community Engagement Programs:** Community Engagement (CE) programs operate at the government level and village level in Karen/Kayin, situated at the Thai-Myanmar border. The main aims of CE programs operating at the village level are to create mutual understanding among team members and villagers, and to gain their trust regarding the program.

6.3 Success Stories

The Malaria Elimination Task Force conducted between 2014 and 2017 by the Shoklo Malaria Research Unit (SMRU) has been a success in Myanmar.

A few salient points of the SMRU Malaria Elimination Task Force (METF) is listed as follows:

- The J. Landier et al. 2018 study identified key elements to successful malaria elimination, and between May 2014 and April 2017 the SMRU research team established 1,222 malarial health posts in four townships.
- Villagers were trained, and supported the work in communities to detect, treat, and monitor malaria for nearly 365,000 people living in an 18,000 km2 area of eastern Myanmar's Karen/Kayin State.
- By April 2017, 965 villages (79%) of 1,222, corresponding to 104 village tracts, were free from *P. falciparum* malaria for at least 6 months. Over the three years, observed incidences of malaria decreased by 60-98%.
- Antimalarial treatment was administered to entire communities living in a sub-population of 50 villages identified as malaria 'hotspots,' where patients were often carrying the malaria parasites, but showed no signs of illness.
- Hotspot villages had three times higher incidence of malaria than neighbouring villages. Early diagnosis and treatment were associated with a significant decrease of *P. falciparum* incidence in hotspots (IRR 0·82, 95% CI 0·76–0·88 per quarter) and in other villages (0·75, 0·73–0·78 per quarter).
- Mass drug administration was associated with a five-time decrease in *P. falciparum* incidence within hotspot villages (IRR 0·19, 95% CI 0·13–0·26).

SMRU-METF examine a map of local malaria hotspot

A boat approaches one of the eastern Myanmar villages where the SMRU Malaria Elimination Task Force (METF) has set up a malaria treatment clinic

Waiting room of Wang Pha clinic, located on the Thai–Myanmar border, run by the Shoklo Malaria Research Unit

7. Market Access Analysis

The following market access points should be considered as entry strategies for the Myanmar VBD market:

- **People:** In Myanmar, a majority of malaria cases occur among population residing permanently or temporarily near the forest. Individuals living in such areas are either poor or from the minority ethnic groups. Mobile and migrant populations are other major at-risk groups for malaria in Myanmar, and hence, any new organization should target these population groups.
- **Products:** Different types of LLINs and ITNs are distributed on a large scale to protect individuals from VBDs. The entry strategy for any new organization should be the mass distribution of LLINs and ITNs, especially to the migrant population. Along with these, an organization can focus on retail market products, such as insecticide coils and sprays/aerosols to prevent VBDs.
- **Manufacturers/Suppliers & Distribution Strategy:** Key manufacturers/suppliers of LLINs/ITNs in Myanmar are Bayer, BASF, Shobika, Tana Netting, and Vestergaard. Nationwide distributors are UNHCR, Myanmar Red Cross Society, and World Vision.
- **Awareness Campaigns:** Building awareness among the population regarding prevention methods is of utmost importance to control the spread of VBDs. Awareness campaigns are organized by partnering with NGOs, such as the Malaria Consortium, Save the Children, the Bill & Melinda Gates Foundation, and regional bodies such as the Myanmar Council of Churches.
- **Inter-sectoral Collaboration:** This is a key factor for the success of malaria control in Myanmar. However, key challenges associated with inter-sectoral collaboration are inadequate funding, irresponsibility, poor infrastructure, and lack of skilled staff. Despite these challenges, opportunities exist to further strengthen the inter-sectoral collaboration among relevant governmental sectors, other local agencies, and partners at various levels.

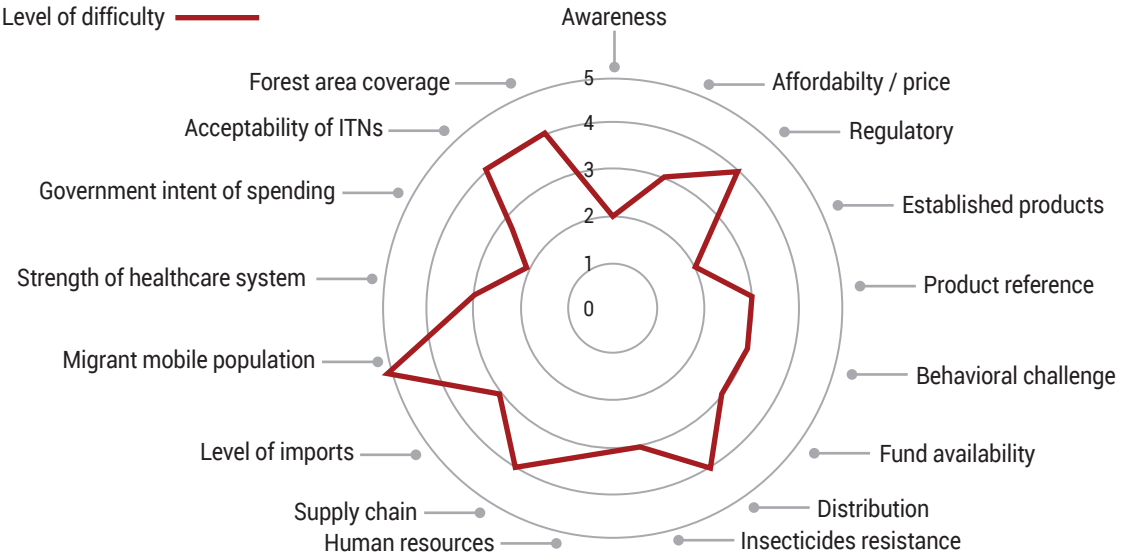
8. First Conclusion

How to enter the market?

Any new organization willing to enter the Myanmar VBD market should collaborate with partners, such as the Malaria Consortium, Save the Children, and the Bill & Melinda Gates Foundation. The organization should also focus on building strong relationships with medical and pharmacy associations for the smooth functioning of awareness campaigns. It can also focus on marketing products, such as insecticide-containing coils, baits, aerosols/sprays, and electric insecticides.

Significant challenges impacting the entry of new products in the market include high migrant population numbers, gaps in the supply chain, low acceptability of LLINs and ITNs, and poor distribution strategies.

FIGURE 20: CHALLENGES FOR NEW PRODUCTS IN MYANMAR



In the above chart for level of difficulty: 1 – lowest challenge; 5 – highest challenge

9. References

The list of participants in the primary interview research process is listed below.

1. Country Director - Leading Insecticide Manufacturer
2. Region Head – Global Donor Body
3. Founder – Local NGO
4. Department Head – Provincial Government
5. Marketing Director – Leading Retail Product Manufacturer
6. Sales Head – Local Retail Player
7. Director – Global Donor Body

10. Appendix

1. Confidence Level for Sources Used in Secondary Research

The following criteria have been used for defining confidence level of secondary sources used in this report:

High:

- Reports published by major funding bodies such as The Global Fund, PMI, WHO, etc.
- Literature published in scientific journals
- Publications from the government (MoH)
- Company websites, press releases, and annual reports

Medium:

- News articles, blogs, published interviews, etc.
- Conference presentations
- Awareness websites
- University websites

2. Malaria Burden Funding, Retail Market – Rating Criteria

Key Parameters	High	Medium	Low
Population at Risk 2017 (% of total population)	>75	25-75	<25
Incidence of Malaria (Cases/1000) (2017)	>50	5-50	<5
LLINs (Mn) (2017)	>10	5-10	<5
Public Funding ($Mn) (2017-18)	>50	30-50	<30
Public Fund ($)/person at risk	>10	2-10	<2
Retail Market ($Mn) (2018)	>100	50-100	<50
Est. funding for LLINs (% of Public Fund)	>25%	10-25	<10

3. Malaria Burden Funding, Retail Market – Data

Key Parameters	Myanmar
Population at Risk 2017	31.7
Incidence of Malaria (2017)	2.1
No. of LLINs distributed (2017)	5.8
Public Funding (2017-18)	58.8
Public Fund (D)/person at risk	D1.9
Retail Market (2018)	45
Retail Spending (D)/person at risk	1.4
Est. funding for LLINs (% of Public Fund)	22%