

Vector Control in the Indo-Pacific: Market Access Landscape

Country Report



Indonesia

INNOVATIVE VECTOR CONTROL CONSORTIUM

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Abbreviations

APBD	Anggaran Pendapatan dan Belanja Daerah	KAP	Knowledge, Attitude, and Practice
API	Annual parasitic index	LLINS	Long Lasting Insecticidal Nets
APBILLION	Anggaran Pendapatan dan Belanja Negara	MCP	Malaria Control Program
ASEAN	Association of Southeast Asian Nations	MoA	Ministry of Agriculture
AWED	Applying <i>Wolbachia</i> to Eliminate Dengue	MoH	Ministry of Health
BRICSR	Bank Rakyat Indonesia	NGO	Non-government Organization
CDC	Centre for Disease Control	PERDHAKI	Indonesian Health Dharma Association
CPI	Consumer Price Index	PLJ	Pulse Lab Jakarta
DEPKES	Department of Kesehatan	PPM	Public-Private Mix
FEW	Family Wellbeing Empowerment	RBM	Roll Back Malaria
GDP	Gross Domestic Product	RSSH	Resilient and Sustainable Systems for Health
GFATM	Global Fund to Fight AIDS, Tuberculosis, and Malaria	SHMC	South Halmahera Malaria Center
IEC	Information, Education, and Communication	TWG	Technical Working Group
IRS	Indoor Residual Spray	UNICEF	United Nations Children's Fund
ITNs	Insecticide-Treated Nets	USAID	United States Agency for International Development
IVM	Integrated Vector Management	VBDC	Vector Borne Disease Control
JE	Japanese Encephalitis	VBDs	Vector-borne Diseases
JKN	Jaminan Kesehatan Nasional	WHO	World Health Organization

1. Executive Summary – Vector Control

Indonesia, a country located off the coast of mainland Southeast Asia in the Indian and Pacific oceans, has an estimated population of 264 million in 2017. The healthcare structure in Indonesia is organized into 4 Directorate Generals, 2 Institutes, an Inspectorate-General, and a Secretariat-General under which there are 14 Centres and Bureaus. The Vector-borne Disease Control (VBDC) Program Directorate oversees the malaria control program in Indonesia.

There has been a steady decline in the incidence of malaria cases over a decade, but a frequent occurrence of dengue cases

Indonesia is endemic for malaria and lymphatic filariasis. Outbreaks of dengue occur frequently, and Chikungunya cases are also reported. However, over the past decade, a steady decline has been observed in the incidence of malaria in the country, whereas the incidence of dengue is gradually increasing. Indonesia has made significant progress towards the regional goal of malaria elimination by 2030, reducing cases by 53% between 2010 and 2015. Dengue is hyper-endemic, and all four serotypes are known to circulate in at least 400 of 497 districts in the country, with more than 200 million people at risk for dengue infection. Chikungunya incidence has ranged between 0.16 and 36.2 cases per 100,000 person per year; no cases of Zika virus been reported.

The share of domestic funding in Indonesia has increased exponentially, from 6% of the total expenditure for malaria in 2011, to 52% in 2016

The Global Fund has invested USD53.6 million on vector control projects in Indonesia for the period of 2018-2020. Regional or private donors such as the Tahir Foundation and the Bill and Melinda Gates Foundation raised USD40 million in 2014 for the prevention and control of vector-borne diseases. These bodies have considerable influence on the government's programs for VBD prevention and control.

A pooled procurement mechanism represents around 55% of the total healthcare product spent by the Global Fund in 2017

Anti-retroviral, Artemisinin Combination Therapy, and Long-Lasting Insecticide Treated Nets (LLINs) are major product categories that constitute ~85% of the total procurement value. Puskesmas, Polindes, and Posyandu act as local distribution centres of vector control tools. Integrated mass distribution campaigns for LLINs are done since 2010. The geographical area of Indonesia is distributed across island and mountains, giving rise to several logistics challenges.

Growth in social media marketing will increase awareness regarding vector control and prevention methods

The vector control and prevention market in Indonesia is mainly driven by two major factors: (1) a rise in the number of awareness programs that focus on control as well as preventive measures to be undertaken for VBDs, and (2) a partnership among global government bodies, local NGOs, and medical associations to ensure that required medical facilities are provided at reasonable cost and adequate quantity. The most common vector control measures used in Indonesia are Long Lasting Insecticidal Nets (LLINs), Insecticide-Treated Nets (ITNs), fogging, Indoor Residual Spray (IRS), larvivorous fish, and larviciding. The growth of social media marketing and use of digital platforms to spread awareness are key market trends that have increased the reach of vector control and prevention activities in Indonesia.

The rise in the number of mobile and migrant populations along with low acceptability for insecticide-treated nets are the biggest challenges in Indonesia

In Indonesia, even with continuous financial backing from The Global Fund and increased domestic funding, there are a few challenges: strategies for urban and cross-border regions, rising number of mobile and migrant populations (that increase VBD transmission risks), inaccuracy in reporting, lack of skilled entomologists, insufficient vector control mapping and low acceptability of insecticide-treated nets.

Indonesia has the largest vector control retail market in South-East Asia

The Indonesian retail market is majorly driven by the low cost of products and ease of availability. The retail market for vector control products in Indonesia was estimated to be ~USD412 million in 2018. Products such as insecticide coils, sprays or aerosols, household repellents, and electric insecticides are included in the Indonesian retail market. In 2018, the insecticide coil market generated a value of USD160–170 million.

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

Indonesia is the largest economy in Southeast Asia, spread across a chain of thousands of islands between Asia and Australia.

2.1.1 Geography

Indonesia is located off the coast of mainland Southeast Asia in the Indian and Pacific oceans. It is an archipelago that lies across the Equator and spans a distance equivalent to one-eighth of Earth's circumference.

The country's islands can be grouped into the Greater Sunda Islands of Sumatra (Sumatera), Java (Jawa), the southern extent of Borneo (Kalimantan), and Celebes (Sulawesi); the Lesser Sunda Islands (Nusa Tenggara) of Bali and a chain of islands that runs eastward through Timor; the Moluccas (Maluku) between Celebes and the island of New Guinea; and the western extent of New Guinea (generally known as Papua).

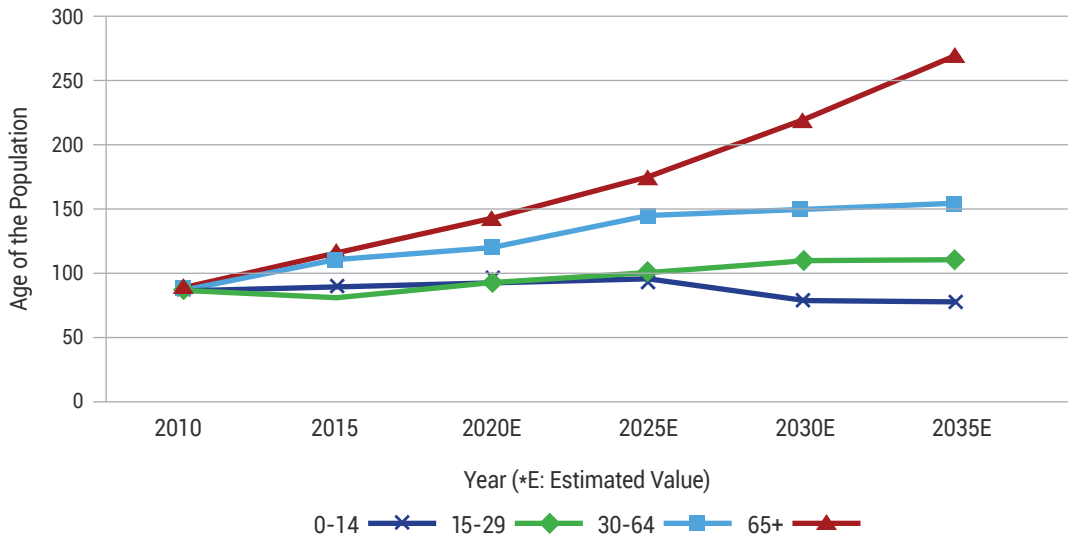
2.1.2 Demographics

Indonesia is the most populous country in Southeast Asia and the fourth most populous country in the world. It had an estimated population of 264 million in 2017, an increase from the 2015 estimate of 257 million. About 56.7% of Indonesia's population lives on Java, the most populous island. The population density of Indonesia is currently at 140.08 individuals per square kilometre.

Indonesia has more than 300 distinct ethnic and linguistic groups, although the largest and the most dominant in terms of politics are the Javanese that contribute over 40% of the total population. Most Indonesians are descended from Austronesian-speaking people. Melanesians are another major ethnic group who live on the eastern part of the country. Other ethnic groups include Sundanese (15.5%), Malay (2.27%), Madurese (3.03%), Batak (3.58%), Minangkabau (2.73%), Betawi (2.88%), Bantenese (1.97%), Banjarese (1.74%), Balinese (1.67%), and Makasseresse (1.13%).

Chinese Indonesians account for merely 3% of the total population; however, they are quite influential and control most of the country's wealth and commerce.

FIGURE 1: POPULATION TREND FOR DIFFERENT AGE GROUPS¹



The younger working-age population (15-29) will continue to increase slowly; however, the increase will be much higher in the mature working-age population (30-64). Individuals that fall under the elderly population (65+) category have registered the fastest growth rate. Numbers are expected to increase by 20.5 million, or 173%, over the 25-year projection period.

According to Indonesian population projections, Indonesia's rural population has begun to decline marginally, a trend expected to continue in the near future. By 2035, the rural population is expected to be over 100 million, whereas the urban population will exceed 200 million, having increased by 71% since 2010.

2.1.3 Economic Situation²

Indonesia's economic freedom score is 65.8, thus making the country's economy the 56th freest in the 2019 Index. Its overall score has increased by 1.6 points, with a sharp increase in business freedom, investment freedom, and judicial effectiveness outpacing declines in monetary freedom and labour freedom. Indonesia is ranked 11th among 43 countries in the Asia-Pacific region, and its overall score is above the regional and world averages.

The government's efforts to improve Indonesia's business environment and attract foreign direct investment by upgrading power and other infrastructure, prosecuting corruption cases more aggressively, and undertaking other steps to improve the regulatory environment, are aimed at sustaining economic development and diversification.

Remaining constraints include an inflexible labour market, long-standing protectionist rules governing trade and foreign investment in extractive sectors, and subsidies to numerous state-owned enterprises.

TABLE 1: INDONESIA ECONOMY FACTS⁹

<p>Economic freedom status: Moderately free</p> <p>GDP (PPP): D3.2 trillion</p> <p>5.1% growth in 2017</p> <p>5-year compound annual growth of 5.1%</p> <p>D12,377 per capita</p>	<p>Unemployment: 4.2%</p> <p>Inflation (CPI): 3.8%</p> <p>FDI Inflow: USD23.1 billion</p> <p>Public Debt: 28.9% of GDP</p>
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Note: 2017 data unless otherwise noted. Data compiled as of September 2018.

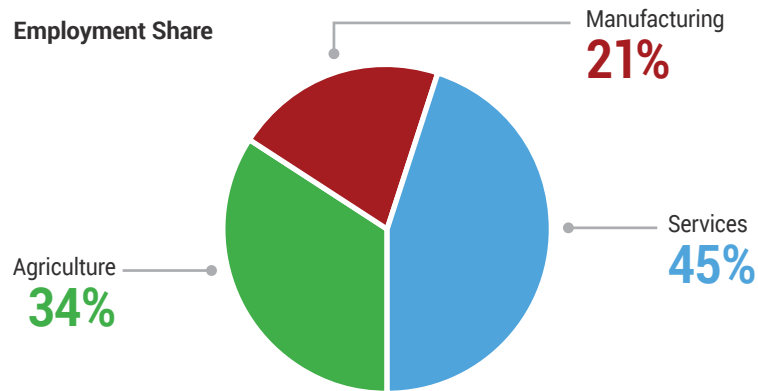
¹ Indonesia Population Projection (Confidence Level (CL) of Source: High)

² Indonesia Country Profile – Economic Freedom (2019) (CL: High)

2.1.3.1 Employment³

The employment rate of young adults without upper secondary education is relatively high (68%), barely increased over the past decade, while for tertiary-educated young adults the rate increased from 62% to 84%.

FIGURE 2: EMPLOYMENT SECTORS



The gender gap in employment is very strong in Indonesia; young men are employed regardless of their educational attainment. These high levels of employment seem to be achieved at the expense of younger women, particularly among those without upper secondary education, where 91% of men are employed compared to 47% of women.

2.1.3.2 Others (Internet Usage, Education, etc.)

In Indonesia, 62% of adults have below upper secondary education. About one-fifth of adults have not completed their primary education and more than a quarter (27%) have only completed primary education. The share of young adults (25-34 years) without upper secondary education has declined by 16 percentage points between 2007 and 2017.⁴

About 50% of young women have not attained upper secondary education, compared to 48% of young men. One of the main reasons is that girls are less likely to be enrolled in primary education than boys.

Internet dissemination is ~53% (143 million), with over 130 million active social media users. Television is the primary medium, but online media is catching up. Facebook has become increasingly popular, and the Indonesians are among the world's most active users of Twitter.⁵

2.1.4 Health Status

2.1.4.1 Health Indicators

Life expectancy has improved, from 59.4 years in 2000 to 62.1 years in 2016. In addition, life expectancy at birth has also increased by nearly 3 years over the same period.⁶

³ OECD (2018) (CL: High)

⁴ OECD (2018) (CL: High)

⁵ Indonesia Country Profile – BBC News (CL: High)

⁶ WHO (CL: High)

2.1.4.2 Living Conditions (Lifestyle)⁷

In terms of accessibility to clean water and sanitation facilities:

- Approximately 84% of Indonesians have access to clean drinking-water sources; of the unserved 16%, rural area constitutes 12%, and the urban area 4%.
- About 59% have access to improved sanitation. The unserved region (41%) consists of about 26% of the rural and 15% of the urban which lack this access.

2.1.4.3 Healthcare Structure⁸

Indonesia's Ministry of Health (MoH), situated in the capital Jakarta, has 4 Directorate Generals, 2 Institutes, an Inspectorate-General, and a Secretariat-General under which there are 14 Centers and Bureaus.

The Directorate-General of Disease Control & Environmental Health has five sub-directorates, where the Vector Borne Disease Control (VBDC) Program Directorate oversees the malaria control program. There are planning and finance units, and a regulation unit involved in the overall management of the business of the Directorate-General.

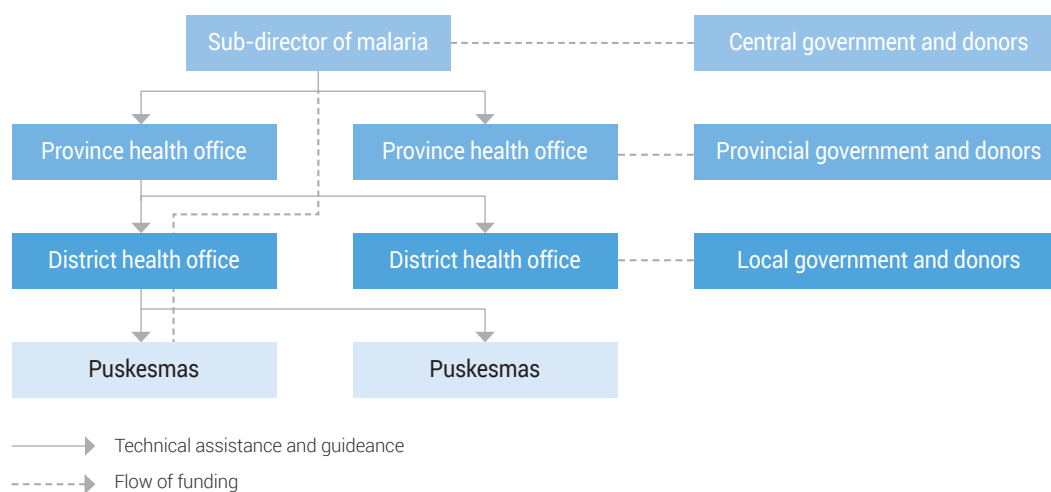
At the local level, each of the 33 provinces has one provincial health office, and each of the districts has one district level health office. Each sub-district has at least one Puskesmas providing curative, preventive, and health promotion services.

These Puskesmas have vehicles or motorboats to serve as mobile health centers for the underserved populations in remote areas. Most Puskesmas are supported by Pustu (Health Post) – a village-based curative facility served by a nurse; Polindes (Village Delivery Post) – a village-based delivery post served by a midwife; and Pusling (Mobile Puskesmas) – monthly Puskesmas visits to Posyandu (integrated health service post) in the village.

The monthly Puskesmas visit to Posyandu is made to actively provide immunization, weight monitoring, antenatal care, and limited curative services. Posyandu is an activity-based post and has been established and managed by the village community.

Structure of the Malaria Program

FIGURE 3: HEALTHCARE STRUCTURE⁹



⁷ WHO (CL: High)

⁸ WHO - National Malaria Control Programme Review (2011) (CL: High)

⁹ Zelman, B. *et al.* n investment case for eliminating malaria in Indonesia (2017) (CL: Medium)

Agencies/ministries involved in the management of malaria:

- Health
- Development Planning
- Forestry and Plantation
- District Secretary of Community Welfare
- Energy, Mineral Resources, and Irrigation
- The Regional House of People's Representative

Challenges in management:

- Weak coordination among sectors, failure to communicate the needs for malaria control.
- Only 16% of Indonesia's total population has health insurance, which is lower when compared to other Southeast Asian countries.
- The average cost of nursing care is about 38 dollars per day in Asia.

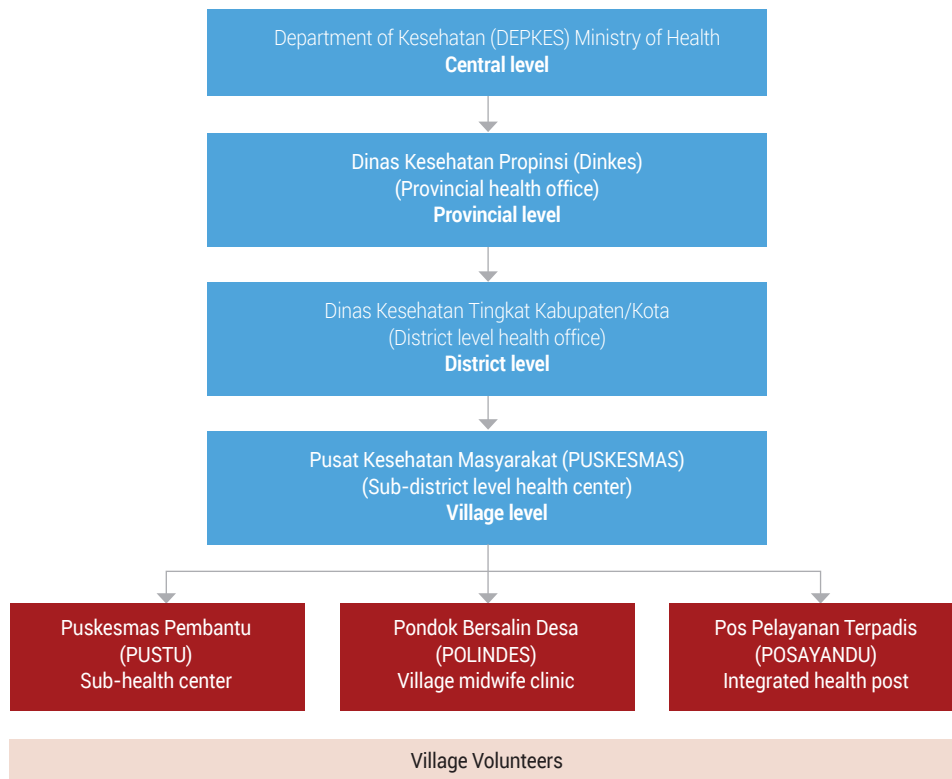
District-level management

- Cases of malaria in a district are handled by individuals who have a Master's degree in Public Health, undergraduate degree in public health programs, or other undergrads who work in sectors other than healthcare.

Challenges in management:

- Job rotation often happens in non-health sectors, resulting in inconsistency of the care and ability of human resources in handling malaria.

FIGURE 4: STRUCTURE OF THE HEALTHCARE SERVICE¹⁰



¹⁰ WHO 2016 (CL: High)

2.1.4.4 Healthcare Spending

Health expenditure as a percentage of GDP is ~3.5% in Indonesia, which has remained low when compared to other countries in the same region. Out-of-pocket expenditure remains constant as ~50% of the total healthcare expenditure.

The Indonesian government is making efforts to reduce out-of-pocket expenditure by introducing public insurance policies. In January 2014, the Indonesian government launched Jaminan Kesehatan Nasional (JKN), a scheme to implement universal healthcare in Indonesia.

It is expected that spending on healthcare will increase by 12% and reach USD46 billion by 2019. Under JKN, all Indonesians will receive coverage for a wide range of treatments via health services from public providers as well as private organizations that have opted to join the scheme.¹¹

TABLE 2: EVOLUTION: ANNUAL GDP, GDP GROWTH, HEALTH EXPENDITURE, AND CURRENT & OUT-OF-POCKET EXPENDITURE OF INDONESIA¹²

Year	Annual GDP (USD Million)	GDP Growth %	Current Health Expenditure (% of GDP)	Current Health Expenditure per capita (USD)	Out-of-Pocket Expenditure per capita (USD)	Ratio of Out-of-Pocket Expenditure from Current Health Expenditure (%)
2017	1,015,539	5.1%	3.4%	-	-	-
2016	932,256	5.0%	3.3%	-	-	-
2015	860,854	4.9%	3.3%	112	54	48.2%
2014	890,815	5.0%	3.4%	120	57	47.0%
2012	917,870	6.0%	3.4%	125	65	51.9%

¹¹ Indonesia Universal Health Scheme (CL: Medium)

¹² The World Bank (CL: High)

3. Vector Control Market Overview

Different Vector Control Tools used by Different End Users

Vector Control Tools	End Users
LLINs	<ul style="list-style-type: none"> Households residents Forest workers and miners Campers Cross border travellers Eastern provinces Women and children
Fogging	<ul style="list-style-type: none"> Government agencies Private pest control operators
Indoor Residual Spray (IRS)	<ul style="list-style-type: none"> Hospitals Academic Institutions Corporate & government offices Factories Households
Larval Control	<ul style="list-style-type: none"> Households residents Hospitals
Insecticide Treated Plastic Sheets	<ul style="list-style-type: none"> Emergency or calamity shelters Schools and community offices

3.1 Vector Control Overview

Major Vector-borne Diseases (VBDs) in the Southeast Asian region are malaria, lymphatic filariasis, dengue, chikungunya, Japanese encephalitis, and visceral leishmaniasis (kala-azar). VBDs have not only affected the health of individuals but also impeded the socioeconomic development in this region.

Indonesia is endemic for malaria and lymphatic filariasis. Outbreaks of dengue occur frequently, and chikungunya cases are also reported. There has been a steady decline in the incidence of malaria in the country over the past decade, whereas the incidence of dengue is gradually increasing.¹³

- Use of LLINs/ITNs:** Indonesia distributes ITNs, aiming for 80% coverage in high-risk areas, in particular among young children and pregnant women. Evaluations of LLIN campaigns were conducted in 2014 (KAP Survey for Kalimantan and Sulawesi) and in 2015 (Rapid Monitoring Survey in Eastern Indonesia by Technical Working Group [TWG] Malaria). Both showed high coverage of households receiving LLINs (83.1-99%), high retention of LLINs in houses (92%), and relatively high utilization of LLINs at night (61.1-81%). A high proportion of children under five were reported using LLINs the previous night (70-85%); however, the coverage among pregnant woman was considerably low (62-64.7%).⁹
- Indoor residual spraying:** According to the Indonesian MoH, six insecticides belonging to two of these classes may be applied for IRS: pyrethroids (alpha-cypermethrin, bifenthrin, deltamethrin, etofenprox, and lambda-cyhalothrin) and carbamates (bendiocarb). Earlier, the Indonesian MoH recommended organophosphates for IRS (fenitrothion, malathion, and pirimiphos-methyl). According to the Indonesian MCP guidelines, IRS is targeted at endemic areas with an API > five cases per 1,000 population, areas with malaria positive infants, or areas with a high potential of malaria outbreak (Department Kesehatan, 2006). These guidelines suggest that IRS should be conducted 2 months prior to the median peak of malaria case numbers. Limitations associated with the use of IRS are a foul smell, fouling of household furniture, and fear of toxicity.¹⁴

¹³ WHO - Implementation of Integrated Vector Management (2010) (CL: High)

¹⁴ Elyazar I R F et al., (2011) (CL: Medium)

- **Fogging:** Fogging increased in Indonesia to reduce the burden of dengue. Space spraying of insecticides or fogging activities involves the application of small droplets of insecticide into the air in the form of hundreds of millions of tiny droplets ranging from 1–30 µm Volume Median Diameter in an attempt to kill adult mosquitoes. Generally, thermal fogs and cold fogs have been commonly used for *Ae. aegypti* control, where both can be dispensed by vehicle-mounted or hand-operated machines. Early application of space sprays on a sufficiently large scale may reduce the DHF transmission intensity in an epidemic.¹⁵
- Limitations of using fogging:
 - Expensive as it must be repeated several times at short intervals (3 to 4 times in a week)
 - Needs special equipment
 - *Aedes* adults re-infest
 - Not effective on its own (need IVM) larvicides, non-essential water container control¹⁶



A worker sprays insecticide with a fogging machine to eradicate mosquitoes in a residential area in Bintaro, South Tangerang.

- **Larval control:** Larviciding is one of the earlier methods used to control malaria in Indonesia systematically. It has also been used to control dengue in various parts of Indonesia. A variety of larvicides used for malaria control includes oils, chemical insecticides, insect growth regulators, and microbial insecticides. Indonesia's MCP recommends insect growth regulators (methoprene and pyriproxyfen) and microbial insecticides (the bacterium *Bacillus thuringiensis israelensis* or BTI) as the preferred larvicidal measures.
- **Larvivorous fish:** The MCP in Indonesia provides guidelines for the introduction of larvivorous fishes. The recommended larvivorous fishes in Indonesia are *Poecilia reticulata* (Indonesians call these ikan guppy), *Aplocheilichthys panchax* (ikan kepala timah), and *Gambusia*. In Central Java, Nalim *et al.* investigated the potential of *P. reticulata*, first introduced into Indonesia in 1961, as a method of control against the *A. aconitus* mosquito, which is found in rice fields.¹⁷

¹⁵ Yee L Y *et al.*, (2016) (CL: Medium)

¹⁶ Implementing Integrated Vector Management in humanitarian emergencies (2016) (CL: Medium)

¹⁷ Elyazar I R F *et al.*, (2011) (CL: Medium)

3.1.1 Vector-borne Disease (VBD) Trends

Epidemiology

- **Malaria:** Indonesia has made significant progress towards the regional goal of malaria elimination by 2030, reducing confirmed malaria cases by 53% between 2010 and 2015.¹⁸ Approximately 70% of malaria cases are from the easternmost provinces of Indonesia, which constitutes ~8% of the total population. The provinces with the highest number of cases of malaria are Papua (42.7%) and Papua Barat (38.4%). In 2017, Indonesia reported ~52% of its area as malaria-free, with a decrease in high, moderate, and low endemic areas.¹⁹ Out of 248 endemic districts/municipalities, 172 are low endemic (33%), 37 are middle endemic (7%), and 39 are high endemic (8%) districts/municipalities.
- **Dengue:** Dengue is hyperendemic, and all four serotypes are known to circulate in at least 400 of 497 districts, with more than 200 million people at risk for dengue infection. Indonesia ranks as the most vulnerable in Asia among dengue-endemic countries, followed by Vietnam, Thailand, the Philippines, and Malaysia. Since the first dengue cases were reported in Jakarta and Surabaya in 1968, it has been included in the national disease surveillance system and is reported in the form of cases, outbreaks, or clinical and virological studies. In 2015, dengue fever cases reported were 129,650 with 1,071 fatalities (50.8 per 100,000 population).²⁰
- **Zika virus:** No reported cases of Zika virus in Indonesia as of February 2018.²¹
- **Chikungunya:** Chikungunya incidence ranged between 0.16–36.2 cases per 100,000 person-year. Incidence of Chikungunya fever had a downward trend during 2009–2012, rose again in 2013, and has declined since then. Moreover, no Chikungunya deaths have been reported.²²
- **Japanese encephalitis:** Indonesia is considered endemic for Japanese Encephalitis (JE) transmission. The disease is prevalent in 29 provinces with Bali, West Kalimantan, East Nusa Tenggara, West Java, and East Java being the areas of highest incidence. Although JE has been detected throughout the Indonesian archipelago from West to East, due to the lack of routine as well as systematic and standardized diagnostic approaches, the disease burden has still not been clearly established.²³
- **Schistosomiasis:** The prevalence of schistosomiasis is confined to three areas only (Napu Valley, Lindu Valley, and Bada Valley), where it is reported as ~3.5%.²⁴
- **Filariasis:** Indonesia is the only country in the world with three types of lymphatic filariasis parasite: *Wuchereria bancrofti*, *Brugia malayi*, and *Brugia timori*. It was estimated that in 2016, 29 provinces and 239 cities/districts were LF endemic areas, with 102,279,739 people at risk of infection.²⁵ Filariasis is the most prevalent in 5 provinces, namely, East Nusa Tenggara, Aceh, West Papua, Papua, and West Java.

¹⁸ Zelman, B. *et al.* (2017) (CL: Medium)

¹⁹ Raharjo M. *et al.* (2018) (CL: Medium)

²⁰ RSIS (2015) (CL: Medium)

²¹ Ministry of Health – Travel Indonesia (CL: High)

²² Harapan H *et al.* (2019) (CL: Medium)

²³ Garjito TA *et al.* (2018) (CL: Medium)

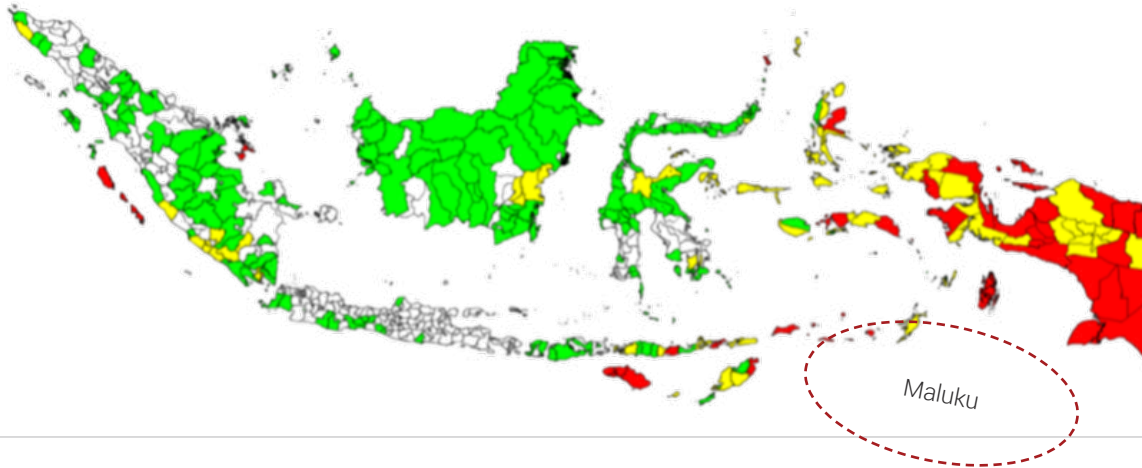
²⁴ Satrija F *et al.* (2015) (CL: Medium)

²⁵ Titaley C R *et al.* (2018) (CL: Medium)

3.1.2 Burden of Disease

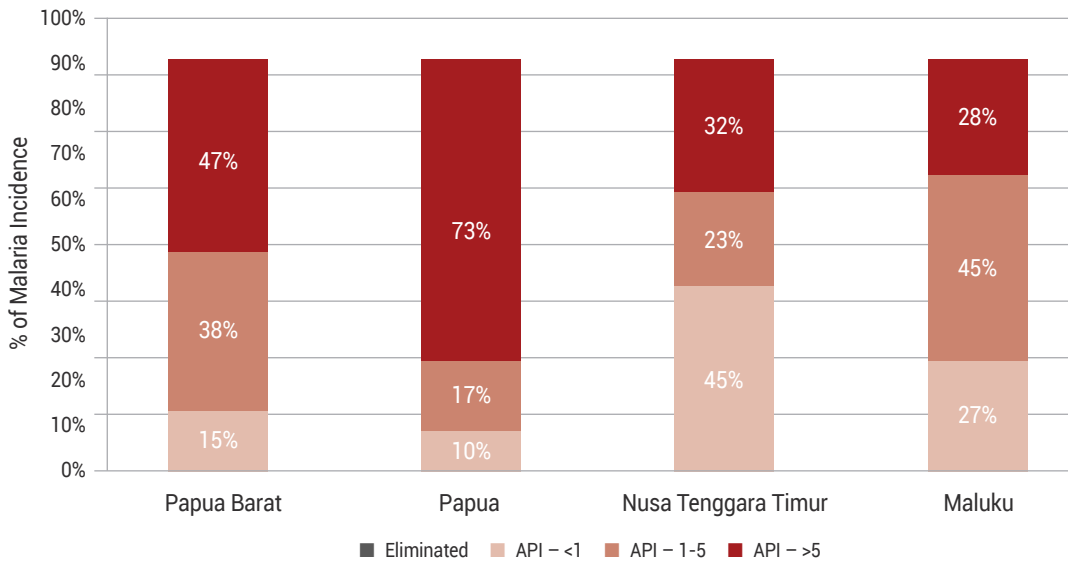
Malaria

FIGURE 5: GEOGRAPHICAL SPREAD OF MALARIA IN INDONESIA²⁷



The prevalence of malaria is high in some non-residential populations with occupational risks, such as forest workers and miners. Village-based rural populations are at increased risk, usually during the harvest season. In 2017, NTT-Maluku and Papua-Pabar provinces had the highest incidence of malaria in Indonesia.

FIGURE 6: REGIONS WITH HIGH MALARIA INCIDENCE²⁶



Around 88% of Indonesian cities have achieved low-risk status for malaria with an API less than 1 per 1000; however, the incidence remains high in eastern Indonesia region in the Papua and Maluku province.²⁶

²⁶ The Global Fund Indonesia, 2018 (CL: High)

Maintaining Malaria Elimination ²⁷

Districts that have succeeded in the elimination of malaria will be conducting a reorientation program, also termed as the maintenance program, to ensure rapid surveillance and case management to detect and treat imported cases. Provinces such as Bali and DKI Jakarta have achieved malaria elimination and are currently implementing the malaria elimination maintenance program. These programs receive domestic funding (non-GF funds). This funding is allocated to maintain Indonesia's malaria-free status, including migration surveillance by 2020 for 335 Indonesian districts.

3.1.3 Economic Burden of VBD

Indonesia has a heavy burden of diseases due to high out-of-pocket expenditure.^{28,29,30,31}

Malaria

- The total economic burden of malaria is USD205 million, in which direct costs account for USD147 million and indirect cost is USD58 million.
- USD0.85 per person is the cost of the malaria program in Indonesia.
- The estimated cost of malaria elimination in Indonesia is USD2 billion for 2016-2030, an average of USD145 million per year.
- In addition to saving 41,000 lives and averting 25 million cases, successful elimination by 2030 can generate economic and financial benefits of approximately USD18 billion, providing a 10:1 return on investment.

Dengue

- As a direct cost, the medical testing cost for diagnosis in Indonesia is USD22.
- The treatment cost in Indonesia is estimated range from USD12.5 to USD495.
- The hospitalization cost per day in Indonesia, including meal costs, is between USD26 and USD47; a patient is hospitalized for an average of 5 days, and thus, the total cost of hospitalization amounts to ~USD190.
- The total direct cost ranges from USD354.5 to USD942 per person.
- The total healthcare expenditure is estimated to be USD960 million, along with USD470 million of indirect cost, which sums up to USD1.43 billion spent on cases of dengue fever in Indonesia.

In Indonesia, financial protection is measured through two indicators:

- Impoverishment
 - Catastrophic health expenditure
-
- Impoverishment: 0.8% or approximately 2 million people are being pushed into poverty because of out-of-pocket (OOP) health spending.
 - Indonesia has ~48% of OOP expenditures .
 - Higher OOP expenditure has resulted in an increased risk of catastrophic health expenditure for households.
 - Catastrophic expenditure on health: 3.6% of people spent more than 10% of their household's total expenditure on healthcare.

²⁷ The Global Fund – Indonesia (2018) (CL: High)

²⁸ WHO World Malaria Report 2018 – Indonesia Profile (CL: High)

²⁹ WHO World Malaria Report 2018 (CL: High)

³⁰ SDG Profile: Indonesia (CL: High)

³¹ Cost-effectiveness of dengue control using copper ions in Indonesia (CL: High)

3.1.4 Measures/Initiatives for Vector Control

National Malaria Control Program (NMCP)³²

- Over the past decade, Indonesia's NMCP has distributed ~20 million LLINs.
- IRS was performed in high-risk villages with API >20 per 1,000 population.
- As a result of these efforts, between 2007 and 2017 API reduced to one-third, from 2.89 per 1,000 to 0.9 per 1,000 population.
- Coordination of the malaria response was led by the MoH with support from UNICEF, WHO, community organizations, and the private sector, with a majority of funding from the Global Fund.

Actual usage of LLINs³³

- Evaluations of LLIN campaigns were performed in two surveys: the KAP 2014 in Kalimantan and Sulawesi and the Rapid Monitoring Survey 2015 in Eastern Indonesia by the Technical Working Group (TWG) Malaria.
- Both surveys showed that 83.1-99% of households received LLINs, 92% reported retention of LLINs, and 61.1-81% reported utilization of LLINs at night.
- 70-85% of children under five reported using LLINs the night prior to the survey; however, only 62-64.7% in pregnant woman reported its use.

Malaria API reduced to one-third from 2007 to 2017 as a result of the National Malaria Control program. However, considerable effort is required to maintain these low levels.

Innovative Strategies for Malaria Control³⁴

• Roll Back Malaria (RBM)

RBM is the coordination forum across programs and sectors that consist of a variety of institutions, expertise, and related stakeholders. These stakeholders help to formulate policies and program strategies as well as foster partnerships with various sectors to increase the resources and the effectiveness toward achieving malaria elimination in Indonesia by 2030. All endemic provinces and several endemic districts in Indonesia have developed rules/regulations for the RBM forum in different formats based on local situations; however, the forum has similar functions on the central level.

Some provinces and districts have established Malaria Centers, an institution based on initiative and commitment of the provincial or district/city level government. These centers are used as coordination forums for malaria elimination by involving all sectors and related programs under the coordination of district or provincial health offices. In 2014, 20 malaria centers were formulated in the provinces of North Maluku, North Sumatera, Papua, Aceh, and Bangka Belitung, and recently in Teluk Bintuni, West Papua.

• Partnership with Indonesian Medical Association and Association of Pharmacists Indonesia

Partnership with the Indonesian Medical Association and the Association of Pharmacists Indonesia is useful in maintaining public-private mix (PPM) of malaria control services. It ensures logistics availability of drugs, reagents, RDT, and LLINs as well as the provision of coaching and monitoring, and evaluation of health care services. It also ensures proper implementation of malaria surveillance systems (recording and reporting).

³² National Malaria Control Program Review (Indonesia) (CL: High)

³³ The Global Fund Indonesia 2018 (CL: High)

³⁴ National Malaria Control Program Strategic Plan 2015 – 2019, Indonesia (CL: High)

- **The aim of this partnership includes:**
 - Increase in coverage and access to quality healthcare services
 - Collaboration in improving PPM of malaria services
 - Implementation of malaria case management standards
 - Implementation of pharmaceutical services and patient's compliance
 - Prevention of malaria drug resistance
 - Standardized competency for medical doctors and pharmacists in the malaria control program

- **Village Malaria Post and Community Self Reliance**

Village Malaria Post (Posmaldes) is the community-based health effort to control malaria in endemic areas, formed and maintained by the community itself. Cadres who have been trained by Puskesmas (community health centers) conduct activities, such as health promotion on malaria control, mosquito breeding site elimination, and simple mapping of the village environment describing mosquito breeding places, roads, and other useful information. Early detection of clinical malaria patients is achieved through an active home visit or passive detection of patients who arrive at the Posmaldes. These patients are either examined by health workers or referred to the nearest healthcare facilities. Results are recorded and reported to Poskesdes/Pustu/Puskesmas. Cadres are invited to attend meetings conducted by Puskesmas/healthcare workers/NGOs and other partners regularly.

- **World Mosquito Program – Eliminate Dengue, Yogyakarta**

Eliminate Dengue Indonesia is a joint research program led by the Faculty of Medicine, Gadjah Mada University and funded by the Tahija Foundation (Tahija Foundation). As part of the program, male *Wolbachia-Aedes gypti* mosquitoes were released in communities around Yogyakarta, Indonesia in January 2014. The purpose of this release was to breed *Wolbachia* bacteria among local mosquito populations so as to have the ability to reduce transmission of dengue fever in humans. *Wolbachia* reduces a mosquito's ability to transmit human viruses, such as Zika, dengue, and chikungunya. The bacteria induce a phenomenon known as cytoplasmic incompatibility in infected hosts, acting as a drive mechanism to push *Wolbachia* into the host populations by indirectly favouring *Wolbachia* infected females. This is done by reducing the reproductive output of uninfected females in a population, which benefits the maternally transmitted *Wolbachia*.^{35,36}

Dengue fever cases in the city declined in May 2018, with ~40 cases compared to 350 cases registered in the previous year. A randomized controlled cluster trial "Applying *Wolbachia* to Eliminate Dengue (AWED)" is ongoing and is expected to reach completion by late 2019.

TABLE 3: VECTOR CONTROL AND PREVENTION CAMPAIGNS^{37,38,39}

Name of the Campaign	Time Period	Target Disease	Coverage	Organization	Digital Campaign	Impact
1 Rumah 1 Jumentik / 3M Plus	2015	Dengue	National	Ministry of Health – Indonesia	No	A survey conducted by Puskesmas in the South Tangerang city found that all of the houses in the city were larva-free.
Buzzoff	June 2018	Dengue/ Malaria/ Zika	Local (Papua Province)	Local Communities	Yes	Week one witnessed training of 34 malaria volunteers. Week two witnessed 18 of these volunteers trained as trainers and week 3 witnessed them execute training seminars under supervision in local communities.
Jumat Keliling (Jumling)	2016	Dengue	Jakarta	The local government	No	In 2018, the cases of dengue fever decreased; only one case reported in April 2018.

³⁵ Neil M. 2018 (CL: Medium)

³⁸ ASEAN (CL: High)

³⁶ Gadjah Mada University (CL: Medium)

³⁹ WVI (CL: Medium)

³⁷ Buzzoff.org (CL: Medium)

Community Efforts to Eradicate Mosquito Breeding

- **1 Rumah 1 Jumantik / 3M Plus**⁴⁰

Jumantik Rumah is one of the family members who is assigned the task of monitoring larva once a week. They can either be a mother or father or any other family member. One Rumah One Jumantik works on 3 Ms, and this activity is based on the family approach that involves:

- **Menguras** (Drain the water storage)
- **Menutup** (Cover it)
- **Mendaur Ulang** (Make use of used goods)

1 house 1 Jumantik was declared as a national movement. The Ministry of Health of Indonesia socialized and implemented this project not only in a residential area but also in the working area of health port offices in airports and seaports.

- **Buzzoff**⁴¹

The Buzzoff works for the elimination of malaria not only by training the locals but also by training the staff. Working with local communities to develop a unique training program can be used to enhance awareness and skills required to combat malaria. Buzzoff has been implemented in Papua province (worst hit islands in the world for malaria), which has reported ~80% of malaria cases of the total malaria cases in Indonesia. Within one week, 34 malaria volunteers were trained. Week two witnessed 18 of these volunteers formed as trainers and week 3 witnessed them run training seminars under supervision in local communities.

- **Jumat Keliling (Jumling)**⁴²

It is known as Clean Friday Movement supported by the local government and World Vision Indonesia to prevent dengue haemorrhagic fever. The objective of the movement is to spread awareness to eradicate mosquito larvae. Jumling was conducted in Jakarta every week that resulted in decreased dengue cases.

- **LaCaK Malaria**⁴³

- Mobile phone-based malaria reporting system – Won the Best Adaptation at the GovInsider Innovation Awards.
- South Halmahera Malaria Center (SHMC) teamed up with Pulse Lab Jakarta (PLJ) to develop a mobile phone-based malaria reporting system that effectively accelerates malaria response.
- Using text number codes to the Lapor Cepat Kasus Malaria (Malaria Case Rapid Reporting), or LaCaK Malaria, SHMC reduced data collection time by 19 days and managed its successful implementation making it much more responsive for the treatment of malaria in health centers across the South Halmahera.

- **Pokentik**⁴⁴

- An Android-based **smartphone application** to support mosquito breeding control measures, to aid **dengue fever prevention** in Semarang, Yogyakarta, Palembang, and Banda Aceh.
- Part of the **Digital Health Movement** or **eHealth** Movement to take part in the prevention and control of mosquito vector-based diseases promoting 3M Plus Movement.

⁴⁰ ASEAN (CL: High)

⁴¹ Buzzoff.org (CL: Medium)

⁴² WVI (CL: Medium)

⁴³ Govinsider (CL: High)

⁴⁴ Google Play Store (CL: Medium)

- **Other Initiatives:**⁴⁵
 - Cooperation with companies (Corporate Social Responsibility).
 - Monthly case finding supervision by district health officers and partners.
 - LLINs routine distribution in collaboration with maternal child health and immunization programs.
 - NGOs involved in the management of mosquito-breeding lagoons.
 - Social marketing of the malaria program.
 - Strengthening malaria competency for pharmacists and physicians - Collaboration with the Ministry of Education and Bank Rakyat Indonesia (BRICSR) in developing malaria local content book.

3.1.5 Challenges

Although several measures and initiatives have been undertaken to control malaria and dengue on both local and central level, explosive outbreaks of these diseases still arise.

Operational constraints in vector control implementation:^{46,47}

- Healthcare centers and sub-health centers are inaccessible and hard-to-reach in endemic areas
- Strategies for urban malaria control and cross-border issues
- Migrant and mobile populations (i.e., mining workers and lodgers)
- Multi-sector collaboration sources/environmental management
- Implementation of the malaria program is limited
- Vector mapping and control
- Lack of skilled personnel in the entomology field
- Accuracy of reports or late reports
- Surveillance activities are not sufficient owing to low coverage

Other challenges for vector control program include:⁴⁸

- Increase in malaria vector species
- Large human mobile population increases the risk of disease transmission
- Inadequate mapping of insecticide resistance
- Low acceptability of insecticide-treated nets
- Behavioural difference among the population, for instance, colour preferences for insecticide treated nets
- Lack of knowledge regarding symptoms, preventive measures, control, and treatment of VBDs

⁴⁵ National Malaria Control Program Strategic Plan 2015 – 2019, Indonesia (CL: High)

⁴⁶ MMV – Medicine for Malaria Venture (2017) (CL: Medium)

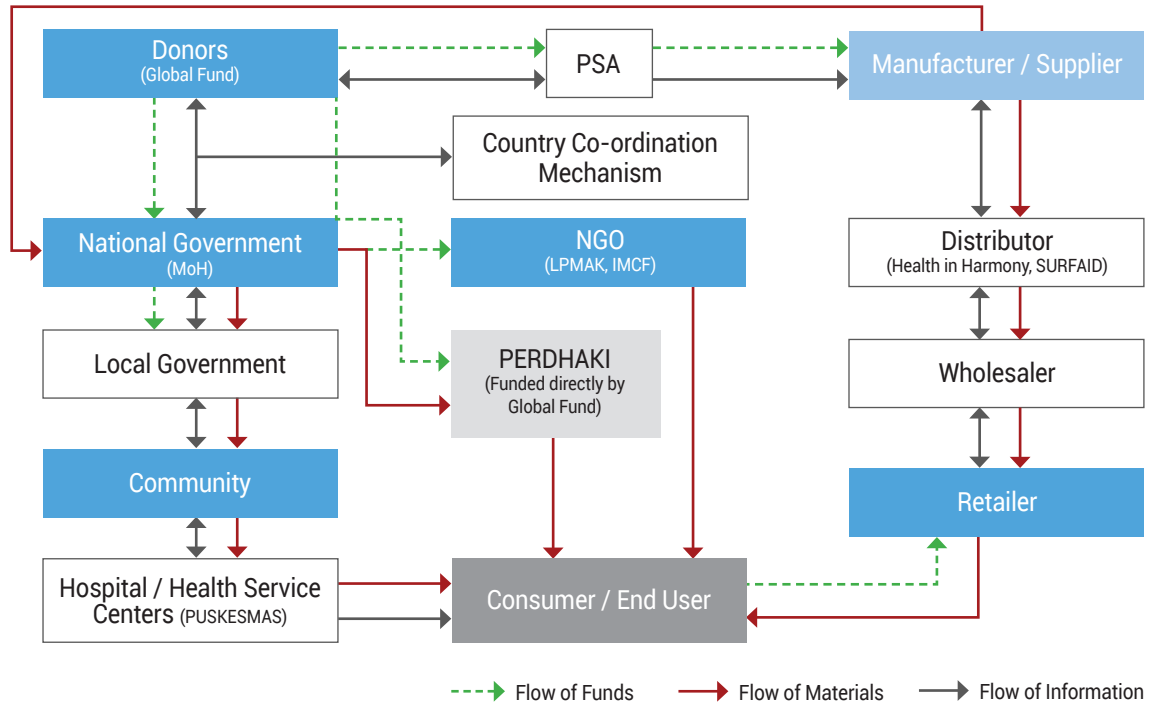
⁴⁷ IJPHS (2013) (CL: Medium)

⁴⁸ National Strategy for IOR – WHO (2016-2019) (CL: High)

4. Market Analysis

4.1 Procurement Channels

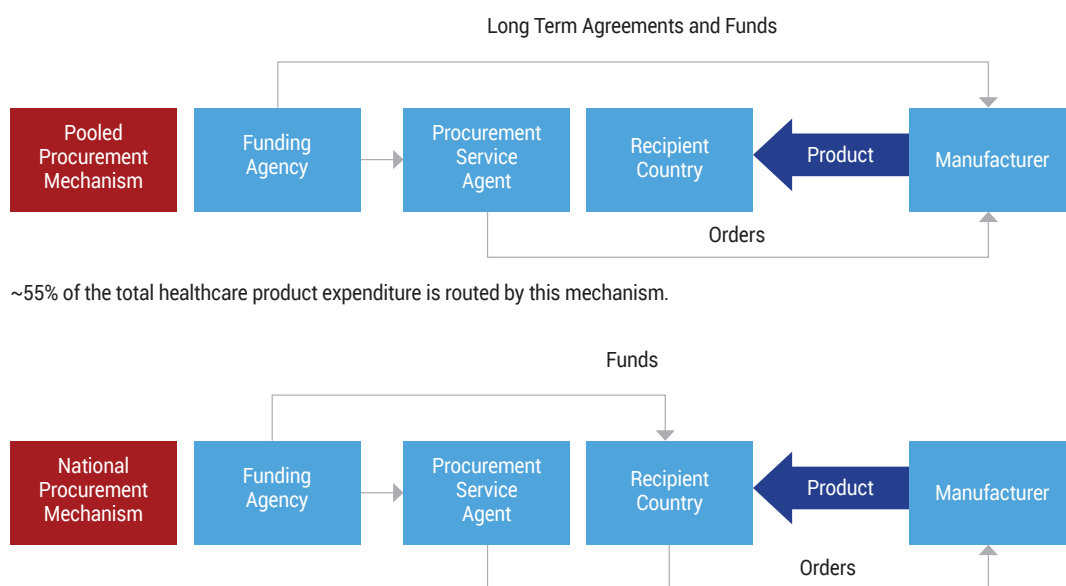
FIGURE 7: RELATIONSHIP BETWEEN STAKEHOLDERS⁵⁰



- A country co-ordination mechanism works by submitting the funding application to The Global Fund on behalf of the country.
- After receiving the product, MoH distributes it to local governments and NGOs.
- NGOs should submit a request to the District Public Health Office to receive the product.
- Local NGOs should submit their annual planning sheet, after which they will receive the product on a quarterly basis.
- Puskesmas, Polindes, and Posayandu act as local distribution centers of vector control tools.

4.1.1 Overview of Procurement Channels

FIGURE 8: POOLED PROCUREMENT MECHANISM IS THE MOST PREFERRED ROUTE FOR PROCUREMENT⁵⁰



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

- Pooled procurement mechanisms represent around 55% of the total healthcare product spent by The Global Fund in 2017.
- Anti-retroviral, Artemisinin Combination Therapy, and Long-Lasting Insecticide Treated Nets (LLINs) are major product categories that constitute ~85% of the total procurement value.
- LLINs solely contribute to ~25% of the total procurement value.

Integrated Distribution Campaigns⁴⁹

- Integrated mass distribution campaigns for LLINs are done since 2010.
- LLIN distribution is integrated with the vitamin A campaign, or mass drugs administered for filariasis. The campaign is supported by The Global Fund with UNICEF.
- During October-November 2017, the integrated campaign of LLIN distribution with mass drug administration for filariasis was undertaken by the government in the West Papua province. In this campaign, 410,425 LLINs were distributed to 915,361 individuals.

Challenges associated with the Mass Distribution Campaign:

- Since the geographical area of Indonesia is distributed across island and terrain (mountains) there are several logistic challenges.
- The biggest challenge during the integrated campaign carried out for two months (October & November) in 2017 was to distribute LLINs to the affected population within the designated timeframe.
- Receipt of funds on time and timely reach of commodities through different modes were major challenges during this campaign.

⁴⁹ UNICEF (2018) (CL: High)

4.1.2 Stakeholders

Key Stakeholders in Indonesia⁵⁰

Global Bodies



Manufacturers



Procurement Service Agent



Government Bodies



Distributors



NGOs



Regional Bodies



⁵⁰ Recruitment Notice 2017 (CL: Medium)

4.1.3 Procurement – Gap Analysis

Gaps in procurement of vector control products exist at logistic, financial, and human resource levels. Disorganized logistics tools, lack of optimum utilization of funds, and the shortage of trained staff are key challenges in the supply chain.^{51,52}

Logistics

- According to the World Bank, **the cost of logistics is ~24% of Indonesia GDP**. ~18% of the cost of goods produced in Java can be attributed to logistics costs. Indonesia was **ranked 44 for connectivity factor in 2018** by the Logistics Connectivity Index.
- Factors contributing to the creation of gaps in the procurement channel include:
 - Loss or damage of vector control tools/products while in transit.
 - **Irregularities in tracking the receipt and delivery** of mosquito nets through the official inventory application.
 - **Delay in the distribution** of nets leading to increased warehouse costs and reduction in the life of LLINs.
 - Regular reporting of stock (with e-socialization such as various online portals/social media).
 - **Lack of uniformity in the handover process of goods**.

Financial

- Unavailability of **stable software** to track funding and expenses.
- **Training** of financial managers to effectively manage and track funds to accelerate vector control activities.
- **Synchronization** of the use of funds from various sources for malaria as well as other vector control activities: State Revenue and Expenditure Budget (Anggaran Pendapatan dan Belanja Negara: APBILLION), Regional Revenue and Expenditure (Anggaran Pendapatan dan Belanja Daerah: APBD), grants, and others.
- Follow-up on audit findings to ensure that shortcomings are rectified and not repeated.

Human resource

- **Recruitment of staff should be decentralized** and planned according to the need of each province; this will help connect easily with the local population, which, in turn, will increase the penetration of vector control activities.
- Regular training of staff to spread awareness of vector control methods and training of end users will enhance knowledge transfer between staff and the population, for the effective utilization of vector control activities.
- Recruitment procedure in the province should be in accordance with the requirement of the role to ensure optimum utilization of funds.
- Evaluation of staff at regular time intervals should be mandatory to understand the shortcomings or additional requirements for vector control and prevention activities.

⁵¹ World Bank (2018) (CL: High)

⁵² Ministry of Health, Indonesia (CL: High)

4.2 Sponsors & Payers

In Indonesia, there are no indigenous manufacturers for LLINs; all LLINs are imported.

Key Stakeholders in Indonesia⁵³

Global Bodies



- For malaria elimination, Indonesia requires ~3 million LLINs annually.
- Of which ~70% is procured by The Global Fund.
- Around ~30% of the LLINs are procured with Anggaran Pendapatan dan Belanja Negara funds provided by the MoH (APBILLION: the Indonesian State Revenue and Expenditure Budget is the annual financial budget of the Indonesian state which is approved by the House of Representatives. It consists of systematic and detailed list of state revenues and expenditure).

4.3 Vector Control Related Spending

Funding for Malaria Prevention and Control by the Indonesian government is expected to be ~USD18 million as compared to the overall need of ~USD50 million. LLINs and IRS are expected to require ~50% funding in 2019.⁵⁴

TABLE 4: GLOBAL AND DOMESTIC FUNDING IN VECTOR CONTROL ACTIVITIES IN INDONESIA⁵⁷

Module	Funding Need (USD Million)			Domestic funding (USD Million)		
	2018	2019	2020	2018	2019	2020
Vector Control: LLIN	2.7	23.1	2.7	2.3	2.3	2.3
Vector Control: IRS	8.3	1.5	9.4	0.1	0.1	0.6
Case Management: Diagnosis	3.9	4.0	4.1	1.2	1.2	1.2
Case Management: Treatment	11.2	7.8	9.1	10.5	9.8	9.1
Resilient and Sustainable Systems for Health (RSSH)	16.7	12.2	16.1	2.7	3.3	4.1
Program Management	9.5	1.1	8.1	0.8	1.0	1.0
Other	-	-	-	-	-	-
Total	52.4	49.7	49.4	17.6	17.7	18.2

Note: Estimates based on coverage for population in high endemic districts: 4,874,589 (from 41 high endemic districts) + population in high endemic villages at moderate endemic districts: 2,336,361 (20% from population at moderate endemic districts) + population in focus area with local transmission in low endemic districts: 318,267 (0.5% from population at low endemic areas)

⁵³ Recruitment Notice 2017 (CL: Medium)

⁵⁴ FutureBridge Analysis Murhandarwati EH et. al., Malaria Journal, 2015 (CL: Medium)

4.3.1 Funding

A majority of the financing for vector control products in Indonesia comes from foreign donors, such as UNICEF, The Global Fund, USAID, WHO, CDC, and others.

4.3.1.1 National funding

Since 2000, Indonesia has applied for a decentralized governance system in most sectors, with the result that every district (500 districts) of the country is responsible for prioritizing and carrying out health activities. In consequence, the greatest percentage of funding is from district government funding (*APBD II*), followed by provincial government funding (*APBD I*), and then from general and specific purpose funding (*Dana Alokasi Umum and Dana Alokasi Khusus*). Health budgets are decided by the local/district government (*APBD II*).⁵⁵

The Indonesian government is the major contributor to domestic funding. As per declaration made by the government in grant application for 2018-20 to The Global Fund, the share of domestic funding has increased exponentially from 6% of the total expenditure for malaria in 2011 to 52% in 2016. This data does not include subnational or private sector financing.⁵⁶ The government of Indonesia has mandated that 5% of the national budget (not including personnel costs) needs to be allocated for health. In addition, districts must allocate 10% of their budget to health. In decentralized Indonesia, subnational governments execute more than 60% of health expenditure, with much of the money from direct transfers from the central level. Table 5 depicts that the co-financing commitment has been met with an actual contribution, which exceeds the planned amount in 2016.

TABLE 5: DOMESTIC FINANCIAL COMMITMENT VS. REALIZATION⁵⁸

Year	Indonesia			% Realization
	Commitment (USD Million)	Actual		
		Amount (USD Million)	Budget Source	
2015	17.4	16.2	<ul style="list-style-type: none"> Central Government (NMCP), De-concentration, DG of Pharmacies: 41% Insurance/BPJS: 52% Local Government (province and district): 7% 	93%
2016	18.9	20.3	<ul style="list-style-type: none"> Central Government (NMCP), De-concentration, DG of Pharmacies: 52% Insurance/BPJS: 42% Local Government (province and district): 6% 	108%

The grant application also indicates the annual funding need of ~USD5 million for all malaria control activities. Domestic funding sources may contribute USD1.7-D1.8 million. These sources include:

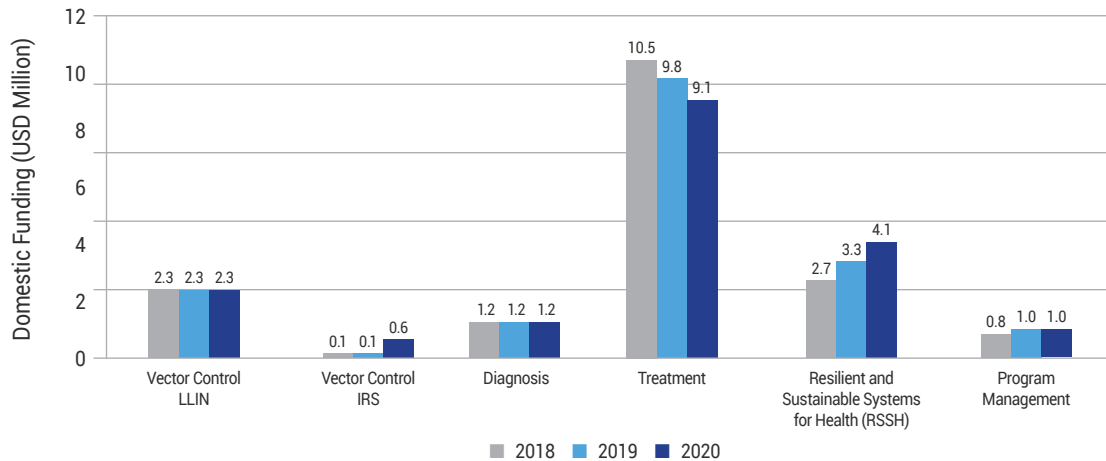
- Amount raised by the government through loans from external sources or private creditors.
- Amount raised by the government through debt relief proceeds.
- Amount provided by government revenues or government funding resources for implementing the national strategic plan.
- Amount provided from the social health insurance mechanism to implement the national strategic plan.
- Amount raised from the private sector in the country to implement the national strategic plan.

⁵⁵ Murhandarwati EH et. al., *Malaria Journal*, 2015 (CL: Medium)

⁵⁶ Global Fund Indonesia: Applicant Self-assessment to Inform Program Continuation (CL: High)

For 2019, an estimated contribution by domestic funds is expected to be 1.77 million. Figure 9 provides the breakup of domestic funding by type of activity in malaria control. This indicates that the funding for vector control activities has remained constant (~15%). Funds for the treatment of identified malaria cases account for a major share (~50%) of the funding.

FIGURE 9: DOMESTIC FUNDING FOR MALARIA CONTROL 2018-2020⁵⁷



The Indonesian government announced a De-Concentrated Budget Ceiling of D1 million for malaria program 2019. Following are the planned activities under the allotted budget:

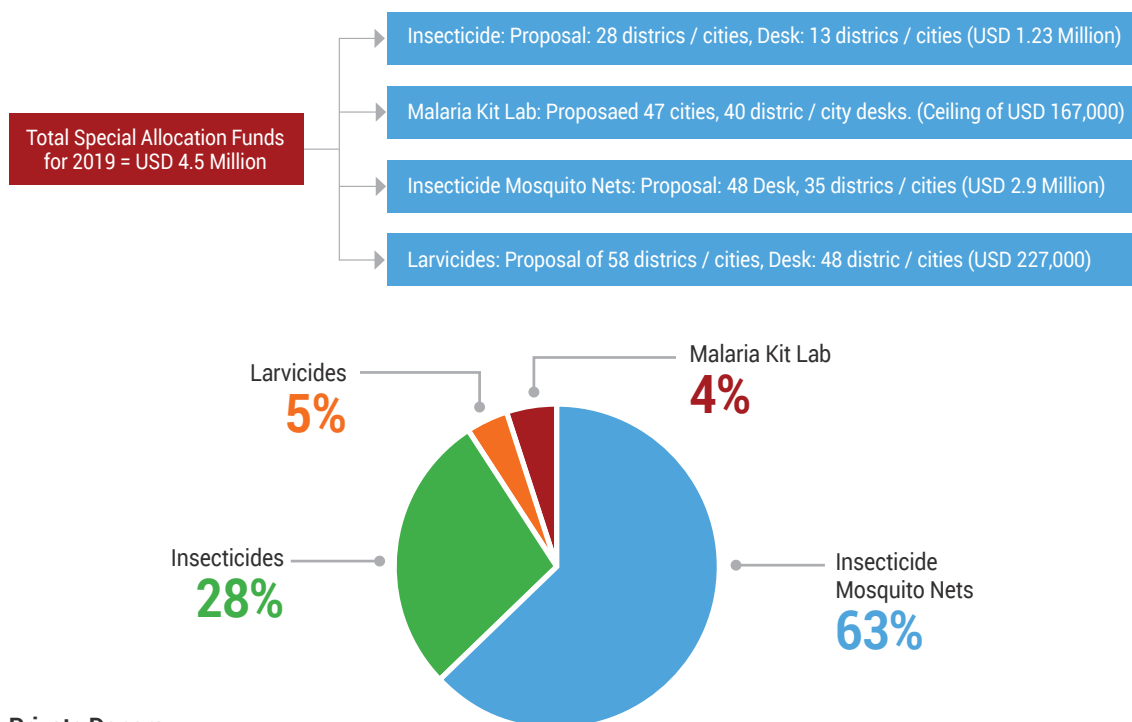
- Malaria Diagnosis and Treatment Management
- Malaria Surveillance Strengthening
- Strengthening Risk Factor Control
- Activities with Output Cost Standards (SBK)
- IRS/Indoor Residual Spraying (spraying insecticides on the walls of the house) in homes
- Blood testing/malaria microscopy
- Malaria Mass Blood Survey (Parasite Rate)
- IRS (spraying insecticides on the walls of houses) in difficult areas
- Survey of Malaria Bulk Blood (Parasite Rate) in difficult areas

In 2019, the Indonesian government allotted ~USD4.5 million as a Special Allocation Funds (DAK) Assignment for FY 2019. Approximately 70% of these funds will be used for vector control products – insecticides, nets, and larvicides.

- The coverage of this special budget:
 - Initial Proposal: 128 cities, 25 provinces
 - Scope: 115 Districts/Cities

⁴⁶ The Global Fund Indonesia, 2018 (CL: High)

FIGURE 9: DISTRIBUTION OF SPECIAL ALLOCATION FUNDS (DAK)⁵⁸



Private Donors



In 2014, the chairman of the Tahir Foundation established a new Indonesian Health Fund with an initial investment of USD 40 million from eight Indonesian business leaders. The Bill & Melinda Gates Foundation matched this investment. A separate investment of USD 65 million to The Global Fund was also made by Dr. Tahir.

4.3.1.2 International Funding

Global Funding Agencies

International funding agencies in Indonesia are the UNICEF, The Global Fund, USAID, CDC, World Health Organization, Bill & Melinda Gates Foundation, National Institute of Allergy and Infectious Diseases, Unitaid, and Wellcome Trust.



The Global Fund to Fight AIDS, Tuberculosis, and Malaria (GFATM) continues to be the major source of external funding for malaria in Indonesia. The only other consistent source of foreign funding over the past decade is USAID, which funds technical assistance for malaria and maternal and child health at national and subnational levels via UNICEF. UNICEF supplements these funds from other sources, but the total sum is small as compared to the funds provided by GFATM. In addition, some CSR support is available, particularly in North Maluku, Papua, and West Papua. As Indonesia's economy grows, these external sources, especially the GFATM, are projected to be replaced by domestic sources in the near future.⁵⁹

⁵⁸ Ministry of Health, Indonesia (2019) (CL: High)

⁵⁹ Global Fund Indonesia: Applicant Self-assessment to Inform Program Continuation (CL: High)

- Two Global Fund projects with a funding amount of USD53.6 million with coverage over 34 provinces and 514 regencies/municipalities for 2018-2020 are listed below:
 - Ministry of Health: Amount funded US D44.6 million (USD14.9 million/year)
 - Indonesian Health Dharma Association (PERDHAKI) amount funded USD9.1 million focusing on 4 Eastern Indonesia (Papua, West Papua, Maluku, and NTT) (USD3 million/year)
- Most of the funds allocated by The Global Fund for 2018-2020 will be used to support implementation in eastern Indonesia.
- Almost half of the funds will be used to support Integrated Vector Management (IVM) activities, including LLIN distribution (approximately 3 million nets) and emphasis on strategic implementation of IRS and larval control.
- It is estimated that more than 50% of the funds from 'The Global Fund' will be utilized to reduce malaria endemicity of 285 cities from high to moderate.
- The Global Fund distributed ~70% of the total mosquito nets in 2017.^{60,61}

TABLE 6: PROPORTION DISTRIBUTION OF MALARIA FUNDING BASED ON THE STRATEGY FORMULATED BY THE GLOBAL FUND, 2018-2020⁶²

Strategy	Budget Allocation (USD million)	Number of Cities in 2018	Percent of Funding	Strategy
Acceleration	23.3	285	55%	>50% of all current high endemic districts (API>5) will change into moderate endemic stratification (API 1-5)
Elimination	13.6	171	30%	>25% of all current low endemic districts (API < 1) will be free from malaria
Maintenance	1.7	30	2%	335 districts in Indonesia will be free from malaria
Others	6.0	28	13%	-
Total	44.6	514	100%	-

Acceleration:

- Distribution of mosquito nets through a mass campaign
- Integrated vector management
- Community empowerment

Elimination:

- Village-based stratification
- Implementation of 1-2-5 strategy for rapid reporting
- Interventions in the migrant population and active case detection
- Mapping of receptive regions

Maintenance:

- *Norma, Standar, Prosedur dan Kriteria* - Norms, Standards, Procedures, and Criteria (NSPK) used by local governments
- Capacity building for health workers
- Provision of malaria logistics (mosquito nets, RDT, insecticides, larvicides, and lab materials)

⁶⁰ Procurement Services Agent (PSA) Consultative Meeting – The Global Fund (2017) (CL: High)

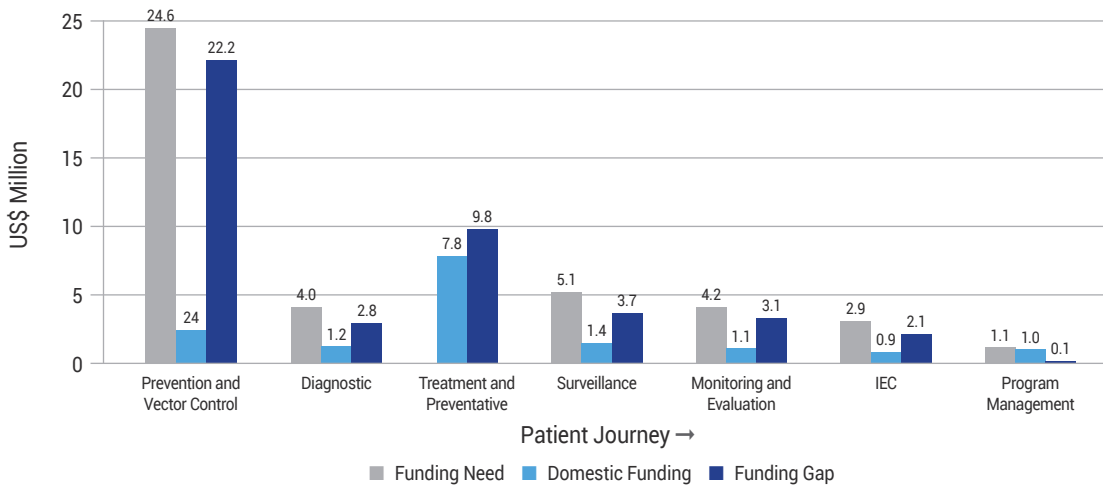
⁶¹ Global Fund: Indonesia Profile (CL: High)

⁶² Ministry of Health, Indonesia (2019) (CL: High)

4.3.2 Funding Gap⁶³

Indonesia's 2018-2020 Global Fund allocation for malaria is not significantly lower as compared to the spending level of the current grant. The grant allocation for the four-year period of 2014-2017 was USD72 million or USD18 million annually, which is similar to the average annual allocation for the three-year period of 2018-2020 (USD53.6 million, 17.9 million annually). The spending level of the grant for the period 2014-2016 was USD34.7 million (USD11.5 million/year). The remaining amount in 2017 was entirely spent on the implementation of activities (USD18 million) and LLIN procurement as well as distribution (USD20 million).

FIGURE 10: FUNDING GAP IN 2019⁶⁴



As depicted in the figure 10, the funding gap of USD22.2 million for 2019 will be addressed by different sources, such as domestic funding and international funding. It is estimated that 36% (USD17.8 million) of the funding need will be addressed by domestic support, where the Indonesian government will be the major funder. One of the major international donors addressing the funding gap is The Global Fund (USD17.9 million annually).

TABLE 7: FUNDING GAP IN 2018-2020⁶⁷

Cost Category	Funding Need (USD Million)			Domestic funding (USD Million)			Funding Gap (USD Million)		
	2018	2019	2020	2018	2019	2020	2018	2019	2020
Prevention and Vector Control	11.0	24.6	12.1	2.4	2.4	2.9	8.6	22.2	9.2
Diagnostic	3.9	4.0	4.1	1.2	1.2	1.2	2.7	2.8	2.9
Treatment and Prevention	11.2	7.8	9.1	10.5	9.8	9.1	0.7	-2.0	0.0
Surveillance	5.9	5.1	5.2	1.0	1.4	1.7	4.9	3.7	3.5
Monitoring and Evaluation	8.4	4.2	8.7	0.9	1.1	1.6	7.5	3.1	7.1
IEC	2.4	2.9	2.2	0.8	0.9	0.8	1.6	2.1	1.4
Program Management	9.5	1.1	8.1	0.8	1.0	1.0	8.7	0.1	7.2

*Note: IEC – Information, Education, and Communication.

The funding need for prevention and vector control activities is more than double for 2019 as compared to 2018. This may be attributed to the planned mass distribution campaign of LLINs in 2019. The target population for net distribution is individuals living in high endemic areas. The total number of nets planned to be distributed is 3.53 million.

⁶³ The Global Fund Indonesia 2018 (CL: High)

⁶⁴ The Global Fund Indonesia 2018 (CL: High)

4.4 Market Description and Analysis

Retail Market⁶⁵

The retail market in Indonesia for vector control products includes insecticide coils, insecticide sprays or aerosols, household insect repellents, electric insecticides, moth proofers, and others. Presently, coils are widely used in Indonesia due to their low cost, primarily in small cities or rural areas where people have low purchasing power. The retail market for vector control products in Indonesia was estimated to be ~USD412 million in 2018. In 2018, the insecticide coil market generated a value of USD160–170 million with the sale of approximately 4000 million insecticide coils. However, owing to factors such as health concerns with the use of coils, spray/aerosols are likely to project growth and replace coils in the coming years. Leading companies in the retail market for vector control products in Indonesia are Megasari Makmur PT (Godrej Group), Johnson Home Hygiene Products PT (SC Johnson & Son Inc.), Suryamas Mentari PT (Bagus Group Indonesia), and Fumakilla Indonesia PT (Fumakilla Ltd.). Leading brands in the retail market are Baygon, Hit, Vape, Bagus, and others.

Donor Market

The vector control and prevention market in Indonesia is primarily funded by The Global Fund. Other international funding agencies in Indonesia are UNICEF, USAID, CDC, World Health Organization, Bill & Melinda Gates Foundation, National Institute of Allergy and Infectious Diseases, Unitaid, and Wellcome Trust. In 2018, The Global Fund invested USD854.8 million for health in Indonesia. Funds received from The Global Fund in Indonesia for vector control programs are widely used for awareness campaigns, distribution of LLINs, and provision of other medical treatments for malaria, dengue, and other VBDs. In regions such as Bali and DKI Jakarta, wherein elimination of malaria is achieved, domestic funds are utilized to maintain the malaria-free status. Most of The Global Fund allocation for 2018-2020 will be used to support the implementation of vector control activities in eastern Indonesia.

TABLE 8: VOLUME AND SALES OF VECTOR CONTROL PRODUCTS IN INDONESIA⁶⁸

Product Class	Indonesia						
	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	3,325	3,675	4,000	0.04	130-135	145-150	160-170
LLINs	3	4	NA	2.25	6.71	9.86	NA
Electric Insecticides	50	57	79	0.70	30-35	40-45	50-55
Spray/Aerosols	38	46	54	3.70	135-140	170-180	190-200
Insecticide Bait	NA	NA	NA	NA	NA	NA	NA
Other Home Insecticides	NA	NA	NA	NA	90-100	105-115	110-125
Leading Brands	Hit, Baygon, Vape						
Leading Companies	Godrej Group, SC Johnson & Son Inc., Fumakilla Ltd						

⁶⁵ FutureBridge Analysis

“Economic and behavioural factors are very important for retail market. In case the product is expensive they will not buy. The individuals do not like the smell of insecticide treated nets, hence they wash the nets, and this reduces the efficacy of nets” – KOL 1

Commentary:

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

FIGURE 11: MARKET SIZE OF VECTOR CONTROL PRODUCTS⁶⁶

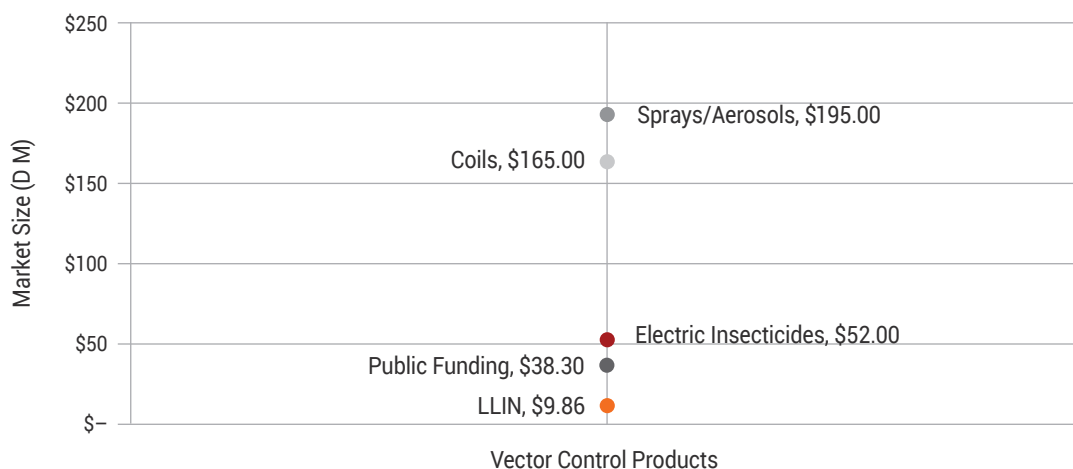














TABLE 9: MALARIA BURDEN FUNDING, RETAIL MARKET⁷⁰

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

Note: High ● Medium ◐ Low ○

⁶⁶ FB Analysis

FIGURE 12: KEY RETAIL BRANDS AND PRODUCTS

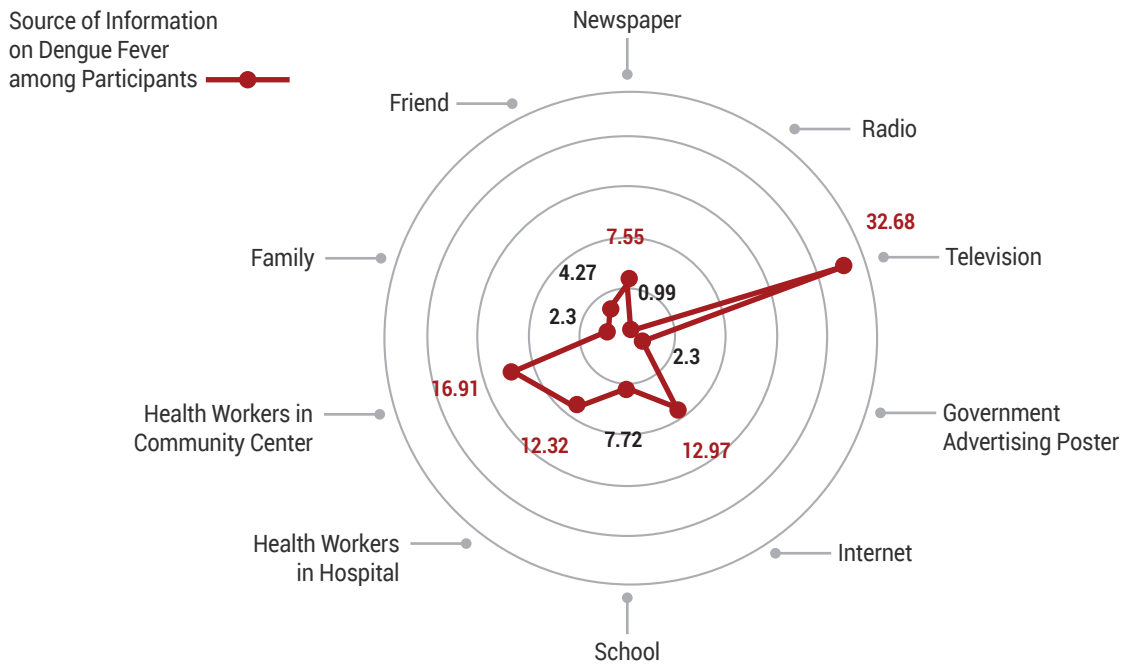
Manufacturer	Electric Insecticides	Coils	Aerosols
Godrej	Hit 	Hit Majik Paper 	Hit 
SC Johnson & Son Inc	Baygon 	Baygon 	Baygon 
Fumakilla Ltd	Vape 	Vape 	Vape 
Reckitt Benckiser Group Plc (RB)		Tiga Roda 	Mortein 
Unilever Group		Domestos 	

4.4.1 Level and Need for Awareness

- A survey was conducted in 2018 with an aim to study Knowledge, Attitude, and Practice (KAP) regarding dengue among the people of Aceh, Indonesia. In 2016, a total of 2,651 dengue fever cases were reported in Aceh (52.02 per 100,000 population). This study included localities in the southwestern (from 0 to 25 m above sea level), central (~1200 m above sea level), and northern (25 to 100 m above sea level) regions of Aceh.
- In Aceh, Indonesia, the knowledge regarding Dengue Fever (DF) was low among inhabitants. One-third of the participants had a positive attitude towards dengue prevention and control measures and reported good preventive practices. There was a strong association between knowledge and attitude regarding DF, and between attitude and preventive practice. However, there was a poor translation of knowledge into preventive practice.
- Programs need to be designed to not only enhance the knowledge and attitude domains but also facilitate the translation of these domains into real preventive measures. To disseminate DF information and increase the translation of knowledge into preventive measures, a religion-based approach might be considered as part of preventive programs and also posters, booklets, and brochures must be distributed to schools, universities, and other various public administrative offices to enhance awareness.⁶⁷

⁶⁷ Harapan H et. al., 2018 (CL: Medium)

FIGURE 13: SOURCE OF INFORMATION ON DENGUE FEVER AMONG PARTICIPANTS⁶⁹



Digital tools

Mobile-based applications can act as an informative tool to attract the public and society's attention and increase awareness and surveillance regarding vector-borne diseases.

Mobile apps developed in Indonesia are listed below:

Bayer Mosquito Learning Lab

- In 2017 Bayer introduced the Mosquito Learning Lab, an online learning tool to raise dengue awareness in Jakarta translated into Bahasa, as part of the ASEAN Dengue Day activities.
- Bayer also introduced Bayer Mosquito Quest – a virtual reality experience that complements the Mosquito Learning Lab.

5. Regulatory Pathways

Insecticides that are used for the control of VBDs such as Malaria, Dengue, Lymphatic Filariasis and Chikungunya go through a regulatory process and registration in the country prior to their use. Insecticides are regulated and registered by the Pesticides Board under the Ministry of Agriculture (MoA), Indonesia. The regulatory authority is responsible for the scrutiny and approval of pesticides belonging to Chemical, Microbial and Biochemical classes.

The pesticide registration process includes the scrutiny of dossiers containing legal, scientific and statutory information by experts in the registration authority. In Indonesia, there is a mandatory requirement for in-country testing of the product to be done as part of registration requirement. The trials are to be conducted in government approved institutes. The registration evaluation is done after the in-country trials and based on the requirement, efficacy and safety of the product regulatory approval is granted for use in the country.

The cost of registration is around USD15,000 – 20,000 and the timelines for regulatory approvals would be 18 – 24 months from the time of submission of dossier for registration. Registrations are granted for a period of 5 years and the certificate can be renewed for another 5 years before it expires.

Provisional registration is also granted for limited period for conducting completing trials leading to the full registration of the product. Provisional registration does not permit any commercial activity. 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 the purpose of research or for conducting testing in the country leading to the registration of the product for commercial use.

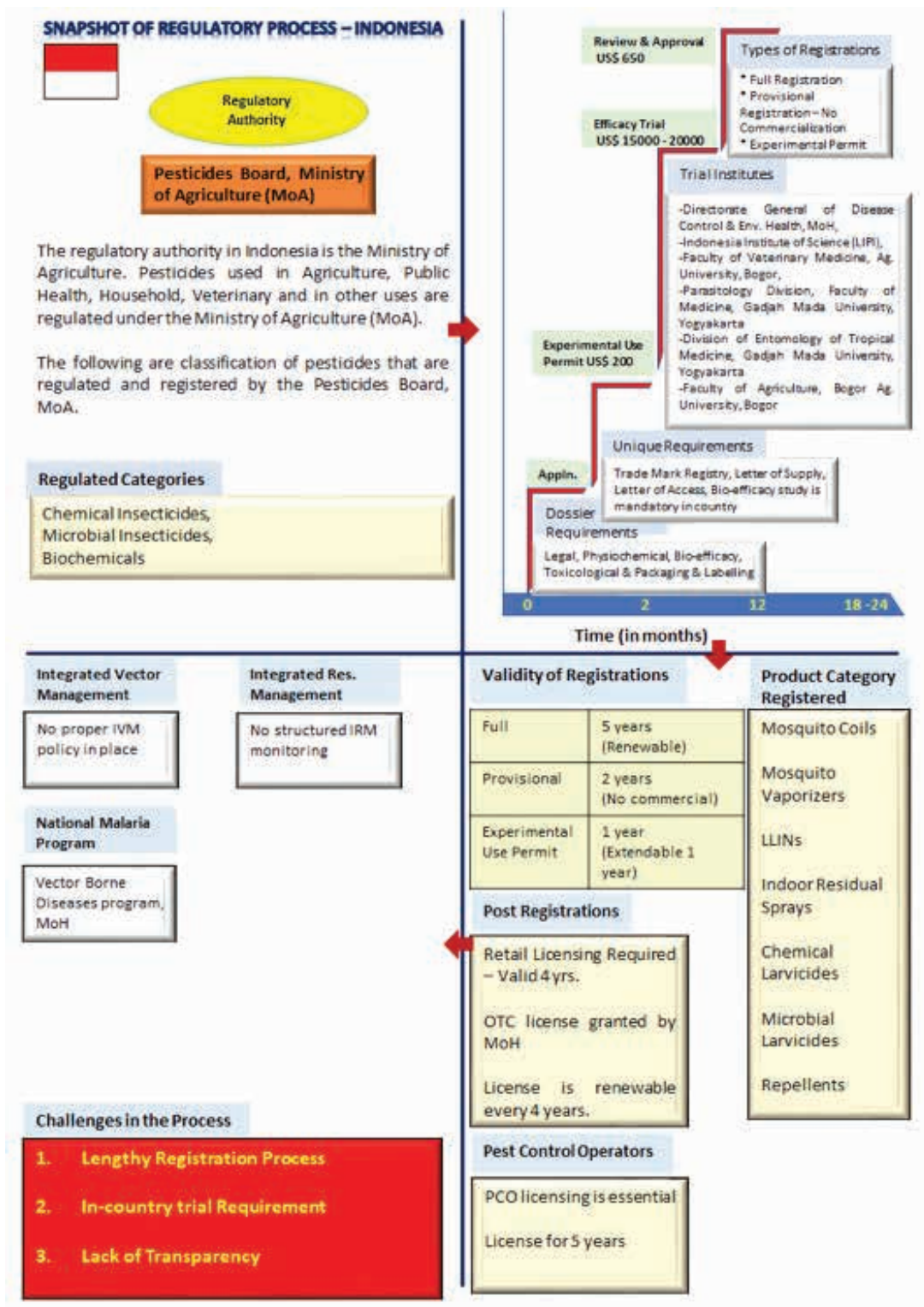
The products that are registered for commercial use are mosquito coils, emanators, LLINs, Insecticides for Indoor Residual Spraying, Chemical Larvicides, Microbial Larvicides, Spatial repellents and Personal repellents.

Post-registration requirements include obtaining a retail license to permit the sale of registered pesticides in retail outlets. A retail license is granted for a period of 4 years and this is also renewable. Apart from this, certain products such as LLINs require a pre or post import inspection by third party inspection agencies such as SGS, Intertek, TUV etc.

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

1. The process of registration is very lengthy
2. In-country trial requirements add to the time as well as cost of registration
3. Lack of transparency in the registration process

FIGURE 14: SNAPSHOT OF REGULATORY PROCESS



6. Market Dynamics

6.1 Market Trends

- **Increase in domestic funding**

An increase in domestic funding was observed from 6% in 2011 to 52% in 2016. In the same year, the committed amount was USD18.9 million, and the amount used for vector control programs was USD20.3 million, which meant that there was a 108% realization of domestic funds.

- **Use of digital tools is increasing awareness and surveillance**

Digital tools such as the Bayer Mosquito Learning Lab, LaCak Malaria, and Pokentik help create awareness, track down disease cases, and monitor the behaviour of clean living.

- **Social marketing**

- Social marketing focuses on changes in health behaviours - the usual target for social marketing are community health workers.
- Board of Family Wellbeing Empowerment (FEW) - a community organization that empowers women to participate in health development in Indonesia.

- **Insecticide coils continue to dominate the rural vector control market whereas other home insecticides category such as spray/aerosol are most preferred amongst the high-income groups**

A large percentage of population with low economic standard is living in Indonesia. This population lays emphasis on low-cost products due to their economic status. The affordability of insecticide coils has contributed to their huge demand in rural areas. Within the home insecticides category, the demand for insecticide coils is challenged amongst urban due to the rapid penetration of newer products, such as sprays/aerosol insecticides. Most of the insecticide coils are sold through traditional channels, such as "tokos" (private storehouse) and "warungs" (a small, neighbourhood convenience shop). However, the insecticide coils sector may decline in the future due to a consumer awareness of health issues and concerns and a shift towards sprays/aerosols.

- **Increase in health concerns spur the demand for electric insecticides**

Electric insecticide is an upcoming category in home insecticides. Electric insecticides consist of products such as vaporizer, electric insect killer racket, UV lamp electrical mosquito killer insecticide trap, and others. There is an increasing emphasis on developing products with fewer side effects on consumer health. Thus, the electric format offers the best solution as it does not produce smoke (like coils) or gas (like sprays/aerosol insecticides). However, limited awareness regarding electric insecticides and as well as their higher cost (compared to other products in this category) have led to restricted market reach.

6.2 Market Drivers

The vector control and prevention market in Indonesia is highly driven by two major factors: (1) A rise in the number of awareness programs that focus on control as well as preventive measures to be undertaken for VBDs; and (2) Partnership among global government bodies, local NGOs, and medical associations to ensure that required medical facilities are provided at an affordable cost and improved quantity.

- **Awareness campaigns**

Awareness campaigns are conducted by government bodies, NGOs, other districts, or local level organizations. These campaigns have helped individuals understand the preventive and control measures for malaria and dengue.

A few of the awareness campaigns are listed below:

- 1 Rumah 1 Jumantik / 3M Plus
- Buzzoff
- Jumart Keliling (Jumling)

- **Increase in global partnership**

Partnership among global donors, government bodies, NGOs, medical associations, and pharmacy associations are playing a major role in the control and prevention of malaria and dengue in Indonesia.

For instance, the partnership between:

- The Global Fund and the Ministry of Health – Indonesia & Indonesian Health Dharma Association.
- Roll Back Malaria and District or Province Health Offices to run malaria prevention campaigns.
- Indonesian Medical Association and Association of Pharmacists Indonesia .
- Environmental Health and Disease Control Institute Partnership.

Potential drivers

- **Disease Pattern:**

In Indonesia, reported cases of malaria had been the highest among all VBDs. Around 70% of malaria cases are from the easternmost provinces of Indonesia, which constitute ~8% of the total population. Dengue is hyperendemic, and all four serotypes are present in at least 400 of 497 districts in Indonesia, with more than 200 million people at risk for dengue infection. In 2015, Filariasis cases reported were 13,032. The prevalence of schistosomiasis is confined to three areas only (Napu Valley, Lindu Valley, and Bada Valley), where it is reported as ~3.5%. Japanese encephalitis is prevalent in 29 provinces. Whereas, the incidence of Chikungunya has shown a downward trend and there are no reported cases of Zika in Indonesia.

- **Impact of diseases:**

Among all VBDs, malaria is a high endemic disease, affecting approximately 70% of the total population. In 2015, there were 129,650 cases of dengue reported with 1,071 fatalities. Hence, there is a huge burden of malaria and dengue as compared to all other VBDs.

- **Economic Dynamics:**

A large sum of money is supplied by The Global Fund for prevention and control activities for VBDs in Indonesia. Domestic funding is available for the maintenance of malaria elimination program. Health expenditure is ~3.5% of GDP in Indonesia. Out-of-pocket expenditure is ~50% of the total healthcare expenditure. The estimated cost for malaria elimination in Indonesia is USD2 billion for 2016-2030, an average of USD145 million per year. The treatment cost for dengue in Indonesia ranges from USD12.5 to USD495.

- **Technology:**

Increase in the use of digital tools such as Bayer Mosquito Learning Lab, LaCak Malaria, and Pokentik help create awareness, track down disease cases, and monitor the behavior of clean living. Rise in social marketing has helped change the health behaviour of the population.

6.3 Success Stories

3M Plus activities to cut life cycle of mosquito are successful in Indonesia.⁶⁸ The 3Ms in the activities are

- **Menguras:** This about to clean and brush water container/water storage once a week.
- **Menutup:** Cover all domestic water storage.
- **Mendaur ulang:** to reused or recycle the garbage such as: discarded food and beverage containers, used tires, plastic, bottle, can, etc.

Additional means to avoid human-vector contact include repellents, mosquito nets for sleeping children, using larva predator such as fish in water container and also using of mosquito repellent plants. The Ministry of Health in Indonesia socialized and implemented this project in residential as well as the working areas of health port office in airport and seaport. This programme was successful in Indonesia to prevent mosquito breeding.

Other programs such as Roll Back Malaria (RBM), the Village Malaria Post and community self-reliance, partnership with environmental health and disease control institute, port health office, medical associations and associations with pharmacists are successful programs in Indonesia to prevent malaria vectors.

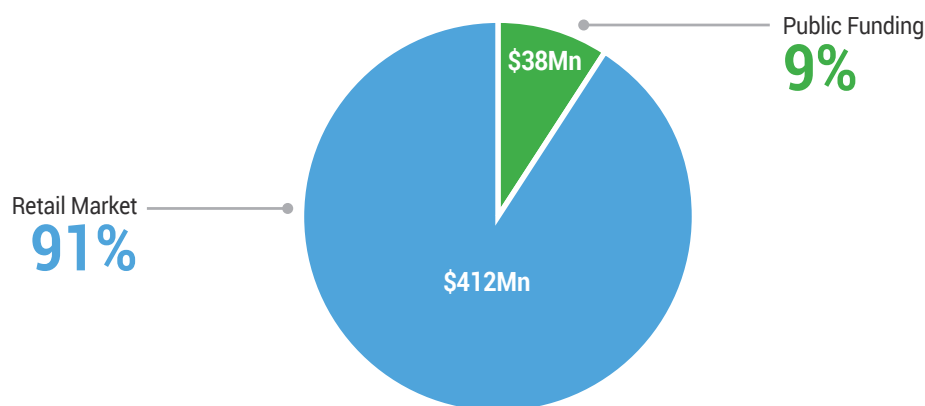
7. Market Access Analysis

The following points need to be considered to enter the Indonesian market:

- **Partnerships:** Any organization willing to enter the Indonesian vector control market should try to build strategic partnerships with the Ministry of Health – Indonesia. It can also focus on developing multi-organization partnerships with medical and pharmacy associations.
- **Products:** The population affected by vector-borne diseases is too huge to cater to. Earlier, activities carried out were the mass distribution of LLINs to the high endemic regions to prevent VBDs. Hence, the entry strategy for any new organization is to focus on mass distribution campaigns of LLINs, as coils and aerosol sprays form a major part of the retail market.
- **Manufacturers / Suppliers & Distribution Strategy:** Key manufacturers/suppliers of LLINs in Indonesia are Bayer, BASF, Vestergaard, and DCT. Companies should opt for mass distribution of LLINs as an initial step to ensure that products are available at subsidized rates. There has to be continuous monitoring of LLINs distributed to check for liability and maintenance of continuous distribution policy.
- **Awareness Campaigns:** Building awareness among the population regarding prevention and intensity of diseases is of utmost importance to control the spread of VBDs. Awareness campaigns emphasizing on education regarding the clean environment, preventive measures, and basic medical help in case of contracting diseases should be provided by local bodies and NGOs, such as PERDHAKI, ICMF, and LPMK in Indonesia.

All programs mentioned above should be implemented at the provincial and village levels, and the sub-health centre at a full/partial subsidized rate.

FIGURE 15: SHARE OF VECTOR CONTROL MARKET SPENDING (USD MILLION), 2017-18



⁶⁸ KOL Opinion

8. First Conclusions

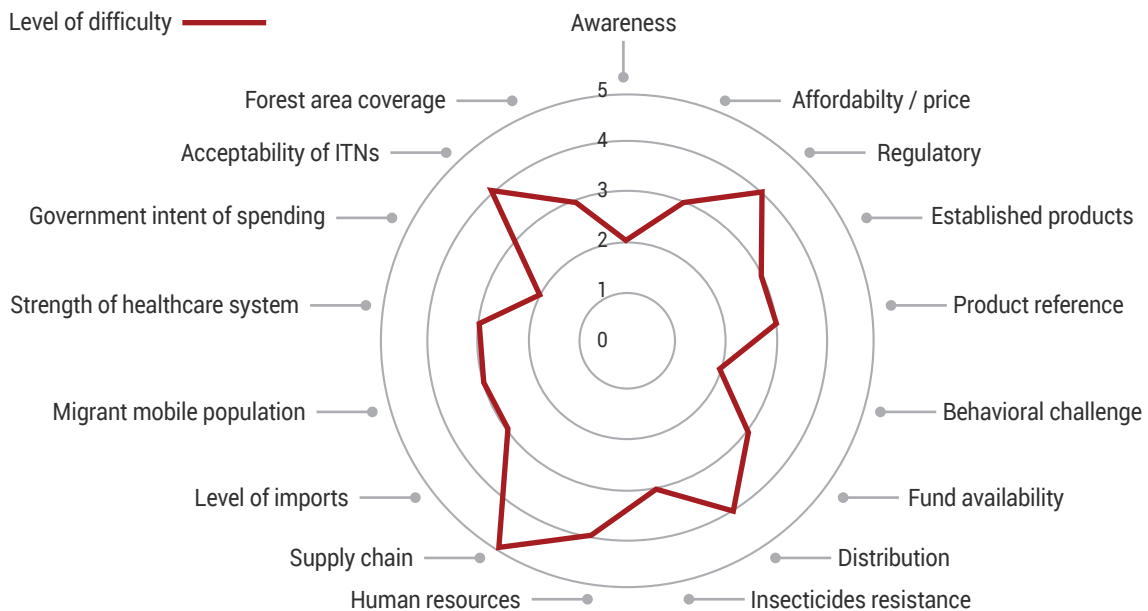
How to enter the market?

Organizations willing to establish their base in the Indonesia vector control market should focus on strategic partnerships with government organizations, or local bodies, or NGOs to enable the widespread distribution of nets, as LLINs are widely used in Indonesia. Strong focus on awareness campaigns and collaboration with medical and pharmacy associations, educational institutes, community health workers, and related stakeholders, among others will also help increase their market reach. Further, this will help knowledge penetration at the local level and ensure prevention and control of vector control diseases.

Organizations can also focus on entering the retail market by promoting their product categories, such as insecticide sprays/aerosols, insecticide coils, insecticide baits, and repellents.

However, high cost of the supply chain, low acceptability of ITNs, and lack of a streamlined regulatory process are key challenges for vector control products in Indonesia.

FIGURE 16: CHALLENGES FOR NEW PRODUCTS IN INDONESIA⁶⁹



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

⁶⁹ FutureBridge Analysis

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. Deconcentration Budget Ceiling in 2019

TABLE 10: DECONCENTRATION BUDGET CEILING IN 2019

Province	Budget Ceiling (USD)	Province	Budget Ceiling (USD)
DKI Jakarta	9,736	Sulsel	30,546
Jawa Barat	32,858	Sultra	28,599
Jawa Tengah	38,595	Maluku	52,931
DI Yogya	17,907	Bali	20,862
Jawa Timur	22,253	NTB	18,515
Aceh	41,690	NTT	76,704
Sumut	57,197	Papua	81,568
Sumbar	30,424	Bengkulu	20,636
Riau	18,654	Malut	35,358
Jambi	24,079	Banten	92,49
Sumsel	28,634	Babel	8,866
Lampung	21,123	Gorontalo	8,837
Kalbar	27,834	Kepri	26,130
Kalteng	29,520	Papua Barat	72,012
Kalsel	15,647	Sulawesi Barat	15,734
Kaltim	19,002	Kalimantan Utara	6,120
Sulut	20,602	Total	993,022
Sulteng	24,600		

2. Confidence Level for Sources Used in Secondary Research

The following criteria used to define the confidence level of secondary sources used in this report are listed below:

High:

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

Medium:

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

3. 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/1,000) (2017)	>50	5-50	<5
LLINs (Million) (2017)	>10	5-10	<5
Public Funding (USD Million) (2017-18)	>50	30-50	<30
Public Fund (D)/Person at Risk	>10	2-10	<2
Retail Market (USD Million) (2018)	>100	50-100	<50
Est. Funding for LLINs (% of Public Fund)	>25%	10-25	<10

4. Malaria Burden Funding, Retail Market – Data

Parameter	Indonesia
Population at Risk 2017	263
Incidence of Malaria (2017)	5.8
LLINs (2017)	4.4
Public Funding (2017-18)	38.3
Public Fund (D)/person at risk	0.5
Retail Market (2018)	412
Retail Spending (D)/person at risk	1.6
Est. funding for LLINs (% of Public Fund)	26%