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Vector Control in the Indo-Pacific: Market Access Landscape

Country Report

Vietnam

INNOVATIVE VECTOR CONTROL CONSORTIUM

November 2019

Contents

List of Tables

List of Figures

Abbreviations

ASEAN	Association of Southeast Asian Nations
BVBD	Bureau of Vector-Borne Disease
CHC	Community Health Centre
CAGR	Compound Annual Growth Rate
GDP	Gross Domestic Product
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
HEMA	Health and Environmental Management Agency
IEC	Information, education and communication
IRS	Indoor Residual Spraying
JE	Japanese Encephalitis
KAP	Knowledge, Attitude and Practice
LMIS	Logistic Management Information System
LLINs	Long-Lasting Insecticidal Nets
LLIHNs	Long-Lasting Insecticidal Hammock Nets
MDG	Millennium Development Goals
NGO	Non-Governmental Organization
NIDQC	National Institute of Drug Quality Control
NIMPE	National Institute of Malariology, Parasitology and Entomology
NMCP	National Malaria Control Program
PNG	Papua New Guinea
SEA	South-East Asia
NMCP	The National Malaria Control Programme
PMI	The President's Malaria Initiative
PQ	Pre-qualification
RAI2E	Regional Artemisinin Initiative 2 Elimination
UNICEF	United Nations International Children's Emergency Fund
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VBD	Vector Borne Disease
VHVs	Village Health Volunteers
VMWs	Village Malaria Workers
WHO	World Health Organization
WTP	Willingness-to-pay

1. Executive Summary Vector Control

Vietnam is the 15th most populated country in the world

Vietnam is a South-East Asian lower middle-income country with an estimated population of 97 million. As of 2019, it is 15th most populated country in the world. The government of Vietnam is actively working on improving the infrastructure of the region, although it is still poor. Inadequate roads, communications, and utilities hinder foreign investment from doing business in the country.

Particularly in the southern part of the country, malaria and dengue are more prevalent

Currently, Vietnam is faced with an opportunity to achieve the elimination of malaria as mandated in the National Strategy for Malaria Control and Elimination in the Period 2011–2020, and Orientation to 2030. Convenient antimalarial combinations still exist but are failing fast; potent tools for vector control are available but could be undermined quickly by the development of insecticide resistance, and financial support from external funding partners continues to flow but is likely time-limited.

Mosquito-borne illnesses, especially malaria and dengue fever, are prevalent in Vietnam, particularly in the southern part of the country. However, Vietnam has had remarkable success in malaria control and is now working towards strategies to eliminate the disease. Various organizations together are working towards malaria elimination.

The grants from the Global Fund have contributed significantly towards diminishing the disease burden in 31 provinces of Vietnam

The Global Fund to Fight AIDS, Tuberculosis and Malaria (GFATM) and WHO are major international bodies providing funds for malaria control in Vietnam. From 2015-2017, the Global Fund has contributed USD25.9 million, and WHO has provided USD9.6 million. The grants from the Global Fund have contributed significantly to diminishing the disease burden in 31 provinces of Vietnam by providing treatment and preparing them for malaria elimination.

The procurement channels for vector control products in Vietnam include the traditional donor channels and retail channels

Various procurement channels for donor products include national government bodies, Non-Governmental Organizations (NGOs), and community health services. Distribution channels for the retail market include grocery stores, supermarkets, convenience stores, hypermarkets, e-commerce, general stores, and hawkers. Global donors are active in the country and are the primary source of donor-driven vector control products such as long-lasting insecticide-treated nets (LLINs) and long-lasting insecticide-treated hammock nets (LLIHNs). The government of Vietnam recommends community re-treatment activities for LLINs across the country.

The National Malaria Control Program (NMCP), the National Institute of Malariology, Parasitology, and Entomology (NIMPE), and the National Institute of Drug Quality Control (NIDQC) are agencies responsible for procurement and supply chain management of malaria products in Vietnam. Long-lasting insecticidal nets are distributed via mass-campaigns in a 3-year cycle. The number of LLINs needed is forecast and procured by the Global Fund; any lag in this is filled by USAID. UNOPS acts as the procurer for the government, and the government allocates these commodities to the health centres for further distribution.

The Vietnam retail market for vector control products was estimated to be ~USD136 million in 2018

The majority of the retail market is driven by direct purchase by the end users; no mass campaigns are done for their distribution. The retail market in Vietnam consists of various consumer products such as coils, vaporizing mats, aerosols, and repellent (lotions and wipes), of which Jumbo, Raid, Mosfly, and Falcon are some of the products largely used in Vietnam. The Vietnam retail market for vector control products was estimated to be ~USD136 million in 2018. The spray/ aerosols product segment accounted for ~80% of the retail market.

Awareness campaigns and initiatives are helping to eliminate malaria in Vietnam

The vector control market in the country is growing, due to factors such as a surge in the use of digital tools to raise awareness about VBDs in Vietnam, and increasing awareness campaigns to enhance vector control and prevention activities. Irrespective of the driving factors, the market faces a few challenges as well.

The cross-border migrant population is one of the key challenges that need to be addressed to eliminate VBDs from the country.

The major challenges are malaria vector insecticide resistance, the outdoor and early evening biting behaviour of primary vectors, product quality, and the provision of effective protection for forest-goers. Other than this, the quantification of LLIN/LLHN requirements has been problematic. Over-allocation of LLINs, net re-treatment and IRS were observed in some areas, while there were significant gaps in others. In order to eliminate VBDs in Vietnam, it is necessary to intensify efforts toward creating public awareness about the correct use of protective measures. It is also vital to develop and implement effective integrated vector management strategies (such as combined ITNs/LLINs and IRS, effective entomological surveillance and research) in the country.

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

Vietnam is a South-East Asian nation with a population of about 97 million. According to new country classifications by income level (World Bank 2018-2019), Vietnam is a lower middle-income country with a gross domestic product (GDP) of about USD2000 per capita per year. Its health-care management system and service are organized into four administrative levels: central, provincial, district and commune.

The country is achieving developmental goals in healthcare. For instance, there is a reduction in the maternal mortality ratio, and infant and under-5 mortality rates. Life expectancy at birth is 70 years for men and 76 years for women. Moreover, morbidity and mortality patterns are shifting from communicable to non-communicable diseases.

2.1.1 Geography

Vietnam is located in Southeast Asia, in the south-eastern extremity of the Indochinese peninsula. The country occupies about 331,688 square kilometres of land, has 3,260 kilometres of coastline, and shares borders with China in the North, and Laos and Vietnam in the West. The country has 63 provinces with 595 districts and 9,050 communes. It has tropical lowlands, rolling green hills, and densely forested mountains.[1] Low-level land covers about 20% of the country's area. Vietnam has a tropical monsoon climate, with a humidity averaging 84% throughout the year.

[1] WorldAtlas (CL: Medium)

2.1.2 Demographics

Vietnam is the 15th most populated developing country in the world, with an unevenly dispersed population; clustering is heaviest along the Gulf of Tonkin and South China Sea, with the Mekong Delta (in the south) and the Red River Valley (in the north) having the largest concentrations of people.[2] The total population of Vietnam crossed more than 90 million in 2018. Ho Chi Minh City is the most populated, followed by Hanoi, the capital of Vietnam.

2.1.3 Economic Situation

Vietnam has one of the fastest-growing economies among south-east Asian countries and is aiming to become a developed nation by 2020. Its GDP growth has been mainly powered by the growth of the industry, such as the construction and services sectors, facilitating the economic transformation of the country. With a GDP growth rate of 6.8% in 2017, the "industry and construction" sector contributed 2.8% of the total economic growth; the "Services" sector contributed 2.9% and the "Agriculture, Forestry and Fishery" sector contributed only 0.4% of the total GDP growth rate.[3]

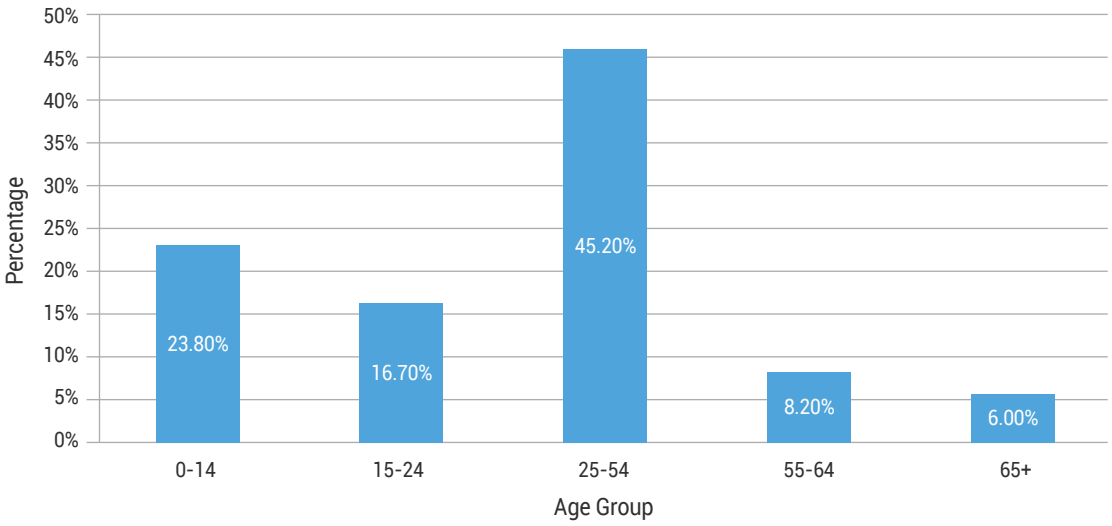
2.1.3.1 Employment

Over the last decade, Vietnam has shifted from an agricultural to an industrial and service economy. The share of people working in the agricultural sector in rural areas has gradually declined from 56.8% in 2005 to 43.6% in 2015. The decrease can be partially attributed to foreign investments in the country. Nevertheless, the agricultural sector is still the primary source of employment for people in the rural areas, with only 21.4% working in the services sector and 20.5% in the construction sector. Another important employment sector is 'wholesale and retail' services, which employs 7.1% of rural youth.[4]

2.1.3.2 Others (Internet usage, Education, etc.)

Vietnam is one of the major emerging nations of the Association of Southeast Asian Nations (ASEAN) region. It has shown the fastest rate of development and growth in various sectors including telecommunication and internet usage. Approximately 49 million people were using internet services in the year 2016, of which 49% were male used and 51% female.

FIGURE 1: VIETNAM POPULATION STRUCTURE BY AGE [5]



Most of the country's population is in the 15-54 age group and are the main target audience for internet usage.

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[2] CIA.Gov (CL: Medium)

[3] The General Statistics Office (CL: High)

[4] OECD (CL: High)

[5] Vietnam Business (CL: Medium)

TABLE 1: VIETNAM INTERNET USER BEHAVIOUR[6]

Top 3 app categories used daily	
Social networking*	94%
Search	77%
Messaging / communication	61%

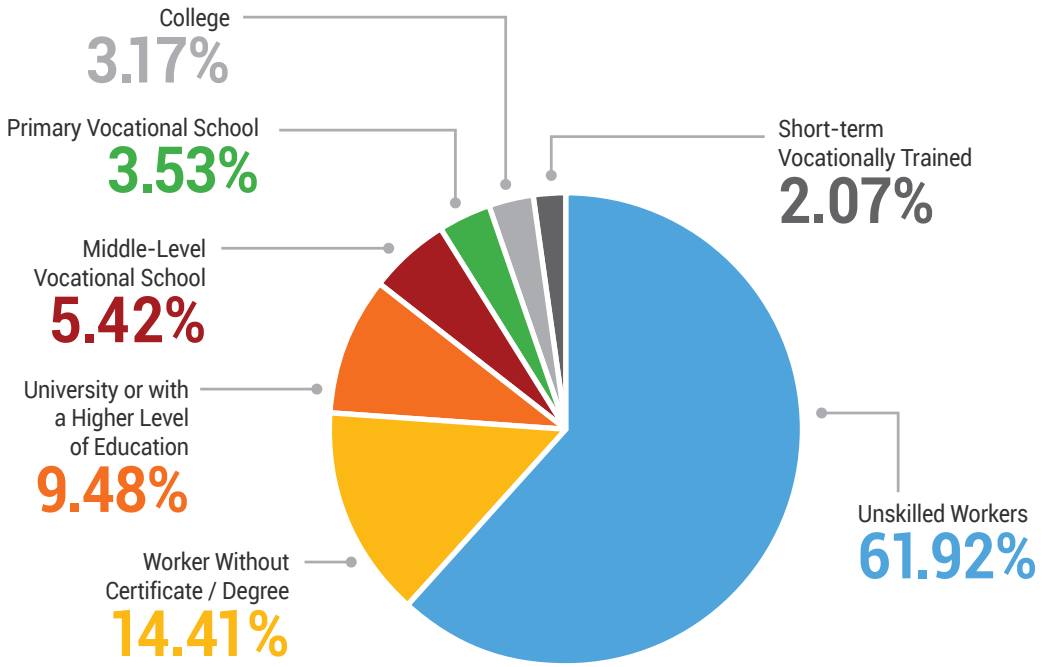
*Facebook, YouTube, and Instagram are amongst the top social networking apps used in the country. Due to this, they can be used to spread awareness about various social problems in the country (such as dengue and malaria).

Education:

Vietnam's education system consists of primary education (Grades 1-5, starting at age 6), lower secondary (Grades 6-9), and upper-secondary (Grades 10-12). There is also pre-primary education (for ages 3-5), secondary vocational training schools, and diverse types of post-secondary institutions. In 2015, Vietnam had more than 15,000 primary schools, 10,000 lower-secondary schools, and 2,400 upper secondary schools. The education system is governed and regulated by government offices that span the central and local levels and, in principle, by parent-teacher associations and other stakeholder groups.

Despite the education system, Vietnam has a high labour force. The below chart represents the education and qualification level of the labour force.

FIGURE 2: STRUCTURE OF THE LABOUR FORCE BY TECHNICAL QUALIFICATION IN 2017 (%) [7]



Around 62% of the labour force in Vietnam consists of unskilled workers.

[6] Vietnam Business (CL: Medium)

[7] International Labour Organization (CL: High)

2.1.4 Health status

2.1.4.1 Health indicators

Vietnam's health indicators have improved significantly over the years. Life expectancy at birth has increased from 69 in 2000 to 73 in 2013 (Source: Ministry of Health, 2013). The country has also achieved some health-related Millennium Development Goal (MDG) indicators, such as the reduction of the maternal mortality ratio which was 65 per 100,000 live births in 2013 compared to 170 per 100,000 in 1990 (Ministry of Health, 2013). The under-five mortality rate was 23.1 (per 1000 live births) in 2013 compared to 33.8 in 2000 and 50.8 in 1990. Vietnam has achieved polio-free status in 1997 (certified in 2000) and the elimination of neonatal tetanus in 2005 due to high routine immunization coverage (WHO, 2015).

Moreover, Vietnam's morbidity and mortality has shifted from communicable diseases to non-communicable diseases. In 2013, the non-communicable disease incidence was 61.69% (including hypertension, diabetes and cancer) (MoH, 2013).

Listed below are some of the key health indicators.

TABLE 2: KEY HEALTH INDICATORS)[2]

Population	97,040,334 (July 2018)
Urbanization	35.9% of total population (2018)
Sex ratio	1 male(s) / female (2017)
Population growth rate	0.9% (2018)
Rate of urbanization	2.98% annual rate of change (2015-20)

2.1.4.2 Living conditions (Lifestyle)

A robust 15-year commitment helps Vietnam exceed the Millennium Development Goal (MDG) target for water and sanitation. Currently, 98% of Vietnam's more than 90 million residents have access to improved drinking water sources, and 78% of the population uses toilets and latrines that meet international standards.[8]

The WHO, with the government of Vietnam, has supported the training of all the urban water suppliers to implement water safety plans, and The United Nations Children's Fund (UNICEF) has worked with government counterparts to implement the plans in rural areas. Because piped water still only reaches 10% of rural households and 61% of urban households, UNICEF has also been working with the Ministry of Agriculture & Rural Development to promote household water treatment and storage in communities where people don't have access to protected water sources.

Similarly, the use of improved sanitation facilities in Vietnam has more than doubled – from 36% in 1990 to 78% in 2015; open defecation, where people do not use any form of latrine or toilet, has been reduced from 39% to 1% over the same time period.[3]

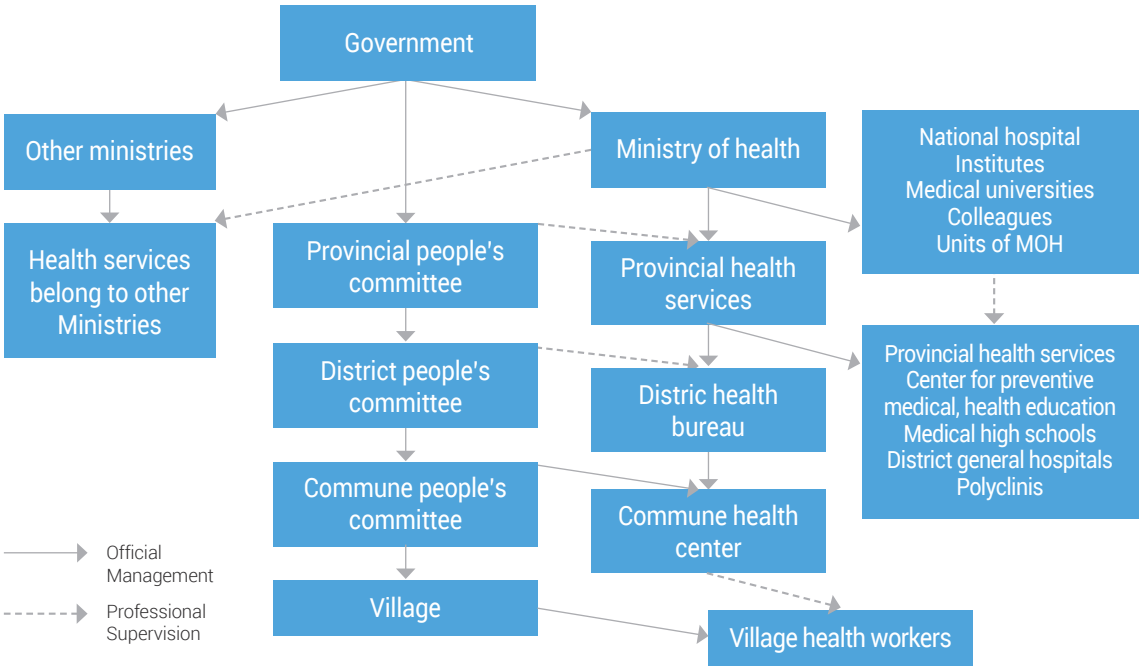
[8] WHO (CL: High)

2.1.5 Healthcare Structure

Vietnam's health system is decentralized. It has a mixed public-private healthcare structure, comprising of 4 administrative levels: central, provincial, district and commune. Currently the public health care sector covers the majority of the country's population.

Provincial, district and commune health facilities are under the proficient management of the Ministry of Health and are responsible for the development and implementation of health care services in the corresponding level. In these levels, the people's committee is responsible for allocating financial and human resources.

FIGURE 3: VIETNAM HEALTHCARE SYSTEM OUTLINE[9]



Despite growing GDP levels, the health care system in Vietnam is facing certain challenges such as a high out-of-pocket expenditure and disparities in health care services. However, the government is trying to improve the system's financial situation and build up new healthcare facilities.

TABLE 3: NUMBER OF HEALTH FACILITIES AND BEDS AND LEVELS 2013)[10]

Types of health facilities	Number of facilities	Number of beds
Central level	46	26,756
Local levels	12,694	2,36,383
Provincial level	447	1,10,549
District level	1214	77,134
Commune level	11,033	48,700
Facilities managed by other ministries	785	12,925
Private hospitals	155	9,501
Total	**13,680**	**2,85,565**

[9] Asian Pacific Journal of Disease Management 2010 (CL: High)

[10] WHO 2016 (CL: High)

FIGURE 4: HOSPITALS BREAKDOWN BY PUBLIC AND PRIVATE[11]

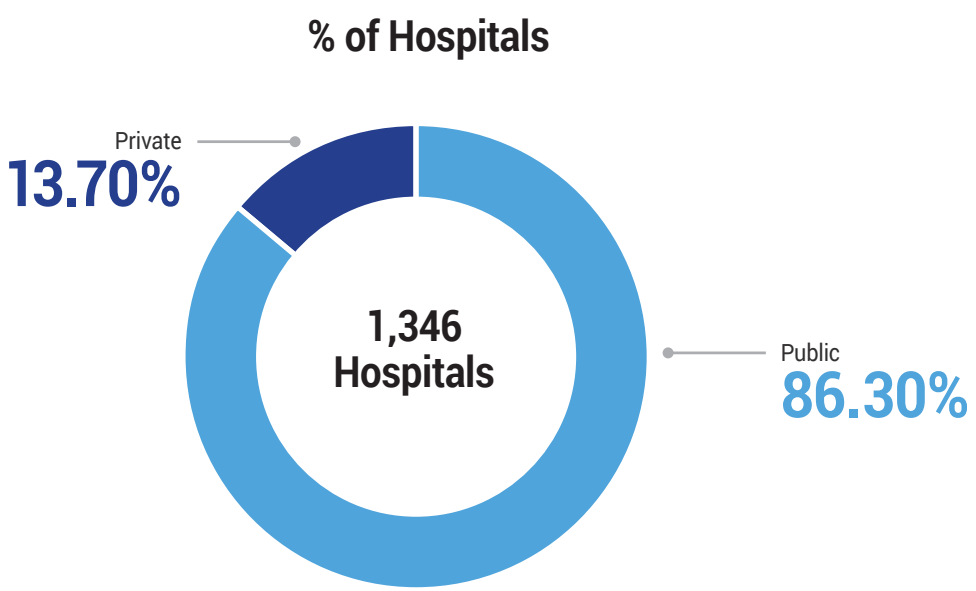
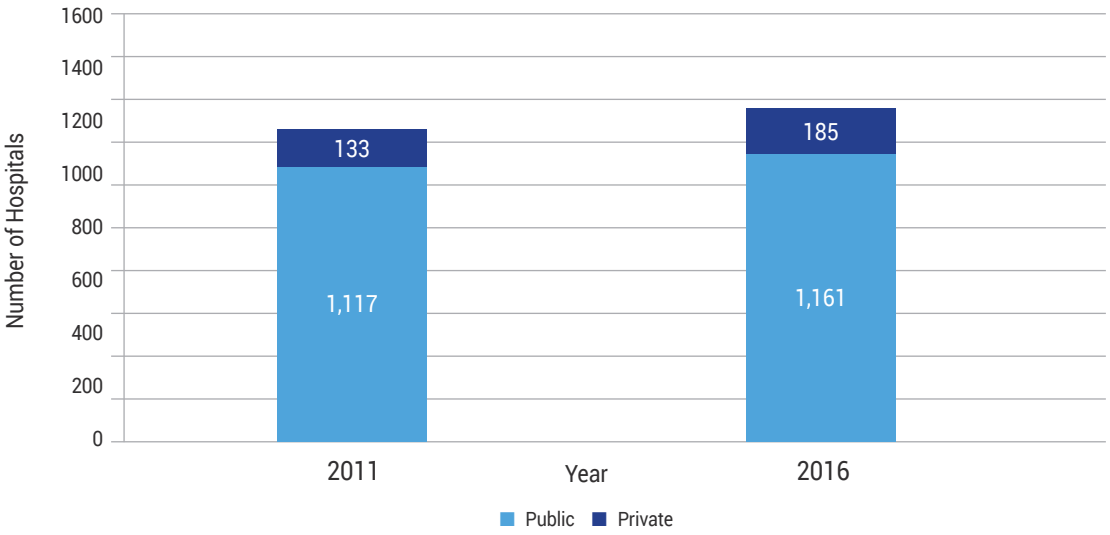


FIGURE 5: NUMBER OF HOSPITALS IN VIETNAM (2011-2016)[12]

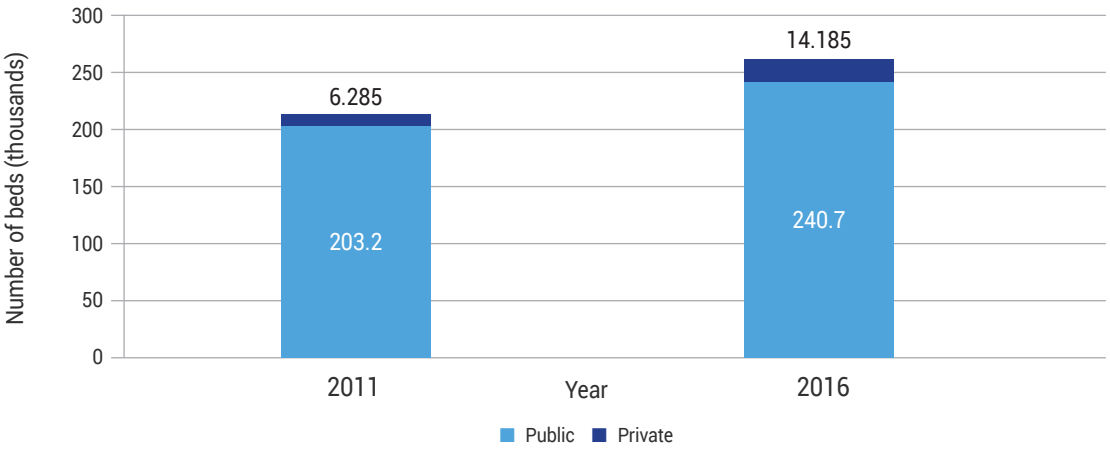


The public sector hospitals grew at a CAGR of 0.8% during 2011-2016, whereas private sector hospitals soared at a CAGR of 6.8%.

[11] General Statistics Office of Vietnam (CL: High)

[12] General Statistics Office of Vietnam (CL: High)

FIGURE 6: NUMBER OF HOSPITAL BEDS IN VIETNAM (2011-2016)[13]



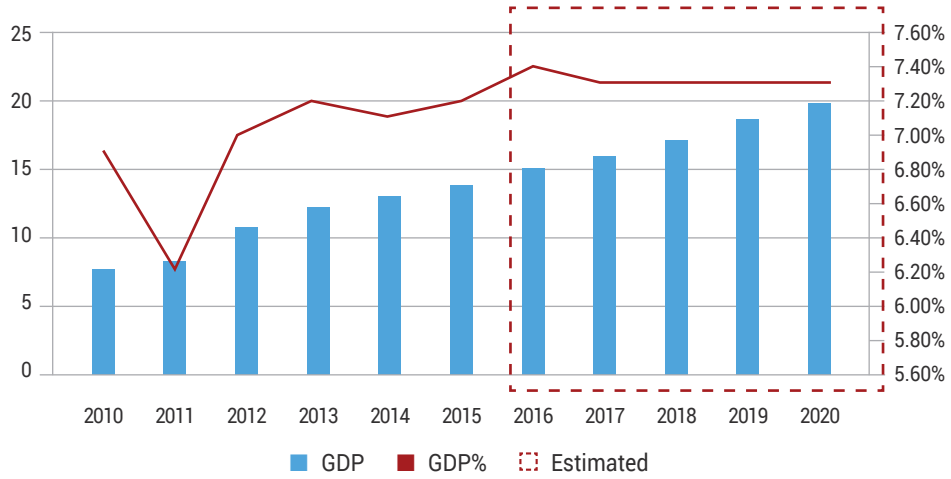
The number of hospital beds in the public sector grew at a CAGR of 3.4% during 2011-2016, whereas in the private sector it grew at a CAGR of 17.7%

2.1.5.1 Healthcare Spending

The health system in the country is funded primarily by the government. Sources of health income include primary sources from the government, health insurance and hospital fees collected directly from beneficiaries of health services.

Vietnam's healthcare expenditure was $16.1 billion in 2017, which represented 7.5% of the country's GDP (Source: Business Monitor International [BMI]).

FIGURE 7: PROJECTED VIETNAM HEALTHCARE EXPENDITURE 2010-2020)[14]



[13] General Statistics Office of Vietnam (CL: High)

[14] Human Resources- Vietnam (CL: High)

3. Vector Control Market Overview

The usage of different vector control tools varies by the types of end users.

TABLE 4: VECTOR CONTROL TOOLS AND END USERS

Vector Control Tools	End Users
LLINs	• Households residents • Forest workers and miners • Cross border travellers • Eastern provinces • Women and children
Fogging	• Government agencies • Private pest control operators
Indoor Residual Spray (IRS)	• Hospitals • Academic Institutions • Corporate & Government Offices • Factories • Households
Larval Control	• Households residents • Hospitals

3.1 Vector Control overview

Malaria and dengue are the most common vector-borne diseases in Vietnam.

3.1.1 Vector Borne Disease (VBD) Trends

Mosquito-borne viruses continue to cause significant global morbidity and mortality, particularly in Southeast Asia. The major vector-borne diseases (VBDs) in the South-East Asia (SEA) region are malaria, lymphatic filariasis, dengue, chikungunya, and Japanese encephalitis.

- **Insecticide-treated nets:** Until 2009, in Vietnam the use of conventional ITNs was higher than of LLINs. However, ITNs are gradually being replaced by LLINs as the funds become available. A large percentage of funds from the Global Fund grants are used to purchase LLINs and LLIHNs (long-lasting insecticide-treated hammocks net). Supplemental single LLINs or LLHNs are also now provided to mobile populations and forest-goers in the country. The government of Vietnam supports re-treatment of conventional nets for those who prefer to use their own bed nets or who live in less endemic areas not targeted for LLINs (depending on the availability and expiry date of insecticides).[15]
- **Indoor residual spraying (IRS):** IRS has been an important tool for vector control in Vietnam since the eradication era. Currently, IRS with an alpha-cypermethrin formulation is carried out as a routine mass preventive measure in more endemic areas. It would also be used as a focal responsive measure in the event of an outbreak. The National Malaria Control Programme (NMCP) also forecasts the use of IRS in response to confirmed transmission foci in elimination settings, but detailed plans have not yet been developed. Moreover, a training of spray teams is conducted annually at the district level.[13]
- **Larval control:** Use of larval control methods is one of the effective methods for vector control in Vietnam. Larviciding has been used to control dengue in various parts of Vietnam, with campaigns to distribute *Mesocyclops* throughout the country. These are tiny crustaceans that kill nearly all mosquito larvae in water-filled containers that mosquitoes use to breed. Using *Mesocyclops* has gained success in all the areas it has been used in.[16]
- **Fogging/thermal fogging:** Thermal fogging is a type of space spraying usually applied by a hand-held or shoulder-carried pulse jet machine, or a two-stroke engine exhaust fog generator; vehicle mounted fogging machines are also available. However, this is not cost-effective for malaria vector control and it is environmentally contaminating. It also often fails to reach the targeted vector and therefore has a limited impact.

[15] WPRO.WHO (CL: High)

[16] Gerald Marten (CL: Medium)

Mosquito-borne illnesses are prevalent in Vietnam, particularly in the south part of the country. Below are few VBD related trends.

- Malaria and dengue are the most common vector-borne diseases in Vietnam.
- Malaria is becoming increasingly focal. In 2015, 211 communes had an API > 1, compared to 488 in 2011. Malaria deaths have decreased from 20 in 2007] to 3 in 2016
- Between August 2016 and July 2017 just six out of 63 provinces/municipalities (Gia Lai, Binh Phuoc, Quang Tri, Dak Nong, Khanh Hoa, Ninh Thuan) together accounted for 66% (1,925/2,903) of total confirmed malaria cases and 81% (1,297/1,601) of confirmed *P. falciparum*. Binh Phuoc alone accounted for 39% of confirmed *P. falciparum*. As elsewhere in the GMS, increasingly malaria is becoming an occupational disease predominantly affecting men
- From January to August 2017, over 90,000 dengue cases have been reported across the country, which is a ~2.5 increase compared to same period in the previous five years (2012-2016).
- Artemisinin-resistant malaria emerged in Vietnam in 2010 and threatens the advances made in malaria control over the previous decade.
- Vietnam has successfully reduced dengue deaths to less than 1 in 1000 cases due to significant scaling-up of dengue prevention and control measures in the last decade.

3.1.2 Burden of Disease

The burden of disease is measured by financial cost, mortality, mobility, among others. In line to this, listed below is information measuring the burden of disease in Vietnam.

- Vietnam has entered the malaria pre-elimination phase. Malaria cases have trended downward over the last two years (2017-2018).
- Malaria mortality has decreased significantly from 41/100,000 people in 2004 to 10/100,000 people in 2016.
- Starting in 2018, malaria interventions are being integrated into the regional RAI2E grant and supervised by the Global Fund Secretariat RAI team.
- In 2014 there were 15,752 confirmed malaria cases. This figure decreased to 4,161 in 2016.
- Deaths due to malaria were six in 2014, three in 2016 and six in 2017.[17]

Reported malaria deaths

Though malaria incidences and deaths have decreased across the country, the malaria burden is still disproportionately affecting certain regions and populations. Malaria transmission in particular is mostly concentrated in hilly, forested areas in southern and central provinces. Among these, Binh Phuoc is the most malaria-affected province in the country, with 1,352/4,548 cases in 2017. This is due to the increase in migrant workers who have limited access to health facilities, as well as high levels of resistance to anti-malarial drugs in the area[18] (Source: WHO).

TABLE 5: MALARIA STATISTICS FROM 2010 TO 2016 IN VIETNAM[19]

	2010	2011	2012	2013	2014	2015	2016
Malaria – clinical & confirmed	53,867	45,588	43,717	35,406	27,868	27,868	27,868
Malaria – confirmed	17,515	16,612	19,638	17,128	15,752	9,331	4,161
Malaria deaths	21	14	8	6	6	3	3
Number of outbreaks	0	0	0	0	0	0	0
Morbidity (/1000 pop)	0.62	0.52	0.49	0.39	0.30	0.21	0.11
API (/1000 at risk)	0.2	1.07	1.18	0.8	1.35	0.77	0.35
Mortality (/1000 pop)	0.02	0.02	0.01	0.01	0.01	0.003	0.003

[17] The Global Fund (CL: High)

[18] WHO (CL: High)

[19] National Malaria Programme Review – Viet Nam (CL: High)

Dengue: This is one of the most common vector-borne diseases in Southeast Asia and has been ranked as the most important mosquito-borne viral disease with epidemic potential in the world. Among all vector-borne viral diseases, the transmission rate of dengue is the fastest in the world. As of August 2017, over 90,000 Dengue cases had been reported across the country since the beginning of the year, which is a ~2.5-fold increase compared to same period of past five years (2012-2016).

Japanese Encephalitis: Japanese encephalitis (JE) is endemic throughout Vietnam. The highest rates of JE disease occur in the Northern provinces around Hanoi and the north-western and north-eastern provinces bordering China. It has seasonal peaks from May through October.[20]

Zika Virus: Zika virus is also transmitted by infected *Aedes* mosquitoes. It causes a self-limiting illness with symptoms lasting 2–7 days, including mild fever, skin rash, conjunctivitis, muscle and joint pain, malaise and headaches. This virus is a risk in Vietnam.

3.1.3 Economic burden of VBD

The economic burden of a disease is one of the important steps to grasp the full scope of vaccination benefits from the social perspective.

- Dengue fever is a major public health concern in many parts of the tropics and subtropics in Asia.
- The percentage of the private economic burden of dengue fever was highest in the low-income group and lowest in the high-income group.
- According to a study, the total cost per dengue episode is USD200 for inpatients and USD62 for outpatients in Vietnam.[21]
- The average cost for a family with a child suffering haemorrhagic dengue fever is USD61.36, of which USD32.73 are direct costs and USD28.73 are indirect costs.[22]

3.1.4 Measures/Initiative for vector control

Vietnam has had remarkable success in malaria control and is now working towards the strategies to eliminate malaria. Various organizations are working together towards malaria elimination.

Several campaigns are being conducted to increase the level of awareness and promote the use of mosquito nets and other vector control measures.

TABLE 6: VECTOR CONTROL AND PREVENTION CAMPAIGNS

Name of the Campaign	Time Period	Target Disease	Coverage	Organization	Digital Campaign	Impact
Programme Meso-Vietnam	2007-2010	Dengue	40 of 45 communes in northern and central Vietnam	The National Institute of Hygiene and Epidemiology (NIHE) and the French Groupement d'Intérêt Publique (GIP)	No	No new cases of dengue were experienced after similar interventions

Following are measures and initiatives undertaken by the government and organizations for vector control in Vietnam.

[20] Disaster management handbook (CL: Medium)

[21] Lee JS, et al., Oct 2017 (CL: High)

[22] The economic impact of dengue hemorrhagic fever on family level in Southern Vietnam (CL: Medium)

Strengthening investment – the WHO and the National Institute of Malaria, Parasitology and Entomology (NIMPE) of Vietnam are organizing a workshop on strengthening investments to maintain achievements towards the elimination of malaria in Vietnam. More than 40 provinces are malaria-free, and with this Vietnam will have achieved all of its targets set out in the 2011-2020 National Strategy for Malaria Control and Elimination. It was among 44 countries with less than 10,000 incidences of malaria per year in 2016 .

Monitoring Malaria drug resistance – Since 2008, the WHO in association with NIMPE and the Regional Institutes of Malaria, Parasitology and Entomology in Quy Nhon and Ho Chi Minh City, are monitoring malaria drug resistance to help prevent its spread with evidence-based interventions. This is achieved by the distribution of long-lasting insecticide-treated bed nets, which have proved to be an effective means of malaria control and continue to play a critical role in reducing disease transmission.[23]

Binh Thuan province – The National Malaria Control Program (NMCP) Vietnam is helping high-risk populations by providing ITNs, spraying insecticides, and performing both early microscopic diagnosis of malaria and treatment (EDTM) with artemisinin drugs in Binh Thuan province (southern Vietnam).[24]

Multi-pronged approach – The National Malaria Control Programme (NMCP) has adopted a multi-pronged approach to control malaria that is broadly in line with best practices in the Greater Mekong Subregion (including Vietnam). In line with the requirements of elimination, case-based surveillance (whereby every case is effectively treated as an outbreak) is being rolled out in all regions, especially the most endemic areas. Information, education and communication (IEC) activities are implemented (primarily through health staff and volunteers) to educate high-risk individuals about malaria prevention and cure, and to mobilize communities to engage in and support malaria elimination efforts.[25]

Dengue – Similarly, dengue is increasingly becoming a cause of death in Vietnam. Various organizations are helping to control dengue fever in Vietnam.

Biological control – In Vietnam, biological control has been used with particular success in community participation programmes involving applications of a small crustacean, *Mesocyclops* (Copepoda), which feeds on the newly-hatched larvae of *Aedes aegypti*. Scientists, in collaboration with health workers, introduced *Mesocyclops* into household water tanks and water jars in rural provinces of northern and central Vietnam.

The Australian Foundation of Peoples of Asia and the Pacific – This aid organization successfully eradicated dengue fever from the northern Vietnamese province of Phan Boi, among others. The organization used the *Mesocyclops* crustacean, (an organism about 1 mm long which eats the larvae of mosquito's that transmit dengue fever) to control *Aedes* breeding from areas such as wells, water tanks, and household water containers. With the help of the Queensland Institute of Medical Research and the Vietnam National Institute of Hygiene and Epidemiology, the community education and clean-up program was also implemented to teach residents about the importance of discarding unused buckets and other containers which can hold stationary water and become potential breeding grounds for mosquitos.[26,27]

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[23] WHO News April 2018 (CL: High)

[24] Van NN, et al., April 2005. (CL: High)

[25] National Malaria Programme Review – Vietnam (CL: High)

[26] Kenyon G, Feb 1999 (CL: High)

[27] Kay B, Feb 2005 (CL: High)

Programme Meso-Vietnam – In the year 2007-2010, the National Institute of Hygiene and Epidemiology (NIHE) and the French Groupement d'Intérêt Publique (GIP) together implemented the "Programme Meso-Vietnam" a public interest group to fight against dengue. Under this program, *Mesocyclops* was as a biological control, as it feeds on the newly-hatched larvae of *Aedes aegypti*. The "Programme Meso-Vietnam" focused on the following two objectives:

- To build the local leadership and capacity for surveillance, diagnosis and integrated control of dengue fever/ dengue haemorrhagic fever
- To reduce mosquito populations through low-cost community-based activities

Local leaders, together with schoolchildren, conducted clean-up campaigns and awareness events. The strategy, which was gradually expanded by health authorities, eliminated the dengue fever vector in 40 of 45 communes in northern and central Vietnam (more than 380 000 people) where the program has been implemented so far. There have been no reported cases of dengue disease in the same area since at least 2002, while incidence in adjacent untreated areas has remained at rates of around 112 cases per 100 000 people.[28]

However, various initiatives and measures are helping Vietnam to achieve its objectives of working towards malaria eliminating and dengue control.

3.1.5 Challenges

The main challenges are malaria vector insecticide resistance, the outdoor and early evening biting behaviour of primary vectors, and provision of effective protection for forest-goers. A few other challenges are listed below:

Quantification: The quantification of LLIN/LLHN requirements has been problematic in recent years. While a bottom–up planning approach is recognized at the central level as being ideal, their request to the provincial level for a bottom–up LLIN gap assessment (meant to inform the development of approximately three-yearly Global Fund funding requests) has been consistently late. This has led to a suboptimal mix of top–down and bottom–up planning for vector control.

Allocation of vector control and personal protection interventions: Over-allocation of LLINs, net re-treatment and IRS were observed in some areas, while there remained significant gaps in others. In some situations, allocations at commune and village levels seemed to be more for the sake of "fairness" rather than based on any clear scientific rationale. Targeting of LLINs and ITNs should be tightened up to focus on achieving total coverage for people in transmission sites. There need to be nationally defined criteria for targeting re-treatment programs.

Product quality: The quality of LLINs and LLHNs procured was inadequate. The polyethylene LLINs procured under RAI in Vietnam were too small, with users complaining that they are unable to tuck their nets under their sleeping mats.

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[28] WHO News April 2018 (CL: High)

4. Market Analysis

4.1 Procurement channels

The procurement channels for vector control products in Vietnam include the traditional donor channels and the retail channels. Large global donors are active in the country and are the primary source of donor-driven vector control products such as long-lasting insecticide treated nets (LLINs) and long-lasting insecticide treated hammock nets (LLIHNs). The government of Vietnam recommends community re-treatment activities for LLINs across the country.

4.1.1 Overview of procurement channels

Vietnam supports free mass distribution for LLINs and targeted indoor residual spraying (IRS) for the prevention of malaria. Moreover, the country has introduced village malaria workers (VMWs) and village health volunteers (VHVs) to provide community-based prevention, diagnosis and treatment, and to extend the reach of services to remote and migrant populations.

Malaria focal points are designated at every district and commune levels. District teams run inter-communal microscopy points and malaria centers. Standby treatment is provided for those entering endemic areas where medical services are not easily accessible.

The public sector provides most institutional and specialty care in the country, although the private sector delivers over 60% of outpatient care. In the area of malaria, the private sector is relatively insignificant.[29]

Enlisted below are the agencies responsible for procurement and supply chain management of malaria products in Vietnam.

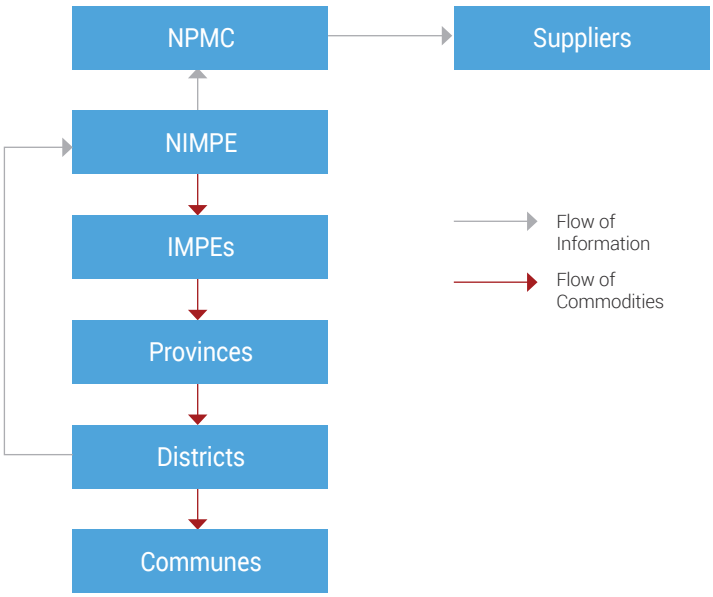
TABLE 7: AGENCIES RESPONSIBLE FOR PROCUREMENT AND SUPPLY CHAIN MANAGEMENT[30]

Sr. no	Activity	Authority responsible
1	Forecasting	National Malaria Control Program (NMCP)
2	Product selection	National Malaria Control Program (NMCP)
3	Procurement	National Malaria Control Program (NMCP)
4	Warehousing	National Institute of Malariology, Parasitology and Entomology (NIMPE)
5	Logistic Management Information System (LMIS)	National Institute of Malariology, Parasitology and Entomology (NIMPE)
6	QA/QC	National Institute of Drug Quality Control (NIDQC)/ National Institute of Malariology, Parasitology and Entomology (NIMPE)
7	Funding sources	Global Fund, WHO

[29] Malaria Supply Chain (CL: High)

[30] Malaria Supply Chain (CL: High)

FIGURE 8: PUBLIC SECTOR MALARIA SUPPLY AND DISTRIBUTION SYSTEM[31]



Dengue is more prevalent in the urban areas and has no specific treatment or cure. However, prevention and intervention can help, depending on how severe the disease is. Dengue can be prevented by avoiding mosquito bites. This can simply be achieved by improving personal care such as using mosquito repellents, reducing skin exposure, and removing stagnant water among others. Unlike malaria prevention products (such as LLINs, and IRS), dengue prevention products are not mass distributed for free in the region and are available in the retail market. Hence, there is no procurement channels for these products.

4.1.2 Stakeholders

Key Stakeholders in Vietnam

Global Bodies

[31] Malaria Supply Chain (CL: High)

Manufacturers

Global Bodies

4.1.3 Procurement channels – Gap analysis

Enlisted below are some challenges identified in the procurement channels.

- **Quantification** – A large proportion of house-holds located in malaria endemic areas are very poor and are unable to afford bed nets. In response to this trend, the government allocates funds to buy bed nets for free distribution to the disadvantaged population. However, there is a huge gap between the population at risk and number of bed nets distributed.
- **Continuous distributions** – Recently, Global Fund funding applications have listed eight mechanisms for the delivery of LLINs through continuous channels; however, there is no evidence of LLINs being delivered through such channels. Nets are not in stock at any level for quick distribution as part of a focused response. Sufficient stocks of LLINs/LLHNs will need to be maintained at provincial, district and commune levels, as appropriate, to support continuous distribution channels.
- **Monitoring and evaluation** – Monitoring and evaluation (M&E) of LLINs and IRS with respect to their coverage, quality and utilization, is not organized. Global Fund-supported LLINs are reported separately from Government-supported ITNs and IRS, and as a result there is no clarity on the percentage of the population protected with vector control. M&E and reporting on vector control and personal protection needs to be strengthened and aligned with standard protocols.

Moreover, one of the major gaps in Vietnam's National Malaria Control Programme (NMCP) is the lack of services for the most remote and impoverished communities where the burden of disease is high. These villages usually have difficult access to health services due to geographic, cultural and socio-economic factors.[32]

4.2 Sponsors & Payers

Key Stakeholders in Vietnam

TABLE 8: STAKEHOLDERS AND IMPLEMENTATION PARTNERS[33]

Funding Sources	Govt. and Global Fund to Fight AIDS, Tuberculosis and Malaria
Procurement	Ministry of Health/ National Malaria Control Program (within BVBD)
Implementing agency	Bureau of Vector-Borne Disease
Storage and distribution	Bureau of Vector-Borne Disease

Note: BVBD: Bureau of Vector-Borne Disease

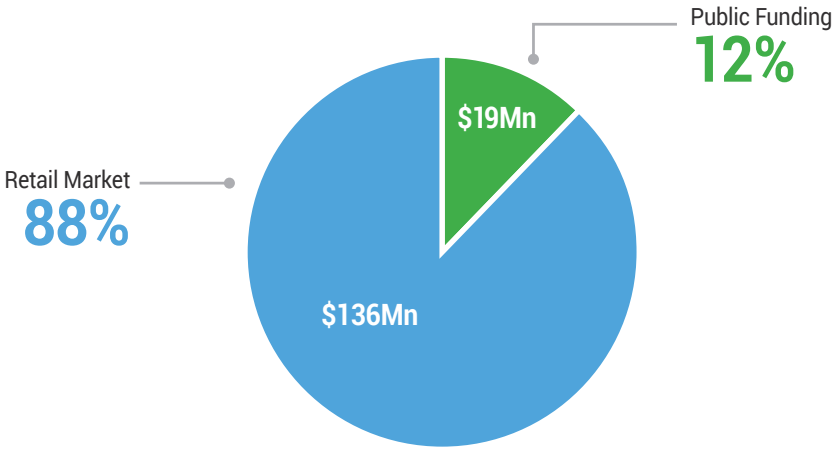
[32] Malaria Supply Chain (CL: High)

[33] Malaria Supply Chain (CL: High)

4.3 Vector Control related spending

In Vietnam, malaria is at the elimination stage; on the other hand, dengue incidence is increasing across the country. The vector control programs are primary funded by the Global Fund and the WHO. As Vietnam is nearing malaria elimination, government funds have increased for the year 2017 as compared to 2016 and 2015.

FIGURE 9: SHARE OF VECTOR CONTROL MARKET SPENDING ($MN), 2017-18[34]



4.3.1 Funding

One of the biggest public health successes of the 21st century is fighting against vector borne diseases, especially malaria. This was possible due to heavy funding from various international organizations such as the Global Fund, The President's Malaria Initiative (PMI), the Bill & Melinda Gates Foundation, and the World Health Organization, among others across the globe.

TABLE 9: PRIVATE SECTOR AND EXTERNAL FUNDING IN THE VIETNAM[35]

Public-private partnerships	No
Main source of funding	GFATM
Other key sources of funding	WHO

Note: WHO – World Health Organization, GFATM – Global Fund to Fight AIDS, Tuberculosis and Malaria

4.3.1.1 National funding

National funds have contributed to declining disease burdens by providing treatment and preparing for malaria elimination in Vietnam.

4.3.1.2 International funding

International organizations like Global Fund and the WHO are the main ones providing

TABLE 10: FUNDING FOR MALARIA CONTROL (CONTRIBUTIONS REPORTED BY COUNTRIES) USD 2015-2017[36]

Year	Government (NMP)
2015	2,666,666
2016	8,01,554
2017	3,022,523

[34] FB Analysis

[35] Malaria Supply Chain in the Greater Mekong Sub-region (CL: High)

[36] The World Malaria Report 2018 (CL: High)

4.3.1.2 International funding

International organizations like Global Fund and the WHO are the main ones providing funds for malaria control in the country.

Global Fund grants have contributed to declining disease burdens by providing treatment and preparing for malaria elimination for 31 provinces in Vietnam.

Listed below are the contributions:

TABLE 11: FUNDING FOR MALARIA CONTROL, (CONTRIBUTIONS REPORTED BY COUNTRIES) USD 2015-2017[37]

Year	Global Fund	WHO	Other Contributions*
2015	5,528,000	5,60,000	2,00,000
2016	11,088,506	2,00,764	2,00,000
2017	9,324,657	2,00,000	5,00,000

Note: *Other contributions as reported by countries: NGOs, foundations, etc.

4.3.2 Funding Gap

Global Fund-supported districts in Vietnam are dependent on the Global Fund for 55–80% of their malaria-related budgets, and this external funding is uncertain. Financial planning seems to require strengthening in some areas. There were no plans for sustainability. Increasing the state budget allocation for the CHC level seemed unlikely as there is a cap for each province and for each sector, and the majority of the budget is spent on salaries.[38]

4.4 Market Description and Analysis

Retail Market:

The majority of the retail market is driven by direct purchase by the end users; no mass campaigns are done for their distribution. There is less private manufacturing in Vietnam as the risk factor is very high, and the profit margins are very low for the manufacturers to individually create a retail market for their own products.[39]

The retail market in Vietnam consists of various consumer products such as coils, vaporizing mats, aerosols, and repellent (lotions and wipes), of which Jumbo, Raid, Mosfly, and Falcon are some of the products used in Vietnam. Fumakilla Ltd, SC Johnson & Son Inc., Mosfly International Sdn Bhd, and Comet Vina Co Ltd, are some of the leading players in the vector control retail market in Vietnam.

The spray/aerosols product segment of the retail vector control market accounted for a market size of approximately USD100-115 million for the year 2018, followed by the insecticide coils product segment valued at USD25-30 million. Moreover, it is estimated that 750 million insecticide coils were sold in 2018 followed by spray/aerosols.

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37 The World Malaria Report 2018 (CL: High)

38 National Malaria Programme Review – Vietnam (CL: High)

39 WHO, Dengue Bulletin (CL: High)

Donor Market:

Long-lasting insecticidal nets are distributed via mass-campaigns in a 3-year cycle. In Vietnam people spend considerable amounts of time away from houses at night so along with LLINs, hammock nets (LLIHNs) are also distributed via mass campaigns. The number of LLINs needed are forecast and procured by the Global Fund; any lag in this is filled by the USAID. UNOPS acts as the procurer for the government; and the government distributes these commodities to the health centers for further distribution.

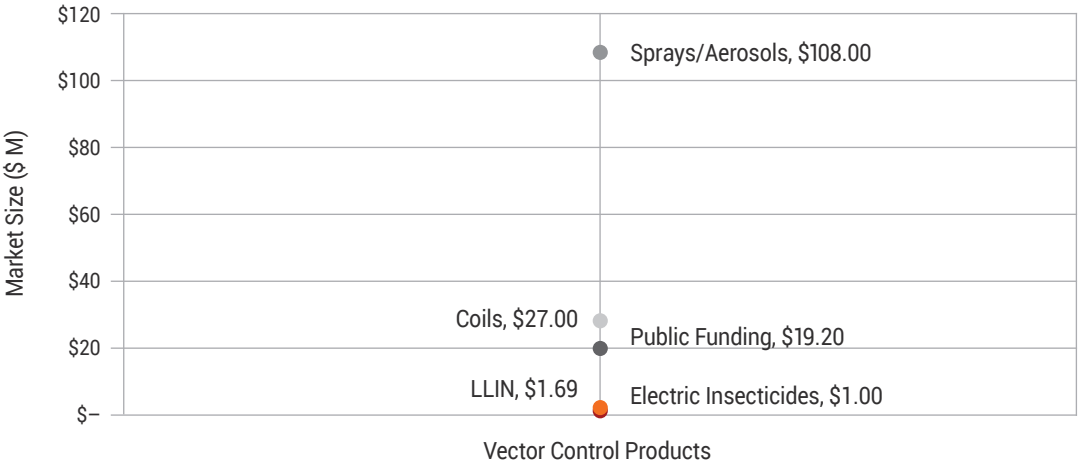
TABLE 12: VOLUME AND SALES OF VECTOR CONTROL PRODUCTS IN VIETNAM[40]

Product Class	Volumes 2016 (Mn)	Volumes 2017 (Mn)	Volumes 2018 (Mn)	Average Unit Price (USD)	Value 2016 (USD Mn)	Value 2017 (USD Min)	Value 2018 (USD Min)
LLIN	0.2	0.75	N/A	2.25	0.45	1.69	N/A
Electric Insecticides	0.33	0.38	0.48	2.1	0.6-0.8	0.8-1.0	1.0-1.1
Spray/Aerosols	16	19	24	4.8	70-75	80-90	100-115
Insecticide Bait	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other Home Insecticides	N/A	N/A	N/A	N/A	5-7	5-7	7-10
Leading Brands	Jumbo, Raid, Mosfly, Falcon						
Leading Companies	Fumakilla Ltd, SC Johnson & Son Inc., Mosfly International Sdn Bhd, Comet Vina Co Ltd						

The market for some retail products surpasses by far the public budget e.g. Mosquito coils and sprays in Vietnam However, a portion of this retail market can be used for disease control.

The average unit price for sprays/aerosols is USD4.8; owing to this higher price, the sales volume for the year 2018 was 24 million, and the average sales value generated was USD100-115 million. As the sprays/aerosols are used in IRS for routine mass preventive measure in most of the endemic areas, the volumes are on the higher side. The National Malaria Control Programme (NMCP) also forecasts the use of IRS in response to confirmed transmission foci in elimination settings. Owing to these reasons, the retail market for spray/aerosols is on higher side as compared to other vector control measures.

FIGURE 10: MARKET SIZE OF VECTOR CONTROL PRODUCTS[40]



[40] FB analysis

TABLE 13: MALARIA BURDEN, FUNDING, RETAIL MARKET

Parameter	Vietnam
Population at Risk 2017	●
Incidence of Malaria (2017)	○
No. of LLINs distributed (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 11: KEY RETAIL BRANDS AND PRODUCTS

Manufacturer	Electric Insecticides	Coils	Aerosols
Mosfly		Mosfly 	Mosfly 
SC Johnson & Son Inc	Raid 	Raid 	Raid 
Fumakilla Ltd	Vape 	Jumbo 	Jumbo 
Falcon Corp		Falcon 	
Reckitt Benckiser Group Plc (RB)			Shieldtrox 
Henkel AG & Co KGaA			Dragon 

4.4.1 Level and need of awareness

Awareness of disease may play an important role in patient adherence to treatment.[41] Various organizations in Vietnam are working towards increasing awareness for VBDs in the country.

It has been observed that malaria elimination efforts in Vietnam could be accelerated by improving treatment, diagnosis, and reporting practices. And other activities that would bolster efforts are increasing awareness of malaria amongst at-risk populations, in particular the importance of using preventive measures and completing courses of anti-malarial medicines.[42]

According to a knowledge, attitude and practice (KAP) study in on malaria in Vietnam, there was an increase in awareness about malaria preventive measures in 2000 as compared with 1995.

TABLE 14: KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) IN HOUSEHOLDS IN PHAN TIEN VILLAGE, SOUTHERN VIETNAM[43]

Parameter	% positive responses	
	1995	2000
KnowleTe of the cause of malaria	18	74
KnowleTe of the symptoms of malaria	28	60
Practice of sleeping under bed nets	10	88
Seeking early help at health post when ill	28	98
Awareness of possibilities for preventing and eradicating malaria	19	80

5. Regulatory Pathways[44]

Pesticides are registered by different agencies in the country for each use. Products that are to be used in the control of pests in Agriculture are registered by the Ministry of Agriculture and Rural Development (MARD). Pesticides that are used in public health control are regulated and registered by the MoH by the Health and Environmental Management Agency (HEMA).

HEMA regulates and registers insecticides that are used for the control of vectors that spread diseases to human beings. All chemical pesticides that are used for vector control in public health are registered by the regulatory authority. No microbial or biochemical pesticides are regulated by the regulatory authority for use in public health. These types of pesticides are not regulated and hence do not require any registration.

Most of the pesticides for use in public health are imported into the country. The country does not have a strong manufacturing capability except for the manufacture of LLINs. Several major LLIN suppliers have their contracted manufacturing facilities in Vietnam.

Local testing of pesticidal products used in public health pest control is mandatory in Vietnam, and the testing is predominantly done by the National Institute for Malariology, Parasitology and Epidemiology (NIMPE). The cost of evaluating the effectiveness of pest control products is about USD10,000–15,000. The scrutiny of the dossier is more of an administrative than a technical evaluation of the documentation.

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41 Heydari A: Relationship between Awareness of Disease and Adherence to Therapeutic Regimen among Cardiac Patients

42 Chen I: Malaria risk factors and care-seeking behaviour within the private sector among high-risk populations in Vietnam: a qualitative study

43 Le Q. Hung: Control of malaria: a successful experience from Vietnam (CL: High)

44 John Vasanthan Paul (JVP) – Independent Regulatory Consultant

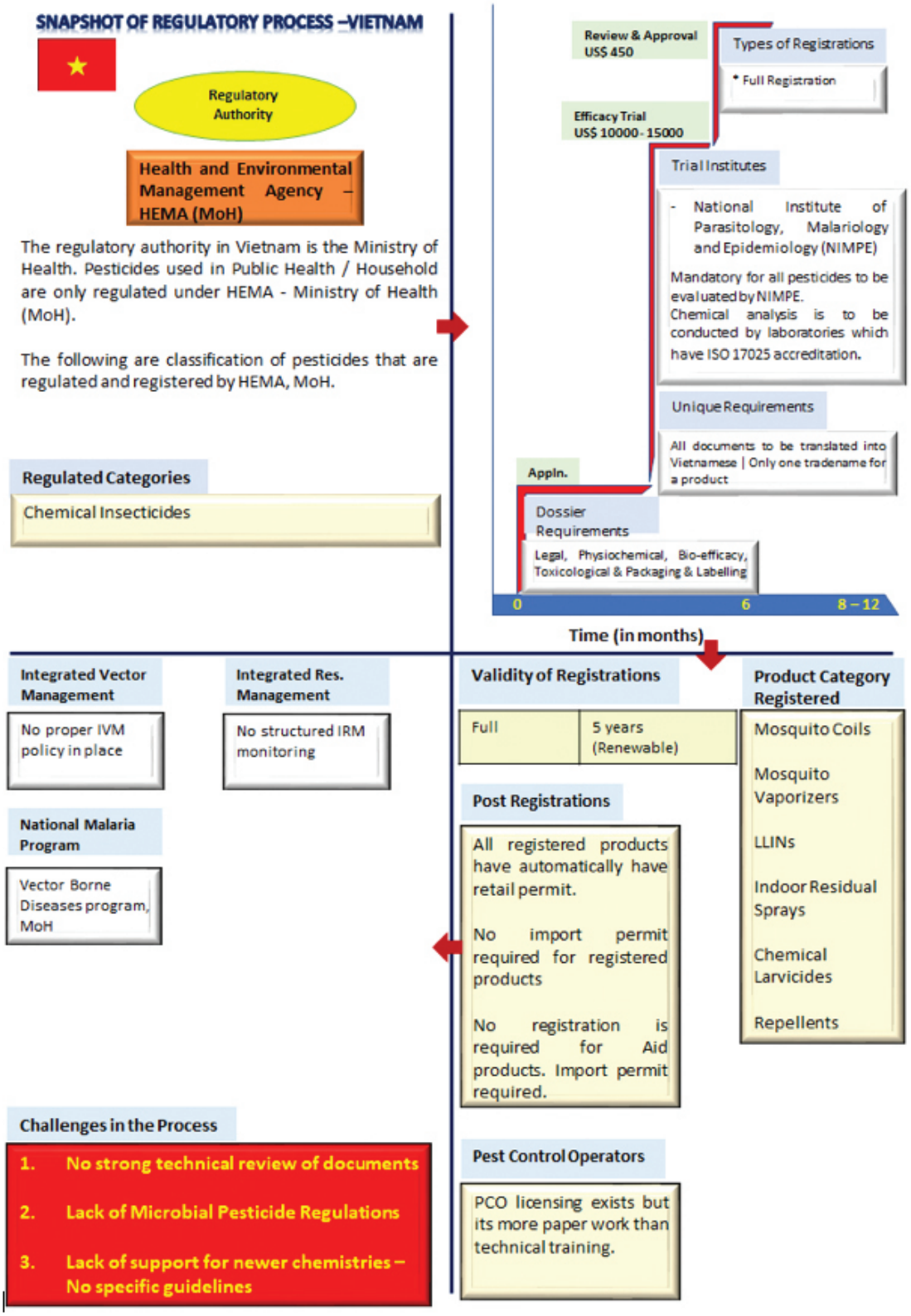
The timelines required for the registration of pesticides for use in vector control is about 8–12 months depending upon the type of pesticides. Generally, evaluation of the product is the major part of the registration process.

In Vietnam all registered pesticides by default have a retailing permit. There is also no requirement for a permit to import pesticides into the country. However, it is mandatory for pesticides that are to be included into the public health programs to be PQ listed. There is also no mandatory registration requirement for pesticides that are to be used for vector control as part of an aid program.

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

1. No strong technical review of dossier leading to registration of the products.
2. Lack of regulations and policies for microbial pesticides for use in Public Health Programs.
3. No support or specific guidelines for newer chemistries.

FIGURE 12: SNAPSHOT OF REGULATORY PROCESS[45]



[45] John Vasanthan Paul (JVP) – Independent Regulatory Consultant

6. Market Dynamics

6.1 Market Trends

Digital tools are used to increase awareness about VBDs: In 2013, the Norwegian Red Cross committed to work with the International Federation of the Red Cross and Red Crescent Societies (IFRC), South-East Asia regional delegation, and the Red Cross of Cambodia, Laos and Vietnam for malaria prevention activities. The main goal of the collaboration is to promote healthier and safer living, and increase resilience at a community level. One element of the project funded by the Norwegian Red Cross focused specifically on support to National Societies for the development of malaria-prevention campaigns.

In July 2013, the IFRC South-East Asia regional delegation hosted a workshop focusing on the role of social media in supporting community resilience. The project funding from the Norwegian Red Cross ensured that health colleagues from the National Societies of Cambodia, Laos and Vietnam were able to participate in the workshop. Using Facebook, the campaign proposals centred on launching malaria awareness campaigns which would reach out to staff, volunteers and the wider public.[46] As 49 million (as of 2016) of the total population are using internet services, out of which 94% are using social network platforms, Facebook can be used as a tool to spread the word on various measures used to control vector-borne diseases through online mass campaigns. Even the efficiency of the vector control products can be stated by providing a link to a web-based survey on social networking websites like Facebook, YouTube and Instagram.

Awareness campaigns and initiatives are helping the country to eliminate malaria: Awareness campaigns are conducted in accordance with government bodies, NGOs and other district or local level organizations. This has helped people to understand the preventive and control measures for malaria and dengue. Various awareness campaigns are conducted in Vietnam. A new entity can collaborate with the ongoing campaigns providing a platform for them to market new vector control products; the campaigners can also help spread the word out to remote communities.

6.2 Market Drivers

Willingness-to-pay (WTP): Willingness-to-pay is the maximum price at or below which a consumer will definitely buy one unit of a product. However, this parameter is important while understanding the market trends. A study was conducted to study the willingness-to-pay for a hypothetical dengue vaccine in Vietnam. It was found that the demand was related to price and income, and that there is significant demand for dengue vaccines in the region. The parametric median WTP was USD26.4 (USD8.8 per dose) in Vietnam.[47] Such a survey provides critical information to both public and private sectors: the study results can be used to ensure broad coverage with an affordable price, and may be incorporated into cost-benefit analyses, informing the prioritization of alternative health interventions at the national level. Conducting such surveys where the private sector can understand the WTP for a particular product will give them a broad idea about public acceptance, and what price should be applied to a new vector control measure to be introduced.

Potential drivers for change:

- **Disease Pattern:** Malaria is becoming increasingly focal. In 2015, 211 communes had an API > 1, compared to 488 in 2011. Malaria deaths have decreased from 20 in 2007] to 3 in 2016. Between August 2016 and July 2017 just six out of 63 provinces/municipalities (Gia Lai, Binh Phuoc, Quang Tri, Dak Nong, Khanh Hoa, Ninh Thuan) together accounted for 66% (1,925/2,903) of total confirmed malaria cases and 81% (1,297/1,601) of confirmed *P. falciparum*. Binh Phuoc alone accounted for 39% of confirmed *P. falciparum*. As elsewhere in the GMS, increasingly malaria is becoming an occupational disease predominantly affecting men.
- **Economic Dynamics**: The main donors in Vietnam are the Global Fund and WHO. The Global Fund has been the major donor for malaria control since 2005. A grant of USD9 million was provided by the Global Fund for VBD prevention and control activities for the year 2017. Domestic funding is available for the maintenance of the malaria elimination program.

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[46] IFRC Southeast Asia Regional Delegation (CL: Medium)

[47] Lee JS, et al., June 2015 (CL: High)

- **Impact of diseases:** Amongst all VBDs, malaria is a highly endemic disease, with increased transmission in the transition period from summer to the rainy season (July-November), particularly in the southern part of the country. Hence there is huge burden of malaria and dengue.
- **Technology:** In 2012 it was documented that Asia Pacific is home to 50 per cent of the world's social media users and 102 million new internet users.[48] Many communities are using technology and social media platforms to create awareness about VBDs in the country; for instance, using Facebook, one proposal centred on launching malaria awareness campaigns reaching out to public. This increased number of participants with a Facebook page, and increased the levels of confidence in using Facebook for both personal and professional purposes following the training.

6.3 Success Stories

The networks of VHWs, village leaders and commune People's Committee members appear to be able to identify high-risk groups (e.g. poor, forest-goers and migrants) and to quantify vector control and personal protection needs. VHWs are well placed to provide IEC associated with vector control and personal protection. CHCs appear to do a good job of coordinating conventional net re-treatments. Entomological surveillance (vector distribution and insecticide resistance monitoring) is sufficient and there is clearly good capacity for this at central level.[49]

Programme Meso-Vietnam: in which local leaders, together with schoolchildren, conducted clean-up campaigns. The strategy eliminated the dengue fever vector in 40 of 45 communes in northern and central Vietnam (more than 380,000 people) where the program was implemented. There have been no reported cases of dengue disease in the same area since at least 2002, while incidence in adjacent untreated areas has remained at rates of around 112 cases per 100,000 people.[50]

7. Market Access Analysis

In order to enter into the Vietnam market, considering the following points is essential.

- **Partnership:** Any organization willing to enter the Vietnam vector control market should try to build a strategic partnership with the MoH, and other organizations in the country, as there are limited public private partnerships. Public–private partnerships should be explored in this region to bring in more resources to the local level.
- **Products:** The population affected by VBDs is too large to reach. Initial activities carried out are mass distribution of LLINs to the high endemic regions in order to prevent disease. However, the malaria burden persists in a few parts of the country. Hence, it is necessary to bring other product categories into consideration, since the retail spending is very high (88% of overall spending, figure 10) for vector control. The organizations can target at-risk populations by providing kits with LLINs and repellents.
- **Awareness Campaigns:** Awareness campaigns emphasizing on education regarding clean environments, preventive measures, and basic medical help in case of disease, should be undertaken with the help of local bodies and NGOs in the country.
- **Geography based on burden of disease:** Geographical analysis for high endemic malaria and dengue regions is necessary. In Vietnam, the highest rates of VBD occur in the northern provinces around Hanoi and the north-western and north-eastern provinces bordering China.

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[48] IFRC Southeast Asia Regional Delegation (CL: Medium)

[49] National Malaria Programme Review (CL: High)

[50] https://journals.openedition.org/factsreports/3759#tocto1n2 (CL: Medium)

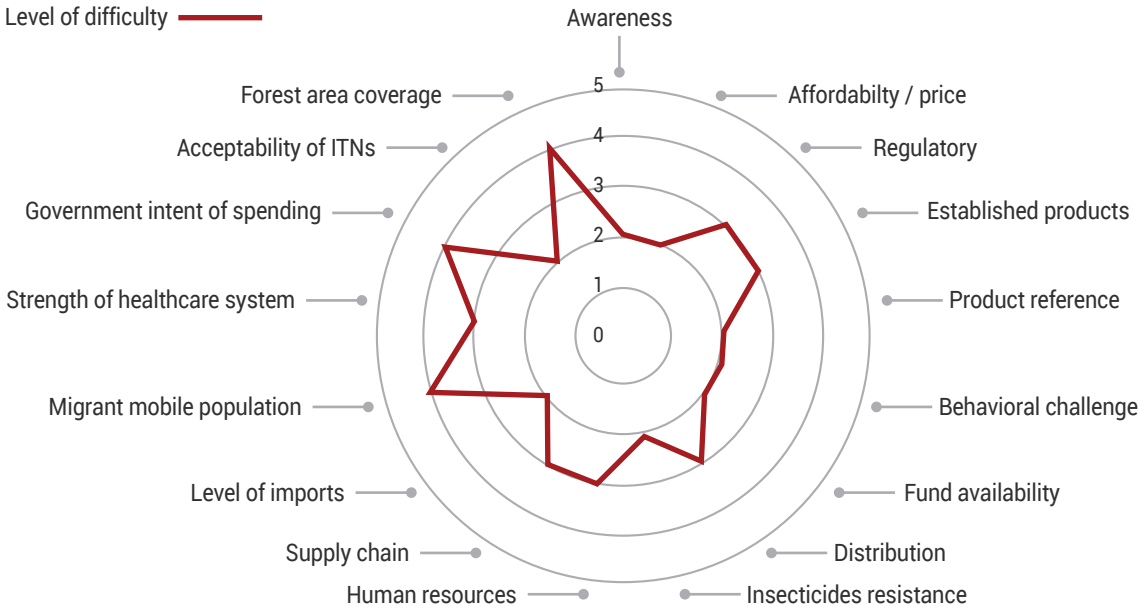
8. First Conclusions

The main vectors of malaria in Vietnam (*Anopheles dirus* and *An. minimus*) are characterized as seasonal and have early outdoor biting habits. Nevertheless, in the region, long-lasting insecticide-treated bed nets (LLINs) have proved an effective means of malaria control, and they continue to play a critical role in reducing malaria transmission. After 2009, LLINs were used to a much greater extent in Vietnam than conventional ITNs. The Government of Vietnam continues to support re-treatment of conventional nets for those who prefer to use their own bed nets or who live in less endemic areas not targeted for LLINs (depending on the availability and expiry date of insecticides).

However, the quantification of LLIN/LLHN requirements has been problematic in recent years. Quantification of LLIN/LLHN requirements should be based on the number of people going to the forest, rather than simply on a rate of one per household. This calls for integrated vector management tools.

In terms of challenges for new products in Vietnam, forest area coverage, government intent of spending and migrant mobile population, rank the highest.

FIGURE 13: CHALLENGES FOR NEW PRODUCTS IN VIETNAM[51]



In 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
3. Vector Control Specialist – MNC Insecticide Manufacturer
4. Country Director – Global Donor
5. Independent Consultant and IVM Adviser – Global Health Organization
6. Director, Country Support – Global Health Organization
7. Managing Principal – Global Manufacturer for Household Insecticides

[51] FB analysis

10. Appendix

1. Confidence Level for Sources Used in Secondary Research

The following criteria has 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 government (MoH)
- Company websites, press releases, 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	Vietnam
Population at Risk 2017	70.4
Incidence of Malaria (2017)	0.06
No. of LLINs distributed (2017)	0.8
Public Funding (2017-18)	19.2
Public Fund ($)/person at risk	D0.3
Retail Market (2018)	136
Retail Spending ($)/person at risk	1.9
Est. funding for LLINs (% of Public Fund)	9%