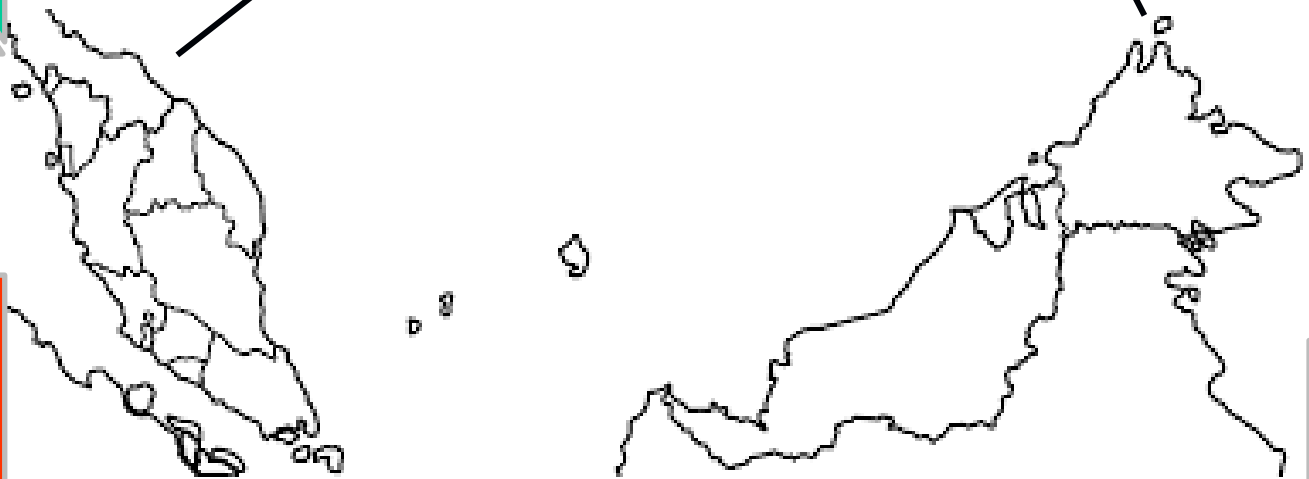
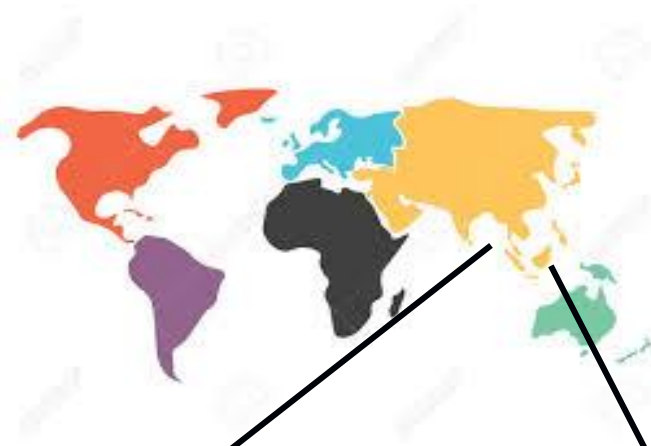




**MINISTRY OF HEALTH  
MALAYSIA**



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2018**

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## Executive Summary

The health status of the country is measured by certain sensitive indicators which are grouped into the following domains; population health status, healthcare resources, prevalence of risk factors and access to care. The population health status is measured by CDR, stillbirth rate, NNMR, IMR, U5MR and MMR. Data on amenable death was insufficient, thus it is not presented in this report.

Most key mortality rates have remarkably decreased since independence which could be attributed to the advancement and coverage of healthcare. The mortality rates were lower than the MDG target, and consistent with upper middle income countries. Longevity resulted in increased of aging population from 5.3% in 2012 to 5.6% in 2016. However, there were apparent increased in trend since recent 5 years.

LE at birth in 2015 was 75 vs the world LE of 72, however, it was 5 years lower than OECD average of 80 years, but higher than most other ASEAN countries. It is consistent with LE of upper middle income countries. Male and female life expectancy at birth in 2016 were 72.5 and 77.2 respectively.

Consistent with global phenomena, Malaysia is also facing the re-emergence of communicable diseases such as tuberculosis and malaria, although the incidence were still relatively low compared to other ASEAN countries. The rate of dengue fever (DF) is dramatically increasing at annual rate of change of 30.7%. Malaysia has done well in controlling the spread of HIV, incidence of which has been decreasing over recent years.

The prevalence of non-communicable diseases however, is generally increasing. Within 5 years NHMS interval, there was about 15% increase in prevalence of DM although the prevalence of hypertension was slightly decreased. Nearly half of the detected diabetic cases were not priorly diagnosed. Mental problem is an emerging health issues. The prevalence was considerably high whereby 29% of people aged 16 years and above and 12% of children aged between 5 and 15 years old were affected.

The prevalence of lifestyle risk factors showed fluctuations during the recent years. The prevalence of physical activity was reasonably low, the prevalence of current smokers among Malaysian adult was 22.8% in 2015. Approximately 39% of adults aged 18 years and over were over-weight and 13% were obese. There was 36% increase in hypercholesterolemia during NHMS 2015 vs NHMS 2011.

In 2016, the doctor per population density was 1.6 per 1,000 population. More than 70% of the total number of doctors were in the public sector. The density was increasing, however, with variations between the states. WP Putrajaya showed the highest density of 52.6 per 1,000 population. The density in Malaysia was higher than the majority of ASEAN countries except Singapore and Brunei. Nurse density was also increasing in trend from 2.4 per 1,000 population in 2010 to 3.2 per 1,000 population in 2016.

There was no significant change in hospital bed density between 2010 and 2016 (range between 1.4 to 1.5 per 1,000 population). The number of beds in MOH hospitals was 10-fold more than the non MOH hospitals.

Primary healthcare are served by public and private clinics. Since 2011 to 2016, the health clinics density was around 32 clinics per 100,000 population (range 32.1 -32.7 per 100,000 population).

Advanced healthcare technologies such as CT Scanner and MRI are available and accessible to the population. Availability of 5 CT scanner and 4 MRI units for every 1,000,000 population which is higher than most ASEAN countries other than Singapore and Brunei.

## MALAYSIA HEALTH SCORECARD

### DIMENSION 1 : GENERAL HEALTH STATUS

#### (a) MORTALITY RATES in 2016

Key:

● : Below national average   ● : Malaysia (national average)   ● : Above national average

States	CMR	PMR	NMR	IMR	U5MR	MMR
<b>MALAYSIA</b>	<b>5.1</b>	<b>8.3</b>	<b>4.2</b>	<b>6.7</b>	<b>8.1</b>	<b>29.1</b>
Johor	5.5 ●	9.1 ●	4.8 ●	7.4 ●	9.0 ●	26.9 ●
Kedah	6.5 ●	8.1 ●	4.8 ●	7.1 ●	8.6 ●	13.9 ●
Kelantan	6.0 ●	9.4 ●	5.0 ●	7.7 ●	9.5 ●	26.0 ●
Melaka	5.8 ●	7.9 ●	4.2 ●	6.9 ●	7.9 ●	27.8 ●
N. Sembilan	6.2 ●	7.4 ●	4.3 ●	6.4 ●	7.5 ●	05.5 ●
Pahang	5.5 ●	8.6 ●	4.3 ●	7.4 ●	9.2 ●	36.2 ●
Perak	7.2 ●	9.2 ●	4.4 ●	6.9 ●	8.6 ●	28.0 ●
Perlis	7.5 ●	7.5 ●	3.9 ●	5.9 ●	6.8 ●	00.0 ●
Pulau Pinang	6.2 ●	9.4 ●	4.6 ●	6.5 ●	8.0 ●	50.5 ●
Sabah	3.4 ●	8.9 ●	3.3 ●	5.7 ●	7.2 ●	57.6 ●
Sarawak	4.6 ●	7.1 ●	3.5 ●	6.0 ●	7.5 ●	15.8 ●
Selangor	4.1 ●	7.4 ●	3.6 ●	6.1 ●	7.4 ●	29.6 ●
Terengganu	5.8 ●	8.2 ●	4.4 ●	7.2 ●	8.6 ●	21.8 ●
WP KL	4.5 ●	8.2 ●	4.1 ●	6.2 ●	7.4 ●	27.2 ●
WP Putrajaya	1.9 ●	6.6 ●	5.4 ●	8.2 ●	10.9 ●	00.0 ●
WP Labuan	2.9 ●	8.0 ●	5.1 ●	8.0 ●	9.7 ●	57.1 ●

Source of data : Department of Statistics Malaysia

CMR : Crude Mortality Rate (per 1000 population)

PMR : Perinatal Mortality Rate (per 1,000 live births)

NMR : Neonatal Mortality Rate (per 1,000 live births)

IMR : Infant Mortality Rate (per 1,000 live births)

U5MR : Under 5 Mortality Rate (per 1,000 live births)

MMR : Maternal Mortality Rate (per 100,000 live births)

**(b) BIRTH RATES, AGEING and LIFE EXPECTANCY in 2016**

Key:

● : Below national average   ● : Malaysia (national average)   ● : Above national average

States	TFR	LBR	SBR	AGEING	LE Male	LE Female
<b>MALAYSIA</b>	<b>1,918</b>	<b>16.1</b>	<b>4.5</b>	<b>6.0</b>	<b>72.6</b>	<b>77.2</b>
Johor	2,086 ●	16.3 ●	4.9 ●	6.5 ●	72.4 ●	77.3 ●
Kedah	2,309 ●	17.0 ●	4.7 ●	7.2 ●	70.4 ●	76.2 ●
Kelantan	3,231 ●	21.4 ●	5.8 ●	6.1 ●	69.2 ●	75.1 ●
Melaka	1,958 ●	16.0 ●	5.0 ●	7.6 ●	72.2 ●	77.4 ●
N. Sembilan	2,175 ●	16.4 ●	4.3 ●	7.0 ●	71.1 ●	76.6 ●
Pahang	2,291 ●	17.0 ●	5.5 ●	6.5 ●	70.7 ●	76.4 ●
Perak	2,045 ●	14.4 ●	4.9 ●	9.6 ●	71.4 ●	77.2 ●
Perlis	2,284 ●	17.5 ●	4.5 ●	8.3 ●	70.4 ●	75.9 ●
Pulau Pinang	1,438 ●	12.7 ●	4.6 ●	7.8 ●	72.4 ●	77.6 ●
Sabah	1,445 ●	13.7 ●	2.9 ●	3.1 ●	72.4 ●	76.2 ●
Sarawak	1,742 ●	13.9 ●	4.2 ●	6.7 ●	70.4 ●	76.2 ●
Selangor	1,726 ●	16.6 ●	3.8 ●	4.6 ●	73.3 ●	77.5 ●
Terengganu	3,236 ●	23.3 ●	5.3 ●	5.3 ●	68.7 ●	74.5 ●
WP KL	1,510 ●	14.4 ●	4.3 ●	6.2 ●	74.3 ●	78.3 ●
WP Putrajaya	2,563 ●	30.4 ●	2.7 ●	1.2 ●	†	†
WP Labuan	1,894 ●	18.1 ●	1.7 ●	3.5 ●	††	††

Source of data : Department of Statistics Malaysia

TFR : Total Fertility Rate (per 1,000 women aged 15-49 years)

LBR : Live Birth Rate (per 1,000 live births)

SBR : Still Birth Rate (per 1,000 live births)

AGEING : Percentage of ageing population

LE : Life expectancy

† : WP Putrajaya combined with WP Kuala Lumpur

†† : WP Labuan combined with Sabah



(c) MORBIDITY RATE FOR TRACER CONDITIONS in 2016

Key:

● : Below national average   ● : Malaysia (national average)   ● : Above national average

States	TB (I)	Dengue (I)	Malaria (I)	DM (P)	HPT (P)	Mental (P)
<b>MALAYSIA</b>	<b>83.1</b>	<b>0.75</b>	<b>7.27</b>	<b>17.5</b>	<b>30.3</b>	<b>29.2</b>
Johor	63.3 ●	0.6 ●	1.1 ●	19.8 ●	27.4 ●	22.2 ●
Kedah	60.5 ●	0.2 ●	0.4 ●	25.4 ●	37.5 ●	26.7 ●
Kelantan	67.8 ●	0.6 ●	6.2 ●	18.5 ●	33.8 ●	39.1 ●
Melaka	63.3 ●	0.7 ●	0.7 ●	16.7 ●	25.8 ●	22.9 ●
N. Sembilan	58.3 ●	2.3 ●	1.0 ●	19.3 ●	32.5 ●	24.0 ●
Pahang	57.5 ●	0.6 ●	2.5 ●	14.8 ●	28.5 ●	27.8 ●
Perak	67.1 ●	0.4 ●	7.4 ●	19.4 ●	36.4 ●	17.0 ●
Perlis	53.0 ●	1.2 ●	0.4 ●	20.6 ●	35.4 ●	24.0 ●
Pulau Pinang	80.6 ●	0.7 ●	0.2 ●	18.1 ●	29.8 ●	19.1 ●
Sabah	129.9 ●	0.1 ●	18.8 ●	14.2 ●	26.8 ●	42.9 ●
Sarawak	104.2 ●	0.3 ●	38.8 ●	14.8 ●	37.3 ●	35.8 ●
Selangor	78.3 ●	1.2 ●	1.4 ●	15.5 ●	25.5 ●	29.3 ●
Terengganu	64.9 ●	1.7 ●	0.8 ●	18.6 ●	26.9 ●	26.0 ●
WP KL	101.7 ●	1.2 ●	0.8 ●	17.4 ●	33.8 ●	39.8 ●
WP Putrajaya	††	††	††	19.2 ●	24.1 ●	20.7 ●
WP Labuan	136.0 ●	0 ●	0 ●	†	†	†

Source of data : Health Informatics Centre, MOH , NHMS  
 TB (I) : Tuberculosis Incidence (per 100,000 population )  
 Dengue (I) : Dengue Incidence (per 100,000 population )  
 Malaria (I) : Malaria Incidence (per 100,000 population )  
 DM (P) : Diabetes Mellitus Prevalence (%)  
 HPT (P) : Hypertension Prevalence (%)  
 Mental (P) : Prevalence of Adult Mental Health Status (%)  
 † : WP Labuan combined with Sabah  
 †† : WP Putrajaya combined with WP Kuala Lumpur

## DIMENSION 2: PREVALENCE (%) OF RISK FACTORS in 2015

Key:

● : Below national average   ● : Malaysia (national average)   ● : Above national average

States	Smoking	Alcoholism	Obesity C	Obesity A	CHOL	Exercise
<b>MALAYSIA</b>	<b>22.2</b>	<b>12.8</b>	<b>7.2</b>	<b>17.7</b>	<b>47.7</b>	<b>66.5</b>
Johor	22.2 ●	13.8 ●	4.6 ●	18.1 ●	45.8 ●	67.1 ●
Kedah	26.5 ●	6.6 ●	6.9 ●	20.5 ●	53.5 ●	66.4 ●
Kelantan	24.6 ●	0.4 ●	2.9 ●	16.2 ●	51.7 ●	74.2 ●
Melaka	16.9 ●	10.3 ●	7.9 ●	21.9 ●	46.6 ●	62.2 ●
N. Sembilan	20.9 ●	10.0 ●	10.0 ●	23.5 ●	49.5 ●	66.3 ●
Pahang	25.5 ●	4.8 ●	8.2 ●	19.4 ●	56.2 ●	74.0 ●
Perak	21.0 ●	14.0 ●	9.7 ●	17.5 ●	48.3 ●	71.9 ●
Perlis	22.2 ●	2.2 ●	8.3 ●	22.3 ●	47.0 ●	72.2 ●
Pulau Pinang	19.2 ●	15.9 ●	11.7 ●	13.8 ●	52.2 ●	74.5 ●
Sabah	28.4 ●	18.4 ●	4.6 ●	13.4 ●	40.9 ●	69.9 ●
Sarawak	25.4 ●	19.7 ●	8.5 ●	18.4 ●	48.6 ●	59.2 ●
Selangor	20.9 ●	12.9 ●	8.7 ●	18.7 ●	43.5 ●	60.1 ●
Terengganu	22.2 ●	1.1 ●	4.3 ●	18.6 ●	52.1 ●	69.3 ●
WP KL	19.1 ●	20.3 ●	10.8 ●	14.9 ●	52.9 ●	63.6 ●
WP Putrajaya	12.4 ●	0.7 ●	7.1 ●	25.8 ●	46.4 ●	67.5 ●
WP Labuan	†	†	†	†	†	†

Source of data : National Health Morbidity Survey 2015

CHOL : Hypercholesterolaemia

Obesity C : Childhood obesity

Obesity A : Adult obesity

† : WP Labuan combined with Sabah

### DIMENSION 3: HEALTHCARE RESOURCES

Key:

● : Above national average ● : Malaysia (national average) ● : Below national average

\*\*Key for Health Expenditure:

● : Below national average ● : Malaysia (national average) ● : Above national average

States	Doctors (2016)	Nurses (2016)	Beds (2016)	Health Expenditure** (2014)	MRI (2010)	CT scan (2010)
<b>MALAYSIA</b>	<b>1.58</b>	<b>3.24</b>	<b>1.44</b>	<b>6,635</b>	<b>3.78</b>	<b>5.12</b>
Johor	1.20 ●	2.72 ●	1.42 ●	3,908 ●	2.99 ●	4.48 ●
Kedah	1.30 ●	2.67 ●	1.27 ●	2,255 ●	3.08 ●	3.59 ●
Kelantan	1.12 ●	2.94 ●	1.44 ●	1,842 ●	1.95 ●	3.25 ●
Melaka	1.89 ●	4.19 ●	1.57 ●	402 ●	4.87 ●	6.09 ●
N. Sembilan	1.92 ●	3.33 ●	1.66 ●	1,518 ●	5.88 ●	8.81 ●
Pahang	1.26 ●	2.98 ●	1.42 ●	1,988 ●	2.67 ●	2.67 ●
Perak	1.45 ●	3.09 ●	2.23 ●	3,349 ●	2.98 ●	4.25 ●
Perlis	2.10 ●	3.75 ●	1.63 ●	402 ●	4.32 ●	4.32 ●
Pulau Pinang	1.81 ●	4.43 ●	1.24 ●	4,016 ●	5.76 ●	7.69 ●
Sabah	0.84 ●	2.14 ●	1.26 ●	2,963 ●	0.91 ●	2.13 ●
Sarawak	1.31 ●	2.54 ●	1.45 ●	3,132 ●	2.83 ●	6.07 ●
Selangor	1.51 ●	2.66 ●	0.88 ●	8,494 ●	4.16 ●	4.88 ●
Terengganu	1.40 ●	2.66 ●	1.39 ●	1,195 ●	0.97 ●	1.93 ●
WP KL	2.99 ●	8.46 ●	2.74 ●	6,031 ●	13.73 ●	15.53 ●
WP Putrajaya	52.63 ●	35.01 ●	7.12 ●	399 ●	†	†
WP Labuan	0.83 ●	2.48 ●	1.25 ●	149 ●	††	††

Source of data : Health Informatics Centre, National Clinical Research Centre

Doctors : Doctors Density (per 1,000 populations)

Nurses : Nurses Density (per 1,000 populations)

Beds : Beds Density (per 1,000 populations)

MRI : MRI Density (per million populations)

CT Scan : CT Scan Density (per million populations)

† : WP Labuan combined with Sabah

†† : WP Putrajaya combined with WP Kuala Lumpur

## DIMENSION 4: ACCESS TO CARE

Key for OOP:

● : Below national average ● : Malaysia (national average) ● : Above national average

Key for DPT3:

● : Above national average ● : Malaysia (national average) ● : Below national average

States	OOP (2015)	DPT3 (2016)
<b>MALAYSIA</b>	<b>397.74</b>	<b>97.97</b>
Johor	144.03 ●	100.86 ●
Kedah	298.54 ●	93.95 ●
Kelantan	61.92 ●	76.56 ●
Melaka	6678.69 ●	104.20 ●
N. Sembilan	232.80 ●	103.26 ●
Pahang	138.81 ●	101.25 ●
Perak	119.01 ●	97.05 ●
Perlis	103.74 ●	100.35 ●
Pulau Pinang	253.49 ●	101.31 ●
Sabah	102.59 ●	98.09 ●
Sarawak	293.86 ●	98.50 ●
Selangor	383.95 ●	97.27 ●
Terengganu	80.84 ●	96.22 ●
WP KL	196.12 ●	118.33 ●
WP Putrajaya	150.57 ●	119.66 ●
WP Labuan	†	104.20 ●

Source of data : NHMS, Health Informatics Centre

OOP : Out of Pockets (RM)

DPT3 : Percentage of DPT Immunization Coverage for (Completion Dose)

† : WP Labuan combined with Sabah

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## Abbreviations

AAR	Average Annual Rate
AMO	Assistant Medical Officer
AMRO	WHO Regional Office for the Americas
ASEAN	Association of Southeast Asian Nations
BOR	Bed occupancy rate
CI	Confidence Intervals
DALYs	Disability Adjusted Life Years
DOSM	Department of Statistics, Malaysia
EMRO	WHO Regional Office for the Eastern Mediterranean
EURO	WHO Regional Office for Europe
GDP	Gross Domestic Product
HC	Health Centre
HIC	Health Informatic Centre
KPI	Key performance indicators
NCRC	National Clinical Research Centre
NHMS	National Health Morbidity Survey
NHEWS	National Healthcare Establishment & Workforce Statistics
N. Sembilan	Negeri Sembilan
MHPU	Malaysian Healthcare Performance Unit
MOH	Ministry of Health
OECD	Organisation for Economic Co-operation and Development
PHC	Primary Health Care
PI	Performance Indicators
QA	Quality assurance
RS	Relative survival
SES	Social Economy Status
SDGs	Sustainable Development Goals
SEARO	WHO Regional Office for South–East Asia
SMRP	<i>Sistem maklumat rawatan perubatan</i>
UNESCAP	United Nation for Economic and Social Commissions for Asia and Pacific
UNICEF	United Nations Children’s Fund
WHO	World Health Organisation
WP	Wilayah Persekutuan
WPKL	Wilayah Persekutuan Kuala Lumpur
WPRO	WHO Regional Office for the Western Pacific

## 1.1 Background

Malaysia is a rapidly developing country. Since its independence in 1957, Malaysia had enjoyed the escalating economic growth and health status of the nation. This is reflected by the rapid improvement in GDP and certain key health indicators. Life expectancy at birth is increasing steadily for both gender, from 56 years for males and 58 years for females in 1957 to 72.6 and 77.2 respectively in 2016.

Most childhood mortalities which are sensitive indicators for overall health system performance had markedly reduced to the level almost equivalent to developing countries. However, many health indicators have apparently plateaued over the recent years. Thus, questions emerged whether the current healthcare is aligned with the growing health needs and population.

As Malaysia is striving toward becoming a high-income country, it is in transition for the engineering and transformation of its healthcare system to be aligned with the global and national needs for health.

This report analysed certain health key indicators, aimed at providing evidence-based information on the current healthcare achievement for policy development and interventions.

## 1.2 Sources of data

We compiled and analyse data from various sources including Department of Statistics

Malaysia, and Health Informatic Centre, Ministry of Health Malaysia.

## 1.3 Structure of this report

This report consists of five chapters;-

[Chapter 2](#) highlights Malaysian health status in terms of life expectancy at birth, mortality rates and percentage of ageing population. In addition, the incidence and prevalence of tracer conditions for communicable (tuberculosis, dengue and malaria) and non-communicable diseases (diabetes mellitus, hypertension and mental problems) are also highlighted.

[Chapter 3](#) describes the prevalence of life-style risk factors to health of the nation. The factors include smoking, alcohol intake, obesity and physical activity. These mainly were population based survey conducted at regular intervals.

[Chapter 4](#) highlights the distribution of resources in healthcare which focuses on human resource in terms of density of doctors and nurses, hospital bed density, density of health clinics and total health expenditure.

[Chapter 5](#) describes the accessibility to healthcare. Out-of-pocket (OOP), immunisation coverage for Diphtheria, Tetanus and Pertusis and Deliveries Attended by skilled health personnel are the indicators of how accessible and affordable is the healthcare.

## MALAYSIAN HEALTH STATUS

### 2.1 Life expectancy at birth

Life expectancy (LE) is the average number of years a person can expect to live if age-specific death rates and age-specific morbidity rates remain the same throughout his or her lifetime. It is a reliable and generalisable indicator of health status of a population.

Life expectancy at birth among the Malaysians has increased steadily since the 60's although it was apparently slowing down observed in the recent decade (Figure 2.1). This trend is consistent with the global experience. Malaysian LE at birth in 2015 was 75 vs the world LE in 2015 was 72, however, it was 5 years lower than OECD average of 80 years. Higher than other SEA countries except Singapore (83), Brunei (77) and Vietnam (76). Overall Malaysia LE is consistent with LE of upper middle income countries<sup>1</sup>.

Life expectancy at birth for Malaysian has gained more than 10 years over 2 decades. Although the increased in life expectancy have occurred across ethnicities, the differential

overall gains have been greatest for Indians (both genders). The acceleration has resulted in the convergence of life expectancy gap especially between the Indians and Bumiputera females. On the other hand, Chinese consistently achieved better health outcomes compared to Bumiputera and Indian.

Although the trends of LE among Malaysians were generally increasing geographically, and demographically, our concern is that there were increasing variability of LE between the high income states and lower income states. Nevertheless, socioeconomic status (SES) is a known factor which influence the health status of a population<sup>2</sup>. Many studies reported evidence of strong association between population income or deprivation with the longevity<sup>3</sup>.

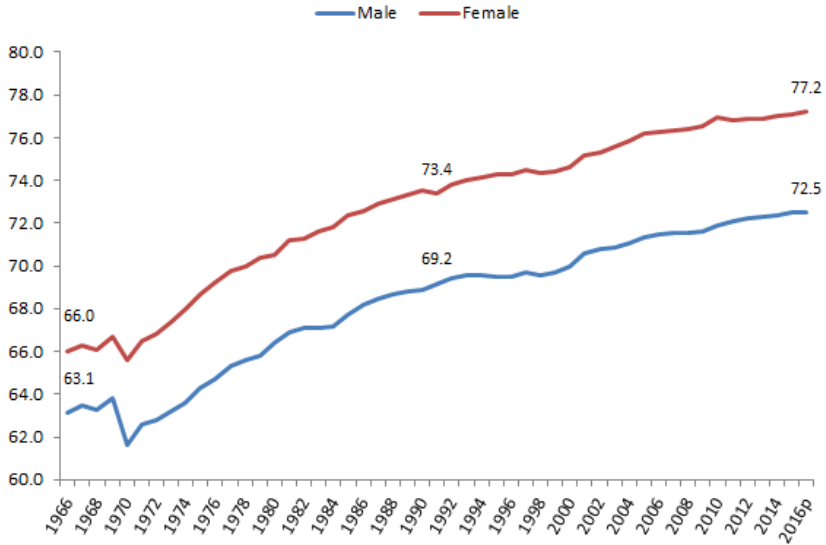
**Life expectancy (LE) at birth** is the average number of years a newborn can expect to live if age-specific death rates and age-specific morbidity rates remain the same throughout his or her lifetime (WHO).

<sup>1</sup>World Bank. World bank open data.

<sup>2</sup>Mohd Kamarulariffin Kamaruddin, Siti Ramizah Ramli, Nor Aini Abdullah, Jamaiyah Haniff etc.(2018). The Assessment of population Health Outcome based on Variation of Life Expectancy in A Developing Country: A Case Study (unpublished manuscript).

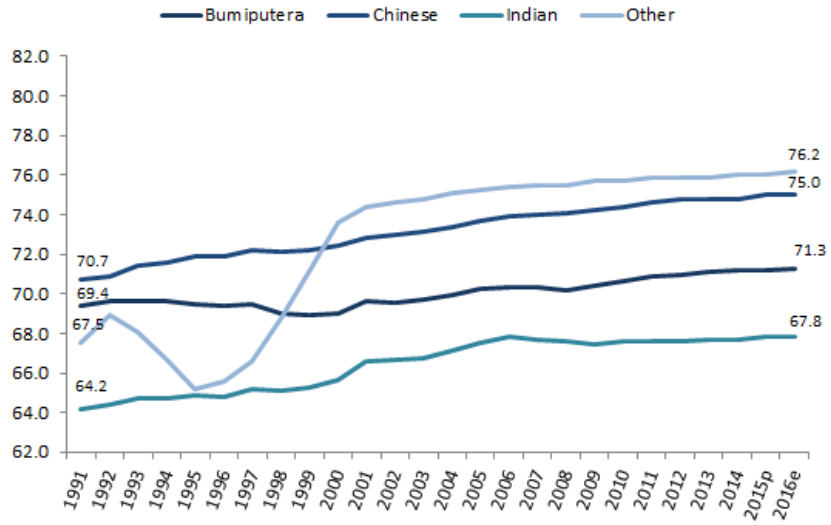
<sup>3</sup>Raj Chetty, Michael Stepner, Sarah Abraham, Shelby Lin, Benjamin Scuderi, Nicholas Turner, Augustin Bergeron, and David Cutler.(2016) The association between income and life expectancy in the united states, 2001-2014. *Jama*, 315(16):1750(1766).

Figure 2.1: Malaysian life expectancy at birth



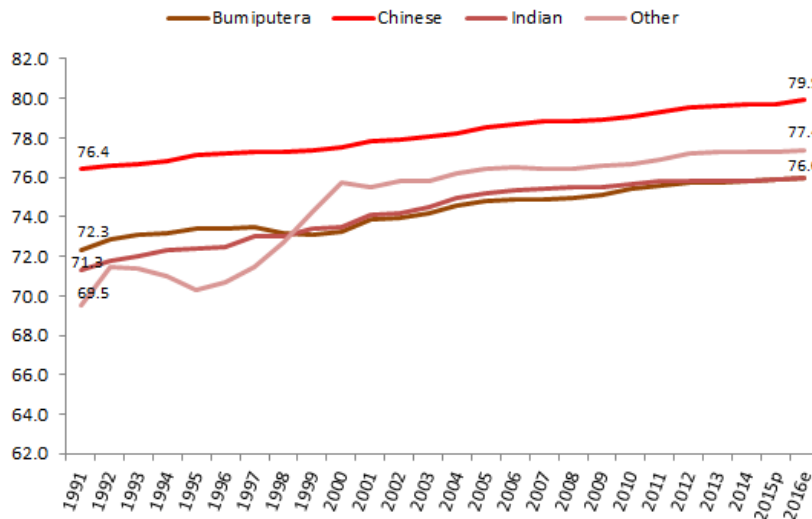
Source of data: DOSM

Figure 2.2: Life expectancy at birth by ethnicity



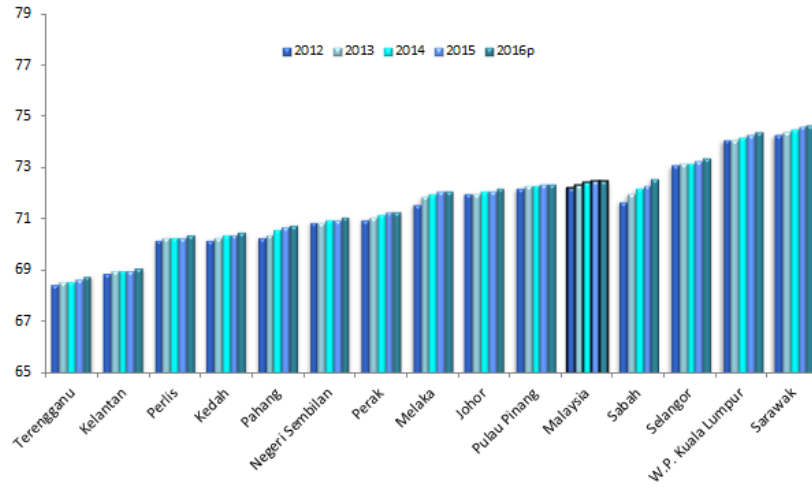
(a) male LE  
Source of data: DOSM

Figure 2.3: Life expectancy at birth by ethnicity



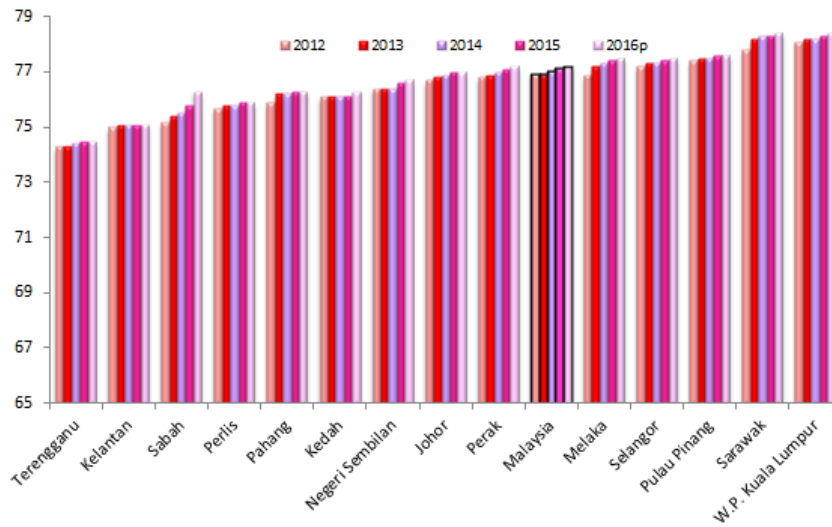
(b) female LE  
Source of data: DOSM

Figure 2.4: Life expectancy at birth by gender



(a) male LE  
Source of data: DOSM

Figure 2.5: Life expectancy at birth by gender



(a) female LE  
Source of data: DOSM



## 2.2 Mortality Rates

### 2.2.1 Crude Death Rate

Crude death rate (CDR) measures the ratio of the number of deaths in a year to the mid-year population for that year expressed per thousand population. It is still an important health indicator for policy monitoring and interventions. CDR has been expanded to input information on the different causes of death, in many dimensions like age, gender, state and ethnicity<sup>1</sup>.

In 2015, improvements were put in place in the conditions of daily living including water and sanitation, specific public health interventions through national expanded program of immunization, promotion of breast feeding, and micronutrient supplementation<sup>2</sup>. Even though, Malaysia crude death rate was comparable to her neighbour Singapore in 2013, (Figure 2.7) but it increased in 2015, in contrast large drops were seen in Vietnam, Brunei and Lao People's Democratic Republic.

A pattern of increasing mortality rates were seen in almost all states in Malaysia over the past 5 years which dropped slightly in 2016 in Wilayah Persekutuan Putrajaya and Kelantan, while the rates in Terengganu, Kedah and Sabah were rather stable (Table 2.1). The higher the crude death rates, despite increase in life expectancy (Figure 2.1), may be explained by lower recent birth rates (Table 2.8), an increasing ageing population (Table 2.9) and lower age-specific mortality rates<sup>1</sup>. However, more refined analytical methods are needed to interpret and determine the causal factors.

Amongst the top 10 causes of death for all ages in Malaysia in 2016 are shown in Figure 2.6. Many of these causes of death may be prevented with optimal and quality health care. Further scrutiny into the marked differences in percentage of death in MOH hospitals and Private hospitals for causes such as neoplasms and certain conditions originating in the perinatal period may be worth while. As a general rule, lower rates of mortality amenable to healthcare can indicate an improvement in health system performance<sup>3</sup>.

Vietnam, although not an affluent country, successfully reduced its maternal mortality rate by rearranging its political and financial priorities to advance health care. A 15-20 percent increase in government expenditure on health care has allowed more than 90 percent of the population to have access to medical services. The child mortality rate in Vietnam for under-fives fell from 81 per cent in 1990 to 61 in 1997<sup>4</sup>.

**Crude Death** is defined as the number of deaths occurring among the population of a given geographical area during a given year, per 1,000 mid-year total population of the given geographical area during the same year (DOSM).

$$CDR = \frac{\text{number of deaths in a year}}{\text{midyear population in a year}} * K$$

where;  
CDR : Crude Death rate  
K = 1,000

<sup>1</sup>Khazanah Research Institute. (2017). Death in Malaysia –What are the statistics telling us?. Retrieved from <http://www.krinstitute.org/assets/contentMS/img/template/editor/KRI%20Views%20-%20Death.pdf>

<sup>2</sup>Economic Planning Unit, Prime Minister's Department Malaysia & United Nations Malaysia. (2016). Malaysia Millennium Development Goals Report 2015. Vol 53. Kuala Lumpur.

<sup>3</sup>Peter-Kaiser Health System Tracker. Mortality Amenable to Healthcare. Retrieved from <https://www.healthsystemtracker.org/indicator/quality/mortality-amenable-healthcare/>

<sup>4</sup>Committee on the Elimination of Racial Discrimination, Reports submitted by States parties under Article 9 of the Convention, Addendum: Vietnam, U.N. Doc. CERD/C/357/Add.2 (2000), p.3. Retrieved from [http://www.bayefsky.com//reports/vietnam\\_cerd\\_c.357\\_add.2.2000.pdf](http://www.bayefsky.com//reports/vietnam_cerd_c.357_add.2.2000.pdf).

Table 2.1: Crude Death Rate (per 1,000 population), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>4.7</b>	<b>4.7</b>	<b>4.9</b>	<b>5.0</b>	<b>5.1</b>	<b>+1.6%</b>	
Johor	5.0	5.1	5.0	5.2	5.5	+1.9%	
Kedah	6.1	6.1	6.3	6.5	6.5	+1.3%	
Kelantan	6.0	6.0	6.1	6.1	6.0	0.0%	
Melaka	5.4	5.5	5.4	5.6	5.8	+1.4%	
Negeri Sembilan	5.6	5.8	5.9	6.1	6.2	+2.1%	
Pahang	5.0	5.2	5.2	5.3	5.5	+1.9%	
Perak	6.8	6.7	6.9	7.0	7.2	+1.1%	
Perlis	6.9	7.2	6.8	7.1	7.5	+1.7%	
Pulau Pinang	5.6	5.7	5.8	6.0	6.2	+2.1%	
†Sabah	-	-	3.3	3.4	3.4	+1.0%	
Sarawak	4.4	4.3	4.4	4.5	4.6	+0.9%	
Selangor	3.7	3.7	3.7	3.9	4.1	+2.1%	
Terengganu	5.6	5.8	5.7	5.8	5.8	+0.7%	
W.P Kuala Lumpur	2.7	2.7	2.9	2.6	2.9	+1.9%	
W.P Labuan	2.7	2.7	2.9	2.6	2.9	+1.4%	
W.P Putrajaya	1.8	2.1	2.4	2.3	1.9	+1.1%	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

Source of data : DOSM

Figure 2.6: Top 10 Causes of Death in Malaysia, 2016

1. Diseases of the circulatory system	22.62%	1. Neoplasms	26.71%
2. Diseases of the respiratory system	21.65%	2. Diseases of the circulatory system	26.43%
3. Certain infectious and parasitic diseases	13.30%	3. Diseases of the respiratory system	13.80%
4. Neoplasms	12.61%	4. Certain infectious and parasitic diseases	13.36%
5. Diseases of the genitourinary system	4.65%	5. Diseases of the genitourinary system	4.19%
6. Diseases of the digestive system	4.56%	6. Diseases of the digestive system	4.09%
7. External causes of morbidity and mortality	4.50%	7. Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	2.92%
8. Certain conditions originating in the perinatal period	2.56%	8. Injury, poisoning and certain other consequences of external causes	1.67%
9. Endocrine, nutritional and metabolic diseases	2.39%	9. Endocrine, nutritional and metabolic diseases	1.25%
10. Disease of the nervous system	1.65%	10. Certain conditions originating in the perinatal period	0.94%

Note: Based on 3 digit code grouping ICD10.  
 \* Based on underlying causes of death.  
 † Preliminary

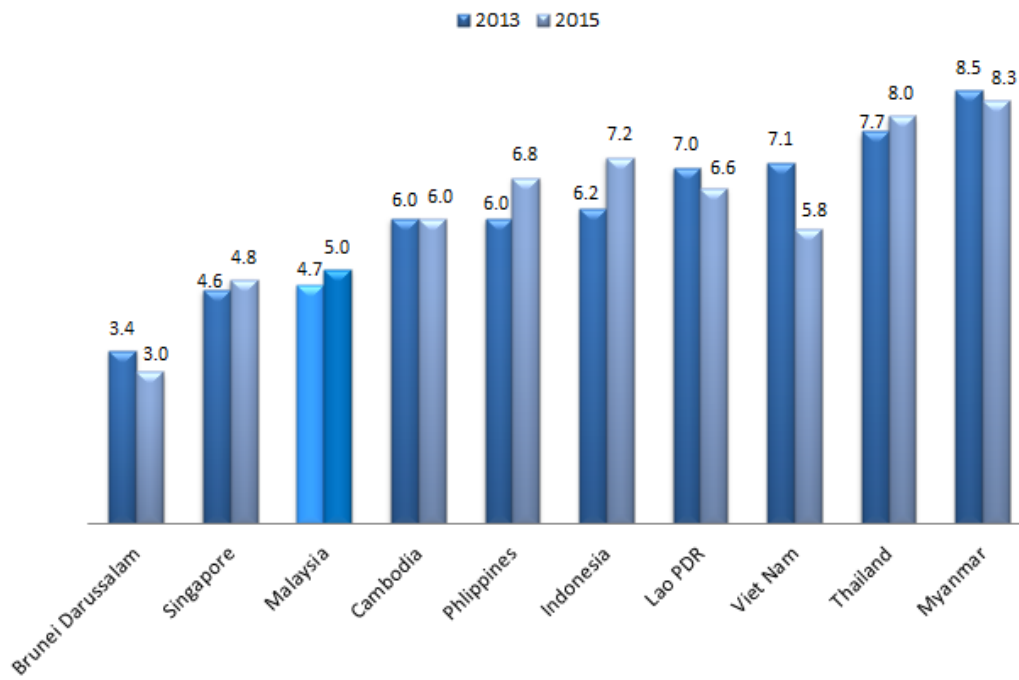
Note: Based on 3 digit code grouping ICD10. \* Based on immediate causes of death.

(a) MOH Hospital

(b) Private Hospital

Source of data: Health Facts 2017, Health Informatics Centre

Figure 2.7: Crude Death Rate (per 1,000 population) in ASEAN Countries



Source of data: ASEAN Secretariat

## 2.2.2 Stillbirth Rate

Different countries use different cut-offs to define stillbirth; however, for comparable international estimates, pregnancy beyond 28 weeks is normally taken as the cut-off point for analysis<sup>1</sup>. Precisely, stillbirth or fetal death is death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of pregnancy; the death is indicated by the fact that after such separation the fetus does not breathe or show any other evidence of life, such as beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles (WHO)<sup>2</sup>.

It can be classified as fresh and macerated stillbirth based on the duration of intrauterine death which are characterised by certain physical signs of the foetus.

Stillbirth is one of the important adverse pregnancy outcomes. Thus, stillbirth rates are a sensitive indicator for good obstetric care, and ultimately reflecting the health status of a nation.

In the last six decades, the stillbirth rates have declined tremendously. In the early 1950s, the rate of still births was as high as about 28 per 1,000 live births, but declined drastically to between 5 per 1,000 in the 1990s and 5.6 per 1,000 births in year 2000<sup>3</sup>.

Based on the latest WHO Global report in 2009, Malaysia was ranked 55<sup>th</sup> with an estimated stillbirth rate of 5.9 per 1,000 total births<sup>4</sup>.

These achievements were aligned with the advancement of economic status as well as im-

provement of maternal and child health care.

The Malaysian stillbirth rate in 2016 was 5.2 per 1,000 births, which achieves the WHO global target of less than 12 per 1,000 births by 2013<sup>5</sup>.

However, the stillbirth rate is apparently gradually increasing over the last two years. Overall, the average annual rate of change (AAR) for the last five years was +0.9%. The increase was contributed by six states which showed an increasing trend that were reflected by positive AARs (Table 2.2). The states were Johor, Pahang, Perak, Pulau Pinang, Sarawak and Kuala Lumpur.

This trend of change calls for further scrutiny of the modifiable factors associated with stillbirths, and identification of gaps.

A review on the action plan and an evaluation of the effectiveness of obstetric care in both hospitals and primary health care is timely in order to stem further increase in stillbirth rates.

**Stillbirth** is defined as births after 28 completed weeks or more of gestation without any sign of life during delivery (WHO).

$$SBR = \frac{\text{number of still births}}{\text{total number of births}} * K$$

where;

SBR : Stillbirth rate

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>Lawn, Joy E, et al. (2016). Stillbirths: rates, risk factors, and acceleration towards 2030. *The Lancet*, 387(10018), pp.587-603

<sup>2</sup>World Health Organization. (2011). International Classification of Disease, 10th Revision (ICD-10)

<sup>3</sup>Sutan, Rosnah. (2009). A review of determinant factors of stillbirths in Malaysia. *J Community Health*, 14,(2) pp.68-77

<sup>4</sup>World Health Organization. (2009). Country Stillbirth Rates per 1,000 Total Births for 2009. Retrieved from [www.who.int/pmnch/media/news/2011/stillbirths.countryrates.pdf](http://www.who.int/pmnch/media/news/2011/stillbirths.countryrates.pdf)

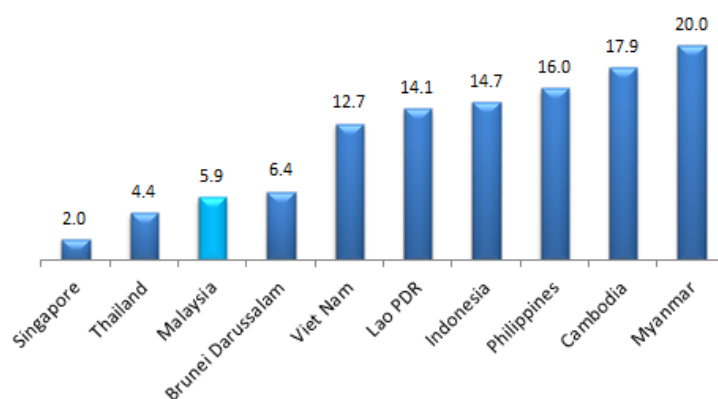
<sup>5</sup>Mullan, Zoe. (2016). Stillbirths: still neglected?. *The Lancet Global Health*, 4(2), pp.69

Table 2.2: Stillbirth Rate (per 1,000 births), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>4.3</b>	<b>4.3</b>	<b>4.3</b>	<b>4.4</b>	<b>5.2</b>	<b>+3.9%</b>	
Johor	4.0	4.7	3.9	5.2	5.4	+6.2%	
Kedah	4.9	5.4	5.2	4.8	4.9	0.0%	
Kelantan	6.5	5.5	5.5	5.1	5.8	-2.3%	
Melaka	5.4	4.4	4.9	4.4	4.6	-3.2%	
Negeri Sembilan	4.6	5.0	3.6	4.7	4.2	-1.8%	
Pahang	4.7	4.5	5.4	5.5	5.5	+3.2%	
Perak	3.4	4.6	4.1	4.3	5.9	+11.7%	
Perlis	5.3	4.2	4.6	5.8	5.0	-1.2%	
Pulau Pinang	4.1	4.0	3.6	4.6	5.6	+6.4%	
†Sabah	-	-	3.5	3.2	6.2	+21.0%	
Sarawak	4.0	4.6	4.2	4.1	4.5	+2.4%	
Selangor	3.8	3.8	3.9	3.9	4.6	+3.9%	
Terengganu	6.5	5.5	6.4	6.0	5.0	-5.1%	
W.P Kuala Lumpur	3.5	2.8	3.6	3.7	5.6	+9.9%	
W.P Labuan	5.6	2.9	2.1	4.1	4.5	-4.3%	
W.P Putrajaya	2.8	4.0	3.3	4.2	1.9	-7.5%	

\*AAR : Average annual rate of change for last 5 years  
†Sabah : AAR calculated for last 3 years  
Source of data : DOSM

Figure 2.8: Stillbirth Rate (per 1,000 live births) in South East Asian Countries, 2009



Source of data: WHO

### 2.2.3 Perinatal Mortality Rate

The term “perinatal mortality” has been used for infant death which is attributed to obstetric events. This includes stillbirths and neonatal deaths in the first week of life. Perinatal mortality relates to the health status of pregnant women, new mothers and the newborns. It is an important indicator for maternal health and healthcare. It may also reflect the quality of care provided to women during pregnancy, intrapartum and postpartum, and to the newborns in the first week of life.

The common causes of perinatal mortality based on Wigglesworth’s classification are; normally formed macerated still births, lethal congenital malformation, conditions associated with prematurity, asphyxial condition and other specific conditions<sup>1</sup>.

Overall, the PNMR increased over the recent five(5) years with annual change of about 2.6 per 1,000 live births. Nine of fifteen states showed an increasing trend (Table 2.3). The

causes of these increasing perinatal deaths should be accurately captured and investigated to plan for targeted programmes towards reduction of deaths.

**Perinatal mortality** refers to stillbirths and neonatal deaths in the first week of life. The perinatal period commences at 22 completed weeks (154 days) of gestation and ends seven completed days after birth (WHO).

**Perinatal deaths** refer to stillbirths and deaths of infants aged less than one week (DOSM).

$$PNMR = \frac{\text{Early neonatal death} + \text{stillbirths}}{\text{Total births}} * K$$

where;

PNMR : Perinatal mortality rate


















Total births = live births + stillbirths

K = 100 or 1,000 or 10,000 or 100,000

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<sup>1</sup>Keeling, J. W., MacGillivray, I., Golding, J., Wigglesworth, J., Berry, J., & Dunn, P. M. (1989). Classification of perinatal death. Archives of disease in childhood, 64(10 Spec No), 1345-1351

Table 2.3: Perinatal Mortality Rate (per 1,000 live births), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>7.3</b>	<b>7.3</b>	<b>7.2</b>	<b>7.7</b>	<b>8.3</b>	<b>+2.6%</b>	
Johor	7.1	7.6	6.8	8.9	9.1	+5.1%	
Kedah	8.8	8.4	8.6	8.0	8.1	-1.6%	
Kelantan	10.5	9.1	9.5	8.2	9.4	-2.2%	
Melaka	9.2	7.1	7.7	6.9	7.9	-3.0%	
Negeri Sembilan	8.2	8.2	7.0	7.9	7.4	-2.0%	
Pahang	8.5	9.1	8.8	9.0	8.6	+0.2%	
Perak	6.8	8.0	6.8	7.1	9.2	+6.2%	
Perlis	8.2	8.9	8.8	9.7	7.5	-1.8%	
Pulau Pinang	7.2	6.9	6.3	8.1	9.4	+5.5%	
†Sabah	-	-	5.6	8.7	8.9	+16.7%	
Sarawak	6.5	7.0	6.9	6.4	7.1	+2.7%	
Selangor	6.2	6.5	6.3	6.3	7.4	+3.6%	
Terengganu	10.4	10.2	10.7	10.0	8.2	-4.6%	
W.P Kuala Lumpur	5.6	5.0	6.0	6.1	8.2	+7.9%	
W.P labuan	9.5	9.2	4.9	9.7	8.0	-3.4%	
W.P Putrajaya	6.6	8.4	7.5	7.6	6.6	0%	

\*AAR : Average annual rate of change over last 5 years

†Sabah : AAR calculated for last 3 years

Source of data : DOSM

## 2.2.4 Neonatal Mortality Rate

Neonatal Mortality Rate (NNMR) is the probability of dying during the first 28 days of life, expressed per 1,000 live births. 2.6 million babies aged less than 1 month die each year, or 7000 newborns daily, as reported by UNICEF<sup>1</sup>. More than 80% of newborn deaths are caused by premature birth, complications during labour and delivery; and infections. Many of these preventable and manageable causes needs comprehensive system-wide approaches as may be seen in countries like Japan with only 1 death in every 1,000 birth during the first 28 days. Malaysia has regulated a guideline for universal understanding of the classification of preventable and non-preventable deaths toward the Sustainable Development Goals of ending preventable deaths of newborn and children under 5 years old, by year 2030<sup>2</sup>.

Similar trend with stillbirth and perinatal mortality, NNMR in Malaysia was remarkably reduced since 1950s. For peninsular Malaysia, NNMR was 34.4 per 1,000 live births in 1950. The statistic records for Sabah and Sarawak were not yet well established till 1965 which reported 25 per 1,000 live births for Malaysia including Sabah and Sarawak. It declined steadily till the recent years<sup>3</sup>.

However, over the recent 5 years, the trend is apparently gradually increasing with AAR of +1%. This trend was consistent with the trend of stillbirths (subsection 2.2.2) and perinatal mortality rates (subsection 2.2.3).

In 2016, NNMR was 4.2 per 1,000 live birth which was relative lower than most ASEAN countries except Singapore (Figure 2.9).

Figure 2.10 compares the causes of neonatal death from 2012 to 2016 in Malaysia. Even with the advancement in the antenatal diagnostic technology in Malaysia, there is still an increased percentage of neonatal deaths from lethal congenital malformation and asphyxia during the 5 year period. A national maternal serum screening was not made mandatory owing to the ethical and religious issues surrounding the management that follows positive diagnoses. However the availability of such screening has been made public. Although the increase in immaturity deaths are not remarkable, more importantly is the recognition that the cause of death of immature neonates has been classified as preventable deaths.

There was a large leap of the ‘unknown’ neonates death from 3.4 in 2012 to 7.5 in 2016. This is of concerned since deaths certification are a major means of identifying public health problems and evaluating the effectiveness of programmes developed in the interest of the public. A retrospective review of the death classification may not only confirm the diagnosis, but also determine any inaccuracy in the death certification.

**Neonatal mortality** refers to deaths of infants aged less than 28 days (DOSM).

$$NNMR = \frac{\text{Number of deaths under 28 days}}{\text{Total live birth}} * K$$

where;

NNMR : Neonatal mortality rate

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>United Nations Children’s Fund. (2018). Neonatal Mortality. Retrieved from <https://data.unicef.org/topic/child-survival/neonatal-mortality/>

<sup>2</sup>Shafie, Zaridah, et al. (2017). *Maternal Screening for Foetal Abnormally, MOH/PAK/59.03(TR)*. Putrajaya, Ministry of Health.

<sup>3</sup>Department of Statistics Malaysia. (2016). *Neonatal Mortality Rate, Malaysia, 1935-2014*. Retrieved from <http://www.data.gov.my/data/ms.MY/dataset/vital-statistics-malaysia-1057/resource/ebd6c958-5203-47a8-823f-52397376e0b0>



Table 2.4: Neonatal Mortality Rate (per 1,000 live births), 2012-2016

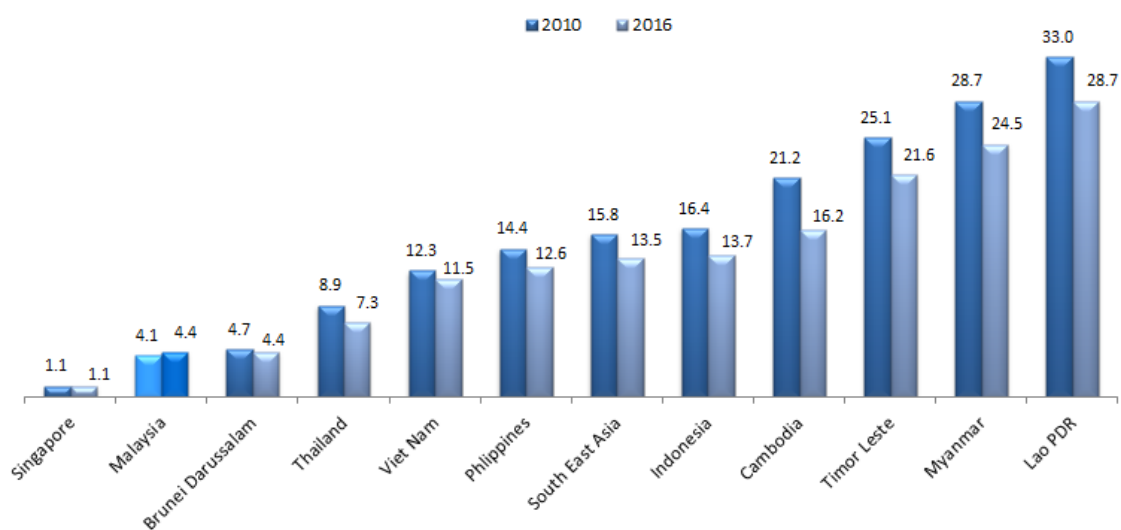
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>4.0</b>	<b>4.0</b>	<b>3.9</b>	<b>4.3</b>	<b>4.2</b>	<b>+1.0%</b>	
Johor	4.4	4.1	4.0	4.7	4.8	+1.8%	
Kedah	4.9	4.4	4.5	4.1	4.8	-0.4%	
Kelantan	5.2	4.8	5.5	4.3	5.0	-0.8%	
Melaka	4.7	3.6	3.7	3.2	4.2	-2.2%	
Negeri Sembilan	4.8	4.7	4.4	4.8	4.3	-2.2%	
Pahang	4.7	6.1	4.1	4.7	4.3	-1.8%	
Perak	4.2	4.5	3.9	3.9	4.4	+0.9%	
Perlis	4.1	7.7	4.9	5.3	3.9	-1.0%	
Pulau Pinang	4.4	4.0	3.5	4.6	4.6	+0.9%	
†Sabah	-	-	2.8	7.1	3.3	+5.6%	
Sarawak	3.8	3.4	3.7	3.4	3.5	-1.6%	
Selangor	3.3	3.6	3.1	3.3	3.6	+1.8%	
Terengganu	5.4	6.2	5.8	5.1	4.4	-4.0%	
W.P Kuala Lumpur	2.9	3.0	3.7	3.1	4.1	+7.2%	
W.P Labuan	5.1	6.3	5.3	5.6	5.1	0%	
W.P Putrajaya	4.8	6.1	4.6	4.2	5.4	+2.4%	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

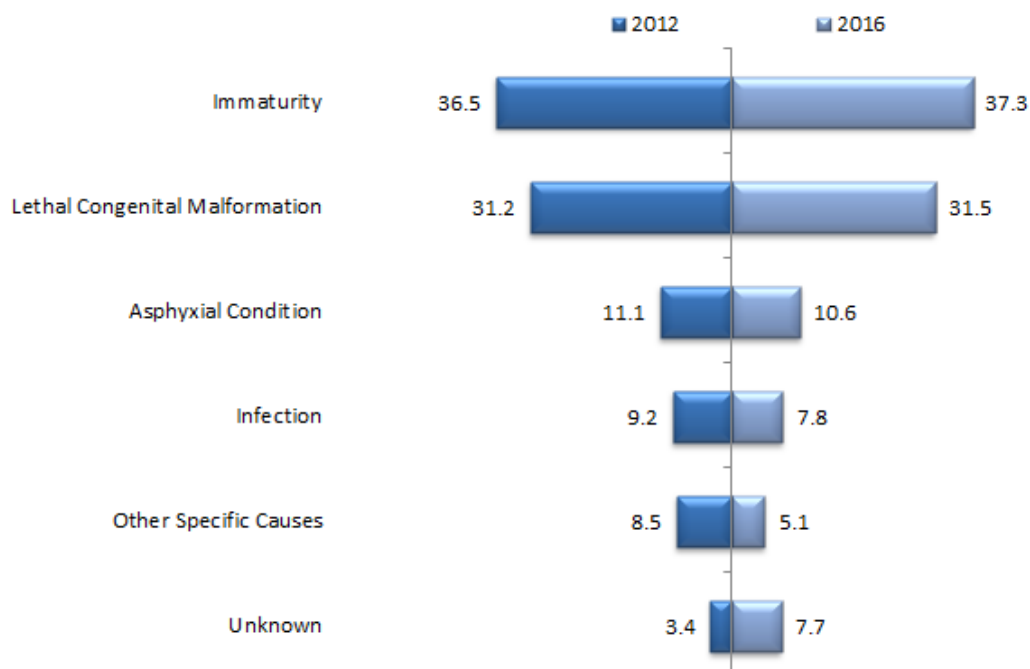
Source of data : DOSM

Figure 2.9: Neonatal Rate (per 1,000 live births) in South East Asian Countries



Source of data: UNESCAP

Figure 2.10: Comparison of causes of neonatal deaths (%) in Malaysia, 2012 & 2016



Source of data: Family Health Development Divison, MOH

### 2.2.5 Infant Mortality Rate

Infant Mortality Rate (IMR) is the number of deaths of infants under one year old for every 1,000 live births. As an international health indicator, IMR has a large impact on other health indicators like life expectancy at birth and years of potential life lost before age sixty-five. Countries with high IMR tend to rank low on other national health indicators<sup>1</sup>.

During the International Conference on Population and Development, (ICPD) Programme of Action 1994, it was agreed that all countries should aim to achieve an IMR under 35 per 1,000 live births by 2015<sup>2</sup>. Malaysia had successfully achieved the target in a rate of 6.7 per 1,000 live births which was lower than the average for ASEAN countries (Figure 2.11) and close to the OECD IMR average of 4 per 1,000 live births (Figure 2.12).

Similar to the trend in stillbirths, and neonatal mortality rate, overall, IMR was apparently increasing with AAR of +1.6% over the past 5 years. The states which showed an increasing trend by descending order were WP KL, Selangor, Johor, Perak and WP Labuan. Sabah, which is one of the low-income states had shown a tremendous improvement in IMR with 50% decreased from 11.2 per 1,000 live birth in 2015 to 5.7 per 1,000 live birth in 2016 (Table 2.5). However, data for the earlier years were not available.

On the contrary, the high-income state of WP KL and WP Putrajaya showed relatively higher IMR of 6.2 per 1,000 live birth and 8.2 per 1,000 live births respectively in 2016. These may be explained by the high perinatal

mortality rate (8.2) for WP Kuala Lumpur and the high neonatal mortality rate (5.4) in WP Putrajaya, both of which are the main contributors to infant deaths. (refer to tables on PMR Table 2.3 and NNMR Table 2.4)

The Department of Statistics Malaysia reported 77% of infant deaths in 2017 were due to five causes of death which included certain conditions originating in the perinatal period (41.9%) that is congenital malformations, deformations & chromosomal abnormalities (30.5%), pneumonia (3.0%) chronic lower respiratory disease (0.9%) and meningitis (0.7%)<sup>3</sup>.

Other equally important factors considered amenable to planned change, are identified as birth weight, maternal age at birth, short pregnancy intervals or prior reproductive loss, sex of the child, birth order, duration of breast feeding and conditions of supplementation, types of household water and sanitation, year of child's birth, maternal education, household income and composition, institution of birth, ethnicity, and rural residence<sup>4</sup>.

It is inevitable to include strategies towards education and health status of women and their families to further control and reduce infant deaths.

**Infant mortality** refers to deaths of infants aged less than 1 year (DOSM).

$$IMR = \frac{\text{Death of infants aged } \leq 1 \text{ year}}{\text{Total live birth in the same year}} * K$$

where;

IMR : Infant mortality rate

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>Atlas, Scott W. (2013). *In Excellent Health: Setting the Record Straight on America's Health Care*. Stanford, California: Hoover Press

<sup>2</sup>United Nation. (1995). *International Conference on Population and Development*. Retrieved from [https://en.wikipedia.org/wiki/International\\_Conference\\_on\\_Population\\_and\\_Development](https://en.wikipedia.org/wiki/International_Conference_on_Population_and_Development)

<sup>3</sup>Department of Statistics. (2018). *DOSM Press Release: Statistics on Causes of Death, Malaysia, 2017*. Retrieved from <https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev>

<sup>4</sup>Dixon, Gale.(1993). Ethnicity and infant mortality in Malaysia. *Asia-Pacific Population Journal/United Nations* 8(2), pp.23-54.

Table 2.5: Infant Mortality Ratio (per 1,000 live births), 2012-2016

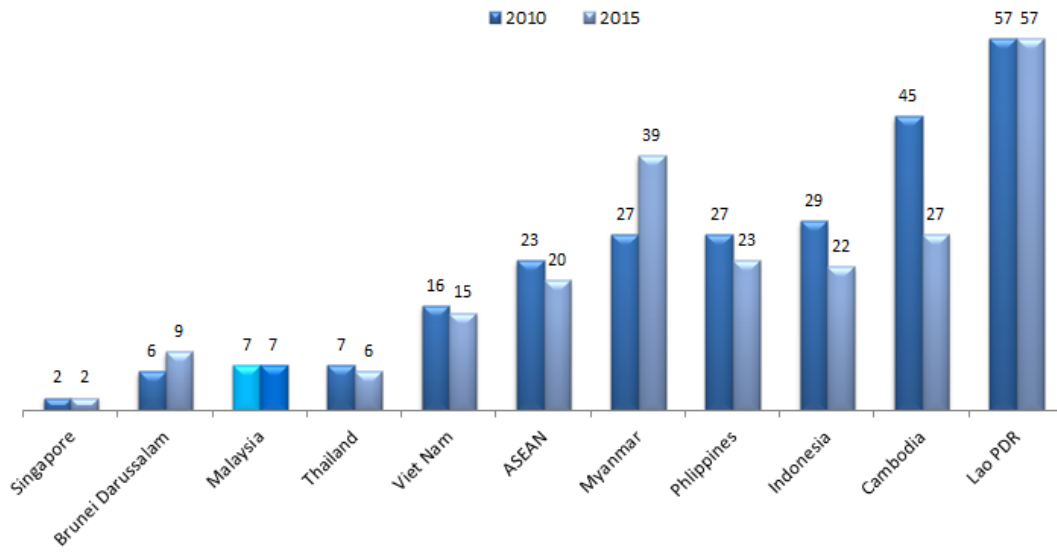
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>6.2</b>	<b>6.3</b>	<b>6.7</b>	<b>6.9</b>	<b>6.7</b>	<b>+1.6%</b>	
Johor	7.0	6.3	6.1	7.3	7.4	+1.1%	
Kedah	7.2	6.7	6.3	6.6	7.1	-0.3%	
Kelantan	8.1	7.4	8.1	6.7	7.7	-1.0%	
Melaka	7.4	6.6	5.8	5.5	6.9	-1.4%	
Negeri Sembilan	7.5	7.4	6.9	6.9	6.4	-3.1%	
Pahang	8.0	9.4	7.4	7.7	7.4	-1.5%	
Perak	6.6	6.7	6.2	6.4	6.9	+0.9%	
Perlis	6.5	8.9	7.5	8.1	5.9	-1.9%	
Pulau Pinang	6.6	6.0	5.6	6.3	6.5	-0.3%	
†Sabah	-	-	10.0	11.2	5.7	-17.1%	
Sarawak	6.4	5.7	5.7	5.6	6.0	-1.3%	
Selangor	5.3	6.0	5.3	5.3	6.1	+2.9%	
Terengganu	7.6	9.1	7.9	7.9	7.2	-1.1%	
W.P Labuan	7.9	7.5	8.0	9.2	8.0	+0.3%	
W.P Putrajaya	9.2	10.4	10.1	7.7	8.2	-2.3%	
W.P Kuala Lumpur	4.7	4.9	6.2	5.4	6.2	+5.7%	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

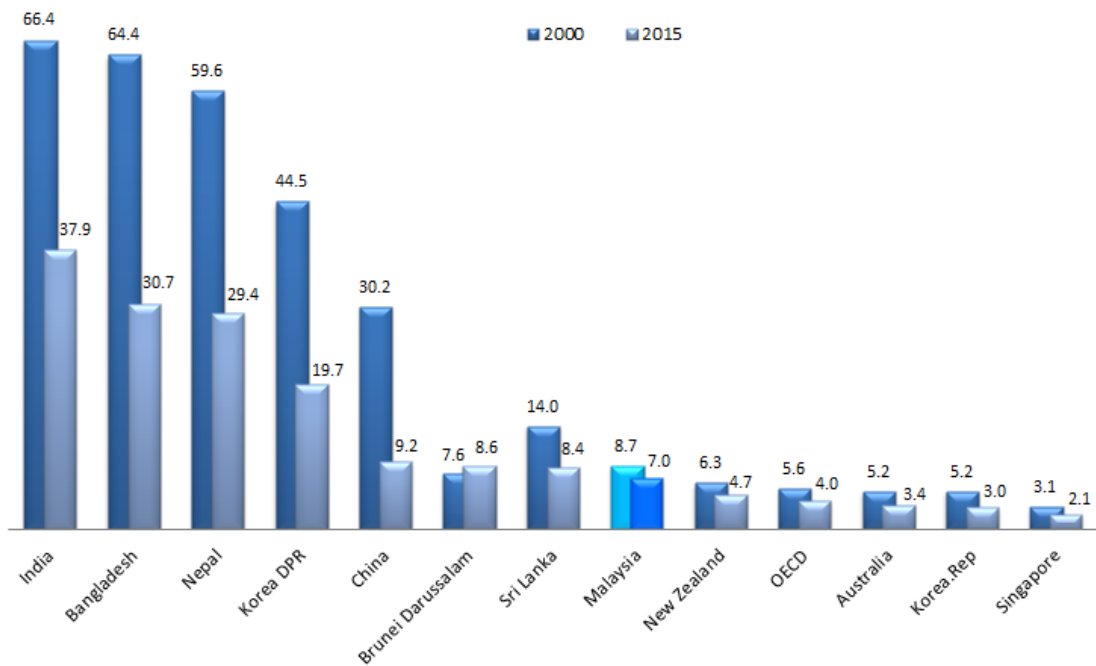
Source of data : DOSM

Figure 2.11: Infant Mortality Rate (per 1,000 live births) in ASEAN Countries



Source of data: UNESCAP

Figure 2.12: Infant Mortality Rate (per 1,000 live births) in OECD



Source of data: OECD

## 2.2.6 Under 5 Mortality Rate

Under-5 mortality rate (U5MR) is the probability of a child born in a specific year or period dying before reaching the age of 5 years if subject to age-specific mortality rates of that period. Globally, under-5 mortality rate has decreased by 56% from an estimated 93 deaths per 1,000 live births in 1990 to 41 deaths per 1,000 live births in 2016<sup>1</sup>. The leading causes of death were pre-term birth complications, pneumonia, birth asphyxia, diarrhoea and malaria.

Overall, the U5MR of 8.1 per 1,000 live births in 2016 (Figure 2.13) lower than the **SDG target of 25 per 1000 live births** and compared to the WHO European region of rate 9.6 per 1,000 live birth<sup>1</sup>. It is also lower than most ASEAN countries except Singapore and Brunei (Figure 2.14).

Although the achievement is below the threshold, the U5MR in Malaysia was a gradual slightly increase in past five years (2012-2016) with AAR of +1.3%. Eight states showed upward trends which was indicated by positive AARs. WP Kuala Lumpur showed the highest change with AAR of +5.7%, and the lowest was Sabah with 3-year AAR of -17.7% followed by Perlis with AAR of -5.2% (Table 2.6).

Based on medically certified U5MR cause of death, the most common cause of death in 2016 were certain conditions originating in the perinatal period (35.0%) followed by congenital malformations, deformations and chromosomal abnormalities (27.2%) followed by infection i.e. pneumonia (3.8%). Transport-related accidents was one of the 10 leading causes of death<sup>2</sup>. An almost similar pattern was reported in 2013<sup>3</sup>.

Although, U5MR has decreased markedly and was lower than the SDG target, data from recent years shows an apparent upward trend. This should alert the relevant authority on revising preventive measures in order to prevent further increase. Focus should be given to tackle the amenable causes of death such as infections and accidents.

**Under-five mortality** refers to deaths of children under the age of 5 years old (DOSM).

$$U5MR = \frac{\text{Number of deaths under 5 in year}}{\text{Total live birth in the same year}} * K$$

where;

U5MR : Under 5 mortality rate

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>World Health Organization, Global Health Observatory Data. *Under five mortality*. Retrieved from [http://www.who.int/gho/child\\_health/mortality/mortality\\_under\\_five\\_text/en/](http://www.who.int/gho/child_health/mortality/mortality_under_five_text/en/)

<sup>2</sup>Department of Statistics, Malaysia. (2017). *Statistics On Causes Of Death*. Putrajaya: Department of Statistics, Malaysia

<sup>3</sup>Department of Statistics Malaysia. (2014). *Statistics on causes of death: Malaysia 2010-2013*. Putrajaya: Department of Statistics, Malaysia

Table 2.6: Under 5 Mortality Ratio (per 1,000 live births), 2012-2016

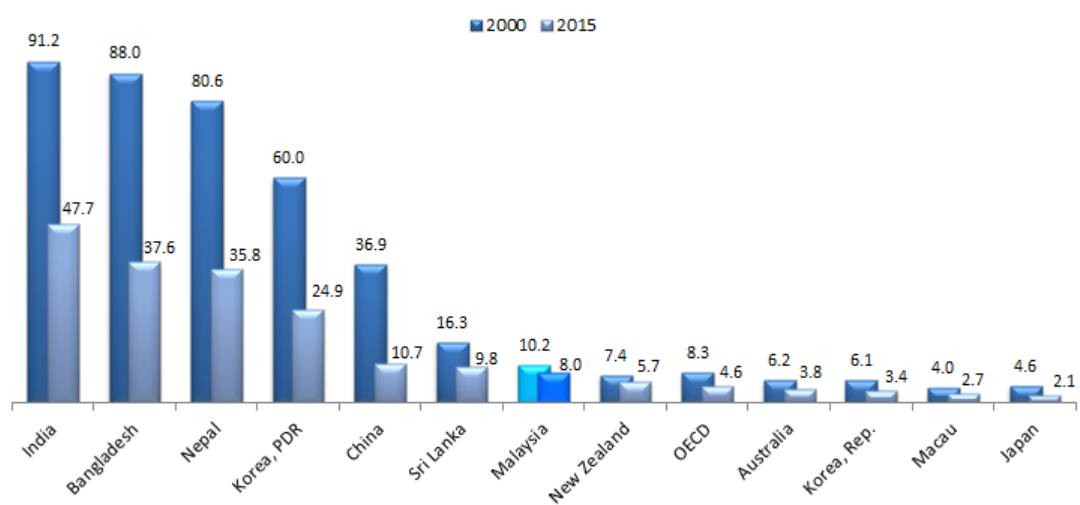
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>7.6</b>	<b>7.9</b>	<b>8.3</b>	<b>8.4</b>	<b>8.1</b>	<b>+1.3%</b>	
Johor	8.5	7.7	7.4	8.5	9.0	+1.1%	
Kedah	8.5	8.3	7.9	7.8	8.6	+0.2%	
Kelantan	9.9	9.3	10.1	8.1	9.5	-0.8%	
Melaka	8.3	7.8	7.1	7.0	7.9	-1.0%	
Negeri Sembilan	8.4	9.0	8.0	8.4	7.5	-2.2%	
Pahang	10.7	11.5	9.4	9.7	9.2	-3.0%	
Perak	8.4	9.0	7.8	8.1	8.6	+0.5%	
Perlis	8.9	10.1	8.0	8.8	6.8	-5.2%	
Pulau Pinang	7.7	7.3	7.0	7.5	8.0	+0.8%	
†Sabah	-	-	12.9	14.0	7.2	-17.7%	
Sarawak	7.7	7.5	7.4	6.9	7.5	-0.5%	
Selangor	6.5	7.4	6.5	6.5	7.4	+2.6%	
Terengganu	9.3	11.0	9.6	9.6	8.6	-1.6%	
W.P Labuan	9.0	9.2	9.1	9.7	9.7	+1.5%	
W.P Putrajaya	10.8	11.1	12.7	9.4	10.9	+0.2%	
W.P Kuala Lumpur	5.6	6.0	7.1	6.5	7.4	+5.7%	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

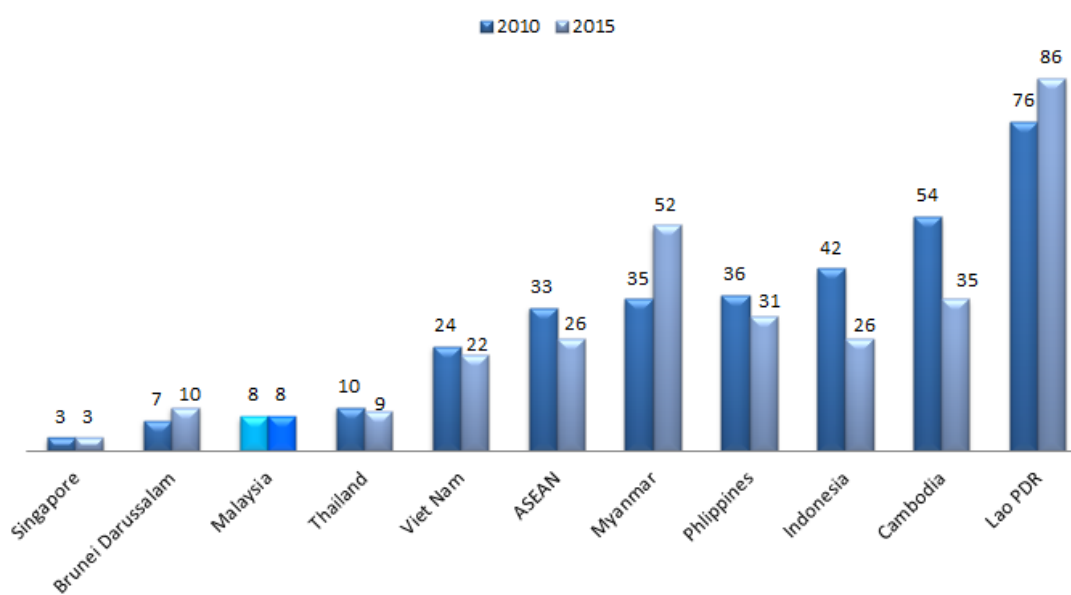
Source of data : DOSM

Figure 2.13: Under 5 Mortality Rate (per 1,000 live births) among OECD countries



Source of data: OECD

Figure 2.14: Under 5 Mortality Rate (per 1,000 live births) in ASEAN Countries



Source of data: UNESCAP



### 2.2.7 Maternal Mortality Ratio

The maternal mortality ratio (MMR) is a measure of obstetric risk. Specifically, it is the risk of dying once a woman is pregnant. It has been widely acknowledged as a general indicator of the overall health of a population.

Malaysia embarked on Confidential Enquiry into Maternal Deaths (CEMD) since 1991. Since then there has been an apparent decline in the maternal mortality ratio. There was a changing trend in maternal deaths from direct obstetric causes to indirect maternal deaths and fortuitous deaths<sup>1</sup>.

The trend of MMR apparently increased in recent years. MMR increased from 23.2 in 2012 to 29.1 per 100,000 live births in 2016, with the annual rate of change in five years (AAR) of 4.6%. Five states showed a decreasing trend indicated by negative AAR; Perlis (-100%), Negeri Sembilan (-13.3%), Sarawak (-10.7%), Kedah (-6.3%) and Terengganu (-4.3%). On the other hand, the remaining states showed an increasing trend (Table 2.7).

Overall, Malaysia's MMR was still relatively low, ranking 4<sup>th</sup> among the ten ASEAN countries (Figure 2.16) but higher than the OECD average. The OECD looked at the annual rate of change since year 2000 to latest available years. The AAR for Malaysia within this period was -31% against the OECD AAR of -44%

(Figure 2.17).

Obstetric embolism, postpartum haemorrhage and eclampsia are among the most common direct causes of maternal deaths (Figure 2.15). Although earlier reports showed there was a changing trends from direct to indirect causes of death, however, during the past 5 years, there was an increasing trend in direct causes of death with annual rate of change (AAR) of 5.9% .

Although Malaysia's MMR was lower than the SDG target of 70 per 100,000 live births, further evaluation on interventions is still necessary to revise current policies on the quality of maternal health and obstetric care in order to stop the upward trend.

**Pregnancy-related death** is defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (WHO).

$$MMR = \frac{\text{number of maternal death}}{\text{number of live births}} * K$$

where;

MMR : Maternal mortality ratio

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>Ravichandran, J. and Ravindran, J. (2014). Lessons From The Confidential Enquiry Into Maternal Deaths, Malaysia. *BJOG: An International Journal of Obstetrics & Gynaecology*, 121 (s4), pp.47-52.

Table 2.7: Maternal Mortality Ratio (per 100,000 live births), 2012-2016

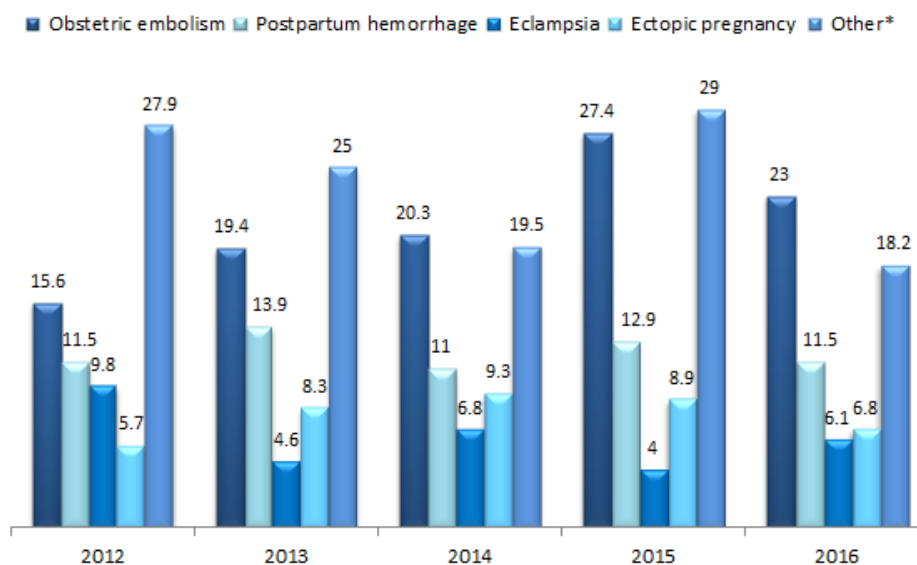
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>23.2</b>	<b>21.4</b>	<b>22.3</b>	<b>23.8</b>	<b>29.1</b>	<b>+4.6%</b>	
Johor	26.5	20.9	26.5	23.1	26.9	+0.3%	
Kedah	19.2	11.4	27.4	35.3	13.9	-6.3%	
Kelantan	13.5	33.0	28.0	20.5	26	+14.0%	
Melaka	7.0	14.6	34.3	41.2	27.8	+31.8%	
Negeri Sembilan	11.2	34.3	37.5	21.7	5.5%	-13.3%	
Pahang	32.8	18.5	24.4	10.7	36.2	+2.0%	
Perak	23.9	22.6	13.7	33.1	28	+3.2%	
Perlis	24.1	0	44.4	69.5	0	-100%	
Pulau Pinang	21.0	14.0	17.5	27.0	50.5	+19.2%	
†Sabah	-	-	17.4	34.7	57.6	+48.4%	
Sarawak	27.8	7.4	14.6	17.6	15.8	-10.7%	
Selangor	17.6	26.2	17.4	19.4	29.6	+11.0%	
Terengganu	27.2	27.5	33.3	18.1	21.8	-4.3%	
W.P labuan	0	0	0	0	57.1	-	
W.P Putrajaya	0	0	65.3	69.7	0	-	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

Source of data : DOSM

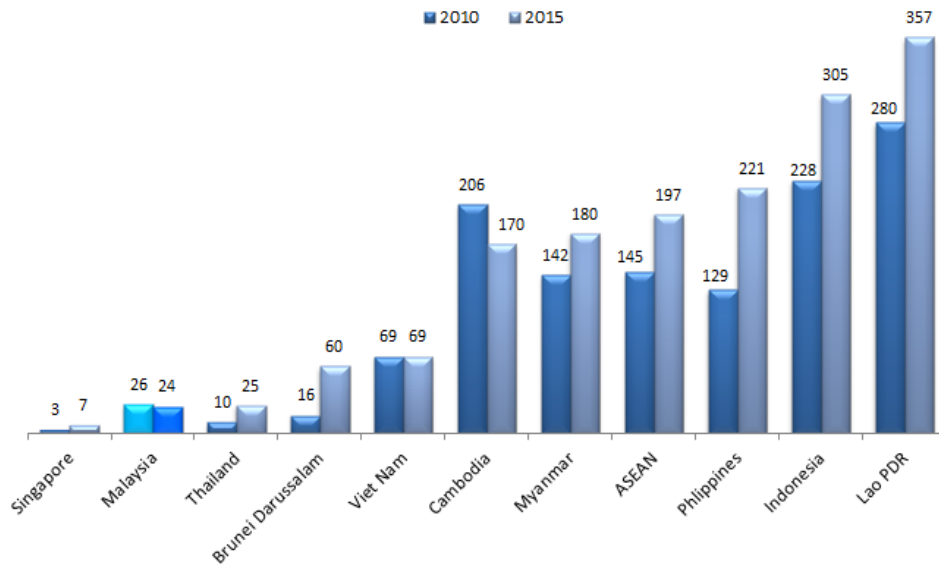
Figure 2.15: Causes of Maternal Deaths in Malaysia (%), 2012-2016



\*maternal diseases classifiable elsewhere but complicating pregnancy, childbirth and the puerperium

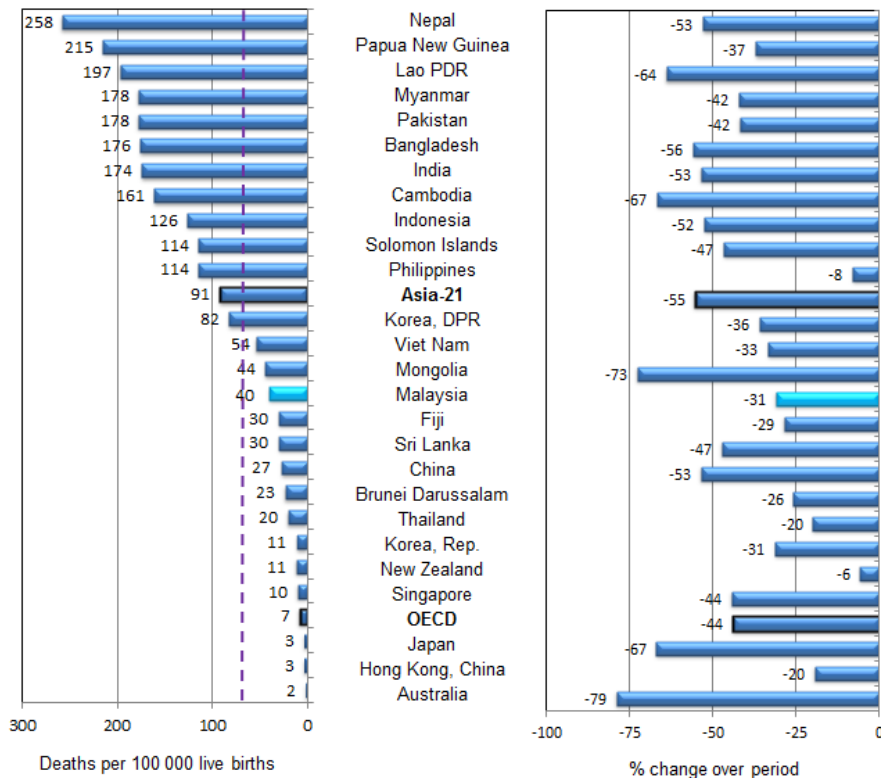
Source of data: DOSM

Figure 2.16: Maternal Mortality Ratio (per 100,000 live births) in ASEAN Countries



Source of data: ASEAN Secretariat

Figure 2.17: Estimated Maternal Mortality Ratio, 2015 (or the latest year available) and Percent Change since 2000



Data year from 2000 to latest year available  
 Source: OECD Health Statistics; WHO ; Health Facts of Hong Kong 2015  
<http://dx.doi.org/10.1787/888933413283>

## 2.3 Crude Birth Rate

Crude Birth Rate, CBR is defined as the number of live births during a year divided the mid-year population of that year (per 1000 population). CBRs are useful for general comparison between different groups, communities and regions. However, being “crude” it does not identify which group of people in the population were actually at risk of having births, and it ignores the age structure of the population<sup>1</sup>.

Monitoring CBR and CDR may help in the prediction of population growth of a country. Importance of which lies in the demographic transition of a country from a high birth and death rate of a pre-industrialized stage to lower birth and death rate of an industrialized economic system. This theory however, does not take into account the social changes of a population such as migration and disease outbreak.

Figure 2.18 shows the Malaysian CBR for females were lower before 2014 but equalizes afterwards to that of males until 2016. In Table 2.8, the highest CBR seen since 2012-2016 in Wilayah Putrajaya could be explained by its rather small scale population with a small percentage of ageing citizens (1.2%). Selangor on the other hand, showed a fortyfold higher CBR, the highest number of live births among all states in Malaysia, (104,661 live births in 2016), at the same time it has a relatively higher ageing population (4.6%) which may have influenced the birth rate.

Birth rate data is highly dependent on the birth registration system of a country. Statis-

tically the registration of 98% of a country’s birth (as in industrialised countries since 2000) may be defined as universal coverage, but from a human rights perspective, universality is only achieved with the registration of each and every child born under a state jurisdiction. Any unregistered child is therefore denied the rights to a family environment, education, health intervention, protection against abuse and exploitation, state benefits and may not even be recognized as part of society<sup>2</sup>.

Malaysia was regarded by the United Nations International Children’s Fund (UNICEF) as among the high achievers in birth rate registration; as it has a decentralized birth registration system. The local police officers, village headmen and midwives are legally required to notify the District Registrar of any births occurring in their respective areas, these notifications is entered into a centralized birth registration database accessible by authorized agencies through a web site<sup>3</sup>.

**Crude Birth Rate** is defined as a ratio of the number of live births during a year to the mid-year population in that year (per 1,000 population)(WHO).

$$CBR = \frac{\text{Number of live birth}}{\text{Mid - interval population}} * K$$

where;

CBR : Crude birth rate

K = 100 or 1,000 or 10,000 or 100,000

<sup>1</sup>Introduction to Sociology.(n.d.). *Population study and its significance: Crude Birth Rate*. Retrieved from <http://www.apastyle.org/learn/faqs/cite-website-material.aspx>

<sup>2</sup>UNICEF. (2005). *The “rights” Start to Life: A Statistical Analysis of Birth Registration*. New York,USA: UNICEF

<sup>3</sup>UNICEF. (2002). *Birth Registration:Right from The Start*. Retrieved from <https://www.unicef-irc.org/publications/pdf/digest9e.pdf>

Table 2.8: Crude Birth Rate (per 1,000 live births), 2012-2016

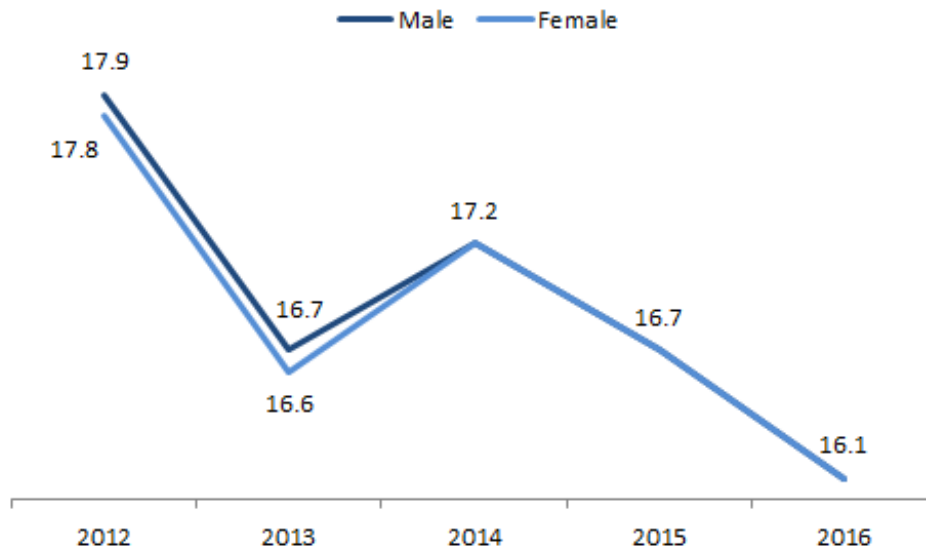
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>17.8</b>	<b>16.7</b>	<b>17.2</b>	<b>16.7</b>	<b>16.1</b>	<b>-2.0%</b>	
Johor	17.5	16.5	17.0	16.8	16.3	-1.4%	
Kedah	18.2	17.2	17.7	17.5	17.0	-1.4%	
Kelantan	22.4	21.6	22.8	22.2	21.4	-0.9%	
Melaka	16.9	16.0	16.7	16.4	16.0	-1.1%	
Negeri Sembilan	16.9	16.3	17.3	16.9	16.4	-0.6%	
Pahang	17.7	17.2	18.1	17.5	17.0	-0.8%	
Perak	15.5	14.5	14.9	14.7	14.4	-1.5%	
Perlis	17.3	16.7	18.4	17.4	17.5	+0.2%	
Pulau Pinang	14.7	12.9	13.6	13.1	12.7	-2.9%	
†Sabah	-	-	15.6	14.7	13.7	-4.2%	
Sarawak	16.8	15.3	15.4	14.7	13.9	-3.7%	
Selangor	18.9	17.5	18.0	17.5	16.6	-2.6%	
Terengganu	23.5	22.9	23.7	23.8	23.3	-0.2%	
W.P Kuala Lumpur	15.9	14.7	15.6	14.5	14.4	-2.0%	
W.P Labuan	19.6	19.1	19.9	20.5	18.1	-1.6%	
W.P Putrajaya	40.2	37.3	37.9	34.6	30.4	-5.4%	

\*AAR : Average annual rate of change for last 5 years

†Sabah : AAR calculated for last 3 years

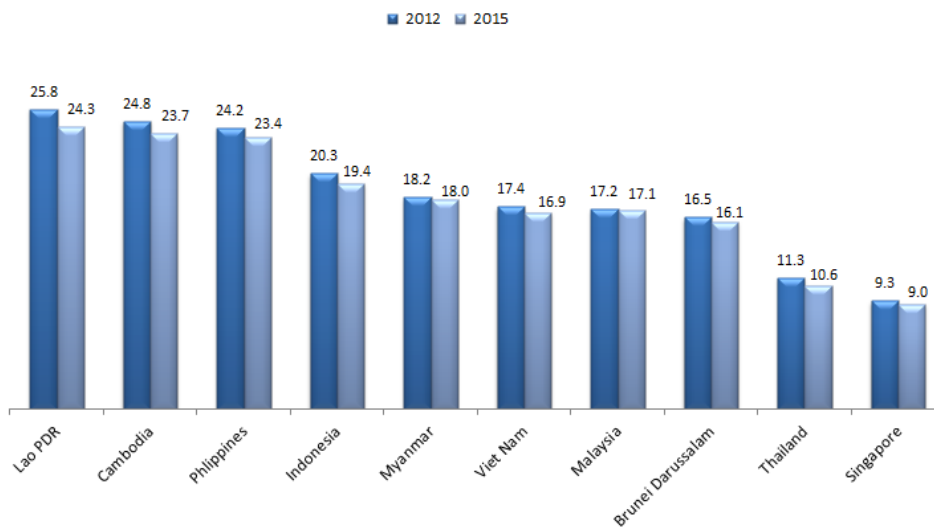
Source of data : DOSM

Figure 2.18: Crude Birth Rate (per 1,000 live births) by Gender



Source of data: DOSM

Figure 2.19: Live Birth Rate (per 1,000 live births) in ASEAN Countries



Source of data: ASEAN Secretariat

## 2.4 Ageing

WHO defined healthy ageing, as the process of developing and maintaining the functional ability that enables wellbeing in older age. Functional ability includes a person's ability to meet their basic needs; to learn, grow and make decisions; to be mobile; to build and maintain relationships; and to contribute to society<sup>1</sup>.

A Decade of Healthy Ageing – from 2020 to 2030 pointed out that low and middle income countries are rapidly ageing, 80% of the older people globally<sup>2</sup>. Malaysia is also encroaching an ageing society, where the population above 65 years old are increasing from 5.8% in 2015 to 6.0% in 2016 (Table 2.9). Although not alarming, this minority group is expanding as life expectancy increases at a generous rate and the total fertility rate declining to below replacement level (2.1 babies for women aged 15-49 years, at 1.9) in 2016<sup>3</sup>. Ageing population do not participate in the labour force, and as chronic illnesses are more common in ageing, thus the health expenses for the country is expected to grow.

The National Policy for Older Persons and Plan Of Action for Older Persons was developed in Malaysia adopting 3 priority areas of the Madrid International Plan of Action on Ageing (MIPAA). The first priority is to develop a caring society and capacity-building of society towards the ageing phenomena. The policy envisioned older persons who

are independent, dignified, high sense of self-worth, with an optimized self-potential, leading a healthy, positive, active and productive life.

It is important to recognize and aim for a healthy ageing outcome where intervention must commence at an earlier age. Health benefits can be gained if started early, at puberty and done regularly on a moderate scale physical activity or bodily movement produced by skeletal muscles that results in energy expenditure<sup>4</sup>. Older people have a lower in muscles strength in health upper and lower limbs, body-fat percentages, flexibility, agility and endurance<sup>5</sup>. A statistical microsimulation model of future health and spending of older Americans showed delayed ageing is challenging in social and fiscal nature<sup>6</sup>.

Dietary Restriction (DR) has been observed to increase health during ageing in nearly all organisms tested, including primates and possibly humans. Although DR policy may not be successful implemented in human due to low compliance, nevertheless the recommendation of it as a healthy lifestyle has to be mentioned<sup>7</sup>. Reduced intake of certain amino acids may be more important than reduced calorie intake<sup>8</sup>.

**The elderly population** is defined as people aged 65 and over

<sup>1</sup>WHO,10 Priorities Towards A Decade of Healthy Ageing. Retrieved from <http://www.who.int/ageing/WHO-ALC-10-priorities.pdf?ua=1>

<sup>2</sup>WHO. Retrieved from <http://www.who.int/news-room/fact-sheets/detail/ageing-and-health>

<sup>3</sup>Department of Statistics Malaysia. Retrieved from <https://www.dosm.gov.my/v1/index.php?r=column>

<sup>4</sup>Andrews, Gary R. (2001). Care of older people: Promoting health and function in an ageing population. *British Medical Journal*, Vol 322(7288), pp.728.




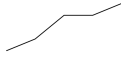

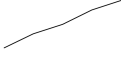



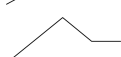




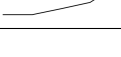


<sup>5</sup>Milanović, Zoran, et al. (2013). Age-Related Decrease in Physical Activity and Functional Fitness among Elderly Men and Women. *Clinical Interventions in Aging*, Vol 8, pp. 549.

<sup>6</sup>Goldman, Dana P., et al. (2013). Substantial Health and Economic Returns from Delayed Aging May Warrant A New Focus for Medical Research. *Health affairs* 32(10), pp. 1698-1705

<sup>7</sup>Partridge, L. (2014). Intervening in Ageing to Prevent the Diseases of Ageing. *Trends in Endocrinology & Metabolism*, Volume 25(11), pp.555-557

<sup>8</sup>Solon-Biet, Samantha M. Et al. (2014). The Ratio of Macronutrients, Not Caloric Intake, Dictates Cardiometabolic Health, Aging, and Longevity in Ad Libitum-Fed Mice. *Cell Metabolism*, 19(3), pp.418-430

Table 2.9: Percentage of Ageing Population, 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>5.3</b>	<b>5.5</b>	<b>5.6</b>	<b>5.8</b>	<b>6.0</b>	<b>2.5%</b>	
Johor	5.5	5.7	5.9	6.3	6.5	3.4%	
Kedah	6.3	6.5	6.6	6.9	7.2	2.7%	
Kelantan	5.7	5.8	6.0	6.0	6.1	1.4%	
Melaka	6.5	6.7	6.9	7.3	7.6	3.2%	
Negeri Sembilan	6.0	6.3	6.5	6.8	7.0	3.1%	
Pahang	5.4	5.5	5.8	6.2	6.5	3.8%	
Perak	8.1	8.4	8.7	9.2	9.6	3.5%	
Perlis	7.3	7.3	7.4	8.1	8.3	2.6%	
Pulau Pinang	6.9	7.2	7.5	7.6	7.8	2.5%	
Sabah	3.0	3.1	3.2	3.1	3.1	0.7%	
Sarawak	5.9	6.0	6.2	6.5	6.7	2.6%	
Selangor	3.8	4.1	4.3	4.4	4.6	3.9%	
Terengganu	5.0	5.1	5.2	5.2	5.3	1.2%	
W.P Kuala Lumpur	5.0	5.2	5.5	5.9	6.2	4.4%	
W.P Labuan	2.6	2.7	2.9	3.3	3.5	6.1%	
W.P Putrajaya	0.7	0.7	0.8	0.9	1.2	11.4%	

\*AAR : Average annual rate of change for last 5 years

Source of data : DOSM



## 2.5 Communicable diseases

### 2.5.1 Dengue

Dengue is the most common arthropod-borne viral infection which is endemic in tropical and sub-tropical countries. Up to 50-100 million infections are estimated to occur annually in over 100 countries, putting almost half of the world population at risk. The incidence of dengue has increased 30-fold over the last 50 years. It has been said that climate change has widened its geographical distribution and has influence on the breeding pattern of the vectors.

Dengue fever and dengue hemorrhagic fever/dengue shock syndrome are caused by the dengue viruses (dengue-1, dengue-2, dengue-3, and dengue-4) transmitted from viremic to susceptible humans mainly by the bites of *Aedes aegypti*. Since the effectiveness of dengue vaccine is still debatable, the control of dengue fever is very much dependent on the control of its vectors.

The rate of dengue fever (DF) increased over the period of six years (between 2011 and 2016) with 6 years AAR of 30.72%. There was

a rapid rise between 2013 and 2015 (Figure 2.20), which was contributed by outbreaks in WP Kuala Lumpur, Selangor and Johor (Table 2.12). Higher incidences of dengue was recorded in 2015 in most states compared to the previous years. On the other hand the rate of dengue haemorrhagic fever(DHF) was decreased with 6 years AAR of -13.8%. No significant trend in dengue fatality rate was observed during this period (Figure 2.20).

**Dengue Mortality Rate** refer to death due to Dengue Fever (DF) and Dengue Hemorrhagic Fever (DHF) cases. This is a clinical diagnosis decided by the doctor based on clinical findings as well as the relevant investigations (Health Information Centre).

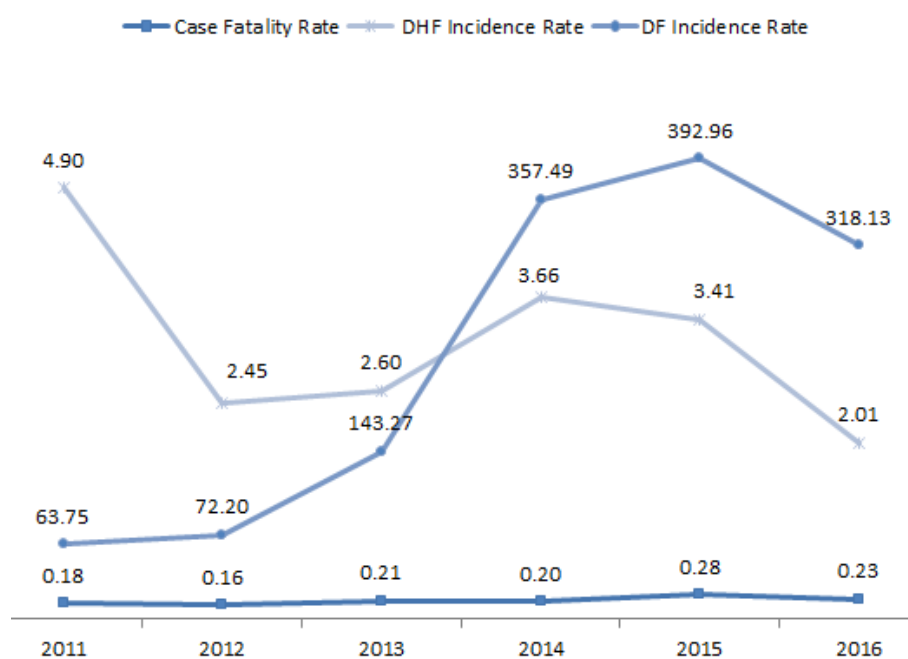
$$DIR = \frac{\text{number of dengue cases}}{\text{midyear population in a year}} * K$$

where;

DIR : Dengue Incidence Rate

K = 1,000

Figure 2.20: Dengue Incidence and Mortality Rate (per 100,000 population)



Source of data: Disease Control Division, MOH

Table 2.10: Dengue Fever Incidence Rate (per 100,000 population), 2012-2016

States	2011	2012	2013	2014	2015	2016	*AAR
Malaysia	63.8	72.2	143.3	357.5	393.0	318.1	+30.7%
Perlis	46.3	71.4	92.4	130.1	104.1	72.5	+7.8%
Kedah	25.0	40.1	39.4	48.8	47.4	46.5	+10.9%
Pinang	96.5	47.8	62.0	188.1	348.2	149.0	+7.5%
Perak	57.4	69.6	102.7	304.4	379.2	151.0	+17.5%
Selangor	127.1	154.7	410.7	925.5	1065.9	814.4	+36.3%
†W.P. Kuala Lumpur	106.1	97.1	137.2	385.5	443.3	459.3	+27.7%
W.P. Labuan	66.3	221.6	12.9	11.6	2.1	13.3	-23.5%
N.Sembilan	51.9	51.8	111.5	347.5	220.6	256.8	+30.6%
Melaka	41.1	51.8	166.9	315.6	272.2	255.3	+35.6%
Johor	56.0	46.5	136.6	178.6	441.3	290.4	+31.6%
Pahang	53.0	40.5	45.8	135.0	183.5	186.5	+23.3%
Terengganu	43.7	63.3	49.1	142.8	123.9	168.0	+25.2%
Kelantan	11.3	74.8	84.7	852.2	165.3	342.9	+76.7%
Sabah	17.8	17.0	20.4	41.1	81.4	95.9	+32.4%
Sarawak	37.4	53.8	49.5	97.6	72.6	100.8	+18.0%

\*AAR : Average annual rate of change for last 6 years

†W.P. Kuala Lumpur : includes W.P Putrajaya

Source of data : Source of data: Disease Control Division, MOH

Table 2.11: Dengue Haemorrhagic Fever Incidence Rate (per 100,000 population), 2012-2016

States	2011	2012	2013	2014	2015	2016	*AAR
Malaysia	4.9	2.5	2.6	3.7	3.4	2.0	-13.8%
Perlis	0.0	0.4	1.2	0.0	0.8	0.4	-1.0%
Kedah	1.1	0.8	0.3	0.7	0.8	0.4	-14.3%
Pinang	2.6	1.3	2.7	2.7	2.4	0.8	-17.5%
Perak	1.4	1.4	0.7	1.9	2.8	1.2	-3.2%
Selangor	12.0	6.6	5.9	10.5	9.9	5.7	-11.6%
†W.P. Kuala Lumpur	9.0	4.1	4.5	5.9	5.6	3.8	-13.4%
W.P. Labuan	4.4	1.1	2.1	0.0	0.0	0.0	-100.0%
N.Sembilan	2.2	0.5	0.5	1.3	2.8	2.6	+2.8%
Melaka	5.5	1.5	9.6	5.6	5.0	2.7	-11.3%
Johor	2.6	0.5	2.2	1.3	1.7	0.8	-18.5%
Pahang	9.9	0.9	0.3	0.8	1.4	0.9	-33.4%
Terengganu	2.4	4.3	4.9	6.2	2.3	1.7	-5.3%
Kelantan	0.8	1.1	1.0	2.2	0.6	1.0	+2.3%
Sabah	0.0	0.4	0.7	0.7	0.6	0.3	-10.0%
Sarawak	1.3	1.5	0.7	1.1	0.4	0.4	-19.4%

\*AAR : Average annual rate of change for last 6 years

†W.P. Kuala Lumpur : includes W.P Putrajaya

Source of data : Source of data: Disease Control Division, MOH

Table 2.12: Dengue Haemorrhagic Fever Mortality Rate (per 100,000 population), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>0.12</b>	<b>0.31</b>	<b>0.71</b>	<b>1.10</b>	<b>0.75</b>	<b>+44.27%</b>	
Johor	0.03	0.69	0.71	1.44	0.63	+83.84%	
Kedah	0.2	0.05	0.34	0.68	0.24	+3.71%	
Kelantan	0.0	0.12	1.0	0.41	0.61	+50.15%	
Melaka	0.00	1.06	0.70	0.92	0.78	-7.38%	
Negeri Sembilan	0.19	0.09	0.92	1.46	2.36	+65.51%	
Pahang	0.06	0.13	0.38	0.99	0.68	+62.51%	
Perak	0.21	0.16	0.85	1.01	0.40	+13.75%	
Perlis	0.42	0.41	0.00	0.41	1.20	+23.36%	
Pulau Pinang	0.06	0.43	0.67	1.14	0.70	+63.45%	
Sabah	0.06	0.15	0.17	0.28	0.05	-3.58%	
Sarawak	0.04	0.16	0.23	0.11	0.26	+45.41%	
Selangor	0.21	0.42	1.33	2.16	1.24	+42.64%	
Terengganu	0.00	0.00	0.18	0.43	1.69	+110.96%	
†W.P Kuala Lumpur	0.28	0.44	1.14	1.83	1.18	+33.34%	
W.P Labuan	0.00	0.00	0.00	0.00	0.00	0.00%	

\*AAR : Average annual rate of change for last 5 years  
†W.P. Kuala Lumpur : includes W.P Putrajaya  
Source of data : Source of data: Disease Control Division, MOH

## 2.5.2 HIV

HIV continues to be a major global public health issue, having claimed more than 35 million lives so far. In 2016, 1.0 million people died from HIV-related causes globally. There were approximately 36.7 million people living with HIV at the end of 2016 with 1.8 million people becoming newly infected in 2016 globally<sup>1</sup>.

The HIV incidence and mortality rate in Malaysia decreased steadily over the seven years. In 2016, the HIV incidence rate was 10.73 per 100,000 population which declined by 16.8% since 2010 (Figure 2.21). In parallel with the declining of HIV incidence, HIV related mortality decreased by 53.5% for the same period (from 1.14 per 100,000 in 2010 to 0.53 per 100,000 population in 2016).

WP Kuala Lumpur showed the highest incidence rate of HIV compared to other states. On the other hand, for Perlis, although the incidence was mostly lower than the national

average, there was rapid increase over recent years. Prevalence of HIV in Malaysia was above the Asia-19 (19 selected Asian countries) where the estimated prevalence was 303 per 100,000 population.

**Human immunodeficiency virus (HIV)** is a retrovirus that destroys or impairs the cells of the immune system. As HIV infection progresses, a person becomes more susceptible to infections (WHO).

**HIV Incidence Rate** The total number of persons estimated to be living with the disease at a particular time.

$$IR = \frac{\text{number of new HIV cases}}{\text{number of person exposed to risk}} * K$$

where;

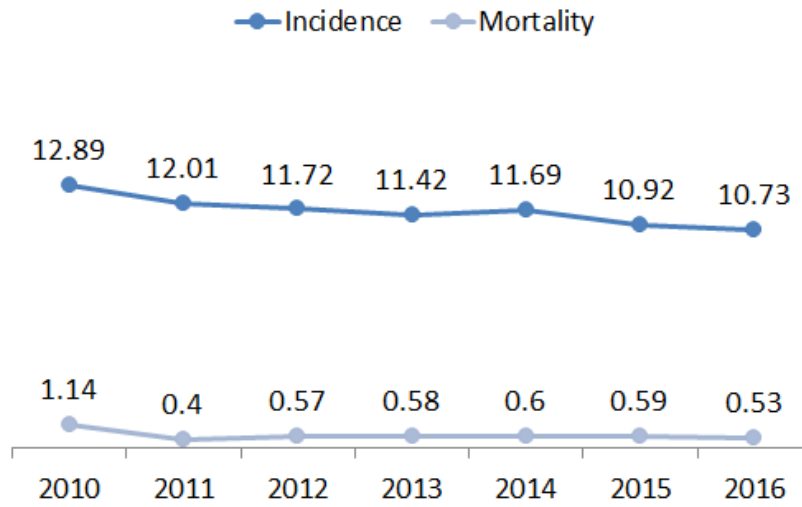
IR : Incidence rate

K = 100,000

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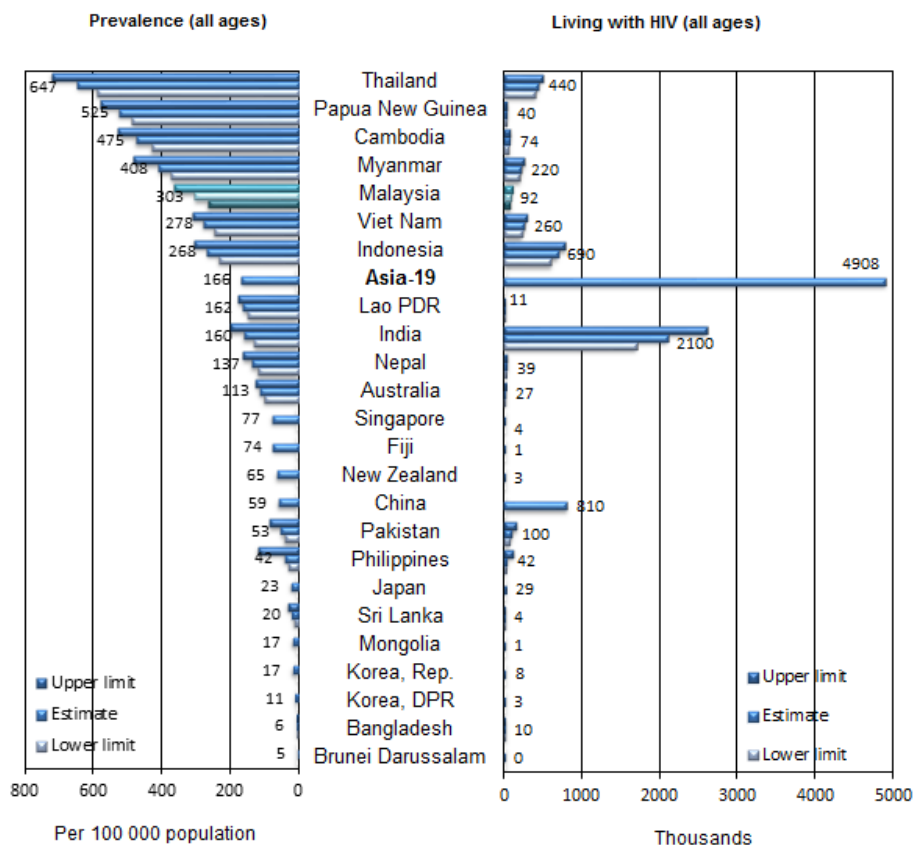
<sup>1</sup>World Health Organization. (2018, 8th Mac). *HIV/AIDS*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs360/en/>

Figure 2.21: HIV Incidence and Mortality Rate (per 100,000 population) in Malaysia



Source of data: Disease Control Division, MOH

Figure 2.22: Estimated Number of Persons Living with HIV, 2015



Source of data: OECD

<http://dx.doi.org/10.1787/888933413306>

Table 2.13: HIV Incidence Rate (per 100,000 population), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>11.72</b>	<b>11.42</b>	<b>11.69</b>	<b>10.92</b>	<b>10.73</b>	<b>-1.75%</b>	
Johor	15.32	9.84	11.15	12.69	8.78	-10.54%	
Kedah	8.21	7.67	8.41	6.61	8.06	-0.37%	
Kelantan	16.70	12.43	13.42	9.84	10.52	-8.83%	
Melaka	18.04	19.83	16.00	14.66	12.53	-7.03%	
Negeri Sembilan	8.80	9.16	9.69	12.11	10.64	+ 3.87%	
Pahang	17.50	18.06	13.46	10.90	13.02	-5.74%	
Perak	6.29	4.76	6.35	6.01	4.79	-5.30%	
Perlis	8.77	9.11	7.80	10.98	13.55	+ 9.09%	
Pulau Pinang	7.82	6.82	6.68	6.19	4.71	-9.64%	
Sabah	5.66	7.38	7.37	6.58	6.71	+ 3.46%	
Sarawak	5.77	7.38	9.02	8.73	9.41	+10.28%	
Selangor	12.51	13.85	14.21	13.06	14.10	+2.42%	
Terengganu	13.45	13.39	18.54	14.30	11.32	-3.39%	
†W.P Kuala Lumpur	25.71	27.39	24.40	24.13	26.68	-0.74%	
W.P Labuan	5.46	7.50	9.46	13.43	5.11	-1.32%	

\*AAR : Average annual rate of change for last 5 years

†W.P. Kuala Lumpur : includes W.P Putrajaya

Source of data : Source of data: Disease Control Division, MOH

### 2.5.3 Malaria

Malaria is a vector-borne disease which imposed a major public health concern in most tropical countries in the world. In 2016, an estimate of 216 million cases of malaria were reported across 91 countries, with an increase of 5 million cases as compared to the previous year<sup>1</sup>.

It is endemic in Malaysia for more than a century. Since the introduction of the Malaria Eradication Programme in 1960, the incidence of malaria has reduced significantly to 0.1 per 1,000 population (or 100 per 100,000 population) in 1998. Thus it has entered the elimination phase with the target of “malaria free” Malaysia. In 2016, the incidence was 7.3 per 100,000 population which is almost 94% reduction from 1998 rates and lower than neighbouring ASEAN countries (Figure 2.24).

Although there has been a drastic decline in malarial incidence since 1960s, there is a current concern for re-emerging of malaria cases. With the recent report of cases of a fifth malarial parasite (*Plasmodium knowlesi*)<sup>2</sup> which is a zoonotic infection in addition to the existing endemic parasites; *P.falciparum*, *P.vivax*, *P.malariae* and *P.ovale*, a new challenge elimination of malaria is potentially imposed .

This is visible as in the past 10 years, there was a sudden spike in malaria incidence between 2009 and 2011 (Figure 2.23). The highest incidence was in Sarawak, Sabah and Pahang, (Table 2.14) consistent with the high incidence of *P.knowlesi malaria* reported in these states

during this period<sup>3</sup>.

With vast deforestation and other economic activities, zoonotic diseases have become a threat to human health. The disease surveillance should be modelled as a sensitive tool to provide early warning of potential increase in cases or outbreaks.

**Malaria** is a tropical disease caused by a parasite transmitted by the bites of infected female Anopheles mosquitoes. After a period spent in the liver, malaria parasites multiply within red blood cells, causing symptoms such as fever, headache and vomiting. Malaria is preventable and curable, although no vaccine currently exists but if left untreated, malaria can become life-threatening by disrupting the blood supply to vital organs (WHO).

**Malaria Incidence Rate** is the number of confirmed reported malaria cases per 100 000 persons per year

$$IR = \frac{\text{number of confirm malaria cases}}{\text{midyear population in a year}} * K$$

$$MR = \frac{\text{number of death due to malaria}}{\text{number of malaria cases in a year}} * K$$

where;

IR : Malaria Incidence Rate

MR : Malaria Mortality Rate

K = 1,000

<sup>1</sup>World Health Organization.(2018, 8 Mac). *Fact Sheet:World Malaria Report 2016*. Retrieved from <http://www.who.int/malaria/media/world-malaria-report-2016/en/>

<sup>2</sup>Singh, B., and C. Daneshvar. (2010). Plasmodium Knowlesi Malaria in Malaysia. *Med J Malaysia* 65(3),pp. 166-72.

<sup>3</sup>William, Timothy, et al.(2013). Increasing Incidence of Plasmodium Knowlesi Malaria Following Control of P. Falciparum and P. Vivax Malaria in Sabah, Malaysia. *PLoS Neglected Tropical Diseases* 7(1),e2026.



Table 2.14: Malaria Incidence Rate (per 100,000 population) , 2012-2016

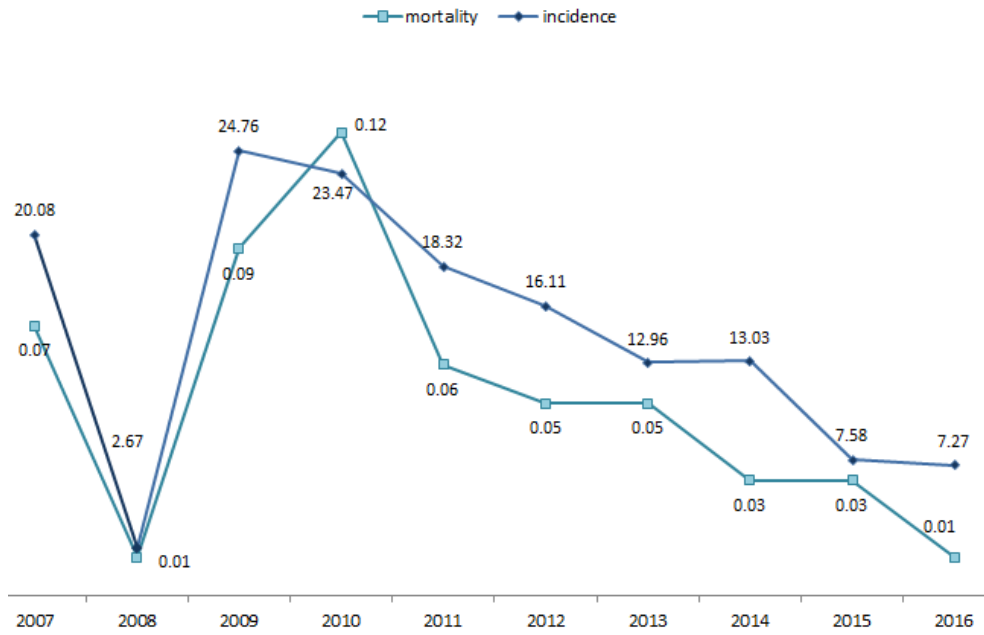
States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>16.11</b>	<b>12.96</b>	<b>13.03</b>	<b>7.58</b>	<b>7.27</b>	<b>-14.71%</b>	
Johor	2.53	1.75	1.19	1.27	1.12	-15.04%	
Kedah	1.65	2.28	0.93	0.68	0.42	-23.94%	
Kelantan	10.61	22.63	7.62	3.14	6.18	-10.25%	
Melaka	2.14	0.94	1.16	0.23	0.67	-20.73%	
Negeri Sembilan	9.28	5.05	2.95	1.64	1.00	-35.95%	
Pahang	13.95	11.38	8.01	4.87	2.46	-29.32%	
Perak	4.3	4.15	3.3	1.37	7.41	<b>11.50%</b>	
Perlis	0.00	0.41	0.82	1.63	0.40	-0.62%	
Pulau Pinang	2.30	2.39	2.25	1.02	0.17	-40.61%	
Sabah	61.01	46.85	51.04	29.46	18.8	-20.98%	
Sarawak	61.71	38.98	49.93	33.12	38.82	-8.85%	
Selangor	4.78	5.26	5.62	1.70	1.44	-21.33%	
Terengganu	3.11	3.69	1.50	0.95	0.76	-24.56%	
†W.P Kuala Lumpur	1.28	1.76	1.09	0.86	0.80	-8.97%	
W.P Labuan	3.28	0.00	0.00	0.00	0.00	-	

\*AAR : Average annual rate of change for last 5 years

†W.P. Kuala Lumpur : includes W.P Putrajaya

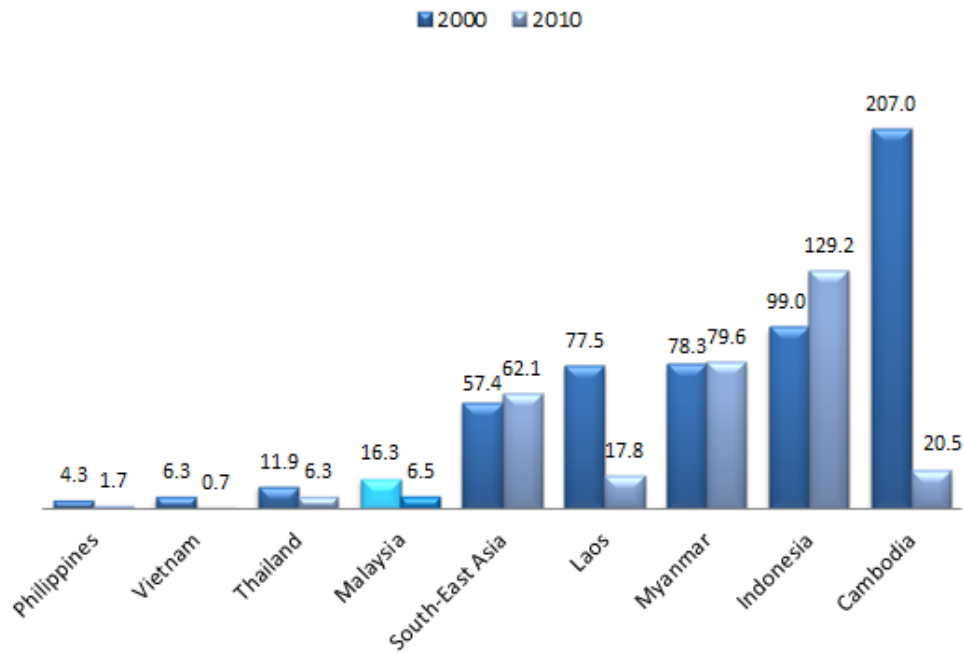
Source of data : Source of data: Disease Control Division, MOH

Figure 2.23: Malaria Incidence and Mortality Rate (per 100,000 population) in Malaysia



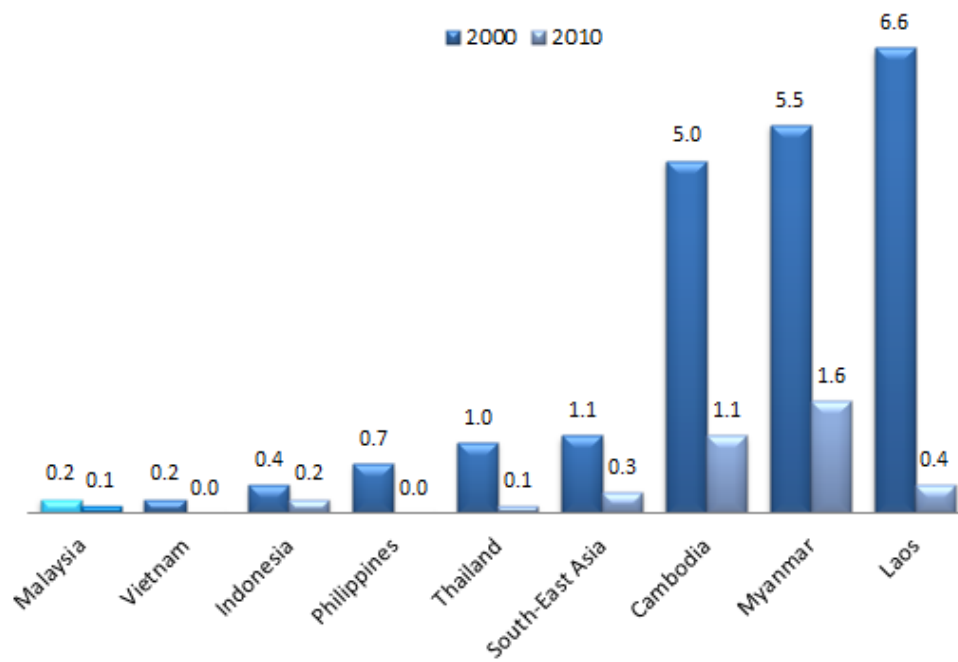
Source of data: Disease Control Division, MOH

Figure 2.24: Malaria Incidence Rate (per 100,000 population)



Source of data: UNESCAP

Figure 2.25: Malaria Mortality Rate (per 100,000 population)



Source of data: UNESCAP

## 2.5.4 Tuberculosis

Tuberculosis (TB) remains a global burden and is one of the top 10 causes of death world-wide despite world-wide measures to curb the disease. According to the WHO, 10.4 million people fell ill with TB, and 1.7 million died from the disease in 2016. Over 95% of TB deaths occurred in low- and middle-income countries<sup>1</sup>.

In 2014, on average across OECD countries, the TB incidence was about 12 cases per 100,000 populations. DPR Korea reported the highest TB incidence rate while New Zealand the lowest. Across Asia (among 22 selected Asian countries), there was an average of 181 cases per 100,000 population. The TB incidence rate in Malaysia was relatively lower than the Asian-22 with 103 cases per 100,000 population. However, this incidence rate is still higher than the OECD average<sup>2</sup>.

It has been reported that there has been an overall increasing trend of TB incidence in Malaysia from 1990 to 2014<sup>3</sup>. The trend continued to increase to 81.3 per 100,000 population in 2016 (Figure 2.32) which means that the increase is 19% in seven years since 2010. The increase was about 1% annually (AAR=0.99%). Negeri Sembilan showed the highest annual increase followed by WP Labuan and Selangor with AAR of 5.1%, 4.7% and 4.4% respectively (Table 2.15).

According to WHO, 16% of TB cases die from the disease. TB mortality rate in Malaysia was fairly low fluctuating between 4.8 and 6.2 cases per 100,000 populations since 2010.

Although the goal of MDG to prevent fur-

ther increase in TB incidence and death by 2015 has been achieved<sup>3</sup>, however, like other parts of the world, Malaysia is also experiencing the re-emergence which is apparently contributed by the prevalence of HIV infection and other immunocompromised conditions. Focus should be given to enhance the strategy to curb the re-emergence of the disease particularly among the immunocompromised groups; children, HIV infected people, and those who developed multi-drugs resistant TB (MDR-TB)<sup>4</sup>. Strict policy on TB screening and treatment of immigrants and foreign workers from countries with high TB burden may also be beneficial. Focused strategies are crucial in order to curb further increase and to achieve the SDG target to reduce the incidence rate of TB<sup>5</sup>.

**Tuberculosis (TB)** is a contagious disease, caused by the *Mycobacterium tuberculosis* bacteria. It usually attacks the lungs but can also affect other parts of the body. It is spread through the air, when people who have the disease cough, sneeze, talk or spit (WHO).

**Tuberculosis Incidence Rate** is the number of new and relapsed TB cases (all forms of TB, including cases in people living with HIV) arising in a given year per 100 000 population.

$$IR = \frac{\text{number of new TB cases}}{\text{number of persons exposed to risk}} * K$$

where;

IR : Incidence rate

K = 100,000

<sup>1</sup>World Health Organization. (2018). *Tuberculosis*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs104/en/>

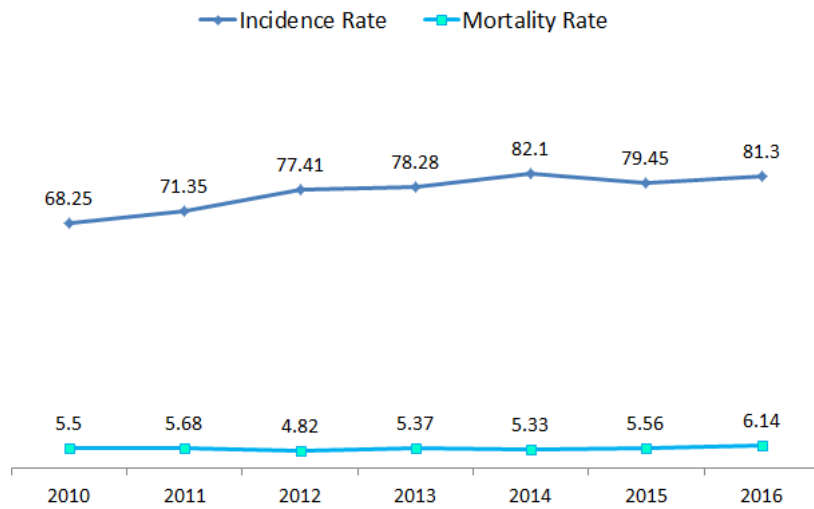
<sup>2</sup>OECD/WHO. (2016). *Tuberculosis. Health at a Glance: Asia/Pacific 2016: Measuring Progress towards Universal Health Coverage, OECD Publishing, Paris*. Retrieved from <http://dx.doi.org/10.1787/health-glance-ap-2016-en>

<sup>3</sup>Wejse, Christian. "Tuberculosis elimination in the post Millennium Development Goals era." *International Journal of Infectious Diseases* 32 (2015): 152-155

<sup>4</sup>Shajahan, Rafiq, et al. (2016). Predictors of Re-Emerging Tuberculosis: A Review. *Open Access Library Journal* 3(03),pp.1.

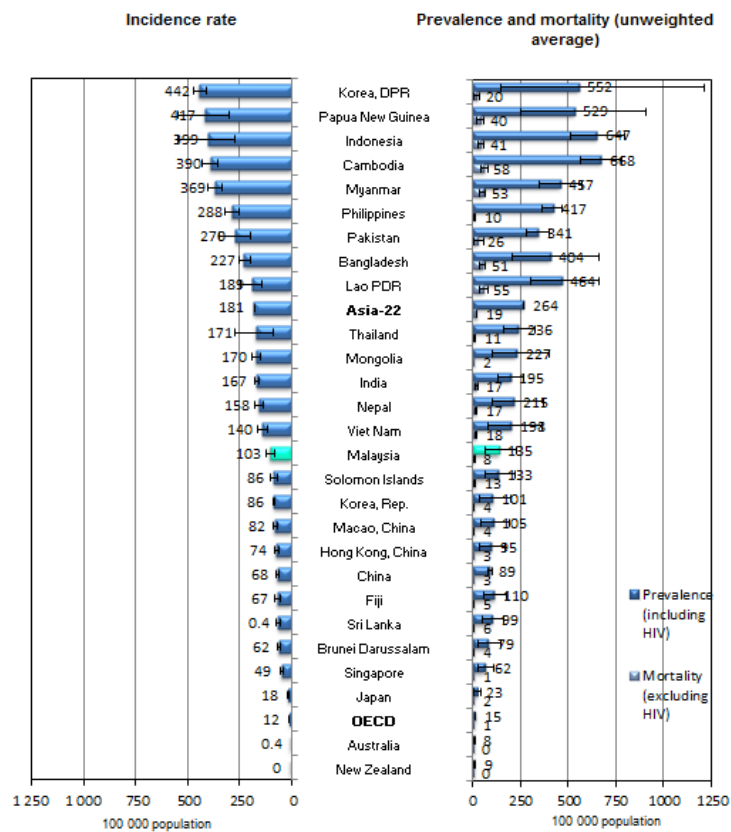
<sup>5</sup>WHO. *End TB Brochure*. Retrieved from [http://www.who.int/tb/End\\_TB\\_brochure.pdf](http://www.who.int/tb/End_TB_brochure.pdf) (access on 13 August 2018)

Figure 2.26: Tuberculosis Incidence and Mortality Rate (per 100,000 population) in Malaysia



Source of data: Disease Control Division, MOH

Figure 2.27: Estimated burden of disease caused by Tuberculosis, 2014



Source of data: OECD

<http://dx.doi.org/10.1787/888933413291>

Table 2.15: Tuberculosis Incidence Rate (per 100,000 population), 2012-2016

States	2012	2013	2014	2015	2016	*AAR	Trend
<b>Malaysia</b>	<b>77.41</b>	<b>78.28</b>	<b>82.1</b>	<b>79.45</b>	<b>81.30</b>	<b>+0.99%</b>	
Johor	59.48	62.21	65.14	67.79	63.31	+1.26%	
Kedah	58.79	56.50	63.58	61.73	60.50	+0.58%	
Kelantan	87.54	82.96	80.74	71.76	69.78	-4.43%	
Melaka	64.81	63.47	76.41	58.77	63.32	-0.46%	
Negeri Sembilan	45.44	51.68	62.72	60.72	58.29	+5.11%	
Pahang	57.48	55.13	57.40	57.66	57.49	-	
Perak	64.30	63.54	65.58	66.88	67.10	+0.86%	
Perlis	77.28	64.21	48.85	52.85	52.99	-7.27%	
Pulau Pinang	77.28	77.01	76.08	77.15	80.56	+0.83%	
Sabah	131.27	129.99	136.20	125.98	129.89	-0.21%	
Sarawak	95.45	101.11	107.20	97.69	104.23	+1.78%	
Selangor	63.00	70.14	75.26	75.40	78.27	+4.44%	
Terengganu	67.07	65.89	64.36	61.55	64.95	-0.64%	
†W.P Kuala Lumpur	106.31	96.39	96.86	97.99	101.74	-0.87%	
W.P Labuan	108.08	106.11	109.36	119.83	135.99	+4.70%	
*AAR	: Average annual rate of change for last 5 years						
†W.P. Kuala Lumpur	: includes W.P Putrajaya						
Source of data	: Source of data: Disease Control Division, MOH						

## 2.6 Non-communicable diseases

### 2.6.1 Diabetes

Diabetes is a common condition and its prevalence is dramatically rising all over the world. The biggest impact is on adults of working age in developing countries. WHO noted that one in 20 deaths is attributable to diabetes and at least one in ten deaths among adults between 35 and 64 years old is attributable to diabetes. Diabetes has become one of the major causes of premature illness and death in most countries, mainly through the increased risk of cardiovascular disease (CVD). Cardiovascular disease is responsible for between 50% and 80% of deaths in people with diabetes<sup>1</sup>.

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. There are two types of diabetes; diabetes type I which is typically in childhood but may also occurs in adults, and diabetes type II which is commonly among adult with high risk factors such as obesity and sedentary. Diabetes is a leading cause of blindness, amputation and kidney failure. These complications account for much of the social and financial burden caused by diabetes.

Knowledge on the magnitude of the diabetes burden in Malaysia is mainly based on the National Health Morbidity Survey (NHMS) which is a population-based survey, National Diabetes Registry (NDR) and Malaysian Health Data Warehouse (MyHDW) for hospital ad-

mission.

Based on NHMS<sup>2</sup>, the prevalence of diabetes is apparently rising (refer Table 2.16). The prevalence in 2011 and 2015 were 15.2% and 17.5% respectively. There was approximated 15% increase within the 5-year interval. Most states showed increased prevalence of diabetes except for Pahang, Selangor, Melaka, Kelantan, Negeri Sembilan and Perlis. Kedah showed the highest prevalence and it had increased by 14% over the 5-year period. There was no significant difference between prevalence in males and females<sup>2</sup>. The prevalence among males and females in 2015 were 16.5% and 18.3% respectively. Although the prevalence among females is increasing and higher as compared to previous survey, the male to female ratio was still almost about 1:1.

There is concern that the increase in prevalence was contributed by the higher proportion of undiagnosed cases in both years. The prevalence of diagnosed vs undiagnosed cases in 2011 were 7.2% and 8.0% respectively while in the latest survey, the prevalences were 8.3% and 9.2% respectively (Table 2.16). These findings are alarming and justify urgent remedial intervention.

**Diabetes Mellitus** is a condition in which the amount of glucose (sugar) in the blood is too high because the body cannot use it properly (WHO) .

<sup>1</sup>WHO. (2018). *Diabetes Action Now: An Initiative of World Health Organization & International Diabetic Federation*. Retrieved from <http://apps.who.int/iris/bitstream/handle/10665/42934/924159151X.pdf?>

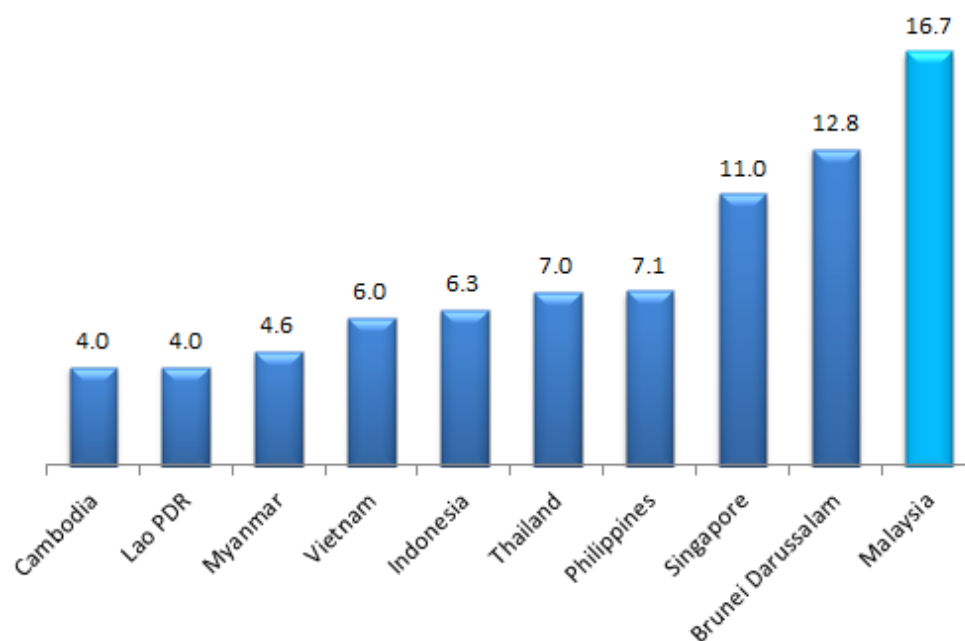
<sup>2</sup>Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)-Communicable Diseases Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*

Table 2.16: Prevalence of Diabetes (%), 2011 & 2015

States	2011			2015			Change of undiagnosed
	Overall	Known	Undiagnosed	Overall	Known	Undiagnosed	
<b>Malaysia</b>	<b>15.2</b>	<b>7.2</b>	<b>8.0</b>	<b>17.5</b>	<b>8.3</b>	<b>9.2</b>	<b>+1.2</b>
Johor	13.4	7.6	5.9	19.8	8.8	11.0	+5.1
Kedah	22.5	9.1	13.4	25.4	9.3	16.1	+2.7
Kelantan	19.7	8.0	11.7	18.5	7.1	11.3	-0.4
Melaka	17.1	10.4	6.6	16.7	8.3	8.4	+1.8
Negeri Sembilan	22.0	11.5	10.5	19.3	10.5	8.8	-1.7
Pahang	16.7	8.6	8.1	14.8	6.3	8.6	+0.5
Perak	16.2	10.1	6.1	19.4	11.9	7.4	+1.3
Perlis	24.8	8.7	16.1	20.6	10.9	9.7	-6.4
Pulau Pinang	15.0	8.5	6.4	18.1	9.0	9.1	+2.7
†Sabah	16.5	6.5	10.1	14.2	5.9	8.3	-1.8
Sarawak	11.6	7.1	4.5	14.8	8.3	6.6	+2.1
Selangor	9.0	2.6	6.4	15.5	7.8	7.7	+1.3
Terengganu	12.3	5.1	7.3	18.6	8.7	9.9	+2.6
W.P Kuala Lumpur	11.3	7.2	4.1	17.4	8.1	9.3	+5.2
W.P Putrajaya	8.8	4.6	4.2	19.2	5.30	13.9	+9.7

†Sabah : includes W.P Labuan  
Source of data : NHMS

Figure 2.28: Diabetes Prevalence (% of population age 20 to 79), 2017



Source of data: World Bank



## 2.6.2 Hypertension

Worldwide, hypertension is estimated to cause about 12.8% of the total all annual death and 3.7% of total DALYs. It is a major risk factor for coronary health disease and stroke. The overall prevalence of hypertension for adults age 25 and above was around 49% in 2008. The increase in the prevalence of hypertension could be attributed to increase in the ageing population.

Based on NHMS, the overall prevalence of hypertension decreased from 32.7% in 2011 to 30.3% in 2015. The prevalence of undiagnosed hypertension was also reduced by 2.6%. Most states showed reduced prevalence of both hypertension and undiagnosed hypertension except Kelantan, WP KL and WP Putrajaya.

A study using NHMS 2011 data found the prevalence of young adult hypertension of 17.3% was significantly associated with obesity and diabetes<sup>1</sup>. Looking at the increment of national obesity prevalence from 15.1% in 2011 to 17.7% in 2015, and diabetes prevalence from 15.5% in 2011 to 17.5% in 2015; Malaysia may be expecting new cases soon.

The new American Heart Association (AHA) 2017 guidelines for high blood pressure (BP) lowered the threshold of elevated BP to 120-129 mmHg systolic and less than 80 mmHg<sup>2</sup> diastolic to allow for an earlier intervention mainly with non-drug approaches and account for any occurring hypertensive complications. Malaysia on the other hand, in the 5th Edition

Clinical Practice Guidelines on Management of Hypertension focused more on targeted blood pressure for specific groups at risk. An adult BP of 120-139/85-89 mmHg is still classified as normal, unless seen in high risk groups<sup>3</sup>.

A global monitoring network by WHO targeted 25% relative reduction in raised BP prevalence or, containment of the prevalence according to national circumstances by 2025. Figure 2.29 showed only 0.9% reduction of population with raised BP in Malaysia over a 3- year duration. At this rate over the next 7 years, it is estimated that there will be a total of 4-5% reduction in raised BP population prevalence.

Regulatory strategies plays a significant role in the control of BP. Policies that help reduce the risk factors associated with hypertension has to be population-based and implemented seriously. On the rise and trending globally are workplace wellness programmes, which are considered by WHO to be the most cost-effective prevention of NCDs including hypertension. On the other hand, institutionalized training of health workers especially at the primary health care level will ensure improvement in the detection and management of hypertension.

**Hypertension** is defined as persistent elevation of systolic blood pressure (BP) of 140 mmHg or greater and/or diastolic BP of 90 mmHg or greater, taken at least twice on two separate occasions (WHO) .

<sup>1</sup>Omar, Mohd Azahadi, et al. (2016). Prevalence of young Adult Hypertension in Malaysia and its associated factors: Findings from National Health and Morbidity Survey 2011. *Malaysian Journal of Public Health Medicine* 2016, Vol.16(3):pp.274-283

<sup>2</sup>American College of Cardiology. (2017). *Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults*. Retrieved from [https://www.acc.org/ /media/Non-Clinical/Files-PDFs-Excel-MS-Word-etc/Guidelines/2017/Guidelines\\_Made\\_Simple\\_2017\\_HBP.pdf](https://www.acc.org/ /media/Non-Clinical/Files-PDFs-Excel-MS-Word-etc/Guidelines/2017/Guidelines_Made_Simple_2017_HBP.pdf)

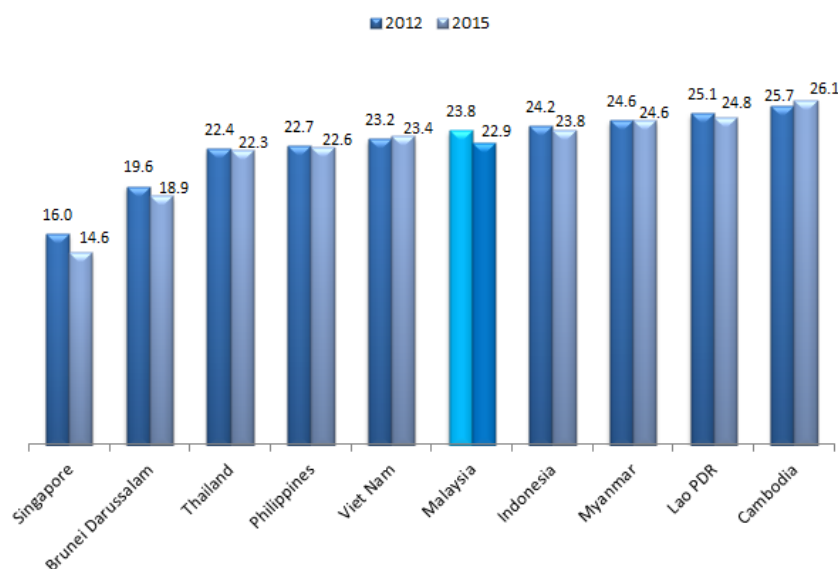
<sup>3</sup>Ministry of Health Malaysia, Malaysian Society of Hypertension, Academy of Medicine Malaysia. (2018). *Clinical Practice Guidelines on Management of Hypertension 5th Edition*. Retrieved from <http://www.moh.gov.my/index.php/pages/view/133>

Table 2.17: Prevalence of Hypertension (%), 2011 & 2015

States	2011			2015			Change of undiagnosed
	Overall	Known	Undiagnosed	Overall	Known	Undiagnosed	
<b>Malaysia</b>	<b>32.7</b>	<b>12.8</b>	<b>19.8</b>	<b>30.3</b>	<b>13.1</b>	<b>17.2</b>	<b>-2.6</b>
Johor	36.4	14.0	22.4	27.4	11.2	16.2	-6.2
Kedah	38.2	14.2	24.0	37.5	14.3	23.2	-0.8
Kelantan	27.9	11.1	16.9	33.8	10.6	23.2	+6.3
Melaka	32.8	16.0	16.9	25.8	13.1	12.7	-4.2
Negeri Sembilan	34.1	15.1	19.0	32.5	16.1	16.4	-2.6
Pahang	29.9	11.9	17.9	28.5	10.7	17.8	-0.1
Perak	42.9	18.0	24.9	36.4	17.3	19.1	-5.8
Perlis	41.1	12.8	28.3	35.4	14.2	21.1	-7.2
Pulau Pinang	28.4	11.2	17.2	29.8	12.6	17.2	0.0
†Sabah	29.1	10.3	18.8	26.8	12.9	13.9	-4.9
Sarawak	40.5	14.6	25.9	37.3	16.5	20.8	-5.1
Selangor	28.7	11.4	17.4	25.5	12.4	13.1	-4.3
Terengganu	26.8	10.4	16.3	26.9	11.5	15.3	-1.0
W.P Kuala Lumpur	27.1	11.8	15.3	33.8	11.2	22.6	+7.3
W.P Putrajaya	22.5	9.8	12.7	24.1	10.0	14.1	+1.4

†Sabah : includes W.P Labuan  
 Source of data : NHMS

Figure 2.29: Percentage of defined population with raised blood pressure in ASEAN , 2012 & 2015



Source of data: Global Health Observatory Data Repository, WHO

### 2.6.3 Mental Health

Mental health disorders is a major public health concern throughout the world contributing to a substantial proportion of health problems in most countries. Global Burden of Disease Study (GBOD) 2010 reported that mental and substance disorders was one of the leading causes of disease burden in 2010 which accounted for 10% of global DALYs and 28.5% of global years lost due to disability (YDLs).

The magnitude of mental illness is based on the NHMS, which is an extensive nationwide survey. Overall, the prevalence of Generalised Anxiety Disorder among the adult sixteen years old and above was 1.7 % (95 % CI: 1.5-2.0). The prevalence of lifetime depression and current depression were 2.4 % (95 % CI: 2.1-2.8) and 1.8% (95 % CI: 1.5-2.1) respectively<sup>1</sup>. NHMS in 2012 focused on the health issues among the adolescent age-group in school. Attempted suicide reflecting the mental health status of adolescent was reported as 6.8% (95% CI: 6.11-7.52). This is apparently high<sup>2</sup>.

Based on a recent survey<sup>3</sup>, the overall preva-

lence of mental health problem among 16 years and above was 29.2% (95% CI 27.9-30.5) and 12.1% for children aged 5-15 years old in 2015. Kelantan reported to have high prevalence of mental problems (39.1%) after WP Kuala Lumpur (39.8%) & Sabah (42.9%) (Figure 2.30).

Suicidality is the most serious impact of mental health disorders. The Global School-Based Health Survey in 2012 revealed the prevalence of suicidal attempt among school children aged between 13 and 17 years old was about 6.8% (Table 2.18). The overall suicide rate was slightly higher than the average rate for ASEAN countries (Figure 2.31)

The magnitude of mental health problems has triggered an alert and stepping up of remedial measures. Policies should focus and invest on the prevention strategies at the primary healthcare level as well as at the tertiary level to minimise the impact caused by result of mental illness.

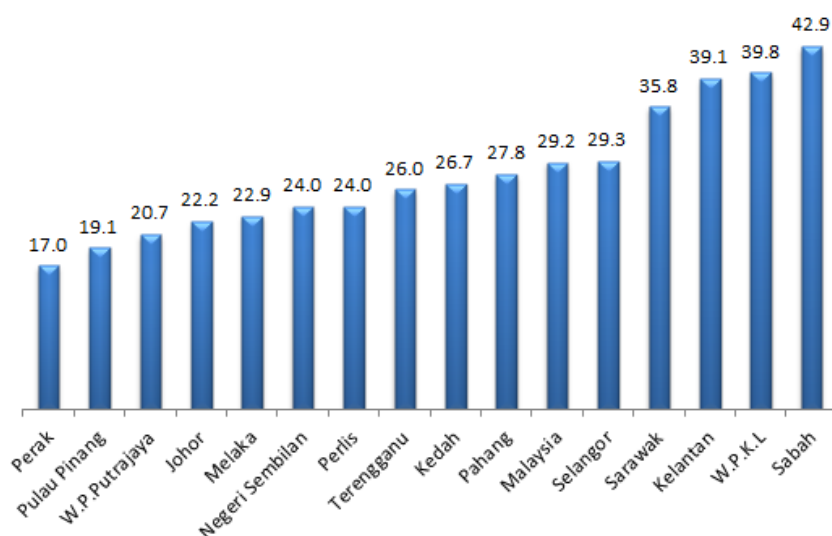
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<sup>1</sup>Institute of Public Health. (2011). *National Health and Morbidity Survey 2011 (NHMS 2011)-Non-Communicable Diseases Volume II*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/NHMS2011-VolumeII.pdf>

<sup>2</sup>Institute of Public Health. (2012). *National Health and Morbidity Survey 2012 (NHMS 2012): Global School-Based Student Health Survey (MOH/S/IKU/29.139(TR))*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/2012/NHMS2012Pahang.pdf>

<sup>3</sup>Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)-Communicable Diseases Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

Figure 2.30: Prevalence of Adult Mental Health (16 years old and above) in Malaysia, 2015



Source of data: NHMS

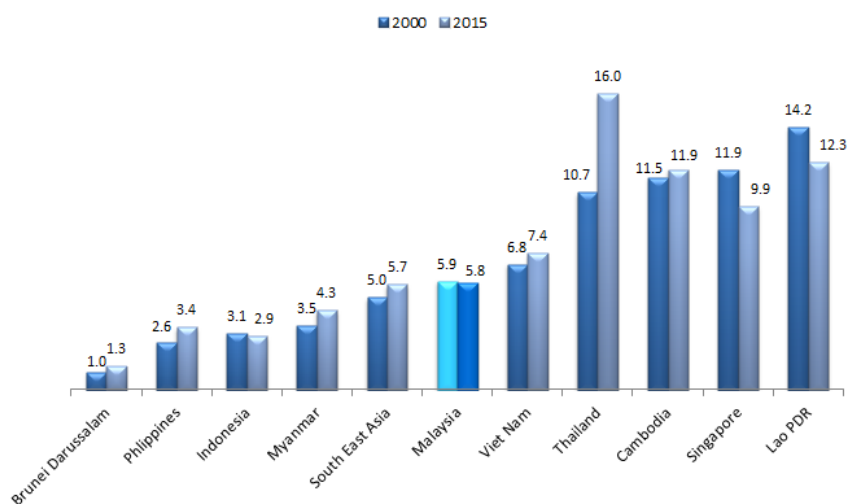
Table 2.18: Prevalence of suicide risk, National Health & Morbidity Survey 2011 and 2012

Suicidal Category	2011		2012	
	Prevalence( $\geq 16$ y.o)	95% CI	Prevalence (13-17 y.o)	95% CI
Suicidal Ideation	1.7%	1.4-1.9	7.9%	7.07-8.60
Suicidal Plan	0.9%	0.7-1.1	6.4%	5.96-6.88
Suicidal Attempt	0.5%	0.4-0.7	*6.8%	6.11-7.52

\* : one or more attempts

Source of Data: NHMS 2011, and NHMS 2012-Global School Health Survey

Figure 2.31: Suicide Rate (per 100,000 population) in South East Asia



Source of data: UNESCAP

## 2.6.4 Cancer Survival Rate

Cancer is the second leading cause of death globally, and is responsible for about 1 in 6 deaths. Hence, the economic impact of cancer is significant. The total annual economic cost of cancer in 2010 was estimated to be approximately USD 1.16 trillion<sup>1</sup>.

Worldwide, lung cancer was the most common cancer constituting 12.9% of the total cancer cases and of cancer deaths (19.4%) in 2012. Breast cancer was the second most common cancer (11.9%) followed by colorectal cancer (9.7%). However, breast cancer was the most common cancer in females (25.2%) in that year. The fatality rate for lung cancer was high, but for breast cancer prognosis is relatively favourable<sup>2</sup>.

In Malaysia, cancer was the fourth leading cause of death which contributes to 12.6% of all deaths in government hospitals and 26.7% in private hospitals in 2016<sup>3</sup>.

A population-based cancer registry was initiated in 1993. The cancer incidence in Malaysia for 2007-2011 in males 86.9 and in females was 99.3 per 100,000 populations<sup>4</sup>. Cancer was the fourth leading cause of death which contributes to 12.6% of all deaths in government hospitals and 26.7% in private hospitals in 2016. There has been an increasing trend from 2007-2016 from 11.3% in 2007 to 12.6% in 2016<sup>3</sup>.

Cancer survival is one of the key measures of the effectiveness of cancer services. It reflects both how good the system is in detecting the disease and on whether people have

rapid access to effective treatment. It is a sensitive indicator for evaluation of health policies and effectiveness of the overall cancer control strategy. Survival estimates reflect the average prognosis for a particular cancer.

We reviewed the survival rates of three common cancers in Malaysia; lung (including trachea & bronchus), breast and colorectal cancer based on the recently published report by the National Cancer Registry on the MySCAN project<sup>5</sup>.

The overall observed survival (OS) and relative survival (RS) for breast cancer for the period between 2007 and 2016 was 61.9% and 66.8% respectively (Table 2.19). The prognosis is substantially good as reflected by 1-year and 5-year RS of 89.7% and 66.8% respectively (Figure 2.32). Although higher than some other Asian countries, the survival rate is still lower than our developed neighbour i.e Singapore, and most OECD countries (Figure 2.34).

For the same period, the overall OS and RS for colon cancer was 45.3% and 56.8% respectively, whilst, for rectal cancer was 36.0% and 45.1% respectively.

Lung cancer (including trachea and bronchus) is the most fatal with OS and RS of 9.0% and 11.0% respectively.

On the overall, the survival rates of all cancers are lesser in Malaysia than those in developed countries<sup>6</sup>. Late detection could be a likely contributing factor as indicated in Figure 2.34.

<sup>1</sup>Stewart, B.W, Wild, C.P et al. (2014). *World Cancer Report 2014*. Lyon: International Agency for Research on Cancer

<sup>2</sup>Ferlay, J., et al. (2015). Cancer Incidence and Mortality Worldwide: Sources, Methods and Major Patterns in GLOBOCAN 2012. *International journal of cancer*, 136(5), pp.E359-E386.

<sup>3</sup>Health Informatics Centre, Ministry of Health. Health Facts 2017 (reference data for 2016)

<sup>4</sup>Azizah Ab M, Nor Saleha I.T, Noor Hashimah A, Asmah Z.A, Mastulu W. (2016). *Malaysian National Cancer Registry Report 2007-2011*. National Cancer Institute, Ministry of Health Malaysia

<sup>5</sup>National Cancer Institute. (2018). Malaysian Study on Cancer Survival (MySCAN), Ministry of Health Malaysia, pp.1-72

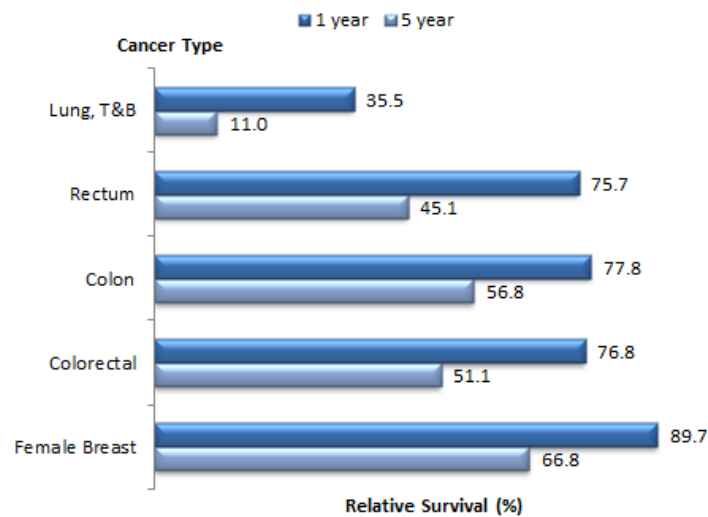
<sup>6</sup>Allemani, C., Matsuda, T., Di Carlo, V., Harewood, R., Matz, M., Nikšić, M., Bonaventure, A., Valkov, M., Johnson, C.J., Estève, J. and Ogunbiyi, O.J. (2018). Global surveillance of trends in cancer survival 2000–14 (CONCORD-3): Analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. *The Lancet*, 391(10125), pp.1023-1075.

Table 2.19: Overall cancer survival by cancer types, period of diagnosis 2007-2011 and followed up to 2016, Malaysia

Cancer Types	OS	95% CI	RS	95% CI
Female Breast	61.9	(61.1,62.6)	66.8	(66.0,67.6)
Colorectal	40.8	(40.0,41.7)	51.1	(50.0,52.3)
Colon	45.3	(44.1,46.6)	56.8	(55.2,58.3)
Rectum	36.0	(34.7,37.3)	45.1	(43.5,46.6)
Lung, T&B	9.0	(8.4,9.7)	11.0	(10.3,11.9)

\* : OS= Observed Survival, RS=Relative Survival  
Source of Data: National Cancer Institute

Figure 2.32: Relative survival at 1-year and 5-year by cancer type, period of diagnosis 2007-2011 and followed up to 2016, Malaysia



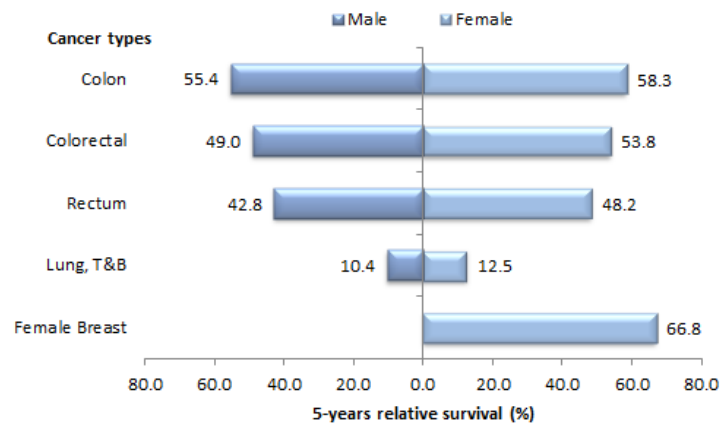
Source of data: National Cancer Institute

Table 2.20: Relative survival by stage of diagnosis and cancer type, period of diagnosis 2007-2011 and followed up to 2016, Malaysia

Cancer Types	Total Number of cases	Cases with staging recorded		5-years relative survival (%)			
		No	%	I	II	III	IV
Female Breast	17009	11444	67.3	87.5	80.7	59.7	23.3
Colorectal	12093	6962	57.6	75.8	72.5	55.6	17.3
Colon	6273	3641	58.0	79.3	77.4	62.5	18.8
Rectum	5820	3321	57.1	72.2	66.3	47.9	15.8
Lung, T&B	8021	4715	58.8	37.1	17.4	7.5	6.3

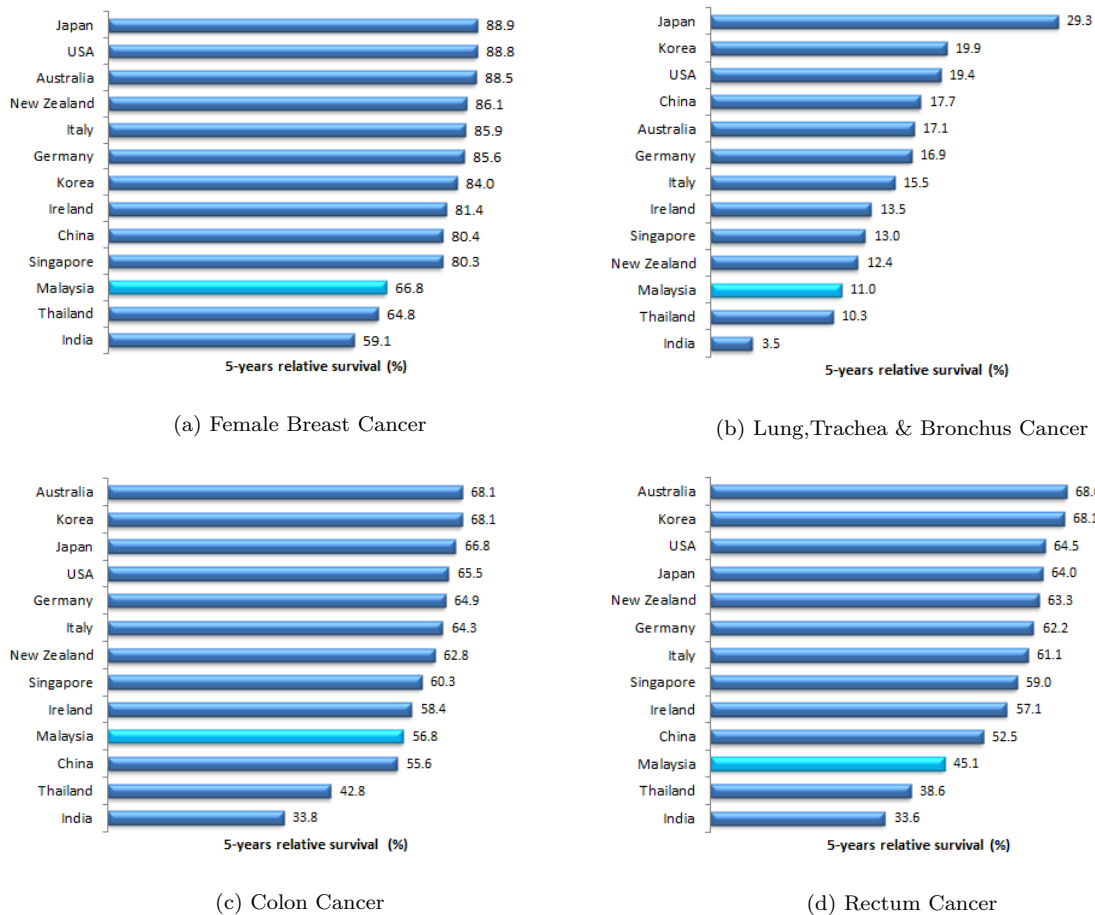
Source of Data: National Cancer Institute

Figure 2.33: Relative survival by cancer type and sex, period of diagnosis 2007-2011 and followed up to 2016, Malaysia



Source of data: National Cancer Institute

Figure 2.34: Cancer : Global Comparison of 5-year relative survival (%)



Source of data: CONCORD-3 Study<sup>6</sup> & MyScan Study by National Cancer Institute

## PREVALENCE OF RISK FACTORS

### 3.1 Tobacco Smoking

Tobacco use is a major contributor to illness and death from non-communicable diseases (NCDs). Globally, tobacco use kills nearly 6 million people a year and the number will increase to 7.5 million by 2020, accounting for 10% of all deaths worldwide. It is recognized as the main cause of premature and preventable deaths in our country.

In Malaysia, it is estimated that 20,000 deaths are attributed to smoking annually and will increase to 30,000 by the year 2020 if the pattern of smoking does not change<sup>1</sup>. Malaysian data were mainly obtained from NHMS 2006, 2011 and 2015.

The national prevalence of current smokers among Malaysian adult was 21.5% in 2006, 19.3% (18 years and above) in 2011 and increased to 22.8% (10 years and above) in 2015 (Table 3.1). It was estimated that nearly five million Malaysians aged 15 years and above smoked<sup>2</sup>. The proportion of male smokers was 30-40 times higher compared to females. Among the three major ethnic groups, Malays

consistently had higher prevalence of smokers compared to Chinese and Indians. In 2015, the prevalence was highest in Sabah and WP Labuan (28.4%), followed by Kedah (26.5%) and Pahang (25.5%); while the lowest prevalence was in WP Putrajaya (12.4%) (Figure 3.1).

Malaysia (22.3%) ranked 6th for adult smoking prevalence among the 10 ASEAN Member States in 2013. Highest was Indonesia at 38.5% and lowest was Singapore at 16.2% (Figure 3.2)<sup>3</sup>. There were large variations between genders across the ASEAN countries. Male smokers were predominantly high.

**Current smokers** are defined as smokers who daily or occasionally smokes any tobacco product. **Tobacco product** consists of smoked tobacco which includes manufactured cigarettes, hand-rolled cigarettes, kreteks, others smoked tobacco such as pipe, curut, cigar, cigarillos, water pipes/sisha hookah, bidis and others<sup>2</sup>.

<sup>1</sup>Disease Control Division, Ministry of Health. (2003). Clinical Practice Guidelines: Treatment of Tobacco Smoking and Dependence 2002. Retrieved from [http://www.moh.gov.my/penerbitan/CPG2017/Respiratory/CPG\\_TobaccoDisorder.pdf](http://www.moh.gov.my/penerbitan/CPG2017/Respiratory/CPG_TobaccoDisorder.pdf)

<sup>2</sup>Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)- Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

<sup>3</sup> WHO, Global Health Observatory Data Repository. (2013). Current Smoking of Any tobacco Product (Aged-Standardized Rate). Retrieved from <http://apps.who.int/gho/data/view.main.TOB30011>



Table 3.1: Prevalence of current smokers in Malaysia

<b>Gender</b>	<b>2006</b>	<b>2011</b>	<b>2015</b>
<b>National</b>	<b>21.5</b>	<b>19.3</b>	<b>22.8</b>
Male	46.4	36.4	43.0
Female	1.6	1.5	1.4
<b>Ethnicity</b>	<b>2006</b>	<b>2011</b>	<b>2015</b>
Malays	24.0	21.5	24.7
Chinese	16.2	12.8	14.2
Indians	13.7	13.0	16.5
Other Bumiputras	24.8	21.9	25.8
Others	23.8	29.2	35.0

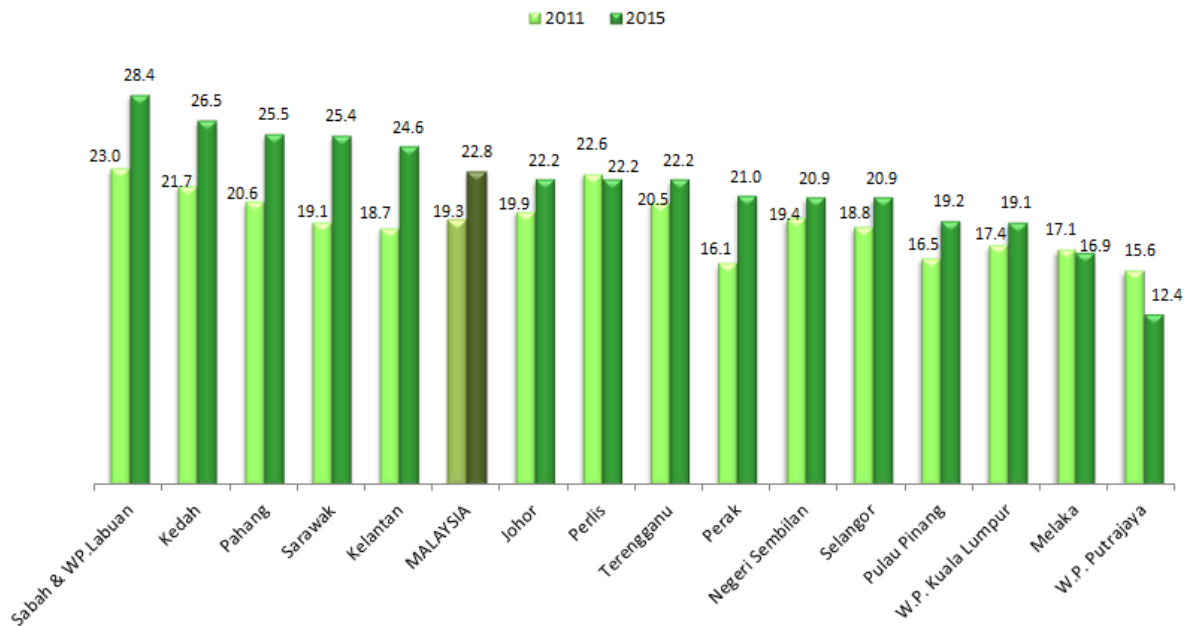
2006 (aged 15 years and above)

2011 (aged 10 years and above)

2015 (aged 18 years and above)

Source of data: NHMS

Figure 3.1: Prevalence of current smokers by state, 2011 and 2015

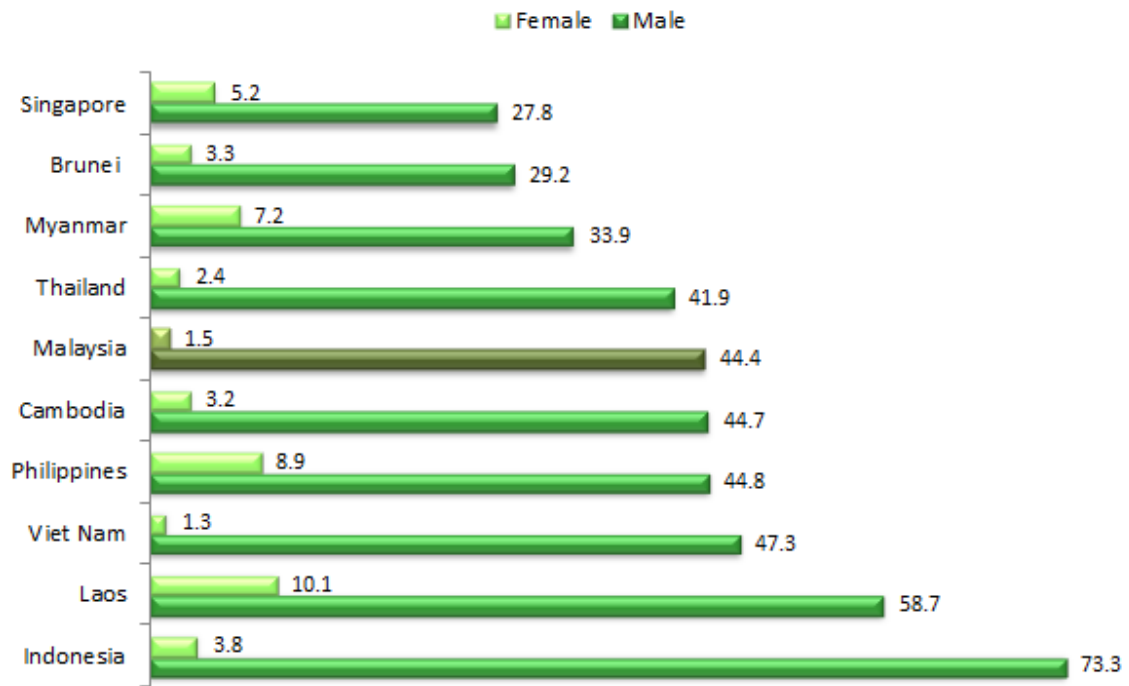


2011 (aged 10 years and above)

2015 (aged 18 years and above)

Source of data: NHMS

Figure 3.2: Current smoking of any tobacco product in ASEAN countries, 2013 (Age-standardized rate)



2013 (aged 15 years and above)

Source of data: Global Health Observatory Data Repository,WHO

## 3.2 Alcohol Consumption

The harmful use of alcohol is a worldwide problem resulting in approximately 3.3 million deaths or 5.9% of all global deaths in 2012<sup>1</sup>. It is not only a causal factor in many diseases, but also a precursor to injury and violence.

Globally, about 16.0% of drinkers aged 15 years or older engage in heavy episodic drinking (HED) every year<sup>1</sup>. Among the ASEAN countries, the prevalence was highest in Laos (14.1%), followed by Singapore (4.2%), Indonesia (2.4%) and lowest in Myanmar (0.1%). Malaysia was slightly higher than Myanmar with 0.3%.

In Malaysia, the prevalence of alcohol consumption had fluctuated from 2006 to 2015 (Table 3.2). Prevalence among male was persistently three times higher than female. The prevalence was higher among Chinese as compared to the other major ethnic groups. Alcohol consumption prevalence was highest in WPKL (20.3%), followed by Sarawak (19.7%) and Sabah (18.4%), while lowest in Kelantan (0.4%)<sup>2</sup>.

Among the current drinkers, the proportion who reported engaging in binge drinking had increased from 50.2% (2011) to 59.4% (2015). Prevalence of both current and binge drinker vary by gender and ethnicity. Current and binge drinker was more common among males than female. By ethnicity the prevalence was highest among Malays followed by other Bumiputras, Indians, others and Chinese. (Table

3.2 & 3.3)

The worldwide consumption in 2010 was equal to 6.2 litres of pure alcohol consumed per person aged 15 years or older, which translates into 13.5 grams of pure alcohol per day<sup>1</sup>. The total alcohol per capita consumption for Malaysia in 2010 was 10.5 litres of pure alcohol which exceeded the worldwide consumption (Figure 3.4).

While Malaysian drinkers consumed on average 10.5 litres of pure alcohol per capita per year, the prevalence of HED among drinkers was lower than worldwide and majority ASEAN countries. WHO had mentioned in the Global status report on Alcohol and Health 2014 that there is no consistent association between alcohol per capita consumption (APC) among drinkers and the prevalence of HED among drinkers<sup>1</sup>.

**Alcohol drink** in this context encompassed any drink containing ethanol irrespective of concentration and inclusive of those consumed for medical purposes such as alcoholic tonic. Data on alcohol was obtained from adult respondent 18 years and above through validated self-administered Alcohol Use Disorder Identification Test (AUDIT) questionnaires. Current drinkers were respondents who still consumed alcohol for the past twelve (12) months prior to the survey<sup>2</sup>.

<sup>1</sup>World Health Organization. 2014. Global Status Report on Alcohol and Health (2014). Retrieved from [http://apps.who.int/iris/bitstream/handle/10665/112736/9789240692763\\_eng.pdf](http://apps.who.int/iris/bitstream/handle/10665/112736/9789240692763_eng.pdf) (Accessed on 28 Mac 2018)

<sup>2</sup> Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)- Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

Table 3.2: Prevalence of current drinker in Malaysia, 2006-2015

<b>Gender</b>	<b>2006</b>	<b>2011</b>	<b>2015</b>
<b>National</b>	<b>8.5</b>	<b>12.8</b>	<b>8.4</b>
Male	13.7	19.2	12.1
Female	4.0	6.2	4.3
<b>Ethnic Group</b>	<b>2006</b>	<b>2011</b>	<b>2015</b>
Malay	0.8	1.0	0.4
Chinese	26.6	29.9	19.2
Indians	14.9	20.9	11.2
Other Bumiputras	18.0	22.8	21.6
Others	7.7	11.5	6.0

2006, 2011 & 2015 (Aged 18 years and above)

Source of data: NHMS

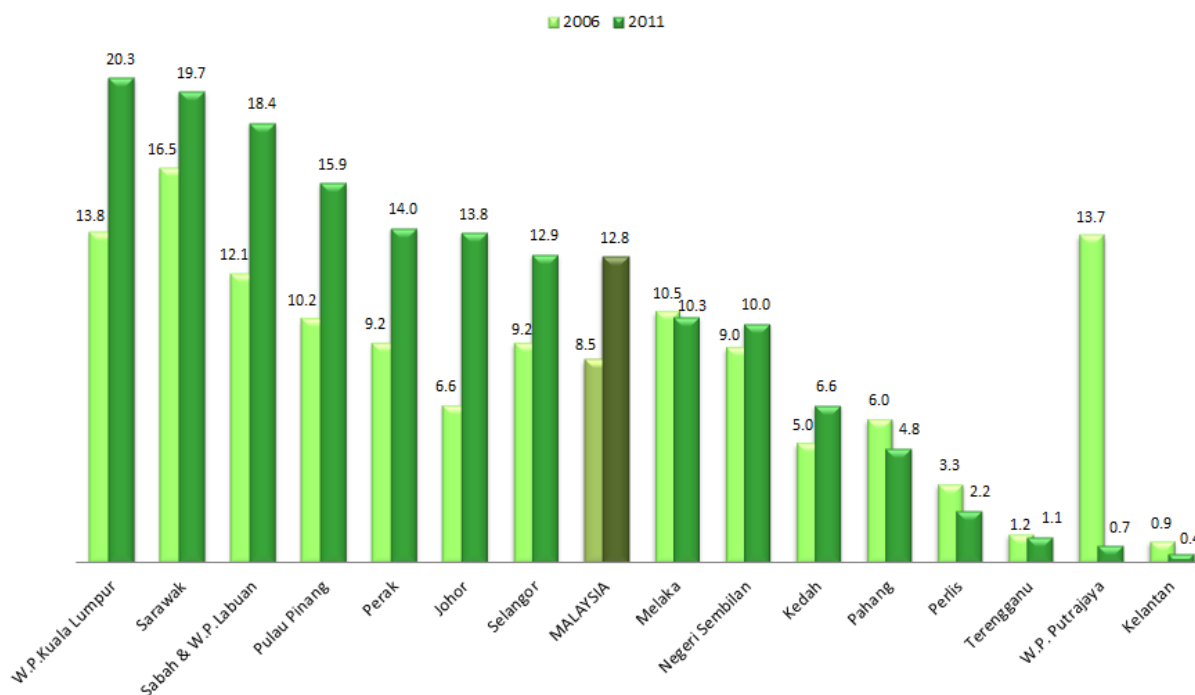
Table 3.3: Prevalence of binge drinker among current drinkers, 2006 & 2015

<b>Gender</b>	<b>2011</b>	<b>2015</b>
<b>National</b>	<b>50.2</b>	<b>59.4</b>
Male	53.5	64.0
Female	39.6	45.7
<b>Ethnic Group</b>	<b>2011</b>	<b>2015</b>
Malay	62.9	87.0
Chinese	45.2	49.7
Indians	44.8	62.5
Other Bumiputras	62.8	74.6
Others	59.4	60.5

2011 & 2015 (Aged 18 years and above)

Source of data: NHMS

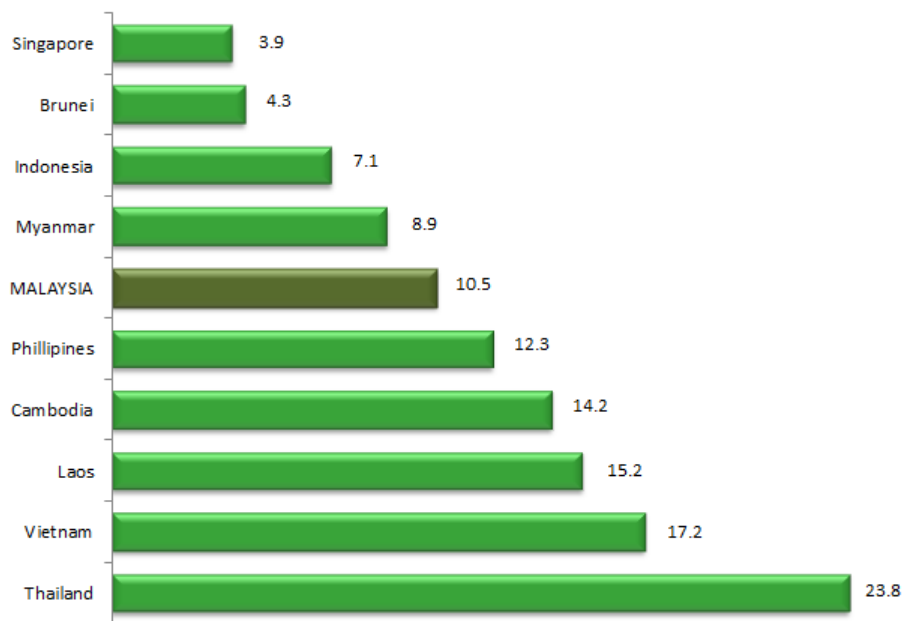
Figure 3.3: Prevalence of current drinker among adult, 2006 & 2011



2011 & 2015 (Aged 18 years and above)

Source of data: NHMS

Figure 3.4: Total alcohol per capita consumption, drinkers only (in litres of pure alcohol), 2010



2010 (Aged 15 years and above)

Source of data: Global Health Observatory Data Repository,WHO

### 3.3 Physical Activity

Insufficient physical activity is on the rise in many countries, adding to the burden of non-communicable diseases (NCDs) and affecting general health worldwide. People who are insufficiently active have a 20% to 30% increased risk of death compared to people who are sufficiently active<sup>1</sup>.

The national prevalence of physically active adults showed increasing trends from NHMS 2006 (56.3%) to the recent NHMS 2015 (66.5%) (Table 3.4). NHMS 2015 reported that although the prevalence was relatively high, a majority of adults were only minimally active<sup>1</sup>. Males (71.1%) were significantly more active than females (61.7%). The highest prevalence of physical activity was observed among other ethnics group (76.5%), followed by Other Bumiputras (69.0%), Malay (66.8%), Indians (66.7%) and Chinese (60.7%). Pulau Pinang (74.5%) had the highest prevalence of active adults followed by Kelantan (74.2%) and Pahang (74%) (Figure 3.5).

Globally, around 23% of adults aged 18 and over were not active enough in 2010 (men 20% and women 27%)<sup>2</sup>. Data from WHO noted that the age-standardized estimate of insufficiently active adults for Malaysia in 2010 was 52.3% (men 46.7% and women 58%) (Figure 3.6). Malaysia had the highest prevalence of physically inactive adults among the ASEAN countries, while Myanmar had the

lowest prevalence (9.9%). Females were less active than males in a majority of the countries<sup>3</sup>.

International data was retrieved from WHO, Global Health Observatory data repository on April 2018. The **prevalence of insufficient physical activity** was defined as population attaining less than 150 minutes of moderate-intensity physical activity per week, or less than 75 minutes of vigorous-intensity physical activity per week, or equivalent. The estimates were based on self-reported physical activity captured using the GPAQ (Global Physical Activity Questionnaire), the IPAQ (International Physical Activity Questionnaire) or a similar questionnaire covering activity at work/in the household, for transport, and during leisure time.

Malaysian data was obtained from adult respondents using the short version of International Physical Activity Questionnaire (IPAQ). Physical activity was categorised into three levels; inactive (category 1), minimally active (category 2) and health enhancing physical activity (HEPA) active (category 3). Those individuals who do not meet the criteria for category 2 or 3 were considered 'insufficiently active'<sup>1</sup>.

<sup>1</sup> Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)- Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

<sup>2</sup> World Health Organization. 2016. *Physical Activity Fact Sheet*. Retrieved from <http://www.who.int/mediacentre/factsheets/fs385/en/>

<sup>3</sup>WHO, Global Health Observatory Data Repository. 2010. *Prevalence of Insufficient Physical Activity among Adults (Age-Standardized Estimate)*. Retrieved from <http://apps.who.int/gho/data/view.main.GDO2101v?lang=en>

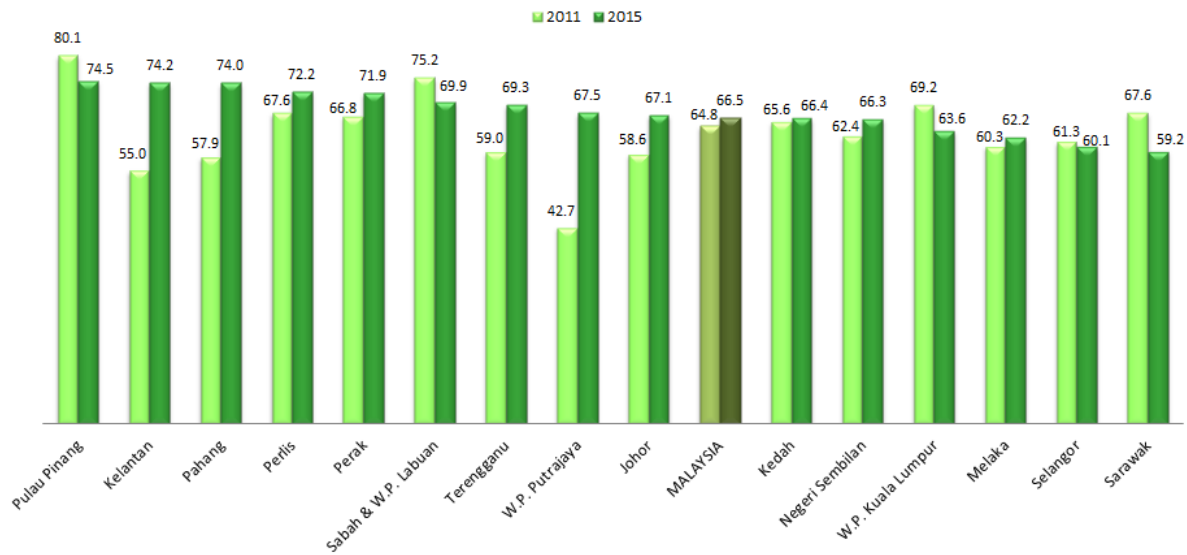
Table 3.4: Prevalence of physically active among adults in Malaysia

Gender	2006	2011	2015
<b>National</b>	<b>53.6</b>	<b>64.8</b>	<b>66.5</b>
Male	64.7	69.9	71.1
Female	49.5	59.6	61.7
Ethnic Group	2006	2011	2015
Malay	57.6	62.1	66.8
Chinese	52.9	61.8	60.7
Indians	55.5	65.5	66.7
Other Bumiputras	55.9	73.2	69.0
Others	58.7	82.0	76.5

2006, 2011 & 2015 (aged 18 years and above)

Source of data: NHMS

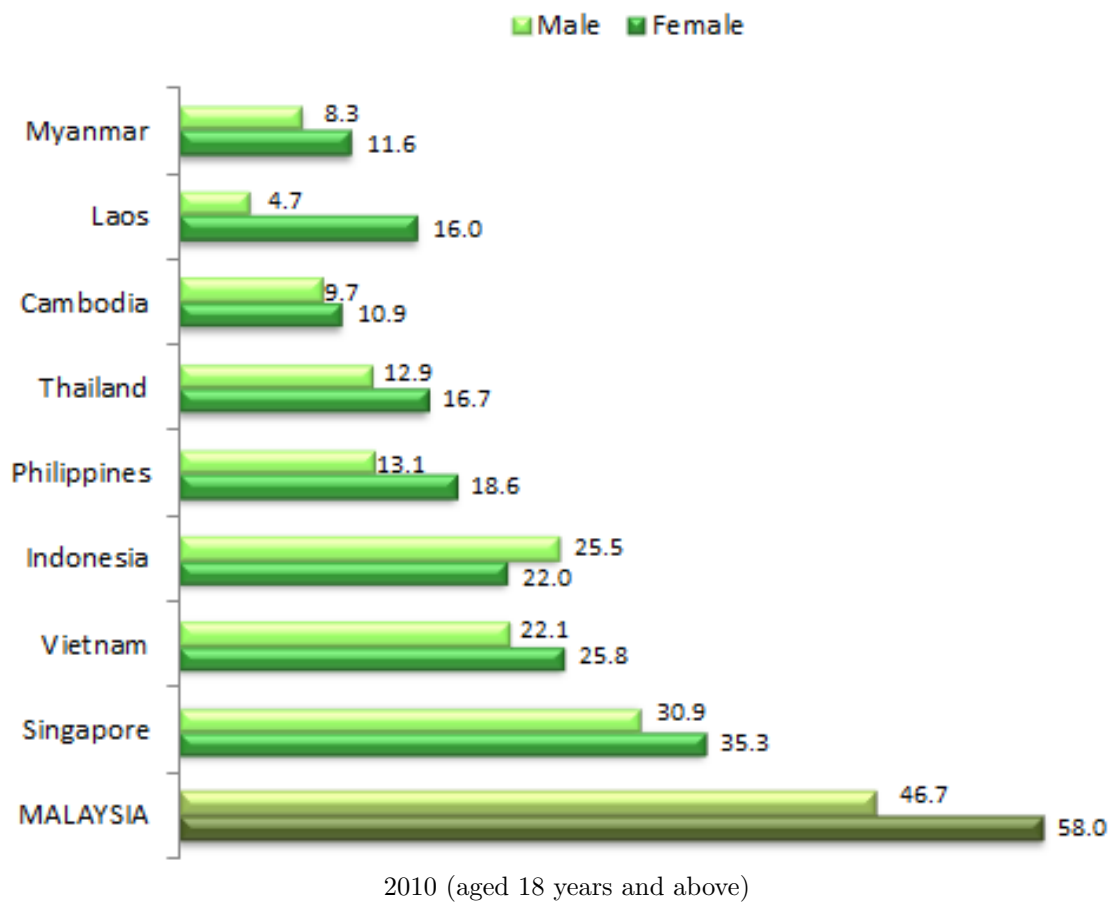
Figure 3.5: Prevalence (%) of physical active among adults, 2011 & 2015



2011 & 2015 (aged 18 years and above)

Source of data: NHMS

Figure 3.6: Prevalence of insufficient physical activity among adults by gender, 2010



Source of data: Global Health Observatory Data Repository,WHO



### 3.4 Adult Obesity

Obesity has reached epidemic proportions globally, with at least 2.8 million people dying each year as a result of being overweight or obese. According to World Health Organization (WHO), worldwide obesity has nearly tripled since 1975. In 2016, approximately 39% of adults aged 18 years and above were overweight and 13% were obese<sup>1</sup>.

The scenario in the Malaysian population is no different. Data from the previous NHMS showed an increasing trend in obesity prevalence among the Malaysian adults from 2006 to 2015 (Table 3.5)<sup>2</sup>. Based on the WHO (1998) classifications, the national prevalence of obesity was 17.7% in 2015, increased from 15.1% in 2011 and 14% in 2006. There were more obese women (20.6%) than men (15.0%). Indians (27.1%) had the highest prevalence of obesity, followed by Malay (21.1%), other Bumiputras (18%), Chinese (11.7%) and others (7.7%). By state, WP Putrajaya (25.8%) had the highest prevalence of adult obesity, followed by Negeri Sembilan (23.5%) and Perlis (22.3%), while Sabah and WP Labuan showed the lowest prevalence of obesity (13.4%) (Fig-

ure 3.7).

Malaysia had the highest prevalence of obesity among adults (15.6%) in South-East Asia (Figure 3.8), followed by Brunei (14.1%) and Thailand (10.0%) in 2016. Vietnam remained the lowest in prevalence of obesity (2.1%) among ASEAN countries since 1975. There were more obese women than men in all South-East Asian countries.<sup>3</sup>

International data was retrieved from WHO, Global Health Observatory (GHO) on April 2018. The World Health Organization (WHO) defines **overweight** as a body mass Index (BMI) equal to or more than 25 kg/m<sup>2</sup>, and obesity as a BMI equal to or more than 30 kg/m<sup>2</sup>.<sup>1</sup>

The National Health and Morbidity Survey classified BMI using two guidelines; the Malaysian Clinical Practice Guidelines of Obesity (2004) and World Health Organization (1998)<sup>2</sup>. For the purpose of comparison, we used the WHO (1998) classification.

<sup>1</sup> World Health Organization. 2017. *10 Facts on Obesity*. Retrieved from <http://www.who.int/features/factfiles/obesity/en/>

<sup>2</sup> Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015). Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

<sup>3</sup> World Health Organization. Global Health Observatory (GHO) Data. *Prevalence of Obesity among Adults, ages 18 years older, 1975-2016*. Retrieved from [http://www.who.int/gho/ncd/risk\\_factors/overweight\\_obesity/obesity\\_adults/en/](http://www.who.int/gho/ncd/risk_factors/overweight_obesity/obesity_adults/en/)

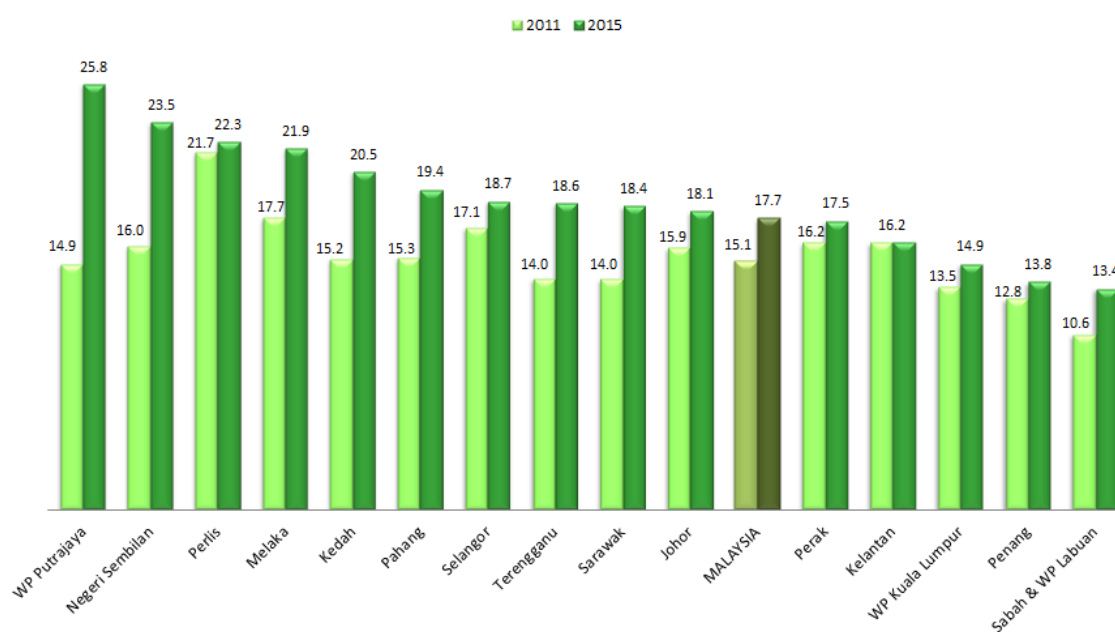
Table 3.5: Prevalence of obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) among adults in Malaysia, 2006-2015

Gender	2006	2011	2015
<b>National</b>	<b>14.0</b>	<b>15.1</b>	<b>17.7</b>
Male	10.0	12.7	15.0
Female	17.4	17.6	20.6
Ethnic Group	2006	2011	2015
Malay	16.6	18.7	21.1
Chinese	8.7	9.7	11.7
Indians	17.7	20.5	27.1
Other Bumiputras	11.2	12.7	18.0
Others	8.1	6.2	7.7

2006, 2011 & 2015 (Aged 18 years and above)

Source of data: NHMS

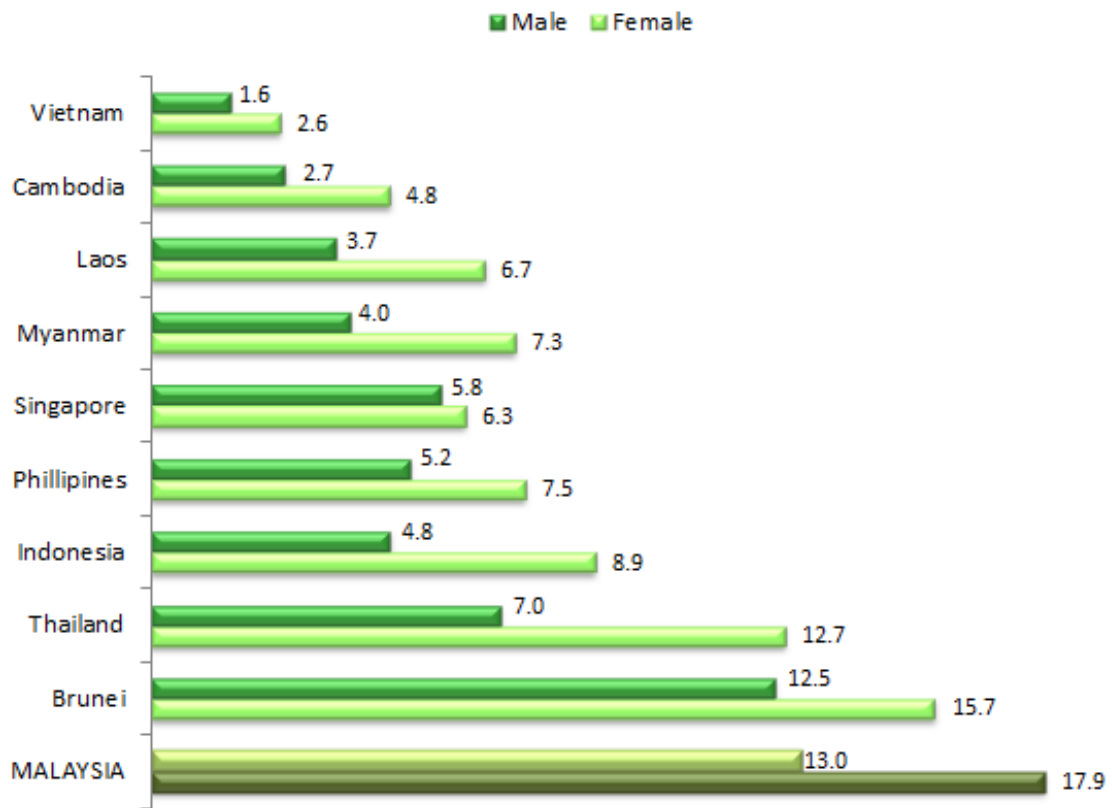
Figure 3.7: Prevalence of obesity (BMI  $\geq 30$  kg/m<sup>2</sup>) adults



2011 & 2015 (Aged 18 years and above)

Source of data: NHMS

Figure 3.8: Prevalence of obesity among adults, 2016 (Age-standardized estimate)



2016 (Aged 18 years and above)

Source of data: Global Health Observatory Data Repository,WHO

### 3.5 Childhood Obesity

Childhood obesity is one of the most serious public health challenges of the 21st century. Overweight children are likely to become obese adults. They are likely to develop diabetes and cardiovascular diseases at a younger age, which in turn are associated with a higher chance of premature death and disability<sup>1</sup>. Globally, 18% of children and adolescents aged 5-19 were overweight or obese in 2016<sup>2</sup>.

National prevalence of overweight/obesity (BMI for age >+2SD based on WHO 2006) among children aged less than 18 years was 11.9% in 2015 (Table 3.6)<sup>3</sup>. The prevalence of obesity was significantly higher among boys (13.6%) compared to girls (10.0%). Among ethnic groups, Chinese had the highest prevalence of obesity (13.0%), followed by Indians (12.6%) and Malay (11.8%) respectively. By state, WPKL had the highest prevalence of child obesity (19.4%) while the lowest in Sabah & WP Labuan (8.0%) (Figure 3.9).

Among ASEAN countries, Malaysia (12.7%) fall shortly behind Brunei (14.1%) ranking second highest prevalence of obesity among chil-

dren and adolescent ages 5-19 (crude estimate) in 2016 (Figure 3.10). As in adult obesity, Vietnam had the lowest number of obese children and adolescent with 2.6% in South-East Asia. There were more obese boys than girls in South-East Asia.

Nutritional status for children below 18 years old was calculated based on Centres for Disease Control Growth Charts (CDC Growth Chart) 2000. Three major indices were used to reflect nutritional status: height for age z-score (HAZ), body mass index (BMI) for age and weight for age (WAZ).

Classification of Z score & BMI cut off point for Nutritional Status (WHO,2006)<sup>3</sup>.

SD	category	weight
<-2SD	low weight for age	underweight
	low height for age	stunting
	low weight for height	wasting
	BMI	thinness
>+2SD	weight for age	overweight
	BMI 0-5 years old	overweight
	BMI 5-19 year old	obesity

<sup>1</sup>World Health Organization. 2017. *10 Facts on Obesity*. Retrieved from <http://www.who.int/features/factfiles/obesity/en/>

<sup>2</sup> World Health Organization. Global Health Observatory (GHO) Data. *Prevalence of Obesity among Children and Adolescents, Ages 5-19, 1975-2016*. Retrieved from [http://www.who.int/gho/ncd/risk\\_factors/overweight\\_obesity/obesity\\_adolescents/en/](http://www.who.int/gho/ncd/risk_factors/overweight_obesity/obesity_adolescents/en/)

<sup>3</sup> Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015). Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

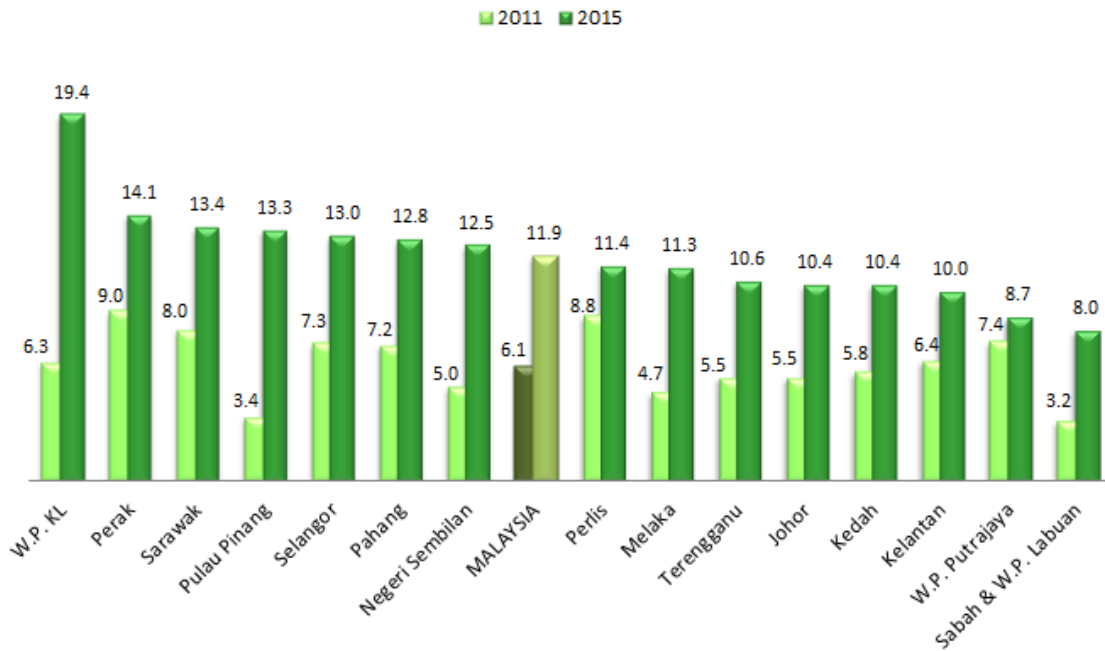
Table 3.6: Prevalence of obesity (BMI for age >+2SD) among children, 2011 & 2015

Gender	2011	2015
<b>National</b>	<b>6.1</b>	<b>11.9</b>
Male	7.6	13.6
Female	4.6	10.0
Ethnic Group	2011	2015
Malay	7.0	11.8
Chinese	4.6	13.0
Indians	7.8	12.6
Other Bumiputras	5.1	11.7
Others	0.6	4.9

2011 & 2015 (Aged < 18 years old)

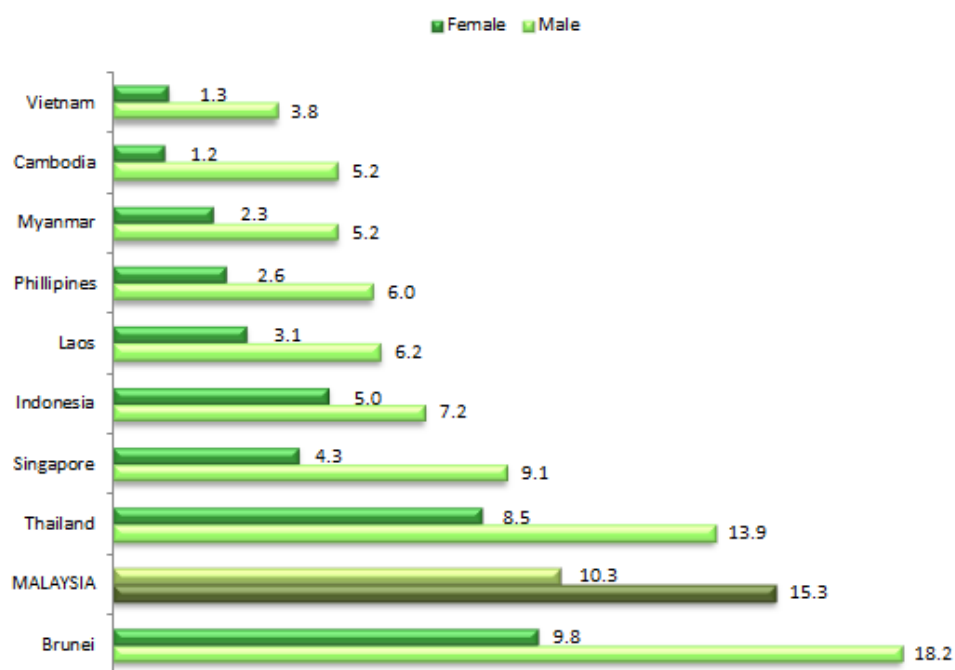
Source of data: NHMS

Figure 3.9: Prevalence of childhood obesity among children in Malaysia, 2011 & 2015



2011 & 2015 (Aged < 18 years old)  
Source of data: NHMS

Figure 3.10: Prevalence of obesity among children and adolescent, 2016 (Crude estimate)



2011 & 2015 (Aged 5-19 years old)

Source of data: Global Health Observatory Data Repository,WHO

## 3.6 Hypercholesterolemia

Hypercholesterolemia or high blood cholesterol is one of the major risk factors for non-communicable diseases along with high blood pressure, high blood glucose and obesity. Recent years have showed an upward surge of non-communicable diseases all over the world due to lifestyles modification, modernisation and advanced in technology. Unhealthy diets and lack of physical activity contributes to the increasing trends of these modifiable risk factors<sup>1</sup>.

In Malaysia, the overall prevalence of hypercholesterolemia (known and undiagnosed) among adults of 18 years and above had increased from 35.1% in 2011 to 47.7% in 2015 (Table 3.7). The prevalence was significantly higher among females (52.2%) compared to males (43.5%). Among the main ethnic groups, the Malays and Indians had the highest prevalence at 50.1% respectively, followed by the Chinese at 47.5%. Pahang (56.2%) had the highest prevalence of hypercholesterolemia, followed by Kedah at 53.5% and WP Kuala Lumpur at 52.9%, while the lowest was Sabah and WP Labuan at 40.9% (Figure 3.11)<sup>2</sup>.

Data by WHO noted that Malaysia (52.1%) was among the five countries in South-East

Asia with high prevalence of raised total cholesterol ( $\geq 5.0$  mmol/L) in 2008 (Figure 3.12). The highest was Singapore (57.5%), Malaysia falls fourth (52.1%) while the lowest was Cambodia (30.0%). The prevalence among females were slightly higher than males<sup>3</sup>.

The hypercholesterolemia survey was carried out on all respondents aged 18 years old and above by questionnaire and measurement of finger-pricked total cholesterol using the CardioChek portable blood test system. **Known hypercholesterolemia** was defined as self-reported of being told to have hypercholesterolemia by a doctor or assistant medical officer (AMO). A respondent was classified as having **undiagnosed hypercholesterolemia** when the respondent was not known to have hypercholesterolemia and had a total blood cholesterol of 5.2 mmol/L or more<sup>2</sup>.

The international data was retrieved from WHO, Global Health Observatory (GHO) data repository on April 2018. The estimates were based on systematic analysis of health examination surveys and epidemiological studies with 321 country-years and 3.0 million participants<sup>3</sup>.

<sup>1</sup>World Health Organization. 2015. *Health diet fact sheet*. Updated September 2015. Retrieved from <http://www.who.int/mediacentre/factsheets/fs394/en/>

<sup>2</sup> Institute of Public Health. (2015). *National Health and Morbidity Survey 2015 (NHMS 2015)- Non-Communicable Disease, Risk Factors & Other Health Problems Volume II (MOH/S/IKU/52.15)*. Retrieved from <http://iku.moh.gov.my/images/IKU/Document/REPORT/nhmsreport2015vol2.pdf>

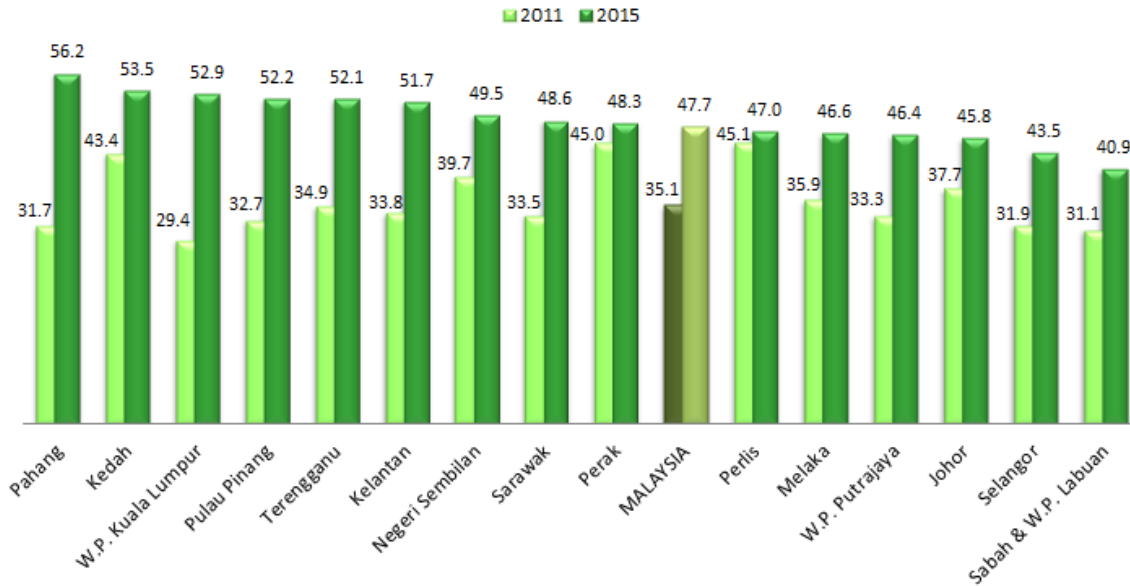
<sup>3</sup>World Health Organization, Global Health Observatory (GHO) Data Repository. 2008. *Prevalence of Raised Total Cholesterol ( $\geq 5.0$  mmol/L), Ages 25+*. Retrieved from <http://apps.who.int/gho/data/node.main.A884?lang=en>

Table 3.7: Prevalence of overall hypercholesterolemia (%), 2011 & 2015

Gender	2011	2015
<b>National</b>	<b>35.1</b>	<b>47.7</b>
Male	30.1	43.5
Female	40.2	52.2
Ethnic Group	2011	2015
Malay	38.4	50.1
Chinese	33.4	47.5
Indians	35.5	50.1
Other Bumiputras	29.8	45.4
Others	25.2	37.4

Source of data: NHMS

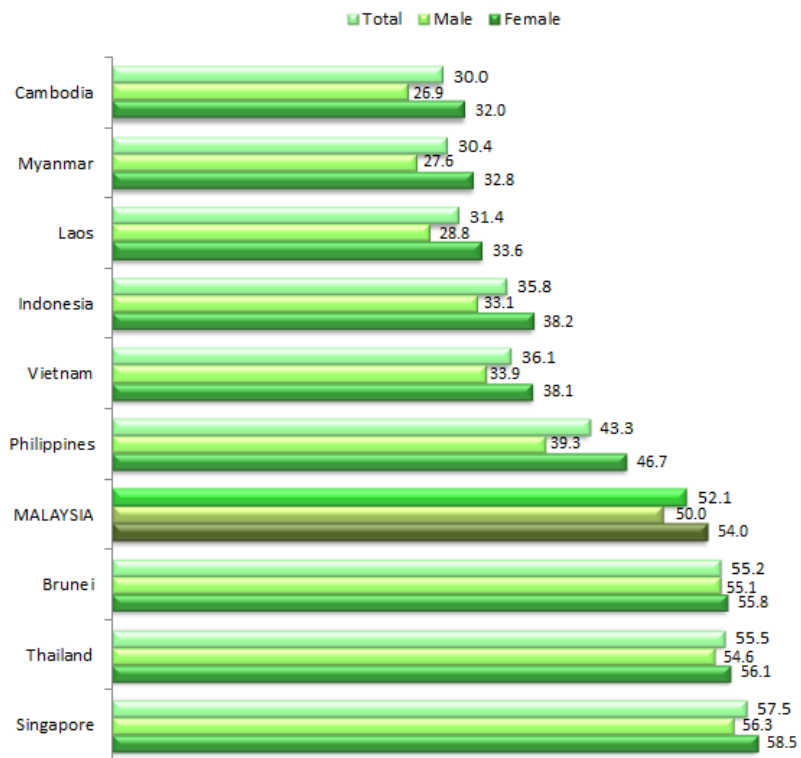
Figure 3.11: Prevalence of overall hypercholesterolemia ( $\geq 5.2$  mmol/L) among adults, 2011 & 2015



Source of data: NHMS



Figure 3.12: Prevalence of raised total cholesterol ( $\geq 5.0$  mmol/L), 2008 (Age-standardized estimate)



2008 (Aged 25 years old and above)

Source of data: Global Health Observatory Data Repository,WHO

## HEALTHCARE RESOURCES

### 4.1 Doctors

Data from World Health Organization (WHO) found that health workers are distributed unevenly across the globe; approximately 44% of WHO Member States report to have less than 1 physician per 1,000 population<sup>1</sup>.

The physician density (doctor ratio per 1,000 population) trend in Malaysia from 2010 to 2016 were generally increasing although not remarkable (Figure 4.1). It had become rather plateau in the recent years but the number of doctors in public and private sectors continued increasing every year. In 2016, the total number of doctors were approximately above 50,000; representing doctor density of 1.58 per 1,000 population<sup>2</sup>. More than 70% of the total doctors worked in public sector.

The number of doctor to population ratio showed marked differences among the states of Malaysia. Selangor had the highest number of doctors (public and private combined) with a total of 9,483 doctors and it was also one of the heavily populated states in Malaysia, thus the doctor density (1.51) was lower than national at 1.58 per 1,000 population (Figure 4.2).

The state with highest doctor to 1,000 population ratio was W.P.Putrajaya (52.63), followed by W.P.KL (2.99), Perlis (2.10) and Negeri

Sembilan (1.92), while the lowest was Sabah (0.84) and W.P.Labuan (0.83). All of the states have more than 1 physician per 1,000 population except for the last two states. Labuan had the lowest number of doctors at 81 while Sabah had about 3,212 doctors; this equals 1 doctor for 1,207 populations in W.P.Labuan and 1 doctor for 1,187 populations in Sabah. W.P.Putrajaya had approximately 1 doctor to every 19 populations, mostly because it has the smallest population in Malaysia. Putrajaya is also the Federal Government Administrative Centre for the Ministry of Health Malaysia, contributing to the marked number of doctors in administrative. The placement of doctors may need reassessment in order to enable a higher ratio for states with higher population density.

Among the ASEAN Member States, Malaysia ranked third with 1.533 physicians per 1,000 population in 2015 (Figure 4.3). Highest was Singapore with 2.28 per 1,000 populations; followed by Brunei (1.75) while lowest is Cambodia (0.14)<sup>3</sup>. More than half of the ASEAN countries have less than 1 physician per 1,000 population.

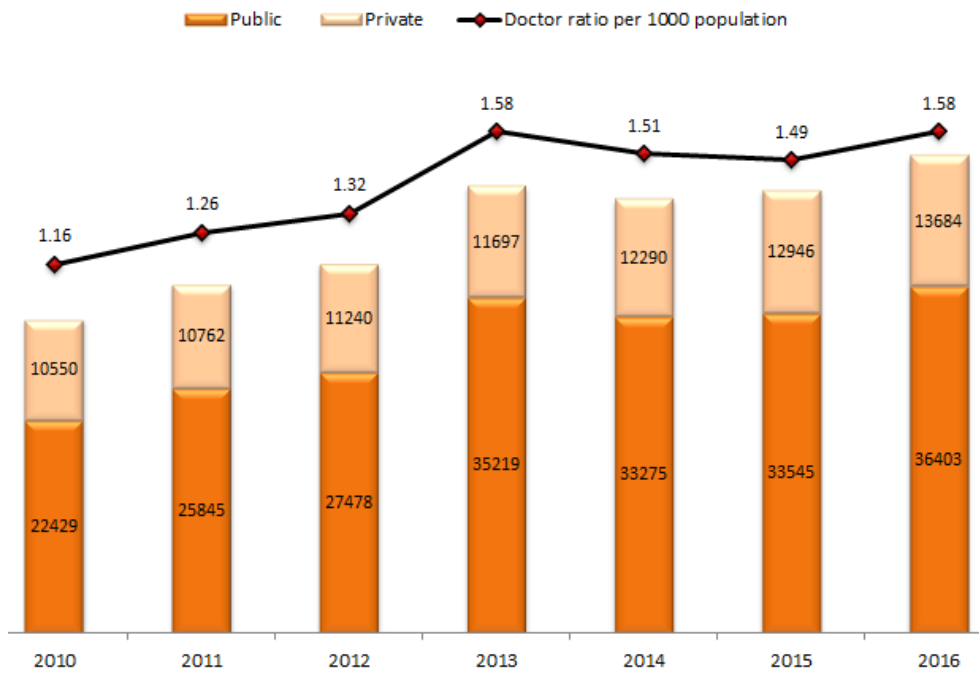
**Physician** refers to medical doctors including generalist and specialist medical practitioners.<sup>3</sup>

<sup>1</sup>World Health Organization (WHO),Global Health Observatory (GHO) Data. Retrieved from [http://www.who.int/gho/health\\_workforce/physicians\\_density\\_text/en/](http://www.who.int/gho/health_workforce/physicians_density_text/en/)

<sup>2</sup>Health Informatics Centre, Ministry of Health Malaysia. Health Indicators 2010-2017

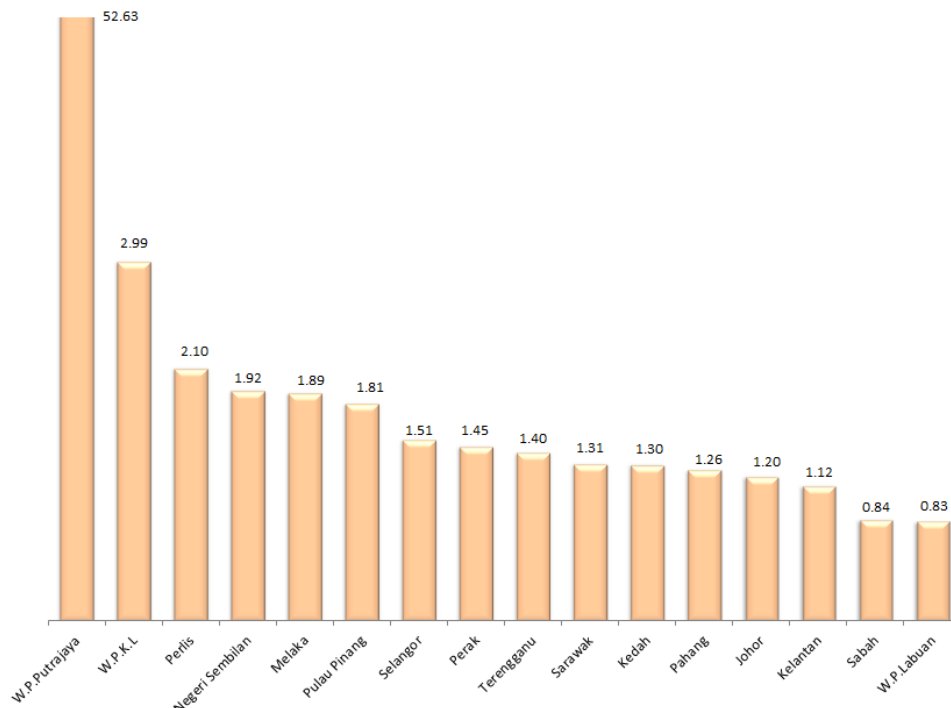
<sup>3</sup>World Health Organization (WHO),Global Health Observatory (GHO) Data Repository. *Physicians Density (per 1,000 population)*. Retrieved from <http://apps.who.int/gho/data/node.main.A1444?lang=en>

Figure 4.1: Number of doctors (public & private sectors) and Doctor density (per 1,000 population) in Malaysia, 2010-2016



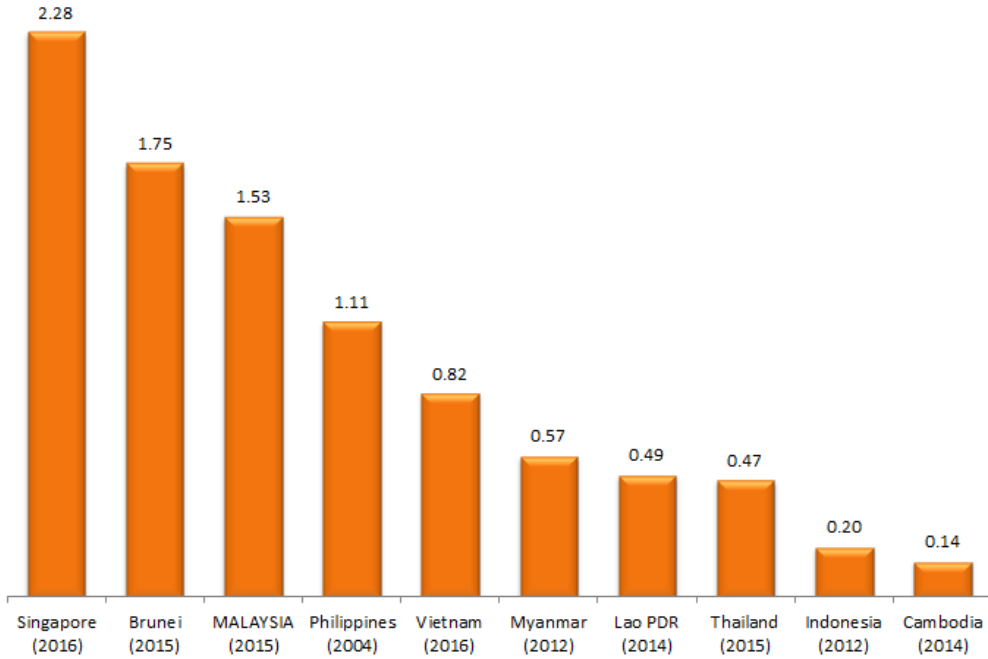
Source of data: Health Informatics Centre, MoH

Figure 4.2: Doctor density (per 1,000 population), by state, 2016



Source of data: Health Informatics Centre, MOH

Figure 4.3: Doctor density (per 1,000 population), among ASEAN Member States



Source of data: Global Health Observatory Data Repository,WHO

## 4.2 Nurses

WHO reported that approximately 50% of WHO Member States have less than 3 nursing and midwifery personnel per 1,000 population; about 25% report to have less than 1. In many countries nurses and midwives constitute more than 50% of the national health workforce<sup>1</sup>.

The scenario was not much different in Malaysia. In 2010, our country had approximately 2.44 nurses per 1,000 population; which equals 1 nurse per 410 populations (Figure 4.4). The number had increased over the years to 3.24 nurses per 1,000 population (1 nurse to 309 population) in 2016<sup>2</sup>. The number of nurses in public sector were more than double compared to those in private.

W.P.Putrajaya had the highest ratio of nurses to 1,000 population at 35.01, followed by W.P.KL (8.46), Pulau Pinang (4.33), Melaka (4.19), while the lowest was in Sabah (2.14). More than half of the states had less than 3 nurses per 1,000 population (Figure 4.5). Selangor had the highest number of nurses (15,123) both in public and private, but the ratio per 1,000 population was 2.66 (approximately 1 nurse per every 383 populations); still below national average of 3.24. Sabah and W.P.Labuan had about 1 nurse to every 475 and 463 populations respectively. In contrast,

W.P.Putrajaya with the least number of population had 1 nurse per 29 populations in that state.

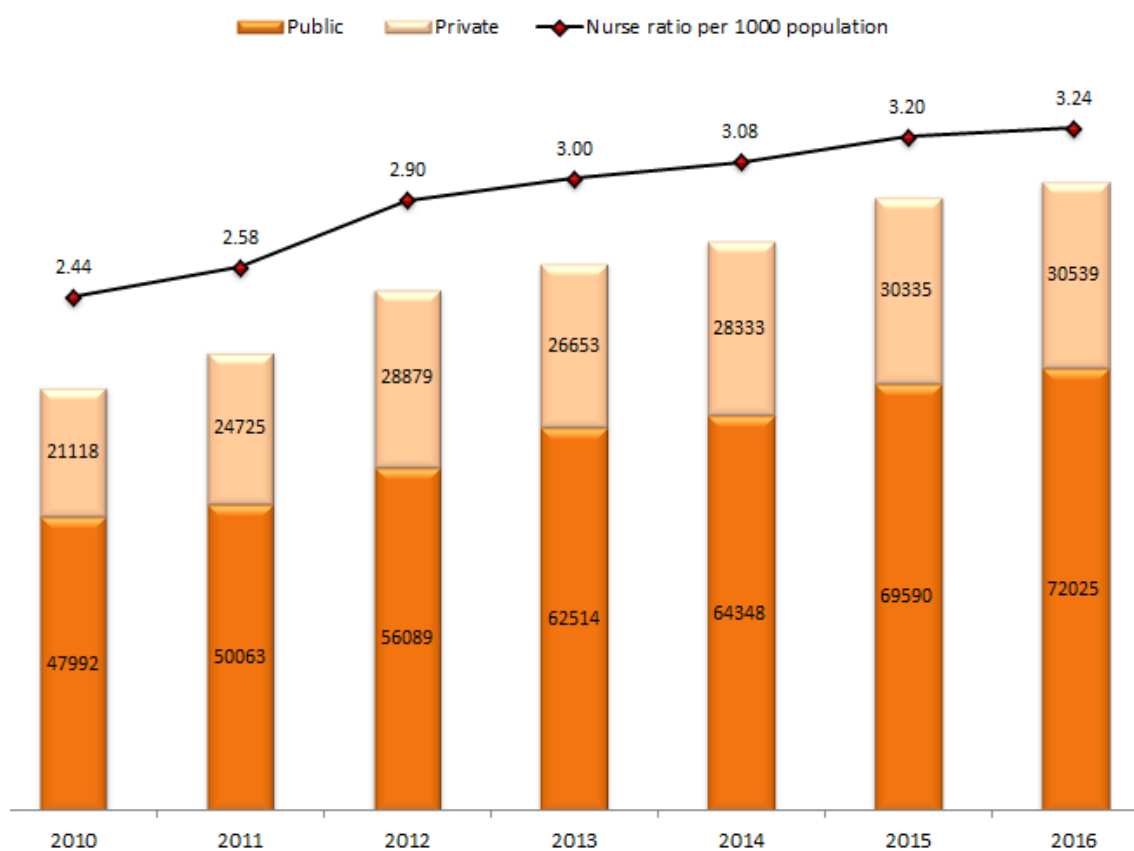
In comparison to the other ASEAN countries, Singapore had the highest nurses density with 7.12 nurses per 1,000 population, followed by Brunei (6.51), Malaysia (4.12), while lowest was Philippines (0.24). More than half of the ASEAN Member States have less than 3 nurses per 1,000 population (Figure 4.6)<sup>1</sup>.

**Nurses and midwives** include professional nurses, professional midwives, auxiliary nurses, auxiliary midwives, enrolled nurses, enrolled midwives and other associated personnel, such as dental nurses and primary care nurses<sup>2</sup>. Malaysian data was retrieved from Health Indicators 2010-2017, Health Informatics Centre, Ministry of Health Malaysia.<sup>2</sup> International data was retrieved from WHO, Global Health Observatory data repository. The figure might be slightly different from our national data because the denominator (national population estimates) was obtained from the United Nations Population Division's World Population Prospects database<sup>2</sup>.

<sup>1</sup>World Health Organization (WHO). Global Health Observatory (GHO) data. *Density of Nursing and Midwifery Personnel (total number per 1,000 population, latest available year)*. Retrieved from [http://www.who.int/gho/health\\_workforce/nursing\\_midwifery\\_density/en/](http://www.who.int/gho/health_workforce/nursing_midwifery_density/en/)

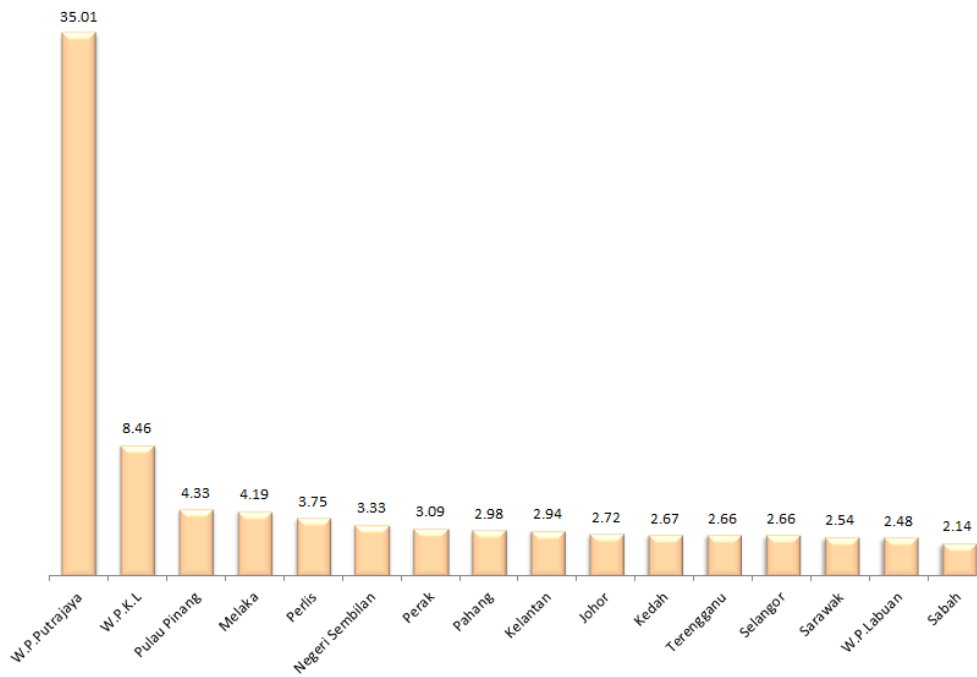
<sup>2</sup> Health Informatics Centre, Ministry of Health Malaysia. Health Indicators 2010-2017.

Figure 4.4: Number of nurses (public& private sectors) and Nurse density (per 1,000 population), 2010-2016



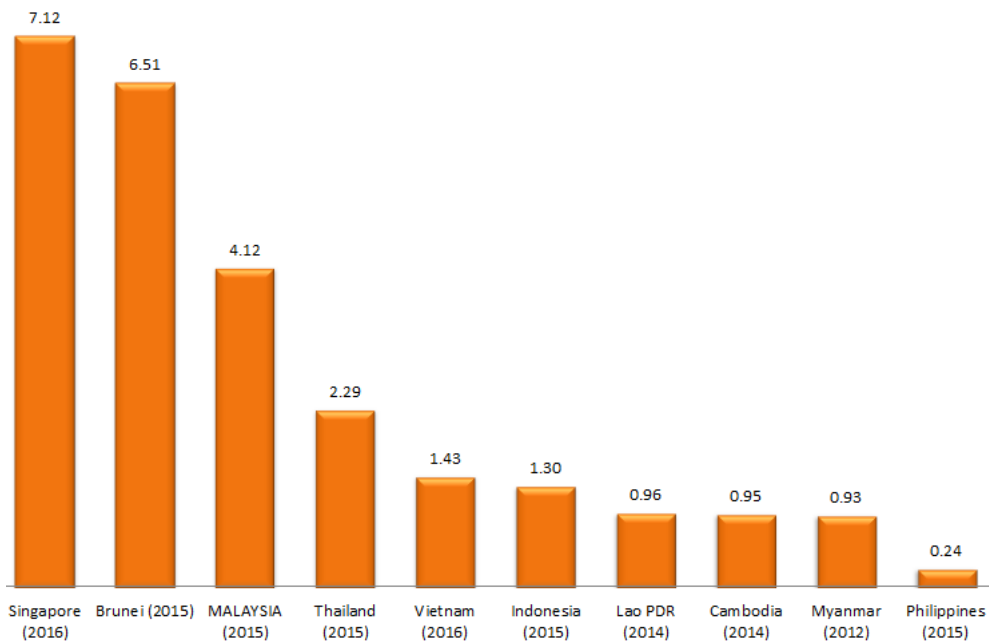
Source of data: Health Informatics Centre, MOH

Figure 4.5: Nurse density (per 1,000 population),by state 2016



Source of data: Health Informatics Centre, MOH

Figure 4.6: Nursing and Midwifery personnel density (per 1,000 population) among ASEAN Member State



Source of data: Global Health Observatory Data Repository,WHO

### 4.3 Hospital Beds

This indicator provides a measure of the resources available for delivering services to inpatients in hospitals in terms of number of beds that are maintained, staffed and immediately available for use<sup>1</sup>. Hospital beds include inpatient beds available in public, private, general, and specialized hospitals and rehabilitation centers. It is measured in number of beds per 1,000 inhabitants<sup>1</sup>.

In Malaysia, the ratio of hospital beds per 1,000 population had not changed much ; ranging from 1.46 to 1.44 since 2010 (Figure 4.7). On the contrary, the total number of beds in public and private hospital had increased in same period (41,483 beds in 2010 to 45,678 beds in 2016). The beds density in 2016 was 1.44 per 1,000 population, equivalent to 1 bed to 693 population<sup>2</sup>. The number of beds in MoH hospitals were constantly tenfold the number in non MoH hospitals.

By state, W.P.Putrajaya had the highest bed density at 7.12 per 1000 population, followed by W.P.KL (2.74), Perak (2.23), while Selangor had the lowest bed density (0.88)(Figure 4.8). Putrajaya had 593 beds which equates to 1 bed per 140 populations. In contrast, although Selangor had the second highest the number of beds (5,531 beds), it was still insufficient for its growing population; lie approximately 1 bed to

1139 populations<sup>2</sup>.

Data from WHO on the most recent available date showed that hospital bed density in Malaysia in 2015 was 1.45, falling short behind Singapore, Thailand and Laos which had 2.4, 2.1 and 1.5 beds per 1,000 population respectively. Brunei had the highest density at 2.7 beds per 1,000 population while Phillipines had the lowest 0.5 beds per 1,000 population (Figure 4.9)<sup>3</sup>.

Malaysian data was retrieved from Health Indicators 2010-2017, Health Informatics Centre, Ministry of Health Malaysia<sup>2</sup>. **MoH hospital beds** include hospital and special medical institutions (leprosy, respiratory and psychiatric institutions)<sup>2</sup>. The bed density (bed ratio per 1,000 population) was calculated by dividing the total bed to total population of that same year, multiplied by 1,000. The bed-to-population ratio was calculated by dividing total population to total number of beds. The total population (current population estimates) data was retrieved from the same source<sup>2</sup>. International data were compiled from the WHO Regional offices and modified to standardize the unit of measure to per 1,000 population<sup>3</sup>.

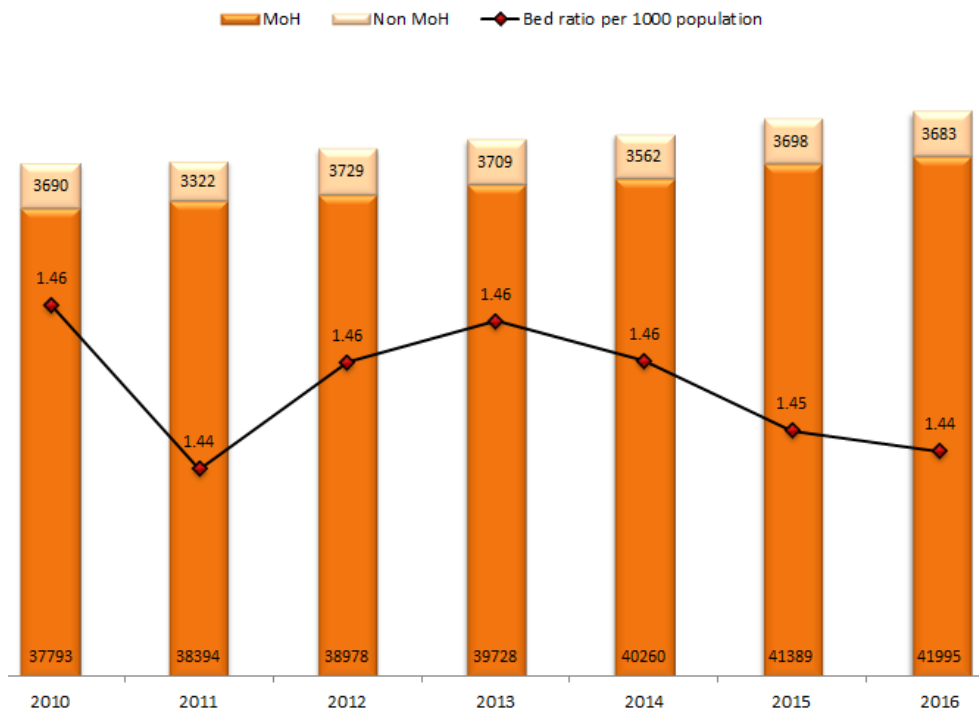
<sup>1</sup> OECD. 2015. Hospital Beds Total, per 1,000 Inhabitants. Retrieved from <https://data.oecd.org/healthqt/hospital-beds.htm>

<sup>2</sup>Health Informatics Centre, Ministry of Health Malaysia. Health Indicators 2010-2017

<sup>3</sup> World Health Organization, Global Health Observatory Data Repository. *Hospital Bed Density*. Retrieved from <http://apps.who.int/gho/data/node.main.HS07?lang=en>

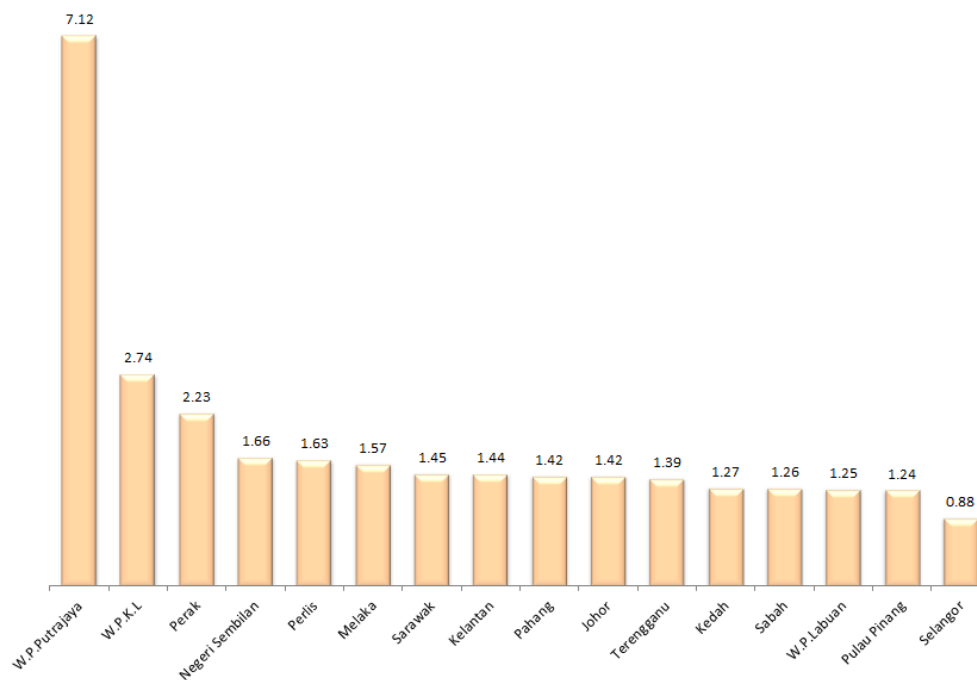


Figure 4.7: Number of bed (in MoH & non MoH) and Beds density (per 1,000 population), 2010-2016



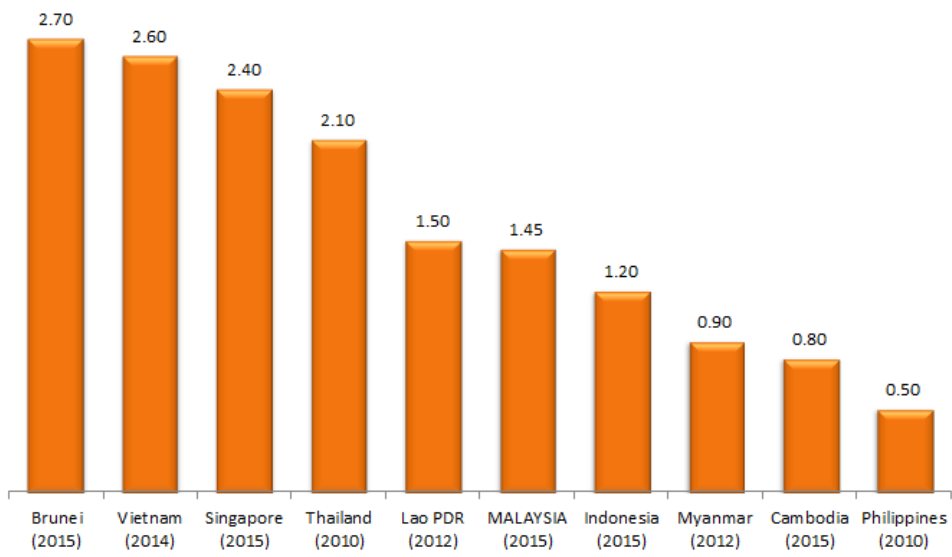
Source of data: Health Informatics Centre, MOH

Figure 4.8: Bed ratio (per 1,000 population) by state, 2016



Source of data: Health Informatics Centre, MOH

Figure 4.9: Hospital beds (per 1,000 population) among ASEAN Member States



Source of data: Global Health Observatory Data Repository,WHO

## 4.4 Health Clinics

Generally, the number of health clinics were increased steadily (mostly from the growing number of newly registered private medical clinics) from 2011 to 2016, although the density per 100,000 population ranging from 32.11 to 32.72 (Figure 4.10)<sup>1</sup>. The numbers of private clinics were almost tripled that of public clinics. In 2016, we had a total of 10,198 health clinics (2,863 public clinics and 7,335 private clinics) compared to 9,438 health clinics in 2011<sup>1</sup>. This showed that as the population increases, the demand for primary healthcare also increase.

Among the states of Malaysia, W.P.KL & Putrajaya had the highest health clinic ratio per 100,000 population (57.69), followed by Melaka (42.48), Negeri Sembilan (39.19) while lowest was Sabah (17.44). The number of health clinics in Selangor was 2,132 (195 public clinics and 1,937 private clinics), highest among all the states and it equals to 1 clinic to 2,954 populations. W.P.KL & Putrajaya had 1,079 health clinics (24 public clinics and 1,055 private clinics), which is equivalent to 1 clinic per 1,734 populations. In contrast, Sabah had 665 health clinics (295 public clinics and 370 private clinics); this represents 1 clinic to 5,734 populations<sup>1</sup>. Variation between the states was

markedly high (Figure 4.11).

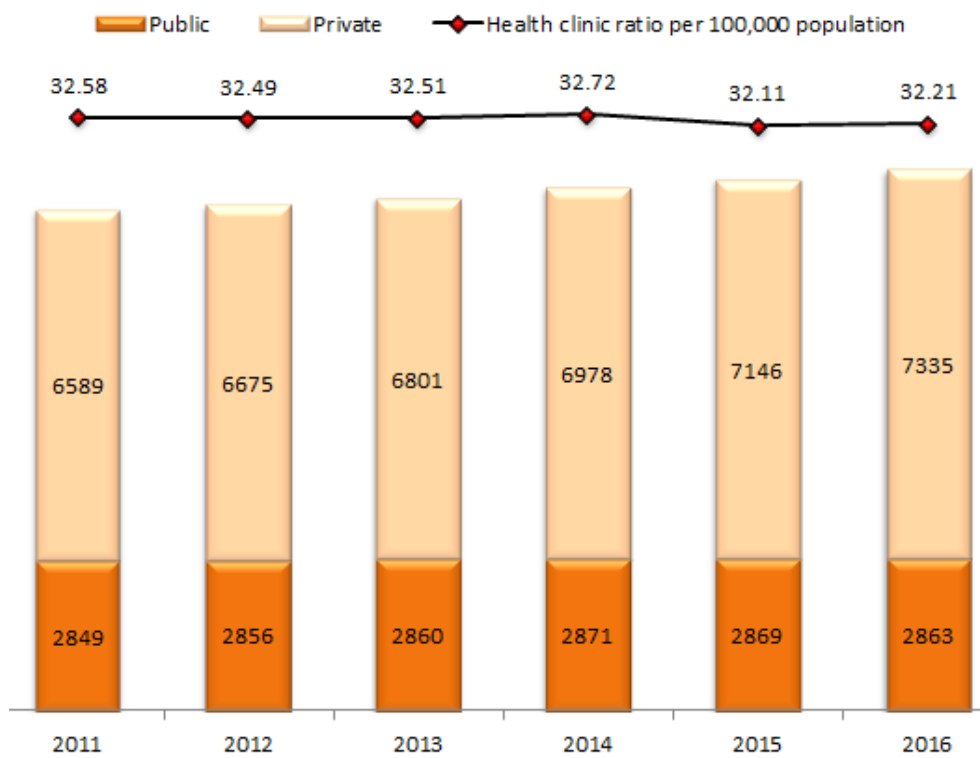
There were no data on health centres density (per 100,000 population) for more than half of the ASEAN countries including Malaysia in the WHO, Global Health Observatory data repository for international comparison. Moreover, some of the countries only provided either public or private sector data thus difficult to do comparison<sup>2</sup>.

**Density of health centres** is defined as number of health clinics from the public and private sectors, per 100,000 population<sup>2</sup>. Malaysian data was retrieved from Health Indicators 2010-2017, Health Informatics Centre, Ministry of Health Malaysia<sup>1</sup>. Public consists of government health clinic, community clinic as well as maternal and child health clinic. Private consists of registered private medical clinic by Medical Practice Division, Ministry of Health Malaysia<sup>1</sup>. There was no data for private medical clinic for 2010. Private clinics data for W.P.Putrajaya from the Medical Practice Division is combined with W.P.KL, thus we had combined both data to represent as W.P.KL & Putrajaya.

<sup>1</sup> Health Informatics Centre, Ministry of Health Malaysia. Health Indicators 2010-2017

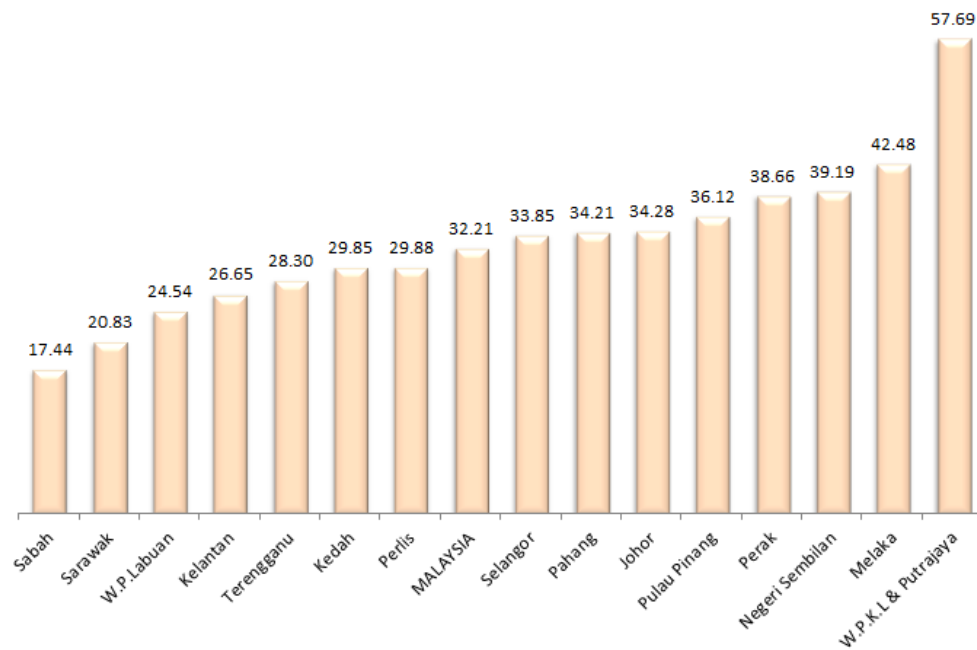
<sup>2</sup>World Health Organization, Global Health Observatory Data Repository. 2013. *Health Infrastructure Data by Country: Density of Health Centres (per 100,000 population)*. Retrieved from <http://apps.who.int/gho/data/view.main.30000>

Figure 4.10: Number of health clinics in Malaysia (public & private sectors) and Health clinic density (per 100,000 population), 2010-2016



Source of data: Health Informatics Centre, MoH

Figure 4.11: Number of Health clinics per 100,000 population by state, 2016



Source of data: Health Informatics Centre, MOH

## 4.5 CT Scan and MRI Machines

Medical technology is one of the important components in Health Systems Resources. The availability of expensive technological equipment such as computed tomography (CT) scanners and magnetic resonance imaging (MRI) had increased over the years especially in the private sectors. There is no ideal number of CT scanners or MRI units per population, but there was evidence of inappropriate and excessive use of these expensive diagnostic technologies as reported by OECD<sup>1</sup>.

The number of CT units at private sector were almost doubled, that of public sector for majority states of Malaysia. Highest was seen in Selangor (11 units at public, 18 units at private sectors), followed by W.P.KL (10 units at public, 15 units at private). Terengganu had only 1 unit of CT in its public and private sector respectively. The numbers of MRI unit at private were more than doubled of its public. Highest numbers were seen in both Selangor (5 units in public, 18 units in private) and W.P.KL (7 units in public, 14 units in private). Similarly, Terengganu had only 1 unit of MRI at its public sector<sup>2</sup>.

Similar trends were seen for both density of CT and MRI procedure performed per 1,000 population (Table 4.1). W.P.KL had the highest density (42.7 and 22.4), followed by Pulau Pinang (42.0 and 14.7), Melaka (31.6 and 10.9), while Terengganu was the lowest (4.2 and 0.9) for both. About 5 states ranked above the national density of CT procedure performed (17.1 per 1,000 population) and 4 states had higher MRI procedure performed density than the national of 6.0 per 1,000 population.

There were large variations in the use of CT and MRI machines across the country. The state with the highest CT was tenfold that of

the lowest state, while the variation in MRI between the two states were almost twenty-fold. The number of procedures performed were even greater with W.P.KL at 71,446 CT scan performed and 37,481 MRI performed while Terengganu had 4,392 and 945 of CT scan and MRI performed in the same year respectively.

Data from WHO ranked Malaysia third for CT density (6.43 units per million population) and second for MRI density (2.89 units per million population) among the ASEAN Member States. Singapore ranked first for both CT and MRI density with 8.87 and 7.76 units per million population. There were no data on CT and MRI density for Indonesia and Vietnam (and Thailand on MRI density). Some of the data consisted of public or private sector such as CT density data for Myanmar, which represented public only the sector while Brunei data on MRI density only represented only the private sector<sup>3</sup> (Figure 4.12).

**Density of computed tomography units** defined as number of Computed tomography (CT) scan units from the public and private sectors, per 1,000,000 population while density of magnetic resonance imaging units defined as number of Magnetic Resonance units from the public and private sectors, per 1,000,000 population<sup>3</sup>. Method of measurement by WHO was count of medical devices available in the country, divided by the number of population<sup>3</sup>. Malaysian data was retrieved from Clinical Research Centre, National Healthcare Establishments & Workforce Statistics (Hospital) 2010, Kuala Lumpur 2012. There were no more similar report produced afterwards, therefore the most recent available data was 2010<sup>2</sup>.

<sup>1</sup> OECD. (2015). *Health at a Glance 2015: OECD Indicators*, Paris:OECD Publishing. Retrieved from [http://dx.doi.org/10.1787/health\\_glance-2015-en](http://dx.doi.org/10.1787/health_glance-2015-en)

<sup>2</sup> Clinical Research Centre. 2012. National Healthcare Establishments & Workforce Statistics (Hospital) 2010. Kuala Lumpur

<sup>3</sup> World Health Organization. Global Health Observatory data repository. Medical equipment. Retrieved from <http://apps.who.int/gho/data/node.main.510?lang=en> (Accessed on 6 April 2018)

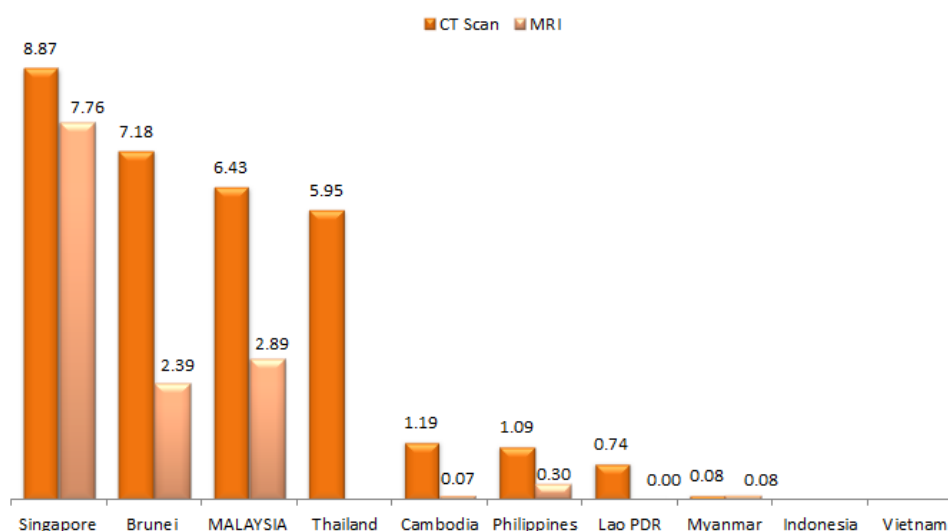
Table 4.1: Total number of CT & MRI procedure performed and Density (per 1,000 population), by state, 2010

States	No of CT Scan procedure performed	CT pro- cedure per- formed per 1,000 population	Density procedure performed per 1,000 population	No of MRI procedure performed	Density procedure performed per 1,000 population
<b>Malaysia</b>	<b>484 831</b>	<b>17.1</b>		<b>17 010</b>	<b>6.0</b>
W.P. K.L	71 446	42.7		37 481	22.4
Pulau Pinang	65 503	42.0		23 016	14.7
Melaka	25 957	31.6		8 944	10.9
Negeri Sembilan	21 312	20.9		5 406	5.3
Johor	60 458	18.1		18 651	5.6
Selangor & W.P Putrajaya	93 226	16.8		37 760	6.8
Perak	35 574	15.1		9 044	3.8
Kedah	27 276	14.0		7 748	4.1
Sarawak	29 866	12.1		8 377	3.4
Pahang	13 337	8.9		3 713	2.5
Kelantan	13 621	8.8		2 762	1.8
Perlis	1 902	8.2		532	2.3
Sabah & W.P Labuan	20 961	6.4		5 431	1.6
Terengganu	4 392	4.2		945	0.9

state ranking follow CT scan density

Source of Data: National Healthcare & Establishments Workforce Statistics (Hospital) 2010, Clinical Research Centre

Figure 4.12: CT Scanners and MRI density (per 1,000,000 population) among ASEAN Member States, 2013



Source of data: Global Health Observatory Data Repository,WHO

## 4.6 Total Health Expenditure

Total health expenditure is the sum of general government and private expenditure on health. Per capita estimates use the mid-year population as the denominator<sup>1</sup>.

Current health expenditure as a share of GDP provides an indication on the level of resources channelled to health relative to other uses. It shows the importance of the health sector in the whole economy and indicates the societal priority which health is given measured in monetary terms<sup>2</sup>. WHO reported that about 10% of global GDP were spent on health in 2015<sup>3</sup>.

Based on Malaysia National Health Accounts (MNHA) Health Expenditure reports, the total health expenditure for Malaysia increased from RM35,231 million in 2010 to RM49,731 million in 2014. The health spending as a share of Gross Domestic Product (GDP) for that period ranged from 4.29 per cent to 4.49 per cent of GDP (Figure 4.13)<sup>4</sup>.

By state, Selangor had the highest expenditure of RM8,494 million; surpassing National expenditure of RM6,635 million in 2014. Selangor had the largest population thus the highest expenditure. The state with lowest expendi-

ture was W.P.Labuan at RM149 million (Figure 4.14)<sup>4</sup>.

Malaysia ranked third for the current health expenditure (per capita in PPP) among ASEAN countries at 1063.9 dollars in 2015 (Figure 4.15). Singapore top with 3681.3 dollars per capita, followed by Brunei (2083.4 dollars), while lowest was Laos with 165.8 dollars<sup>1</sup>. In terms of current health expenditure as a share of GDP, highest was Cambodia with 6 per cent and lowest was Brunei at 2.6 per cent, while Malaysia at 4.0 per cent<sup>2</sup>.

**Current health expenditure (CHE) per capita** in PPP is defined as Per capita current expenditures on health expressed in respective currency - international PPP dollar. This indicator calculates the average expenditure on health per person in comparable currency including the purchasing power of national currencies against USD. It contributes to understand the health expenditure relative to the population size facilitating international comparison. Unit of measure is USDPPP<sup>1</sup>.

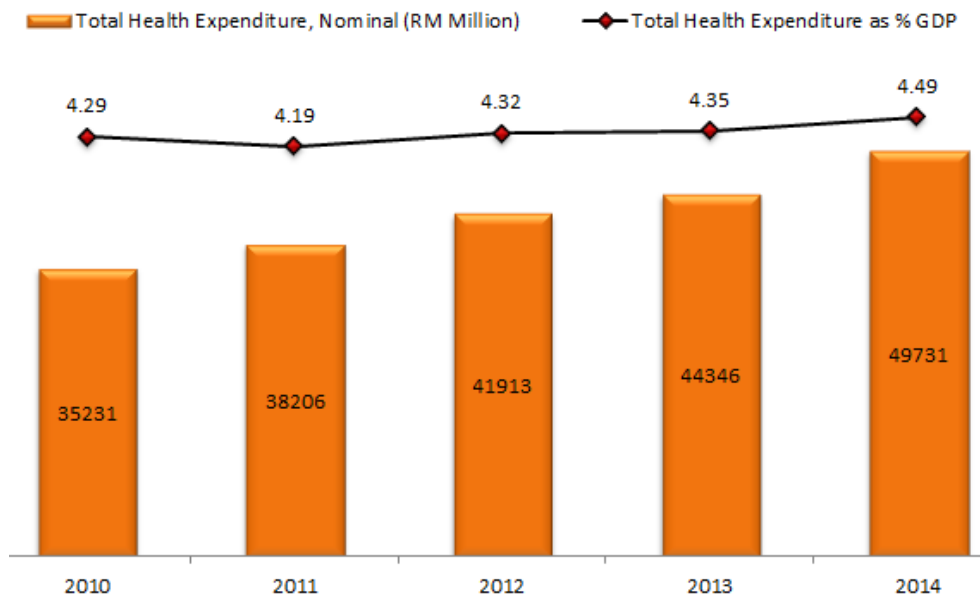
<sup>1</sup> World Health Organization, Global Health Observatory Data Repository. *Current Health Expenditure (CHE) per capita in PPP*. Retrieved from <http://apps.who.int/gho/data/node.main.GHEDCHEpcPPPSHA2011?lang=en>

<sup>2</sup> World Health Organization, Global Health Observatory Data Repository. *Current Health Expenditure (CHE) as percentage of GDP*. Retrieved from <http://apps.who.int/gho/data/node.main.GHEDCHEGDPSHA2011?lang=en>

<sup>3</sup>World Health Organization. *Current health expenditure (CHE) as Percentage of GDP*. Retrieved from [http://www.who.int/gho/health\\_financing/health\\_expenditure/en/](http://www.who.int/gho/health_financing/health_expenditure/en/)

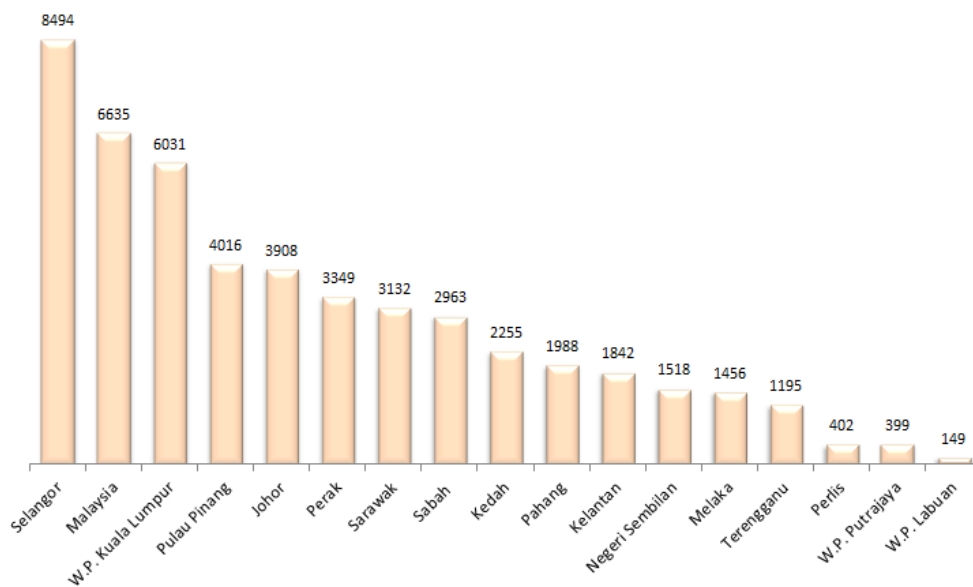
<sup>4</sup>Ministry of Health Malaysia. 2016. *Malaysia National Health Accounts - Health Expenditure Report 1997-2014 (MOH/S/RAN/45.16(AR))*

Figure 4.13: Total Health Expenditure (RM Million) and Total Health Expenditure as % of GDP, 2010-2014



Source of data: MNHA

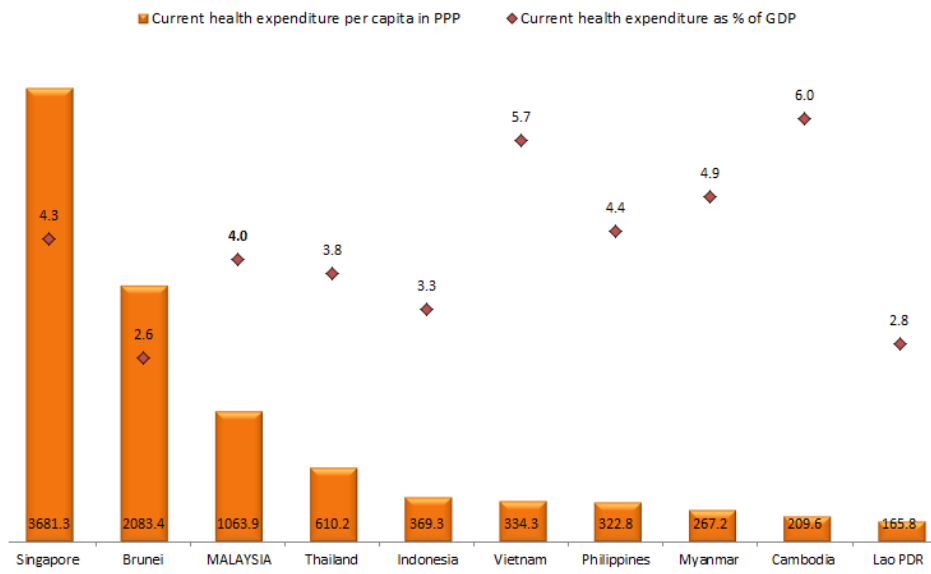
Figure 4.14: Total Health Expenditure (RM Million), by state, 2014



Source of data: MNHA



Figure 4.15: Current health expenditure per capita in PPP and Current health expenditure as % of GDP among ASEAN Member States, 2014



Source of data: Global Health Observatory Data Repository,WHO

## 5.1 Out of Pockets Health Expenditure

Out-of-pocket (OOP) represents the share of the expenses that the insured party must pay directly to the health care provider, without a third-party (insurer, or government).

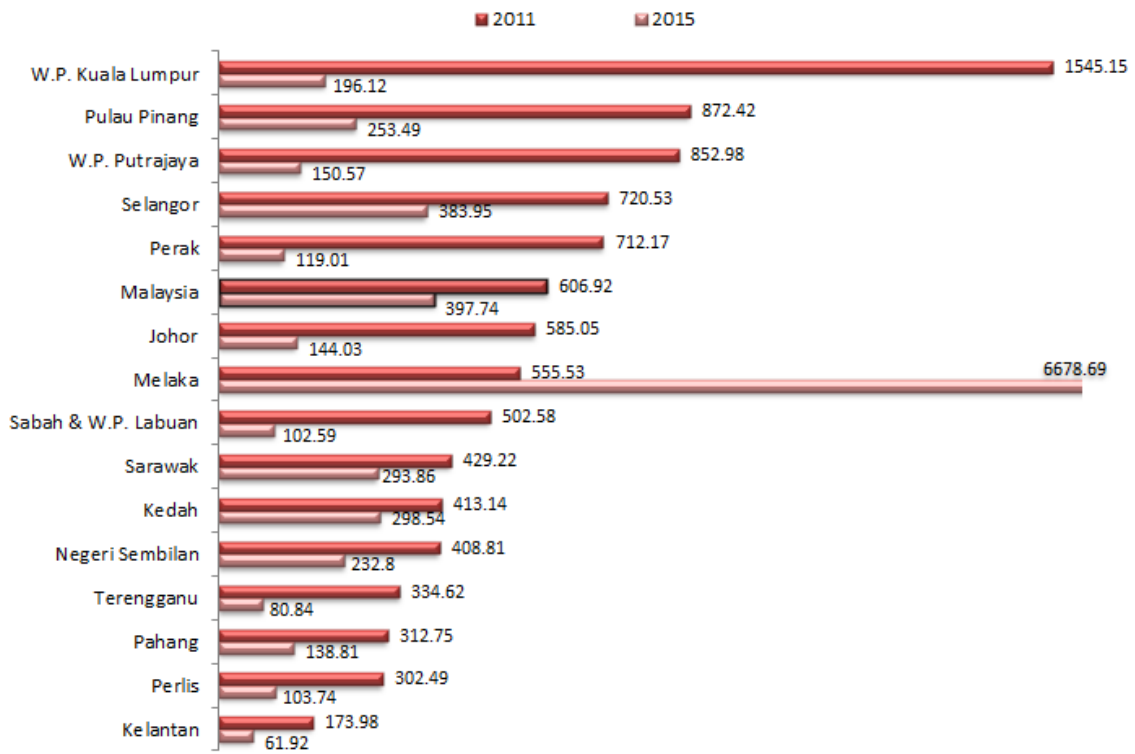
Based on NHMS, the Malaysian OOP had declined about 34.5% in 2015 as compared to 2011. The healthcare system is similar in all states, however, there were variations in the level of OOP. Most states showed the decline in OOP except for Melaka which was markedly increased in 2015. On the other hand, Wilayah Persekutuan Kuala Lumpur showed the highest OOP of RM1545.15 per capita in 2011 but decreased about 87.3% in 2015 to RM196.17 per capita. Two states in the east coast; Kelantan and Terengganu showed the lowest OOP

of less than RM100.00 per capita (Figure 5.1).

The out of pocket expenditure as a percentage of total health expenditure in Malaysia was relatively low in comparison with other ASEAN countries and South East Asia average (Figure 5.2).

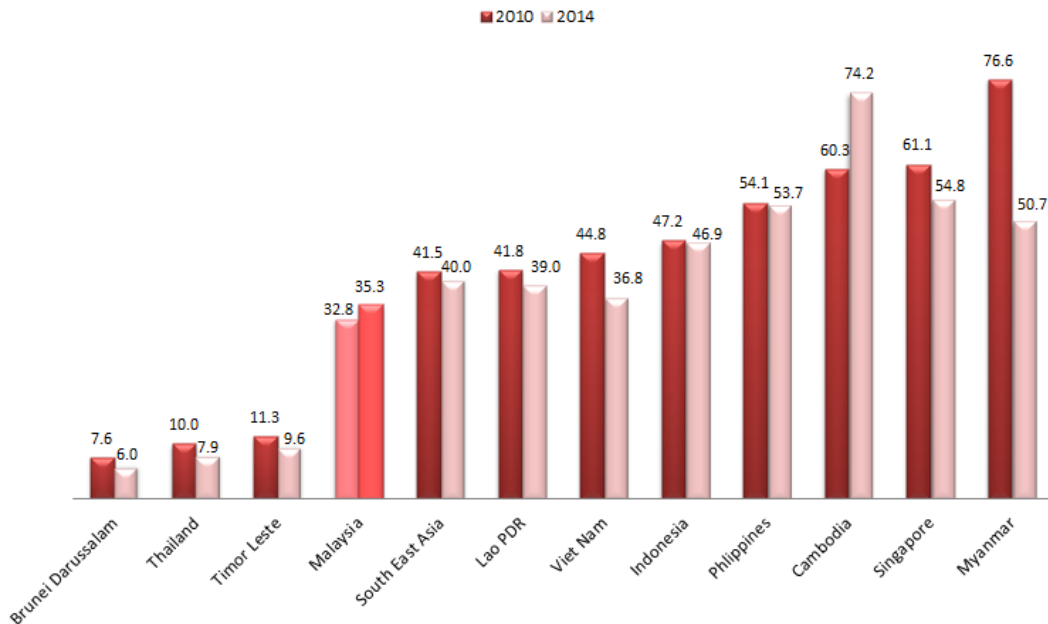
**Out-of-pocket payments (OOPs)** are defined as direct payments made by individuals to health care providers at the time of service use. This excludes any prepayment for health services, for example in the form of taxes or specific insurance premiums or contributions and, where possible, net of any reimbursements to the individual who made the payments (WHO).

Figure 5.1: Total Out of Pocket per capita Health Expenditure in Malaysia



Source of data: NHMS

Figure 5.2: Out of Pocket Expenditure as a Percentage of Total Health Expenditure in South East Asia



Source of data: UNESCAP

## 5.2 Immunisation Coverage for Diphtheria, Tetanus and Pertussis

Vaccine-preventable diseases (VPD) are still a major public health concern worldwide. The global vaccination coverage remains at 85%, with no significant changes during the past few years<sup>1</sup>. Global vaccination coverage is the proportion of the world's children who receive recommended vaccination<sup>1</sup>.

Receiving three doses of diphtheria-tetanus toxoid-pertussis vaccine (DTP3) is considered one of the key indicators of childhood vaccination coverage<sup>2</sup>. The immunization coverage for DTP3 in Malaysia is relatively high with all states achieved more than 85% except for Kelantan (76.56%) in 2016. WP Putrajaya had the highest DTP3 coverage (119.66%), followed by WPKL (118.33%), WP Labuan (104.20%) and Melaka (104.05%). However, majority had declined in the DTP3 coverage as compared from 2012.

Data collected by Family Health Development Division, MOH found that there is an increase in vaccine hesitancy and geographic clustering of outbreaks in recent years<sup>3</sup>. The scenario of vaccine refusal in Malaysia had started in 2012-2013 which possibly leads to the reduction of DTP3 coverage in some states. Kedah, Perak,

Pahang, Terengganu and Kelantan are among the states with high number of vaccine refusal. The top three reasons for refusal are mainly related to its content, "halal" or "haram" issue and the preference for homeopathy treatment<sup>3</sup>.

Based on data by WHO/UNICEF, the immunization coverage of DTP3 for Malaysia in 2016 was 95%. Thailand and Brunei had the highest coverage (99%) among other ASEAN countries, followed by Singapore (97%), Vietnam (96) and Malaysia. Two countries had DTP3 immunization coverage below 85%.

The Global Vaccine Action Plan (GVAP) 2011-2020 is a framework aims to achieve the Decade of Vaccines vision and goals of delivering universal access to immunization<sup>4</sup>. GVAP had set a target of 90% national coverage of DTP3 by 2020<sup>4</sup>. Monitoring data at subnational levels is crucial to help prioritize and tailor vaccination strategies and operational plans to address immunization gaps and improve coverage<sup>1</sup>.

**DPT3 Immunisation coverage** in Malaysia is defined as the percentage of completed immunisation DPT3 of children aged <1 year old during the specified year

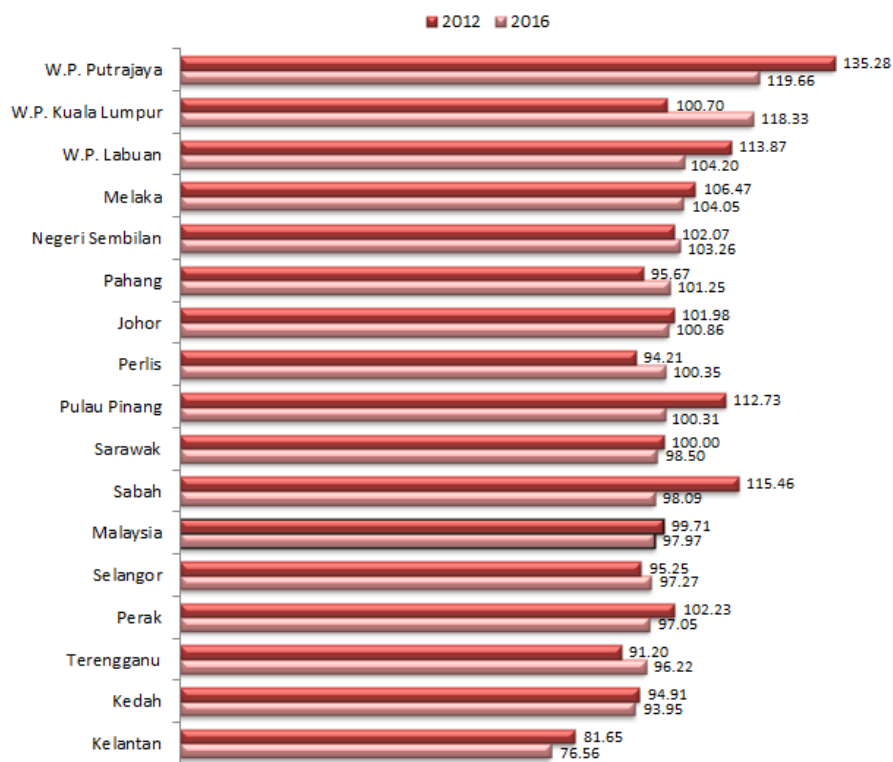
<sup>1</sup>WHO. 2018, July 16. *Fact Sheets on Immunization Coverage*. Retrieved from <http://www.who.int/news-room/fact-sheets/detail/immunization>

<sup>2</sup>Devasenapathy N, Ghosh Jerath S, Sharma S, et al. 2016. Determinants of Childhood Immunisation Coverage in Urban Poor Settlements of Delhi, India: A Cross-sectional Study. *British Medical Journal (BMJ) Open*, Vol 6(8), e013015. doi: 10.1136/bmjopen-2016-013015. Retrieved from <https://bmjopen.bmj.com/content/6/8/e013015>

<sup>3</sup>Immunisation Programme in Malaysia. Vaccinology 2017–III International Symposium for Asia Pacific Experts in Hanoi, Vietnam. 16-19 October 2017. . Retrieved from <https://www.fondation-merieux.org/wp-content/uploads/2017/10/vaccinology-2017-faridah-kusnin.pdf>

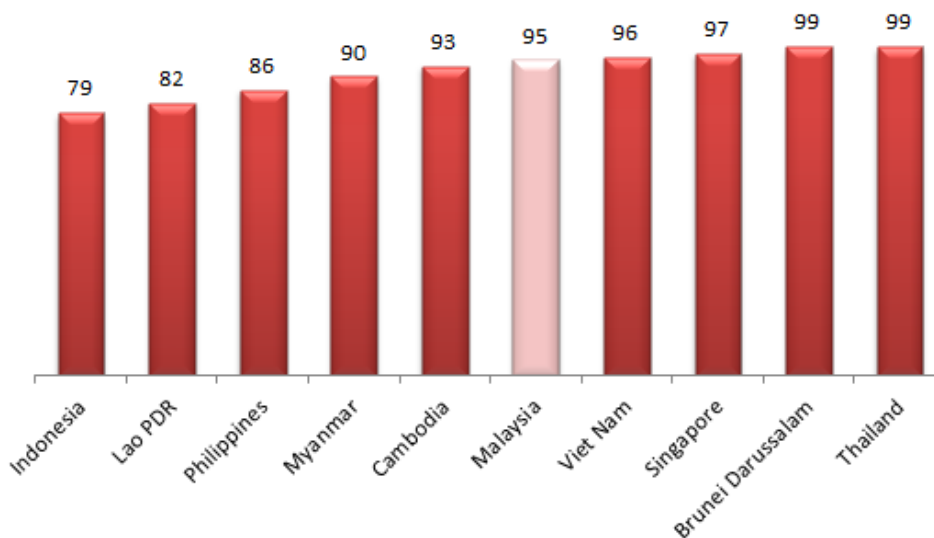
<sup>4</sup>WHO, 2018, July 16. Decades of Vaccines-Global Vaccine Action Plan 2011-2020. Retrieved from [https://www.who.int/immunization/global\\_vaccine\\_action\\_plan/DoV\\_GVAP\\_2012\\_2020/en/](https://www.who.int/immunization/global_vaccine_action_plan/DoV_GVAP_2012_2020/en/)

Figure 5.3: Immunization Coverage for Diphteria, Tetanus and Pertusis, (%) Completion Dose



Source of data: Health Informatics Centre, MOH

Figure 5.4: International Comparison : DPT3 Immunization Coverage (%), 2016



Source of data: UNICEF

### 5.3 Deliveries Attended by Skilled Health Personnel

Proportion of births attended by skilled health personnel is the percentage of deliveries attended by personnel who are trained to provide the necessary supervision, care and advice to women during pregnancy, labour and the postpartum period, to conduct deliveries on their own and to care for newborn. <sup>1</sup> This is a process indicator, which showed strong association with the level of maternal mortality <sup>2</sup>. It is indicator 3.1.2 under goal 3 (Ensure healthy lives and promote well-being for all at all age) and target 3.1 (by 2020, reduce the global maternal mortality ratio to less than 70 per 100,000 live births) of the SDG <sup>3</sup>.

One of critical strategy for reducing maternal morbidity and mortality is ensuring that every baby is delivered with the assistance of a skilled birth attendant which generally includes a medical doctor, nurse or midwife. The risk of stillbirth or death due to intrapartum related complication can be reduced by about 20% with the presence of a skilled birth attendant.

Total deliveries were apparently decreased from 455,650 in 2012 to 443,432 in 2016<sup>4</sup>. The pattern of antenatal services showed tremen-

dous improvement in term of the proportion of deliveries attended by trained birth attendants, from 98.7% in 2012 to 99.5% in 2016 (Figure 5.5).

Three quarters of the deliveries occurred in Public Hospitals, the remainder were in private and others (Figure 5.6).

Relatively, Malaysia achievement in percentage of births assisted by a skilled birth attendant is higher than most ASEAN countries except Brunei & Singapore however slightly lower compared to other OECD Countries such as Australia & Japan (Figure 5.7).

**Numerator:** Number of births attended by skilled health personnel (doctors, nurses or midwives) trained in providing life-saving obstetric care, including giving the necessary supervision, care and advice to women during pregnancy, childbirth and the postpartum period, to conduct deliveries on their own, and to care for newborns.

**Denominator:** The total number of live births in the same period.

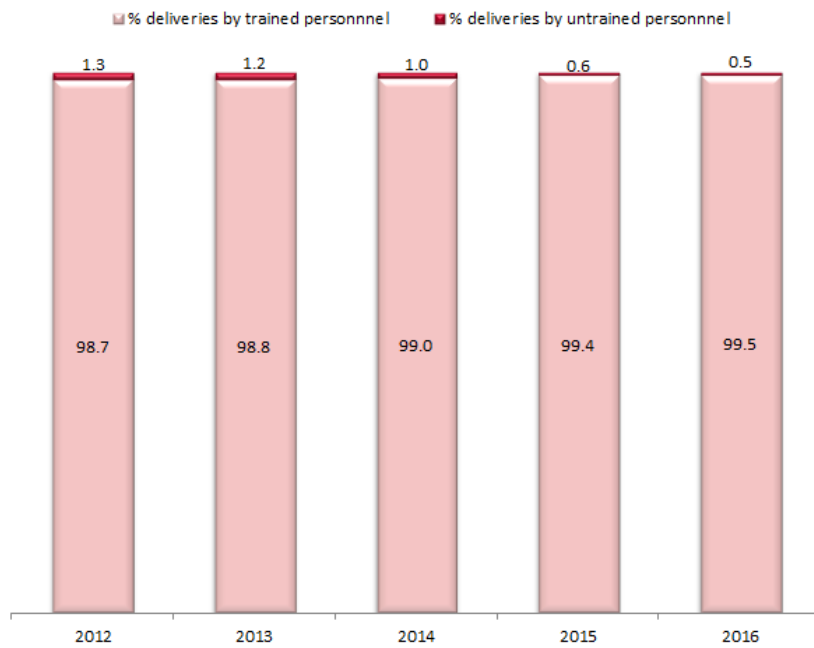
<sup>1</sup>World Health Organization Regional Office for South-East-Asia. Retrieved from [http://www.searo.who.int/entity/health\\_situation\\_trends/data/chi/deliveries-attended-by-skilled-health-personnel/en/](http://www.searo.who.int/entity/health_situation_trends/data/chi/deliveries-attended-by-skilled-health-personnel/en/)

<sup>2</sup>AbouZahr, C. and Wardlaw, T. (2001). Maternal Mortality at the End of a Decade: Signs of Progress? *Bulletin of the World Health Organization*, 79, pp.561-573.

<sup>3</sup>United Nations Children's Fund. Retrieved from <https://data.unicef.org/resources/definition-of-skilled-health-personnel-providing-care-during-childbirth/>

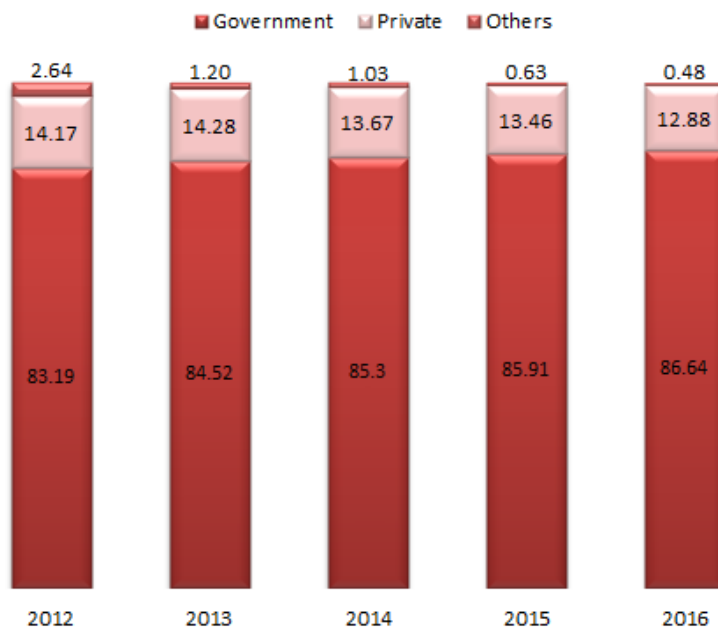
<sup>4</sup>Health Information Centre. Health Fact, 2012-2016

Figure 5.5: Total Deliveries in Malaysia & Percentage of Deliveries by Trained Personnel, 2012-2016



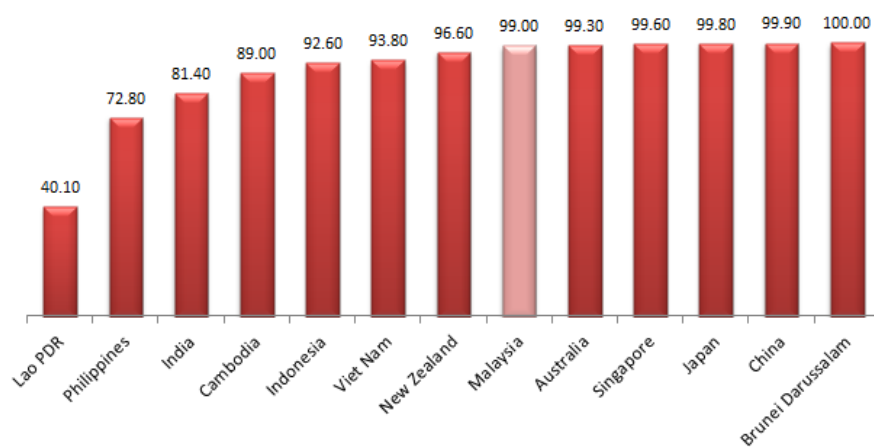
Source of data: Health Informatics Centre, MOH

Figure 5.6: Deliveries by Trained Personnel in Malaysia by Sectors (%), 2012-2016



Source of data: Health Informatics Centre, MOH

Figure 5.7: International Comparison : Percentage of Births assisted by a Skilled Birth Attendant (%), 2011-2016



Source of data: UNICEF