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SOCIAL INEQUALITIES AND HEALTH IN MALAYSIA

THE STATE OF HOUSEHOLDS 2020 PART III

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CONTENTS

ABBREVIATIONS

BMI	:	Body mass index
CEMD	:	Confidential Enquiry into Maternal Deaths
CVDs	:	Cardiovascular diseases
DALY	:	Disability-adjusted life years
DOS	:	Department of Statistics
EPU	:	Economic Planning Unit
EU	:	European Union
EUR	:	Euro
FAO	:	Food and Agriculture Organization
Food PLI	:	Food Poverty Line Income
GBD	:	Global Burden of Disease
GDP	:	Gross domestic product
GHQ	:	General Health Questionnaire
HALE	:	Healthy life expectancy
HIES	:	Household Income and Expenditure Survey
ILO	:	International Labour Organization
IMR	:	Infant mortality rate
LE	:	Life expectancy
MCO	:	Movement Control Order
MDG	:	Malaysian Dietary Guidelines
MHPU	:	Malaysian Healthcare Performance Unit
MOH	:	Ministry of Health
MPI	:	Multidimensional Poverty Index
MyWI	:	Malaysian Wellbeing Index
NCDs	:	Non-communicable diseases
NHMS	:	National Health and Morbidity Survey
OECD	:	Organisation for Economic Co-operation and Development
PYLL	:	Potential years of life lost
RNI	:	Recommended Nutrition Intakes
SDG	:	Sustainable Development Goals
SDQ	:	Strengths and Difficulties Questionnaire
SMPH	:	Summary measures of population health
SMR	:	Standardised mortality ratio
SOCSO	:	Social Security Organisation
T20	:	Top 20%

ABBREVIATIONS

U5MR	:	Under-five mortality rate
UK	:	United Kingdom
UNDP	:	United Nations Development Programme
US	:	United States
USD	:	United States Dollar
WC	:	Waist circumference
WHO	:	World Health Organization
YLD	:	Years lived with disability
YLL	:	Years of life lost

GLOSSARY

Body Mass Index (BMI)	:	A person's weight divided by the square of their height. It is used to assess a person's nutritional status, categorising a person as underweight, overweight or obese. *Source: WHO (n.d.-b)*
Catastrophic healthcare spending	:	Out-of-pocket spending for healthcare that exceeds a certain proportion of a household's income which indicates that the expenditure causes financial hardship. *Source: Wagstaff et al. (2018)*
Concentration Index	:	A measure of health inequality. The index ranges from -1 to 1, with a negative value indicating health problem is concentrated among the least-advantaged, 0 indicating total equality and a positive value indicating health problem is concentrated among the most-advantaged. *Source: O'Donnell et al. (2007)*
Disability-adjusted life years (DALYs)	:	The sum of years of potential healthy life lost due to premature mortality and the years of productive life lost due to disability. *Source: WHO (n.d.-g)*
Life expectancy (LE)	:	The average number of years a person can expect to live from any given age, assuming mortality patterns remain constant. *Source: DOS (2020b)*
Health inequalities	:	Differences in health across population. *Source: Arcaya, Arcaya, and Subramanian (2015)*
Health inequity	:	A form of health inequality between groups of people within and between countries that is avoidable. Usually a product of exogenous factors like socioeconomic background. *Source: Arcaya, Arcaya, and Subramanian (2015)*
Healthy life expectancy (HALE)	:	Life expectancy that applies disability weights to health conditions to calculate the equivalent number of years a person can expect to live. It is useful in ascertaining the effects of population morbidity on life expectancy. *Source: WHO (n.d.-d)*
Infant mortality rate (IMR)	:	The number of deaths of infants below the age of 1 expressed as a rate per 1,000 live births. *Source: WHO (n.d.-e)*

GLOSSARY

Malaysian Wellbeing Index (MyWI)	:	An indicator of Malaysians' well-being from an economic and social perspective. A composite index based on 14 components including five economic components (communications, education, income and distribution, transport and working life) and nine social components (culture, environment, family, governance, health, housing, leisure, public safety, social participation). *Source: DOS (2019a)*
Mortality rate	:	Number of deaths in a population in a given period expressed as a rate per population at the beginning of that period. *Source: CDC (n.d.)*
Multidimensional Poverty Index	:	A measure that identifies multiple deprivations at the household and individual level in health, education and standard of living. The MPI reflects both the incidence of multidimensional deprivation (a headcount of those in multidimensional poverty) and its intensity (the average deprivation score experienced by poor people). *Source: UNDP (2019)*
Neonatal mortality rate	:	The number of deaths of infants aged less than 28 days per 1,000 live births in that year. *Source: DOS (2020k)*
Non-communicable Diseases (NCD)	:	Chronic diseases that are not directly transmissible and are the result of a combination of factors including diet, genetics, lifestyle and physical environment. *Source: WHO (2018a)*
Precarious employment	:	Employment that provides low pay, uncertain status of employment, little say over working conditions and a lack of access to social protection and benefits. *Source: ILO (2016a)*
Psychosocial	:	Captures all ways that social factors influence the state of mind. *Source: PHE and UCL Institute of Health Equity (2017)*
Recommended Nutrient Intake (RNI)	:	The recommended nutrient intake to meet the nutrient needs of practically all healthy persons. *Source: MOH (2017)*

GLOSSARY

Social determinants of health inequities	:	Determinants that influence the distribution of factors that directly impact health (also known as the social determinants of health) across the population. The social determinants of health inequities include the political and socioeconomic context and the resulting social structure. *Source: Solar and Irwin (2007)*
Social determinants of health	:	Determinants that directly affect health including the health system, physical environment, psychosocial stressors and health-impacting behaviours. *Source: Solar and Irwin (2007)*
Summary measures of population health (SMPH)	:	Measures that combine information on mortality and non-fatal health outcomes to represent the health of a population. *Source: WHO (2002)*
Under-five mortality rate	:	The number of deaths of all children under 5 years per 1,000 live births in that year. *Source: DOS (2020k)*
Years of life lost (YLL)	:	Measures premature mortality by multiplying the number of deaths with life expectancy at age of death/number of years a person was expected to live at age of death. Thus, the measure assigns heavier weight to deaths occurring at early ages. *Source: WHO (n.d.-j)*
Years lived with disability (YLD)		Measures health loss due to disability or ill-health for a particular cause by taking the number of incident cases in that period, multiplied with the average duration of the disease and disability weight (weightage that reflects the severity of the disease). *Source: WHO (n.d.-g)*

EXECUTIVE SUMMARY

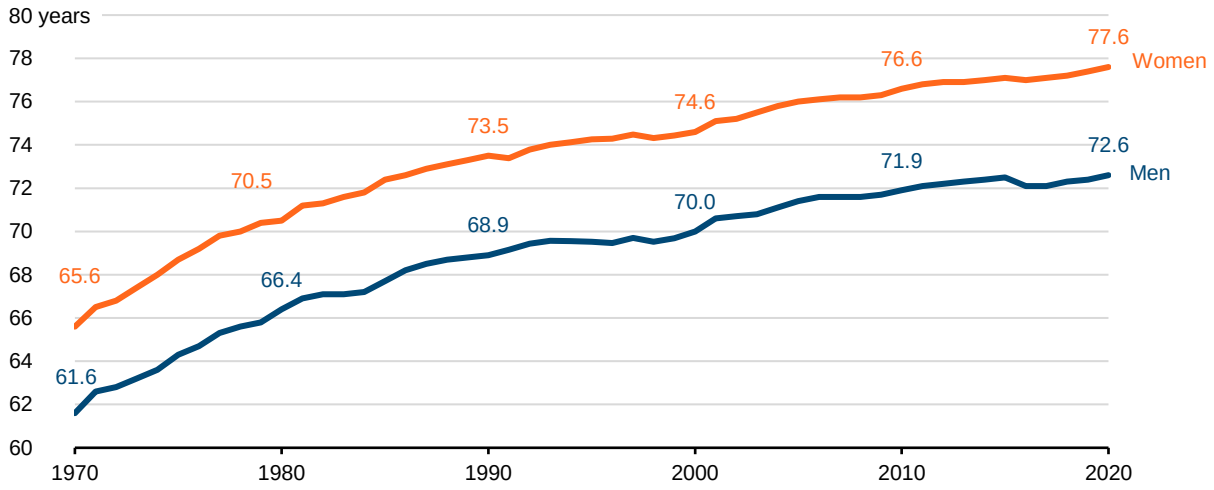
Health beyond healthcare

Health is not just determined by healthcare and having access to it. Rather, health outcomes are due to a mix of factors apart from healthcare, including living conditions and work, environments as well as behaviour. This report looks beyond the question of healthcare and instead focuses on the social factors that may affect the health outcomes of Malaysians. We explore two social factors specifically, namely income and work, and their relationship with health outcomes.

Malaysia's overall health outcomes have experienced laudable improvements over the last decades

Malaysians are now living longer. Life expectancy, or the number of years a person can expect to live, is a key indicator for assessing population health. In 2020, a male and female newborn can expect to live to the age of 72.6 and 77.6 years old, respectively, on average. By comparison, a male and female baby born 50 years earlier in 1970 on average would only live to the age of 61.6 and 65.6 years old, respectively.

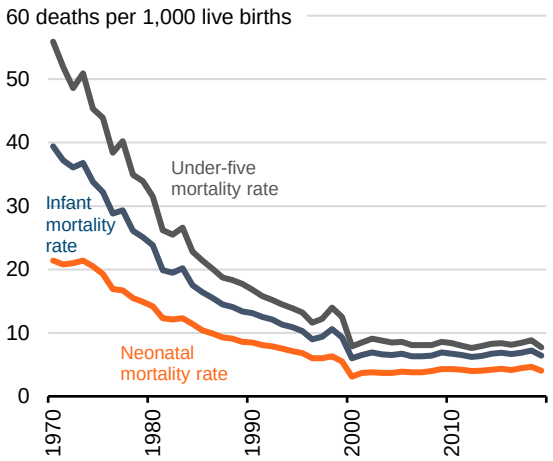
Life expectancy, 1970 – 2020



Source: DOS (2020b), DOS (2020i)

The increase in life expectancy is in line with the **decrease in mortality observed in the past decades, including child and maternal mortality**. For example, the number of deaths among infants aged less than 28 days (neonatal mortality rate) in 2019 stood at 4.1 deaths per 1,000 live births, compared to 21.4 in 1970. Similar declines were recorded in deaths among infants under 1 year old (infant mortality) and children under 5 years old (under-five mortality), which stood at 6.4 and 7.7 deaths per 1,000 live births, respectively. The number of maternal deaths declined from 140.8 deaths per 100,000 live births in 1970 to 21.1 in 2019.

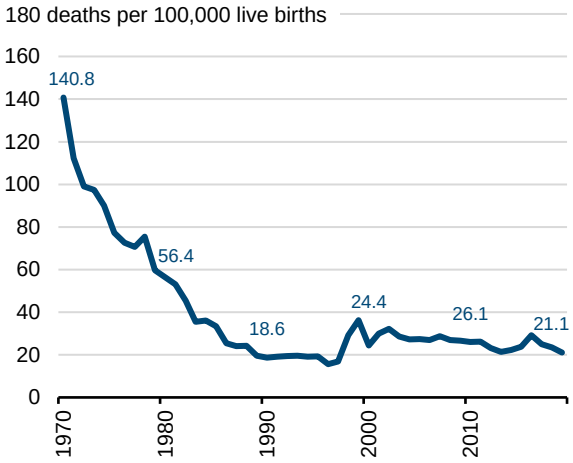
Child mortality rates, 1970 – 2019



Note:
1. Neonatal mortality rates: 1970 – 2019, Malaysia
2. Infant mortality rates: 1970 – 2019, Malaysia
3. Under-five mortality rates: 1970 – 1979, Peninsular Malaysia; 1980 – 2019, Malaysia

Source: DOS (2020i), DOS (2020k), DOS (2016)

Maternal mortality ratio, 1970 – 2019

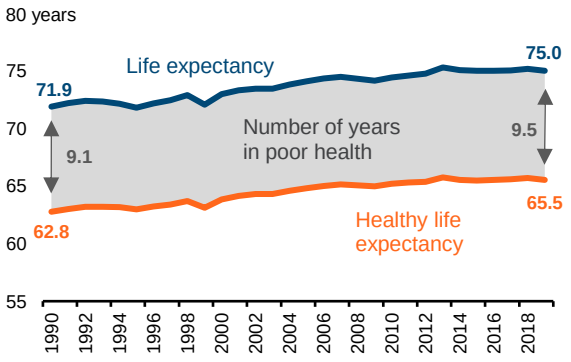


Source: DOS (2020i), DOS (2020k)

Living longer but not necessarily healthier

With rising life expectancies, discussions of health should expand towards ensuring every person lives not just longer, but that those years are lived in good health. To account for years lived in illness and disability, we can refer to healthy life expectancy (HALE), a measure of the average number of years a person can expect to live in good health from any given age. Although a baby born in 2019 can expect to live up to 75.0 years, 9.5 years of those years would be spent in poor health. Since 1990, Malaysia has recorded marginal improvements in healthy life expectancy, but these improvements were not large enough to reduce the number of years in poor health. In fact, the number of years in poor health increased slightly from 9.1 years in 1990 to 9.5 years in 2019.

Life expectancy and healthy life expectancy, 1990 – 2019



Source: Global Burden of Disease Collaborative Network (2020)

Life expectancy and healthy life expectancy, 1990 and 2019

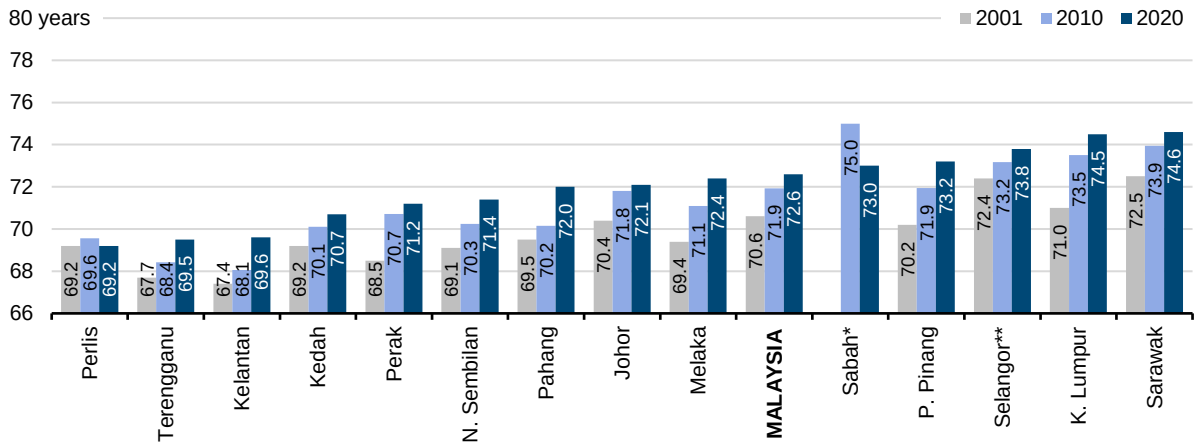
	1990	2019
Life expectancy at birth, LE (years)	71.9	75.0
Healthy life expectancy at birth, HALE (years)	62.8	65.5
Number of years in poor health (LE – HALE)	9.1	9.5
Proportion of life in poor health (%)	12.7	12.7

Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

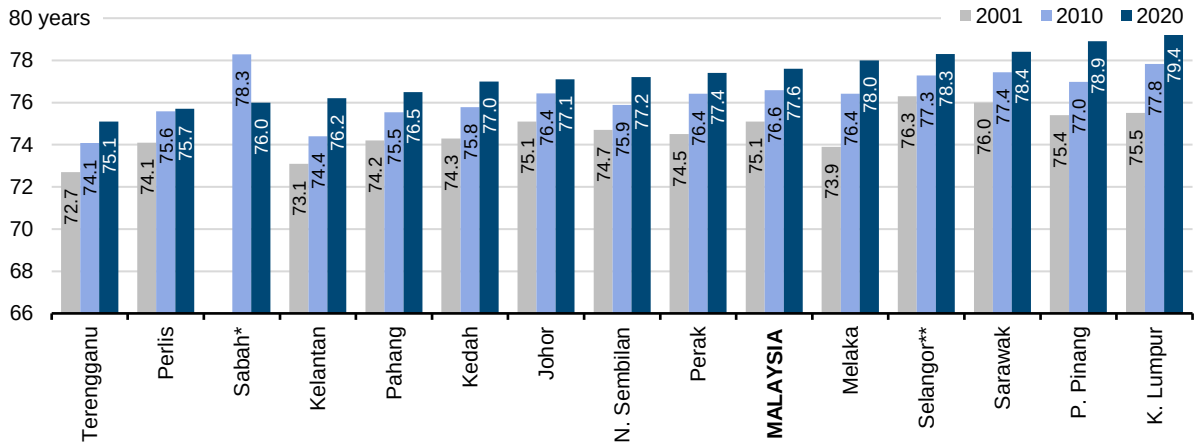
The gains in health are uneven across the population

There appears to be **significant variation in life expectancy between genders, ethnicities and states**. For instance, a male newborn in Sarawak or Kuala Lumpur in 2020 is expected to live to 74 years, whereas a male newborn in Perlis, Terengganu or Kelantan is only expected to live up to 69 years, i.e. a gap of 5 years. Similarly, a female newborn in Kuala Lumpur is expected to live to 79 years, whereas a female newborn in Terengganu or Perlis is only expected to live up to 75 years, i.e. a gap of 4 years.

Life expectancy for men by state, 2001, 2010 and 2020



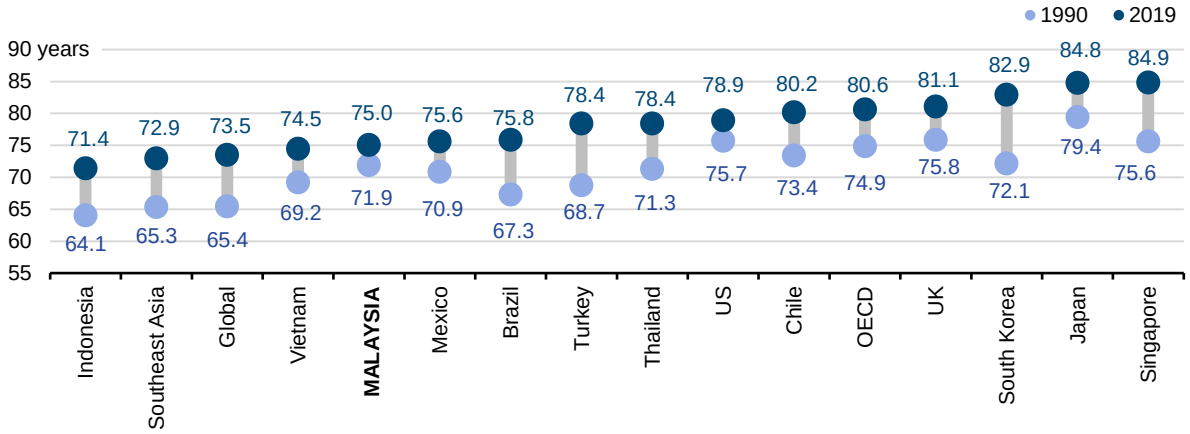
Life expectancy for women by state, 2001, 2010 and 2020



Note: *Includes Labuan. ** Includes Putrajaya. Data for Sabah and Labuan were unavailable for 2001.
Source: DOS (2020b), DOS (2015a), DOS (2013)

Additionally, **international benchmarking indicates room for improvement**. In 2019, Malaysia's life expectancy was higher than the Southeast Asian regional average, but below the OECD countries. Malaysia's growth in life expectancy lagged behind countries with comparable income levels. Although Malaysia started off with a similar life expectancy as Mexico, and higher than Thailand and Turkey in 1990, these countries have overtaken us in the last three decades.

International comparison of life expectancy, 1990 and 2019



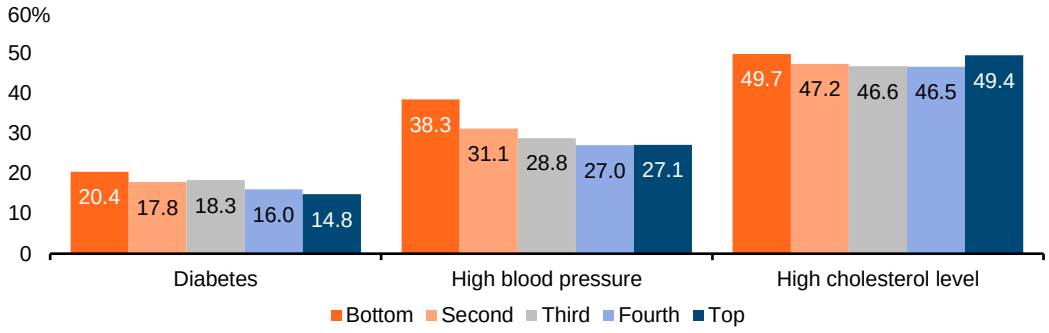
Note: The life expectancy figure for Malaysia is different compared to other charts due to the use of different sources. This source is used to allow for standardised international comparison.
Source: Global Burden of Disease Collaborative Network (2020)

Health data show gaps between the better and worse off

Aside from differences in health outcomes by gender, ethnicity and state, there are notable health inequalities by income and occupation. **Poor health outcomes tend to be more prevalent in lower income groups.**

The prevalence of diabetes (characterised by high blood sugar levels), hypertension (high blood pressure) and hypercholesterolemia (high cholesterol levels) were highest among adults in the bottom household income quintile (bottom 20%) and lowest in the top quintile (top 20%). For example, the percentage of adults with high blood pressure was 38.3% in the bottom quintile and 27.1% in the top quintile.

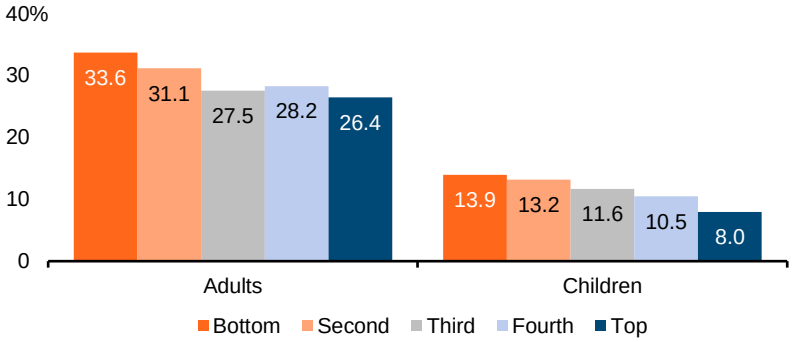
Prevalence of diabetes, high blood pressure and high cholesterol level among adults by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Prevalence includes (1) respondents diagnosed with diabetes/high blood pressure/high cholesterol by a doctor or assistant medical officer and (2) respondents who did not know they had diabetes/high blood pressure/high cholesterol until MOH tests indicated that they do.
3. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

This pattern is also seen in the prevalence of mental health problems among adults and children, with 33.6% of adults and 13.9% of children in the bottom quintile having some mental health problems, compared to 26.4% of adults and 8.0% of children in the top quintile.

Prevalence of mental health problems by household income quintile, 2015



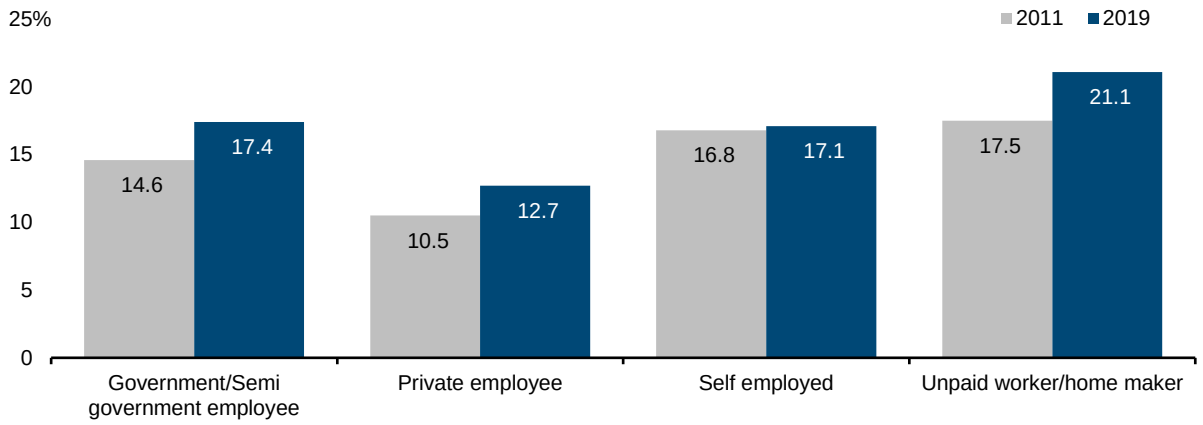
Note:
1. Adults refer to individuals aged 16 years and above. Children refer to individuals aged 5 to 15 years.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Work and working conditions also affect both physical and mental health

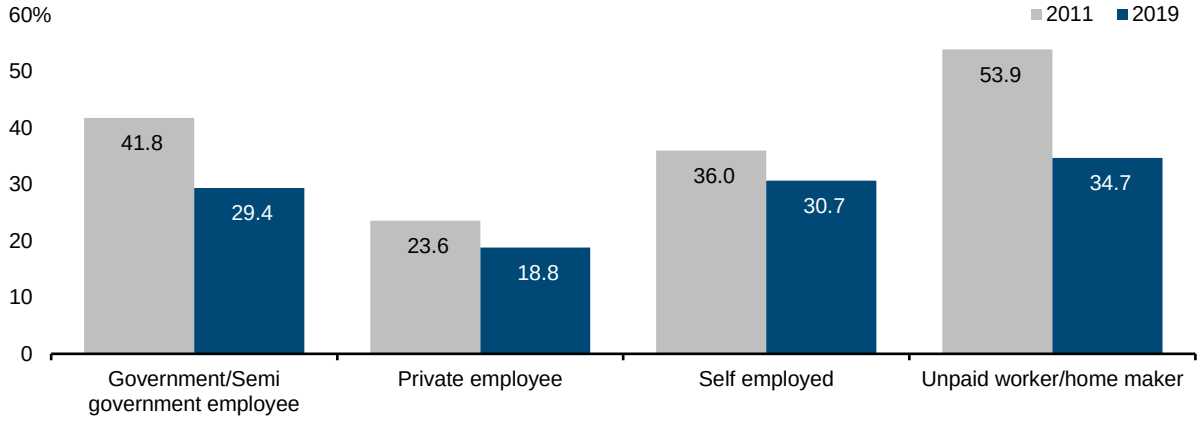
Work can be health-enhancing by providing income, which can be used to improve health, e.g. by purchasing health-enhancing goods and services. However, **work can also negatively impact health** by exposing workers to (1) physical and chemical hazards including harmful substances such as pesticides and other toxic substances including carcinogens and (2) psychosocial hazards including stress due to work demand and other conditions over which they have little control.

A high proportion of the Malaysian working age population have health conditions. In 2019, unpaid workers/home makers had the highest prevalence of high blood pressure (34.7%) compared to other workers (government/semi-government employees at 29.4%; private sector employees at 18.8%; self-employed persons at 30.7%).

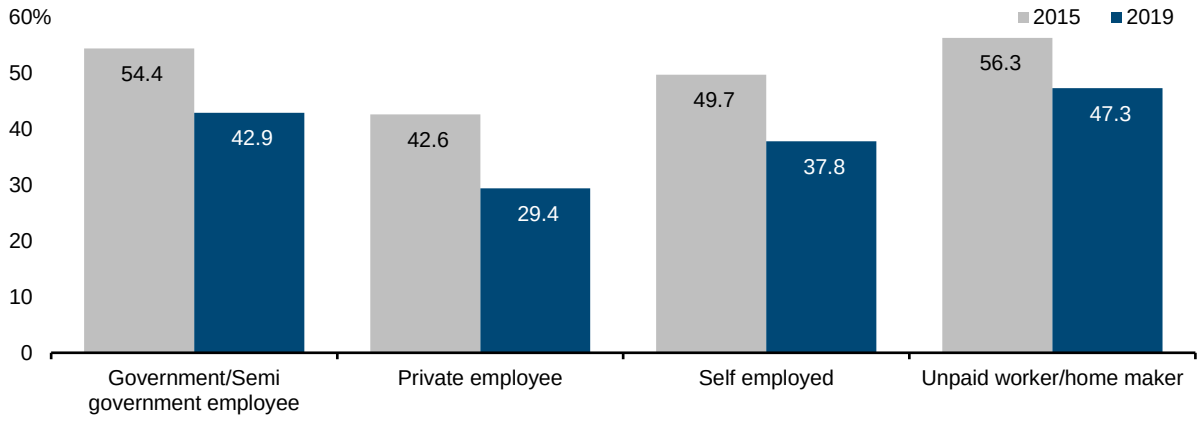
Prevalence of diabetes by employment status, 2011 and 2019



Prevalence of high blood pressure by employment status, 2011 and 2019



Prevalence of high cholesterol level by employment status, 2015 and 2019[1]



Source: IPH (2015), IPH (2020b)

[1] For high cholesterol level, comparison with 2011 is not made as the reported employment categories are different than those reported for latter years.

Certain segments of the working population are more vulnerable than others. Those in informal employment and foreign workers are more vulnerable to ill health due to the nature of their work. While work can expose individuals to work-related hazards, lack of work, i.e. unemployment, is a predictor of poor health.

Social factors affect health outcomes, too. Improving health for all requires addressing these social determinants

Malaysia's healthcare system promises universal access to healthcare for its people, but health inequalities suggest that universal access alone does not ensure good health for all. Rather, **health outcomes are due to a mix of factors including income, working environments and individual behaviour**. When these determinants are unevenly distributed in society, this contributes to health inequalities within the population. Thus, public policies play an important role to reduce these health inequalities.

While health can be improved by addressing the determinants that directly affect health, only addressing these determinants is unlikely to eliminate health gaps. **Considering the importance of social factors in determining health outcomes, policies must place greater importance on the social mechanisms underlying the inequitable distribution of health**. Hence, an intersectoral approach to tackling issues such as eliminating barriers to education, scaling up social protection for neglected populations and improving housing conditions are needed. In designing national policies to improve the overall well-being of the nation—whether it be urban, educational or industrial planning—policymakers must take into account health considerations across all policies.

INTRODUCTION

"Inequalities are a matter of life and death, of health and sickness, of well-being and misery.... Creating a fairer society is fundamental to improving the health of the whole population and ensuring a fairer distribution of good health."

Strategic Review of Health Inequalities in England post-2010,
chaired by Professor Sir Michael Marmot

INTRODUCTION

Social Inequalities and Health in Malaysia is the final part of a three-part report under the Khazanah Research Institute's (KRI) flagship publication *The State of Household 2020* (SOH2020).

Part I of SOH2020, *Welfare in Malaysia: Across Three Decades* starts off by looking at household income and expenditure, as well as their poverty and inequality dynamics, to assess the social welfare of Malaysian households. It adds value to the analysis of welfare by locating it within the distribution and production structures of the economy. The core argument is that the welfare of households cannot be divorced from how the economy is organised and structured.

Part II of SOH2020, *Work in an Evolving Malaysia* examines the different realities in the world of work from a regional perspective. The labour market continues to remain important for household welfare as employment earnings constitute the largest share of household income, while the quality and condition of work i.e. *decent work* correspond to overall well-being of many individuals. The discussion on labour is also embedded within the context of capital, technology and Covid-19 to further understand the opportunities and challenges in the future of work.

Against the backdrop of these two parts, **Part III of SOH2020, *Social Inequalities and Health in Malaysia*** considers the well-being of Malaysians through the lens of their health, going beyond the usual focus on life expectancy and access to healthcare. This report draws attention to the important role of social factors that determine health outcomes and produce health inequalities between different income and occupational groups. While Covid-19 has shone a spotlight on the importance of health, the themes discussed in this report are pertinent to the country's long-term public health beyond the pandemic.

Why Health?

Health is an intrinsic part of human welfare. The value of being healthy i.e. being in a state of complete physical, mental and social well-being is self-evident. Improving health is not only a goal in itself, but also a means to achieving other development goals. Without health, there can be no poverty eradication, no labour productivity, no higher education[2]. As noted by Stiglitz, Sen and Fitoussi looking at the quality of life, "health is perhaps the most fundamental component of capabilities as, without life, none of the other component matters."[3]

The importance of health has been underscored at the global scale by the Covid-19 pandemic. This public health crisis has brought the world to a standstill, with devastating effects on the economy and society. Malaysians were not excluded. In a special survey by the Department of Statistics (DOS) at the height of the Covid-19 outbreak in Malaysia in April 2020, 90.9% of respondents mentioned that health and life were their main priority at the time[4].

[2] WHO (2001)

[3] Stiglitz, Sen and Fitoussi (2009)

[4] Income is the main priority of 4.6% respondents, while return to normal life is the priority of 4.5% of respondents. Source: DOS (2020j)

Long before the pandemic, health maintained as a key policy area for Malaysia. Gaps in health and health policy objectives were part of the main discussions in past Malaysia plans and other policy documents, with progress in widening access to healthcare evident. Public health services for the rural population, who made up a large majority of the population in the early decades of Malaysia's formation, improved significantly. In 1965, there was one health centre for every 150,000 persons in rural areas. By 1986, this number improved to one for every 21,697 rural inhabitants[5]. Training programmes created a team of medical professionals, resulting in the ratio of physicians to population improving from 0.16 physicians for every 1,000 persons in 1965 to 0.34 in 1986 and 1.54 in 2015[6].

Health continues to be an integral part of the welfare of Malaysians as reflected in several Malaysian policy instruments. For example, the Malaysian Wellbeing Index (MyWI), introduced in the 11th Malaysia Plan (2016 – 2020), includes health as one of its components, noting that health is "an integral part of well-being, due to its contribution to the functioning of a person."[7] However, as with many indices, the Wellbeing Index is an aggregated figure giving no indication of the distribution of the component indicators across the population.

For this, the Multidimensional Poverty Index (MPI) can complement the MyWI by measuring non-monetary deprivations in the population. The MPI was introduced in 2010 by the United Nations Development Programme (UNDP) in its Human Development Report and adapted in the 11th Malaysia Plan[8]. In terms of health, the global MPI considers child mortality and nutrition[9] as indicators of health, whereas Malaysia's MPI emphasises access i.e. to healthcare facilities and clean water. By these measures, Malaysia has low deprivations in the area of health, indicating that most Malaysians have access to a nearby healthcare facility and also to clean water.

[5] MOH (1986), MMA (1980) as cited in Chee and Barraclough (2007)

[6] Physicians include generalist and specialist medical practitioners. Source: CEIC (n.d.)

[7] DOS (2019a)

[8] EPU (2015)

[9] Adults aged 20 and above are considered underweight if their body mass index (BMI) is below 18.5m/kg^2, adolescents aged 15 – 19 are considered underweight based on World Health Organization age-specific BMI cut-offs and children aged 14 and below are considered undernourished if the z-score of their height-for-age (stunting) or weight-for-age (underweight) is more than two standard deviations below the median of the reference population.

Malaysia's MPI, 2019

Dimension	Indicator	Deprivation Cut-offs	Incidence of Deprivation (%)
Education	Years of schooling	All household members aged 13 – 60 have less than six years of education	1.0
	School attendance	Any children aged 6 – 16 not schooling	0.4
Health	**Access to healthcare facility**	**Distance to healthcare facility more than 5km and no mobile health facility**	**6.5**
	Access to clean water	**Other than treated pipe water inside house and public water pipe/standpipe**	**3.9**
Standard of Living	Conditions of living quarters	Dilapidated or deteriorating	3.7
	Room crowdedness	More than two household members in a bedroom	9.5
	Toilet facility	Other than pour or flush toilet	0.4
	Access to garbage collection facility	No garbage collection facility	13.3
	Transportation facilities	All members in the household do not use private or public transport	0.6
	Access to basic communication tools	Does not have consistent fixed line phone or mobile phone	1.1
Income	Monthly household gross income	Monthly household gross income less than mean household poverty line income	5.6

Source: DOS (2020e)

Malaysia's MPI health indicators reflect Malaysia's focus on ensuring universal access to healthcare, with virtually all Malaysians having access to public healthcare facilities at substantially subsidised prices. As a result, Malaysia appears to have a low incidence of catastrophic healthcare spending[10], as healthcare is largely affordable for Malaysians. According to the World Bank, only 1.4% of households in Malaysia experienced catastrophic healthcare spending[11]. Hence, Malaysia's healthcare system often receives high praise for providing universal access to its people[12].

However, there is mounting evidence demonstrating that health is not just determined by healthcare and having access to it. Rather, health outcomes are due to a mix of factors apart from healthcare, including living conditions and work, environments as well as behaviour, often shaped by social and public policies. Some studies have estimated that healthcare itself contributes to only 10 – 25% of a population's health status, whereas social and economic environment contribute to 50 – 80%, while the remaining are attributed to biology/genetics, physical environment and lifestyle factors[13].

Thus, this report looks beyond the question of healthcare. Instead, we focus on the social factors that may affect the health outcomes of Malaysians. The report is split into three main sections, as summarised below.

Section 1: Levels of Health

The first section provides an overview of health status and assesses progress in recent decades. We analyse standard indicators of health status, namely life expectancy and mortality rates. We then delve into summary measures of population health, looking at health expectations and gaps. While the country has made significant strides in improving overall national health status, there are still gaps among segments of the population, indicating room for improvement. Additionally, we move the discussion from increasing life expectancy to improving the quality of life.

[10] Catastrophic healthcare spending describes a situation where a person has to pay for medical care themselves at the point of use (known as "out-of-pocket" payments) where the payment is a large proportion of the person's (or the household's) total income, to a point where it causes financial hardship. Source: Wagstaff et al. (2018)

[11] Here calculated as the percentage of households which spend more than 10% of total household expenditure on healthcare. Source: World Bank (2018)

[12] WHO (2018b)

[13] O'Hara (2005), Hood et al. (2016)

Section 2: Health and Income

In this section, we introduce concepts of health inequalities and health inequities, and their determinants. Health inequalities refer to all health differences between population groups regardless of cause, whereas health inequities refer to inequalities caused by determinants inequitably distributed across the population. This section shows health differences between income groups, with the rich having far better outcomes than their poorer counterparts. Lastly, we go deeper into selected determinants of health, namely care utilisation and health-impacting behaviours, to ascertain variations among income groups.

Section 3: Health and Work

The third section discusses how employment and working conditions influence health outcomes. We explore the effects of work-related hazards on health outcomes such as cardiovascular diseases and mental health, which are among the top causes of ill health for Malaysians. We use publicly-available data on the health of the working age population in Malaysia, drawing from the National Health and Morbidity Survey and the Global Burden of Disease Study. Finally, we discuss the health of some vulnerable groups in Malaysia, namely workers in informal employment, foreign workers and the unemployed.

We conclude this report by emphasising the need to tackle the social determinants of health in order to improve the health of Malaysians through an increased focus on health inequalities and preventive care, across the whole of government, not just the health sector. We also urge for greater publicly available disaggregated health statistics for more meaningful analysis of population health and health inequalities so these inequalities can be addressed.

SECTION

01

SECTION 1

LEVELS OF HEALTH

"The goal of "health for all" draws attention to the "all". At present, health resources are not shared equally by all the people; significant gaps still exist in many countries, and health is the privilege of the few. Indicators should reflect progress towards correcting this imbalance and closing the gap between those who "have health" and those who do not".[14]

World Health Organization

The World Health Organization (WHO) defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."[15] Health is a complex, multidimensional concept that is impossible to capture with a single measure. While there are many angles one can approach in exploring "health", for this report the health status of the population is the central focus.

Health indicators can measure socioeconomic progress; for instance, health and nutrition directly indicate quality of life, and an indirect indicator of overall socioeconomic development[16]. As the country grows economically, it is important to see how this affects the overall well-being of the *rakyat*, where their health should be among the main yardsticks for measuring progress. The health status of different population groups should also be assessed to identify existing gaps and design appropriate policy responses.

The following overview of the country's health indicators assesses progress in recent decades, mainly by analysing standard indicators for measuring health status, namely life expectancy and mortality rates. Using available data, comparisons are made by gender, ethnicity and state. International comparisons are used to benchmark Malaysia's progress, particularly with countries at similar levels of socioeconomic development or in the same region.

The second part offers summary measures of population health, mainly composite measures that combine both mortality and morbidity. Two concepts are considered: (1) health expectancy—using the healthy life expectancy (HALE) metric; and (2) health gaps—using the disability-adjusted life years (DALY) metric.

[14] WHO (1981)
[15] WHO (2006)
[16] WHO (1981)

1.1 Health status indicators

1.1.1. Life expectancy

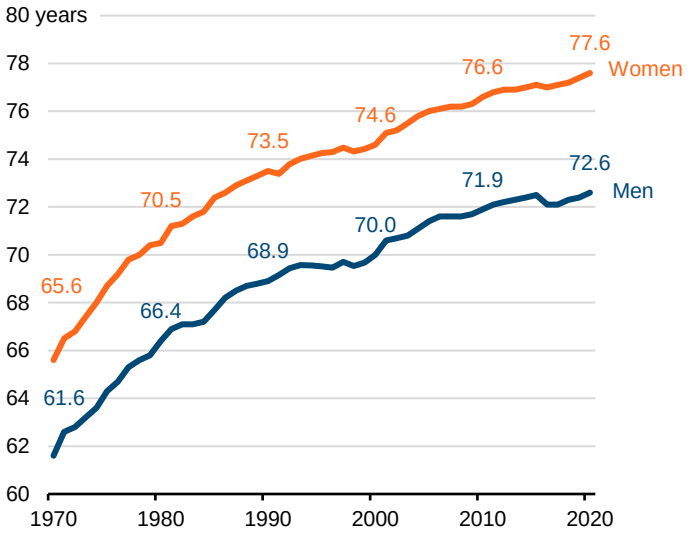
Life expectancy at birth is the most cited headline figure of a country's health. A population's health is typically measured using life expectancy at birth as an indicator. Life expectancy is a statistical measure estimating the average number of years a person can expect to live from any given age, assuming mortality patterns remain constant[17]. Life expectancy at birth is the average number of years a newborn can expect to live given prevailing mortality rates.

National life expectancy trends

Malaysians have experienced tremendous improvements in life expectancy over the past decades. A male baby born in 2020 can expect to live to 72.6 years, 11 years more than a baby born in 1970 who could expect to live to 61.6 years (see Figure 1.1). Women have higher life expectancies compared to men, mirroring the trend across the world[18]. In 2020, women in Malaysia had a longer life expectancy at birth (77.6 years), much higher than it was in 1970 (65.6 years), an additional 12 years.

However, the increase in life expectancy has plateaued in the last decade, especially for men. Table 1.1 shows that improvements in life expectancy were the highest during the 1970 to 1980 period but have moderated since. From 2011 to 2020, life expectancies for men and women only grew by 0.7% (0.5 life years) and 1.0% (0.8 life years), respectively.

Figure 1.1: Life expectancy, 1970 – 2020



Note: Data for 2019 is preliminary, data for 2020 are estimates.
Source: DOS (2020b), DOS (2020i)

Table 1.1: Growth rate of life expectancy

Growth between periods	Men	Women
1971 – 1980	6.1%	6.0%
1981 – 1990	3.0%	3.2%
1991 – 2000	1.2%	1.6%
2001 – 2010	1.8%	2.0%
2011 – 2020	0.7%	1.0%

Note: 1970 – 1990 is only for Peninsular Malaysia. Rates from 1991 are for the whole of Malaysia.
Source: DOS (2020b), DOS (2020i), KRI calculations

[17] DOS (2020b)
[18] GBD 2019 Demographics Collaborators (2020)

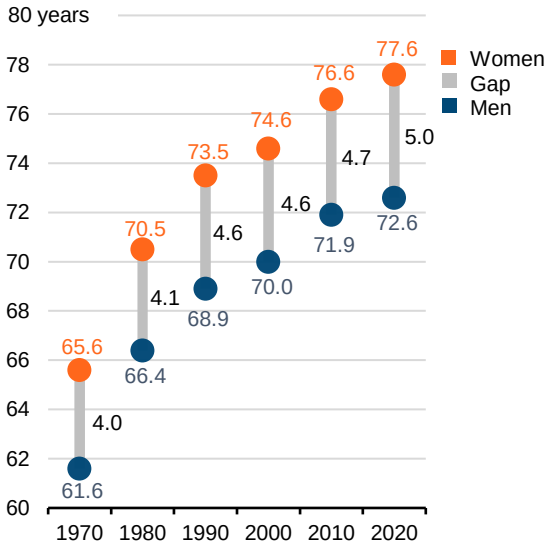
Variations in life expectancy by gender, ethnicity and state

While Malaysians are living longer, the additional life years gained are not equally distributed across the population, as seen in the variation by gender, ethnicity and state.

Comparisons of life expectancy between men and women show the gap gradually widening over the decades. In 2019, women could expect to live an additional 5.0 years compared to men, as opposed to an extra 4.0 years in 1970 (see Figure 1.2).

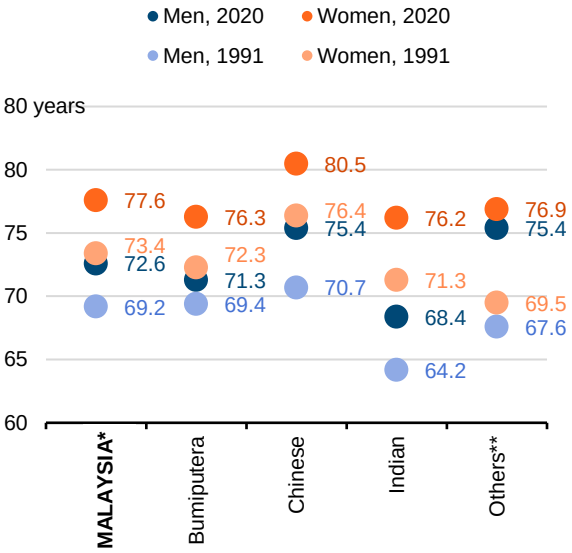
All ethnic groups have experienced improvements in life expectancy. Of the three major ethnic groups, Chinese women have the highest life expectancy of 80.5 years, four more years compared to Bumiputera and Indian women. In 2020, Indian and Bumiputera men were behind the national average life expectancy by 4.2 years and 1.3 years, respectively[19].

Figure 1.2: Life expectancy by gender, 1970 – 2020



Source: DOS (2020b), DOS (2020i), KRI calculations

Figure 1.3: Life expectancy by ethnicity and gender, 1991 and 2020



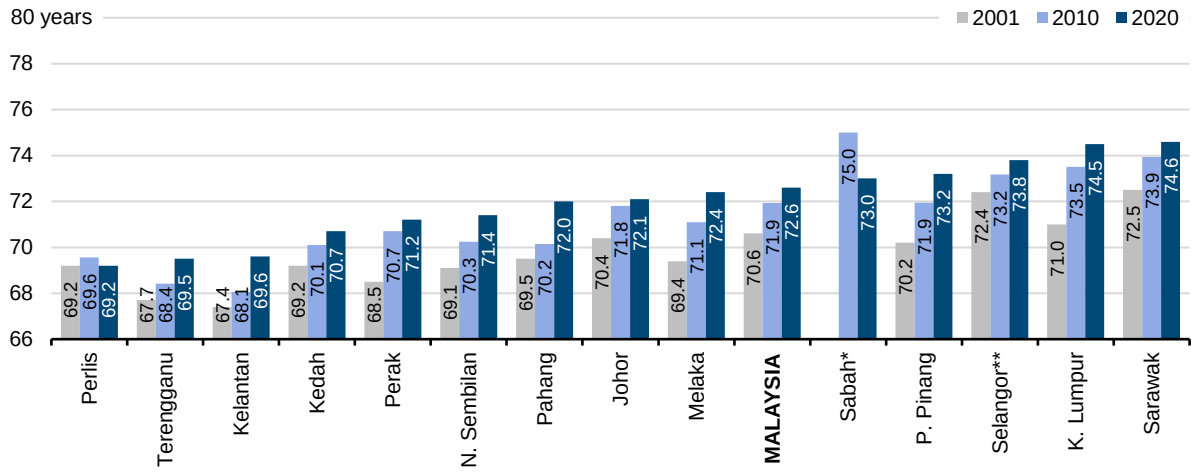
Note: *Citizens and Non-citizens. **Includes Non-citizens
Source: DOS (2020b), DOS (2020i)

The number of years one is expected to live also varies across different geographic areas, as seen by the differences across states (see Figures 1.4 and 1.5). From 2001 to 2019, all states except Sabah recorded rising life expectancies[20]. However, the increases in life expectancies were uneven, changing the differences among the states. For instance, a male newborn in Sarawak in 2020 is expected to live to 74.6 years, whereas a male newborn in Perlis is only expected to live up to 69.2 years, i.e. a gap of 5.4 years. Similarly, a female newborn in Kuala Lumpur is expected to live to 79.4 years, whereas a female newborn in Terengganu is only expected to live up to 75.1 years, i.e. a gap of 4.3 years.

[19] Estimates of life expectancy by ethnicity is only available at the national level.

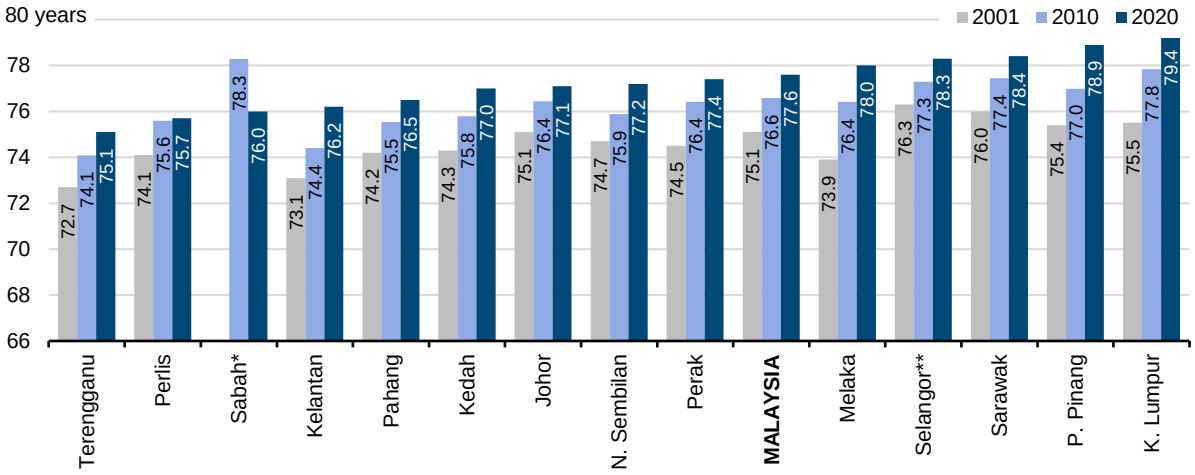
[20] We recommend caution in interpreting statistics on mortality and life expectancy in Sabah. Citing DOS (1999), Mariapun, Hairi and Ng (2016) explained that data on death registration in Sabah were incomplete due to high physical barriers, e.g. many locations within the state were isolated and hard to reach.

Figure 1.4: Life expectancy for men by state, 2001, 2010, and 2020



Note: *Includes Labuan. ** Includes Putrajaya. Data for Sabah and Labuan are unavailable for 2001.
Source: DOS (2020b), DOS (2015a), DOS (2013)

Figure 1.5: Life expectancy for women by state, 2001, 2010 and 2020

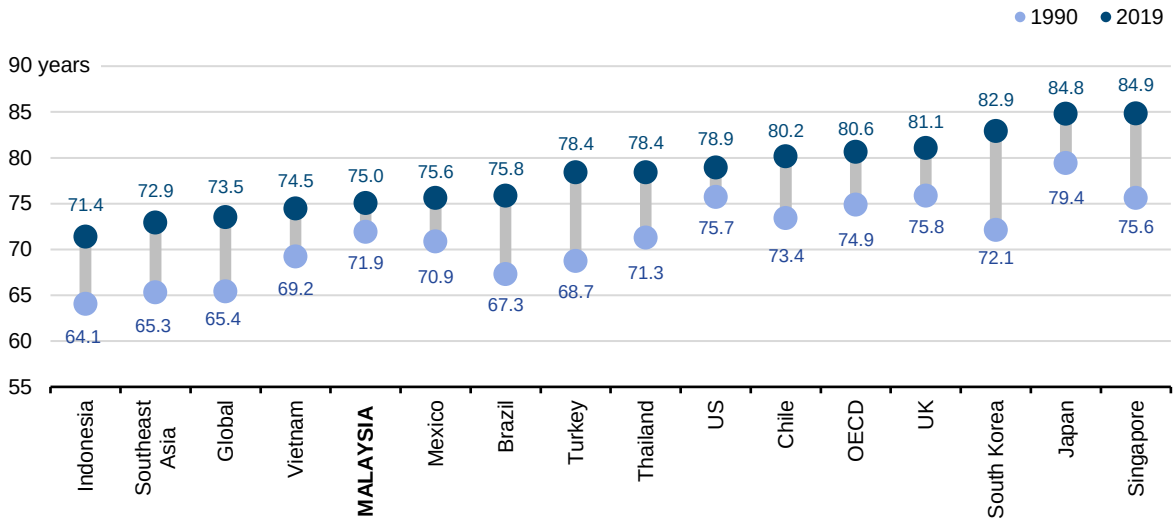


Note: *Includes Labuan. ** Includes Putrajaya. Data for Sabah and Labuan are unavailable for 2001.
Source: DOS (2020b), DOS (2015a), DOS (2013)

How have we fared internationally?

International comparison of life expectancy shows Malaysia experienced more modest gains in both absolute and relative terms compared to other countries (see Figure 1.6). In 2019, Malaysia's life expectancy was higher than the Southeast Asian regional average, but below the OECD countries. Although Malaysia started off with a similar life expectancy as Mexico, and higher than Thailand and Turkey in 1990, the others have overtaken us in the last three decades. Of all the countries and groups reported in Figure 1.6, Malaysia only made more progress than the United States.

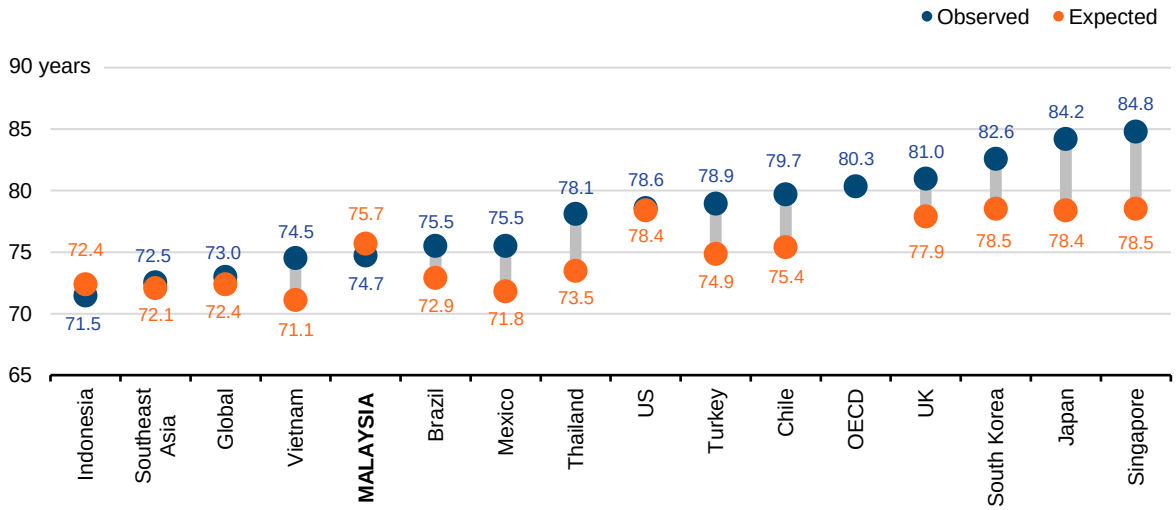
Figure 1.6: International comparison of life expectancy, 1990 and 2019



Note: The life expectancy figure for Malaysia is different compared to other charts due to the use of different sources. This source is used to allow for standardised international comparison.
Source: Global Burden of Disease Collaborative Network (2020)

Figure 1.7 shows the *observed* life expectancy and the *expected* life expectancy in 2017, where the latter is an estimate of what a country's life expectancy should be, given its development level[21]. Malaysia's observed life expectancy was 74.7 years, one year less than expected life expectancy at 75.7 years. While observed life expectancy fell short of expectations, countries with comparable expected life expectancies such as Thailand (73.5 years), Turkey (74.9 years) and Chile (75.4 years) had much higher observed life expectancies than Malaysia. Vietnam which was expected to have lower life expectancy than Malaysia had similar observed life expectancy.

Figure 1.7: Observed and expected life expectancy, 2017



Note: GBD 2017 is used because GBD 2019 has yet to publish observed versus expected data at time of writing.
Source: Global Burden of Disease Collaborative Network (2018)

[21] The IHME constructed the expected life expectancy based on a country's per capita income, educational attainment and total fertility rate. Source: Global Burden of Disease Collaborative Network (2018)

1.1.2. Mortality

The mortality rate is another indicator of life expectancy. The lower the probability of dying (mortality rate), the longer the number of years a population lives and vice versa. An advantage of the mortality measure is that death is a unique and clearly identifiable event that is a consequence of the occurrence and severity of a disease[22].

Child mortality rates

Child mortality rates indicate a population's health status during childhood. At the same time, they reflect the health status of the whole population as many factors impacting child mortality affect the population as a whole (e.g. economic development, general living conditions and illnesses)[23]. Compared to other health outcomes, child mortality is more susceptible to the quality of a health system as deaths are predominantly caused by infectious diseases largely amenable to treatment[24]. Three metrics of child mortality are reviewed here as reported in Table 1.2:

Table 1.2 Selected child mortality indicators

Indicator	Definition	Purpose
Neonatal mortality rate	The number of deaths of infants aged less than 28 days per 1,000 live births in that year.	Provides insights on maternal and newborn care. Factors such as health of the mother, antenatal care and birth weight are important determinants of neonatal mortality.
Infant mortality rate	The number of deaths in children under 1 year of age per 1,000 live births in that year.	Reflects the availability, utilisation and effectiveness of a health care system, particularly, post-natal care. It is also a Sustainable Development Goal (SDG) target.
Under-five mortality rate	The number of deaths of all children under 5 years of age per 1,000 live births in that year.	Captures both infant and child mortality rates. It is also an SDG target.

Source: DOS (2020b), MHPU (2014)

Figure 1.8 shows Malaysia has made tremendous progress in reducing child mortality rates. Across all three indicators, mortality rates have declined significantly since 1970: neonatal mortality rates by 81.0%, infant mortality rates by 83.8% and under-five mortality rates by 86.2%. In fact, the country has already met and exceeded the target of the Sustainable Development Goals (SDG)[25] of reducing neonatal and under-five mortality rates down to 12 and 25 deaths per 1,000 live births, respectively.

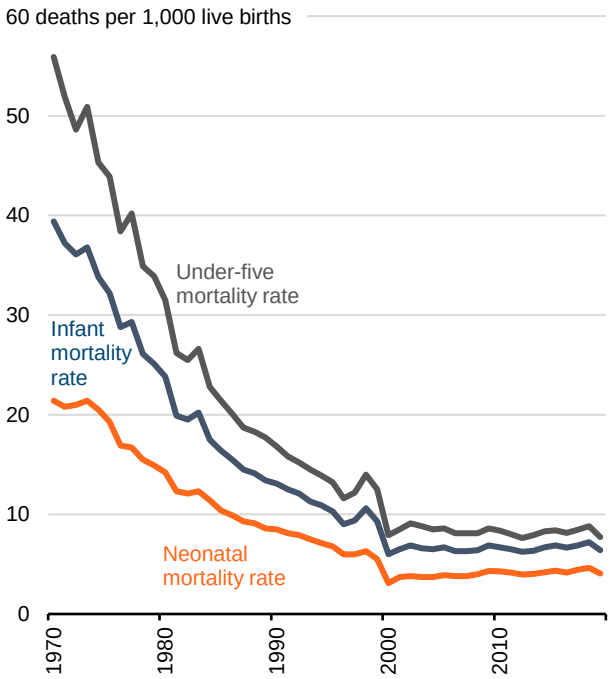
In 2019,

- Neonatal mortality rate was at 4.1 deaths per 1,000 live births, compared to 21.4 in 1970.
- Infant mortality rate was at 6.4 deaths per 1,000 live births, compared to 39.4 in 1970.
- Under-five mortality rate was at 7.7 deaths per 1,000 live births, compared to 55.9 in 1970.

[22] PAHO (n.d.)
[23] Whitehouse (1982)
[24] Coburn and Coburn (2007), Rutherford, Mulholland and Hill (2010)
[25] The SDGs or Global Goals are a collection of 17 interlinked goals adopted by all United Nations Member States in 2015, as part of the 2030 Agenda for Sustainable Development. Source: UN (n.d.)

However, these indicators have gradually increased in the last decade. Neonatal, infant and under-five mortality rates each recorded more than 2% average annual growth from 2014 to 2018, while 2019 figures recorded a decline[26]. At the same time, the accuracy of death certification remains a challenge[27]. In 2018, 54,644 deaths (31.7%) were non-medically certified[28] which implies the data do not accurately capture the underlying causes of death[29].

Figure 1.8: Child mortality rates, 1970 – 2019



	Neonatal mortality rate	Infant mortality rate	Under-five mortality rate
1970	21.4	39.4	55.9
1980	14.2	23.8	31.5
1990	8.5	13.1	16.8
2000	3.1	6.0	7.9
2010	4.3	6.7	8.4
2019	4.1	6.4	7.7

Note:
1. Neonatal mortality rate: Malaysia 1970 – 2019
2. Infant mortality rates: Malaysia 1970 – 2019
3. Under-five mortality rate: Peninsular Malaysia 1970 – 1979, Malaysia 1980 – 2019
Source: DOS (2020i), DOS (2020k), DOS (2016)

Figure 1.9 shows average child mortality rates between 2015 and 2019. Although Malaysia has low childhood mortality rates at the national level, there have been persistent gaps across states. Selangor, Kuala Lumpur and Sarawak consistently recorded low rates for the three indicators, while Sabah, Labuan and Negeri Sembilan registered much higher rates compared to the rest.

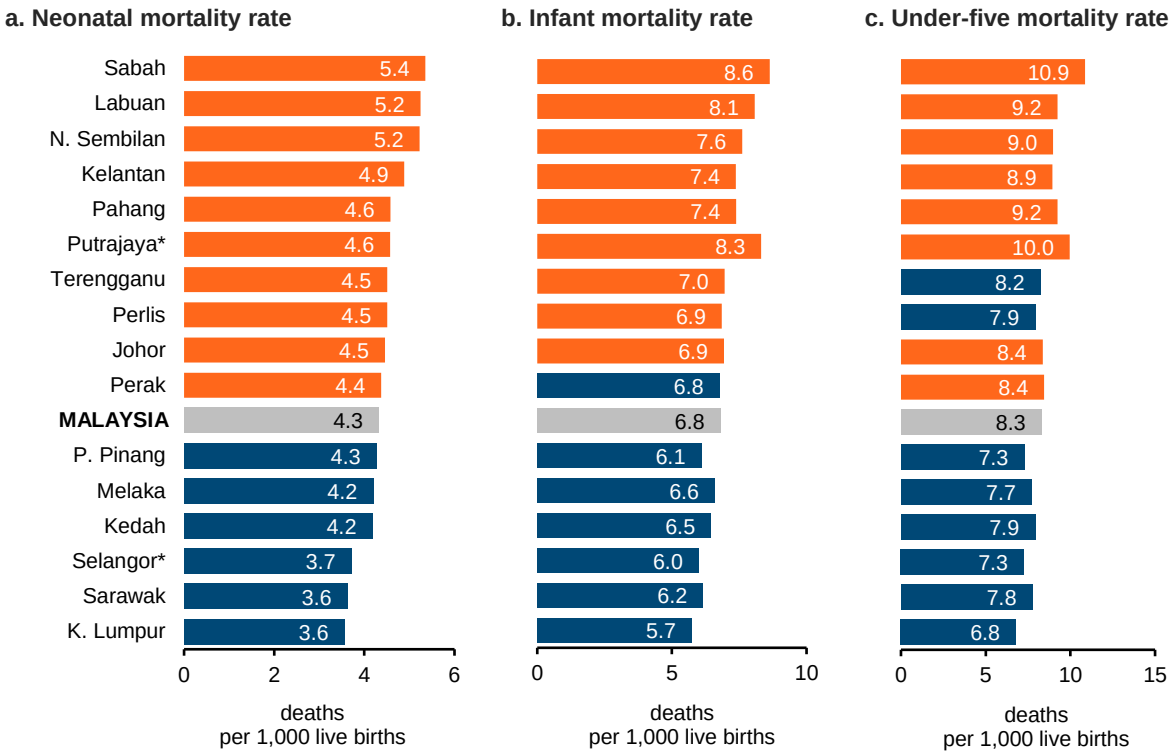
[26] From the Statistics on Causes of Death 2019 report, the increase in neonatal deaths can be partly attributed to the increase in deaths from "disorders related to short gestation and low birth weight", whereas the increase in infant and under-five deaths can be partly attributed to the increase in deaths from "certain conditions originating in the perinatal period". Source: DOS (2019b), KRI calculations

[27] KRI (2017)

[28] "Non-medically certified deaths" are when verification is made by informants without medical qualification such as the police or individuals. In contrast, "medically certified deaths" refer to those verified by a medical officer or a coroner only. Source: DOS (2019b)

[29] For child deaths, the percentage of non-medically certified deaths in 2018 were: neonatal 13.3%, infant 9.9%, under-five 12.5%. Source: DOS (2019b)

Figure 1.9: Child mortality rates by state, average 2015 – 2019

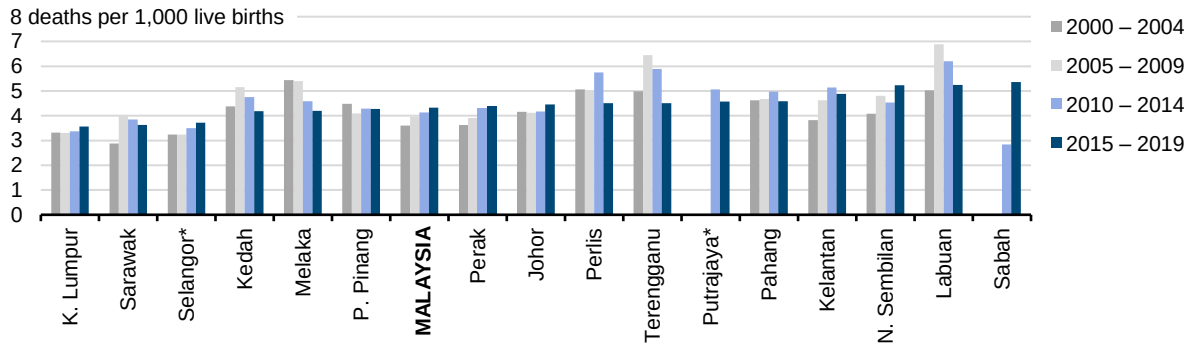


Note: *For the year 2000 – 2009, Selangor includes Putrajaya. Due to the fluctuating pattern of annual mortality rates, figures were averaged between 2015 and 2019. The rates above the national average are highlighted in orange, while those below are in blue. See Appendix A for the detailed figures.
Source: DOS (2020k), KRI calculations

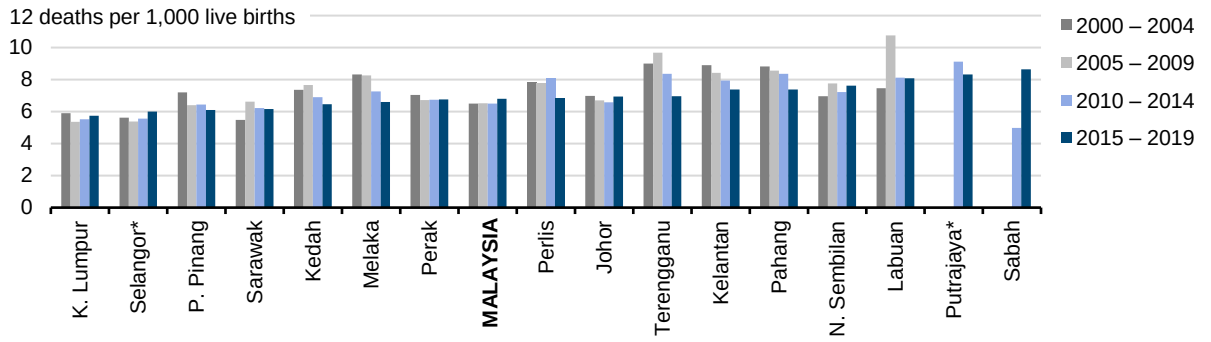
Child mortality rate trends during 2000 – 2019 were also inconsistent across states, as seen in Figure 1.10. There are states which recorded steady declines across the indicators (e.g. Melaka and Terengganu), while some states had gradually increasing mortality rates (e.g. Selangor, Kuala Lumpur and Sabah).

Figure 1.10: Average child mortality rates by selected periods

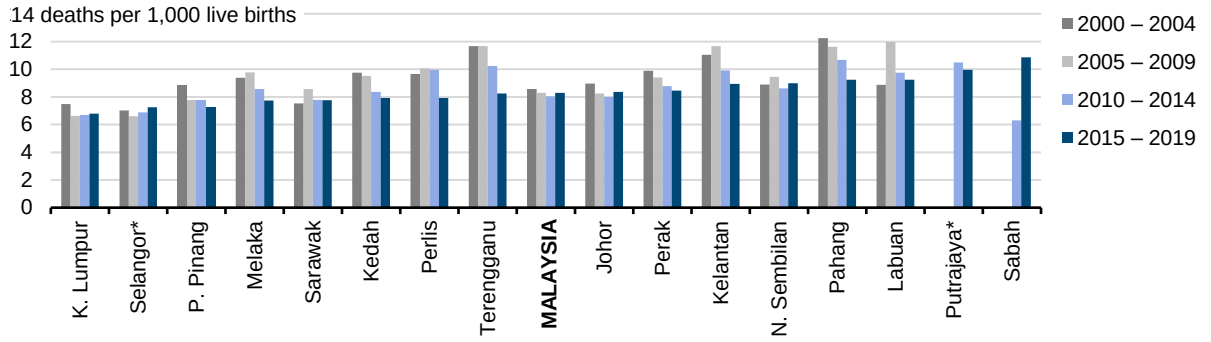
a. Neonatal mortality rate



b. Infant mortality rate



c. Under-five mortality rate



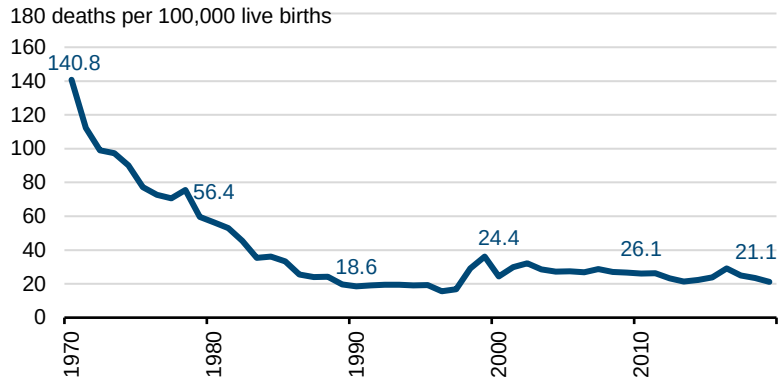
Note: *For the year 2000 – 2009, Selangor includes Putrajaya. Due to the fluctuating pattern of annual mortality rates, the figures were averaged for selected periods. See Appendix A for the detailed figures.
Source: DOS (2020k), DOS (2015b), KRI calculations

Maternal mortality ratio

Another general indicator of health is the maternal mortality ratio, i.e. the number of maternal deaths[30] per 100,000 live births. In developing countries, complications during pregnancy and childbirth are a leading cause of death and disability among women of reproductive age, thus the ratio represents the risk of dying associated with each pregnancy, i.e. obstetric risk[31]. Figure 1.11 shows that the maternal mortality ratio has greatly declined from 140.8 deaths per 100,000 live births in 1970 to 21.1 deaths per 100,000 live births in 2019, i.e. a reduction of 85%. In fact, Malaysia is lauded for its systematic approach in reducing maternal deaths, namely the Confidential Enquiry into Maternal Deaths (CEMD) initiative from 1991[32]. The national audit contributed to improving the quality of maternal death statistics, identifying causes of maternal deaths and subsequent planning of remedial actions to reduce maternal deaths.

[30] Maternal deaths refer to deaths that are caused by complications of pregnancy, childbirth and the puerperium, within the period of 42 days after childbirth in a given year. Source: DOS (2020k)
[31] WHO (n.d.-f)
[32] Led by the Ministry of Health, the government scaled up the existing system of maternal mortality audit from a local and state level to a formal national audit. Source: Ravichandran and Ravindran (2014)

Figure 1.11: Maternal mortality ratio, 1970 – 2019



Source: DOS (2020i), DOS (2020k)

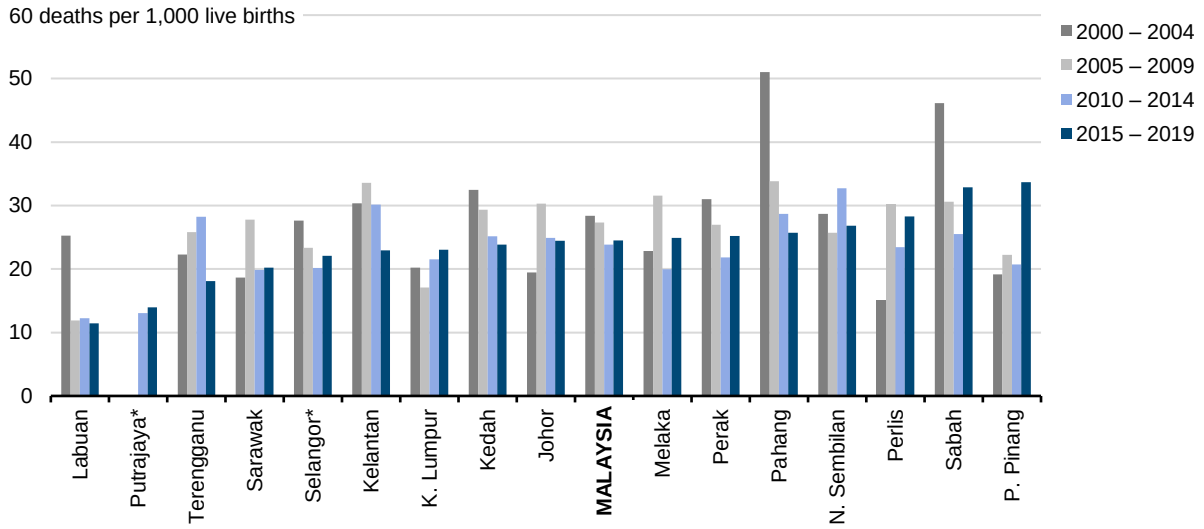
Table 1.3: Growth rate of maternal mortality ratio

Growth between periods	Maternal mortality ratio
1971 – 1980	- 49.7%
1981 – 1990	- 64.9%
1991 – 2000	27.4%
2001 – 2010	-12.9%
2011 – 2019	-19.4%

Source: DOS (2020i), DOS (2020k), KRI calculations

Figure 1.12 shows that while our national maternal mortality ratio remains low, variations between states continue to persist. The average maternal mortality ratio during 2015 – 2019 was noticeably higher in Pulau Pinang (33.7) and Sabah (32.9), compared to other states. Additionally, half of states has seen increased maternal mortality ratios since 2010, with the highest growth in Pulau Pinang and Sabah.

Figure 1.12: Average maternal mortality ratio by selected periods

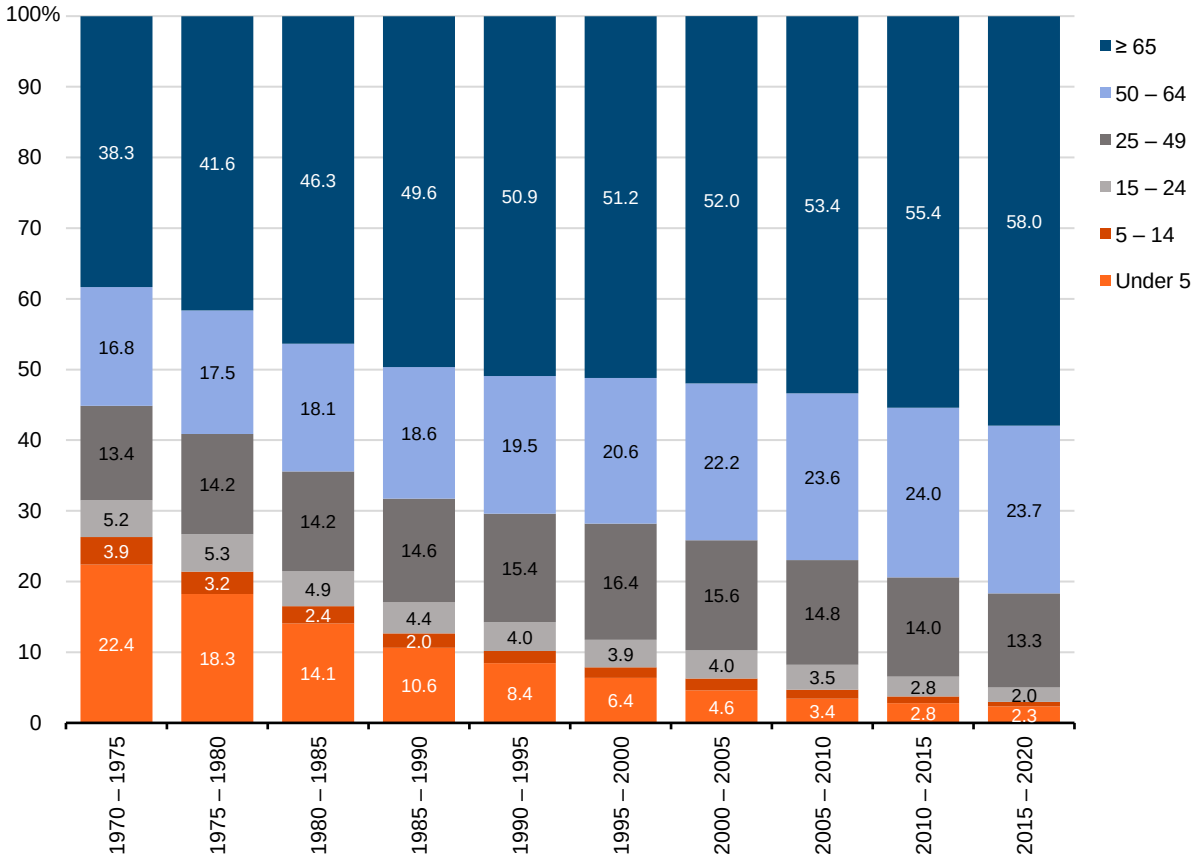


Note: *For the year 2000 – 2009, Selangor includes Putrajaya. Due to the fluctuating pattern of annual mortality rates, the figures were averaged for the selected periods. See Appendix A for the detailed figures.
Source: DOS (2020c), DOS (2020k), KRI calculations

Shedding light on adult and elder mortality

With declining child mortality, more of the population reach adulthood. The number of older people dying has outnumbered that of younger people, another indicator that the population is now living longer. Analysis of the distribution of deaths across the years shows changing trends as the population aged. During the 1970 – 1975 period, the proportion of deaths of those aged 65 and above totalled 38%, rising to 58% in 2015 – 2020.

Figure 1.13: Breakdown of deaths by age, 1970 – 2020

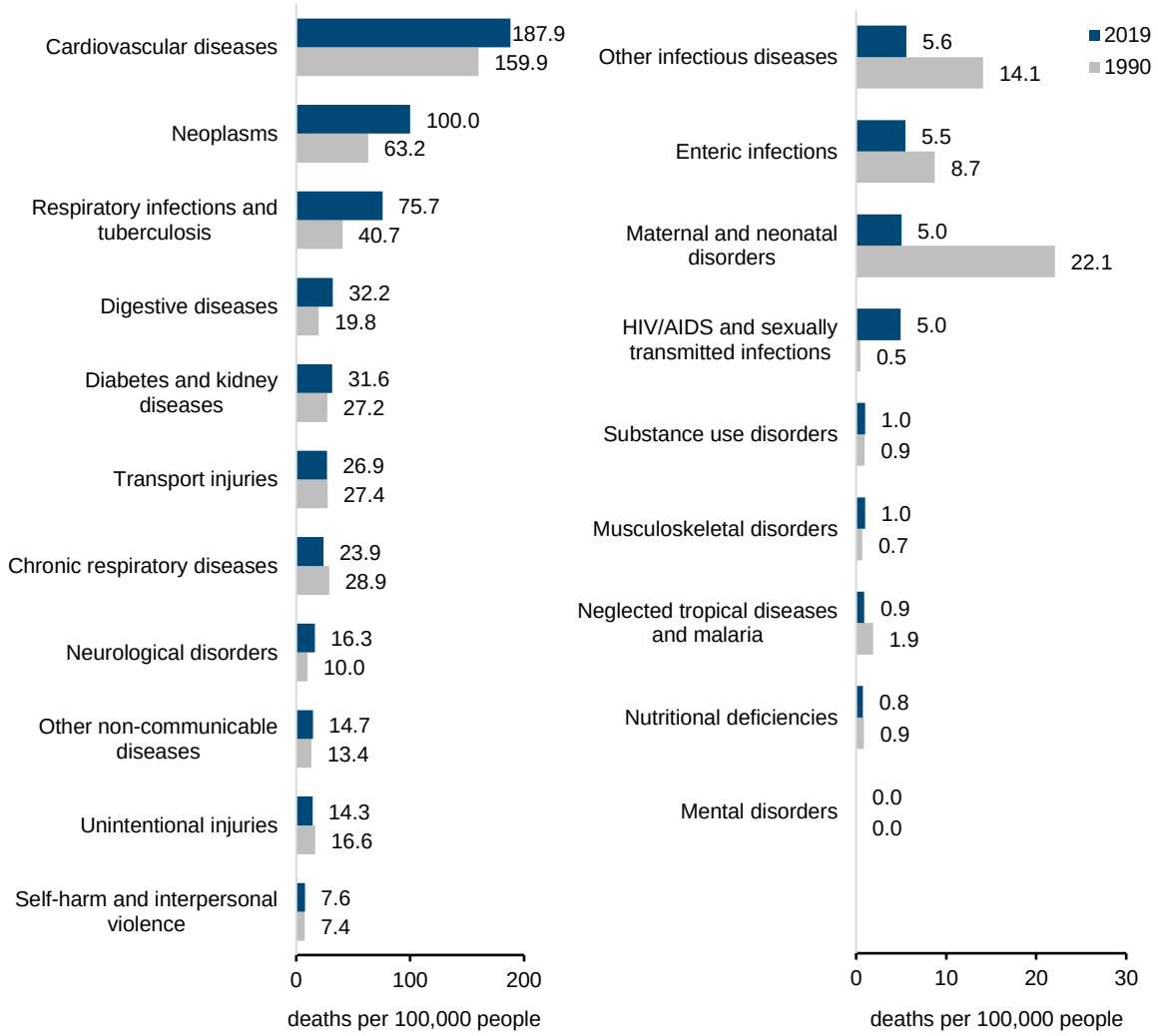


Source: UN (2019), KRI calculations

What do Malaysians die of?

To understand the patterns of mortality, it is important to look at trends in the causes of deaths. Cardiovascular diseases and neoplasms (cancers) remain the leading cause of deaths in Malaysia, with a marked increase in mortality rates since 1990 (see Figure 1.14). The mortality rate due to respiratory infections and tuberculosis have also almost doubled in the last two decades. On a more positive note, the country has recorded a significant decline in mortality rates due to maternal and neonatal disorders, enteric infections (infections of the intestinal tract) and other infectious diseases.

Figure 1.14: Mortality rate by cause, 1990 and 2019

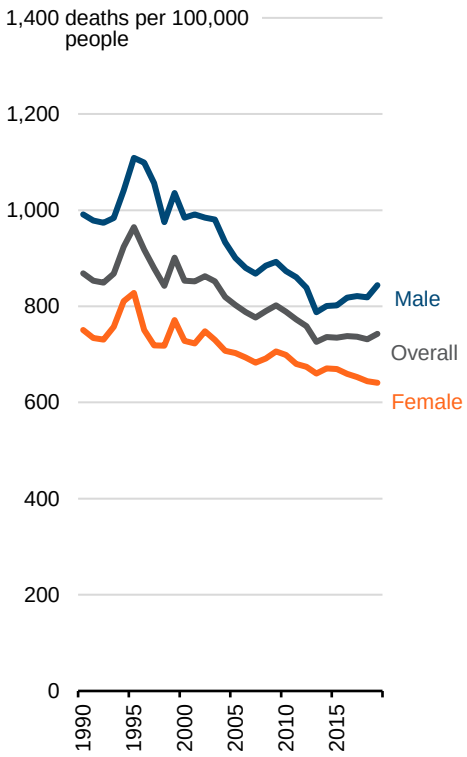


Note: The Global Burden of Disease (GBD) 2019 Study organises the causes of deaths and disability in a hierarchical list containing four levels. This figure utilises data from the GBD 2019 and displays the causes of deaths at Level 2. See Appendix B for more information on the hierarchies and examples of the diseases.
Source: Global Burden of Disease Collaborative Network (2020)

Comparing mortality by gender

Both men and women are experiencing decreasing mortality rates, but men recorded much higher mortality rates compared to women. This is evident from Figure 1.15 which compares the age-standardised mortality rates by gender from 1990 to 2019[33]. Additionally, the gap between men and women started to close between 1990 and 2013, however, this trend reversed in 2014 and the gap has since continued to widen. Table 1.4 shows that ischaemic heart disease (also known as coronary heart disease)[34], lower respiratory infections and stroke are the most common underlying causes of death for both genders. Conversely, deaths due to road injuries appear more prevalent among men, while breast cancers were more prevalent among women.

Figure 1.15: Age-standardised mortality rate by gender, 1990 – 2019



Source: Global Burden of Disease Collaborative Network (2020)

Table 1.4: Top 10 leading causes of death by gender, 2019

	Causes of deaths for men	Deaths	(%)
1	Ischaemic heart disease	21,331	20.7
2	Lower respiratory infections	12,364	12.0
3	Stroke	10,539	10.2
4	Road injuries	6,306	6.1
5	Chronic obstructive pulmonary disease	4,199	4.1
6	Tracheal, bronchus, and lung cancer	3,687	3.6
7	Cirrhosis and other chronic liver diseases	3,247	3.1
8	Chronic kidney disease	2,990	2.9
9	Colon and rectum cancer	2,672	2.6
10	Diabetes mellitus	1,760	1.7
	Total	**69,095**	**67.0**
	Total deaths in 2019	**103,155**	

	Causes of deaths for women	Deaths	(%)
1	Ischaemic heart disease	12,680	17.4
2	Stroke	9,389	12.9
3	Lower respiratory infections	9,347	12.9
4	Breast cancer	3,511	4.8
5	Chronic kidney disease	3,115	4.3
6	Colon and rectum cancer	2,166	3.0
7	Alzheimer's disease and other dementias	2,028	2.8
8	Diabetes mellitus	2,019	2.8
9	Chronic obstructive pulmonary disease	1,928	2.7
10	Urinary diseases	1,553	2.1
	Total	**47,736**	**65.6**
	Total deaths in 2019	**72,721**	

Note: This table utilises data from the GBD 2019 and displays the causes of deaths at Level 3. See Appendix B for more information on the hierarchies and examples of the diseases.
Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

[33] Age standardisation involves applying each population's observed age-specific mortality rates to a standard/reference population. It allows comparisons of populations' mortality rates without distortion from differences in age structures. For example, two populations with the same age-specific mortality rates would have different overall mortality rates if their age distributions are different. Prior to age standardisation, one population's overall mortality rate may be higher than the other. After age standardisation, both populations would have the same age-standardised mortality rates. Source: WHO (n.d.-a)

[34] Ischaemic heart disease is a condition whereby the heart coronary arteries, which supply blood to the heart muscle, become narrowed due to a build-up of fatty materials. Source: Wenger et al. (2010)

1.2 Summary measures of population health

As a country develops socially and economically, indicators of survival (i.e. life expectancy and mortality) become less relevant. This is because these measures focus on *quantity* of life—the years one is expected to live, rather than *quality* of life which, for the purpose of this report, implies being able to live out one's life in good health[35].

One way to capture quality of life is by looking at summary measures of population health (SMPH), which combine information on mortality and non-fatal health outcomes to represent the health of a particular population[36]. These metrics are useful indicators for: comparing the health of one population with another, monitoring changes in population health, identifying and quantifying overall health inequalities within populations, and providing balanced attention to the effects of non-fatal health outcomes on overall population health[37].

1.2.1. Health expectancy

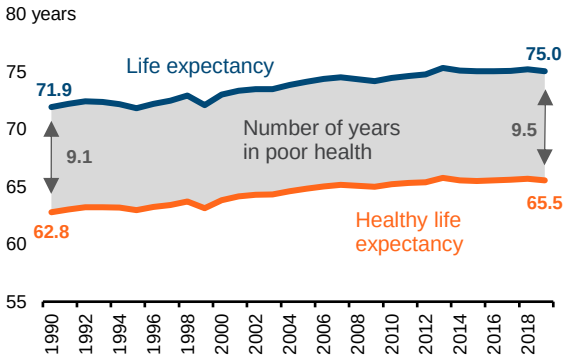
SMPH can be broadly grouped into two categories—health expectancies and health gaps. Health expectancy is a generic term for measures that estimate the average time a person can expect to live in various states of health[38]. While changes in life expectancy (LE) capture overall progress of a population's health over time, it is limited to measuring longevity and does not capture the state of health experienced over the same time span. To adjust for years lived in illness, the "healthy life expectancy" (HALE)[39] measure can be used instead, as it takes account of both mortality and morbidity. HALE is the average number of years a person can expect to live in full health at a given age[40].

Comparing life expectancy with healthy life expectancy, Figure 1.16 shows that although Malaysians are living longer, gains in the number of years expected to live in good health did not match the gains in the number of years expected to be lived. In other words, although we are living longer lives, we are not necessarily living those additional years in good health.

Since 1990, Malaysia has recorded marginal improvements in healthy life expectancy. To put this into perspective, a Malaysian's healthy life expectancy in 2019 was 65.5 years, up from 62.8 years in 1990. This means that although a baby born in 2019 could expect to live up to 75.0 years, 9.5 years of those years (12.7%) would be in poor health. Since 1990, Malaysia has recorded marginal improvements in healthy life expectancy, but these improvements were not large enough to reduce the number of years in poor health. In fact, the number of years in poor health increased slightly from 9.1 years in 1990 to 9.5 years in 2019.

[35] WHO (2002)
[36] Gold and Field (1998)
[37] WHO (2002)
[38] Ibid.
[39] It is also known as health-adjusted life expectancy.
[40] See GBD 2019 Demographics Collaborators (2020) for more information on the calculation method.

Figure 1.16: Life expectancy and healthy life expectancy, 1990 – 2019



Source: Global Burden of Disease Collaborative Network (2020)

Table 1.5: Life expectancy and healthy life expectancy, 1990 – 2019

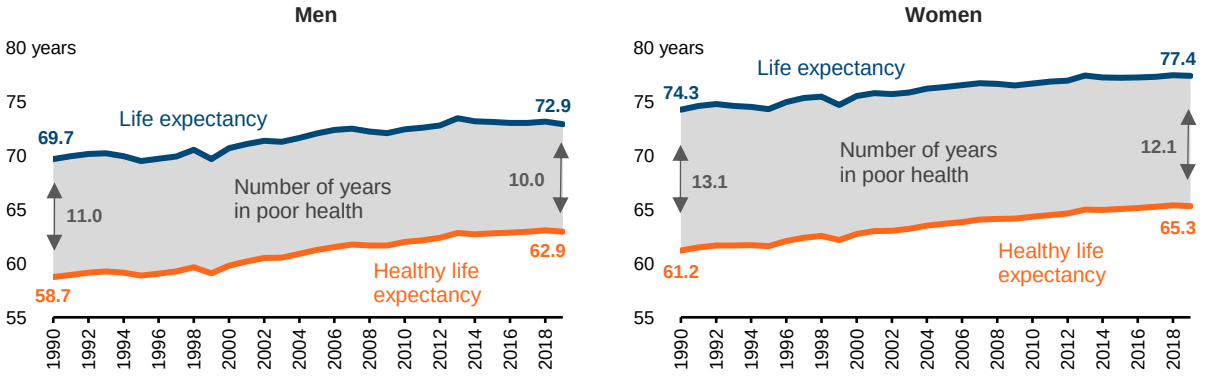
	1990	2019
Life expectancy at birth, LE (years)	71.9	75.0
Healthy life expectancy at birth, HALE (years)	62.8	65.5
Number of years in poor health (LE – HALE)	9.1	9.5
Proportion of life in poor health (%)	12.7	12.7

Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

Variance in health expectancies between genders

Figure 1.17 shows Malaysia's life expectancy and healthy life expectancy at birth for both genders from 1990 to 2019. Similar to life expectancies, in 2019, women had a longer healthy life expectancies at birth compared to males (by 2.4 years). This difference had decreased slightly from 1990 (2.5 years). The healthy life expectancy metric demonstrates that despite women having higher longevity, they spent a larger portion of their additional years in ill health (see Table 1.6). A female newborn in 2019 is expected to spend 12.1 years in ill health compared to a male newborn who is expected to spend 10.0 years in ill health. By the same token, 15.6% of the years enjoyed by women are spent in poor health compared to 13.7% for men.

Figure 1.17: Life expectancy and healthy life expectancy at birth, 1990 – 2019



Source: Global Burden of Disease Collaborative Network (2020)

Table 1.6: Life expectancy (and healthy life expectancy at birth by gender, 1990 and 2019

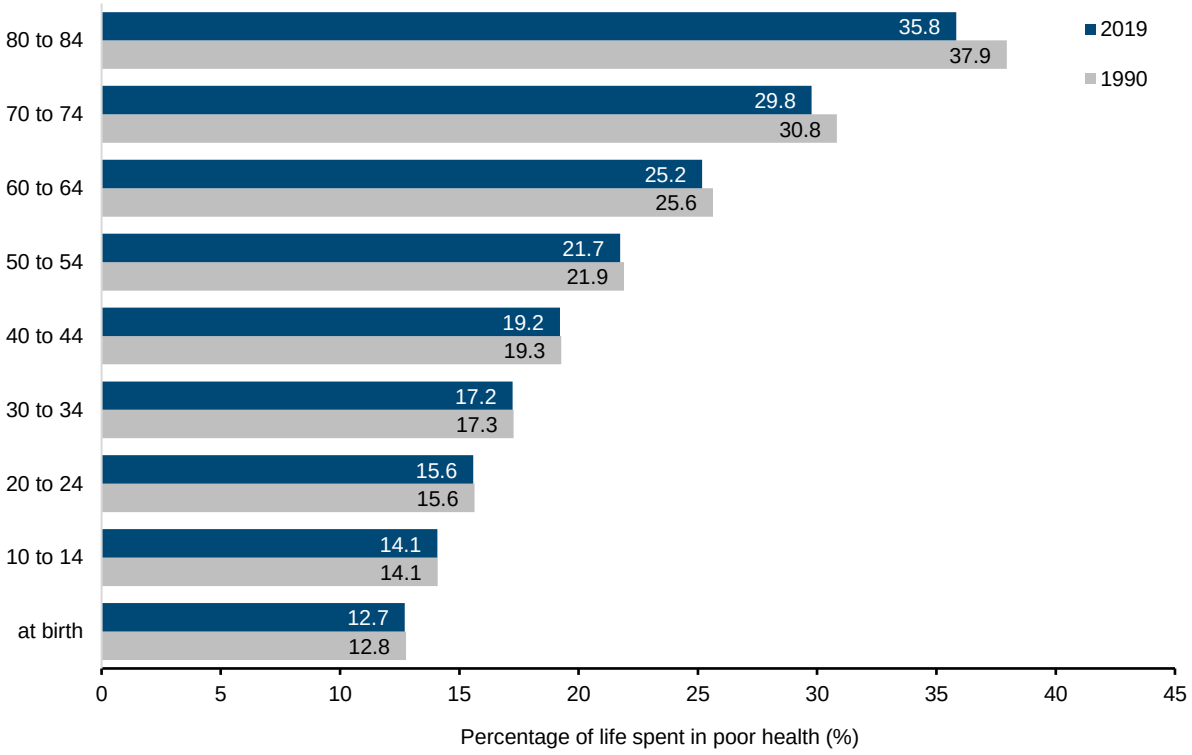
	1990		2019	
	Men	Women	Men	Women
Life expectancy at birth, LE (years)	69.7	74.3	72.9	77.4
Healthy life expectancy at birth, HALE (years)	58.7	61.2	62.9	65.3
Number of years in poor health (LE – HALE)	11.0	13.1	10.0	12.1
Proportion of life in poor health (%)	15.7	17.6	13.7	15.6

Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

Health expectancy and age

Figures 1.18 compares the proportion of life spent in poor health between 1990 and 2019 for each age group. It shows that as we grow older, the probability of spending our remaining lives in ill health increases, as denoted by the increasing proportion spent in poor health as age groups become progressively older.

Figure 1.18: Proportion of life expectancy in poor health by selected age groups, 1990 and 2019

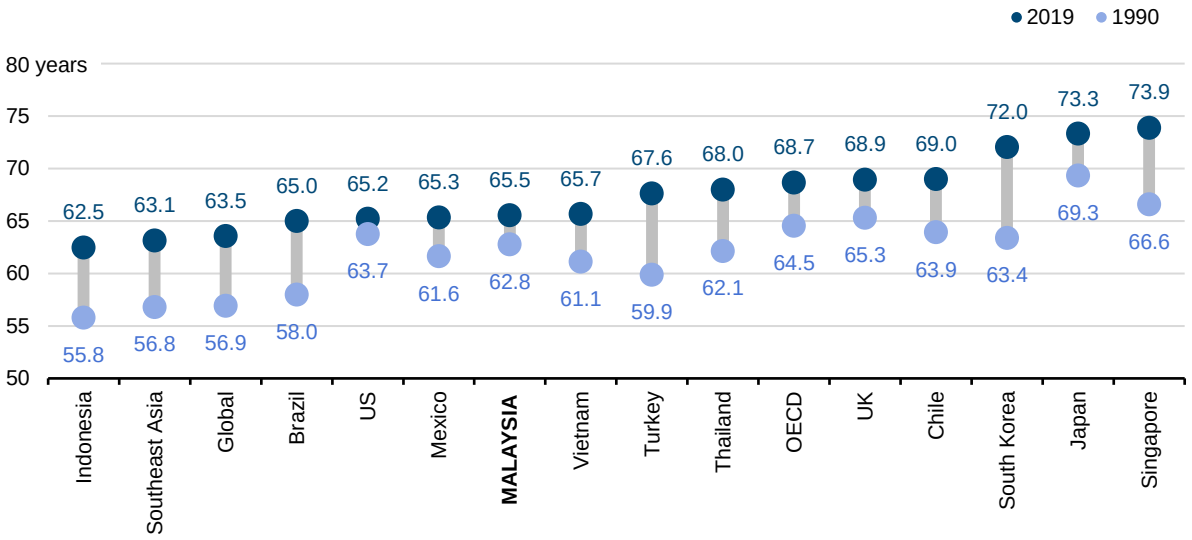


Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

International benchmarking of health expectancies

Figure 1.19 is an international comparison of healthy life expectancy between 1990 and 2019. Similar to life expectancy, Malaysia's healthy life expectancy (at 65.5 years) was higher than Southeast Asia as a whole (63.1 years) and exceeded the global average (63.5 years). However, there is still room for improvement as our healthy life expectancy still lagged behind countries such as Thailand (68.0 years) and Turkey (67.6 years).

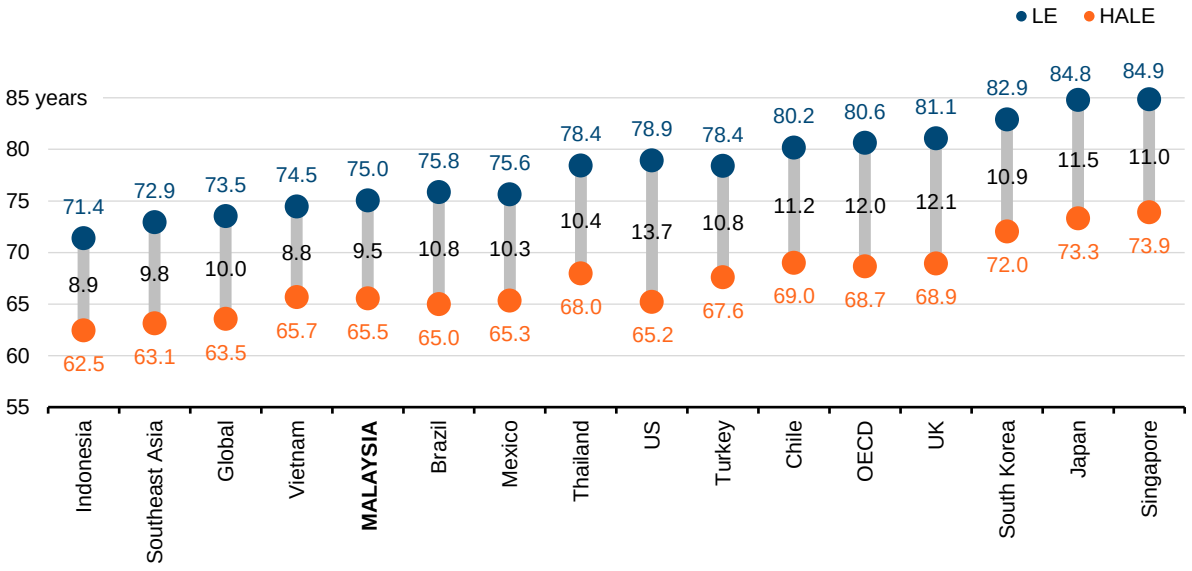
Figure 1.19: International comparison of healthy life expectancy, 1990 and 2019



Source: Global Burden of Disease Collaborative Network (2020)

The estimated number of years in ill health for Malaysia of 9.5 years—depicted by the difference between life expectancy and healthy life expectancy—is low compared to other countries. This is a result of our lower life expectancy, rather than having a higher healthy life expectancy. Therefore, as we strive towards higher longevity, we should ensure that the additional years gained are in good health.

Figure 1.20: International comparison of life expectancy and healthy life expectancy, 2019



Source: Global Burden of Disease Collaborative Network (2020)

1.2.2. Health gaps

Another summary measure of population health is health gaps which measures the difference between the actual health of a population and an ideal health situation with the entire population living to an advanced age, free of disease and disability[41].

Disability-adjusted life years

One common measure of health gaps is the calculation of disability-adjusted life years (DALYs). Similar to healthy life expectancies, DALYs provide a summary statistic for the burden of disease in a population, accounting both mortality and morbidity. DALYs are useful to assess overall population health because they combine the burden of both fatal and non-fatal health loss.

To calculate DALYs, we sum up the estimated years lost due to premature death and disability[42].

- **Health loss from premature death:** There were 175,876 estimated deaths in Malaysia in 2019. The potential life years lost due to premature death is then derived by summing up the differences between a person's age at death and their life expectancy at that age[43]. The estimated years of life lost (YLL) for the whole population attributed to premature death in Malaysia in 2019 was 4.64 million years.
- **Health loss from disabilities:** At the same time, a portion of a person's life is spent in ill health or disability. The number of years lived with disability (YLD) is calculated by computing the number of people living with a particular health condition, multiplied by the average time the condition persists and the magnitude of health loss (indicated by a disability weight)[44]. Diseases and disabilities meant an additional 3.1 million years of healthy life years were lost in Malaysia in 2019.
- **Total health lost:** Summing up total healthy life years lost due to premature death and disability, we get 7.74 million total DALYs. In other words, the Malaysian population is estimated to have lost 7.74 million healthy life years in 2019.

To make sense of these numbers, we can compare them to the size of our population. In 2019, the population was 31.3 million. Therefore, for 2019, the total health loss can be viewed as an average loss of a quarter of a year (0.25 years) for each person in the country.

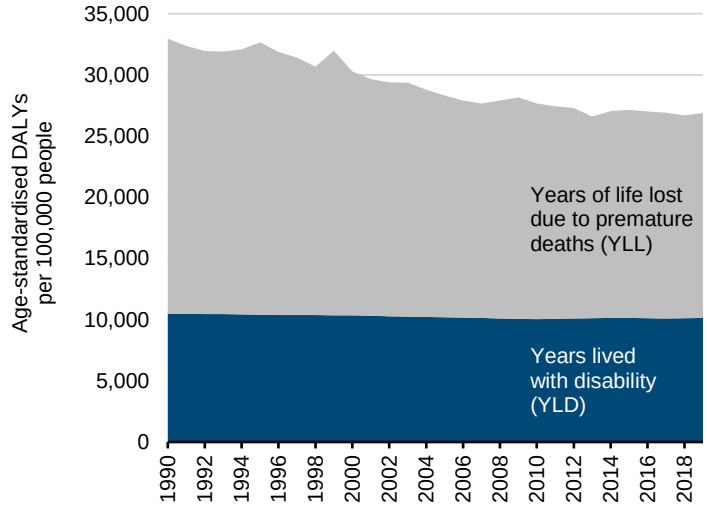
[41] WHO (n.d.-a)
[42] WHO (n.d.-g)
[43] For example, if a boy dies at the age of 5 whereas his expected life expectancy was 88, his death has resulted in 83 years of life lost (YLL). On the other hand, if a woman dies at the age of 60 whereas her expected life expectancy was 89 years, then her death has resulted in 29 YLLs.
[44] For example, a person who lives 10 years with blindness (disability weight of 1.87) would have 1.87 years lived with disability (YLD).

Trends of health loss in recent decades

Figure 1.21 shows the rate of healthy life years lost (as denoted by DALYs) from 1990 to 2019. If we control for the age of the population, Malaysia's rate of healthy life lost has been declining, suggesting that our population has become healthier overall. When we break down total health loss by premature mortality and disability, it is clear that the decline in health loss was driven by falling premature mortality, while the rate of health loss due to disability appears unchanged.

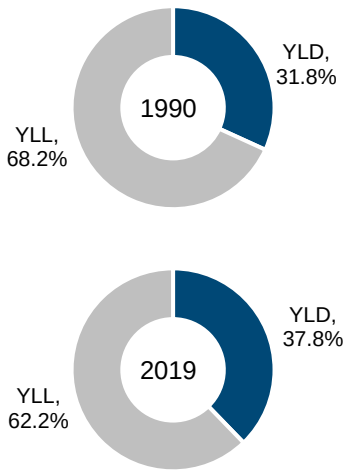
In other words, despite living longer, Malaysians continue to experience similar rates of disability and non-fatal health loss since 1990. Consequently, disabilities now cause a larger proportion of healthy life lost (37.8%) as the rate of premature deaths decreases (Figure 1.22).

Figure 1.21: Rate of healthy life years lost due to premature death and disability, 1990 – 2019



Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

Figure 1.22: Breakdown of healthy life years lost, 1990 and 2019



Note: Calculated using age-standardised rate per 100,000 people.
Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

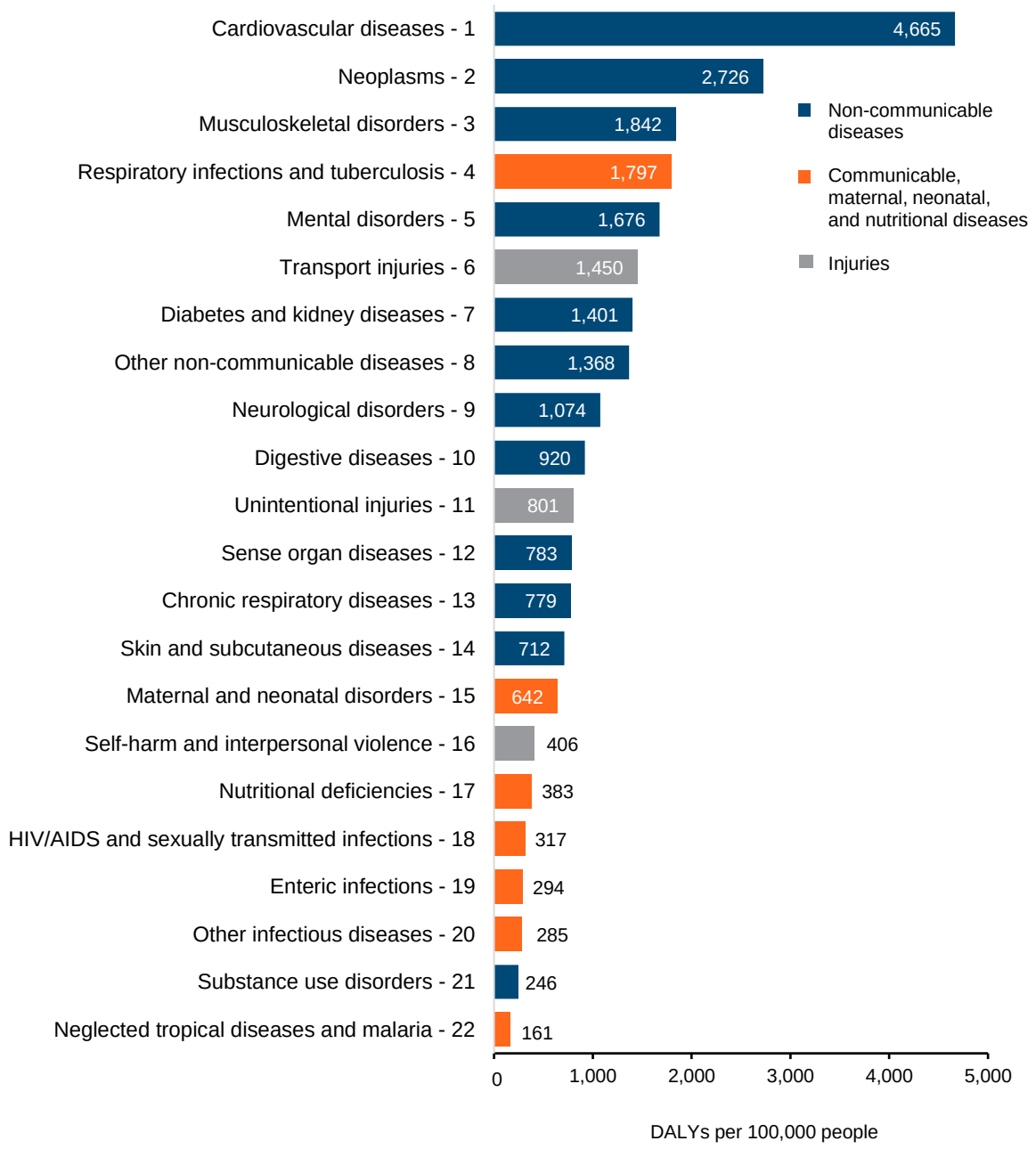
For more information on these three metrics—years of life lost (YLLs), years lived with disability (YLDs) and disability-adjusted life years (DALYs) —readers can read our Working Paper "Health of the Nation: Measuring Burden of Disease"[45]. The paper presents findings from the GBD 2017, highlighting the main causes of premature death and disability, and the overall burden of disease faced by the Malaysian population.

[45] Nazihah, Puteri Marjan and Jarud (2020)

How do different diseases and disabilities contributes towards total health loss?

Impacts on health outcomes also vary by disease and disability, with some being more severe, even fatal than others. Figure 1.23 breaks down the loss of healthy life years in 2019 by cause. Communicable, maternal, neonatal and nutritional diseases are highlighted in orange, non-communicable diseases are blue, while injuries are in grey.

Figure 1.23: Rate of healthy life years lost due to premature death and disability by cause, 2019



Source: Global Burden of Disease Collaborative Network (2020), KRI calculations

From this figure, a few observations can be made:

- As a whole, non-communicable diseases (NCDs) caused a loss of 18,191 healthy life years per 100,000 people, making up 73.6% of total health loss. Communicable, maternal, neonatal and nutritional diseases caused a loss of 3,878 healthy life years per 100,000 people (16.2% of total health loss), followed by injuries that caused a loss of 2,657 healthy life years per 100,000 people (9.6% of total health loss).
- Cardiovascular diseases and cancers were the top two causes of health loss, making up almost one-third of total DALYs (29.9%).
- Respiratory infections with tuberculosis ranked third, accounting for around 7.3% of total health loss. This is in contrast to a typical high-income nation where no communicable diseases fall within the top ten[46].
- Despite being non-fatal, musculoskeletal disorders and mental health issues caused a significant portion of total DALYs (7.4% and 6.8%, respectively). This highlights the extent of health loss from conditions that decrease ability to function, but do not cause death.
- Transport injuries remained among the top ten leading causes of DALYs (ranking sixth). An international comparison of health loss by cause for 2017 found Malaysia to be the only country to have transport injuries among the top ten leading causes of DALYs, with the rate higher than global and Southeast Asian rates[47].

[46]A comparison of age-standardised DALYs by cause shows Malaysia recording a much higher rate of respiratory infections and tuberculosis compared other high-income countries (e.g. United Kingdom, South Korea and Japan). However, Indonesia and the country grouping Southeast Asia showed similar rates of health loss due to respiratory infections which raises the question of whether or not the disease is a region-specific issue. Source: GBD 2017 collaborators (2018), Nazihah, Puteri Marjan and Jarud (2020)

[47] Nazihah, Puteri Marjan and Jarud (2020)

SECTION

02

SECTION 2

HEALTH AND INCOME

"It is not that genes, medical care, and lifestyle are unimportant for health, but [health researchers] miss out on the major influences on health of the way we live our lives in society. The circumstances in which people live and work are intimately related to risk of illness and length of life. Nowhere do we see this connection more clearly than in the social hierarchy".[48]

Michael Marmot

2.1 Health inequities

Malaysia has made great strides in improving its people's health, as demonstrated in the previous section. However, several challenges remain, including the unequal distribution of health outcomes, or health inequalities.

Some health inequalities are unavoidable. For example, differences in health between the elderly and younger populations can be attributed, among others, to biological and physiological variations related to age, factors that are arguably natural and not easily modifiable.

However, other health inequalities are the result of inequitably distributed health-promoting and compromising conditions[49]. For example, differences in health between the rich and the poor can be attributed to variations in the utilisation of care, living and working conditions, exposure to stressful events and other health-impacting behaviours, factors that stem from or can be affected by policy.

Correcting differences in health outcomes due to the biological effects of ageing is very difficult, if not near impossible. But differences in health between the rich and the poor (and other forms of social inequalities) can be corrected, although the ability to do so may be beyond the control of the groups concerned.

The resulting inequalities in the latter scenario are more aptly termed health inequities as they are avoidable and unjust. It is important to differentiate between the two as the second can and should be addressed for various reasons[50].

2.1.1. Importance of reducing health inequities

Health inequities closely relate to concepts of social justice as it involves discrimination and other barriers to healthy lives[51]. Since health is a pre-requisite for well-being[52], the presence of health inequities indicate that certain individuals or groups are unable to participate in and benefit from economic and social development[53].

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[48] Marmot (2005)
[49] Marmot et al. (2012)
[50] WHO (n.d.-c)
[51] Braveman (2014)
[52] Solar and Irwin (2007)
[53] WHO (2009)

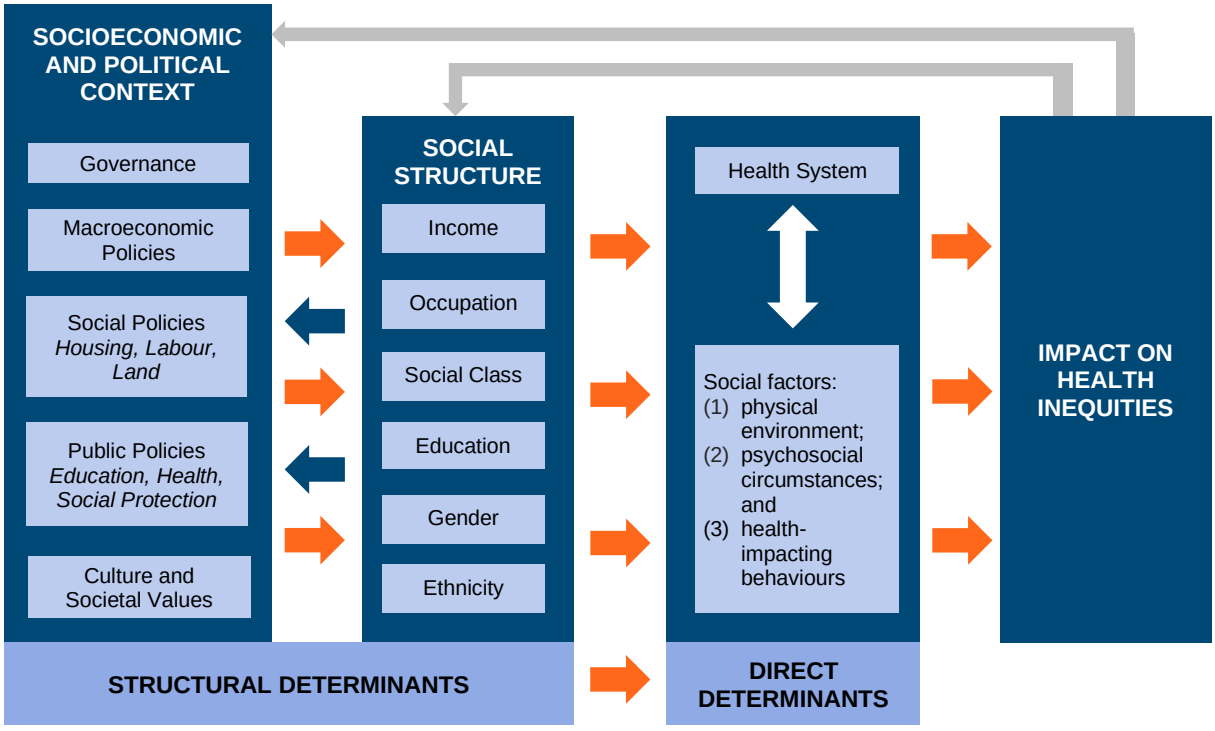
Health inequities most adversely impact impoverished and vulnerable populations and perpetuate the cycle of poverty: poverty breeds ill health, ill health impoverishes. A review of interactive causal pathways of poverty and health shows that poor health diminishes net income through loss of income and increased care costs on the one hand, and low income and poverty contribute to ill health through a multiplicity of deprivations such as inadequate healthcare utilisation, poor dietary practices and unsanitary living conditions on the other[54].

Health inequities perpetuate other socioeconomic inequalities and amount to high economic losses. Mackenbach, Meerding, and Kunst (2011) compared health outcomes in the European Union (EU) against counterfactuals where differences in health between socioeconomic groups were minimised. Their research found that wider health disparities resulted in an increase of 700,000 deaths per year and 33 million cases of morbidities. GDP shrank by 1.4% yearly as a result of labour and productivity losses. Overall, health inequities result in cumulative annual losses of about EUR980b or 9.4% of the EU's GDP.

The remainder of this report aims to better understand health inequities in Malaysia, referring to Solar and Irwin's Conceptual Framework on the Social Determinants of Health Inequities and Health as a guide.

2.1.2. The Social Determinants of Health and Health Inequities

Figure 2.1: Conceptual Framework



Source: Solar and Irwin (2007), WHO (2009)

[54] Wagstaff (2002)

The framework in Figure 2.1 summarises the mechanisms generating health inequities. Reading from left to right, we see that the socioeconomic and political context generates a social structure in which populations are stratified by income, occupation and more. The context and resulting social structure are known as the structural determinants.

These structural determinants do not affect health directly but through direct determinants[55]. Health inequities are generated when these direct determinants are unevenly distributed, reflecting and perpetuating other social inequalities. In other words, individuals experience differences in exposure and vulnerability to health-promoting and compromising conditions based on their respective social status.

Health system

The health system is a direct determinant of health and influences exposure and vulnerability to health-affecting conditions mainly by influencing access to care. Benzeval, Judge, and Whitehead (1995) succinctly summarised three ways the health system can tackle health inequities:

1. Ensure health resources are adequately supplied.
2. Respond to the health needs of the population.
3. Lead and promote public health policies ensuring health for all and eliminating health inequities.

While the role of the health system in creating and addressing health inequities is not disputed, it is not the sole determinant. Health inequalities[56] are even found in countries with universal health insurance[57]. Furthermore, health inequalities can still be seen among individuals near the top of the socioeconomic hierarchy[58]. Those in the upper income groups are likelier to have health insurance and other means to pay for healthcare services, making lack of access an unlikely explanation for health differences. Lastly, socioeconomic differences appear across a wide range of diseases, including those not amenable to treatment or hard to treat[59].

The framework recognises that the health system alone is insufficient to explain health inequities and lists other direct determinants including the physical environment, psychosocial circumstances and behavioural factors.

[55] Solar and Irwin (2007) used the term "intermediary determinants" instead to emphasise these determinants as *intermediaries* between structural determinants and health outcomes. This report uses the term direct determinants instead to emphasise the *direct* impact of these determinants on health.

[56] Framing a real-life situation as inequitable requires some value judgement, thus we only use the term health inequities when necessary, such as in explaining the conceptual framework, to remain as objective as possible in our analyses.

[57] Adler et al. (1993)

[58] Ibid., Committee on Health and Behavior (2001)

[59] Adler et al. (1993), Committee on Health and Behavior (2001)

Physical environment

The physical environment, including living and working conditions, is inextricably linked to social status. Depending on their quality, these circumstances can be conducive or detrimental to health. They generally have negative effects on the health of lower socioeconomic groups. One example is overcrowding in residences. Overcrowded households usually have few resources (hence, the need to share housing costs) and their living circumstances often allow the spread of infectious diseases[60].

Work conditions similarly define people's well-being. Workers in specific occupations often face a disproportionately higher risks of occupational hazards at the workplace. Moreover, some workers, such as the self-employed and those in the informal sector, lack social protection[61]. Section 3 explores further the relationship between health and work.

Psychosocial circumstances

Psychosocial circumstances, such as stressors from negative events, poor living circumstances and lack of social support, negatively affect health. Disadvantaged people experience far more insecurity and stress in their lives[62]. Later in this section, Figure 2.7 shows the higher prevalence of mental health problems among lower income groups.

Health-related behaviours

Mackenbach (2006) suggested that the adoption of health-compromising behaviours may be a coping response to material deprivations and stress, considering the correlation between them. Health-compromising behaviours include unhealthy diets, lack of physical exercise, tobacco smoking and alcohol consumption.

Summary of framework

To recap, the framework shows how the underlying socioeconomic and political context shapes social structure. Positions in this structure are, in turn, closely associated with the determinants of health, resulting in different health outcomes among socioeconomic groups.

The arrows at the top of the framework highlights the reverse effects of health, where health affects social position and, in the case of large-scale disease epidemics, affects the wider socioeconomic and political context[63].

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[60] See Box 3.1 for an illustration of how living conditions affect foreign workers' exposure to the coronavirus in Malaysia.
[61] Solar and Irwin (2007), Hawati and Nur Thuraya (2020)
[62] Solar and Irwin (2007)
[63] For more information on how health affects socioeconomic well-being, particularly on income, refer to O'Donnell, Van Doorslaer and Van Ourti (2015)

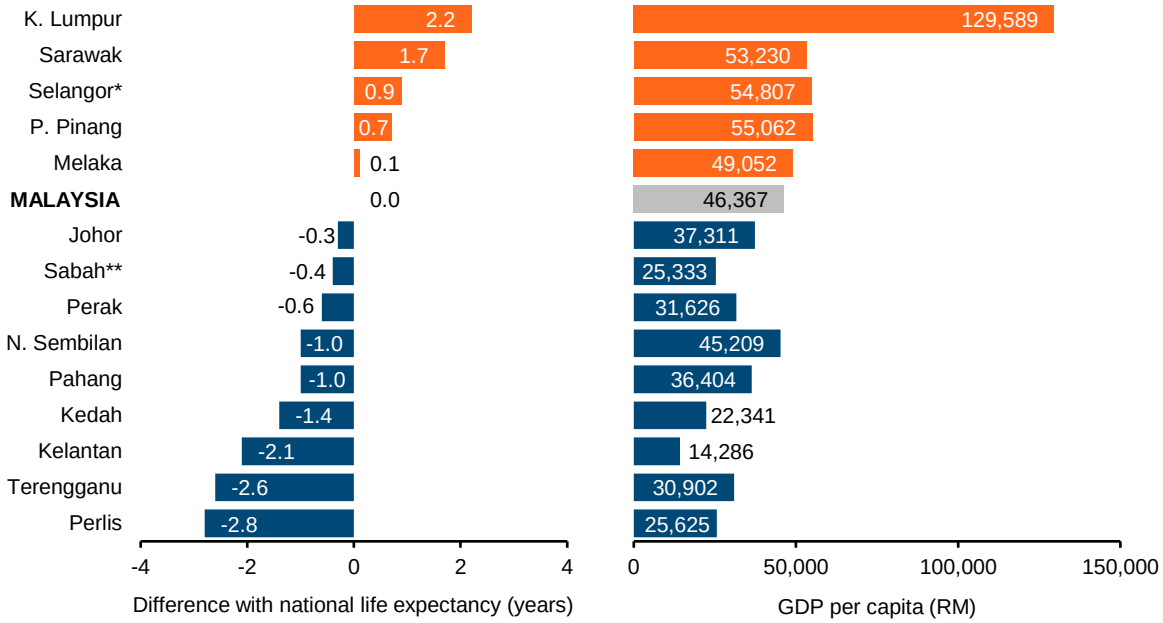
Against this backdrop, this section highlights health inequalities associated with income differences, confirming the relationship between income and health[64]. Furthermore, we investigate patterns of healthcare utilisation as well as other health-impacting behaviours, such as smoking and alcohol consumption, among different income groups to confirm the significance of these determinants, e.g. whether certain income groups are more likely to have health-compromising behaviours.

2.2 Health inequalities by income

2.2.1. Mortality

The relationship between income and life expectancy is well established: mortality rates are higher among those from lower income groups than from higher socioeconomic groups[65]. While we do not have household-level mortality data, state-level data provide valuable insights on this matter. Figure 2.2 shows differences in life expectancy at birth between each state and the national average (which was 74.5 years in 2018). As expected, states with higher GDP per capita, such as Kuala Lumpur, Pulau Pinang, Sarawak, Selangor and Melaka, had higher life expectancies than the average in Malaysia and in states with lower GDP per capita.

Figure 2.2: Differences in life expectancy at birth and GDP per capita by state, 2018



Note:
1. *Includes Putrajaya.
2. **Life expectancy data for Sabah includes Labuan but GDP data excludes Labuan. Labuan's GDP per capita in 2019 was RM77,800.
3. States above the national level of life expectancy are highlighted in orange, while those below are highlighted in blue.
Source: CEIC (n.d.), DOS (2020b), KRI calculations

[64] See Wagstaff (2002), Marmot (2002), O'Donnell, Van Doorslaer and Van Ourti (2015)
[65] Mackenbach (2006)

Additionally, Mariapun, Hairi, and Ng (2016) provided mortality distributions in Peninsular Malaysia using anonymised data of deceased persons from 1998 to 2002, with information on the deceased's district of residence. As proxy for district 'wealth', household data from the 2000 Population and Housing Census of Malaysia were used to create each district's socioeconomic index. Next, quintile cut-offs were determined based on the index values and districts were placed into their respective quintiles, with the bottom quintile comprising of the most socially *disadvantaged* districts and the top quintile comprising of the most *advantaged* districts[66].

Four mortality indicators were calculated for each quintile:

1. The **potential years of life lost (PYLL),** i.e. the average age that a person at their age of death was expected to live minus the age at death[67]. PYLL identifies districts with higher mortality at younger ages.
2. The **standardised mortality ratio (SMR),** i.e. ratio of the actual number of deaths over the expected number of deaths if the district's population distribution by age, gender and ethnicity follows a reference distribution[68], in this case Peninsular Malaysia's. Thus, values higher (lower) than one indicate higher (lower) number of deaths than expected.
3. The **infant mortality rate (IMR),** i.e. deaths of infants below the age of 1 per 1,000 live births and the **under-five mortality rate (U5MR),** i.e. deaths of children below the age of 5 per 1,000 live births. Compared to other health outcomes, child mortality is highly susceptible to the quality of the health system as many of the deaths are caused by infectious diseases amenable to treatment[69].

Table 2.1 shows that mortality indicators were worst for the bottom quintile. The risk of dying young was higher in disadvantaged districts with the PYLL, IMR and U5MR values for the bottom quintile almost double those for the top quintile. Moreover, the number of actual deaths was higher than expected in the bottom quintile as indicated by the SMR. This is in stark contrast to the SMR of the top quintile, which was below one, meaning that the actual number of deaths was less than expected.

[66] A district's socioeconomic advantage is represented by the district's median household's socioeconomic index, based on various components including access to utilities, head of household's education level and employment status, house ownership, ownership of durable consumer goods and quality of dwelling. In this context, an advantaged district refers to districts with the highest scores in these components. Source: Mariapun, Hairi and Ng (2016)

[67] Also, minus 0.5 years. This is meant to capture the discrepancies in the actual ages at death which were assumed to be evenly distributed between the last two birthdays. Source: Wheller, Baker and Griffiths (2006)

[68] Age standardisation involves applying each population's observed age-specific mortality rates to a standard/reference population. It allows comparisons of populations' mortality rates without distortion from differences in age structures. For example, two populations with the same age-specific mortality rates would have different overall mortality rates if their age distributions are different. Prior to age standardisation, one population's overall mortality rate may be higher than the other. After age standardisation, both populations would have the same age-standardised mortality rates. Source: WHO (n.d.-a)

[69] Coburn and Coburn (2007), Rutherford, Mulholland and Hill (2010)

Table 2.1: Mortality indicators by districts' socioeconomic quintile, 1998 – 2002

Districts' socioeconomic quintile	PYLL/1,000 person years	SMR	IMR/1,000 births	U5MR/1,000 births
Bottom	122.2	1.1	10.1	14.9
Second	116.5	1.1	8.9	12.3
Third	97.2	1.0	8.1	11.2
Fourth	84.6	1.0	7.4	9.4
Top	69.6	0.8	6.0	8.2

Note: PYLL = Potential years of life lost; SMR = Standardised mortality ratio; IMR = Infant mortality rate; U5MR = Under-five mortality rate
Source: Mariapun, Hairi, and Ng (2016)

2.2.2. Morbidity

Besides mortality, it is also necessary to investigate health inequalities involving morbidities. With life expectancies higher than ever, mortality rates have become less informative for measuring population health as the additional years of life expectancy are not necessarily years of life lived in good health. Thus, incorporating morbidity statistics in the planning of health and social services provision became increasingly relevant[70].

To detect health inequalities in morbidities, we use the National Health and Morbidity Survey (NHMS) 2015 data from the Ministry of Health (MOH) Malaysia[71]. The NHMS is a national survey conducted by the MOH to collect heath data on Malaysian communities for policy formulation and planning. The first survey was conducted in 1986, after which it was conducted at over 10-year intervals until 2006. Starting in 2011, the NHMS was conducted every four years with the latest being the 2019 NHMS. The NHMS uses a two-stage stratified random sampling method, resulting in a sample representative of the population. Information on individuals, including health outcomes and health-related behaviours, were collected for all household members who meet the inclusion criteria[72].

Using NHMS data requested from the MOH, we employ household income per capita[73] as a measure of socioeconomic status and we group individuals into quintiles, with the bottom quintile (bottom 20%) being the lowest household income per capita group and the top quintile (top 20%) being the highest. Estimates by quintile from the NHMS 2015 report differ from this report's as the NHMS report used quintiles created using household income without factoring in household size[74]. Where data are available, we also present time-series statistics from previous NHMS.

[70] Nazihah, Puteri Marjan and Jarud (2020)
[71] We analysed the NHMS 2015 microdata as the 2019 NHMS microdata are only available upon request one year after the 2019 NHMS report publication. Source: NIH (2019)
[72] Some parts of the survey must only be answered by individuals who meet specific conditions e.g. information on diabetes was only collected from individuals aged 18 and above in the NHMS 2015.
[73] $Household\ income\ per\ capita = \frac{Household\ income}{Household\ size}$. For example, a household of four earning a monthly gross household income of RM4,000 would result in household income per capita of RM1,000.
[74] The rudimentary mode of creating quintiles based on household income can be misleading when comparing households of varying sizes. For example, take two households with incomes of RM10,000 per month each. The usual practice classifies both households in the top income quintile i.e. the T20 based on the household income distribution

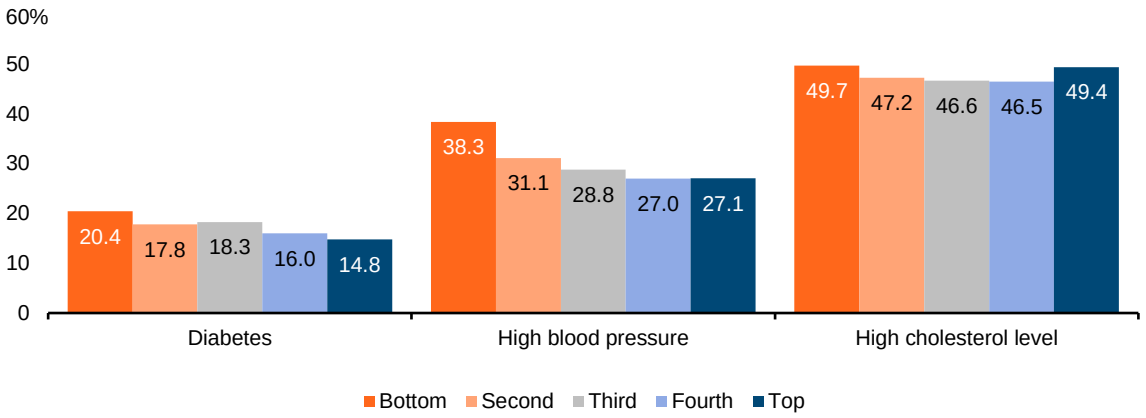
Diabetes, high blood pressure and high cholesterol

In 2019, NCDs accounted for the largest proportion of DALYs at 73.6%[75]. The high prevalence of NCDs contributes to economic loss because of reduced labour productivity and to rising health care costs. One study estimated that NCDs cost the Malaysian economy up to RM8.9b due to productivity losses from missing work (absenteeism), working but at lower capacity (presenteeism) and premature death, and up to RM100.79b from the total disease burden[76].

Among NCDs, cardiovascular diseases (CVDs) including heart attacks and strokes were the leading causes, contributing 18.9% of total DALYs[77]. Diabetes, high blood pressure and high cholesterol are some of the biggest risk factors for CVDs[78].

Figure 2.3 presents the prevalence of these health conditions by quintile. In general, the figure illustrates negative socioeconomic gradients, with the prevalence highest in the bottom quintile, and decreasing with each subsequent quintile.

Figure 2.3: Prevalence of diabetes, high blood pressure and high cholesterol level among adults by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Prevalence includes (1) respondents diagnosed with diabetes/high blood pressure/high cholesterol by a doctor or assistant medical officer and (2) respondents who did not know they had diabetes/high blood pressure/high cholesterol until MOH tests indicated that they do.
3. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

in the 2016 Household Income and Basic Amenities Survey report. However, if the first household is a two-person household while the second is a 10-person household, it is unreasonable to assume living standards in both households are the same. See Hawati, Ho and Suraya (2019) for more information on the importance of accounting for household size and composition to better understand the living standards of households and its members.

[75] Global Burden of Disease Collaborative Network (2020)

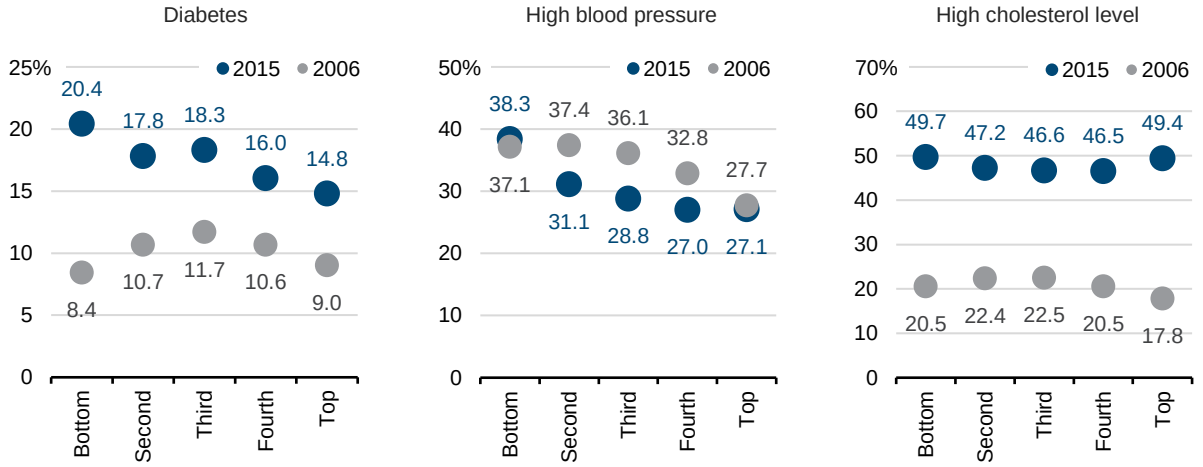
[76] MOH and WHO (2020)

[77] Global Burden of Disease Collaborative Network (2020)

[78] IPH (2015)

As data on these indicators were also collected in the previous NHMS, we present the changes for all quintiles over time in Figure 2.4. Between 2006 and 2015, the prevalence of diabetes and high cholesterol increased for all quintiles, albeit at different rates. The prevalence of diabetes in the lower quintiles increased much more than the higher quintiles, resulting in a negative socioeconomic gradient in 2015. For high cholesterol, the prevalence rates depicted an inverted U-shaped curve in 2006, with the bottom and top quintiles having the lowest rates, to a U-shaped curve in 2015, with the bottom and top quintiles having the highest rates instead. The bottom quintile remained as the group with one of the highest prevalence of high blood pressure in 2006 and 2015. Overall, the movements recorded in Figure 2.4 highlight the increasing prevalence of poor health outcomes among those at the lower ranks.

Figure 2.4: Prevalence of diabetes, high blood pressure and high cholesterol level among adults by household income quintile, 2006 and 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. We exclude the prevalence rates from the NHMS 1996 as data for these health outcomes were only collected from individuals aged 30 years and above.
3. Prevalence includes (1) respondents diagnosed with diabetes/high blood pressure/high cholesterol by a doctor or assistant medical officer and (2) respondents who did not know they had diabetes/high blood pressure/high cholesterol until MOH tests indicated that they do.
4. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Overweight, obesity, abdominal obesity and underweight

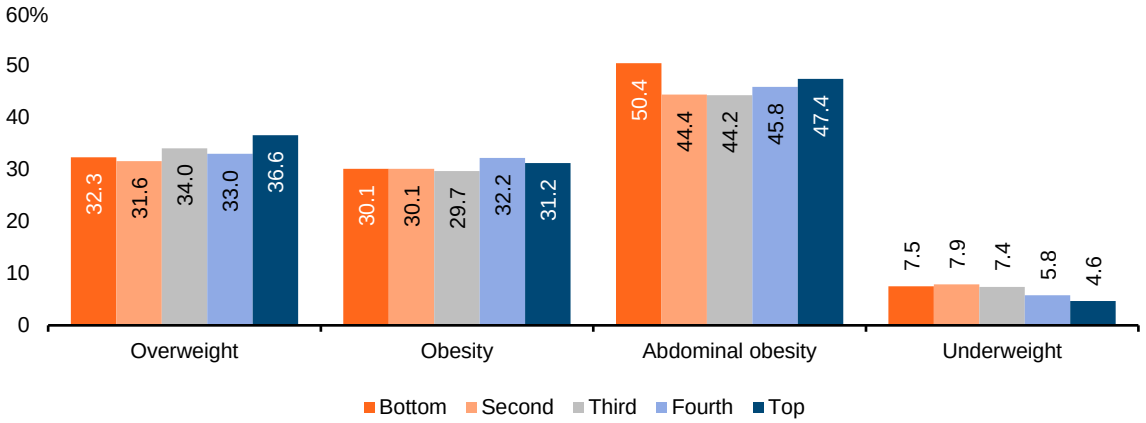
Other NCD factors include overweight and obesity defined as excessive body fat accumulation that is the result of excessive intake of energy and nutrients. The status of overweight and obesity can be determined using the Body Mass Index (BMI)[79]. Following the 2004 Malaysian Clinical Practice Guidelines of Obesity, adults with BMIs of 23 – 27.49kg/m^2 and above 27.49kg/m^2 are considered overweight and obese, respectively. Figure 2.5 shows that the prevalence of overweight and obesity were generally higher for adults in the top quintiles relative to those in the bottom quintiles.

[79] The BMI is a function of a person's height and weight: $\frac{Weight\ in\ kg}{Height\ in\ m^2}$.

While assessing obesity using BMI is common practice, it is also worthwhile to consider abdominal obesity estimated using the waist circumference (WC), grouping men with WC above 90cm and women with WC above 80cm as abdominally obese[80]. Unlike obesity measured via BMI, the highest prevalence of abdominal obesity is among adults in the bottom quintile at 50.4%.

At the other extreme, underweight is typically due to undernutrition involving deficiencies in energy and nutrient intakes. Adults are classified as underweight if their BMIs are below 18.5kg/m^2. The prevalence of underweight was concentrated in lower income quintiles: 7.5% of adults in the bottom quintile were underweight versus only 4.6% in the top quintile.

Figure 2.5: Prevalence of overweight, obesity, abdominal obesity and underweight among adults by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

International experiences suggest that patterns in overweight and obesity may reflect a country's level of development. In less developed countries, overweight and obesity are more prevalent among the rich than the poor. In more developed countries, the converse is true[81]. This is not to say that the prevalence of overweight and obesity is declining among the rich, but rather the increase is much faster among the poor. One possible reason for this is that the well-off are better able and thus, more prone to adopting health-promoting habits than the poor[82]. One example is in consumption of healthy foods which is partly dependent on the financial ability to purchase them[83].

[80] Presenting both measures of obesity gives a more thorough understanding of the subject matter as they complement one another and address each measure's shortcomings. One weakness of measuring obesity via BMI is the failure to differentiate between muscle mass and fat e.g. an athlete with a BMI of 30 would be classified as obese despite having little body fat. WC can be used to identify individuals at increased risk of NCDs due to the build-up of abdominal/tummy fat, whereas BMI estimates total body fat. While excess fat regardless of location is not desirable, evidence suggests that fat around the middle carries substantial health risks. However, WC is relatively harder to accurately measure compared to height and weight. This report does not go into the details of different obesity measurements. For a better understanding on how to measure waist circumference as well as a review of studies on obesity measurements, see WHO (2011).

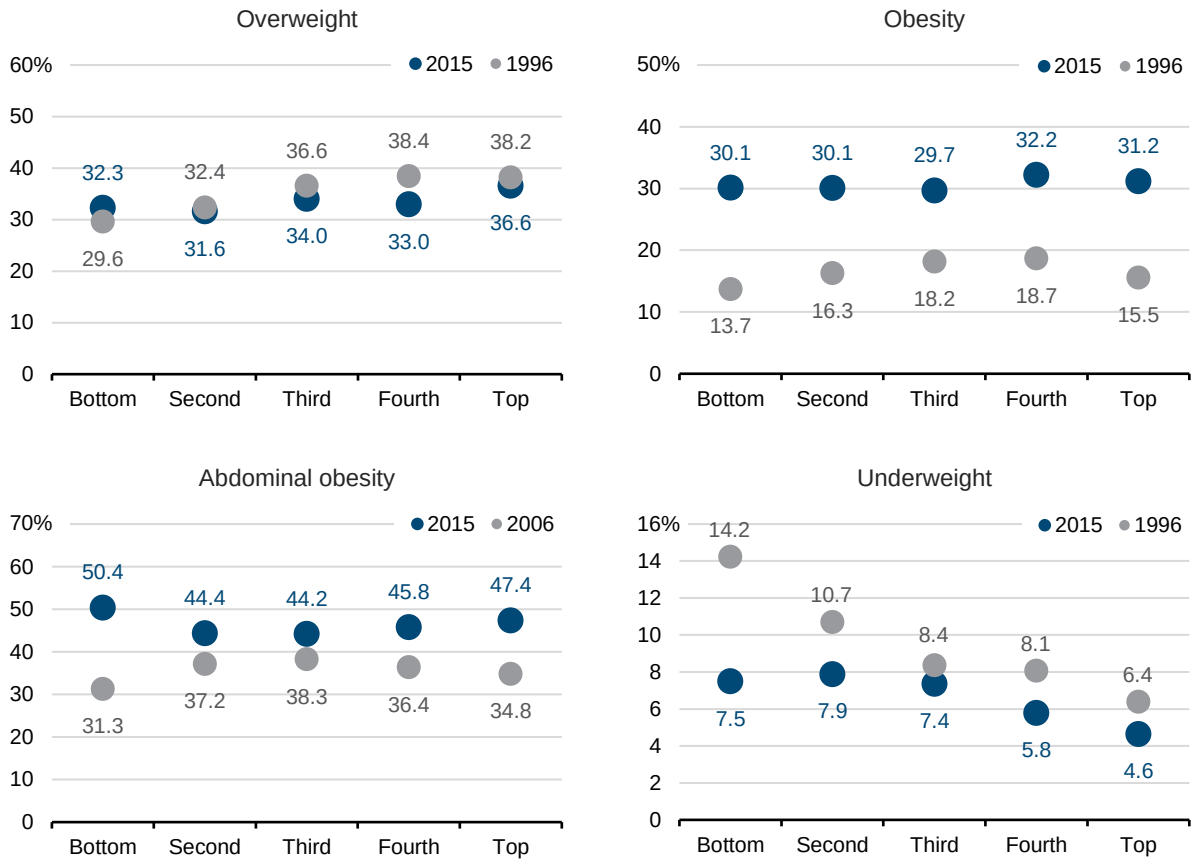
[81] Mariapun, Ng and Hairi (2018), Mackenbach (2006)

[82] Mariapun, Ng and Hairi (2018)

[83] See Box 2.2 for more details.

Figure 2.6 summarises statistics on overweight, obesity and abdominal obesity in Malaysia in 1996 and 2015. While the prevalence of overweight remained the highest in the top quintiles, the bottom quintile was the only group with a higher prevalence rate in 2015 relative to in 1996. Obesity increased for all quintiles, although the different magnitudes of change for each quintile resulted in a flatter curve in 2015[84]. In 2006, the bottom quintile had the lowest prevalence of abdominal obesity. While not conclusive, statistics on overweight and obesity suggest that the lower quintiles are gradually catching up with the higher quintiles. Underweight prevalence reduced for all with the bottom quintile experiencing the greatest reduction.

Figure 2.6: Prevalence of overweight, obesity, abdominal obesity and underweight among adults by household income quintile, 1996/2006 and 2015



Note:
1. The NHMS 1996 did not collect information on waist circumference for abdominal obesity.
2. Adults refer to individuals aged 18 years and above.
3. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

[84] Analysing the nutritional status of adults aged 30 years and above in Malaysia using NHMS data from 1996, 2006 and 2011, Mariapun, Ng and Hairi (2018) found a similar narrative with the authors stratifying the sample by location and gender. In Peninsular Malaysia, women in lower quintiles had higher overweight/obesity rates relative to women in higher quintiles in 2011 whereas the opposite was true in 1996. For women in Sabah and Sarawak, the contribution to the prevalence of overweight/obesity from women in lower quintiles also increased from 1996 to 2011. The changes for men in Peninsular Malaysia, and Sabah and Sarawak were less apparent, i.e. the prevalence of overweight/obesity is still concentrated among adults in higher quintiles.

Mental health problems

Despite being mainly non-fatal, mental health problems contribute to 6.8% of Malaysia's total DALYs, making it the fourth largest contributor[85]. Mental illness represents a public health problem with wide-ranging health and economic implications, with the estimated loss in Malaysia from mental illness projected to rise from USD10.6 billion in 2010 to USD24.3 billion by 2030[86].

The General Health Questionnaire GHQ-12 was used to estimate the prevalence of mental health problems among adults[87] while information on mental health problems among children aged five to 15 was obtained from their parents/guardians through the Strengths and Difficulties Questionnaire (SDQ)[88].

The prevalence of mental health problems among adults and children was highest for the bottom quintile and lowest for the top quintile (see Figure 2.7). Figure 2.8 shows that the prevalence of specific mental health problems among children differed by quintiles. Children with peer problems (including children who tend to be more solitary or are bullied by their peers) were more concentrated in the bottom quintile than in higher quintiles. Similarly, moving up the quintiles sees declining percentage of children with emotional problems (including children who feel unhappy and often worry), conduct problems (including children who cheat and lie), hyperactivity (including restless children) and lack of pro-social skills (including those unkind to others)[89].

Functional difficulty/Disability

The prevalence of having functional difficulties or disabilities also differed among quintiles. Figure 2.9 reports the percentages of people who either have difficulty in doing or are unable to do the following: seeing (even when wearing spectacles or contact lenses), walking, remembering, self-care (such as cleaning oneself and wearing clothes), listening (even when using a hearing aid) or communicating. For all disabilities, the rates were highest for the bottom quintile and lowest for the top quintile.

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[85] Global Burden of Disease Collaborative Network (2020)

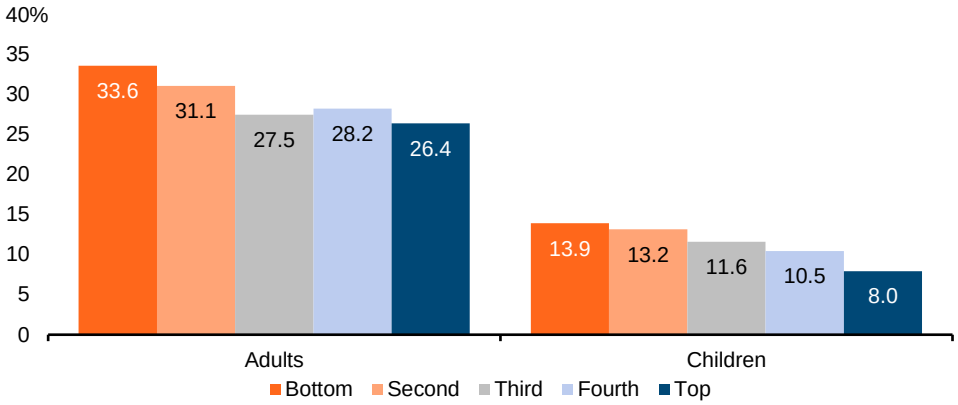
[86] IPH (2015), Atun et al. (2016), Vigo (2016)

[87] The questionnaire contains 12 questions relating to mental health with four possible responses. The first two responses ("Better than usual" and "Same as usual") are considered positive with scores of zero while the two others ("Less than usual" and "Much less than usual") are considered negative with a score of one each. Respondents who score three or more, i.e. have at least three negative responses are classified as having some mental health problems.

[88] Parents/guardians answer the SDQ based on their understanding or perception of a child's behaviour over the past six months. The SDQ is divided into five sets of questions which focus on different problems namely (1) conduct problems, (2) emotional problems, (3) hyperactivity, (4) peer problems and (5) pro-social skills. With each set consisting of five questions, the SDQ totals 25 questions. Possible responses for each question and their scores are as follows: 0 for "Not True", 1 for "Somewhat True" and 2 for "Certainly True". The scores from questions on conduct problems, emotional problems, hyperactivity and peer problems added together yield the total difficulties score. The possible range of scores for each set is zero to 10 and zero to 40 for the total difficulties score. Children who recorded scores of 14 or more are classified as having some mental health problem. Scores for specific problems are also determined as follows: three and above for conduct and peer problems, four and above for emotional problems, six and above for hyperactivity and five and below for lack of pro-social skills. Source: Goodman and Goodman (2009)

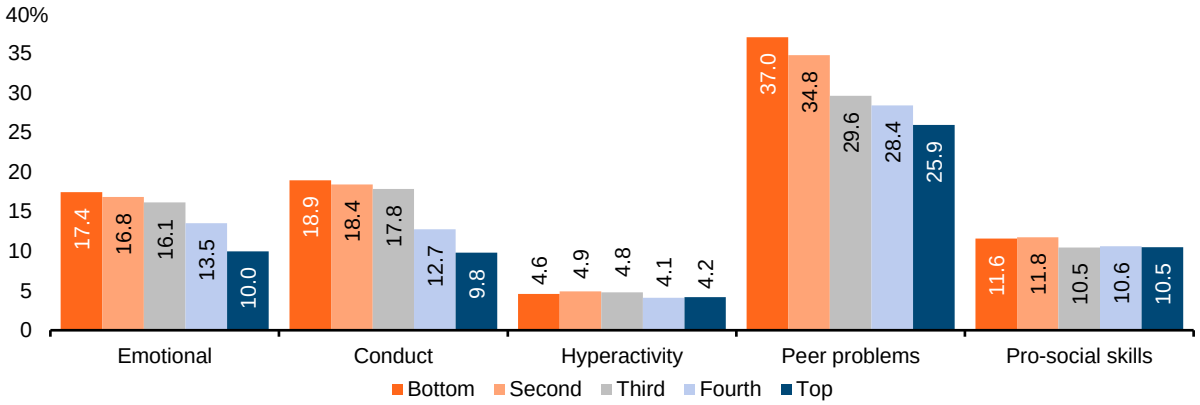
[89] The specific issues mentioned represent only some areas covered by the questionnaire. For more details, see the questionnaire in the NHMS 2015.

Figure 2.7: Prevalence of mental health problems by household income quintile, 2015



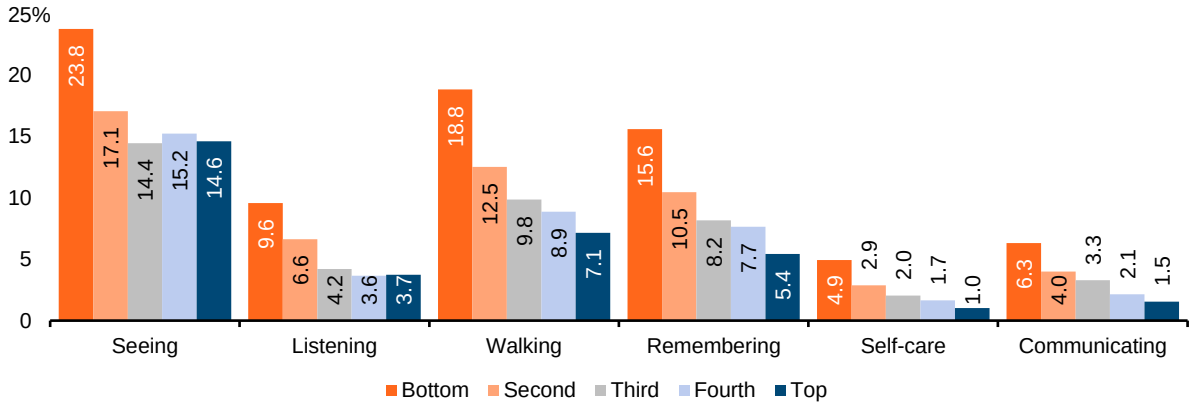
Note:
1. Adults refer to individuals aged 16 years and above. Children refer to individuals aged 5 to 15 years.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Figure 2.8: Percentage of children with specific mental health problems by household income quintile, 2015



Note:
1. Children refer to individuals aged 5 to 15 years.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Figure 2.9: Prevalence of functional difficulty or disability among adults by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

2.3 Direct determinants of health

Data on health outcomes in Malaysia show gaps between the poorer and richer segments of the population in Malaysia. Particularly, mortality and morbidity rates are worse among the disadvantaged relative to the advantaged, showing negative socioeconomic gradients in health. As a result, the poor socioeconomic groups not only live shorter lives, but most likely spend more years in ill health. Referring to Solar and Irwin's framework, we consider two determinants of health mediated by income: (1) the health system and (2) selected health-related behaviours, namely consumption of fruits, vegetables and plain water, physical activity, tobacco smoking and alcohol consumption.

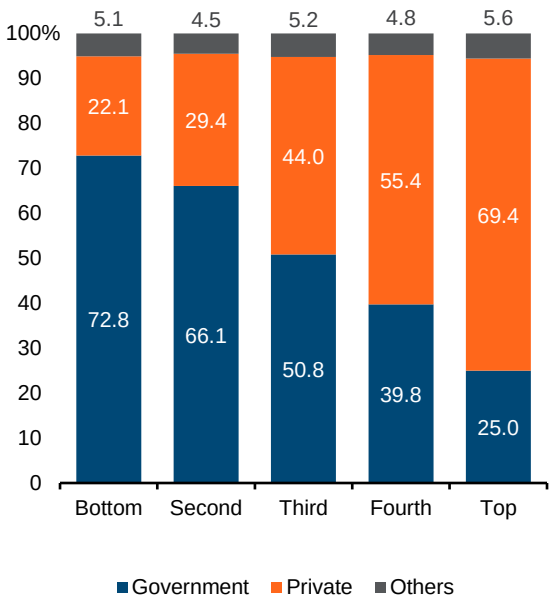
2.3.1. Health system

According to Atun et al. (2016), Malaysia's health system is relatively successful with the country making impressive health gains over the years. The authors commended Malaysia for achieving a high level of affordable access to healthcare while maintaining comparatively low health expenditures. The government has claimed that the low-cost public health system, mainly financed by tax revenue[90], is not able to cope with rising demands for more health expenditure. Thus, the role of the private sector in the health system has gradually increased while financing to pay for healthcare among the population has diversified since the 1980s[91].

Malaysia's two-tiered health system ensures access for all, but patterns of public and private utilisation are influenced by socioeconomic considerations. In the NHMS 2015, those in the lower quintiles (especially the bottom quintile) stated that they were likelier to use government facilities for both minor and major health problems (see Figures 2.10 and 2.11). Private facilities were the main choice for minor problems among those in the fourth and top quintiles. Interestingly, we see increased reliance on publicly provided care for major health problems as even a majority of those in the top quintile preferred government over private facilities.

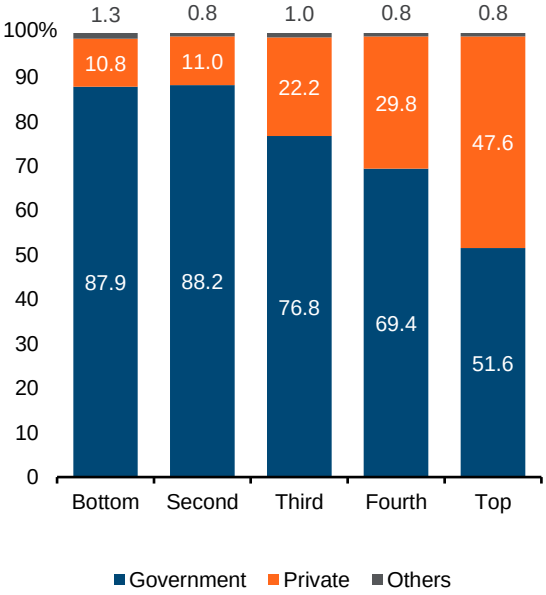
[90] Suleiman (2002)
[91] Atun et al. (2016)

Figure 2.10: Choice of care provider for *minor* health problems by household income quintile and sector, 2015



Note:
1. Examples of minor health problems include flu, fever, cough and stomachache.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Figure 2.11: Choice of care provider for *major* health problems by household income quintile and sector, 2015

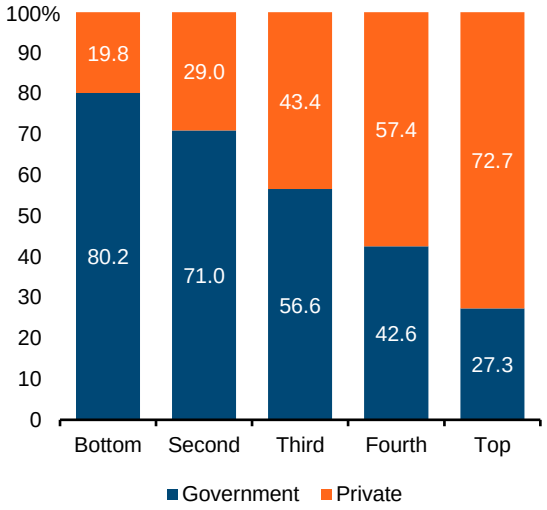


Note:
1. Examples of major health problems include cancer, diabetes and heart problems.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

To see whether this perception is close to reality, we look into the actual health-seeking behaviours of individuals who received inpatient care (those staying at least one night in hospital) in the past 12 months and outpatient care (those who sought care at a health facility but did not stay overnight) in the past two weeks since the date the respondent was surveyed for the NHMS 2015. While there is a strong likelihood of selection bias, such as older individuals being overrepresented as they are more likely to be ill and seek treatment, the statistics are still quite telling. Figures 2.12 and 2.13 are almost duplicates of Figures 2.10 and 2.11, with public facilities being more commonly utilised by the lower quintiles for outpatient care and by the first four quintiles for inpatient care[92].

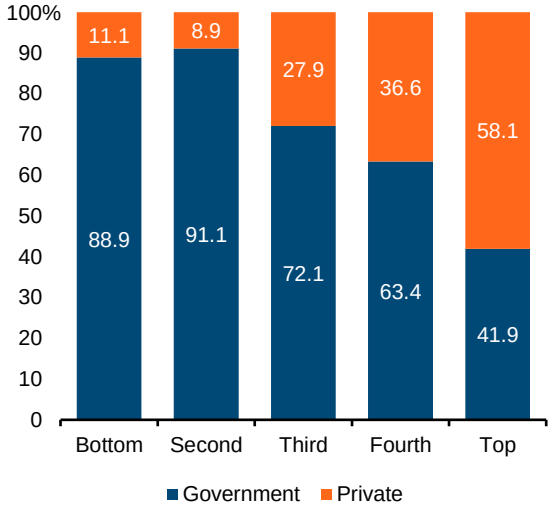
[92] Majority of treatment received from inpatient care was for major health problems, major surgery and birth delivery. Source: IPH (2020a), KRI calculations

Figure 2.12: Choice of care provider for *outpatient* care by household income quintile and sector, 2015



Note: Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Figure 2.13: Choice of care provider for *inpatient* care by household income quintile and sector, 2015



Note: Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

It is beyond the scope of this report to investigate the health system and health-seeking behaviours of Malaysians in detail[93]. However, differences in health outcomes and usage of the health facilities among quintiles suggest that some features of the health system are more likely to contribute to health inequalities and should be investigated further.

Box 2.1: Financial access to care

Decisions on healthcare utilisation are partly driven by pricing and affordability. In the NHMS 2015, respondents were asked how much they *think* is the price[94] of various healthcare services by sector. Based on these responses, the average perceived cost to treat minor and major health problems in government facilities was lower than in private facilities (see Table 2.2). However, the absolute difference in perceived costs was much higher for treating major problems. For example, in 2015, the average perceived cost of coronary bypass surgery in a government facility was about RM2,144 whereas it was RM13,124 in a private facility.

Table 2.2: Average perceived cost of different health treatments or healthcare service by sector, 2015

	Public facility	Private facility
Treatment for flu	RM4.10	RM44.09
Treatment for diabetes	19.46	165.81
Receive stitches	10.54	90.89
Receive bypass surgery	2,143.87	13,123.62
Birth delivery	154.72	2,094.43

Source: IPH (2020a), KRI calculations

[93] See Atun et al. (2016) for detailed accounts on different aspects of Malaysia's health system.
[94] Healthcare expenses in this box article refer only to costs *not* subsidised by taxes.

Complementing Table 2.2, Table 2.3 lists the actual costs incurred by respondents of the NHMS 2015 who received inpatient treatment by sector. Likewise, the price tag for inpatient care was lower in public facilities regardless of the health ailment treated for or service received. For outpatient care, the average actual cost was RM17 in public facilities against RM283 in private facilities[95].

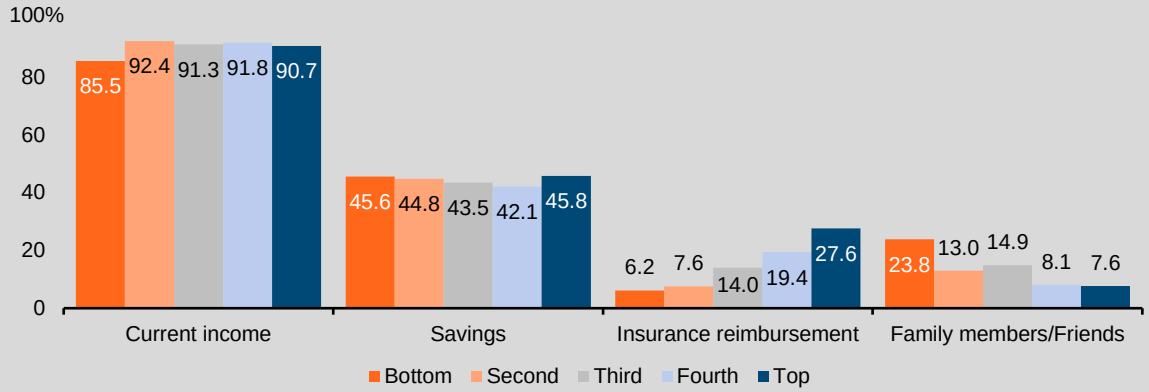
Table 2.3: Average *actual* cost of different health treatments or healthcare service by sector, 2015

	Public facility	Private facility
Minor health problems	RM41.06	RM1,087.04
Major health problems	266.85	2,758.95
Minor surgery	221.87	2,966.27
Major surgery	5,413.77	7,169.13
Normal delivery	142.23	4,194.90
Forcep/Vacuum delivery	59.12	No response
Lower segment caesarean section/ Caesarean/Operation for delivery	370.76	No response

Source: IPH (2020a), KRI calculations

To pay for expenses related to healthcare, most Malaysians used their own incomes and savings. However, the percentage of individuals who reported insurance reimbursement as a source of payment in the top quintile was more than three times the share in the bottom quintile. On the other hand, those in the bottom quintile relied more on informal social networks, such as help from family and friends, to pay for healthcare expenses.

Figure 2.14: Source of payment for healthcare by household income quintile, 2015



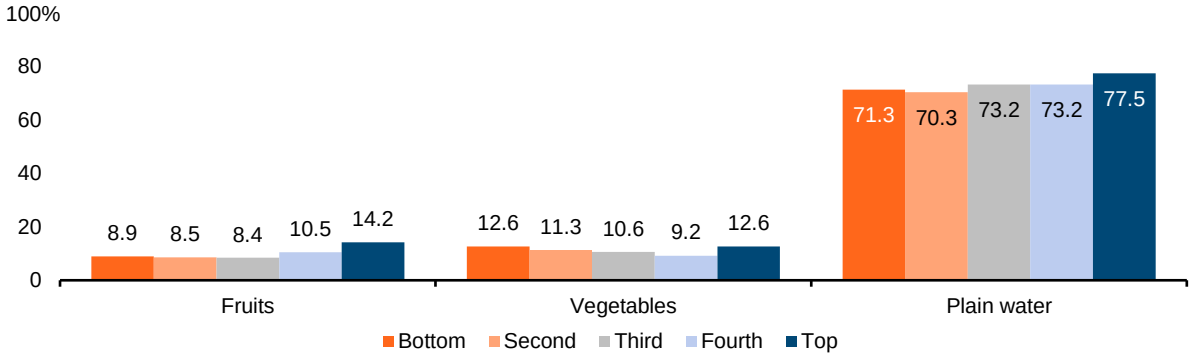
Note: Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

[95] IPH (2020a), KRI calculations

2.3.2. Consumption of fruits, vegetables and plain water

Figure 2.15 presents the percentage of adults in each quintile who consume adequate amounts of fruits (at least two servings per day), vegetables (at least three servings per day) and plain water (at least six 250ml-glasses per day). Overall, the share of adults who consume enough fruits and vegetables was low, i.e. only about 10% of adults, regardless of socioeconomic background. Adults in the top quintile were the most likely to eat adequate amounts of fruits and vegetables. Most adults drink the recommended amount of plain water although the bottom and second quintiles had the lowest percentages at 71.3% and 70.3%, respectively.

Figure 2.15: Percentage of adults who consume adequate fruits, vegetables and plain water by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

Box 2.2: Is a healthy diet affordable?

The risk factors contributing to NCDs in Figures 2.3 and 2.5 affect much of Malaysia's population with health outcomes having deteriorated over time (see Figures 2.4 and 2.6). We must identify factors responsible for these outcomes to uncover avenues for improvements now. One of these avenues is eating healthy diets which entails consuming foods that are good for one's health and prevent malnutrition and other health risks[96].

Recommended Nutrient Intakes and Malaysian Dietary Guidelines

Governments and planning bodies have long recognised the importance of eating healthy to maintain good health and develop dietary guidelines for the population. One of the first was by Dr E. Smith who recommended the cheapest foods to prevent starvation during the cotton famine in mid-19th century United Kingdom[97]. Many years later, and after various guidelines, the 2002 Food and Agriculture Organization (FAO)/WHO joint report became the global reference point for countries to develop their own recommended intakes of macro and micronutrients[98].

[96] WHO (2020b)
[97] MOH (2017)
[98] Macronutrients are nutrients that we need in significant quantities for energy whereas micronutrients are other essential nutrients needed in small quantities for a range of physiological functions. Source: MOH (2017), WHO (2003)

In 2005, the Recommended Nutrition Intakes[99] (RNI) was introduced by Malaysia's MOH to delineate the nutrient needs of practically all healthy persons, with the latest RNI—released in 2017—listing the total daily recommended amounts of macronutrients, namely carbohydrates, proteins and fats, and micronutrients, consisting of 26 vitamins and minerals varying with a person's gender, age and physical activity level[100].

To help Malaysians achieve these daily recommended intakes in the RNI, the Malaysian Dietary Guidelines (MDG)—first released in 1999 and last updated in 2010—were introduced[101]. The MDG translates the RNI recommendations to number of food servings for specific food groups including cereals and grains, fruits and vegetables, and various protein sources. The latest 2010 MDG is based on the 2005 RNI[102] and an updated version of the MDG based on the 2017 RNI is being developed by the MOH at the time of writing[103].

Can Malaysians afford a healthy diet?

Even if consumers are aware of healthy diets and the foods are readily available for purchase, they are still food insecure if they cannot afford to buy them[104]. Consumer decisions with regards to food choices are affected by financial constraints. A survey of 1,719 adults throughout Malaysia revealed that one barrier to practicing healthy eating habits is the price of healthy foods[105]. According to Darmon, Briend, and Drewnowski (2004), food prices are a major barrier to making healthy dietary choices. As a result, studies have noted that poor communities consume more of cheaper energy-dense, nutrient-poor diets which is a global phenomenon. Quoting from the findings of a systematic review covering all the relevant academic papers published from 2000 to 2014, "*(f)oods of lower nutritional value and lower-quality diets generally cost less per calorie and tended to be selected by groups of lower socioeconomic status[...] Acceptable healthier diets were uniformly associated with higher costs."*[106] Another study based on responses from communities in 18 countries found that the consumption of fruits and vegetables is particularly low in low income countries relative to high income countries and this was partly due to affordability issues[107].

[99] The recommended nutrition intake is also known as the recommended dietary allowance, recommended daily amount and recommended daily allowance.
[100] Physical activity level associates a numerical value with a person's lifestyle in relation to their habitual physical activities, allowing researchers to group persons as sedentary, moderately active, active or very active. Based on activity level, the energy requirements of these persons are then determined. Source: National Research Council (1989), MOH (2017)
[101] Tee (2011)
[102] MOH (2010)
[103] MOH (2020b)
[104] To be food secure, multiple factors need to be addressed including food (1) availability, (2) utilisation, (3) stability and (4) access. *Availability* refers to the physical availability of food. *Utilisation* refers to the proper way foods are prepared in order to nutritionally benefit from them and food safety practices. *Stability* implies continuous supply of access to food despite shocks such as seasonal droughts. *Access* means both physical and economic access to food. While physical access refers to logistics, economic access refers to food affordability. Source: FAO (2006)
[105] Ismawati Sharkawi, Zainalabidin Mohamed and Rezai (2014)
[106] Darmon and Drewnowski (2015)
[107] Miller et al. (2016)

Studies of the relationship between food costs and diet quality have been well established across various communities in high income countries such as the United States, Australia and the United Kingdom[108]. Results from the few studies that have been conducted on Malaysia seem to be in line with international findings.

In mid-2016, 450 adults in Selangor were interviewed using the Food Frequency Questionnaire to collect data on dietary intakes. The Ministry of Domestic Trade and Consumer Affairs' price database was used to estimate the respondents' dietary costs. The study found that there is a significant correlation between eating healthily and higher food costs[109]. In another 2016 study, the cost of an MDG-recommended 2,000 kcal energy diet was calculated using prices from three hypermarkets in the city centre of Pulau Pinang. The study calculated the cost at about RM1,062.30 per month[110], relatively high when compared to the median monthly salary of RM2,000[111]. This suggests that, at least in the small urban enclaves of Selangor and Pulau Pinang, greater affluence implies having better economic access to a healthy diet.

At the national level, we may take the 2019 Food Poverty Line Income (Food PLI) as the minimum cost of eating a recommended diet considering that the food basket for the Food PLI was created based on recommendations from the 2017 RNI and the updated MDG. There is no single national figure for the Food PLI as the figure for each household depends on household composition and location. However, DOS presented the Food PLI for two parents with a teenage son and a young son, amounting to RM1,197.85. The percentage of households below their respective Food PLIs is miniscule at 0.4%. However, those above the Food PLI and the PLI but remain close to the thresholds remain vulnerable, as their low income would be used for various essentials, leaving little room for spending on healthy diets[112].

While more work needs to be undertaken to determine the affordability of eating healthy in Malaysia, the higher and/or worsening burden of morbidities including underweight and diabetes among lower income individuals relative to others gives cause for concern as they are likely to be the most affected individuals by high food prices. Furthermore, the low intakes of fruits and vegetables regardless of background shown in Figure 2.15 raise other issues related to food consumption (aside from food affordability) that must also be looked into.

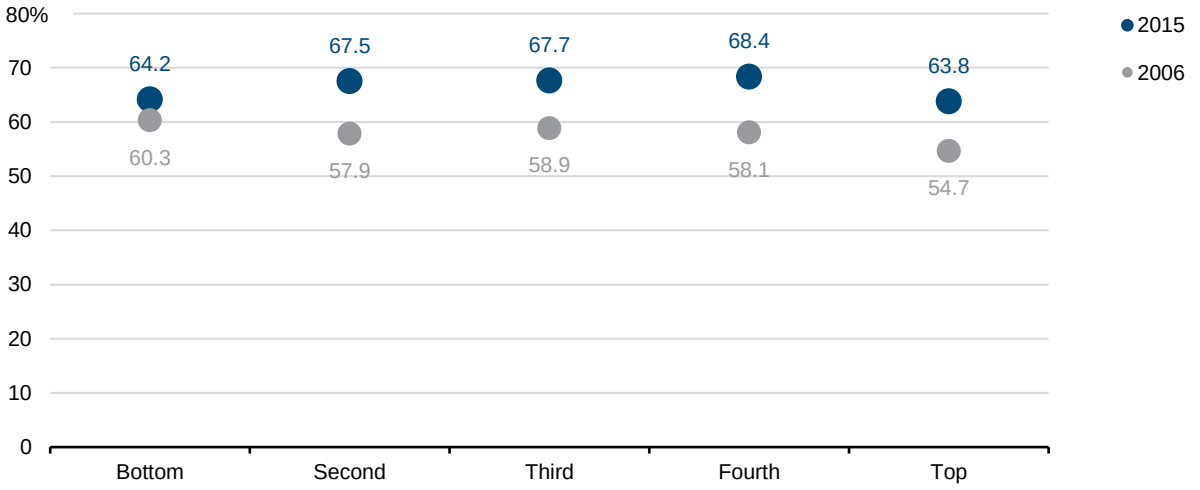
[108] Rehm, Monsivais and Drewnowski (2011), Burns and Friel (2007)
[109] Pondor, Gan and Appannah (2017)
[110] Saleem et al. (2016)
[111] DOS (2020a)
[112] DOS (2020d), DOS (2020e)

2.3.3. Physical activity

When it comes to managing weight, food intake must be balanced with physical activity. As mentioned earlier, individuals gain weight whenever their energy intake is excessive, i.e. it does not match their energy expenditure. Even for the underweight, exercise is still important for weight gain as it helps muscular development[113].

From 2006 to 2015, all quintiles saw an increased percentage of adults being physically active[114] (see Figure 2.16). However, the bottom quintile recorded the lowest increase from 2006 to 2016. This shifted the bottom quintile from having the highest percentage of adults who were physically active in 2006 at 60.3%, to one of the lowest in 2015 at 64.2%.

Figure 2.16: Percentage of physically active adults by household income quintile, 2015



Note:
1. Adults refer to individuals aged 16 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

[113] MOH (2010)

[114] Following the NHMS' definition, a person is physically active if they meet at least one of the following conditions:
Do vigorous activities, e.g. carry heavy weights, aerobic exercises, fast cycling, etc. at least 20 minutes per day for a minimum of three days a week.
Walk or do moderate intensity activities e.g. carry light weights, mop the floor, cycling, etc. at least 30 minutes per day for a minimum of five days a week.
Do any combination of walking, moderate or vigorous intensity activities for a minimum of five days a week achieving at least 600 Metabolic Equivalent of Task (MET) minutes per week.
MET is a unit that measures how much energy an activity consumes in one minute compared to being at rest. For example, a 2 MET activity expends twice the energy used by the body at rest. Researchers have assigned MET values for many different physical activities such as running, walking and doing aerobics. The amount of MET minutes per week indicates how much energy is expended performing various activities relative to being at rest throughout the whole week. Let us assume that last week a person (1) ran for 90 minutes, (2) walked for 30 minutes and (3) did aerobics for 60 minutes and assuming the MET values for running, walking and doing aerobics are 9.8, 3.8 and 6.83 respectively, then the MET minutes for that week is equal to the following: $(9.8 \times 90) + (3.8 \times 30) + (6.83 \times 60) = 1{,}861.8$ MET minutes per week. Source: Omni Calculator (n.d.)

2.3.4. Tobacco smoking

Smoking is another important factor for health as diseases associated with smoking such as cancer and CVDs are the main causes of premature death in Malaysia[115]. The percentage of adults who at least occasionally smoke tobacco product was highest for the middle quintiles (the second to fourth quintiles) with the percentages ranging from 24.1 – 25% (see Figure 2.17). Additionally, we investigate the prevalence of exposure to second-hand smoke among non-smokers (see Figure 2.18) considering the link between second-hand smoke and smoking-related diseases has already been established. The WHO estimated that exposure to second-hand smoke is responsible for 600,000 deaths every year[116]. The NHMS 2015 classified second-hand smokers as individuals who live or work with smokers who smoke in their homes or workplaces. In this case, we see that the prevalence was generally higher in the lower quintiles than the upper quintiles.

Figure 2.17: Percentage of adults who smoke by household income quintile, 2015

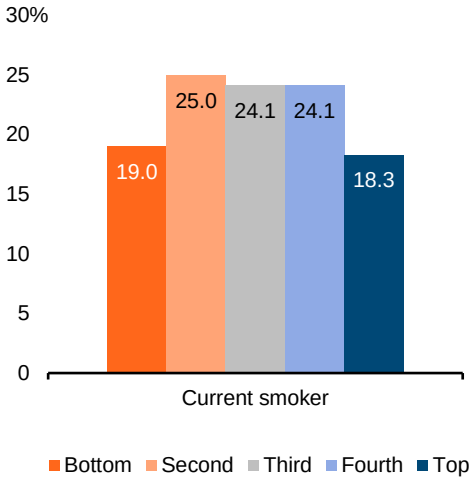
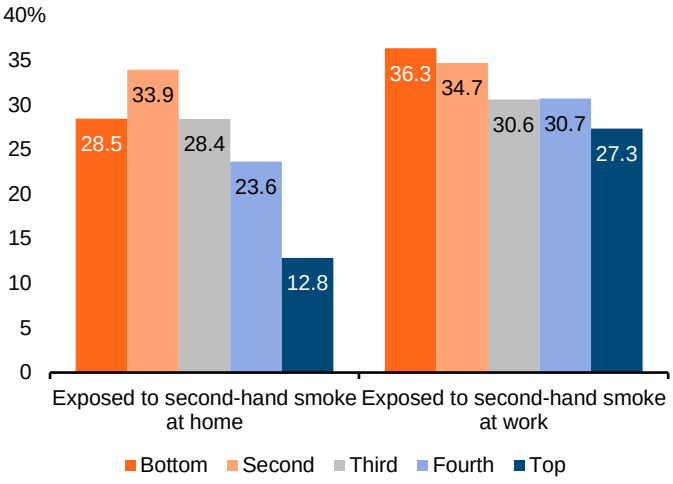


Figure 2.18: Percentage of non-smoking adults exposed to second-hand smoke by household income quintile, 2015



Note:
1. Adults refer to individuals aged 15 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

[115] IPH (2015)
[116] WHO (n.d.-i)

2.3.5. Alcohol consumption

Alcohol consumption is also a risk factor and patterns of consumption differed by income quintiles (see Figure 2.19). The percentage of current drinkers was lowest in the bottom quintile at 5.4% and gradually increases to 13.8% in the top quintile. However, the prevalence of drinking is unlikely to capture the full extent of the issue. Harmful use of alcohol e.g. binge or excessive drinking is a related concern, with data suggesting that excessive alcohol consumption is far more frequent in lower socioeconomic groups as in the EU[117]. Figure 2.20 shows that about 60% of alcohol drinking adults in the bottom quintile binge drink i.e. drinking at least six glasses of alcohol in one sitting compared to around 52.3% in the top quintile. However, it should be noted that the absolute number of adults who binge drink was highest for the top quintile.

Figure 2.19: Percentage of adults who drink by household income quintile, 2015

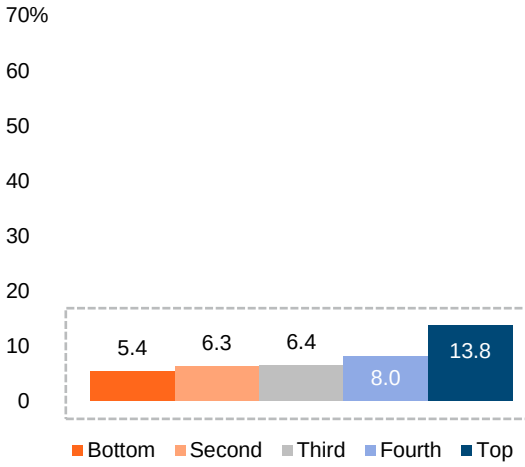
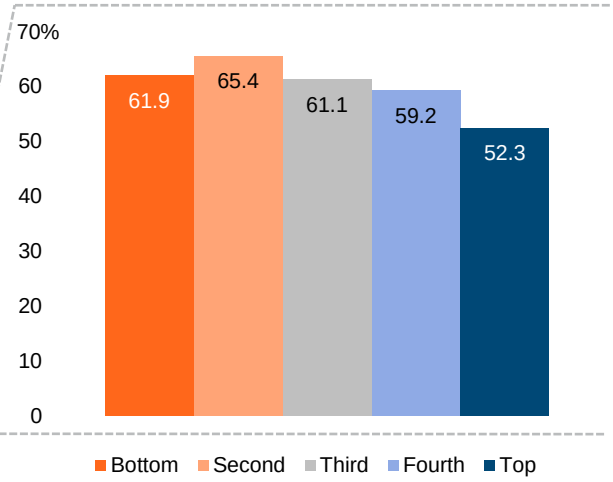


Figure 2.20: Percentage of currently drinking adults who binge drink by household income quintile, 2015



Note:
1. Adults refer to individuals aged 18 years and above.
2. Household income quintiles are based on monthly gross household income per person.
Source: IPH (2020a), KRI calculations

2.4 Overview of health inequalities in Malaysia

Another method to detect health inequalities is by calculating **concentration indices**. The index ranges from -1 to 1 with the index taking a negative value when a health condition is more prevalent in lower income groups and a positive value when it is more prevalent in higher income groups. The larger the value, the higher the prevalence in lower or higher income groups. 0 generally indicates total equality. More information on the concentration index can be found in Appendix C[118].

[117] Mackenbach (2006)
[118] All indices were calculated using Stata version 12.0 using the commands created by O'Donnell et al. (2016).

Tables 2.4 and 2.5 confirm our earlier findings. For a large majority of the investigated health problems, the concentration indices were below 0, meaning the occurrence of such health problems was concentrated in lower income groups. For health-promoting behaviours such as eating enough fruits and drinking enough water, the indices indicate that individuals from higher quintiles were more likely to practice. In comparison, health-damaging behaviours such as smoking and binge drinking were more common among the economically disadvantaged.

Table 2.4: Concentration indices for selected health problems, 2015

Health problem	Concentration Index
Diabetes	-0.058
High blood pressure	-0.068
High cholesterol	-0.003
Overweight	0.024
Obesity	0.011
Abdominal obesity	-0.007
Underweight	-0.101
Mental health problems among adults	-0.046
Mental health problems among children	-0.072
Disability in seeing	-0.092
Disability in listening	-0.208
Disability in walking	-0.187
Disability in remembering	-0.195
Disability in self-care	-0.274
Disability in communicating	-0.251

Source: IPH (2020a), KRI calculations

Table 2.5: Concentration indices for selected health-impacting behaviours, 2015

Health-promoting/damaging	Health-impacting behaviour	Concentration Index
Health-promoting	Adequate intake of fruits	0.100
Health-promoting	Adequate intake of vegetables	-0.017
Health-promoting	Adequate intake of plain water	0.017
Health-promoting	Physically active	-0.0003
Health-damaging	Current tobacco smoking	-0.007
Health-damaging	Current alcohol consumption	0.172
Health-damaging	Binge drinking among current drinkers	-0.043
Health-damaging	Exposure to second-hand smoke at home among non-smokers	-0.127
Health-damaging	Exposure to second-hand smoke at work among non-smokers	-0.050

Source: IPH (2020a), KRI calculations

Box 2.3: Inequalities affect vulnerability to Covid-19

This section highlights differences in health outcomes between income groups, with individuals from lower quintiles bearing the brunt of health problems. Similarly, international experiences suggest that the Covid-19 pandemic affects income groups differently, with disadvantaged communities generally facing higher risks of Covid-19 infection and dying from it[119]. For example, in the United States, Covid-19 infections and deaths are disproportionately high among African-Americans[120]. Using detailed microdata in Sweden including data of all recorded Covid-19 deaths in the country, Drefahl et al. (2020) found that those with low-income, low education level and born in a low- or middle-income country were predicted with a higher risk of Covid-19 death. While more studies are needed to better understand why certain groups are more affected than others, it is reasonable to assume that existing inequalities are partly to blame.

Disparities in the social determinants of health including access to care, and work and living conditions are associated with differences in exposure to the virus. For instance, where costs for Covid-19 testing and treatment are not subsidised, out-of-pocket expenditure to treat Covid-19 pose a substantial financial burden for the poor, creating a financial barrier to care[121]. In the United States, African-Americans make up a disproportionately large share of essential and frontline workers, jobs which many are unable to do from home, increasing their exposure to infection[122].

Compounding Covid-19 risks, these inequalities in the social determinants of health result in health inequalities. According to the WHO, Covid-19 is deadlier for those with pre-existing health conditions such as cardiovascular and chronic respiratory diseases[123], conditions of which the prevalence is often inversely associated with socioeconomic status[124].

In Malaysia, Covid-19 cases and deaths are not publicly reported together with socioeconomic characteristics, thus the link between Covid-19 and social status cannot be established conclusively. To make a more conclusive link, there must be a consensus that improving health necessitates a broader view on what affects health, including economic and social factors. In the case of Covid-19, more detailed data on Covid-19 cases and deaths should be made available and analysed. Only then can we know whether Covid-19 impacts certain population groups more adversely and how it does so, allowing the government to take appropriate actions in mitigating the health and economic impacts.

[119] Burström and Tao (2020)
[120] Dorn, Cooney and Sabin (2020)
[121] Wang and Tang (2020)
[122] Dorn, Cooney and Sabin (2020)
[123] IPH (2015), WHO (2020a)
[124] Sommer et al. (2015)

SECTION

03

SECTION 3

HEALTH AND WORK

"When [employment and working conditions] are good, they can provide financial security, social status, personal development, social relations and self-esteem, and protection from physical and psychosocial hazards." [125]

WHO Commission for the Social Determinants of Health

Work can have a significant impact on health. The importance of work on health outcomes may not be surprising as many determinants of health inequities, including income, are related to work.

Thus, efforts to improve the health of the population must take into account the various ways employment and work conditions can enhance or harm physical and mental health. This is especially important as employment and working conditions can also drive health inequities, as health-adverse jobs tend to be concentrated among the more disadvantaged social groups.

Working age individuals make up the majority of the population in Malaysia. In 2019, 22.7 million individuals in Malaysia were in the working age population (15 to 64 years old), i.e. 69.7% of the total population[126]. While not everyone of working age participates in the workforce[127], their health status significantly influences overall population health.

This section discusses the relationship between health and work[128], the overall health status of the workforce, as well as the health of vulnerable working populations in Malaysia.

3.1 How work affects health

3.1.1. Ability to pay for healthcare

Work can be health-enhancing as it provides an important source of income, which can be used to purchase health-promoting goods and services or to adopt health-promoting behaviours. For example, as shown in Figure 2.14, most Malaysians rely on their incomes to pay for healthcare-related spending, and earnings from paid employment continue to be the largest source of income for Malaysians at 61.6% in 2019[129]. Furthermore, as established earlier, health is associated with income, with those in lower income groups often experiencing poorer physical and mental health compared to those with higher incomes.

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[125] WHO (2008)

[126] DOS (n.d.)

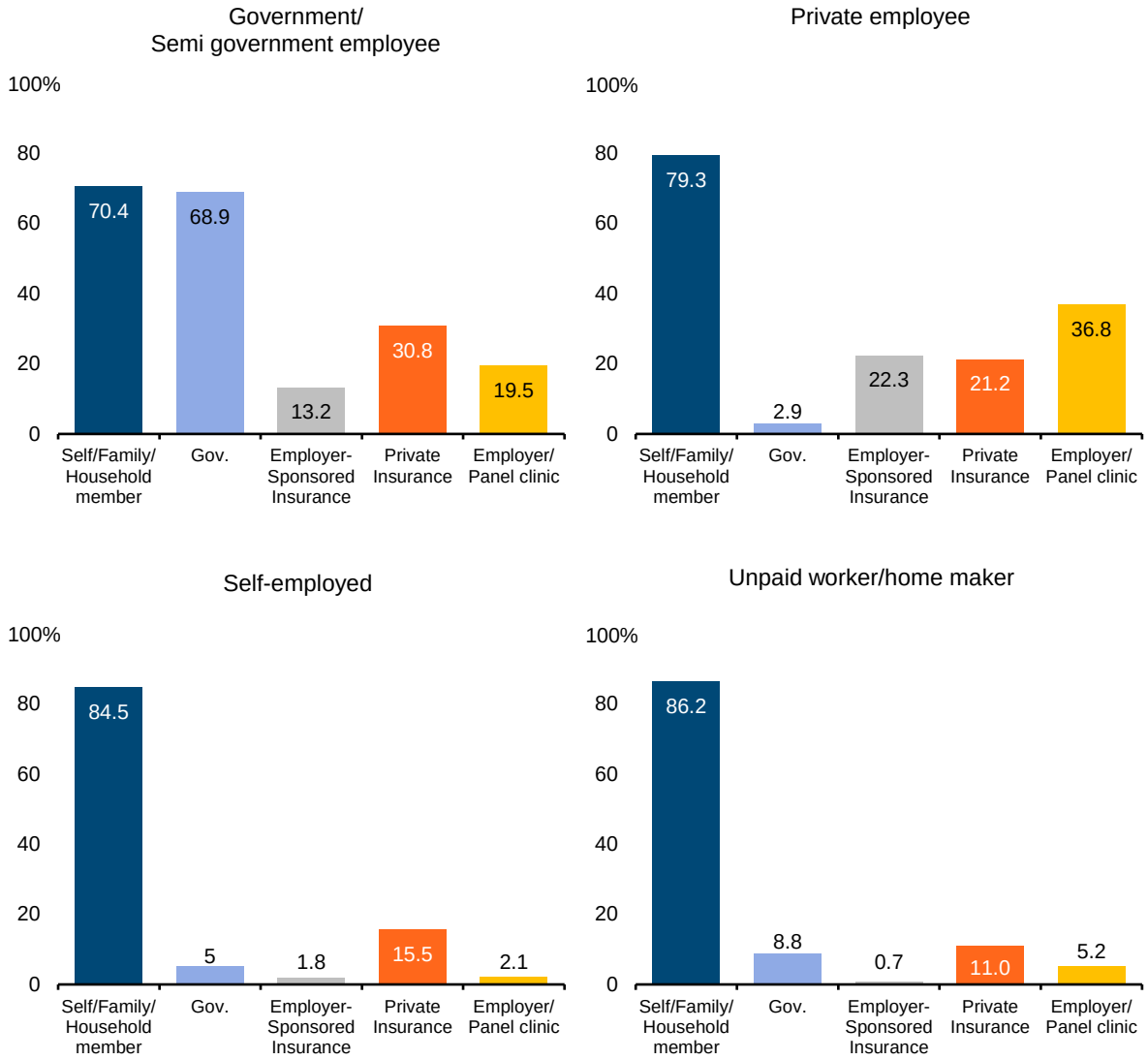
[127] In 2019, the Malaysian workforce was composed of approximately 15.6 million people, with a labour force participation rate of 68.7%. Source: DOS (2020g)

[128] In this chapter, we focus on the effect of work on health, rather than the converse, i.e. health on work. On the latter, unsurprisingly, research has shown that being in poor health is associated with an increased risk of job loss or unemployment. For example, a meta-analysis by van Rijn et al. (2014) of longitudinal studies on the relationship between health status and exit from paid employment found that poor health is associated with increased risk of exit from paid employment.

[129] DOS (2020e)

In addition to providing income from earnings, for many, employment may secure funding for healthcare in the form of employer-sponsored medical insurance or direct payment by employers for medical expenses. This is especially true for those in "standard" employment, where workers have job stability and access to legally mandated benefits such as paid sick leave, maternity leave and other forms of social protection[130]. In Malaysia, even with highly-subsidised public healthcare costs, paid employees (in both the public and private sectors) rely at least partially on their employers for sources of healthcare payments, as shown in Figure 3.1.

Figure 3.1: Typical sources of healthcare payments by occupation, 2019



Note: Those in the unpaid worker/home maker category may have their healthcare costs paid for by the employer of their family member.
Source: IPH (2020b)

[130] Hawati and Nur Thuraya (2020)

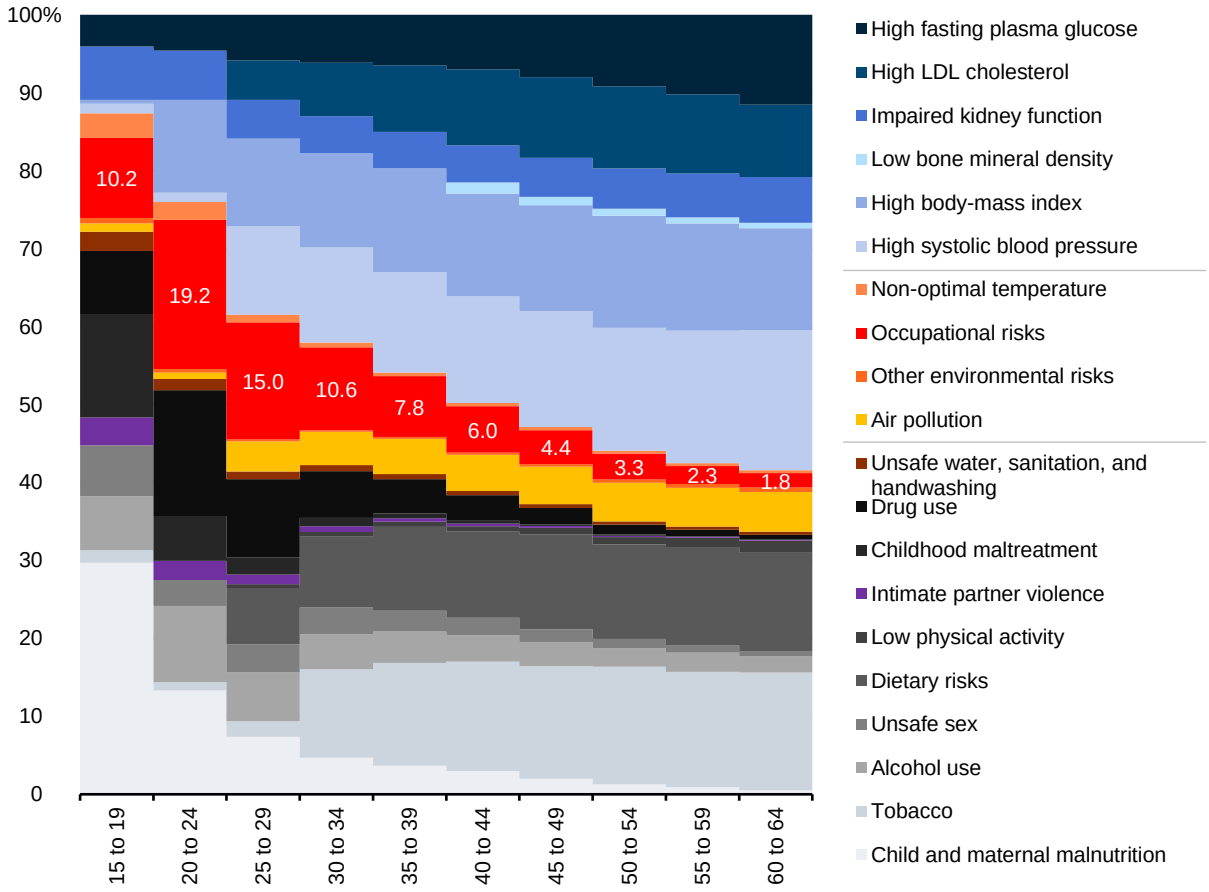
Thus, employment provides a crucial source of healthcare funding for many Malaysians, not only in the form of salaries and wages earned, but also employer-sponsored insurance or even direct payments. This enables them to increase their health-seeking behaviours and access to healthcare services.

3.1.2. Exposure to physical and chemical hazards

Work can be detrimental to health if it exposes individuals to physical and chemical hazards including harmful substances such as asbestos, pesticides and other carcinogens, which can lead to potentially fatal diseases such as lung cancer. Workplace accidents can result in injuries or death, dominating conventional discussions of occupational health and industrial injuries.

The Global Burden of Disease (GBD) study provides estimates of the effects of these occupational risk factors on human health. Based on the GBD 2019 study, 4.9% of Malaysia's overall working age population's burden of disease (DALYs) can be attributed to these occupational hazards. Notably, occupational risks were major contributors to the disease burden of youths, responsible for 19.2% of the disease burden attributable to risk factors for 20 to 24 year olds, as shown in Figure 3.2.

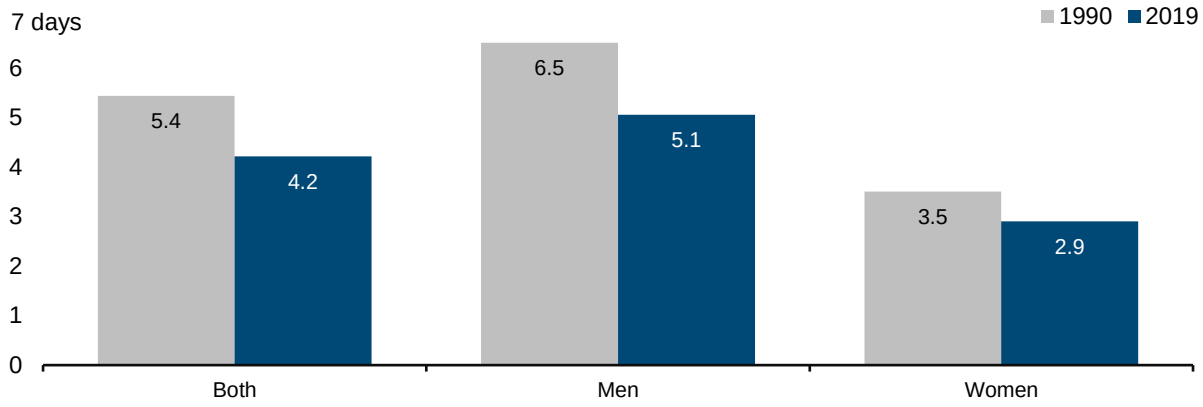
Figure 3.2: Proportion of working age population's burden of disease by risk factor, 2019



Source: Global Burden of Disease Collaborative Network (2020)

In 2019, each member of Malaysia's workforce lost approximately four days on average to diseases that can be attributed to selected occupational risks, as shown in Figure 3.3. In 2019, men lost five days on average to occupational diseases, while women lost about three days a year on average. For both men and women, the number of days lost to occupational diseases declined in 2019 compared to 1990. Taken together, this has a significant impact on the national productivity and economic output.

Figure 3.3: Average days lost to disease attributable to occupational risks per worker by gender, 1990 and 2019



Note: Assumes that occupational risks only apply to those in the workforce
Source: Global Burden of Disease Collaborative Network (2020), DOS (2020g), KRI calculations

Despite existing preventive legislation, work-related injuries continue to occur. According to the Social Security Organisation (SOCSO), there were 70,000 work-related accidents in 2017, up from 60,000 in 2013. Even though rates of both fatal and non-fatal occupational injuries in Malaysia have fallen since the 1980s, workers in some sectors, such as agriculture, construction and mining, were more vulnerable than others to work-related injuries, although their wages do not reflect the higher work-related risks they face[131].

3.1.3. Exposure to psychosocial hazards

Although physical hazards remain a real risk for workers, much of ill health may also be due to psychosocial hazards in the workplace. Psychosocial hazards are defined by the ILO as the interactions among job content, work environment, employees' competencies and job satisfaction that affect health of workers[132]. Psychosocial hazards at work are often more difficult to characterise than physical hazards as psychosocial hazards reflect workers' perceptions and experiences, which can be influenced by many factors. Table 3.1 provides some examples of psychosocial hazards.

[131] Nur Thuraya and Siti Aiysyah (2020)
[132] ILO (1986)

Table 3.1: Examples of psychosocial hazards

Psychosocial hazard	Example of factors that may contribute to hazard
Job content	Lack of variety or short work cycles, fragmented or meaningless work, under use of skills
Workload & work pace	Work overload, intense time pressure, continually subject to deadlines
Work schedule	Shift work, night shifts, inflexible work schedules, unpredictable hours, long or unsociable hours
Control	Low participation in decision making
Environment & equipment	Inadequate equipment availability, suitability or maintenance; poor environmental conditions such as lack of space, poor lighting, excessive noise
Organisational culture & function	Poor communications, low levels of support for problem solving and personal development, lack of definition of, or agreement on, organisational objectives
Interpersonal relationships at work	Social or physical isolation, poor relations with superiors, interpersonal conflict, lack of social support, bullying, harassment
Role in organisation	Role ambiguity, role conflict and responsibility for people
Career development	Career stagnation and uncertainty, poor pay, job insecurity, low social value to work
Home-work interface	Conflicting demands of work and home, low support at home, dual career problems

Source: Leka and Jain (2010)

The landmark Whitehall studies of British civil servants in the 1960s and 1980s are notable for showing that individuals in lower status occupations were more likely to face more psychosocial stress and subsequently experienced substantially worse health outcomes. The studies are considered controlled with participants having the same access to healthcare under the National Health Service.

The first Whitehall study (Whitehall I) established the relationship between occupational status and coronary heart disease death rates. In the study, participants[133] in the lowest occupational category had 3.6 times the coronary heart disease death rates of participants in the highest occupational category[134]. After controlling for age and other standard risk factors such as smoking, high blood pressure and physical activity, the lowest occupational status group still had 2.1 times higher relative risk of coronary heart disease death compared to the highest occupational status group[135].

[133] The first Whitehall study involved 17,530 men who were followed-up for a period of seven and a half years. The participants were classified into the following categories according to their occupation status (in descending order of status): administrative, professional, executive, clerical and "other". The "other" category is the lowest in status, composed mainly of messengers and other low-skilled manual workers.
[134] Marmot et al. (1978)
[135] Marmot (1994)

The second Whitehall study[136] (Whitehall II), which began 20 years after Whitehall I, provides insights into the association between occupational status and health outcomes. The first phase of this Whitehall study found that the lower the job status, the higher the prevalence of various diseases for both men and women, after controlling for age. Further investigation found that the higher incidence of disease could be partly attributed to higher exposure to psychosocial hazards such as having highly demanding work and lack of control (e.g. low participation in decision making process) in lower status jobs[137]. These results illustrate how the psychosocial environment at work is an important determinant of health and contributes to ill health.

Since the Whitehall studies, other studies have shown the significant influence of workplace stress on health. A 2012 analysis of 13 studies with 200,000 individuals found that high job strain (defined as excessive job demand and low participation in decision making) was associated with greater incidence of coronary heart disease, even after adjusting for age, gender, lifestyle and conventional risk factors[138]. Similarly, a 2013 analysis of 29 studies found that high job stress is associated with increased risk of hypertension, even after controlling for other risk factors such as age, BMI, race and alcohol use[139].

With technological advances and increasingly globalised markets changing employment arrangements and working conditions, such psychosocial stressors may be more widespread, contributing to a range of health conditions not traditionally considered "occupational"[140]. As noted by the ILO, dramatic changes in the nature of work, such as new modes of employment, higher job demands and poor work-life balance, have increased the magnitude of challenges due to work-related psychosocial hazards[141].

One way the nature of work has changed is the spread of new work organisations and practices, such as "teleworking", or working from home. Working from home can have many benefits, such as enhanced work-life balance, greater flexibility, reduced overhead costs for employers and increased productivity[142].

[136] The Whitehall II study involves 6,900 men and 3,414 women aged 35 – 55 years employed in the British Civil Service when they were recruited for the study in 1985. This group has been followed up since then. Source: Marmot et al. (1991)
[137] Ibid.
[138] Kivimäki et al. (2012)
[139] Landsbergis et al. (2013)
[140] The WHO makes a distinction between "occupational diseases" and "work-related diseases". According to the WHO, an occupational disease is one that results primarily from an exposure to a risk factor from work activity (e.g. lung disease in miners due to high levels of exposure to small-sized dust particles). Work-related diseases are broader and can have multiple causes, where factors in the work environment may play a role, together with other risk factors, in the development of such diseases. Source: WHO (n.d.-h)
[141] ILO (2016b)
[142] Leka and Jain (2010)

Indeed, during the Movement Control Order (MCO) imposed in Malaysia in March 2020 in response to the Covid-19 pandemic, 43.7% of workers surveyed worked from home, an option biased towards high-skill occupations and uncommon for the country's most vulnerable workers[143]. While working from home may have many benefits, there have been some concerns of possible negative consequences on workers' health through social isolation and blurring of boundaries between work and home domains[144]. As working arrangements have changed, even more with Covid-19, it is important to ensure a healthy work-life balance for all.

3.2 Health of the nation's workers

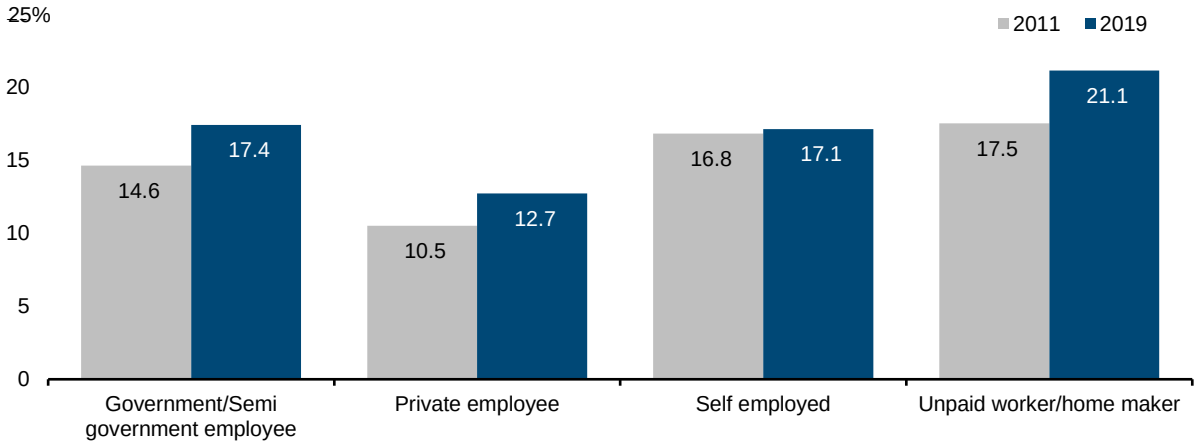
3.2.1. Physical health

The NHMS presents some health outcome indicators by type of occupation. Figures 3.4, 3.5 and 3.6 show the prevalence by employment status of three risk factors for developing CVDs, namely diabetes, high blood pressure and high cholesterol. As mentioned in the previous section, these three conditions significantly contribute to the development of coronary artery disease[145].

As can be seen in Figures 3.4, 3.5 and 3.6, large proportions of workers in Malaysia have the risk factors for developing CVDs. Worryingly, between 2011 and 2019, the prevalence of diabetes increased across all employment statuses, with unpaid workers/home makers seeing the highest rise in prevalence at 3.6 percentage points. Unpaid workers/home makers also had the highest prevalence of hypertension and high cholesterol levels than other employment categories in 2019, at 34.7% and 47.3%, respectively, although the prevalence rates have declined compared to previous years. Private sector employees consistently had the lowest prevalence rates of diabetes, hypertension and high cholesterol relative to all other employment categories. In 2019, approximately one in eight private sector employees had diabetes, one in five had high blood pressure and one in three had high cholesterol levels.

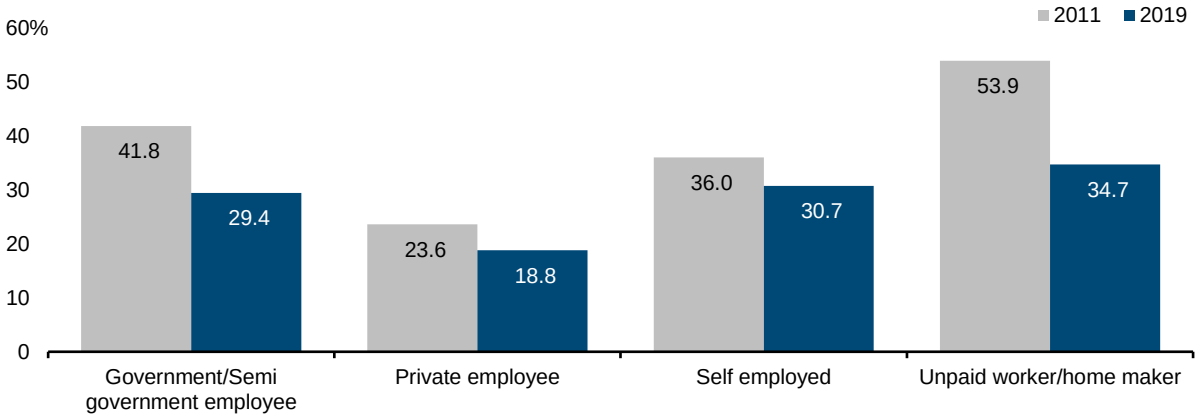
[143] Siti Aiysyah (2020a)
[144] Mann and Holdsworth (2003), Leka and Jain (2010)
[145] Mehta, Wei and Wenger (2015), IPH (2015), Ang and Chan (2016)

Figure 3.4: Prevalence of diabetes by employment status, 2011 and 2019



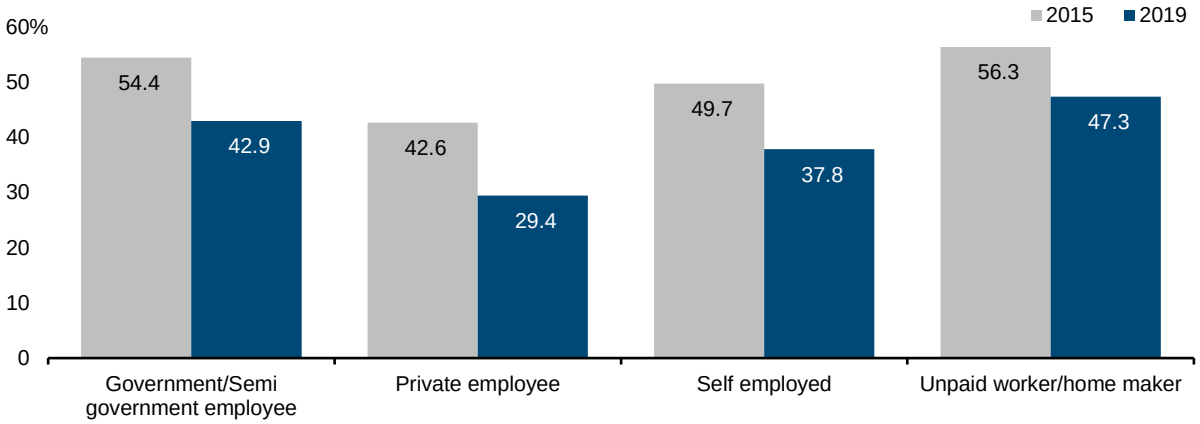
Source: IPH (2015), IPH (2020b)

Figure 3.5: Prevalence of high blood pressure by employment status, 2011 and 2019



Source: IPH (2015), IPH (2020b)

Figure 3.6: Prevalence of high cholesterol level by employment status, 2015 and 2019[146]

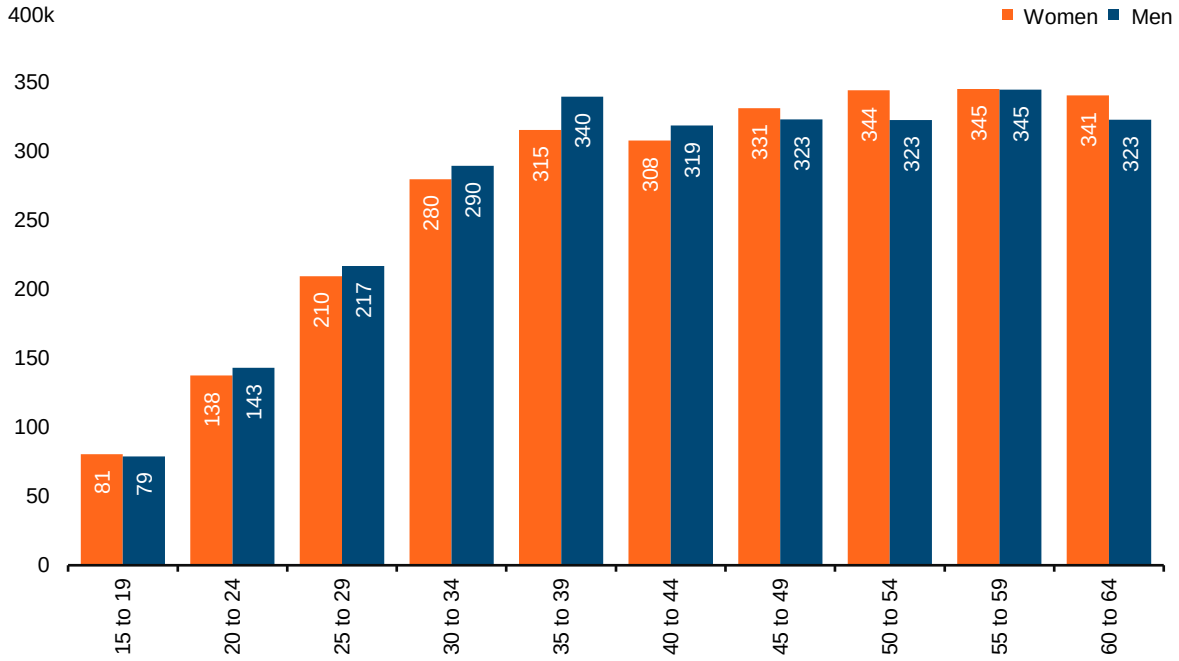


Source: IPH (2015), IPH (2020b)

[146] For high cholesterol level, comparison with 2011 is not made as the reported employment categories are different than those reported for latter years.

What does this mean for the resilience of Malaysia's workforce? According to one study, an estimated 5.4 million working age individuals in Malaysia have at least one underlying health condition that puts them at increased risk of developing severe Covid-19[147]. Such underlying health conditions include CVDs, chronic kidney disease and chronic respiratory diseases. Existing evidence suggests that those with these underlying conditions are more likely to develop severe symptoms which typically require hospitalisation, ventilation and involve increased risk of mortality[148]. In Malaysia, most of the deaths due to Covid-19 were individuals with underlying chronic health problems[149]. Figure 3.7 shows that even those in younger age groups may develop severe Covid-19, although more older people are at increased risk.

Figure 3.7: Number of individuals at increased risk of severe Covid-19, by gender and age group, 2017



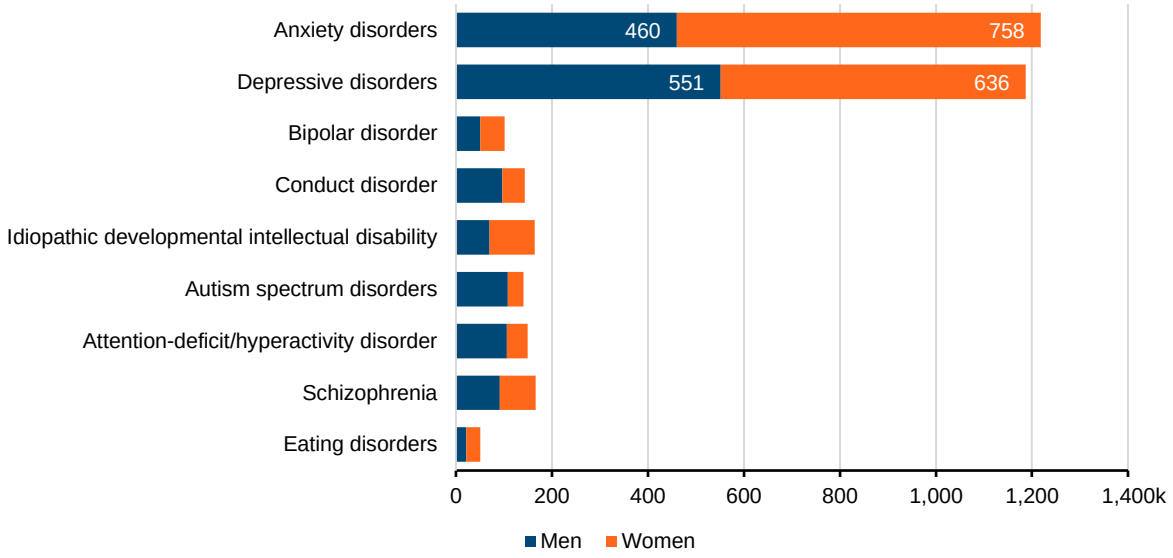
Source: Clark et al. (2020)

3.2.2. Mental health

There has been increasing concern about mental health globally, especially in the working age population. High levels of work-related stress may lead to depression, anxiety, burnout and suicide, particularly among young working women and men[150]. On average, around 20% of the working age population in OECD countries have a mental disorder[151]. For Malaysia, in 2019, anxiety and depressive disorders were the most common form of mental disorders among Malaysia's working age population, especially for women, as shown in Figure 3.8. The prevalence of these mental disorders is higher for women.

[147] Clark et al. (2020)
[148] CDC (2020) and ISS (2020)
[149] MOH (2020a)
[150] Melchior et al. (2007)
[151] OECD (2012)

Figure 3.8: Number of working age individuals with mental disorders by gender, 2019



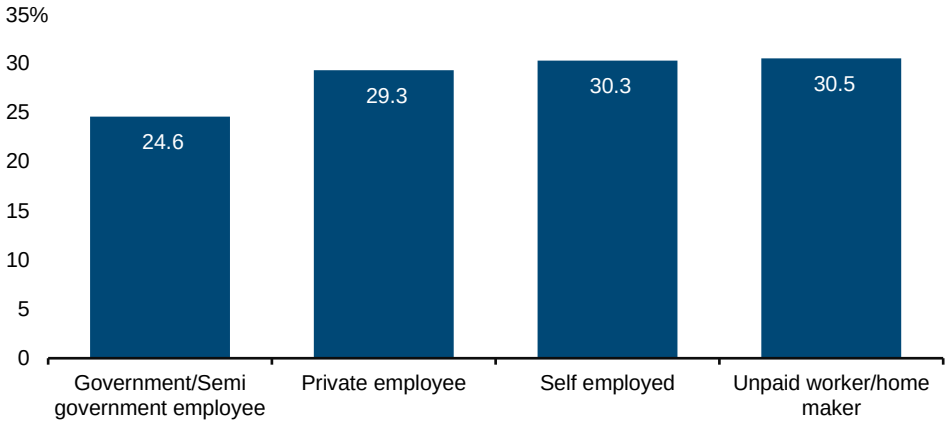
Source: Global Burden of Disease Collaborative Network (2020)

The total burden of mental disorders in Malaysia's working age population in 2019 is estimated to be 439,643 DALYs[152]. To estimate the economic impact of mental disorders for this population, one crude method used in the WHO Commission on Macroeconomics and Health 2001 report suggests that one DALY lost incurs an economic loss (e.g. by reducing worker productivity and earnings) equivalent to between one and three times a country's annual GDP per capita[153]. In 2019, Malaysia's projected GDP per capita was RM46,450[154]. Using the conservative estimate (i.e. one DALY equal to one GDP per capita), mental disorders among Malaysia's working age population cost RM20.4b in 2019. This figure is in line with those produced by Relate Malaysia, which estimates that mental health conditions in the workplace cost RM14.5b to the Malaysian economy in 2018, as a result of absenteeism, presenteeism (working while unwell) and staff turnover[155].

According to the NHMS, in 2015, approximately one in three private sector, self-employed and unpaid workers/home makers in Malaysia experienced some form of mental ill health, as shown in Figure 3.9. The prevalence was only slightly lower among government/semi-government employees, affecting around one in four individuals.

[152] This is equivalent to 439,643 years of good health lost to premature death and disability. Source: Global Burden of Disease Collaborative Network (2020)
[153] WHO (2001)
[154] DOS (2020h)
[155] Chua (2020)

Figure 3.9: Prevalence of mental health problems among adults by employment status, 2015



Source: IPH (2015)

3.3 Health of Malaysia's vulnerable working age populations

Poor working conditions are unequally distributed among working people, usually most prevalent amongst the lowest status workers. Workers in informal employment, foreign workers and the unemployed may be more vulnerable to ill health due to their working conditions, as discussed below.

3.3.1. Workers in informal employment

Workers in informal employment are characterised by their lack of legal and other protections linked to employment. This includes workers in the informal sector (consisting of unregistered businesses) as well as those in the formal sector such as contract-based workers who lack statutorily protected working conditions, wages, access to paid sick leave and more[156]. Self-employed workers (also known as own account workers) and unpaid family workers also generally fall in the category of workers in informal employment[157].

Thus, those in the "unpaid worker/home maker" category in Malaysia tend to have the highest prevalence of poor health including conditions such as diabetes, high blood pressure and mental health problems, as shown above.

[156] Nur Thuraya and Tan (2019)
[157] Siti Aiysyah (2020b)

Workers in informal employment also tend to work in precarious jobs, which can be detrimental to their health. Precarious jobs are defined by exposure to multiple stressors, including strenuous tasks which the worker has low control over (e.g. not included in the decision-making process), low wages and high job instability. Internationally, those in precarious employment, including temporary contract workers and part-time workers, have worse health outcomes compared to workers on full-time or permanent contracts. For example, temporary workers have been found to have significantly higher mortality compared to permanent workers[158]. Additionally, shift workers have been found experience a 2.9-fold increase in the odds of developing coronary artery disease compared with standard/regular day workers[159].

Women in informal employment may be at higher risk of experiencing work-related health conditions compared to men, particularly as much of women's work in the informal economy is unpaid. In 2017, 10.9% of all female workers in the Malaysian informal sector were unpaid family workers, compared to 6.3% of male workers in the informal sector[160]. Moreover, occupational safety and health inquiries typically focus on problems relating to male-dominated work, frequently understating the illnesses and injuries that women experience, which thus often go unrecorded[161].

There is a need to gain better understanding of workers in informal employment in Malaysia, including their employment and working conditions. Examining the impact of their work on health outcomes will be especially important as such forms of employment may be even more widespread in the future[162].

3.3.2. Foreign workers

Foreign workers[163] in Malaysia face significant challenges that have made them among the most vulnerable workers in Malaysia. Although the actual number of foreign workers in Malaysia is uncertain, data from past Labour Force Survey reports suggest that both documented and undocumented foreign workers make up 14 to 16% of the total employed persons in the country since 2010[164]. In 2019, foreign workers made up 31.9% of the workforce in agriculture, and 22.5% and 21.5% of the workers in construction and manufacturing, respectively[165].

158 Kivimäki et al. (2003)
159 Kang et al. (2016)
160 Siti Aiysyah (2020b)
161 ILO (2016b)
162 For further discussion on informal and non-standard employment in Malaysia, see: *The Demise of Formal Employment? — A Literature Update on Informality*, *Unregistered and "Invisible": Workers in Malaysia's Informal Sector* and *Shrinking "Salariat" and Growing "Precariat"? Estimating Informal and Non-standard Employment in Malaysia*.
163 Foreign workers in this context refer to low-paid, low- to semi-skilled workers, both documented and undocumented. This definition includes foreign domestic helpers but excludes expatriate workers who work in high-paying, highly skilled jobs.
164 Tan, Nazihah and Jarud (2020)
165 Ibid.

Despite being a sizeable portion of the country's workforce, there are limited legal protections for foreign workers in Malaysia. According to ILO (2017), foreign workers in Malaysia often work nine to 11 hours daily for six or seven days per week, greatly exceeding the country's legal maximum of 48 hours per week. Despite working long hours, the ILO reports that the majority of workers earn below the legal minimum wage, especially the undocumented[166].

Furthermore, foreign workers in Malaysia typically face financial barriers in accessing healthcare services. While Malaysian citizens enjoy highly subsidised public health, non-citizens are charged significantly higher rates. While the daily ward charges for a Malaysian national is RM3, a non-citizen can expect to pay RM160 per day, 53.3-fold more. For outpatient treatment, non-citizens are charged RM40 compared to RM1 for Malaysians[167]. These fees can impose a significant cost burden on foreign workers as a share of their income, considering they are often paid lower wages[168]. Although documented foreign workers are enrolled in a mandatory health insurance scheme (Skim Perlindungan Insurans Kesihatan Pekerja Asing), the workers typically still have to pay out-of-pocket for medical care as the insurance schemes only provide very limited coverage for hospitalisation and surgery charges at MOH hospitals[169].

The ILO also noted that foreign workers in Malaysia face additional precarity because their legal status is often tied to their employer. For example, should their employer decide to let them go or to no longer renew their work permits, they could lose their legal standing not only to work, but to remain in the country. This may leave workers stranded in Malaysia as the cost of returning to their home country may be high and is not borne by the employer, yet they may face persecution for being undocumented[170].

This is particularly pertinent in light of the Covid-19 pandemic, as many businesses have been forced to lay off their workers, particularly foreign nationals, thus leading to workers losing their documented status at a time when undocumented foreign nationals face discrimination in various ways. Box 3.1 makes a case for protecting foreign workers, regardless of their legal status, during the Covid-19 pandemic.

166 ILO (2017)
167 Loganathan et al. (2019)
168 Jarud and Nazihah (2020)
169 Loganathan et al. (2019)
170 ILO (2017)

Box 3.1: The Case for Protecting Foreign Workers During Covid-19

Since the start of the Covid-19 pandemic, the conditions of foreign workers have been largely overlooked by policymakers in many countries. For example, Singapore's initial success in controlling the pandemic was overturned by an outbreak among foreign workers living in densely-populated dormitories. Within months, the number of confirmed cases went from 102 on 1 March 2020 to over 51,000 on 31 July 2020[171], with over 90% of cases amongst foreign workers. This pushed the Singaporean government to implement urgent measures to protect the workers, including building new dormitories by the end of 2020 to reduce the current density[172].

In Malaysia, there is still much that should be done to improve foreign workers' conditions in the country. There are several strong economic and public health reasons for protection of foreign workers in Malaysia, especially in the face of the Covid-19 pandemic, besides reasons of human rights and international law. As noted earlier, foreign workers make up a significant portion of the country's workforce. Without foreign workers, we may be undermining well over 30%, 22% and 20% of the agriculture, construction and manufacturing sectors' workforces, respectively. This will have dire consequences for the economy, which would not easily prepare to adapt to the loss of labour.

From a public health perspective, extending protection to include workers is necessary to prevent an outbreak among or transmission by this group, which in turn reduces the risk of an outbreak in the greater population. Foreign workers, especially undocumented ones, are unlikely to seek medical care for fear of being detained and/or deported, thus may not know if they carry an infection, especially if they do not have symptoms.

Furthermore, the mass detention of undocumented foreign workers could worsen their living conditions as they would be forced to stay together, in more crammed quarters in immigration detention centres. Indeed, several Covid-19 outbreaks have been reported affecting detainees in lock ups, prisons and immigration centres[173]. Any infection has the potential to spread the virus, and any outbreak has the potential to further strain Malaysia's public healthcare system, regardless of citizenship.

Malaysia's national strategy to limit the spread and impact of Covid-19 must include foreign workers, or risk economic and public health spill-over effects. Policy options that could be considered include facilitating testing, treatment and isolation of foreign workers, stepping up job protection, and strengthening regional cooperation and coordination with Malaysia's neighbouring countries[174]. In an infectious disease pandemic, no one is safe until everyone is safe.

[171] OurWorldInData (2020)
[172] Ministry of National Development of Singapore and Ministry of Manpower of Singapore (2020)
[173] Kanyakumari (2020)
[174] For further exploration of these policy options, refer to Tan, Nazihah and Jarud (2020)

3.3.3. Unemployed persons

While employment can have both positive and negative effects on health depending on working conditions, the evidence strongly suggests that the impact of unemployment on health is always negative. Being unemployed has been found to be associated with higher mortality compared to being employed[175]. Furthermore, numerous studies, such as those following the global financial crisis (GFC) of 2008, consistently found that loss of employment has significant long-term detrimental effects on both physical and mental health[176]. Additionally, the negative health effects of unemployment have been found to be associated with the duration of unemployment, with the adverse effects being greatest among those who experience long-term unemployment[177]. Thus, getting people into work is of critical importance for health, although as illustrated previously, the quality of work matters.

The unemployment rate[178] in Malaysia has remained low and largely stable in past decades. As noted in Part II of SOH2020, prior to 2020, the overall unemployment rate in Malaysia stood at an average of 3.9% for the past 37 years. In 2019, it was 3.3%[179]. However, following the Covid-19 pandemic, unemployment figures rose beginning March 2020, coinciding with the implementation of the MCO. The unemployment rate peaked at 5.3% in May 2020 and has since shown signs of recovery, reported at 4.7% in August 2020[180]. However, resurgence of Covid-19 cases may force measures which could worsen unemployment. Appropriate active labour market policies and planning are crucial in view of expected changes in employment to prevent further detrimental health consequences in the aftermath of the Covid-19 pandemic. The next section further discusses policy implications and responses that should be considered.

[175] The Marmot Review (2010)
[176] Bender, Economou and Theodossiou (2012), Frasquilho et al. (2016)
[177] Maier et al. (2006), Milner, Page and LaMontagne (2013)
[178] Defined as the proportion of those aged 15 to 64 who are actively seeking work but are unable to find work.
[179] KRI (2020)
[180] DOS (2020f)

CONCLUSION

"Healthy life is an outcome of sustainable development, as well as a powerful and undervalued means of achieving it. We need to see health both as a precious asset in itself, and as a means of stimulating economic growth and reducing poverty."

Dr Gro Harlem Brundtland
Director-General Emeritus, WHO

CONCLUSION

At a glance, Malaysians have improved their health status over the years. The population as a whole has seen continuous increasing life expectancies. However, as shown in Section 1, the growth in life expectancy has slowed in the past decades.

Additionally, life expectancy alone is not an adequate measure of population health. As illustrated in Section 1, much of the additional years of life experienced by Malaysians over the past decades are not necessarily lived in good health. Many Malaysians experience debilitating health conditions such as heart disease, back pain and mental ill health, reducing their quality of life. Thus, we must also consider healthy life expectancy as a measure of the health of the population, that is, the amount of years that an average Malaysian can live in good health without diseases and disability.

To accurately assess Malaysia's achievements in improving the health of its population, it is important to examine not only changes in levels of health over time, but also to see how health is distributed and how equally gains in health are enjoyed across society. Some differences in health outcomes may be inevitable, e.g. due to genetic factors, such as differences in the risk of developing specific diseases across age groups. While genetics and lifestyle factors are important determinants of health, it is increasingly recognised that the majority of differences in health status can be attributed to the uneven distribution of social factors such as income and working conditions. These social determinants of health are dubbed as the "causes of the causes" of health outcomes.

Indeed, findings in this report support the claim that health inequalities are often tied to social inequalities. Available statistics for Malaysia suggest that in general, the most socially disadvantaged members of society are the ones who experience more detrimental exposure and greater vulnerability to health-damaging factors. Section 2 presents a clear gradient of health outcomes according to income gradients; for example, the poorer the household, the higher the prevalence of high blood pressure, mental ill health and functional disability (e.g. seeing, hearing and walking). Section 3 illustrates that unpaid workers and home makers are almost always worse off than other workers, including being less likely to use medical insurance compared to private sector employees to pay for healthcare, meaning they are more likely to rely on out-of-pocket payments. This also suggests that unpaid workers and home makers are more dependent on unstable financial sources to pay for care, influencing their decision to seek care and subsequently contributing to unequal health outcomes. Such differences in health by socioeconomic status are unnecessary, unfair and avoidable.

Considering the importance of social factors in determining health outcomes, policies must place greater importance on the social mechanisms underlying the inequitable distribution of health. Hence, an intersectoral approach to tackling issues such as eliminating barriers to education, scaling up social protection for neglected populations and improving housing conditions are needed. In other words, in designing national policies to improve the overall well-being of the nation—whether it be urban, educational or industrial planning—policymakers must take into account health considerations across all policies.

Furthermore, health policy must take a longer term, preventive approach to address the root causes of health challenges, going beyond curative care. Currently, Malaysia's health system focuses more on curative care, with 68.3% of total health expenditure spent on curative care services in 2018, compared to only 6.1% on preventive services[181]. Numerous studies have shown that greater investment in preventive services would be more cost-effective in the long run[182]. In addition to being highly cost-effective, public health interventions are typically intended to benefit the wider population, rather than only those who can afford medical care.

Any plans to improve population health requires comprehensive understanding of the numerous factors driving health outcomes. Yet, data on the social, economic and environmental factors that affect health in Malaysia is limited, or at least not publicly available or easily accessible. This means that research to address the social determinants of health is often hindered by insufficient data. For example, while the government collects information on the specific occupation of the NHMS respondents, the NHMS only reports on the health status of workers by broad occupation groups, namely government/semi government employees, private employees, self-employed, and unpaid workers/home makers. This highly aggregated data prevents more meaningful analysis of the impact of work on the health of Malaysians, especially as these categories cannot be easily compared to the occupation categories used in the Labour Force Survey, one of the key sources of data for research on the Malaysian workforce. Additionally, publicly available disaggregated health data (such as life expectancy, mortality rates and prevalence of diseases by districts) would enable greater analysis of health inequalities so that they can be addressed.

Considering the importance of health for social development and vice versa, one option to be considered is to harmonise the NHMS (currently the main source of population health statistics) with other existing national surveys. Harmonising here means that for overlapping areas of interest, similar questions and categories are used. Harmonising the surveys would allow policy researchers to better understand the interrelationship between health and other social factors such as income, expenditure and labour. This may be feasible since the NHMS uses the same sampling framework as the Household Income and Expenditure Survey and the Labour Force Survey.

With greater understanding of the social context underlying health statistics, we can not only ensure continued improvements in the nation's health, but also ensure that improvements are shared by all, regardless of social position.

[181] Preventive services include vaccination programmes, health promotion campaigns, screening programmes, family planning services and countless other public health programmes for the entire nation. This also includes the country's disease surveillance and control programmes, which are crucial in giving early warning of potential outbreaks such as Covid-19. Other top health spending in 2018 were 8.8% on medical goods for out-patients, 7.4% on health administration and insurance, and 5% on health personnel education and training. Source: MOH (2020c)

[182] Masters et al. (2017), WHO (2014)

APPENDICES & REFERENCES

APPENDIX A

CHILD MORTALITY RATES AND MATERNAL MORTALITY RATIO

Table A1: Neonatal mortality rate by state, 2000 – 2019

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Per 1,000 live births																				
MALAYSIA	3.1	3.7	3.8	3.7	3.7	3.9	3.8	3.8	4.0	4.3	4.3	4.2	4.0	4.0	4.2	4.3	4.2	4.4	4.6	4.1
Johor	3.6	4.6	4.3	4.2	4.1	4.2	4.0	3.9	4.4	4.1	4.4	3.9	4.4	4.1	4.0	4.7	4.8	4.5	4.3	3.9
K. Lumpur	3.1	3.8	4.1	2.8	2.8	3.1	3.1	3.9	3.3	3.1	3.2	4.1	2.9	3.0	3.7	3.1	4.1	3.8	4.0	2.8
Kedah	3.0	5.2	4.1	5.0	4.6	5.0	4.5	5.2	5.6	5.5	5.4	4.5	4.9	4.4	4.5	4.1	4.8	3.8	4.2	4.0
Kelantan	4.5	4.1	3.4	3.8	3.3	4.0	3.7	4.6	4.9	5.9	5.4	4.9	5.2	4.8	5.5	4.3	5.0	5.1	5.1	5.0
Labuan	2.0	1.3	10.2	5.7	5.9	5.3	9.5	7.6	4.8	7.2	7.4	6.9	5.1	6.3	5.3	5.6	5.1	4.2	7.1	4.2
Melaka	5.7	5.5	5.7	5.0	5.3	5.6	5.3	4.8	5.7	5.6	5.2	5.7	4.7	3.6	3.7	3.2	4.2	4.2	4.9	4.5
N. Sembilan	3.6	4.2	4.0	5.3	3.3	4.3	5.5	4.1	4.3	5.8	4.6	4.1	4.8	4.7	4.4	4.8	4.3	5.7	6.1	5.2
P. Pinang	4.5	4.0	4.7	4.3	4.9	4.1	4.6	3.8	3.7	4.3	4.6	4.9	4.4	4.0	3.5	4.6	4.6	3.9	4.3	3.9
Pahang	4.8	4.2	4.9	4.3	4.9	5.5	4.8	3.8	4.4	4.9	4.3	5.6	4.7	6.1	4.1	4.7	4.3	4.7	4.6	4.6
Perak	3.2	3.5	3.8	3.5	4.1	3.8	3.6	4.0	3.6	4.4	4.9	4.0	4.2	4.5	3.9	3.9	4.4	4.6	4.4	4.5
Perlis	5.6	5.3	5.2	4.9	4.3	3.3	5.4	5.8	6.0	4.7	5.8	6.2	4.1	7.7	4.9	5.3	3.9	2.5	6.4	4.5
Putrajaya	-	-	-	-	-	-	-	-	-	-	4.5	5.4	4.8	6.1	4.6	4.2	5.4	4.8	5.0	3.5
Sabah	-	-	-	-	-	-	-	-	-	-	2.6	2.0	2.1	2.0	5.4	7.1	3.3	6.1	6.3	3.9
Sarawak	1.9	3.1	3.3	2.9	3.2	3.6	3.8	4.0	3.9	4.7	4.2	4.2	3.8	3.4	3.7	3.4	3.5	4.2	3.8	3.2
Selangor	3.2	2.9	3.2	3.6	3.3	3.2	2.9	3.0	3.4	3.7	3.6	3.8	3.3	3.6	3.1	3.3	3.6	3.7	4.1	3.8
Terengganu	2.2	5.1	6.1	5.6	5.9	7.0	6.3	6.5	6.5	5.9	6.1	6.0	5.4	6.2	5.8	5.1	4.4	4.1	4.2	4.8

Note: For the year 2000 – 2009, Selangor includes Putrajaya.
Source: DOS (2020k), DOS (2015b)

Table A2: Infant mortality rate by state, 2000 – 2019

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Per 1,000 live births																				
MALAYSIA	6.0	6.5	6.9	6.6	6.5	6.7	6.3	6.3	6.4	6.9	6.7	6.5	6.2	6.3	6.7	6.9	6.7	6.9	7.2	6.4
Johor	6.2	7.7	7.1	7.1	6.8	7.3	6.5	6.1	6.9	6.7	7.1	6.4	7.0	6.3	6.1	7.3	7.4	6.8	6.9	6.3
K. Lumpur	5.5	6.7	7.1	5.4	4.8	5.1	5.3	6.1	4.9	5.4	5.5	6.4	4.7	4.9	6.2	5.4	6.2	6.5	6.2	4.4
Kedah	5.9	8.5	7.3	7.7	7.4	7.9	6.8	7.7	8.1	7.8	7.8	6.6	7.2	6.7	6.3	6.6	7.1	5.9	6.4	6.4
Kelantan	10.1	8.7	8.6	9.2	7.9	8.9	7.6	8.2	7.9	9.5	8.4	7.7	8.1	7.4	8.1	6.7	7.7	7.7	7.5	7.2
Labuan	5.4	3.4	13.0	7.6	7.9	9.9	14.5	10.8	8.9	9.7	9.2	8.1	7.9	7.5	8.0	9.2	8.0	7.1	9.5	6.6
Melaka	7.8	7.5	9.3	8.1	8.9	8.4	8.0	7.8	8.2	8.9	8.1	8.6	7.4	6.6	5.8	5.5	6.9	6.6	7.6	6.3
N. Sembilan	5.7	7.5	7.5	8.2	5.9	8.3	8.5	6.2	6.9	8.9	7.2	7.1	7.5	7.4	6.9	6.9	6.4	8.2	8.9	7.6
P. Pinang	7.0	6.5	8.1	6.3	8.1	6.4	7.4	5.8	6.0	6.4	6.8	7.2	6.6	6.0	5.6	6.3	6.5	5.8	6.4	5.5
Pahang	8.7	8.0	9.2	8.7	9.5	9.5	8.7	8.1	7.7	8.8	7.6	9.5	8.0	9.4	7.4	7.7	7.4	7.4	7.3	7.1
Perak	7.1	6.5	7.1	6.8	7.7	7.4	5.9	6.9	6.2	7.2	8.0	6.2	6.6	6.7	6.2	6.4	6.9	6.9	6.6	7.0
Perlis	8.8	7.8	8.0	7.9	6.8	7.9	8.0	7.3	8.1	7.6	8.0	9.6	6.5	8.9	7.5	8.1	5.9	5.6	8.9	5.7
Putrajaya	-	-	-	-	-	-	-	-	-	-	7.4	8.5	9.2	10.4	10.1	7.7	8.2	8.3	9.2	8.2
Sabah	-	-	-	-	-	-	-	-	-	-	4.2	3.8	3.3	3.6	10.0	11.2	5.7	9.6	10.1	6.6
Sarawak	5.2	5.4	5.7	5.7	5.4	6.1	6.8	6.5	6.3	7.4	6.8	6.5	6.4	5.7	5.7	5.6	6.0	6.3	7.2	5.7
Selangor	5.2	5.2	6.0	6.0	5.7	5.3	5.0	5.3	5.4	5.9	5.7	5.6	5.3	6.0	5.3	5.3	6.1	6.0	6.5	6.1
Terengganu	7.2	9.4	10.0	8.7	9.7	10.3	9.9	10.1	9.4	8.7	8.3	8.9	7.6	9.1	7.9	7.9	7.2	6.2	6.1	7.3

Note: For the year 2000 – 2009, Selangor includes Putrajaya.
Source: DOS (2020k), DOS (2015b)

Table A3: Under-five mortality rate by state, 2000 – 2019

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Per 1,000 live births																				
MALAYSIA	7.9	8.5	9.1	8.8	8.5	8.6	8.1	8.1	8.1	8.6	8.4	8.0	7.6	7.9	8.3	8.4	8.1	8.4	8.8	7.7
Johor	8.1	9.7	9.3	9.1	8.6	9.0	7.9	7.4	8.9	8.0	8.6	7.8	8.5	7.7	7.4	8.5	9.0	8.2	8.4	7.7
K. Lumpur	7.0	8.0	8.8	7.3	6.3	6.5	6.1	7.4	6.5	6.6	7.2	7.6	5.6	6.0	7.1	6.5	7.4	7.7	7.3	5.1
Kedah	7.8	11.2	10.0	10.1	9.6	9.8	8.7	9.7	10.0	9.4	9.2	7.8	8.5	8.3	7.9	7.8	8.6	7.3	8.0	7.9
Kelantan	13.5	5.4	12.2	12.7	11.4	12.6	11.1	11.4	11.0	12.2	10.7	9.7	9.9	9.3	10.1	8.1	9.5	9.3	8.9	8.9
Labuan	8.0	4.7	13.0	8.8	9.9	10.6	14.5	11.4	10.7	12.7	12.3	9.2	9.0	9.2	9.1	9.7	9.7	7.1	10.1	9.6
Melaka	9.8	4.7	10.8	10.5	11.1	10.3	8.9	9.6	9.5	10.6	9.5	10.2	8.3	7.8	7.1	7.0	7.9	7.9	8.3	7.5
N. Sembilan	7.5	9.9	9.2	10.1	7.8	9.8	10.8	8.0	8.4	10.2	9.2	8.5	8.4	9.0	8.0	8.4	7.5	9.9	10.4	8.8
P. Pinang	8.4	7.6	9.5	8.5	10.1	7.9	8.9	7.5	7.1	7.5	8.5	8.5	7.7	7.3	7.0	7.5	8.0	7.0	7.6	6.4
Pahang	11.4	11.8	12.9	12.2	12.9	12.6	12.2	11.1	10.4	11.8	10.1	11.7	10.7	11.5	9.4	9.7	9.2	9.3	9.0	8.9
Perak	9.5	9.0	10.6	9.8	10.5	10.3	8.6	9.5	8.2	10.4	10.6	8.2	8.4	9.0	7.8	8.1	8.6	8.5	8.4	8.6
Perlis	11.0	9.4	10.2	9.4	8.3	10.4	10.0	9.6	10.8	9.4	10.0	12.7	8.9	10.1	8.0	8.8	6.8	6.7	10.3	6.9
Putrajaya	-	-	-	-	-	-	-	-	-	-	8.6	9.1	10.8	11.1	12.7	9.4	10.9	9.1	11.3	9.1
Sabah	-	-	-	-	-	-	-	-	-	-	5.0	4.6	4.2	4.7	12.9	14.0	7.2	12.4	12.7	8.0
Sarawak	7.8	7.4	7.6	7.7	7.1	8.2	8.8	8.6	8.0	9.3	8.3	7.9	7.7	7.5	7.4	6.9	7.5	7.9	9.5	7.1
Selangor	6.4	6.6	7.7	7.4	7.0	6.6	6.2	6.4	6.8	7.0	7.0	7.0	6.5	7.4	6.5	6.5	7.4	7.2	7.8	7.4
Terengganu	9.5	11.9	13.1	11.6	12.2	12.4	11.6	12.3	11.4	10.6	10.3	10.9	9.3	11.0	9.6	9.6	8.6	7.5	7.3	8.2

Note: For the year 2000 – 2009, Selangor includes Putrajaya.
Source: DOS (2020k), DOS (2015b)

Table A4: Maternal mortality ratio by state, 2000 – 2019

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Per 100,000 live births																				
MALAYSIA	24.4	29.9	32.2	28.5	27.2	27.4	26.9	28.8	27.0	26.7	26.1	26.2	23.2	21.4	22.3	23.8	29.1	25.0	23.5	21.1
Johor	19.4	14.7	20.1	18.9	24.4	17.7	33.5	50.2	17.3	32.8	21.4	29.2	26.5	20.9	26.5	23.1	26.9	24.6	27.8	20.0
K. Lumpur	17.0	36.7	15.4	15.9	16.1	21.2	20.8	12.0	19.9	11.6	24.5	15.7	37.1	11.8	18.5	3.9	27.2	24.3	41.3	18.5
Kedah	24.4	34.1	35.5	22.6	45.6	35.0	14.8	32.4	36.7	27.8	42.7	25.0	19.2	11.4	27.4	35.3	13.9	27.3	25.3	17.4
Kelantan	22.3	21.0	32.2	33.6	42.7	32.3	29.7	26.6	34.4	44.8	44.4	31.8	13.5	33.0	28.0	20.5	26.0	25.6	18.2	24.5
Labuan	0.0	0.0	0.0	126.3	0.0	0.0	0.0	0.0	59.5	0.0	61.3	0.0	0.0	0.0	0.0	0.0	57.1	0.0	0.0	0.0
Melaka	13.1	7.0	65.2	21.6	7.4	45.0	46.3	14.9	44.1	7.4	15.4	28.6	7.0	14.6	34.3	41.2	27.8	27.8	27.8	0.0
N. Sembilan	5.2	22.6	34.0	40.5	41.0	23.8	18.0	29.1	40.3	17.3	35.4	45.3	11.2	34.3	37.5	21.7	5.5	22.1	33.0	51.7
P. Pinang	3.7	12.1	28.3	29.8	21.8	17.7	27.3	22.3	17.4	26.3	37.8	13.4	21.0	14.0	17.5	27.0	50.5	41.9	19.3	29.8
Pahang	23.7	76.1	70.9	42.1	42.5	38.9	40.3	28.0	35.1	26.9	27.0	40.6	32.8	18.5	24.4	10.7	36.2	29.0	33.3	19.4
Perak	26.8	36.8	28.4	45.2	17.9	32.1	21.7	24.6	35.0	21.5	25.0	24.0	23.9	22.6	13.7	33.1	28.0	20.1	23.6	21.3
Perlis	0.0	0.0	0.0	24.6	50.5	50.9	25.7	50.7	24.0	0.0	48.6	0.0	24.1	0.0	44.4	69.5	0.0	22.5	0.0	49.5
Putrajaya	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	65.3	69.7	0.0	0.0	0.0	0.0
Sabah	62.9	75.5	36.9	33.8	21.7	31.8	28.2	42.5	27.8	22.7	14.8	34.6	32.7	28.2	17.4	34.7	57.6	26.7	18.9	26.6
Sarawak	16.7	6.5	26.7	18.2	25.3	23.1	21.0	28.2	34.5	32.0	24.1	25.4	27.8	7.4	14.6	17.6	15.8	21.2	30.0	16.5
Selangor	28.4	23.9	34.5	27.8	23.6	22.7	24.3	20.6	21.9	27.2	18.3	21.2	17.6	26.2	17.4	19.4	29.6	24.0	19.6	17.9
Terengganu	20.1	20.8	21.5	22.5	26.6	36.4	41.1	17.9	4.3	29.3	33.0	20.2	27.2	27.5	33.3	18.1	21.8	21.5	10.6	18.5

Note: For the year 2000 – 2009, Selangor includes Putrajaya.
Source: DOS (2020c)

APPENDIX B

CAUSES AND RISKS HIERARCHY

The GBD Study organises causes and risks factors in hierarchical nested categories containing four levels. For causes, the highest level, Level 1, is divided into three mutually exclusive categories which are (1) Communicable, maternal, neonatal and nutritional diseases, (2) Non-communicable diseases and (3) Injuries. Level 1 causes can be further disaggregated to Level 2, and this can in turn be further broken down into Levels 3 and 4. The GBD 2019 produced estimates for 369 diseases and injuries in total.

Table B1: GBD 2019 causes of mortality and disability, Level 1 and 2

Level 1	Level 2	Level 3 (non-exhaustive)
Communicable, maternal, neonatal, and nutritional diseases	HIV/AIDS and sexually transmitted infections	HIV/AIDS, sexually transmitted infections excluding HIV
	Respiratory infections and tuberculosis	Tuberculosis, lower respiratory infections, upper respiratory infections, otitis media
	Enteric infections	Diarrheal diseases, typhoid and paratyphoid, invasive non-typhoidal salmonella (iNTS), other intestinal infectious diseases
	Neglected tropical diseases and malaria	Malaria, leishmaniasis, dengue, yellow fever, rabies, leprosy, Ebola, Zika virus
	Other infectious diseases	Meningitis, encephalitis, diphtheria, whooping cough, tetanus, measles, varicella and herpes zoster
	Maternal and neonatal disorders	maternal disorders (e.g. maternal haemorrhage, ectopic pregnancy), neonatal disorders (e.g. neonatal preterm birth)
	Nutritional deficiencies	Protein-energy malnutrition, iodine deficiency, vitamin A deficiency, dietary iron deficiency
Non-communicable diseases	Neoplasms	Lip and oral cavity cancer, nasopharynx cancer, esophageal cancer, stomach cancer, colon and rectum cancer, liver cancer, breast cancer, prostate cancer
	Cardiovascular diseases	Rheumatic heart disease, ischemic heart disease, stroke, hypertensive heart disease, non-rheumatic valvular heart disease
	Chronic respiratory diseases	Chronic obstructive pulmonary disease, pneumoconiosis, asthma, interstitial lung disease and pulmonary sarcoidosis
	Digestive diseases	Cirrhosis and other chronic liver diseases, upper digestive system diseases, appendicitis, pancreatitis
	Neurological disorders	Alzheimer's disease and other dementias, Parkinson's disease, Idiopathic epilepsy, multiple sclerosis, headache disorders, migraine
	Mental disorders	Schizophrenia, depressive disorders, bipolar disorder, anxiety disorders, eating disorders, autism spectrum disorders, attention-deficit/hyperactivity disorder
	Substance use disorders	Alcohol use disorders, drug use disorders
	Diabetes and kidney diseases	Diabetes mellitus, chronic kidney disease, acute glomerulonephritis
	Skin and subcutaneous diseases	Dermatitis, psoriasis, bacterial skin diseases, scabies, fungal skin diseases, viral skin diseases, acne vulgaris
	Sense organ diseases	Blindness and vision loss, age-related and other hearing loss, other sense organ diseases
	Musculoskeletal disorders	Rheumatoid arthritis, osteoarthritis, low back pain, neck pain, gout
	Other non-communicable diseases	Congenital birth defects, urinary diseases and male infertility, gynaecological diseases, hemoglobinopathies and haemolytic anaemias, endocrine, metabolic, blood, and immune disorders, oral disorders, sudden infant death syndrome
Injuries	Transport injuries	Road injuries (e.g. pedestrian road injuries, cyclist road injuries, motorcyclist road injuries, motor vehicle road injuries)
	Unintentional injuries	Falls, drowning, fire, heat, and hot substances, drowning, poisonings, exposure to mechanical forces, animal contact
	Self-harm and interpersonal violence	Self-harm, interpersonal violence, conflict and terrorism, executions and police conflict

Source: Global Burden of Disease Collaborative Network (2020)

For risk factors, the broadest level, Level 1 is also grouped into three categories which are (1) Metabolic risks, (2) Environmental/occupational risks, and (3) Behavioural risks. The GBD 2019 produced estimates for 87 risk factors.

Table B2: GBD 2019: Risks hierarchy, Level 1 and 2

Level 1	Level 2	Level 3 (non-exhaustive)
Environmental / occupational risks	Unsafe water, sanitation, and handwashing	Unsafe water source, unsafe sanitation, no access to handwashing facility
	Air pollution	Particulate matter pollution, ambient ozone pollution
	Suboptimal temperature	High temperature, low temperature
	Other environmental risks	Residential radon, lead exposure
	Occupational risks	Occupational carcinogens, occupational asthmagens, occupational noise, occupational injuries
Behavioural risks	Child and maternal malnutrition	Suboptimal breastfeeding, child growth failure, low birth weight and short gestation
	Tobacco	Smoking, chewing tobacco, second-hand smoke
	Alcohol use	
	Drug use	
	Dietary risks	Diet low in fruits, vegetable, legumes, whole grains, nuts and seeds, milk. Diet high in red meat, processed meat, sugar-sweetened beverages
	Intimate partner violence	
	Childhood sexual abuse and bullying	Childhood sexual abuse, bullying victimization
	Unsafe sex	
	Low physical activity	
Metabolic risks	High fasting plasma glucose	
	High LDL cholesterol	
	High systolic blood pressure	
	High body-mass index	
	Low bone mineral density	
	Impaired kidney function	

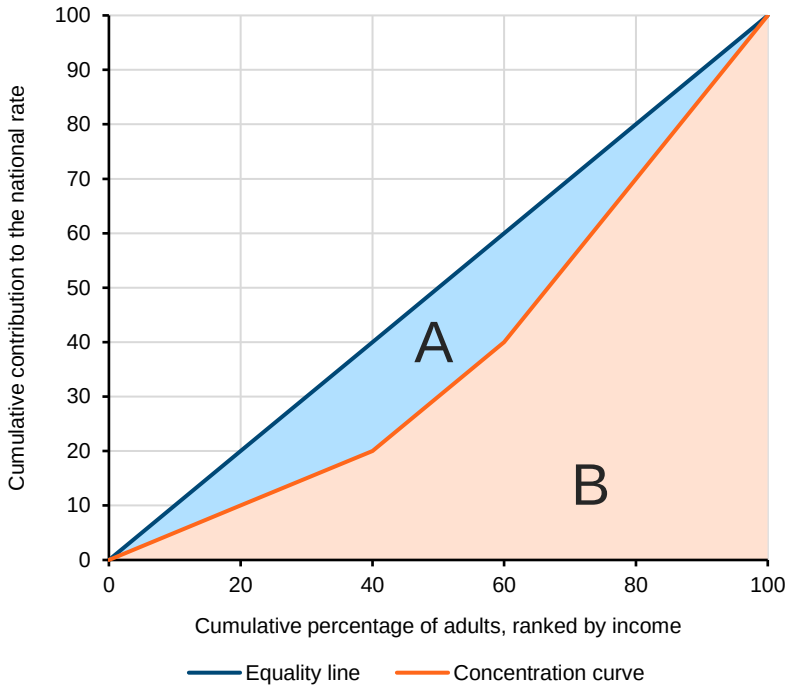
Source: Global Burden of Disease Collaborative Network (2020)

APPENDIX C

CONSTRUCTING THE CONCENTRATION CURVE AND CALCULATING THE CONCENTRATION INDEX

The concentration curve in Figure C.1 plots the cumulative contribution to a health variable, such as the prevalence of a disease, on the vertical y-axis against the cumulative percentage of a population ranked by a measure of living standards on the horizontal x-axis[183]. For example, the concentration curve for diabetes would show the cumulative contribution to the national prevalence by each quintile. If every group has exactly the same value for the health variable i.e. proportionally, each quintile contributed 20% to the national prevalence rate, the concentration curve will be a 45-degree diagonal line, running from the bottom left-hand corner to the top right-hand corner. Like the Lorenz curve, a straight diagonal line signifies complete equality whereby the health outcome is equally distributed throughout the population. If the health variable is concentrated among the least-advantaged (most-advantaged), the concentration curve will lie above (below) the equality line. The farther the curve is above (below) the line of equality, the more concentrated the health variable is in the lower (higher) socioeconomic ranks.

Figure C1: Example of a concentration curve

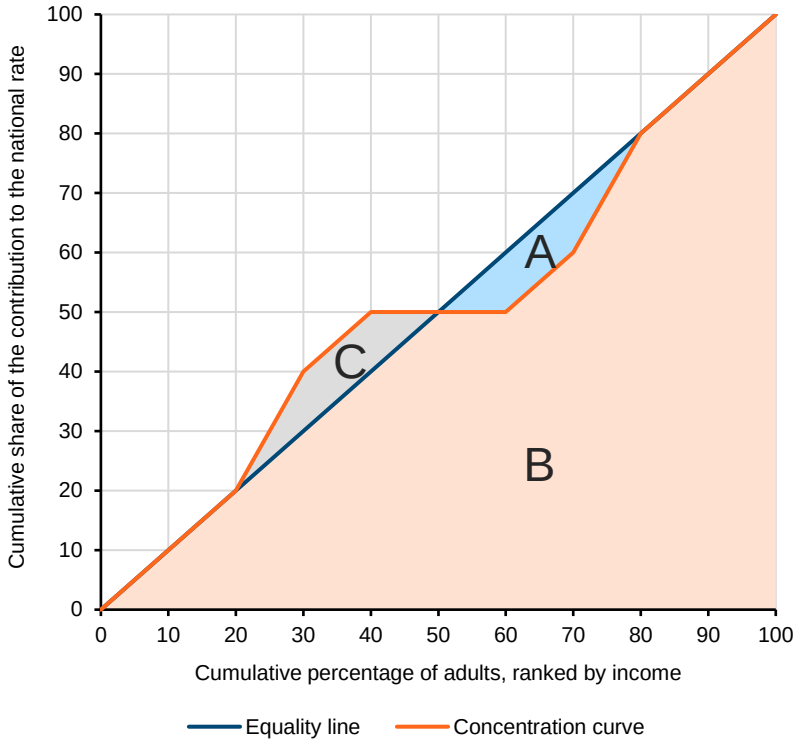


The concentration index summarises the concentration curve[184]. It is calculated by dividing area A in Figure C.1, which is the gap between the equality line and the concentration curve, by the sum of areas A and B, which is the gap between the equality line and the x-axis. The index ranges from -1 to 1 with the index taking a negative value when a health condition is more prevalent in least-advantaged groups, 0 when it is equally distributed and a positive value when it is more prevalent in most-advantaged groups.

[183] Kakwani, Wagstaff and Van Doorslaer (1997)
[184] Ibid.

It is important to remember that the index can be negative, 0 or positive but this does not necessarily mean that the concentration curve is always above, on or below the equality line. For example, the index for the concentration curve in Figure C.2 is 0 not because the concentration curve lies on the equality line but because it crosses the midpoint of the equality line, and the gaps between the concentration curve and the equality line above and below the equality line cancel each other out.

Figure C2: A concentration curve with a concentration index of zero

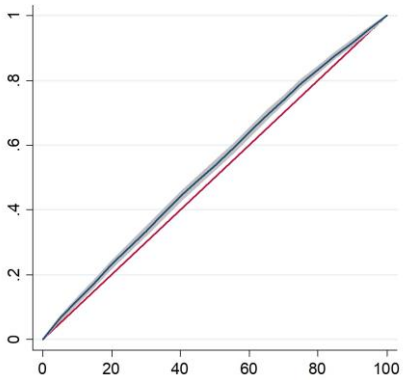


For Figure C.2, the top and bottom quintiles contribute 20% each to the health variable while the second and fourth quintiles contribute 30% each. The third quintile does not contribute at all i.e. there is zero prevalence. Therefore, concluding that there is no health inequality is incorrect.

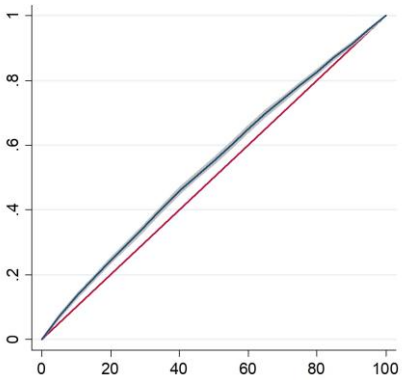
To complement Tables 2.4 and 2.5, Figure C.3 collects the concentration curves. The blue line is the concentration curve while the red line is the equality line.

Figure C3: Concentration curves of concentration indices in Tables 2.4 and 2.5

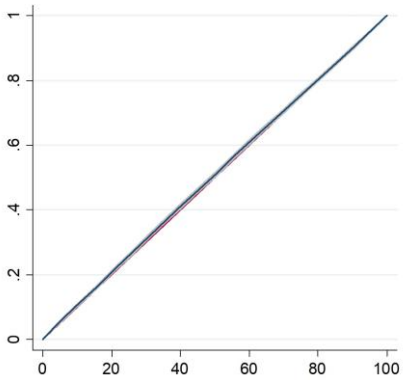
Diabetes



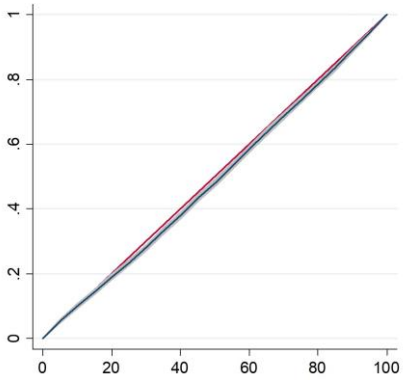
High blood pressure



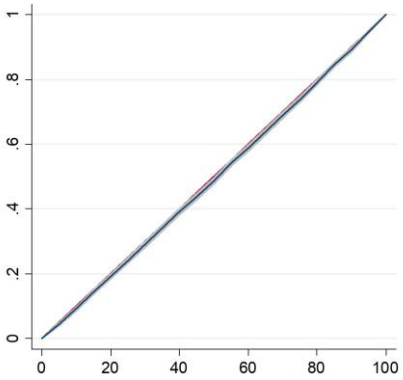
High cholesterol



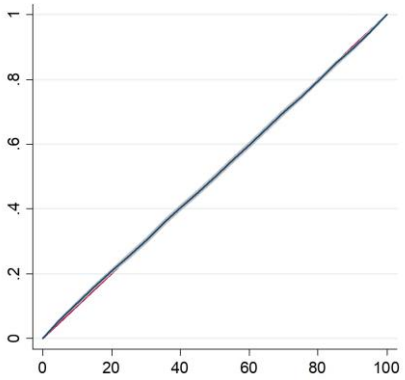
Overweight



Obesity



Abdominal obesity



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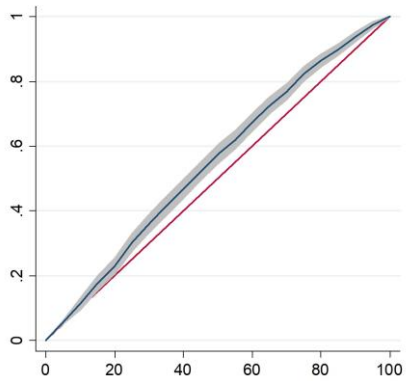
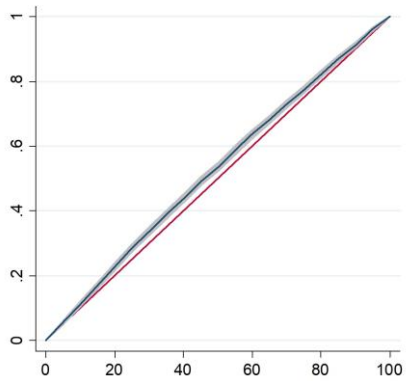
CONSTRUCTING THE CONCETRATION CURVE AND CALCULATING THE CONCETRATION INDEX

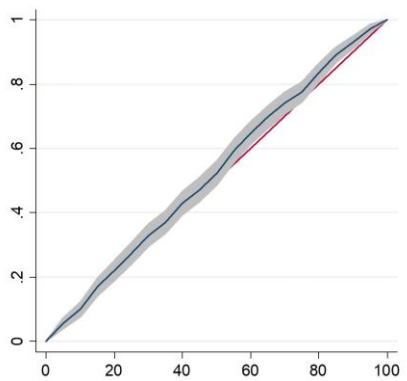
Underweight



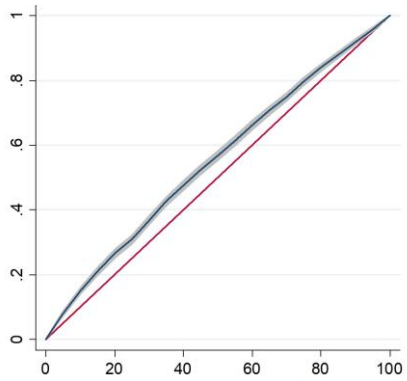
Mental health problems among adults



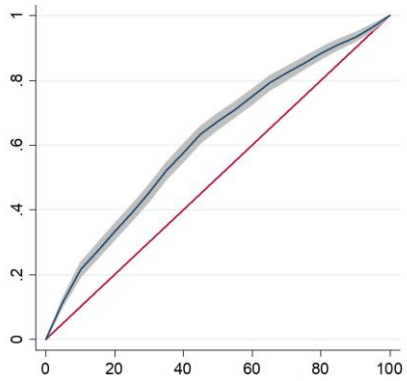
Mental health problems among children



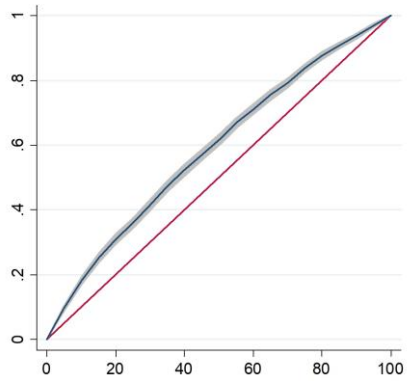
Disability in seeing



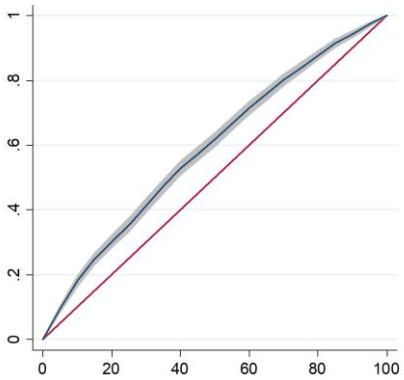
Disability in listening



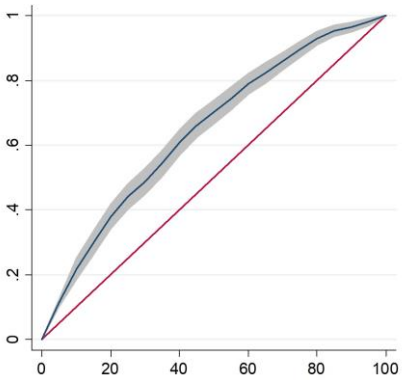
Disability in walking



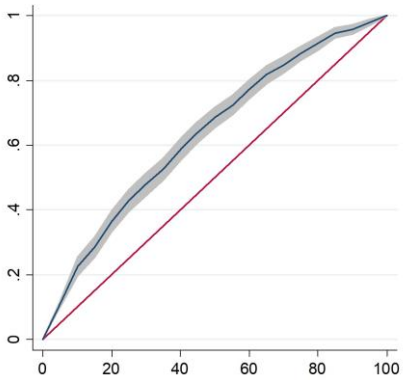
Disability in remembering



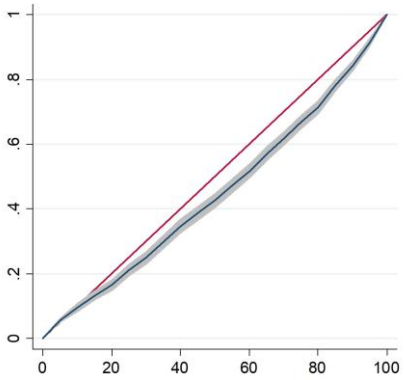
Disability in self-care



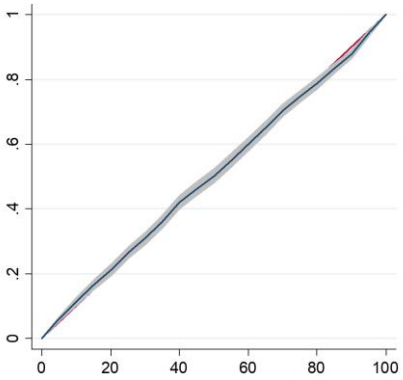
Disability in communicating



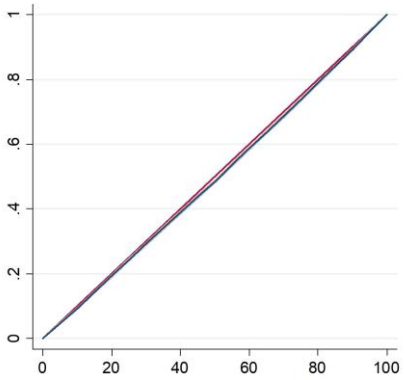
Adequate intake of fruits



Adequate intake of vegetables



Adequate intake of plain water



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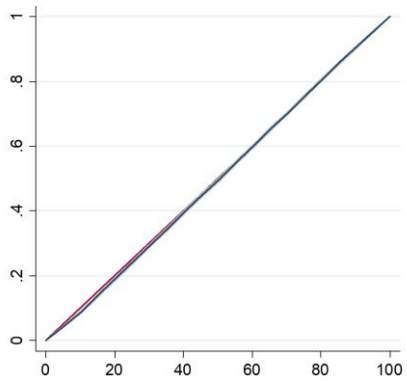
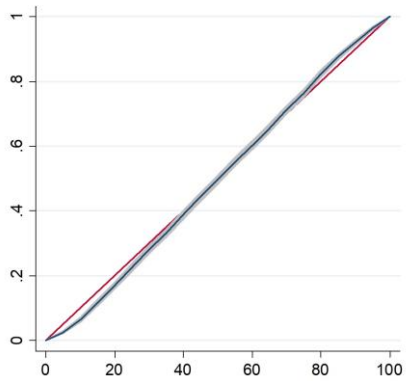
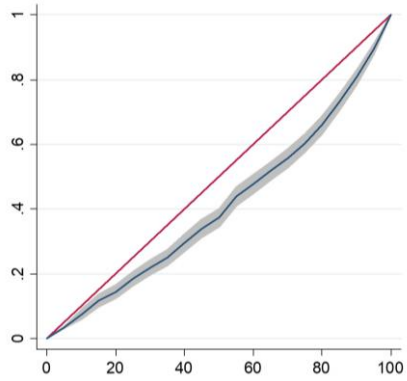
Physically active



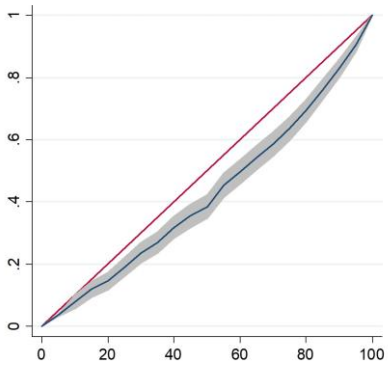
Current tobacco smoking



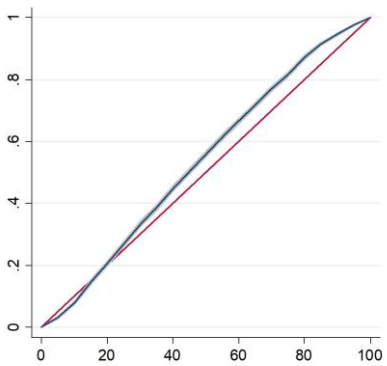
Current alcohol consumption



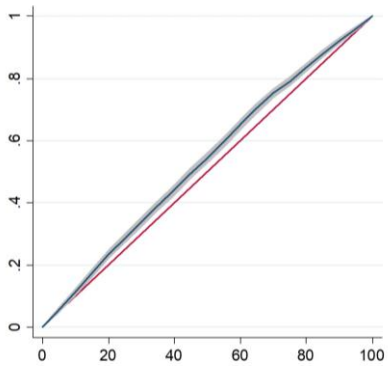
Binge drinking among current drinkers



Exposure to second-hand smoke at home among non-smokers



Exposure to second-hand smoke at work among non-smokers



Source: IPH (2020a), KRI calculations

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