Introduction

Introduction

1.1 Background

The National Health and Morbidity Survey (NHMS) is carried out to obtain community-based data on the pattern of health problems and health needs of the people in Malaysia. This data is essential for the Ministry of Health to review its priorities and programs, plan future allocation of resources and evaluate the impact of current strategies.

The first NHMS was carried out in 1986. Subsequent surveys (NHMS II in 1996 and NHMS III in 2006) were conducted in 10-yearly intervals, to review the health status in Malaysia. Since 2011, taking into account the need for updated and recent health data for policy formulation, the NHMS was structured to be carried out every year, in 4 yearly cycles. The start of each cycle focuses on non-communicable diseases (NCDs) and healthcare demand, as well as other areas of priority as determined by the Ministry of Health (MOH). The scopes of study within each survey is determined by the NHMS Steering Committee, chaired by the Director General of Health Malaysia, and consists of members from both the Ministry of Health as well as representatives from local universities. Several rounds of discussions are also held with local stakeholders to determine the topics and best methods of study in NHMS.

NCDs are the leading cause of death worldwide. In Malaysia, NCDs account for 67% of premature mortality, and over 70% of disease burden in 2014. The previous survey in 2015 had reported high and increasing prevalence of NCDs and NCD risk factors in Malaysia. The year 2019 marks the start of a new cycle of NHMS, the 6th cycle, to monitor the changes and trends in NCDs, following the pattern of the previous surveys carried out in 2011 and 2015.

The data obtained from NHMS 2019 is important to assist the Ministry of Health Malaysia to make evidence-based policies, and review the status of non-communicable diseases in Malaysia, as well as determine the utilization and expenditure of health services. The data is also used by multiple agencies, including monitoring of international indicators such as the Sustainable Development Goals (SDG).

1.2 Objectives

General objective

To provide community-based data and evidence to the Ministry of Health Malaysia on non-communicable diseases, risk factors of non-communicable diseases, and healthcare demand for review of national health priorities and programmes.

Specific objectives for the NCD component:

To determine prevalence of;

- Diabetes
- Hypertension
- Hypercholesterolemia
- Nutritional Status
- Dietary Practice
- Physical Activity
- Tobacco Use
- Alcohol Consumption
- Substance Abuse
- Anaemia
- Depression
- Disability
- Men's Health (ED & BPH)
- Women's Health (Cancer Screening)
- Epilepsy
- Health Literacy

NHMS 2019

Methodology

Methodology

2.1 Target Population

The NHMS 2019 covered both urban and rural areas in all 13 states and 3 federal territories in Malaysia. The target population was the residence in the non-institutional living quarters (LQs). Institutional population such as those staying in hotel, hostels, hospitals, etc. were excluded from this survey.

2.2 Sampling Frame

The geographical areas in Malaysia were divided into Enumeration Blocks (EBs). Each EB is defined and classified into either urban or rural areas by Department of Statistics based on the population size of the gazetted area. The definition of urban area is a gazetted area which has a combined population of 10,000 or more. A gazetted area with a combined population of less than 10,000 is classified as rural area.

There were over 75,000 EBs in Malaysia. Each EB usually contains between 80 to 120 LQs with an average population of 500 to 600 people. The sampling frame consists of selected EBs same as that was provided by Department of Statistics Malaysia in NHMS 2015.

2.3 Sample Size Determination

Sample size was calculated using a single proportion formula for estimation of prevalence.

$$n_{SRS} \geq \frac{Z^2_{\alpha/2} P(1-P)}{e^2}$$

The sample size calculation was based on a few criteria as below:

i. Variance of proportion of the variable of interest (Based on NHMS 2015 or other literatures)
ii. Margin of error (e) (Between 0.02 to 0.07)
iii. Confidence Interval of 95%

To ensure optimum sample size, few adjustments were made:

i. Adjusted for finite population (Based on 2019 projected population)
ii. Adjusted for the design effect (deff) (Based on previous survey: NHMS 2015)
n(complex)= n(srs) * deff
iii. Adjusted the n(complex) taking into account expected non-response rates of 35%
n(adj) = n(complex) * (1 + non-response rate)

The sample size was then adjusted according to the need of the analysis, whether the prevalence estimate was at the national, or state level. Based on the core objectives and above mentioned considerations, the optimum sample size required was 5,676 LQs.

The allocation of samples to the states, urban and rural was done proportionally to the population size. Bigger number of samples were allocated to states with bigger population size such as Selangor, Johor and Sabah, and lesser number of samples were allocated to states with smaller population size such as Melaka, Perlis and Labuan.

2.4 Sampling Design

To ensure national representativeness, two stage stratified random sampling was used. The two strata are primary stratum, which made up of states of Malaysia, including Federal Territories, and secondary stratum, which made up of urban and rural strata formed within the primary stratum.

Sampling involved two stages; the Primary Sampling Unit (PSU), which were the EBs and the Secondary Sampling Unit (SSU), which were the LQs within the selected EBs. For NHMS 2019, a total of 5,676 LQs were selected from the selected 475 EBs in Malaysia, where 362 and 113 EBs were selected from urban and rural areas respectively. Twelve LQs were randomly selected from each selected EB. The distribution of selected sample by state is presented in Table 2.1. All individuals with their primary residence and residing for at least 2 weeks prior to data collection, in the selected LQ were eligible to participate in this survey.

- All households within the selected LQs were included in the study.
- All members in the households were also included in the study.

Table 2.1: Distribution of Sample by State, NHMS 2019

No.	State	Enumeration Block			Living Quarters		
		Urban	Rural	Total	Urban	Rural	Total
1.	Johor	29	10	39	348	120	468
2.	Kedah	16	8	24	192	96	288
3.	Kelantan	11	13	24	132	156	288
4.	Melaka	22	2	24	264	24	288
5.	Negeri Sembilan	17	7	24	204	84	288
6.	Pahang	13	11	24	156	132	288
7.	Pulau Pinang	24	2	26	288	24	312
8.	Perak	20	7	27	240	84	324
9.	Perlis	14	10	24	168	120	288
10.	Selangor	59	5	64	708	60	768
11.	Terengganu	15	9	24	180	108	288
12.	Sabah	23	16	39	276	192	468
13.	Sarawak	17	13	30	204	156	360
14.	WP Kuala Lumpur	25	0	25	300	0	300
15.	WP Labuan	23	0	23	276	0	276
16.	WP Putrajaya	32	0	32	384	0	384
	TOTAL	362	113	475	4,320	1,356	5,676

2.5 Ethical Considerations

This study had obtained ethical approval from the Medical Research and Ethics Committee of Ministry of Health Malaysia, and was registered in the National Medical Research Registry, bearing registration number NMRR-18-3085-44207. Before data collection was conducted, the relevant local authorities were contacted and informed.

Prior to each interview, the purpose of the survey and methods used during the survey was explained to the respondent and information handed out via the participant's information sheet. Furthermore, before the interview or any assessment was carried out, informed written consent was taken from each participant or guardian, with an additional assent form signed by participants between 7 to 18 years of age.

All participants who were found to require medical attention at the time of the survey were referred using a structured referral letter to the nearest government health clinic for further assessment and management.

2.6 Questionnaire and Other Survey Materials

Structured questionnaires were used to collect data based on the scopes of the survey. There were two types of questionnaire; face-to-face interview and self-administered. For the face-to-face interview, the pre-tested questionnaire was bi-lingual (Bahasa Melayu and English) accompanied with questionnaire manual prepared as a guide to the data collectors. The self-administered questionnaires were in four languages; Bahasa Melayu, English, Mandarin, and Tamil. There were flash cards provided in the form of code book to assist in the interview.

The face-to-face interview questionnaire was programmed into an application and the data collection was done using tablets. Respondents were given the tablet to fill themselves for the self-administered questionnaires. Hardcopies of the self-administered questionnaires were also prepared should the respondent choose to answer in paper. The modules contained in the questionnaire, as well as the questionnaire used and target age group are presented in Table 2.2. The complete questionnaire and code book for NHMS 2019 is attached in the appendix of this report (Appendix 7 and 8).

Table 2.2: Questionnaire Used for NCD Component, NHMS 2019

Module	Questionnaire	Method	Target Age Group
Household Information	-	Face-to-face	All
Sociodemography	-	Face-to-face	All
Diabetes	STEPS	Face-to-face	18 years and above
Hypertension	STEPS	Face-to-face	18 years and above
Hypercholesterolemia	STEPS	Face-to-face	18 years and above
Physical Activity	IPAQ – Short Form	Face-to-face	16 years and above
Smoking	Mini GATS	Face-to-face	15 years and above
Dietary Practice	-	Face-to-face	18 years and above
Health Screening	-	Face-to-face	18 years and above
Alcohol	AUDIT	Self-Administered	13 years and above
Substance Abuse	-	Self-Administered	18 years and above
Disability	WG Short Set	Face-to-face	18 years and above
Child Functioning	WG	Face-to-face	2 - 17 years
Mental Health (Adult)	PHQ	Self-Administered	18 years and above
Mental Health (Children)	SDQ-Mall	Self-Administered	5 - 15 years
Health Literacy	HLS-M-Q18	Self-Administered	18 years and above
Benign Prostatic Hyperplasia	IPSS	Self-Administered	40 years and above
Erectile Dysfunction	IIEF	Self-Administered	18 years and above
Epilepsy	Ottman Epilepsy Screening	Face-to-face	All

Interviews were conducted for respondents aged 13 years and above, while for respondents below 13 years, the parent/guardian responded to the interview on their behalf (by proxy). Similar rules were applied to the self-administered questionnaire.

Clinical Assessment (done by nurses):

- Anthropometry (weight/height/length and waist circumference):
  - » All ages.
- Blood pressure measurement:
  - » Aged 18 years and above.
- Biochemistry tests (Fasting Blood Glucose and Cholesterol):
  - » Aged 18 years and above.
- Haemoglobin test:
  - » Aged 15 years and above

For the assessment of weight, Tanita Personal Scale HD 319 was used for adults, while Tanita Baby Scale 1583 was used for infants. Both tools had been validated and calibrated prior to the survey. For field implementation, a standard weight was supplied for each team for standardisation. For measurement of height, SECA Stadiometer 213 was used for adults, while Measuring Mat SECA 210 was used for infants. Both tools had also been validated and calibrated prior to the survey. All measurements were carried out twice by trained nurses.

Omron Japan Model HEM-907 was used for blood pressure assessment, while CardioChek® PA Analyzer was used to assess fasting blood glucose and cholesterol, both tools which had been validated and calibrated prior to the survey. A validated and calibrated HemoCue® Machine Hb 201+ was used to measure haemoglobin level.

Any participant who was found to be pregnant, post-natal, bed-ridden, or having physical disabilities or deformities were excluded from the anthropometric assessment. All measurements from the clinical assessment were recorded in the clinical assessment form and subsequently keyed into the tablet by the nurse.

2.7 Field Preparation and Logistic Support

Excellent support was provided by the State Health Departments in the preparation for field data collection. A Liaison Officer was appointed in each state to assist in the data collection activities. They assisted in the delivery of information regarding the survey and liaised with the selected communities, relevant District Health Officers and Local Authorities for logistic arrangements. They also assisted in the publicity of the survey through dissemination of relevant information to various stakeholders including the public.

Before the implementation of the data collection, scouts were appointed from the District Health Office of the selected districts. The selected LQs were then identified and tagged by the scouts. The members in the selected LQs, communities and related government agencies were also informed about the survey, through information leaflets.

Field Supervisors for each state were recruited from among the Institute for Public Health, Institute for Health Systems Research, Institute for Health Behavioural Research and other agencies of Ministry of Health Malaysia personnel, to liaise with the Liaison Officers in the arrangement of transportation, accommodation, appointment with respondents and other related logistic issues. Research Assistants were recruited as interviewers to assist in the data collection. A total of 70 teams were established throughout Malaysia, 57 in Peninsular Malaysia and 13 in East Malaysia, comprising Sabah, Sarawak and WP Labuan. Each team was led by a Team Leader and comprised of an additional two Research Assistants, one driver and one Nurse.

2.8 Training

A training course for scouts was conducted in March 2019. The scouts were trained on the technique of reading the EB maps, locating the selected LQs, tagging the identified LQs and informing head of the household on the survey. The scouts were also required to update the data collection teams on the basic information of the household members.

Prior to data collection, a training course was conducted for the field supervisors, team leaders, nurses and interviewers. The training course was conducted separately for data collectors from Peninsular Malaysia and Sarawak, Sabah and Labuan from 8th to 13th of July 2019.

The main objectives of the training were to familiarize the data collection teams with the questionnaire, develop the interpersonal skills and appreciate the need for good teamwork. Briefing on the questionnaire, mock interview in the classroom and individual interviewing practice under supervision were conducted during the training.

The nurses were trained on the techniques of using the equipment used for clinical assessment in NHMS 2019. They were also briefed on the criteria for referral of respondents with health problems. At the end of training a pilot test for data collection was conducted.

2.9 Publicity

A publicity campaign is a vital component in enhancing the response rate of a national level community survey. Its main purpose is to create awareness among the public about the planned survey activities besides obtaining the highest possible participation from the household members of the selected LQs nationwide. The publicity campaign utilised both printed and electronic media and was further emphasized during the listing activities.

A publicity team was formed to coordinate all the activities related to publicity. The publicity team was responsible for designing the template and drafting the content of publicity materials such as pamphlets, posters, buntings, banners, car stickers, participant information sheets, media press releases, news stickers and text (both questions and answers) for radio and television interviews based on input from the Principal Investigator and approval of the NHMS Central Committee.

In order to ensure the message reached various ethnic groups of the community, most of the printed publicity materials such as pamphlets and respondent information sheets were produced in four main languages – Malay, English, Mandarin and Tamil. Pamphlets were distributed by the scouts during their initial visit as well as utilized by the data collection team.

The publicity team liaised closely with their counterparts from the Corporate Communication Unit, MOH especially in making publicity arrangements with the printed media as well as mass media such as television and radio. In addition, the implementation at the state level was strongly supported by the State Health Departments through the State Liaison Officers. Furthermore, the State Liaison Officers or Field Supervisors for each state were also responsible for the arranging of local media interviews and arranging additional publicity strategies when required. The NHMS 2019 also actively utilized the social media, such as Facebook and Instagram, to create awareness of this survey among the public.

A summary of publicity activities and material used are as seen in Appendix 9.

2.10 Data Collection

Data collection was carried out between 14th July 2019 and 2nd October 2019. An appointment with the eligible household was made by the team leader prior to the actual visit. In case any of the eligible household members were not available during the first visit, the team had to make several visits to ensure a good coverage of all the eligible members in the household. At least three visits were attempted before the household was classified as unsuccessful.

Unsuccessful survey at the household level could be due to LQs that refused to participate, that were empty, locked, besides others such as a hostile or dangerous environment. Unsuccessful survey at the individual level could be due to individuals who did not meet the eligibility criteria for the survey, individuals who were not at home during the scheduled visits, those who refused to participate, or language barrier.

2.11 Data Management and Monitoring During Data Collection

Data processing activities were centralised at the Institute for Public Health. This included receiving data from the field (input from mobile tablet devices to the centralised server) up to handing over the cleaned dataset to the data analysis team.

Face-to-face interviews were conducted by the data collection teams using mobile tablet devices based on the questionnaire system application developed. Completed interviews were sent to the Survey Creation System (SCS) server centralised in the Institute for Public Health whenever there was an internet connection. Data in the server were downloaded weekly by the data management team. Datasets were continuously monitored for quality control; especially on accuracy of the respondent ID, outliers or incorrect data.

To ensure the quality of data captured, quality checks were also in-built into the application pertaining to eligibility in answering different modules based on age group or sex. Subsequently, the dataset was sent to the data analysis team.

Throughout the data collection period, the Central Coordinating Team (CCT) conducted weekly meeting to monitor the progress of each team. These meetings were chaired by the Director of Institute for Public Health (IPH) to discuss on the movements of the teams, logistic issues, response rate, and the publicity.

The productivity of each team was monitored by comparing the cumulative targeted LQs with the weekly progress report by the teams and the amount of data received in the server. This information was updated regularly on the monitoring board at the operation centre in IPH together with the status of self-administered questionnaires (SAQ) received. Hardcopy SAQ were sent to the operation centre via courier.

2.12 Data Analysis

Data analysis was done together with the Biostatistics and Data Repository team from the National Institutes of Health, Ministry of Health Malaysia. All analyses were carried out according to objectives of the survey, working definitions and dummy tables. Complex samples analysis procedures were used in the analysis and was carried out at 95% confidence interval.

A weighting factor was applied to each individual to adjust for non-response and for the varying probabilities of selection. The weight used for estimation is given by:

$$W = W1 \times F \times PS$$

Where;

- W1 : the inverse of the probability of selecting the EBs
- F : the non-response adjustment factor
- PS : a post-stratification adjustment factor calculated by age, gender and ethnicity

NHMS 2019

General Findings

General Findings

3.1 Sample Coverage

From the 5,147 eligible LQs, a total of 4,703 LQs were successfully interviewed, giving a LQ response rate of 91.4%. From these LQs, a total of 15,683 participants were eligible for interview. A total of 14,965 respondents were successfully interviewed, giving an individual response rate of 95.4%. The overall response rate for this community-based survey is therefore 87.2%. The response rate by state is presented in Table 3.1.

3.2 Socio-Demographic Characteristics

A total of 10.9% of the respondents of NHMS 2019 are from the state of Selangor. A total of 61.4% of the respondents are from urban localities and females made up 52.8% of the total respondents. Those of Malay ethnicity were 66.5% of the respondents, with Indian ethnicity, Bumiputera Sabah, Bumiputera Sarawak and others making up between 4% to 7% each. A total of 36.5% of the respondents reported their highest educational level to be up to secondary education, with those of no formal education and tertiary education at 16.2% each. Private employees made up 20.2% of the respondents, meanwhile government employees made up 7.0%, with a further 3.4% of retirees in the sample.

Table 3.1: Response Rate by Living Quarters and Individual by State, NHMS 2019

State	Living Quarters			Individual			Total Response Rate (%)
	Eligible	Interviewed	Response Rate (%)	Eligible	Interviewed	Response Rate (%)	
Johor	428	404	94.4	1,244	1,212	97.4	91.96
Kedah	255	241	94.5	788	760	96.4	91.15
Kelantan	261	250	95.8	801	791	98.8	94.59
Melaka	278	270	97.1	881	859	97.5	94.70
Negeri Sembilan	255	246	96.5	771	730	94.7	91.34
Pahang	272	265	97.4	908	894	98.5	95.92
Pulau Pinang	290	265	91.4	896	829	92.5	84.55
Perak	291	276	94.8	883	801	90.7	86.04
Perlis	260	253	97.3	730	722	98.9	96.24
Selangor	689	573	83.2	1,732	1,626	93.9	78.07
Terengganu	261	255	97.7	1,009	972	96.3	94.12
Sabah	415	374	90.1	1,417	1,344	94.8	85.48
Sarawak	329	296	90.0	1,160	1,067	92.0	82.76
WP Kuala Lumpur	281	238	84.7	688	664	96.5	81.74
WP Labuan	258	250	96.9	792	772	97.5	94.45
WP Putrajaya	324	247	76.2	983	922	93.8	71.50
MALAYSIA	**5,147**	**4,703**	**91.4**	**15,683**	**14,965**	**95.4**	**87.19**

Based on the self-reported income of each individual, the household income was calculated and categorized based on state-specific cut-off for B40, M40 and T20 category. The cut-off values for each state were obtained from the Departments of Statistics Malaysia. A total of 68.1% of the respondents fell in the B40 category, with only 8% in the T20 category. This, as in most self-reported studies, shows a certain degree of under-reporting present in the income levels. The sociodemographic characteristics of all respondents in NHMS 2019 are presented in Table 3.2.

Table 3.2: Sociodemographic Characteristics of Sample, NHMS 2019

Sociodemographic characteristics	Count	Percentage (%)
MALAYSIA	**14,965**	**100.0**
State		
Johor	1,212	8.1
Kedah	760	5.1
Kelantan	791	5.3
Melaka	859	5.7
Negeri Sembilan	730	4.9
Pahang	894	6.0
Pulau Pinang	829	5.5
Perak	801	5.4
Perlis	722	4.8
Selangor	1,626	10.9
Terengganu	972	6.5
Sabah	1,344	9.0
Sarawak	1,067	7.1
WP Kuala Lumpur	664	4.4
WP Labuan	772	5.2
WP Putrajaya	922	6.2
Location		
Urban	9,183	61.4
Rural	5,782	38.6
Sex		
Male	7,064	47.2
Female	7,901	52.8
Age Group (Years)		
0 – 4	1,249	8.3
5 – 9	1,391	9.3
10 – 14	1,214	8.1
15 – 19	977	6.5
20 – 24	938	6.3
25 – 29	973	6.5
30 – 34	1,008	6.7
35 – 39	1,065	7.1
40 – 44	891	6.0
45 – 49	908	6.1
50 – 54	957	6.4
55 – 59	941	6.3
60 – 64	838	5.6
65 – 69	645	4.3
70 – 74	455	3.0
75 and above	515	3.4
Citizenship		
Malaysian	14,064	94.0
Permanent Resident	134	0.9
Non-Malaysian	766	5.1
Ethnicity		
Malay[a]	9,955	66.5
Chinese	1,669	11.2
Indian	875	5.8
Bumiputera Sabah	1,039	6.9
Bumiputera Sarawak	608	4.1
Others	819	5.5
Marital Status		
Single	6,667	44.6
Married	7,165	47.9
Widow(er)/Divorcee	1,132	7.6
Education Level		
No Formal Education	2,423	16.2
Primary Education	4,597	30.7
Secondary Education	5,462	36.5
Tertiary Education	2,426	16.2
Occupation		
Government Employee	1,050	7.0
Private Employee	3,027	20.2
Self-Employed	1,900	12.7
Unpaid Worker/Homemaker	2,068	13.8
Retiree	511	3.4
Student	2,878	19.2
Not Working[b]	3,523	23.6
Household Income Quintile		
Quintile 1	2,754	19.6
Quintile 2	2,848	20.3
Quintile 3	2,805	20.0
Quintile 4	2,638	18.8
Quintile 5	2,973	21.2
Household Income Category		
Bottom 40% (B40)	9,551	68.1
Middle 40% (M40)	3,347	23.9
Top 20% (T20)	1,120	8.0

a - Malay includes Orang Asli
b - Not working includes unemployed, and old age

3.3 Sample Representativeness

The estimated population obtained in the NHMS 2019 closely resembles the actual population structure of Malaysia for 2019, as projected by the Department of Statistics Malaysia. The comparison is shown in Figure 3.1.

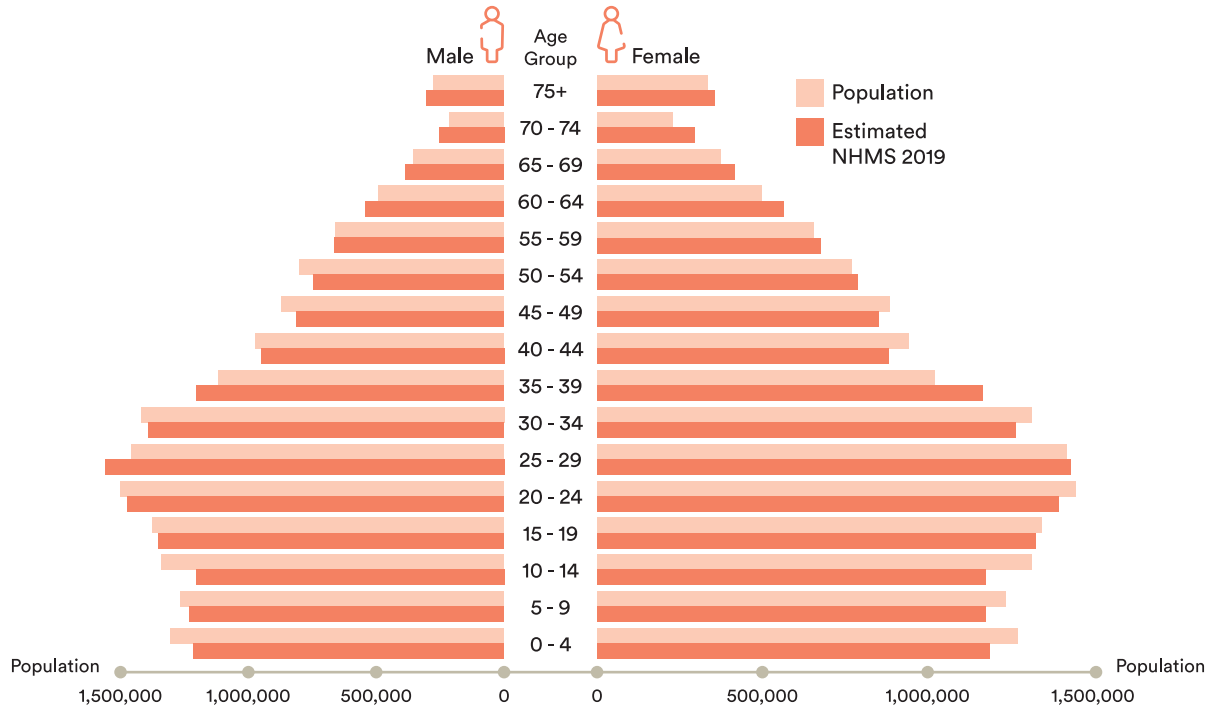

Figure 3.1: Population Pyramid Comparing Estimated Population of NHMS 2019 and Projected Population of Malaysia for 2019 by Age and Sex [1]

Reference:
1. Department of Statistics Malaysia (2016). Population Projection (Revised), Malaysia, 2010-2040