



RESEARCH ARTICLE

Poverty related diseases amongst Malaysia's low-income community: a review

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ABSTRACT

Poverty, as proven by several studies, is a driving force behind poor health and hygiene practices. This review attempts to outline common communicable and non-communicable diseases that disproportionately affect Malaysia's 2.91 million low-income households. The current study also looks into the government's housing and healthcare programmes for this demographic to improve their health and well-being. The initial examination yielded incredibly little research on this marginalised community, with event reporting typically generalised to the Malaysian community as a whole rather than analysing disease incidences based on household income, which would better reflect poverty-driven diseases. As a result, there is an acute need for more accurate information on the epidemiology of diseases among the poor in order to address this public health issue and provide conclusions that can drive policy designs.

Keywords: Health; B40; low-income; poverty; Malaysia.

INTRODUCTION

According to the World Health Organisation (WHO), health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (Atwater, 1947). Since 1948, there has been no amendment to this definition. Malaysia, together with 192 other countries, adopted the 2030 Sustainable Development Goals (SDGs) in 2015, defining a course for development that incorporates economic growth, social inclusion, and environmental sustainability. Goal 3 - good health and well-being - is one of the 17 goals established by the United Nations (UN), and it aims to ensure healthy lifestyles and promote well-being for all individuals of all ages. This goal is arguably one of the most crucial ones, with targets of dwindling epidemics of infectious diseases like AIDS, malaria and neglected tropical diseases (NTDs), as well as reducing one-third of premature deaths due to non-communicable diseases, apart from promoting mental well-being, by the year 2030 for all individuals, with no prejudice (Economic Planning Unit, 2021)

Malaysia is unique in that the nation's 32.67 million population consists of a variety of ethnicities and races with Bumiputera (69.8%) being the dominant ethnic group, followed by Chinese (22.4%), Indians (6.8%) and others (1%) (Department of Statistics Malaysia, 2021). In Peninsular Malaysia, a Bumiputera is the offspring of a Malay Muslim or Orang Asli, as defined in Article 160 (2) of the Federal Constitution, whereas in East Malaysia, a Bumiputera includes both Muslims and non-Muslims from all indigenous groups, namely Malay, Dayak, Melanau, Bajau, and other ethnic groups listed in Article 161A of the Federal Constitution (Mason & Omar, 2004).

The Malaysian government defines urban poverty as a lack of financial means to fulfil basic necessities, which can be separated into food and non-food categories and is measured by Food and Non-food Poverty Line Income (PLI). PLI is the bare minimum of money required to meet one's fundamental needs, which include both food and non-food products, and a person or household is categorised as poor if their income falls below that amount (Mat Zin, 2007). The PLI value is determined by the Prime Minister Department's Economic Planning Unit (EPU) and considers the size, composition, and location of the household (state, urban, or rural) (Rasool *et al.*, 2011). For instance, a family of 5 residing in Klang Valley might be considered as an urban poor household compared to a family of 7 residing in Perlis. In July 2020, Department of Statistics Malaysia announced that the new national PLI is RM2 208, (USD492) which is higher than before (RM980) (USD218) and puts over 400 000 households earning lesser than this income per month to be poor. Of this, the Food PLI is RM1 038 (USD231) and the non-food PLI is RM1 170 (USD260) (Department of Statistics Malaysia, 2020a).

The Malaysian household income can be categorised into 3 groups: Top 20%, Middle 40% and Bottom 40%. According to the Department of Statistics Malaysia (2020a), there are about 2.91 million Bottom 40 (B40) households with a household income limit of RM4 850 (USD1 082) while there are 2.91 million M40 households with an income limit between RM4 850 to RM10 959 (USD1 082 - USD2 444). The T20 group comprises of 1.46 million households with income limit that exceeds RM10 959 (USD2 444). From this, Bumiputera makes up 72% of the B40 group and 52% of the T20 group, while non-Bumiputera makes up 18% of the B40 group and

39% of the T20 group (Department of Statistics Malaysia, 2020a). The purpose of classifying household incomes is to ensure that no one is left out in accordance with the development of the country and assistance is given to those in need to sustain their livelihood.

Poverty is a major challenge in Malaysia as socioeconomic issues, health, and food insecurity continue to plague the low-income or B40 group (Siwar *et al.*, 2016). Sen (1999) contends that poverty should be defined as a lack of basic capacities rather than a lack of income. This includes but not limited to the lack of education, social exclusion, and low health status. Education, according to Becker and Chiswick (1966), will produce a balance in income distribution. Hence, the government will constantly prioritise educational development while developing national development plans. Households that had no education certificates recorded mean incomes of RM4 374 (USD975) in 2019, while households with degree qualifications have median incomes of RM12 051 (USD2 688) (Department of Statistics Malaysia, 2020a).

The low-income community is more vulnerable and prone to diseases as health and income are interrelated (Cunningham, 2018). Having a low income could translate to over-working and insufficient provisions in sustaining a healthy lifestyle. It is more frequent that the B40 group make sacrifices due to monetary issues at the expense of their health, from having a carbohydrate-centric meal as proteins and vegetables can be expensive, to not completing or even starting treatments as the cost is unbearable. Poverty-related diseases (PRD) or diseases of poverty are diseases that occur more prevalent in low-income populations and include infectious diseases as well as diseases connected to malnutrition and poor health habits (von Philipsborn *et al.*, 2015). This includes Malaria, diarrheal diseases, helminth infections and other neglected tropical diseases (NTDs) like dengue. Agonizingly, these diseases are still considered to be neglected in research and development (R&D). This is where the '10/90 Gap' concept arises, which is defined as having 10% of the world's resources allotted in researching 90% of diseases that affect 90% of the population more so in the low-income countries than the high-income countries (Stevens, 2017).

Health challenges among the poor

Poverty can also limit access to adequate healthcare and education; as a result, a lack of education preserves health problems due to a lack of awareness to maintain appropriate health practises (Sahimin *et al.*, 2020). In a report by WHO (2010), it has been found that urban dwellers' health determinants (e.g social, economic and physical environments) could create a triple threat of urban diseases and health conditions; (a) infectious diseases including HIV and diarrheal infections due to overcrowding and lack of safe water and sanitation system; (b) non-communicable diseases and conditions contributed from poor air qualities and changes of diet and physical activities and (c) injuries and violence owing to poverty, unemployment, and poor housing conditions.

According to the most recent WHO (2021a) definition, communicable diseases (CD), also known as infectious diseases, are caused by microorganisms such as bacteria, viruses, and parasites and can be transmitted directly or indirectly from one person to another or through close contact. Some are spread by vectors, whereas others are spread by the consumption of infected food, water, or even air. Noncommunicable diseases (NCDs) are also known as chronic diseases since they persist for an extended period of time and are caused by a combination of genetic, psychological, environmental, and behavioural factors (WHO, 2021c).

As a result, this study seeks to outline the prevalent communicable and non-communicable diseases that are prominent in the Malaysian's low-income population – the B40 group, as well as the Government's efforts in tackling the issues.

MATERIALS AND METHODS

A Pubmed, Microsoft Academic, Google Scholar and MEDLINE search was performed for both peer and non-peer-reviewed articles and reports relevant to the poor and B40 populations in Malaysia. Keyword search terms like (PPR AND health), (poor AND diseases), (B40 AND diseases), (urban slumps AND parasitic infection), (NCD AND B40) were used. Individual diseases terms like (Dengue), (Soil-transmitted helminth), (Measles), (Communicable diseases) AND (Non-communicable diseases) were also used to search for literature writings. Additional papers and reports were also identified from the citations within articles. We also looked at official Ministry of Health Malaysia websites, apart from the World Health Organization (WHO) and the Centers for Diseases Control and Prevention (CDC) for information and current data on health issues and diseases.

RESULTS

Communicable diseases amongst the Malaysian poor

The following are some of the most common communicable diseases amongst Malaysian's low-income community. This includes vaccine preventable diseases like measles, diphtheria, poliomyelitis, pertussis and Covid-19, which all share a common route of transmission of direct contact with infected droplets, as well as vector-borne diseases that can be controlled by keeping the environment clean, and parasitic infections that rely on both personal and environmental hygiene.

Vaccine preventable diseases

Vaccination is highly effective in preventing certain infectious diseases like measles, diphtheria, polio and pertussis. Since the 1950s, the Malaysian government has provided free immunisation against 12 infectious diseases caused by specific types of virus and bacterium to babies and children as part of the National Immunisation Programme (NIP) (Malaysian Paediatric Association, 2019). However, it is important to note that the study of communicable diseases within the B40 communities in Malaysia is remarkably limited. In the rural parts of Malaysia, the Ministry of Health initiated outreach programs to ensure that the marginalised group are not left out. To achieve this, the Ministry of Health Malaysia undertook several initiatives, including the National Covid Immunisation Programme (PICK) for both adults and children, as well as outreach vaccine programmes in rural and peri-rural Malaysia through its subsidiary, ProtectHealth, to facilitate and expedite the process of vaccination for Malaysia's marginalised communities. These programmes are free of charge as the government views vaccination of the most vulnerable groups as a humanitarian act.

Measles

Recently the number of people rejecting vaccines are increasing due to misinformation which resulted in the increase by 1000% for the case of measles in 2018 compared to 2013 (Malaysian Paediatric Association, 2019). According to the statistics provided by the Ministry of Health Malaysia (2019a), the number of parents rejecting vaccines increased from 637 cases in 2013 to 1 603 in 2016 but with a slight decrease to 1 404 in 2017 (Kannan, 2019).

However, on a more positive note, the number of measles cases in Malaysia are showing a downward trend as the cases reported are decreasing from 1 958 cases in 2018, 1 077 cases in 2019 to 478 cases in 2020 (WHO, 2021b). Under the NIP, vaccines against measles are administered in two doses for babies at 9-months and 12-months of age. Measles is caused by a paramyxovirus and can be spread through droplets from an infected person's mouth and nose when talking, coughing, or sneezing, and the virus is highly contagious

that it can remain in airspace for up to two hours after the infected person leaves the space. Currently, there are no specific treatment for measles except for treating its symptoms which includes giving out paracetamol to bring down fever and taking enough fluids to avoid dehydration (Paimin, 2020).

Diphtheria

In 2018, Malaysia recorded 5 cases of death due to diphtheria where 4 cases were among those who have been immunised. Diphtheria is a potentially fatal disease caused by the bacteria *Corynebacterium diphtheriae* and spreads via the transmission of droplets (CDC, 2020). It is considered to be highly infectious, hence even one reported case of this disease is considered to be an outbreak (Loganathan & Mohamed, 2018). Loganathan & Mohamed also reported a case in 2016 where a 28-year-old man appeared to have contracted diphtheria from an unidentifiable source, which suggests that this sporadic outbreak reinforces the importance of vaccination. The re-emerging cases of diphtheria in this country is an indicator to a break in vaccine coverage which needs to be addressed. The treatment for this infectious diseases is usually aimed at succumbing the bacteria with antitoxin and/or antibiotic (CDC, 2020).

Poliomyelitis

Apart from that, polio or poliomyelitis took Malaysia by surprise in late 2019, where one case of polio outbreak was reported in Sabah after 27 years of being a polio-free country. Polio is caused by a viral infection that attacks the nervous system and can cause permanent paralysis. It is easily transmitted via the faecal-oral route or by consuming contaminated food or drinks with infected droplets (Ministry of Health Malaysia, 2019b). As of March 2020, a fourth case of polio was reported in Sandakan, Sabah which involved a three-year old non-Malaysian who has never been vaccinated against polio since birth (Pillai & Thanaraju, 2020). The polioviruses detected in Malaysia have been genetically linked with those circulating in the Philippines, from when the country had an outbreak in 2019. In February 2020, WHO and UNICEF provided 2.5 millions of monovalent type 2 oral polio vaccine to Malaysia, despite the ongoing COVID-19 pandemic (UNICEF, 2020).

Pertussis

Pertussis, generally known as whooping cough, is a respiratory disease caused by the bacteria *Bordetella pertussis*. It is characterised by uncontrollable and forceful coughing that makes breathing difficult, and spreads from one person to another through droplets emitted out during coughing or sneezing. This disease can affect people from all age ranges but could be fatal if contracted by babies or children (CDC, 2019b). In 2018, the Ministry of Health Malaysia reported 22 deaths due to pertussis where 19 cases were not immunised. The number of reported cases increase significantly from 41 cases in 2010 to 892 cases in 2018 and 19 of the affected cases were children with no history of immunisation (MIMS, 2019). However, Edwards (2019) reported that the vaccine against pertussis may not work as well as it used to, as studies suggest that bacteria behind the diseases has undergone genetic mutation, and thus the usage of antibiotics may be preferred, apart from symptomatic treatment.

Human Coronavirus (COVID-19)

More recently, the SARS-2-CoV, or COVID-19, which infamously caused the coronavirus disease and worldwide lockdown in 2020 has caused over 6 million and 35 thousand deaths worldwide and in Malaysia, respectively (Worldometer, 2022). At the time of writing of this manuscript, Malaysia is riding at the end of the third wave of infection and has an average of 1 500 – 2 000 cases every day (COVIDNOW, 2022). To the best of our knowledge, there has yet to be published data that studies the infection rate between the different classes of income in Malaysia. However, there has been established data on the social impact of lockdown and restrictions on the poor, and this group is heavily affected and experiences

greater challenges than other income groups (Rönkkö *et al.*, 2021). Currently, 84.2% of the Malaysian population has received at least two doses of vaccination (COVIDNOW, 2022).

Vector-borne infections

Malaria

Malaria is one of the world's most major public health issues, and nearly half of the world's population lives in areas at risk of malaria transmission in 87 countries and territories, according to the WHO's World Malaria Report 2020 (WHO, 2020). Malaria caused an estimated 229 million clinical episodes and 409 000 deaths in 2019, with 94% of them occurring in African regions (CDC, 2021). Malaysia has been declared 'Malaria-free' due to the absence of incidences of malaria from human indigenous malaria species such as *P. falciparum*, *P. malariae*, *P. ovale*, and *P. vivax* from 2018 to 2020. Malaysia, according to the Minister of Health, is now working to eradicate malaria through zoonotic transmission (Bernama, 2021a).

Plasmodium knowlesi is the fifth species that can cause malaria in humans and can be transmitted between non-human primate hosts by *Anopheles* mosquitoes and cause infections in humans (Chin *et al.*, 2020). Recent studies (Hussin *et al.*, 2020; Noordin *et al.*, 2020) has shown that *P. knowlesi* is in fact responsible for most malaria cases in Malaysia, though it is more common in East Malaysia compared to Peninsular Malaysia. Cases of malaria has been reported in both rural and urban setting with increased proneness in areas with proximity to jungles and forests as well as among migrant workers coming from endemic countries. The majority of malaria research published in Malaysia were conducted in East Malaysia, which may be attributed to the densely wooded geographical areas compared to Peninsular Malaysia (Hussin *et al.*, 2020).

Malaria has been considered as a disease of the poor and studies have shown to prove this, correlating lower household income with greater risk of malaria infection (Ayele *et al.*, 2012). Poor living conditions apart from low educational attainment contribute to the lack of awareness and deplorable attitude towards malaria in terms of preventative measures and acquiring treatment. To the best of our knowledge, there has yet to be any study in Malaysia that exclusively compared the prevalence of malaria infection between the household income groups. However, based on known risk factors of infection including poor housing conditions, poor literacy on malaria and blue-collared occupations involving those in agriculture and forestry (Chin *et al.*, 2021), there is an increased risk for the B40 populations compared to the other groups.

Dengue

Dengue on the other hand, is endemic to Malaysia and Southeast Asia for years. According to a report released by the World Health Organisation in 2021, countries in the South-East Asia apart from People's Republic of Korea, contributes to half of the global burden of dengue (WHO, 2021d). Although there has been much debate about whether dengue is a disease of poverty, with some studies finding a link between low socioeconomic status, low education level, and low-income level with the prevalence of dengue (Hagenlocher *et al.*, 2013; Lippi *et al.*, 2018), there have also been studies that found no such claim (Heukelbach *et al.*, 2001). Although dengue is no longer predominantly an urban disease, with relatively similar dengue immunoglobulin G (IgG) seroprevalence in urban (61% – 92%) and rural (28% – 91%) settings (Chew *et al.*, 2016; Azami *et al.*, 2020), we cannot disregard the fact that its vector, *Aedes aegypti*, has adapted and thrive in an urban setting with an aggregation of humans living in close quarters in high-rises (Da Conceição Araújo *et al.*, 2020). The increasing number of vertical living suggests that it will generate greater barriers in controlling vectors, i.e., *Aedes* mosquitoes from breeding, due to their adaptability to non-landed, high-rise dwelling. This was further evidenced by Lau *et al.* (2013) and Ab Hamid *et al.* (2020), where they found *Aedes* larvae in high-

rise residential structures at high rates. Ab Hamid et al. (2020) also attested that mosquito larvae could even be detected in the upper strata of buildings, although the first three stories are considered 'hot zones' for mosquito breeding. According to Zainon et al. (2016), poor building conditions such as broken pavements, uneven roof structures, and a lack of floor trenches all have the potential to become mosquito breeding places. Indeed, this demonstrates that *Aedes* mosquitos have infiltrated and adapted to breeding in multi-story buildings and preventive measures should be strengthened to avoid any unintended consequences.

The Malaysian Ministry of Health produced a list of dengue hotspots in early 2022, 25 of which are in Klang Valley, Malaysia's most populous location, with 11 of them being high-rise residential complexes. Surprisingly, two of the 11 high-rise buildings were PPR neighbourhoods. Upon further probing into the data available in the recent 5 years, we looked at hotspot localities that was exclusive to PPRs as it is confirmed that those residing here are of the lower incomes. Table 1 shows the number of dengue hotspots in PPRs across the nation in the recent 5 years. Although the hotspot localities in PPRs are shown to be low (0.33%, n=171/52 117 localities), this does not reflect on the prevalence of dengue in the entire low-income community, as they might live in other forms of low-cost residency that are not PPRs. However, this figure does serve as an insight to the prevalence of dengue in the low-income community.

In order to combat this disease, the government has raised public awareness, particularly regarding the necessity of eradicating its vector, through a variety of means, including the use of posters, leaflets, infographics, and videos. When there is a case or an outbreak of dengue in one locality, the ministry will fog the area with appropriate pesticides within 24 hours of a reported case, with a follow-up fogging 7 - 10 days later (Ministry of Health, 2020). The ministry has also proposed a community-based fogging effort, COMFOG, in which the responsibility for fogging falls on the community itself, rather than waiting for ministry personnel, when there is an outbreak or for preventive fogging. However, the COMFOG team will go through ministry training beforehand.

In December 2021, Malaysia records a total of 26 365 cases of dengue which showed a profound decrease as compared to the previous two years: 88 845 cases in 2020 and 127 407 in 2019. The number of deaths also showed a sharp decrease from 145 deaths in 2020 to 20 deaths in 2021. However, as of mid-February 2022 the data is showing a slight increase in cases as the cumulative cases of dengue is at 4 950 compared to 4 454 cases reported in the same period in 2021 (Ministry of Health, 2022a).

According to Rahim et al. (2021), the number of dengue cases recorded during the first Movement Control Order (MCO I) was low since the majority of individuals stayed at home, minimising the risk of vector exposure. Despite this, this study discovered that a large-scale population MCO strategy for controlling dengue transmission is not possible. There is also a risk that dengue cases would be undetected since there is a fear that going into healthcare facilities with a fever will be misdiagnosed as COVID-19 rather than dengue. The threat of being separated from a loved one, as well as

the general fear of the dreaded epidemic, may have contributed to the drop in dengue incidence.

Lymphatic filariasis

Lymphatic filariasis (LF) is another mosquito-borne disease in which thread-like nematodes infects the human lymphatic vessels. Infected people are generally asymptomatic; however, acute manifestations of this condition may include lymphangitis as well as systemic symptoms such as mild fever, while chronic manifestations may include elephantiasis, hydrocele and lymphedema (Al-Abd et al., 2014). In Malaysia, lymphatic filariasis is caused by *Brugia malayi* which are spread via mosquitoes from the genus *Mansonia* and *Anopheles* (Noordin, 2007). The disease spreads when a mosquito bites an infected person and ingest microfilariae during the blood meal. The mosquito completes the microfilariae cycle to become the third-stage larvae which migrate to the mosquito's proboscis ready for transmission to the next person. In the human host, the infective larvae mature into adults, reside in the lymphatics and produce millions of microfilariae which caused damage to the lymphatic channels and resulting in chronic complications of lymphoedema (CDC, 2019a).

Risk factors for this disease includes having outdoor occupations (Zakaria & Avoi, 2021), low income (Targema et al., 2008), low socio-economic level (Shiferaw et al., 2012) as well as the condition of housing areas and level of education (Chesnaix et al., 2014).

In line with the WHO initiative on Global Programme to Eliminate Lymphatic Filariasis (GPELF), Malaysia has launched the Lymphatic Filariasis Elimination Programme (LFEP) in the year 2002. The objectives of LFEP are to stop transmission of LF by mass drug administration (MDA) using Diethylcarbamazine and Albendazole and to alleviate the suffering of people affected by the disease through morbidity management and disability prevention (MMDP). Beginning of LFEP, lymphatic filariasis was endemic in eight states, (Kedah, Perak, Johor, Pahang, Terengganu, Kelantan, Sabah, and Sarawak) with 127 endemic implementation units (IU) involving a total of 1.1 million residents in rural areas. From the year 2004, a minimum of five cycles of MDA has been delivered to all 127 endemic IUs in Malaysia to achieve the LF elimination target which is LF antibody less than 2%. Later, in the year 2019 Malaysia has implemented three main strategies to accelerate the elimination of LF by enhancing surveillance using antibody rapid test kit; MDA using triple drugs therapy (ivermectin + diethylcarbamazine + albendazole) in 111 hotspot localities with recrudescence of LF infections and three years follow up of positive cases upon treatment. By the year 2020, six endemic states (Kedah, Kelantan, Terengganu, Pahang and Perak) in Peninsular Malaysia have successfully brought the LF antibody levels to less than 2%. Malaysia is targeting national LF elimination by the year 2025 (Triple Drug Therapy (IDA), n.d.).

Parasitic Infection

Malaysia is a developing country seeking to become a developed country and improving people's quality of life is a major component of this drive. Considering Malaysia is a tropical country with a moist climate, it is excellent for the survival of soil-transmitted helminth eggs and/or larvae (Dunn et al., 2016). Although intervention efforts may be successful in some communities, such as those from middle to high-income households, those who live in urban settings, and those who have completed secondary education, it has limited success in lower household groups or those with a low education level. This is most apparent in the Orang Asli (OA) communities – the Peninsular Malaysia indigenous people, who constitute 13.8% of the total national population, where 99.29% of them belong to the B40 group (International Work Group for Indigenous Affairs, 2021).

Researchers have been pointing out the adverse effects of harbouring parasites in one's body, which includes having constant diarrhoea, malnutrition, anaemia, and stunted growth in children (Ahmed et al., 2011; Murtaza et al., 2018). Having all of these

Table 1. Hotspot localities in PPRs across Malaysia in the recent 5 years

Year	Total Hotspot localities	Total PPR hotspot localities	Total number of cases in PPR hotspots	Mean dengue cases per PPR
2022	1921	25	507	20
2021	7111	15	78	5
2020	34465	49	1135	23
2019	6300	64	1110	17
2018	2320	18	250	14

Source: (Ministry of Health Malaysia, 2022b).

symptoms may impair the host’s performance and work quality, lowering his or her quality of life. According to a 2011 study by Ahmed *et al.*, the number of days of absenteeism from school was considerably higher among those with moderate-to-heavy infection compared to those with only light infection. Projecting this pattern forward, it is safe to conclude that frequent absences from school (or job) will result in low-income employment and an inability to enjoy a high quality of life. As a result, in order to safeguard Malaysia’s aim of becoming a developed country, it is equally vital to ensure that the quality of life of vulnerable populations such as the B40 and OA communities, in both rural and urban settings, is on par with the rest of the Malaysian population.

It is well established and backed up by many studies throughout the years that intestinal parasitic infection is an indicator or tell-tale sign of poverty, other than low education level, poor health literacy and hygiene, overcrowding and the lack of basic amenities (Ahmed *et al.*, 2011; Ngui *et al.*, 2011; Elyana *et al.*, 2016). Due to rapid urbanisation taking place in Malaysia, the number of migrations from rural areas to the city is increasing (Kan *et al.*, 1989). Thus, overpopulation causes a lack or poor handling of waste management and garbage disposal, which increases the chances of contracting soil transmitted helminths (STH) like *Ascaris lumbricoides*, *Trichuris trichuria*, and hookworms (Dunn *et al.*, 2016), where ascariasis is said to be a mirror of socioeconomic status and a reflection of environmental sanitary practises (Crompton & Savioli, 1993). Crompton and Savioli (1993) also argued that intestinal parasitic infections (IPI) tend to persist and flourish wherever poverty, inadequate sanitation, and overcrowding are entrenched. Sinniah and colleagues’ (2014) study of IPI occurrence in the literature since the 1970s reveals a significant trend of decrease over more than four decades among the slum and flat dwellers as well as the urban poor. The decrease in infection patterns implies that the policy of relocating the urban poor, notably the squatter population living in slums into contemporary public housing (PPRs), as well as the national helminth control program among school children by the Ministry of Health Malaysia from 1974 to 1983, had a favourable impact.

However, recent enlightenment by Sahimin *et al.* (2020) showed that advances made in reducing IPI prevalence may be sliding back, as the prevalence of IPI among public housing residents (PPRs) was higher than those living in non-public housing, at 22.5% and 16.2% respectively. Although equipped with modern facilities, improper waste management and the lack of civic consciousness appear to contribute to the increase in these statistics. Table 2 is an updated summary of IPI surveillance amongst the residents of low-cost flats

Table 2. Updated summary of IPI prevalence adapted from Sinniah *et al.* (2014)

Location	Prevalence of IPI (%)	Author & Year of study
Sri Melati Flats, Kuala Lumpur	19.3	Kan, 1983
Sri Pahang Flats, Kuala Lumpur	28.5	Kan, 1983
San Peng Flats, Kuala Lumpur	7.9	Kan, 1983
Shaw Road Flats, Kuala Lumpur	35.2	Kan, 1983
Sentul, Kuala Lumpur	17.6	Che Ghani <i>et al.</i> , 1989
Flat Jalan Klang Lama, Kuala Lumpur	8.1	Sinniah <i>et al.</i> , 2002
Flat Kg. Harun, Kuala Lumpur	5.1	Sinniah <i>et al.</i> , 2012
Sentosa Flats, Kuala Lumpur	5.5	Sinniah <i>et al.</i> , 2014
Alor Gajah (Melaka), Gombak (Selangor), Bandar Tun Razak, Bukit Bintang, Pantai Dalam (Kuala Lumpur)	22.5	Sahimin <i>et al.</i> , 2020

from Sinniah *et al.* (2014). IPIs may reappear at a high rate if no effort is made to combat them, based on their current trajectory.

Non-Communicable diseases amongst the Malaysian poor

A decade ago, nine global voluntary targets were set up by the WHO in reducing mortality, morbidity and disability attributed to non-communicable diseases (NCD) (WHO, 2013). On account of this, Malaysia launched the National Strategic Plan for Non-Communicable Diseases (NSP-NCD) 2010-2014 in 2010, as well as its successor, NSP-NCD 2016-2026 in 2015 (Ministry of Health, 2016). This national framework aims to further strengthen NCD prevention especially in controlling behavioural risks including tobacco use, unhealthy diet, sedentary lifestyle, and harmful use of alcohol.

According to the National Health and Morbidity Survey (NHMS) 2019, NCDs were responsible for more than 70% of Malaysians’ premature deaths and disease burden (IPH, 2020). On the bright side, Malaysia has adopted NCD surveillance in order to discover the repercussions, risk factors, and health system capacity linked to NCD (Chandran *et al.*, 2021). This is critical since NCDs are preventable if the required precautions are followed, including early intervention at a young age. This is where PeKa B40 and mySalam becomes valuable.

There is also a need to further facilitate the process of improving the lifestyle quality of Malaysians, especially those who are vulnerable, especially the low-income group. Not only is it a humanitarian deed, but by doing so, not only will the healthcare load be reduced, but the nation’s development will benefit as well. The first step in achieving this goal is to address the difficulties that arise in the community.

Mental Health

The Institute for Public Health (IPH) has defined mental health as a state well-being in which every individual realises his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to his or her community (IPH, 2020). Ghazali *et al.* (2020) have defined mental disorder as a health condition that involves either in the way of thinking, emotions and one’s behaviour or the combination of these which can cause a person to be overwhelmed and struggles with their daily life routine. Urbanisation has brought with it its own set of issues involving mental health and well-being (Trivedi *et al.*, 2008). Studies (Ibrahim *et al.*, 2019; Zolkifeli & Amin, 2019; Ghazali *et al.*, 2020) have showed that the prevalence of mental health disorders was a lot higher in the low-income groups compared to higher income groups. It was also reported by the Institute for Public Health (IPH) in 2020 that the prevalence for depression specifically, was higher in those who earn lesser than RM1 000 (USD223) per month (2.7% of B40 compared to 0.5% of T20), with an overall prevalence of 2.3% for adults above the age of 18 years. Generally, the level of happiness is associated with the household income.

According to the same survey, children from the B40 household income had the highest frequency of having mental health problems at 9.2%, with children from rural areas having a greater prevalence (8.8%) than those from urban areas (7.5%).The report also unfolded the prevalence for depression for adults was the highest in Wilayah Persekutuan Putrajaya at 5.4%, followed by Perlis at 4.3%. Another report produced by UNICEF Malaysia in 2021 stated that the COVID-19 epidemic had exacerbated the community’s mental health situation as a consequence of cumulative difficulties such as financial insecurity, food insecurity, prolonged lockdown in tight quarters, and loss of jobs. One in every five PPR household heads reported feeling depressed, while one in every two parents believes their children’s mental health has suffered as a result (UNICEF, 2021).

In a report by the Department of Statistics, it was revealed that there are 2.7 million B40 groups where 63% of them were residing in the urban areas while the remaining 37% were in the rural settings (Amin & Ibrahim, 2016). Most of the B40 communities in urban areas tend to live in low-cost high-rise buildings with high-density

population like PPR, where there are limited spaces and resources with densely packed buildings since they simply could not afford better quality housing. There have been studies (Bentley *et al.*, 2011) that showed the correlation between living in cramped, over-crowded spaces with poor air quality and pollution to having a direct impact on mental health. As the trend of urbanisation is growing rampantly, many developers tend to do a rushed job and a poor one at ensuring the development of a well-planned settlement, as long as the houses are built. This is in contrast to what Rautio *et al.* (2017) proposed, which stated that a well-planned environment with adequate green space and low levels of noise and air pollution can help avoid the development of mental health issues.

The Ministry of Women, Family, and Community Development increased support for its helpline, *Talian Kasih*, which provides psychological counselling to those affected by the COVID-19 stay-at-home order. During the lockdown, it was found that the hotline received over 150,000 phone calls in the first 11 months of the order, with more than half relating to welfare assistance and roughly 4,000 relating to child and domestic violence (Bernama, 2021b).

Cardiovascular disease (CVD) and CVD related diseases

According to the Malaysian Burden of Disease and Injury Study, cardiovascular and circulatory illnesses accounted for 34.8% of fatalities in Malaysia (2009 – 2014). The Department of Statistics (Department of Statistics Malaysia, 2020b) supported this report, stating that ischemic heart disease caused almost 16,000 deaths in 2019 alone. Moving forward, the best strategy to eradicate CVD is to reduce the number of people with predisposing illnesses such as hypertension, diabetes, and hypercholesterolemia. Malaysia has the greatest rate of overweight and obese people in Asia, with 64% of males and 65% of females are overweight or obese, and this was further corroborated by Ng *et al.* (2014) and IPH (2015), as well as Shahar *et al.* (2019), where it was presented that obesity affects 22.8% of Malaysian children from low-income homes.

The 2019 National Health and Morbidity Survey (NHMS) found that the current prevalence of hypertension among people over the age of 18 was 30%. However, it was more widespread in rural (17.2%) than in urban regions (15.5%), and it was greater among those in the B40 compared to the T20 group at 30.8% and 22.7%, respectively (IPH, 2020).

The national prevalence for hypercholesterolemia or raised blood cholesterol for the year 2019 was 38.1% and highest among the M40 group (40.4%) (IPH, 2020). At the same time, diabetes and raised blood glucose was seen to be higher in the B40 group compared to the T20 group, at 9.2% & 18.5% and 13.0% & 15.5%, respectively. This could even be seen in the OA communities as reported by Tuan Abdul Aziz *et al.* (2016) and Wong *et al.* (2018), where it was pointed that the risks for developing CVS in the OA communities is growing. Diabetes, hypertension, hypercholesterolemia, and obesity have been shown to be predisposing factors to developing cardiovascular diseases (Shahar *et al.*, 2019). This could be the long-term effect of economic expansion and urbanisation leading to sedentary behaviours such as increased fast-food intake and a drop-in physical activity (Apal Sammy *et al.*, 2021).

The 2019 NHMS also revealed that the percentage of individuals not known to have hypertension (14.4%) and diabetes (9.3%) among the B40 category was higher than the opposite spectrum of family income, at 14.4% & 9.3% and 10.4% and 8.3%, respectively. This could be explained by the fact that the B40 group scored higher in the category of low health literacy (36.6%) than the T20 group (30.7%). This indicates that low-income people have a harder time acquiring, comprehending, and using health-related information across the three domains of healthcare, disease prevention, and health promotion. As a result, they are more likely to develop these diseases than other income groups and may make poor health decisions. As people with inadequate health literacy are less likely to utilise preventative interventions, resulting in higher healthcare costs and overuse of healthcare services (Howard *et al.*, 2005).

Malnutrition

Malnutrition and poverty have long been assumed to be linked, as a lack of financial resources leads to a preference for inexpensive, highly processed, carbohydrate-based foods over nutrient-dense foods. While energy levels may increase, micronutrient levels such as riboflavin, iron, zinc, protein, and vitamins remain low (Siddiqui *et al.*, 2020). This, in turn, may have an impact on physiological and mental functioning, making it difficult to attend school or job and subsequently lowering one's income level (Jung *et al.*, 2019). Although malnutrition can occur at any age, gender, or income level, it is more common in low-income populations as malnutrition and an inadequate diet are factors commonly associated with poor socioeconomic status (French *et al.*, 2019; Shahar *et al.*, 2019). Needless to say, malnutrition has a double-edged effect on one's weight, either making them overweight or underweight, each of which has its own set of health consequences.

Good nutrition is critical for children's growth and development at all stages, especially during their formative years. Unfortunately, one in every five Malaysian children is stunted, with the prevalence of stunting, wasting, overweight, and obesity in children under the age of five being higher in the B40 categories (IPH, 2020). A more recent study by Lee *et al.* in 2022 showed that the prevalence of stunting in children nationwide was 16.1%, lower than the 21.8% previously recorded by the 2019 NHMS. Nevertheless, this is still a concerning projection because stunting is frequently associated with poor immunity and cognitive impairment, which could lead to reduced socioeconomic opportunities as they progress in life (Malaysian Paediatric Association, 2021). Malnutrition is also assumed to be intergenerational, which means that pregnant women with inadequate nutritional intake may have a poor birth outcome and, subsequently, stunted infant growth (IPH, 2020). A study conducted in 2014 to assess factors linked with childhood stunting in OA communities showed that intestinal parasite infections and having stunted mothers were among the significant factors that contributed to the stunting of 35.6% of the children (Murtaza *et al.*, 2018).

Adult malnutrition is also inevitable, as the 2019 NHMS revealed that 94.9% of Malaysian adults do not consume the recommended quantity of dietary fibre, a trend that is predicted to continue. Underweight Malaysian adults were more common among students and those in the B40 age group, and this was also shown to be more common in low-income households (IPH, 2020). Poor dietary choices and consumption can increase the risk of diabetes, hypertension, anaemia, obesity, and even depression (Siefert *et al.*, 2001), and these risks can lead to the development of various disorders later in life.

Government initiatives for the low income

Housing (People's Housing Program)

Malaysia is one of Southeast Asia's most urbanised countries with 77.16% of its total population residing in urban areas, falling behind Singapore (100%) and Brunei (78.25%) and above Cambodia (24.23%), Myanmar (31.14%), East Timor (31.32%), Laos (36.29%), Vietnam (37.34%), Philippines (47.41%), Thailand (51.43%), and Indonesia (56.64%) (O'Neill, 2022). The global economic wave in Malaysia has changed not only the country's economic structure, but also the population and wealth distributions in favour of large cities such as Selangor, Penang, and Johor (Rostam *et al.*, 2010). In developing countries such as Malaysia, urbanisation is usually led by a crisis such as, shortage of health workers due to under-investment, brain-drain and immense workload (Godfrey & Julien, 2005). Accelerated urban expansion over a short period of time may also increase in urban diseconomies for example environmental deterioration, pollution, poor sanitation services and water sources and diseases as well as having population demands that outstrip service capacity, apart from the emergence of squatters in urban settings, as argued by Mok *et al.* (2007) and Trivedi *et al.* (2008).

Recognising this, the Malaysian government responded by constructing low-cost high-rise housing, known as *Projek Perumahan Rakyat* (PPR) and *Perumahan Awam* (PA) in all urban areas to resettle squatters while also satisfying the housing needs of the country's low-income group (B40) (Ministry of Housing and Local Government, 2018). Impressively, Malaysia succeeded to reduce the number of slum families by more than 90% during a two-decade span, from 571 261 in 1999 to 52 503 households in 2018 (Ministry of Housing and Local Government, 2018). Malaysia's government established the People's Housing Project (PPR) in 1998 to work in tandem with the National Housing Policy to ensure that low-income people have access to appropriate and affordable shelters and accompanying facilities and has since managed to resettle and house over 35 566 squatters and B40s (Ministry of Housing and Local Government, 2018). Depending on the vicinity, these units can either be rented at RM124 (USD28) per month or be bought at RM35 000 (USD7 806). Table 3 summarises the general outline of a typical PPR unit.

To a large extent, Malaysia has successfully relocated and reduced the number of urban and slum dwellers by providing them with modern houses and significantly improved access to utilities such as electricity and clean water sources, in addition to a basic sewage system, reducing the risks of hazards associated with poor hygiene and sanitation (Ministry of Housing and Local Government, 2018).

Healthcare

At the turn of the century, the World Health Organization placed Malaysia 49th in the world for its overall healthcare system, after Singapore, Japan, and Thailand, who were ranked 6th, 10th, and 47th, respectively, but ahead of Indonesia, which was ranked 92nd. Fast forward two decades, and Malaysia is ranked fourth in the Best Healthcare in the World Category of the 2021 International Living Global Retirement Index, owing to the professionalism of healthcare workers and the low cost of treatments (International Living, 2021). The Malaysian healthcare system is sustained by tax revenues and is rightly praised for its highly subsidised services, where only 2% - 3% of the ministry's expenditure is recouped from the patients' charges. It is said that the ministry subsidises up to 98% of the treatment costs for its nationals at public health facilities, with exemptions or minimal charges to the low-income communities should they be in penury as these facilities have a policy of not refusing treatment to not who cannot reimburse (CodeBlue, 2020). Table 4 summarises the cost for treatments and use of health facilities charged to Malaysians including outpatient services, as well as ward admissions (Ministry of Health, 2022a).

Aside from substantially subsidised hospital services, the Ministry of Health also established clinics in the community to provide better access to the general public. This includes *Klinik kesihatan*, *Klinik komuniti* and *Klinik desa*. *Klinik desa* is a small rural clinic managed by trained nurses that focuses on maternal and child health, with some offering outpatient treatments, depending on its facilities. *Klinik komuniti* was rebranded from *Klinik 1Malaysia* and is also managed by trained nurses and medical assistants. This type of clinic is frequently set up in densely populated residential areas, including PPRs and other low-cost flats, and offers basic treatments like as burns, fever, and follow-up treatments and screenings for certain noncommunicable diseases (NCDs) for a treatment charge of USD 0.30. *Klinik kesihatan*, on the other hand, is a major clinic with complete facilities that provides minor treatments and follow-ups for some NCDs, as well as X-rays and an outpatient pharmacy dispensary. All of the clinics mentioned have treatment rates ranging from USD 0.30 to USD 1.50, with no additional charges for prescribed medications (Azhan, 2016; JKWPKL, 2022).

It has been reported that more members of the B40 group suffer from NCD than those of the M40 and T20 groups, resulting in a higher NCD burden (Wilde, 2019; IPH, 2020). Most NCD cases in the B40 group go undiscovered or are discovered later when the

Table 3. Summary of the general outline of a typical PPR unit

Applicant	Those with a monthly income of less than RM 3 000 (USD 669)
Type of House	5 to 18 floors for urban locations and terrace house for peri-urban areas
Size of House	Not less than 700 square feet
Features	3 bedrooms, 1 living room, 1 kitchen area, 2 toilets
Rental rate	RM124 (USD28) per month
Public Facilities	Communal area, prayer room, waste collection facilities, playground, commerce space

Source: Ministry of Housing and Local Government (2021).

Table 4. A summary of cost for Malaysian in terms of consultation, B) daily ward use and C) daily treatments

Services	Charges (USD)
A) Consultation	
Outpatient	0.30
Specialist	1.50
B) 1 st Class	
One bed	26.70
Two bed	20.02
Four bed	13.35
2 nd Class	8.90
3 rd Class	0.67
C) 1 st class	3.34
2 nd class	1.11
3 rd class	Free

Source: Ministry of Health, Malaysia (2022a).

prognosis is dismal. As a result, the government launched the *Skim Peduli Kesihatan* for the B40 group (PeKa B40) in 2019 with the aim of alleviating people's burdens, as all PeKa B40 advantages are provided free of charge (Protecthealth, 2021). The programme was designed to increase access to healthcare, cut treatment costs, and improve Malaysians' well-being by focusing on non-communicable diseases (NCDs), as over half of the B40 demographic group over the age of 40 had at least one NCD (IPH, 2020). To encourage more Malaysians to engage in this scheme, the government set up information kiosks in selected government healthcare facilities, to better disseminate information. According to ProtectHealth, the pioneering subsidiary of the Ministry of Health Malaysia, there are 5 950 292 eligible beneficiaries nationally, however, only 12.39% were screened and claimed this benefit (Protecthealth, 2021). This scheme has four key benefits: health screening, health aid, completing cancer treatment incentive, and transportation incentive. Table 5 discusses each benefit in brevity.

The government also launched mySalam, a free takaful income aid scheme where Malaysians aged 19 to 65 with an annual income of RM24 000 (USD 5 352) are eligible to participate. The insurance is free and allows a one-off cash compensation of up to RM8 000 (USD 1 811) upon the diagnosis of one of the 45 critical conditions covered by the scheme, as well as RM50 (USD 11.50) daily hospitalisation revenue substitution up to RM700 (USD 159) annually at any government hospitals. By pioneering this scheme, the government intends to provide a social health protection system to assist the poor and needy in overcoming financial difficulties in the unforeseen event of a critical sickness. However, the conditions must be diagnosed by a panel of medical practitioners adheres to the government's guidelines (mySalam, 2020).

Table 5. A summary of the four benefits provided by PeKa B40

Benefit	Description
Health screening	This benefit requires recipients to go through a comprehensive health assessment to determine their current state of health and eligibility for the scheme. All tests and examinations are free of charge.
Health aid	The second benefit is immediately applied to people who passed the health screening and covers medical equipment required for procedures that are not funded by the government. A maximum of RM 20,000 (USD4460) is granted to recipients in forms of purchased medical equipment and is only applicable to treatments in MOH hospitals.
Completing cancer treatment incentive	This is an incentive for cancer patients to complete their treatment, with a total of RM 1,000 (USD 223) awarded to those who complete their treatments at MOH hospitals.
Transport incentive	This transportation expenditure incentive is exclusively available to beneficiaries of Health Aid and/or Completing Cancer Treatment Incentive and is intended to compensate recipients' transportation costs to and from MOH hospitals. It should be emphasized that the benefit is not intended to cover the entire expense of the trip.

Source: Protecthealth (2021).

Both mySalam and PeKa B40 are healthcare programmes for low-income groups, with varying eligibility and benefits, intending to ease the burden and address their medical needs.

CONCLUSION

As health and income are inextricably linked, low-income communities are more vulnerable and susceptible to disease. Low income can lead to overwork and lack provisions to maintain a healthy lifestyle, and despite government initiatives, the B40s, in particular, continue to be plagued by communicable and noncommunicable diseases (NCDs). Vaccine-preventable diseases (e.g., measles, diphtheria, poliomyelitis, pertussis, and Covid-19), parasitic infections, vector-borne diseases (e.g., malaria and dengue), mental health issues, cardiovascular diseases, and cardiovascular-related diseases continue to have an impact on the health and well-being of the poor in Malaysia.

Providing these people with affordable houses, albeit necessary, is not sufficient in ensuring and maintaining a tolerable and healthy lifestyle. Although initially the relocating of slum dwellers into public houses (PPRs) proved to reduce the incidence of IPI, the efforts seems to be sliding back. The lack of sustainable follow up measures in assuring the facilities are intact, i.e., functioning elevators and proper waste amenities, could lead to a plethora of other health issues and this is often overlooked.

Although it is widely considered that NCDs are affluent illnesses, the prevalence of NCDs in low- and middle-income countries accounts for 80% of global prevalence. In Malaysia, 47.6% of people aged 40 and up in the B40 category have at least one undiagnosed NCD. As a result, there is an urgent need for early preventative interventions, such as imparting risk factor information and awareness, as well as health programmes and monitoring at the preventive level. Communicable diseases, on the other hand, may be avoided in general by a better understanding of disease transmission and risk factors, as well as proper hygiene measures. This work is therefore significant since it takes a scientific approach to tackling a significant public health issue and gives insights that could be utilised to develop successful health policy.

In 2015, the United Nations adopted the Sustainable Development Goals (SDGs) in ensuring peace and prosperity in all groups of people, and this includes ensuring good health and wellbeing, providing clean water and sanitation as well as reducing income inequalities between the richest and the poorest.

For Malaysia to reach its status as a developed country, efforts of increasing health literacy among those with lower household income must be heightened, as poverty has been shown to be a precursor for a variety of diseases, both communicable and non-communicable.

This study, however, has several drawbacks. To begin, there have been very few and selective studies undertaken in Malaysia to assess the well-being of the urban poor or B40 populations. For example, studies on parasitic infections are frequently oriented toward Orang Asli populations, with limited understanding among other vulnerable groups. There is also a shortage of data on disease incidences based on household income, therefore reporting of cases frequently reflects the incidence among the Malaysian community as a whole.

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Conflict of Interests

The authors declare no conflict of interests.

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