6 *Health Service Delivery*
Disease Prevention and Control

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6.1 Introduction

Disease prevention and control programmes aim to reduce disease incidence, prevalence, and morbidity or mortality (Dowdle, 1998). Within the first thirty years since independence in 1957, Malaysia successfully eradicated or drastically reduced the occurrence of several serious communicable diseases (CDs) (Figure 6.1). During the next thirty years, Malaysia had some success as well as limited or no progress in dealing with non-communicable diseases (NCDs), re-emerging CDs (such as dengue) and other new and emerging CDs (such as influenza H1N1). This chapter analyses the development and evolution of disease control in Malaysia over the sixty years since independence (1957–2017). It explores and analyses the influences and interactions of various components of the health system and beyond the healthcare system in controlling diseases. The chapter does not attempt to address all the threads of disease control efforts in Malaysia. Instead, specific examples of disease control programmes illustrate key features that contributed to the success or limited progress of control efforts.

Disease control programmes in low- and middle-income countries commonly use vertical or campaign-style programmes. Horizontal programmes, on the other hand, rely on a system of health services. Atun, Bennett and Duran (2008) discuss the advantages of vertical programmes (rapid response; quick, economical and efficient solutions; better accountability within limited resources and timeframe) and constraints (donor- and value-driven (responsive to disease, lacking in people-centred care); expensive to sustain; creating subsequent redundancies, inefficiency and fragmentation in the health system). They note that some vertical programmes are standalone, completely separate and parallel to mainstream health services, and continue to remain in that mode. Others are designed as time-limited programmes that are

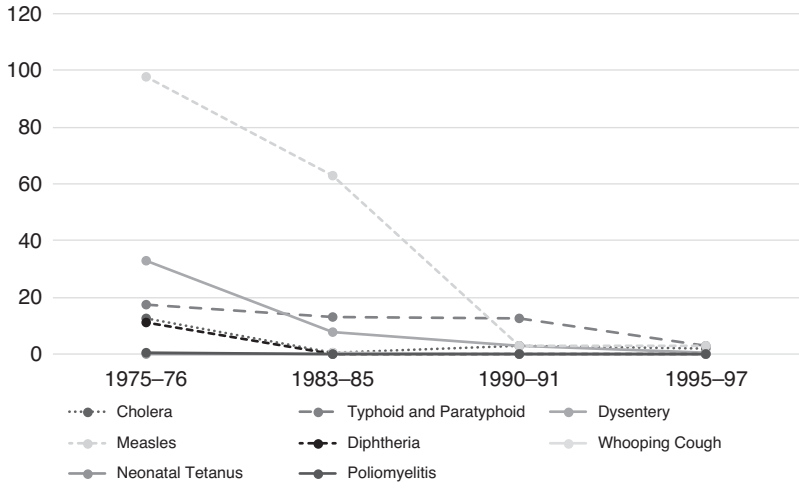

Figure 6.1 Incidence rate of communicable diseases per 100,000 population, Malaysia, 1975–1997.
Sources: Ministry of Health, 1983; Suleiman and Jegathesan, n.d.

then integrated with extant health services; yet others have varying degrees of integration from inception.

This chapter describes Malaysia's developmental experience in disease control and explores how the characteristics of prevalent diseases and the health system have combined to influence the design of disease control programmes and their subsequent integration into the mainstream health service.

6.2 The First Phase (1957 until the Mid-1980s): Control of Communicable Diseases

By the time it gained independence, Malaysia had already controlled several major epidemic contagious diseases (smallpox, cholera, plague). The main CDs of concern were vaccine-preventable diseases (neonatal tetanus, diphtheria, pertussis (whooping cough)), which took a heavy toll of infant lives; vector-borne and water borne diseases (malaria, dysentery, typhoid and paratyphoid, and endemic cholera), which affected the productivity and lives of the work-aged population groups; and tuberculosis (TB), which caused illness and premature death in both adults and children (Box 6.1).

Box 6.1 The major communicable diseases of concern in Malaysia (1960s to mid-1980s)

- **Malaria and TB** were the fifth and sixth leading causes of hospital admissions and deaths, respectively (Supplementary Table 6.a) (Ismail & Martinez, 1974; Suleiman & Jegathesan, n.d.).
- **TB:** An estimated 25% of all hospital beds were occupied by TB patients, most lt in advanced stages of the disease, and 75% of children had been infected by age 15 (MAPTB, 2012).
- **Malaria:** A 1965–66 survey showed 168,500 malaria cases reported from static and mobile clinics in Peninsular Malaysia, an annual 40,000 cases in Sarawak and 250,000 cases in Sabah (Suleiman & Jegathesan, n.d.).
- **Dysentery, typhoid and cholera** were endemic.
- **Yaws** was reported at 140.85 per 100,000 population in 1958 (Lo, 1985).
- **Filariasis** was present in 20,000 of 600,000 people clinically examined between 1960 and 1984 (Suleiman & Jegathesan, n.d.).
- **Leprosy:** An estimated 11,900 to 15,000 cases in Peninsular Malaysia in 1969 (Kamaludin, 1990).
- **Tetanus, diphtheria, pertussis, poliomyelitis and measles** contributed to high infant and child mortality rates (Figure 6.1 and Supplementary Table 6.b).

See Supplementary Tables 6.a, 6.b and 6.c for further information.

As elaborated in Chapters 3, 4 and 5, during the 1960s until the mid-1980s, healthcare for the predominantly rural population increased gradually, with expanding rural health centres and district hospitals and gradually increasing availability of nurses, midwives, hospital assistants (later known as assistant medical officers) and sanitation staff. Training and competence in public health and programme management was limited and concentrated mainly at the national and state levels. Monitoring systems were rudimentary. The high incidence and prevalence of the common CDs was a heavy burden for the nascent health services. The rationale for adopting vertical approaches for controlling selected CDs was to provide additional resources targeted

at rapidly reducing specific disease burdens to enable the young health service to assume responsibility without being overcome by these diseases to the detriment of other functions.

A distinctive feature of Malaysian development was that disease control programme funding was from domestic sources and channelled through the budget allocated to the Ministry of Health (MoH). Malaysia generally does not receive significant bilateral aid for health (World Health Organization, 2017). Foreign aid was mainly in terms of consultant expertise for designing programmes and training staff, management and treatment protocols, and designing monitoring and surveillance systems. Therefore, the new programmes aligned as closely as possible to national health development strategies. There was no need to provide accountability to external donors. On the other hand, there were strong incentives to avoid unnecessary domestic financial burdens by using existing facilities and staff and avoiding human resource issues arising from redundant staff.

The factors that influenced the design of prevention and control programmes included:

- the access of affected population groups to, and coverage provided by, the rural health service and public sector hospitals
- the availability and technical skills of the staff in those facilities
- the management capacity of the health services
- the clinical nature of the diseases in question, which partly influenced how and when those who were affected made contact with health services
- the epidemiological characteristics of the diseases in question, for example, the mode of transmission, the types of vectors and their habits, and the habits and lifestyles of human population groups
- the availability of effective and affordable technology or medical products to address the diseases

The initiatives for preventing and controlling CDs during this period could be categorised in three groups:

1. No dedicated 'programme', for example, waterborne diseases, such as endemic cholera, typhoid and paratyphoid.
2. National programmes (or campaigns) with dedicated organisational entities for planning, training, monitoring and evaluation

but service delivery through the mainstream health services. Examples are the vaccine-preventable diseases of childhood and TB.
3. National- or state-level programmes with dedicated management structures as well as service delivery mechanisms. Examples include vector-borne diseases such as malaria and filariasis.

Table 6.1 illustrates the key features that differentiated the various degrees of verticality in the spectrum of vertical programme designs.

Dedicated vertical programmes were suited for diseases that required the delivery of medical care (immunisation, diagnostic, medication) to specific target population groups or measures aimed at disrupting the lifecycle of specific vectors. In contrast, waterborne diseases required environmental control approaches coupled with surveillance and outbreak control. Therefore, instead of a dedicated disease-specific vertical national programme, preventing waterborne disease was the responsibility of environmental health services (see Chapter 7), while surveillance and control of disease outbreaks was the purview of mainstream health services for CD epidemiology and control.

6.2.1 Socio-economic Development Influenced the Development of Disease Control Programmes

The overall improvement of the country's socio-economic and living conditions (see Chapter 3) facilitated the successes in controlling CDs. The gross domestic product (GDP) per capita increased substantially, with an annual growth of 7.7% between 1970 and the mid-1980s, improving standards of living for the majority of the population, making them less vulnerable to infectious diseases (Tan et al., 1987; UN Country Team, 2005). Significant improvements in roads and transportation made healthcare more accessible.

In addition to economic growth and infrastructure development, social development also progressed. The percentage of women (aged 15–19 years) who attended secondary school increased from 15% in 1960 to 75% in 1980, while the percentage of living quarters with piped water and flush toilets rose from 48% and 18% in 1970 to 68% and 60%, respectively, in 1980 (Tan et al., 1987). The increase in women's education levels as well as improved environmental health contributed to the decline of infant mortality caused by CDs; in

Table 6.1 *Examples illustrating key features in the spectrum of Malaysian vertical disease control approaches that subsequently merged with mainstream health services (see Supplementary Table 6.c for programme details)*

	Examples of vertical disease control programmes		
	Vaccine-preventable diseases of childhood	Tuberculosis	Malaria
Pressures that led to the adoption of national programmes	Professional and political awareness of the value of vaccines, influence of the WHO and availability of affordable vaccines	Strong advocacy by civil society (MAPTB) leading to political awareness and commitment	International pressure to move from control measures (based on species sanitation in cities and rubber estates) to nationwide eradication to avoid becoming a pool of infection dangerous to neighbouring countries
Key organisational features of vertical national programmes at inception: • Dedicated programme[1] • Mainstream[2] • Legislation governing notification of diseases and vector control applied to all the relevant CDs	*Dedicated programme:*[1] • Procurement and distribution of vaccines *Mainstream*[2] *health services (rural health services (RHS) and hospitals):* • Delivery of immunisation • Programme monitoring • Notification of disease and control of outbreaks	*Dedicated programme:*[1] • Planning, monitoring and evaluation • Training and treatment protocols • Supervision of implementation • Community education and mobilisation	*Dedicated programme:*[1] • Planning, monitoring and evaluation • Training and management protocols • Service delivery – vector control, case finding and treatment

Table 6.1 (*cont.*)

	Examples of vertical disease control programmes		
	Vaccine-preventable diseases of childhood	Tuberculosis	Malaria
	• Pre-condition of immunisation as eligibility for school entry	• Supplementary periodic mass screening campaigns *Mainstream*[2] *health services (RHS and hospitals):* Delivery of treatment Notification of cases Contract tracing Provision of financial aid for travel and work absenteeism	*Mainstream*[2] *health services (RHS and hospitals):* Passive case detection, i.e. detection of malaria in patients who attended clinic services for any illness Use of laboratory facilities Notification of cases and laboratory screening
Duration and criteria for merging vertical programmes into mainstream health services	*Duration:* ongoing *Criteria:* eradication (polio) or sustained elimination of vaccine-preventable diseases *Strategies:* Other vaccines were added when they became available and affordable. Vaccine distribution and cold-chain management merged	*Duration:* 15 years of dedicated funding Dedicated management structure was dismantled in gradual stages and completed after 30 years (1995). *Criteria:* High vaccine coverage (95%), reduced incidence of new cases (<60 per	*Duration:* Began as a malaria eradication programme but converted to malaria control after 10 years (in East Malaysia) and 15 years (in Peninsular Malaysia) 'due to operational, administrative and technical problems' (Mak et al., 1992).

	into maternal and child health (MCH) programme.	100,000 population) and good cure rate (>85%). *Strategies:* Monitoring and surveillance systems and dedicated staff were absorbed into the public sector health services and some were re-trained for other programmes.	*Criteria:* Reduce morbidity (<2 per 1,000 population) and mortality (<0.5%) and prevent spread to non- endemic areas. *Strategies:* Over the next 5-year period, vector control activities merged into national programmes for vector-borne diseases. Surveillance, health education and control of outbreaks merged into the gamut of other CD control activities within the public sector health services.

[1] Separate funding and staffing with vertical authority and accountability structure.
[2] Involved the use of existing organisational and service delivery structures, staff and accountability mechanisms.

particular, vaccine-preventable diseases and food-borne and water borne diseases (DaVanzo & Habicht, 1986).

6.2.2 Programmatic Features that Influenced Outcomes

6.2.2.1 Collaborative and Co-ordinated Activities at Various Levels of Service Delivery

The national disease control programmes carried out promotion, prevention and early detection activities (education, vaccination and case detection) mostly at the primary care level. In the rural health units, disease control activities complemented maternal and child health and outpatient care, sanitation and environmental health services, and dental care. District and general hospitals served as training, treatment and referral centres. For example, hospitals supported rural health units by providing training for bacillus Calmette-Guerin (BCG) vaccination and served as referral points for case finding and contact tracing for TB control programmes (Suleiman & Jegathesan, n.d.). The dedicated management teams of the national disease control programmes played a critical role in aligning and co-ordinating disease control funding, strategies, processes, activities and services across different actors, sectors, levels and facilities. For example, TB managerial teams were formed at state level to provide continuous supervision, consultation and support and to ensure seamless co-ordination at all levels of care with available resources (Ismail & Martinez, 1974; Suleiman & Jegathesan, n.d.).

The rapid expansion of rural health facilities and services between the 1960s and 1970s and its linkages to district and general hospitals contributed to the reduction of morbidity and mortality from CDs. However, most of the disease control programmes included a unilateral (one-way) referral system from clinics to primary/district hospitals or national referral hospitals, and this system soon became established as the norm in the health services. The lack of a counter-referral system was workable when the country dealt with CD control that mainly required acute care and response. However, it would later create difficulties in the management of patients with diseases that required long-term care, such as NCDs and HIV.

6.2.2.2 Human Resources

Similar to the public sector health services, the disease control programmes relied on allied health personnel, including nurses, medical

assistants, medical laboratory technologists and junior laboratory technicians rather than doctors. As discussed in Chapters 4, 5 and 8, this strategy enabled Malaysia to reach wider populations, especially those in rural areas, while there was a shortage of medical professionals. The allied health personnel received technical information and skills training and acted as front-line staff. For example, junior laboratory technicians trained by the Institute for Medical Research (IMR) did most of the sputum examination for TB (Cheong, 2010). Allied health staff from rural health clinics assisted in case detection for malaria screening (Jaafar et al., 2007). Not only did the front-line staff provide medical care, they also raised community awareness regarding early detection and treatment.

Staff employed by or deployed to the national disease control programmes were mostly from the same categories as those in the health services, and qualifications and employment conditions were the same. By the time the vertical programmes merged into the mainstream health services, economic and health service growth created the need for more of these personnel as well as the capacity to absorb them. Thus, career paths and absorption were not problematic, and the issue of redundancy was avoided.

6.2.2.3 Surveillance Systems

Each disease control programme developed a tailored surveillance system. For example, a central TB registry established in 1973 under the National TB Control Centre monitored TB cases. Chest clinics in hospitals in each state collected and compiled data for submission to the national level. The malaria eradication programme had a case registry system and entomological surveillance activities. Similarly, leprosy had a surveillance system.

Meanwhile, a standard epidemiological surveillance system had been developed for the Epidemiology Unit since 1971 (Suleiman & Jegathesan, n.d.). The separate surveillance systems were integrated into the standard epidemiologic surveillance system of the MoH during late 1980s and early 1990s when the vertical programmes merged into the mainstream. Although Malaysia has not evaluated the impact of the separate surveillance systems, it is possible to conjecture about both their advantages and their constraints. The dedicated surveillance and monitoring systems of the disease control programmes were probably of better quality because of special efforts in training, tighter

supervision and less staff mobility. However, they would have created duplication and an additional burden on the reporting staff, particularly at the front line. However, the skills and experience gained through the better-quality surveillance in the vertical programmes probably carried over to the mainstream health services when the programmes merged.

6.2.2.4 Community Education and Mobilisation

The disease control programmes used the same strategies of community mobilisation and education as used successfully in primary healthcare (PHC), using local community organisations, particularly in rural areas (see Chapter 4). Also, the MoH programmes partnered with major non-governmental organisations (NGOs), which earlier had advocated for national disease control efforts, mobilised funding from civil society and developed care models. Examples are the Malaysian Leprosy Relief Association (MaLRA) and the Malaysian Association for the Prevention of Tuberculosis (MAPTB). Evidence of the success of such efforts is, for example, the fact that over 80% of registered TB cases in 1975–79 were self-referred by symptom-motivated patients (Cheong, 2010). Not only did such partnerships address ignorance, scepticism and cultural prejudices, they also established practical measures for facilitating and supporting individuals and families to benefit from the disease control efforts. Examples include the provision of a TB allowance to compensate for travel and sickness absenteeism, and the provision of living allowances as well as housing and income-generation opportunities in sheltered communities for cured leprosy patients who carried the stigma that isolated them from their own communities (Suleiman & Jegathesan, n.d.).

However, there were failures. For example, resistance by the population in Sabah to spraying with DDT (dichlorodiphenyltrichloroethane) under the malaria control programme in the 1980s is attributed to the lack of engagement with the communities and failure to understand local needs and concerns (Rahman, 1982; Mak et al., 1992; Ministry of Health et al., 2015).

6.2.2.5 Introduction and Availability of Vaccines and Effective Medicines/Medical Products

The introduction of new technology, vaccines and medicine contributed to the prevention, early detection and control of CDs. The

incidence of childhood TB declined sharply in the 1970s after the introduction of the BCG vaccination programme (Cheong, 2010). Effective treatment such as single-dose penicillin with 2% aluminium monostearate (PAM) for yaws (Lo, 1985), multiple drug therapy (MDT) for leprosy and a shorter duration of TB treatment (from two years to six months) led to reductions in morbidity (i.e. deformity among leprosy patients) and mortality rates (Lo, 1985; Jayalakshmi, 1994; Cheong, 2010). The IMR played a significant role in introducing new vaccines and diagnostic tests in the early days (Box 6.2).

6.2.2.6 Outcomes

The BCG vaccination programme realised its initial objective of providing at least 75% coverage of the susceptible population within a short period (Ismail & Martinez, 1974). The mass survey and treatment campaign with PAM under the yaws control activities also reduced the reported cases from 9,462 in 1958 to 335 in 1968 (Lo, 1985).

The incidence of most CDs declined dramatically (Figure 6.1). The incidence of TB declined from 151.5 per 100,000 population in 1961 to 56.8 per 100,000 population in 1985 (Suleiman & Jegathesan, n.d.); malaria cases reduced significantly from 150,000 to below 50,000 in the late 1970s, but the goal of disease

Box 6.2 The role of the IMR in vaccine production and diagnostic services

- The production of vaccines for cholera, typhoid, plague, smallpox and rabies was started by the IMR in the 1940s (Ramanathan et al., 1976). The IMR initiated field trials and developed them as a standard protocol before any new vaccines were released to the public. In 1986, a trial on measles vaccines was conducted by the MoH and supported by the IMR before it was included as part of the national immunisation programme (UN Country Team, 2005).
- The IMR acted as a central reference laboratory for the whole country for more specialised diagnostic and public health laboratory tests for diseases such as yaws, typhoid and cholera (Ramanathan et al., 1976).

eradication had yet to succeed fully (Mak et al., 1992). Yaws and filariasis were no longer a concern; the country had successfully eliminated leprosy in 1994 and achieved polio-free status in 2000 (Suleiman & Jegathesan, n.d.). With the increase of childhood immunisation coverage (Table 6.2), the infant and child mortality rates had also declined significantly in 1990 (Table 6.3).

Table 6.2 ***Percentage coverage of immunisation in Malaysia, 1970–2017***

% of childhood immunisation coverage	1970	1980	1990	2000	2010	2016/17
BCG for infants	46.6	88.2	97	99.3	99	98.55
DPT (diphtheria, pertussis, tetanus) for infants (3rd dose)	15.0	67.0	89.9	98.7	101.14	99.34
Polio for infants (3rd dose)	15.0	72.0	89.6	93.4	94.13	99.34
Measles/MMR (measles, mumps, rubella) for infants	10.0	20.0	87.1	93.9	96.1	88.8

Sources: Suleiman & Jegathesan, n.d.; Ministry of Health, 2010; 2018b.

Table 6.3 ***Infant and child mortality rates, 1957–2017***

	1957	**1970**	**1983**	**1990**	**2000**	**2010**	**2016/17**
Infant mortality rate (per 1,000 live births)	68.9	39.4	20.2	13.1	6	6.7	7.3
Neonatal mortality rate (per 1,000 live births)	29.6	21.4	12.3	8.5	3.1	4.3	4.2
Toddler mortality rate (per 1,000 population aged 1–4 years)	8	4.2	1.7	0.9	0.5	0.4	0.4
Under-5 mortality rate (per 1,000 live births)	110.4	55.9	26.6	16.8	7.9	8.5	8.6

Sources: Jayalakshmi, 1994; Department of Statistics, 2009; 2011a; Ministry of Health et al., 2015.

Box 6.3 System observations: understanding feedback loops through communicable diseases

The role of feedback loops in CDs is well known among epidemiologists. They use stock-and-flow models, such as the susceptible-infectious-recovered (SIR) model, to predict and curb the spread of disease. Successful control of CDs relies on disrupting biological transmission feedback loops via vaccination, quarantine, culling of vectors, etc. The wide acceptance of such models in the health profession provides a useful entry point to many important system dynamics concepts.

The two programmes that failed to live up to their initial promise were those for TB and malaria. Although greatly reduced during the 1990s, TB incidence remained a problem. There were two contributing factors: first, the large concentration of foreign workers from neighbouring countries were a continual pool of infection. Local surveillance and control systems were ill-prepared to detect and manage them (Suleiman & Jegathesan, n.d.). Second, the HIV/AIDS epidemic brought with it an associated increase in TB due to impaired immune systems (Suleiman & Jegathesan, n.d.). The treatment modalities available at that time and programme strategies were inadequate for addressing this threat. For malaria, although incidence declined significantly, pockets of transmission and endemic levels persisted. There were several contributing factors, including people movement that was difficult to monitor, insecticide resistance, drug resistance and changes in vectors.

6.3 The Next 30 Years: The Era of the Integrated/Horizontal Approach to Disease Control (Mid-1980s to the Present)

6.3.1 The Changing Disease Profile

6.3.1.1 The Rise of Non-communicable Diseases

After the late 1980s, socio-economic development, urban migration, changes in work and lifestyles, and demographic transition to fewer children and more people of working age resulted in an evolving disease profile (see Chapter 3). NCDs such as cardiovascular disease, diabetes

Table 6.4 ***Prevalence of selected NCD risk factors in Malaysia for adults aged ≥18 years, 1996–2015***

NCD risk factor	1996 (%)	2006 (%)	2011 (%)	2015 (%)
Diabetes mellitus	8.3[1]	11.6	15.2	17.5
Hypertension	29.9[1]	32.2	32.7	30.3
Hypercholesterolemia	–	28.2	43.9	47.7
Overweight	16.6	29.1	29.4	30.0
Obesity	4.4	14.0	15.1	17.7
Physical inactivity	–	43.7	35.2	33.5
Smoking[2]	24.8[3]	21.5[4]	23.1[4]	22.8[4]
Alcohol (current drinker)	–	7.4	11.6	7.7

[1] Data for population aged ≥30 years.
[2] Data for population aged 15 years and above.
[3] NHMS II definition: respondent who reported to be smoking at the time of the survey.
[4] Centers for Diseases Control and Prevention (CDC) definition: respondent who reported to have smoked ≥100 cigarettes in their lifetime and smoked daily or some days in the past 1 month.

Sources: Institute for Public Health, 1996; 2008; 2011; 2015; Department of Statistics, 2011b; Ministry of Health Malaysia & Harvard T. H. Chan School of Public Health, 2016.

mellitus and cancer emerged as major contributors to the disease burdens (Supplementary Table 6.a). There was also a shocking rise in the prevalence of NCD risk factors over the years, as shown in the National Health and Morbidity Surveys (NHMS) (Table 6.4). In 2016, NCDs accounted for 74% of all deaths (World Health Organization, 2018), while NCD-related morbidities and disabilities had increased by 80% between 1990 and 2013 (Ministry of Health Malaysia & Harvard T. H. Chan School of Public Health, 2016).

6.3.1.2 Emerging and Re-emerging Infectious Diseases

Since the 1990s, Malaysia has experienced emerging diseases, including HIV infection, dengue, Nipah virus and severe acute respiratory syndrome (SARS), and re-emerging diseases, including resurgent TB and measles, while malaria persisted in endemic areas, perpetually threatening to spread to other areas. (Table 6.5).

The first case of HIV was detected in 1986, and by 2017, there were a cumulative 115,263 HIV cases (Ministry of Health, 2018a). Initially

Table 6.5 ***Incidence rate of emerging and re-emerging communicable diseases (per 100,000 population)***

	1990	1995	2000	2005	2010	2017
HIV	4.30	20.30	26.97	23.42	12.89	10.33
Dengue fever	9.54	10.68	58.93	60.71	148.73	257.6
Dengue haemorrhagic fever	1.29	1.87		3.82	14.23	1.25
Tuberculosis	61.2	56.93	63.29	61.20	68.25	80.78
Measles	3.17	3.16	2.83	5.39	0.26	5.28

Sources: Suleiman and Jegathesan, n.d.; Ministry of Health 2005; 2010; 2018b.

confined largely to injecting drug users (IDUs), sexual transmission thereof became more prevalent in recent years and has proved a challenge to control measures. First recognised as a public health issue in 1973, dengue incidence has increased tremendously, from 969 cases in 1973 to more than 100,000 cases, with 200 deaths per year, since 2014 (Ministry of Health, 2016).

The factors contributing to the emergence of new diseases or the resurgence of longer-standing diseases are complex and include population movements and lifestyle changes, globalisation and the movement of goods, adaptive mutations in pathogens and vectors, and environmental changes that facilitate or support changes. Table 6.6 shows the illustrative key features of emerging diseases in Malaysia.

The Nipah virus outbreak in 1998–1999, SARS in 2002–2003 and the H1N1 pandemic influenza in 2009 not only posed an increased healthcare burden but also caused social disruptions and economic loss. Up to 40% of cases, or 105 people, with acute encephalitis (out of 265 cases) died during the Nipah virus outbreak (Looi & Chua, 2007), while H1N1 caused 77 deaths (out of 12,307 reported cases) in 2009, the majority of whom were children (Sam, 2015).

Meanwhile, re-emerging diseases such as TB and measles continue to be a public health challenge. TB cases per 100,000 population declined over 30 years from 350 cases to about 60–68 cases but increased to about 84 cases in the subsequent 30-year period (Ministry of Health, 2016). Similarly, despite a strong childhood immunisation programme, measles increased during the 30 years after 1990, from an incidence of 3.1–5.18 per 100,000 population, and one-third of the cases during the

Table 6.6 *Illustrative examples of the rapid emergence of and varied challenges posed by emerging diseases in Malaysia*

Year	Virus	Location	Relevant features illustrating the complexity of the disease
1997 2000 & 2003, re-emergence	Enterovirus 71 Known to be circulating widely in the region. Danger of mutation into a more virulent variety.	Sibu	• Hand, foot and mouth disease (HFMD). Transmission: faecal–oral route. Mostly asymptomatic but could cause severe illness with deaths. • In 2000 and 2003, novel variants emerged in Peninsular Malaysia.
1998 Re-emerged 2006	Chikungunya virus Factors potentially responsible for spread include migrant labour and climate changes favouring vector mutation.	Port Klang and Kuala Lumpur Perak (50 km from earlier site)	• Vector-borne disease. Sporadic outbreaks, febrile illness with polyarthritis similar to dengue and thereby masking early recognition. • Re-emergence coincided with wider epidemic in Indian Ocean countries. More serious and higher rate of illness symptoms.
1998	Nipah virus Believed to be 'spill over' from wild fruit bats to commercially reared pigs, and subsequently to humans.	Ipoh, Seremban	• Previously existing as infection in pigs, the virus adapted to infect humans, causing fever, encephalitis and a high mortality rate of about 40%. Genotyping and epidemiological studies in Malaysia and several neighbouring countries resulted in better understanding of natural reservoirs of the virus family and raised the international alert on potential danger in the future.

1986 2003, new variant appeared in Malaysia	HIV type 1 HIV type 1 CRF33_01B	Kuala Lumpur	• First case in Malaysia. • The new variant is widespread in all risk groups. New variants pose a challenge for diagnosis and the development of antivirals and vaccine candidates.
2004 2006 2007	Avian influenza H5N1	Kelantan, Kuala Lumpur, Perak, Penang	• Highly pathogenic virus originating in poultry. Adaptation to infect humans, causing fever; deaths reported in other countries. Outbreaks detected in poultry in Malaysia. Linked to fighting cocks smuggled from neighbouring countries. Rapid and effective control measures prevented the spread to humans.

Source: Adapted from Tee et al. (2009).

recent 2-year period involved children who had never been vaccinated (Ministry of Health, 2016).

6.3.2 Drivers of Change in the Responses to the Disease Profile

6.3.2.1 Health Information Systems

Improved information systems provided information that spurred policy-makers and leaders in the health sector to review and revise national strategies for disease control (see Chapter 10). For example, surveillance systems provided information on emerging and re-emerging CDs. The NHMS provided evidence of the rapid increase and high levels of risk factors and disease prevalence for NCDs, while NCD disease registers provided information on disease trends and disease burdens, early detection and effective control. In some cases, the information also energised social activists to advocate for revised approaches, for example, for HIV/AIDS.

6.3.2.2 International Movements

International movements such as the United Nations' millennium development goals (MDGs), sustainable development goals (SDGs) and the WHO Framework Convention on Tobacco Control (FCTC, ratified on 16 September 2005) served to focus attention and provide impetus for stronger efforts. For example, in 2005, the Cabinet Committee on AIDS agreed to pilot test a harm reduction programme for HIV prevention among IDUs despite it being incompatible with the country's zero-tolerance policy on drugs (see Case Study 6.1). In 2018, the Cabinet Committee decided not to reintroduce 'kiddie pack' cigarettes (packs of ten) despite the possibility of increasing tax revenue (Bernama, 2018).

International concerns about cross-border transmission of emerging diseases contributed to stronger collaboration and co-ordination between Malaysia, regional and international agencies such as the ASEAN[1] and the WHO[2], and bilateral co-ordination with neighbours (e.g. the Thailand-Malaysia Border Health Goodwill Committee, the Health Task Force of the Asia-Pacific Economic Cooperation (APEC) group) (Barraclough & Phua, 2007).

6.3.2.3 Leadership, Governance and Competing Priorities

The examples of cross-sectoral collaboration for NCDs quoted above also provide evidence of the government's commitment and the

influence of leaders from the health sector and of the MoH in shaping policy that transcended several sectors. However, balancing the competing priorities in health with other opportunities for economic growth and development remains a challenge for Malaysia, especially in NCD prevention. Several factors and entities outside of health have considerable influence. For example, food, beverages and tobacco are deemed promising industries for driving growth in the manufacturing sector in the Eleventh Malaysia Plan (2016–20). However, they might not contribute to the promotion of a healthy lifestyle for reducing CDs and NCDs (Economic Planning Unit, 2015). Population health outcomes require multi-actors and sectors to work together to address social, economic and environmental risk factors. There is top-level commitment in the form of a Cabinet-level committee comprised of ministers from various sectors and chaired by the deputy prime minister and several task forces for establishing priorities and developing strategies (Box 6.4).

However, progress in translating the top-level commitment into genuine collaborations across ministries and agencies is slow, especially at implementation level. The MoH faces a continuing challenge to advocate for and create an enabling environment and an integrated approach for implementing multi-sectoral strategic plans. Such plans require the acceptance of roles, responsibilities and incentives for each agency to contribute to disease control efforts as well as for monitoring and evaluation mechanisms to track performance and accountability.

6.3.2.4 Programme Management and Service Delivery

Disease control programmes require considerable structural and functional change to address the changing epidemiologic picture. The previous national control programmes for CDs had tightly knit management structures at MoH level, together with a high level of authority. Hitherto, leadership for managing NCDs had primarily been the purview of various clinical disciplines, such as cardiology, nephrology or oncology. The introduction of a more holistic perspective to NCD control required a more collaborative management structure that allowed inputs from various disciplines and shifted the focus from patient care to population outcomes. This required shared leadership between public health, clinical and laboratory specialist disciplines. Inevitably, the authority structure and interrelationships changed. Also, disciplines that had previously worked within a small

Box 6.4 National committee/task force/strategic plan/policy

Communicable diseases

National committee/task force

- HIV and AIDS
  - o 1985: National AIDS Task Force
  - o 1992
    - Inter-Ministerial Committee on AIDS
    - National Coordinating Committee on AIDS
    - National Technical Committee on AIDS
  - o 2000: Cabinet Committee on AIDS
- Dengue
  - o 2014: National Committee on Dengue

Laws and regulations

- Prevention and Control of Infectious Diseases Act 1988

National Strategic Plan (NSP)

- National Plan of Action on AIDS, 1988, 1998
- NSP on HIV and AIDS, 2006–10 and 2011–15
- NSP for Ending AIDS, 2016–30
- NSP for Leprosy, 2016–20
- NSP for Tuberculosis Control, 2011–15 and 2016–20

Non-communicable diseases

National committee/task force

- NCDs
  - o 2010: Cabinet Committee for a Health Promoting Environment
- Tobacco Control
  - o National Coordinating Mechanism for Tobacco Control

Laws and regulations

- Control of Tobacco Products Regulation 2004 and Control of Tobacco Product (Amendment) Regulations 2008, 2009, 2010 and 2011 under the Food Act 1983

National Strategic Plan (NSP)

- NSP for Non-Communicable Disease, 2010–14 and 2016–25
- NSP for Tobacco Control, 2015–20
- National Cancer Control Blueprint, 2008–15
- NSP for Cancer Control Programme, 2016–20
- National Action Plan for Healthy Kidneys, 2018–25
- Salt Reduction Strategy to Prevent and Control of NCD for Malaysia, 2015–20
- Policy Options to Combat Obesity in Malaysia, 2016–25
- NSP for Active Living 2016–25
- Malaysia Alcohol Control Action Plan 2013–20

circle of related disciplines had to gain competence in collaborating at multi-sector level and aim at population-wide behaviour change, working with communities and using mainstream and social media.

The Epidemiology Unit, previously established under the Health Division of the MoH in 1971, had focused on CDs. It was re-organised in 1992 (Suleiman & Jegathesan, n.d.) to expand its scope to include NCDs, disease surveillance, HIV/AIDS, vector-borne diseases, occupational and environment health and tobacco control, and public health laboratories. Its responsibilities include policies, planning and strategic management, building integrated and collaborative efforts with other agencies including healthcare providers in the private sector, and providing a platform within the MoH to co-ordinate inputs from the various clinical disciplines as well as with the research institutions[3] that provide laboratory expertise or programme evaluation and investigative skills.

As discussed in Chapters 4 and 5, since the early 1990s, the service delivery system was re-organised and upgraded with the appropriate technology and staff, particularly at the primary care level, to strengthen comprehensive management of CDs and NCDs. Box 6.5 provides examples of the initiatives. Public sector clinics have standardised clinical management protocols to guide service providers, but the process of placing fully trained multi-disciplinary teams is a slow, ongoing process and far from complete (see Chapter 4). For example, healthcare providers' insufficient interpersonal and communication skills contributed to gaps in managing diabetic patients (Lim et al., 2018). Chan (2015) highlighted the need for trained diabetic nurse educators to empower patients for self-care. Additionally, efforts at addressing NCD management are hampered by inadequate referral systems, lack of continuity of care between primary, secondary and tertiary care, and inadequate involvement of private general practitioners in the co-ordinated management of NCDs (see Chapters 4 and 5).

NCD monitoring evolved from early ad hoc initiatives from various clinical disciplines that established patient registries[4] to monitor their disease speciality. This resulted in over 31 separate disease registries by 2012, most of which had resource constraints. There were over 70 databases with no linkages to each other, and data standards varied (Clinical Research Centre, 2012). Efforts to centralise the registries and standardise the quality of data face several challenges, including the lack of resources (workforce, funding and information communication

Box 6.5 Examples of integration of disease prevention and control activities (prevention, early detection, management and treatment) in PHC clinics

- 1995: Breast self-examination (BSE) and annual breast examination by trained health workers
- 1996: Decentralisation and transfer of general outpatient services in hospitals to PHC clinics
- 1998: HIV screening and management services such as prevention of mother-to-child transmission (PMTCT) programme
- 2000 onwards: Integration of diabetes screening and management, methadone services for IDUs, management of other NCDs

technology (ICT) infrastructure), a governing body and data sharing between registries. The more successful registries are those that deal with single diseases or interventional entities and that require data input from fewer sources. Examples are the renal and cataract registries that contribute to continuous improvement in quality of care.

Recognising the high cost of managing and treating NCDs, the MoH adopted a key strategy of encouraging healthier lifestyles that would reduce NCD risk factors in the community. A series of national healthy lifestyle programmes targeted at the general population (Suleiman & Jegathesan, n.d.) disseminated key messages through a variety of channels. Also, specially designed community mobilisation efforts were implemented to empower communities to foster behaviour change with the involvement of multiple agencies such as the Ministry of Education and the Ministry of Information. Despite these efforts, diabetes, obesity and overweight increased dramatically, and smoking rates remained unchanged (Table 6.4). Malaysia has yet to find effective means of addressing these challenges.

The health system had to respond to emerging and re-emerging CDs with better tools for rapid diagnosis, rapid and effective analysis of epidemiological data and rapid response capability to control outbreaks – this required sophisticated technology at multiple levels: field, laboratory, clinical and digital information. The effort required financial resources and higher levels of competency in human resources. The continuing burden of dengue, malaria and TB required multi-agency collaboration.

Box 6.6 Key milestones in the evolution of responses to emerging communicable diseases

1999: Inter-ministry committee for the control of zoonotic diseases
2002: Epidemic intelligence programme
2006: National influenza pandemic preparedness plan
2007: Crisis preparedness and response centre
2008: Risk communication plan

Source: Sulaiman, 2011.

Earlier years had seen the development of surveillance and systems to respond to CD outbreaks. The new challenges, illustrated in Table 6.6, resulted in further evolution, and the key milestones in Box 6.6 demonstrate the range of stakeholders and activities involved.

New procedures required the district health office to act as a gatekeeper to collect data routinely from a wider range of stakeholders, including health facilities in the public and private sectors, such as laboratories, clinics and hospitals (clinical-based surveillance); the Department of Veterinary Services and FOMEMA (Foreign Workers' Medical Examination); and communities (Ministry of Health, 2004).

Monitoring systems established by the earlier national control programmes for CDs such as TB had been merged into the mainstream by 1995, whereby district health offices were the nodal points for integrating data from hospitals and clinics. Nevertheless, at the national level, separate programme entities maintained some elements of their original structure. For example, the chest clinics maintained their own TB registry, and most of the district health offices had limited access to such data, leading to a lower priority for TB control (Ministry of Health, 2002). The situation only improved in 2002 when the National TB Information System (TBIS) gave the district health office full responsibility for co-ordinating and monitoring the information. Nonetheless, contact tracing for CDs such as TB and HIV remains a concern, particularly among the key populations, that is, migrant and rural populations, including the indigenous populations (Suleiman & Jegathesan, n.d.).

Box 6.7 System observations: considering feedback loops in behavioural change

The health system has frequently struggled when it has had to change human behaviour for successful disease control. Health promotion often follows a knowledge gap theory, assuming that providing the right information will yield the right behaviour, but with very limited results. Positive feedback from unhealthy behaviour – for example, the satisfaction from eating unhealthy foods – is often immediate, whereas negative feedback – for example, cardiovascular disease – is distant, vague and uncertain. More immediate feedback that promotes healthy behaviour and discourages unhealthy behaviour, such as social approval, may provide useful tools for individual behavioural change. On a larger scale, we need to consider what types of feedback loops will create health-promoting environments.

6.4 Conclusion

Malaysia has successfully reduced the burden of several CDs through time-limited dedicated programmes aimed at specific diseases. These programmes largely avoided the well-known disadvantages of vertical programme approaches. There are several contributing factors: programme designs recognised and relied on the existing and developing healthcare delivery system. Thus, at the front line, service delivery was in the hands of the PHC providers.[5] This avoided unnecessary duplication and inefficiencies and subsequent potential redundancy and wastage of human resources and physical facilities. On the other hand, the dedicated vertical approach enabled the development of competencies in programme management, supervision, monitoring and evaluation that later transferred to the public health sector. Conceivably, reliance on domestic and not foreign funding ensured that programme design was accountable to domestic authorities and therefore aligned to national health and development priorities and strategies. (Other chapters elaborate on these priorities and strategies.)

Emerging and re-emerging infectious diseases pose continuing challenges, some of which have been easier to address. The

underlying factors are the adaptive behaviour of pathogens, changes in the habits and immune levels of communities that expose them to virulent pathogens, and changes in the environment that facilitate change in either pathogens or humans. There is insufficient knowledge on how the emergence of a new disease can be prevented. Therefore, health systems rely on rapid recognition and effective control of outbreaks. Quick to recognise that Malaysia has the climatic and geographic features that place it at risk of emerging diseases, particularly those arising from zoonotic pools of infection (Ministry of Health, 2002; 2004), the country rapidly developed the capacity for early recognition and containment of outbreaks (Lim, 1999). There has been less success in dealing with re-emerging diseases caused by human behaviour such as migration and drug use or by the adaptive behaviour of pathogens and vectors compounded by human behaviour, such as antibiotic-resistant microbes and dengue.

Malaysia has had less success in the field of NCDs. The reasons for this are unclear. The range of diseases is much broader and their causative and contributory factors more varied. For some, such as several neoplastic diseases, medical knowledge about their prevention and management is limited. For others, such as cardiovascular and metabolic diseases, the contributory factors require a change in human behaviour, which is complex and dependent on a wide variety of influences. The health sector has yet to devise effective means of addressing many of those influences.

6.5 Key Messages from Malaysia's Experience

6.5.1 What Went Well?

- The design of disease-specific control programmes, as far as possible, used existing healthcare delivery systems. They also developed specific competencies in programme management, supervision, monitoring and evaluation, which later transferred to the public health delivery system.
- The health system rapidly developed the capacity for prompt recognition and effective control of outbreaks of new diseases, as knowledge on prevention was insufficient.

6.5.2 What Didn't Go So Well?

- The health system has had less success in dealing with NCDs and CDs caused by:
  - Human behaviour such as migration and drug use.
  - The adaptive behaviour of pathogens and vectors compounded by human behaviour, such as antibiotic-resistant microbes and dengue.

6.5.3 Trends and Challenges

The increasing prevalence of diseases whose root causes lie outside the traditional jurisdiction of the health system will require innovative leadership and new approaches.

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Appendix III
Supplementary Tables

Supplementary Table 6.a ***Ten principal causes of admissions and deaths, 1960, 1974 and 1996***

	1960, rank (%)		1974, rank (%)		1996, rank (%)
Causes	Admissions	Deaths	Admissions	Deaths	Deaths
Accidents	1 (10.14)	7 (5.63)	1 (13.48)	3 (10.53)	3 (9.44)
Skin diseases	2 (4.11)	–	6 (2.58)	–	–
Gastroenteritis/digestive system diseases	3 (3.90)	3 (8.93)	3 (3.71)	8 (2.87)	7 (4.60)
Complications of pregnancy	4 (3.72)	10 (2.64)	2 (4.97)	–	–
Tuberculosis	5 (2.88)	5 (7.36)	–	7 (4.40)	–
Malaria	6 (2.65)	–	–	–	–
Mental illness	7 (2.42)	–	4 (3.10)	–	–
Bronchitis	8 (2.34)	–	10 (1.95)	–	–
Pyrexia of unknown origin	9 (2.21)	–	8 (2.16)	–	–
Heart diseases	10 (1.77)	2 (9.94)	5 (2.59)	2 (15.02)	1 (15.61)
Disease of early infancy	–	1 (15.2)	7 (2.29)	1 (18.99)	6 (7.82)
Cardiovascular/cerebrovascular diseases	–	8 (3.17)	9 (2.08)	4 (7.32)	4 (9.27)
Pneumonia	–	4 (8.48)	–	6 (6.50)	8 (4.17)
Neoplasms	–	6 (6.03)	–	5 (6.71)	5 (8.92)
Deficiency diseases	9 (2.81)	–	–	10 (1.43)	–
Liver diseases	–	–	–	9 (2.32)	–
Septicaemia	–	–	–	–	2 (10.12)

Sources: Ismail and Martinez, 1974; Suleiman & Jegathesan, n.d.

Supplementary Table 6.b *Infant and child mortality rates, 1957–2017*

	1957	1970	1983	1990	2000	2010	2016/2017
Infant mortality rate (per 1,000 live births)	68.9	39.4	20.2	13.1	6	6.7	7.3
Neonatal mortality rate (per 1,000 live births)	29.6	21.4	12.3	8.5	3.1	4.3	4.2
Toddler mortality rate (per 1,000 population aged 1–4 years)	8	4.2	1.7	0.9	0.5	0.4	0.4
Under-5 mortality rate (per 1,000 live births)	110.4	55.9	26.6	16.8	7.9	8.5	8.6

Sources: Department of Statistics, 2009; 2011a; 2011b; 2018.

Supplementary Table 6.c *National disease control programmes*

Disease control programme	Key strategies			Supporting strategies			Outcomes
	Prevention	Screening/ detection	Treatment and management	Human resource and capacity building	Surveillance system	Community participation	
Yaws Elimination Campaign, 1954 – with assistance from WHO and UNICEF (UN Children's Fund)		Mass survey campaign, with annual re-surveys. When the incidence rates declined, modified school surveys were deployed every 6 months. If infectious cases were found, the entire area would be studied.	Mass treatment using procaine penicillin for open cases, latent cases and contact.	Yaws elimination unit was set up.			Incidence rate declined from 140.85 per 100,000 population in 1958 to <2 in 1974. Yaws control activities were integrated into the general health services in 1974. All health workers were trained to recognise yaws cases.
Filariasis Control Programme, 1960		Case detection: House and population censuses and nocturnal mass blood survey. Whenever a nocturnal survey was not feasible, the diethylcarbamazine (DEC) stimulation technique was used during follow-up of cases or in school surveys.	Mass treatment in the locality using DEC: Individual case follow-up was carried out after 3–5 months while the locality was resurveyed after about 2–3 years.	Peninsular Malaysia: Control team (medical assistant, public health auxiliary, junior laboratory technician, driver and vehicle). Sabah and Sarawak: Ad hoc team to conduct surveys and treatment in specific areas.			1988–90: There appeared to be a decreasing trend in the number of filariasis cases detected countrywide. 1983: incorporated into the Vector-Borne Disease Control Programme.

Supplementary Table 6.c *National disease control programmes* (continued)

Disease control programme	Key strategies			Supporting strategies			Outcomes
	Prevention	Screening/ detection	Treatment and management	Human resource and capacity building	Surveillance system	Community participation	
National TB Control Programme, 1961 – monitored and co-ordinated by the Division of TB and National TB Control Centre	National health education campaigns: To increase public awareness of TB signs and symptoms and early diagnosis. BCG vaccination programme: Between 1961 and 1974, at least 75% of the susceptible population had been vaccinated (total BCG vaccinations performed: 4,965,982).	Case finding programme: Early case detection among symptomatic and high-risk groups (at least 66%) in the community using mass miniature radiography (MMR), X-ray, bacteriological and sputum examination and referred for appropriate treatment.	Treatment programme: 20-month standard treatment regimen (streptomycin with isoniazid or isoniazid with para-aminosalicylic acid or thiacetazone) for patients to render them non-infective (at least 95%). The National TB Control Centre served as the national referral hospital for patients with complicated TB.	Countrywide training programme conducted by the National TB Centre, supported by hospitals, for different categories of personnel (doctors, nurses, hospital assistants, health inspectors, medical students and lab technicians). Formation of State TB Control/Managerial Teams in 1973 to supervise and monitor the treatment programme and contact tracing.	1973: The TB registry was established.	Working with MAPTB to provide socio-economic aid and increase community participation to reduce defaulter rates for treatment.	TB is no longer the major cause of death. The National TB Control Programme was integrated with public health and general medical services in 1995.

Supplementary Table 6.c *National disease control programmes* **(continued)**

Disease control programme	Key strategies			Supporting strategies			Outcomes
	Prevention	Screening/ detection	Treatment and management	Human resource and capacity building	Surveillance system	Community participation	
Malaria Eradication Programme, 1967–82: Part of the Global Malaria Eradication Programme	Vector control: Residual insecticide spraying using DDT (started with DDT wettable powder and replaced by DDT emulsion) - Abate 500 E was applied in drains and canals - Automatic siphons, tidal gates and sluice gates were constructed to manage water movement. Health education for the community.	Active case detection in high-risk areas. Passive case detection in patients seeking medical and health services. Mass blood screenings every 6 months in areas with increase of cases, influx of foreign workers, interior Orang Asli settlements and where there were cases in non-endemic areas.	Presumptive treatment (Darachlor (chloroquine/pyrimethamine)) was given to suspected cases, especially those from malarious areas before blood examination. Radical and follow-up treatment (sulfadoxine/pyrimethamine, chloroquine and primaquine) was given for all reported cases.	Vertical organisational structure: - Director and deputy director - Administration bureau - Spraying bureau - Health education and training bureau - Epidemiology bureau - Entomology bureau - Malariologist - District chief and multipurpose/special team Specially trained personnel deployed to map and spray all houses and structures, perform census counts, perform mass blood surveys and general surveillance activities.	Case registries Entomological surveillance activities to study vector habits.		Substantial decline in reported cases in West Malaysia and Sarawak, from 150,000 at the start of the programme to <50,000 a year in the late 1970s. Did not succeed in eliminating malaria, re-orientated strategy to malaria control. 1985: Incorporated into the Vector-Borne Disease Control Programme.

Supplementary Table 6.c *National disease control programmes* **(continued)**

Disease control programme	Key strategies			Supporting strategies			Outcomes
	Prevention	Screening/ detection	Treatment and management	Human resource and capacity building	Surveillance system	Community participation	
			Introduction of multiple drug therapy (MDT) and decentralisation of treatment: patients were hospitalised only during the intensive phase of treatment, and follow-up treatment was available at 23 skin clinics throughout the country.				
National Leprosy Control Programme Peninsular Malaysia (1969), Sarawak (1974), Sabah (1985)		Early case finding by staff of the 'skin clinics'.	Institutional treatment only for infectious cases and non-infectious cases with severe reactions from drug cases requiring reconstructive surgery.		A Central Registry of cases was established at the National Control Centre: it registered 50% or 8,710 estimated cases in 1969.	Worked with MaLRA to reduce stigma and facilitate social integration of patients.	1994: achieved WHO elimination status of <1 per 10,000 population.

Supplementary Table 6.c *National disease control programmes* **(continued)**

	Key strategies			Supporting strategies		Outcomes
Disease control programme	Prevention	Screening/ detection	Treatment and management	Human resource and capacity building	Surveillance system	Community participation
National Immunisation Programme – Expanded Immunisation Programme was adopted as part of the National Immunisation Programme in the late 1980s. • Smallpox (early 1950s) • DPT (1958) • BCG (1961) • Poliomyelitis (1972) • Measles (1984) • Rubella (1988) • Hepatitis B (1989)	Immunisation campaigns jointly organised with NGOs. Dissemination of health education messages through mass media. Delivered through the rural health units or the MCH clinics in urban areas as part of MCH services.	Focus on low-coverage groups: • Estate population • Indigenous people • Religious subgroups • Urban poor • Defaulter tracing • Missed opportunities	Strengthening of the cold chain: • Provision of suitable refrigerators, ice packs and vaccine carriers • Training on the management, maintenance and monitoring of the cold chain		Development of a mapping system and improved monitoring system at district and local levels.	Almost 90% childhood immunisation coverage for BCG, DPT, polio and MMR in 1990 Decline of the infant and children mortality rate.

System Analysis Case Study 6.1: Adoption of Harm Reduction Strategies for Preventing HIV among Injecting Drug Users

Shiang Cheng Lim and David T. Tan

The HIV Epidemic and Drug Abuse in Malaysia

HIV was first reported in Malaysia in 1986. Following this, infection rates rose sharply over two decades, culminating in the peak incidence of approximately 7,000 new cases per year in 2002 (Ministry of Health Malaysia, 2016b), of which 70–80% were injecting drug users (IDUs), followed by female sex workers (FSWs), transgender people (TG) and men who have sex with men (MSM) (Malaysian AIDS Council & Malaysian AIDS Foundation, 2012). Injecting drugs was associated with drug abuse. Malaysia had declared drugs the 'Nation's Number One Enemy' since 1970 and had aimed to create a drug-free nation by 2015.

Malaysia's efforts to combat drug use and trafficking took a criminalisation approach, including: (1) mandatory death penalty for drug trafficking, (2) preventative education for young people and school children, and (3) compulsory detention and rehabilitation programmes for drug users. Treatment and rehabilitation centres adopted the total abstinence method, that is, 'cold turkey' detoxification, focusing mainly on vocational, spiritual, psychosocial and military-style physical training with little or no medical intervention to assist drug users in quitting their drug habits (Kamarudin, 2007). The rising number of cases led to increased criminal enforcement, education and rehabilitative efforts under the criminalisation approach (Figure 6-A). This was expected to reduce

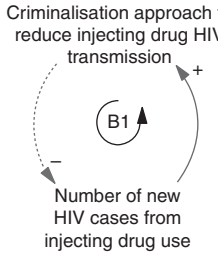

Figure 6-A A criminalisation approach emphasising criminal enforcement, education and rehabilitative efforts failed to reduce the number of new HIV cases from injecting drugs use.

HIV spread to acceptable levels, creating a balancing loop (B1). Unfortunately, this strategy did not yield the desired outcomes.

Indeed, although Malaysia's efforts in the war on drugs were expected to prevent and curb drug use, the number of drug users instead continued to grow. The criminalisation of drug use also led to riskier injecting behaviours among IDUs because many of them feared being caught in possession of any injecting equipment (Reid et al., 2007). This increased the sharing of needles and consequent transmission of HIV. In the early 2000s, the HIV prevalence rate among IDUs was 10–27% (UNAIDS, 2001). The ineffectiveness of the criminalisation approach (Figure 6-A, dotted line, B1) created an urgent demand for alternative solutions, such as harm reduction.

Barriers to the Adoption of Harm Reduction Strategies

Harm reduction principles (see Box 6-A) were gaining traction globally. However, there were several barriers to the introduction of such an approach in Malaysia. Social stigmatisation and criminalisation of drug users were major obstacles to the feasibility of carrying out needle exchange and drug replacement therapy – reinforcing existing practices instead. With a predominantly Muslim population, strong religious and cultural views on drugs and stigmatisation of users were major barriers to public acceptability of harm reduction (Kamarulzaman & Saifuddeen, 2010).

Jurisdiction over the prevention of drug use and HIV was split between enforcement under the Ministry of Home Affairs (MOHA) and healthcare under the MoH. In practice, the enforcement paradigm took priority. Medical practitioners were obligated to report persons with drug dependency who sought medical treatment so that they could be detained and rehabilitated under the Drug Dependants (Treatment and Rehabilitation) Act 1983. Consequently, most IDUs did not seek HIV testing or early diagnosis and would only discover their status at treatment and rehabilitation centres due to compulsory testing or when forced to undergo testing due to suspected HIV-related symptoms (Positive Malaysian Treatment Access and Advocacy Group, 2012).

Additionally, negative societal attitudes towards IDUs were also prevalent within the healthcare workforce (World Health Organization, Regional Office for the Western Pacific & Ministry of Health, Malaysia, 2011). IDUs did not trust healthcare providers –

Box 6-A Harm reduction principles and strategies

Harm reduction focuses on preventing and reducing drug-related harm rather than preventing drug use. It is modelled around humanistic values that uphold human dignity and rights (Hunt et al., 2003). Focused on public health rather than criminal justice, harm reduction goals include reducing injecting drug use and the sharing of injecting equipment, reducing drug abuse, and increasing abstinence from all drug use.

Examples of Harm Reduction Strategies

1. **Needle and syringe exchange programme (NSEP):** Emphasises the use of sterile equipment and the return of used needles and syringes to prevent sharing, which proliferates HIV transmission.
2. **Methadone maintenance treatment (MMT):** Offers an oral, long-acting opioid substitute for reducing the use of illicit parenteral substances and for improving the person's social health status (e.g. enabling them to take on full-time employment).
3. **Condom distribution:** A structural intervention usually complemented with other education strategies aimed at reducing the risk of sexual exposure to HIV.

Early success of harm reduction strategies came from the Netherlands, where success was noted in the reduction of acute hepatitis B incidence and stabilisation of HIV prevalence (Buning, 1991).

particularly with regard to maintaining confidentiality of their HIV status. Most preferred to turn to peers, including former IDUs, as they were more supportive (Positive Malaysian Treatment Access and Advocacy Group, 2012). These attitudes made it very difficult for government health services to be an effective conduit for harm reduction approaches. Some civil society organisations already engaged with the IDU community were better positioned and equipped to do so. Examples included handing over activities from the MoH to civil society, modifying national-level policies that criminalised drug users and addressing stigmatisation of IDUs by multiple stakeholders, including religious leaders and healthcare providers (Figure 6-B).

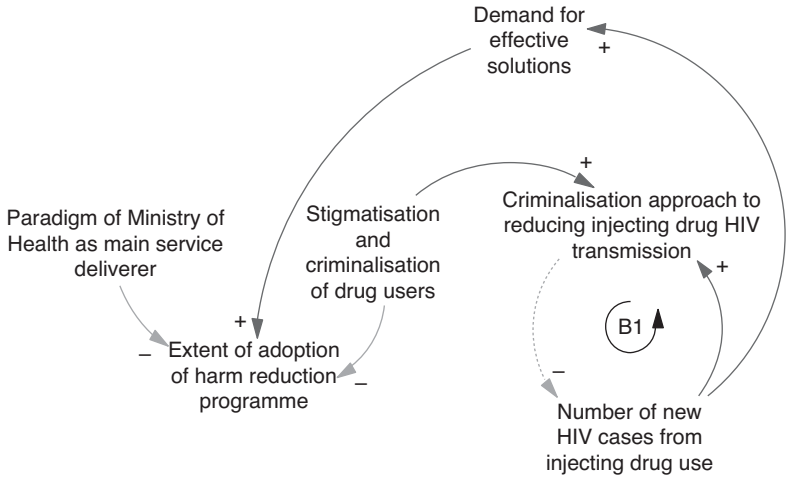

Figure 6-B Stigmatisation and the paradigm of regarding the MoH as the main provider of outreach and services were barriers to a harm reduction programme.

Window of Opportunity and Leadership Resulting in Pilot Programmes

Two key events created a window of opportunity for government leadership to change existing policies (Figure 6-C). First, the Millennium Development Goals (MDGs) mid-term review in 2005 reported that Malaysia was not on track to achieve MDG No. 6 of halting the spread of HIV/AIDS by 2015. This triggered concerns at the highest political levels. At around the same time, local advocacy efforts led by prominent Malaysian individuals hit a high-water mark (see Box 6-B). Together, these events created institutional and public acceptability for the piloting of the methadone maintenance treatment (MMT) programme and needle and syringe exchange programme (NSEP) in October 2005 and February 2006, respectively. Government leadership and strategic partnerships with non-governmental organisations (NGOs) played key roles in the implementation of these harm reduction initiatives. The paradigm that required the MoH to be the main service deliverer changed.

Methadone is a controlled substance and its use requires medical supervision. While the MoH had the authority to implement MMT, it required strong partnerships with NGOs who were able to reach out and win the trust of the IDU community. Implementation of the NSEP

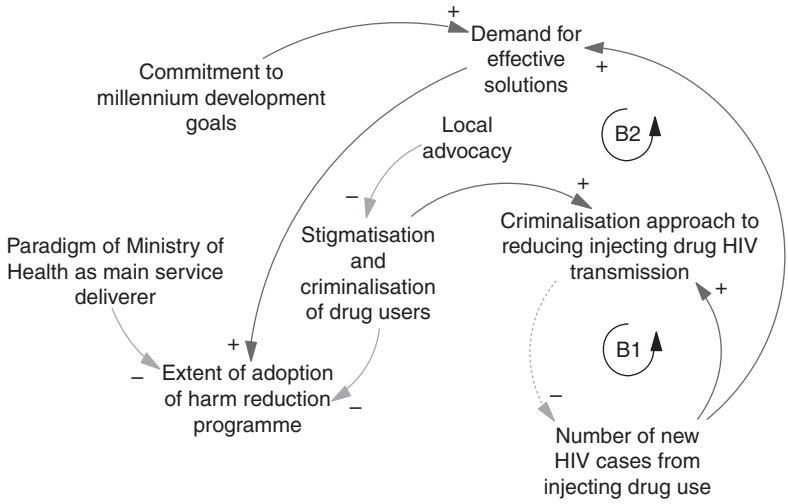

Figure 6-C Commitment to MDG goals and local advocacy were critical enabling factors that overcame barriers to the adoption of the harm reduction approach.

by the government agencies was seen as contradictory to existing drug policies, and there was a fear of inciting resistance from the conservative parties. Civil society organisations, therefore, became an attractive platform. The government provided financial backing to the Malaysian AIDS Council (MAC) (Box 6-B) and allocated RM 4 million annually for their NSEP outreach activities (Malaysian AIDS Council & Malaysian AIDS Foundation, 2007). In turn, the MAC provided a rich resource pool of community healthcare and peer outreach workers with a pre-existing and long-standing rapport with the IDU community. This partnership marked a significant milestone in changing the paradigm for service delivery.

The pilots proved effective. There was a significant reduction in IDUs sharing used equipment as well as a reduction of IDUs using the services of street or port doctors (people who inject drugs for IDUs) across the three NSEP pilot sites (Ibrahim, 2007). Within the MMT pilot project, there were high compliance and retention rates and improved employment rates and performance among the clients who came for MMT programmes (Reid et al., 2007); (Babu, 2009).

Box 6-B Key involvement by the MAC in the government's adoption of harm reduction strategies

The MAC was established in 1992 and serves as the umbrella organisation for partner organisations to advocate, support and co-ordinate all HIV-related activities.

Advocacy

Harm reduction initiatives in Malaysia were propelled by the MAC, which was led by the following influential figures:

- Datin Paduka Marina Mahathir (daughter of the prime minister, Mahathir Mohamad (1981–2003 and 2018–20), president of MAC between 1994 and 2005).
- Dato' Prof Dr Adeeba Kamarulzaman (related to Malaysian royalty and graduated with a medical degree from Australia, MAC board member since early 2000) (Narayanan et al., 2011).
  - Led the Harm Reduction Working Group (HRWG) and used evidence-based research to advocate for harm reduction by focusing on drug use and HIV/AIDS as a public health problem – the pilot project for MMT and NSEP was approved by the Cabinet Committee on Drug Use in 2005 based on the HRWG proposal (Reid et al., 2007).
  - Generated bottom-up support among the religious agencies and scholars in the community by conducting workshops and engaging in theological exchanges (Narayanan et al., 2011).

Implementation

With continuous allocated funding from the Malaysian MoH since 2003 and being the principal recipient of the Global Fund later on (Tanguay, 2011), the MAC and its partner organisations would be the primary implementers of harm reduction initiatives, which include (Malaysian AIDS Council & Malaysian AIDS Foundation, 2015; Ministry of Health Malaysia, 2015; Ministry of Health Malaysia, 2016b):

- Community-based peer outreach programmes
- Drop-in centres
- Shelter care
- HIV treatment and adherence support programme (TAPS)

Sustaining and Replicating Success

The conditions for action described above will not necessarily sustain the acceptability of harm reduction indefinitely. However, the successes achieved in reducing HIV risk and prevalence among IDUs have created acceptance and ownership of the harm reduction programme within the MoH and provided justification to other stakeholders and actors for the continuation and scaling up of the programme, which creates a reinforcing loop (Figure 6-D, R1). Harm reduction has been recognised as the right HIV prevention strategy by the MoH, which has taken ownership of the programme and its successes (Ministry of Health Malaysia, 2013; Institute for Public Health, 2016).

Despite persistent mixed attitudes towards drug users, the success provided justification to other stakeholders and actors for the continuation and scaling up of the programme. Top-level politicians have thrown their weight behind harm reduction policies and programmes. To increase the buy-in from religious groups, the deputy prime minister justified the programme to religious authorities on the grounds that drastic action is needed in emergencies that could lead to death,

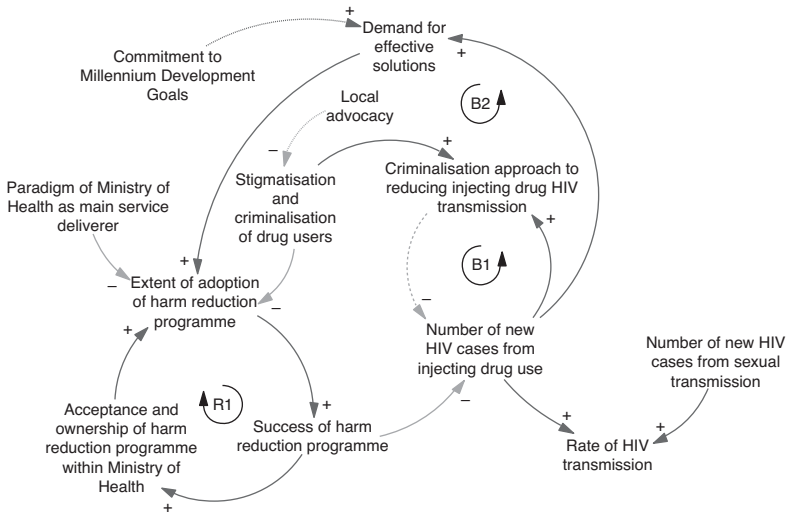

Figure 6-D Success of the pilots created favourable conditions for institutional changes that persisted even after key enabling factors for the adoption of the harm reduction approach (MDGs and local advocacy) receded.

which is permissible under the rule of *darūra* (the rule of necessity) in Islamic law (Narayanan et al., 2011). These political commitments were translated into organisational re-structuring as well as financial support for the harm reduction programme. A National Harm Reduction Task Force, comprising representatives from health and drug control authorities, the police, prison and religious authorities, academics and NGOs was set up in 2005. It provided opportunities for different government agencies to work across and increase the partnership with NGOs (Kamarulzaman, 2009). There was increased funding from the government to finance human resource costs, facility overheads, methadone procurement for MMT services in public facilities and the delivery of NSEP services by NGOs, and the government remained the single largest funding source even as the programme scaled up (Naning et al., 2014). This financial commitment is an indication of the acceptance and ownership of the harm reduction programme within the MoH.

Service delivery through NGOs has proven to be very important, with 70% of needle exchange services delivered through such organisations. The drug replacement therapy wing of the intervention had to be delivered through government (or private) clinics due to methadone being a controlled substance, and penetration has been much lower.

The number of new HIV infections fell from its peak in 2002 to an average of 3,400 cases per year in 2010 and has since plateaued (Ministry of Health Malaysia, 2018). The risk of HIV transmission among IDUs fell from 70–80% to about 10% in 2017, and HIV prevalence among IDUs also decreased from 22.1% in 2009 to 13.4% in 2017 (Ministry of Health Malaysia, 2018). A cost analysis study reported savings of RM 47.1 million in direct healthcare costs and 12,653 HIV infections averted since 2006 (Naning et al., 2014). These remarkable successes have ensured the sustainability of the harm reduction programme even after the initial conditions that enabled it (i.e. the MDGs and the highwater mark of local advocacy) had passed.

New Problems Emerge

The harm reduction programme has achieved and sustained substantial results in reducing HIV transmission among IDUs. These gains have been maximised, however, and further progress in reducing HIV transmission requires new strategies. Sexual transmission is now the leading

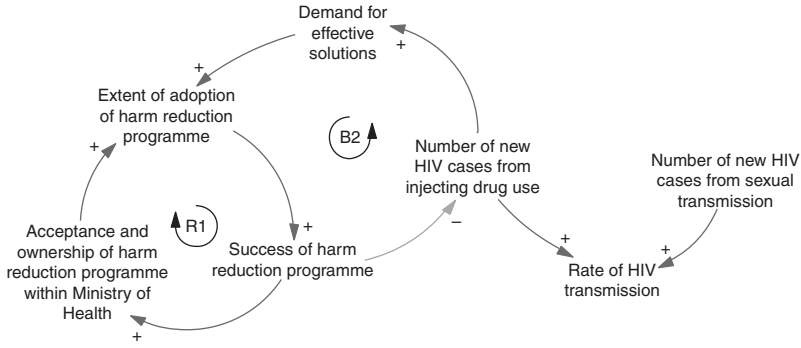

Figure 6-E While harm reduction strategies have reduced HIV in IDUs, the gains are being threatened by the increasing incidence of sexual transmission of HIV.

cause of HIV infection. Evidence shows that the number of new cases has remained persistent and may even be increasing, threatening to reverse gains against the spread of HIV (Figure 6-E).

The MoH acknowledges this challenge. *'The MDGs were vital for the Malaysian government's decision to adopt harm reduction initiatives in the year 2006, however current and ongoing efforts are built upon previous successes and are streamlined towards meeting SDG goals such as Fast Tracking to Zero and Ending AIDS'* (Ministry of Health Malaysia, 2015).

Conclusion and Lessons Learnt

This experience provides lessons on how to test potentially effective strategies for improved health outcomes when the stigmatisation and criminalisation of culturally 'deviant' behaviours are major obstacles. International commitments such as the MDGs, together with evidence-based research, proper data collection and accountability, can help government leadership undertake the necessary interventions even if they may be locally unpopular. Civil society groups may be vital in the delivery of services, particularly services targeted towards marginalised populations. And early success, as seen from the pilot programmes, will probably be necessary in order to sustain interventions in the face of societal suspicion.

The existing harm reduction strategies targeted at IDUs may have reached their limits for reducing the spread of HIV in the Malaysian

context, particularly as sexual transmission has overtaken injecting drug use as the major mode of HIV transmission since 2011 (Malaysian AIDS Council & Malaysian AIDS Foundation, 2012). To progress further and meet the new targets of '90-90-90' (90% diagnosed, 90% on treatment, 90% virally suppressed) and to end AIDS by 2030, the MoH will require new strategies that can address sexual transmission effectively. The adoption of such strategies will probably encounter similar barriers related to the stigmatisation and criminalisation of culturally 'deviant' behaviours, so the previous experience holds valuable lessons. At this time, however, the evidence base for interventions to curb the sexual transmission of HIV is low, whereas a high likelihood of substantial success will be needed for key actors to take the political risks of pushing through such an intervention.

Systems Lessons

Systems analysis illustrates that conditions that enable a change in practice are often transient, especially when there is doubt about and hostility to the new practice. For such changes to be sustainable, feedback loops that reinforce the new practice have to be built. Good narrative-building that captures and communicates successes in ways that fit organisational paradigms are valuable for this.

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Notes

1. Association of South East Asian Nations.
2. World Health Organization.
3. Examples are the IMR, the Institute of Health Management and the Institute of Health System Research.
4. Patient registries collect uniform data on demographics, diagnostics, treatment and outcomes for patients.
5. The exception was malaria, which required special categories of workers for the limited initial phase of the programme.