

CASE STUDY



Ministry of Health Malaysia

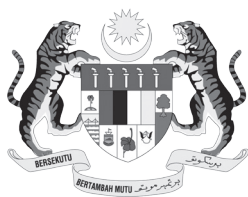


**World Health
Organization**

Representative Office
for Malaysia, Brunei Darussalam,
and Singapore

TOWARDS ELIMINATION OF VIRAL HEPATITIS IN MALAYSIA THROUGH MULTISECTORAL COLLABORATION, 2019

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and Singapore

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ABBREVIATIONS

anti-HBc IgG	immunoglobulin G antibodies specific to the hepatitis B core antigen
anti-HBs	hepatitis B surface antibodies
anti-HCV	hepatitis C antibodies
APASL	Asian Pacific Association for the Study of the Liver
AST	aspartate transaminase
DAA	direct-acting antiviral
DNDi	Drugs for Neglected Diseases initiative
EMTCT	elimination of mother-to-child transmission
EQAS	external quality assurance scheme
FIND	Foundation for Innovative New Diagnostics
FOMEMA	Foreign Workers' Medical Examination
FSW	female sex worker
GHE	Global Health Estimates
HBsAG	hepatitis B surface antigen
HBV	hepatitis B virus
HCV	hepatitis C virus
IARC	International Agency for Research on Cancer
IBBS	Integrated Bio-Behavioural Surveillance
IMR	Institute for Medical Research
MSM	men who have sex with men
NAAT	nucleic acid amplification testing
NBC	National Blood Centre
NGO	nongovernmental organization
NHMS	National Health and Morbidity Survey
NRL	National Reference Laboratory
OST	opioid substitution therapy
PVST	post-vaccination serologic testing
PWID	people who inject drugs
RDT	rapid diagnostic test
TG	transgender person
WHO	World Health Organization

ACKNOWLEDGEMENTS

This report is a product of a joint Ministry of Health and World Health Organization Situational Baseline Assessment of Viral Hepatitis in Malaysia, conducted from 22 to 28 October 2018. The scope of the baseline assessment included health systems, programme management and service delivery structures, laboratory systems, testing strategies and quality assurance, surveillance and strategic information systems, access to medicines and cascade of care, financing of programmes and services, and civil society involvements and public-private linkages. The baseline assessment included desk reviews, visits to service delivery sites and laboratory centres, and interviews with government administrators and programme implementers. In addition, site visits were conducted to selected health-care facilities in Sarawak and Kedah.

We would like to thank the Malaysian Ministry of Health for hosting and facilitating the review process and for sharing a wealth of data and information during the conduct of the baseline assessment and subsequently in the writing of this report. The hepatitis programme in Malaysia is indeed a multisectoral collaborative effort. We would like to thank all partners from various divisions of the Ministry of Health as well as other agencies and individuals, including from the nongovernmental and private sectors, for their contributions.

MINISTRY OF HEALTH

Institute for Medical Research

Disease Control Division - HIV/STI/Hepatitis C Sector

Disease Control Division - Vaccine Preventable Diseases/Food & Water Borne Diseases Sector

National Public Health Laboratory

National Blood Centre

Hospital Ampang

Hospital Selayang

Hospital Kuala Lumpur

Hospital Sultanah Bahiyah

Hospital Umum Sarawak

Kedah State Health Department
Sarawak State Health Department
Pahang State Health Department
Kota Setar District Health Office

NONGOVERNMENTAL ORGANIZATIONS AND PRIVATE SECTOR

Lablink (KPJ) Medical Laboratory
Positive Malaysian Treatment Access Advocacy Group (MTAAG+)

WORLD HEALTH ORGANIZATION

Global Hepatitis Programme, WHO
WHO Regional Office for the Western Pacific – HIV, Hepatitis and STI unit
National Serology Reference Laboratory, Australia

EXECUTIVE SUMMARY

This case study describes Malaysia's journey towards eliminating viral hepatitis, showing the collaborative efforts to introduce hepatitis treatment and sustain prevention of hepatitis transmission. It focuses on access to testing, diagnosis, treatment services (notably high-cost hepatitis medicines) and preventive interventions such as hepatitis B vaccination, blood safety and the elimination of mother-to-child transmission (EMTCT) of hepatitis B. It analyses health system requirements such as laboratory diagnostic capacities for viral hepatitis surveillance and service delivery models. It outlines plans to integrate existing hepatitis surveillance and patient monitoring systems into a health information system that is constantly being adjusted to better capture what is happening on the ground.

Malaysia has the high-level commitment and the potential capacity to achieve the ambitious goal of elimination of viral hepatitis. Malaysia was verified by the World Health Organization (WHO) in 2013 for having achieved the target of hepatitis B prevalence of less than 1% among children five years of age. It has now embarked on the elimination of both hepatitis B and C. The *National Strategic Plan for Hepatitis B and C 2019–2023* was released in August 2019. The health system in Malaysia, with existing service delivery platforms and supported by well-trained human resources and domestic financing, is well equipped to eliminate viral hepatitis at the national, state, district and community levels. There is also potential to further strengthen multilateral, cross-programme and public–private collaboration including engagement of civil society organizations.

The major challenges in Malaysia in eliminating viral hepatitis are under-diagnosis and under-treatment. In Malaysia, large numbers of people are still undiagnosed, and until 2018, only a small proportion of those infected received treatment each year. An estimated 10.5% ($n = 34\,419$) and 6.1% ($n = 23\,258$) of people infected with hepatitis B and C, respectively, were diagnosed in 2017. Among them, only 22.4% ($n = 7709$) and 1.4% ($n = 331$), respectively, were treated for hepatitis B and C. For hepatitis C, previous treatments were poorly tolerated and had limited success, but the new treatments are easier to administer with shorter course durations and higher cure rates, as high as 90% success rate (defined as sustained viral response). Newly available drugs for hepatitis C have revolutionized treatment and the potential of eliminating hepatitis by 2030. Since most hepatitis C virus infections are initially asymptomatic, it is also important to raise sufficient awareness, reduce stigma, and build screening and diagnostic capacity. System challenges include limited availability of reliable epidemiological data, limited access

to care for people who inject drugs, human resource constraints and sustainability of financial resources.

Various activities for achieving hepatitis elimination targets have been identified. These include the setting up of a national working group or steering committee on viral hepatitis, strengthening prevention and harm reduction programmes, ensuring sustainable financing of the blood and transfusion services, managing emerging risks, and continued community engagement. The simplification of laboratory testing and diagnostic strategies is essential. The Institute for Medical Research is being recommended for designation as the National Reference Laboratory for viral hepatitis, responsible for the design of testing algorithms and quality control. Increasing coverage of quality testing and treatment is a major priority. This would include simplification of laboratory testing algorithms, diagnostic strategies and treatment regimens in line with the 2018 WHO recommendations on hepatitis C treatment and diagnosis. As chronic hepatitis B and C are mostly asymptomatic, testing strategies would need innovative approaches. Surveillance systems and data analysis can be improved to understand the burden of disease and tailor interventions more effectively.

1. INTRODUCTION



HEPATITIS B AND HEPATITIS C CAN LEAD TO CHRONIC HEPATITIS.

Viral hepatitis leads to deaths due to complications such as fibrosis, cirrhosis and liver cancer. Liver cancer is the eighth most common cause of cancer in Malaysia, and among males it is the fifth most common cause of cancer (1). The three most common types of viral hepatitis in Malaysia are hepatitis A, B and C. Hepatitis A is foodborne and waterborne and presents as acute hepatitis; it can be effectively prevented through personal hygiene and improved sanitation. Hepatitis A is not a public health issue as water and sanitary conditions have improved. Hepatitis B and C are spread through sex, exposure to contaminated blood and mother-to-child transmission. Hepatitis B and C can lead to chronic hepatitis preceded by a long asymptomatic phase (2, 3). Most individuals infected with hepatitis B virus (HBV) or hepatitis C virus (HCV) are unaware that they have the disease and remain undiagnosed until the late stage. HBV and HCV infection can be prevented through the provision of safe blood transfusions and sterile injecting equipment and sharps, and hepatitis B vaccination. There is no hepatitis C vaccine. Effective treatments are available to suppress HBV replication and cure HCV infection, but the costs can be substantial.

At the Sixty-ninth World Health Assembly, Member States including Malaysia made a commitment to eliminate viral hepatitis as a major public health threat by 2030. The Ministry of Health Malaysia, in line with the World Health Organization (WHO) *Global Health Sector Strategy on Viral Hepatitis, 2016–2021*, has identified viral hepatitis as a priority disease. Table 1 shows the WHO targets for reducing the global burden of viral hepatitis. The Ministry of Health has been working with nongovernmental organizations (NGOs) to develop a strategic road map to achieve the targets in Malaysia by 2030. This case study describes a national coordinated response across different divisions and institutions in the Ministry of Health to prevent and treat hepatitis B and C.

TABLE 1. WHO targets for reducing the global burden of viral hepatitis

TARGET AREA		2020 TARGET	2030 TARGET	
SERVICE COVERAGE				
PREVENTION	Hepatitis B vaccination: third-dose hepatitis B vaccine coverage for infants	90%	90%	
	Prevention of mother-to-child transmission: hepatitis B birth-dose vaccination coverage or other approaches	50%	90%	
	Blood and injection safety	<i>Blood safety:</i> donations screened with quality assurance	95%	100%
		<i>Injection safety:</i> use of safety-engineered devices	50%	90%
	Harm reduction: number of sterile syringes and needles distributed per person per year for PWID	200	300	
TREATMENT	Diagnosis of HBV and HCV	30%	90%	
	Treatment of HBV and HCV	5 million (HBV) 3 million (HCV)	80% eligible treated	
IMPACTS LEADING TO ELIMINATION				
	Incidence of chronic HBV and HCV infections	30% reduction	90% reduction	
	Mortality from chronic HBV and HCV infections	10% reduction	65% reduction	

HBV, hepatitis B virus; HCV, hepatitis C virus; PWID, people who inject drug

Source: Global health sector strategy on viral hepatitis, 2016–2021: Towards ending viral hepatitis. Geneva: World Health Organization; 2016.

1.1 Hepatitis B situation

In Malaysia, where hepatitis B surface antigen (HBsAg) seroprevalence is 1.5–9.8% in the general population, an estimated 1 million people are living with hepatitis B. The most common genotypes are B and C. Approximately 75% of all viral hepatitis cases are due to HBV, with a male-to-female ratio of 2:1 (4). The notification rate of HBV (both acute and chronic) was 15.41 per 100 000 in 2017, a rise from 12.59 per 100 000 in 2016, and the mortality rate was 0.17 per 100 000 (5).

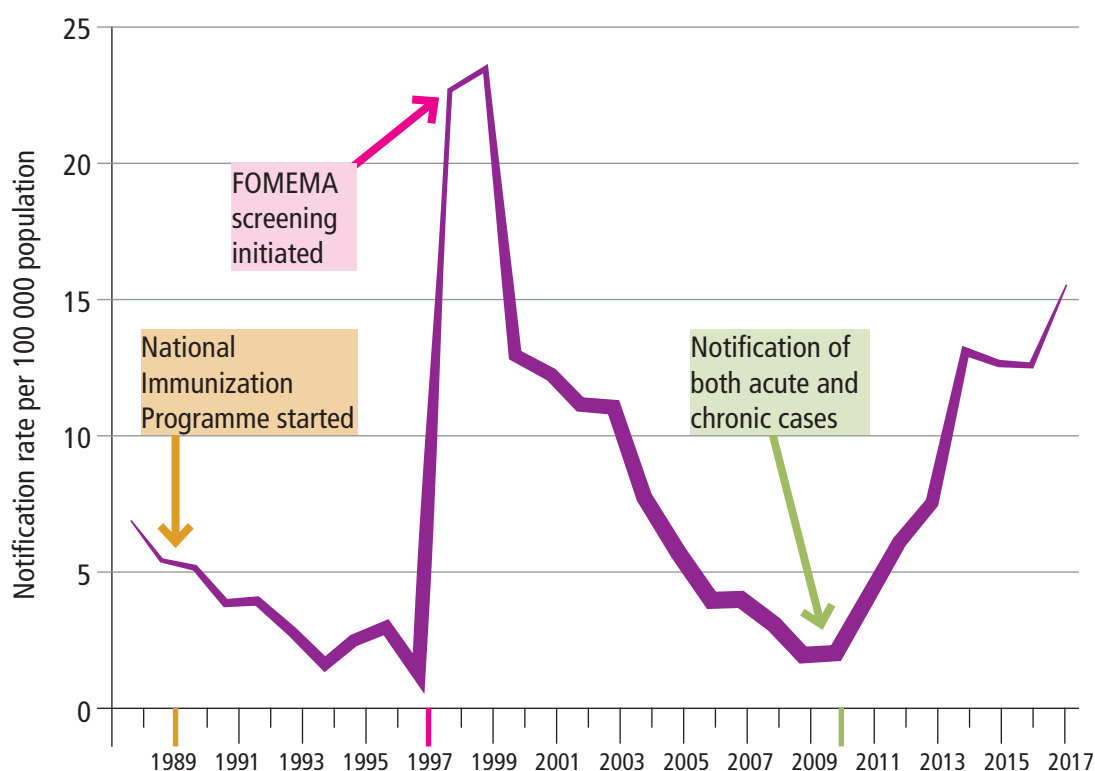
THE SUCCESS OF UNIVERSAL IMMUNIZATION PROGRAMMES IN THE PREVENTION OF HBV TRANSMISSION IS CONFIRMED.

Malaysia was verified by WHO in 2013 for having achieved the target of hepatitis B prevalence of less than 1% among children (6). Universal hepatitis B vaccination of all newborns has been implemented since 1989. In a study that tested 190 077 school-children aged 7–12 years between 1997 and 2003, HBsAg positivity declined from 2.5% among those born in 1985 (before universal infant vaccination) to 0.4% among those born in 1996 (7). In a different study, among 2923 new students at the Faculty of Medicine and Faculty of Dentistry at the University of Malaya between 2005 and 2011, the prevalence of HBsAg was 1.1% among those born before 1989 and only 0.2% among those born in or after 1989 (8). More recently, in a 2018 study, children born in the 1980s were found to be significantly more likely to have detectable HBsAg (18.8% vs 0.7%, $p = 0.04$) and anti-HBc IgG (37.5% vs 8.0%, $p < 0.001$) than those born later. These studies confirm the success of universal immunization programmes in the prevention of HBV transmission.

Fig. 1 shows the notification rate of hepatitis B in Malaysia from 1988 to 2017, with a marked decline in case notification after 1989. Notably, the notification rate peaked twice over the past three decades. In 1997, a screening procedure for foreign workers was introduced,¹ resulting in a sharp increase in case notification that eventually tapered off. However, since 2010, the notification rate has been increasing again. One potential reason for this observation is that health-care personnel have been reporting both acute and chronic cases of HBV without differentiating the two. Notably, most patients with chronic HBV require long-term antiviral treatment. The Ministry of Health spent nearly Malaysian ringgit (MYR) 10 million, or US\$ 2.4 million, on HBV treatment in 2017 (see Section 3.2.2).

1. The Foreign Workers' Medical Examination (FOMEMA), established in 1997, aimed to manage health screening tests for all registered foreign workers in Malaysia.

FIG. 1 Notification rate of hepatitis B in Malaysia, 1988–2017



Source: Situational Analysis on Viral Hepatitis in Malaysia & National Response: Meeting on Hepatitis Response in Malaysia, 6-7 August 2018. Putrajaya: Ministry of Health Malaysia; 2018.

1.2 Hepatitis C situation

A 2014 study estimated that there were as many as 453 700 (95% CI: 391 700–535 100) people living with HCV infection in Malaysia in 2009 (9), giving an estimated adult population prevalence of 2.5%. A more recent disease progression model conducted by the Center for Disease Analysis estimated approximately 384 000 (range: 272 000–443 000) viraemic HCV cases and 5900 new cases in 2015 (10). There is a need for a further revision of the population prevalence estimates for viraemic HCV, using more recent and updated information that better reflects the situation. Better estimation of chronic hepatitis disease burden will help to set programme targets, plan programme activities and estimate costs more accurately and effectively.

The notification rate of hepatitis C has been steadily increasing since 2010. In 2017, the Ministry of Health Malaysia reported the notification rate for HCV at 9.54 per 100 000 population, a 50% increase of diagnosis since 2015. The estimated incidence rate of HCV was 9.54 per 100 000 in 2017, with a mortality rate of 0.29 per 100 000. People who inject drugs (PWID) are disproportionately at higher risk for HCV through the

sharing of contaminated injecting equipment (11). The most common HCV genotypes in Malaysia are genotypes 3 and 1, making up 95% of infections. In a small sequencing and phylogenetic study of a total of 89 samples (of which only 37 gave definite results), genotype 3 was identified in 27 samples (73%) and genotype 1 in 10 (27%) (12). Other studies over the past 15 years show that this genotype distribution has remained unchanged (13). Genotype testing is conducted at the Institute for Medical Research (IMR) and Hospital Kuala Lumpur and a few private laboratories.

**IN 2013,
VIRAL HEPATITIS
SURPASSED HIV
AND AIDS TO
BECOME THE 7TH
LEADING CAUSE
OF DEATH IN THE
WORLD.**

Viral hepatitis surpassed HIV and AIDS to become the seventh leading cause of death in the world in 2013 (14). Hepatitis C has also become a major public health concern in Malaysia as liver cancer was the fifth most common cause of cancer for males and ninth most common cause of cancer for females in 2018 (15). Older interferon-based treatment regimens for HCV were complex to administer and had many side-effects (24–48 weeks of therapy), with cure rates averaging around 40–45%. Over the last several years, the management of chronic hepatitis C has been revolutionized by the development of cell-mediated targeted therapies (direct-acting antivirals [DAAs]) against HCV. These new regimens have short durations, minimal side-effects, low pill burden and efficacy approaching 90–100% (16).

2. MOVING AWAY FROM VERTICAL DISEASE PROGRAMMES THROUGH COORDINATING MECHANISMS

Moving away from an approach of vertical disease programmes, the hepatitis response is using informal and formal mechanisms to coordinate activities across different divisions and sectors under the Director General of Health (Fig. 2).

2.1 National Strategic Plan for viral hepatitis

Responsibility for the development and implementation of the viral hepatitis prevention and control plan and programme is shared by the following Ministry of Health Malaysia departments and institutions:

- » Public Health Division with Vaccine Preventable and Food and Waterborne Diseases Sector and HIV/STI/Hepatitis C Sector;
- » Pharmaceutical Services with National Pharmaceutical and Regulatory Agency;
- » Medical Development Division with the National Blood Centre;
- » Family Health Development Division; and
- » Research and Technical Support Division with the Institute of Medical Research.

The national coordinated response also involves the nongovernmental sector, for example, international NGOs such as Drugs for Neglected Diseases initiative (DNDi), Foundation for Innovative New Diagnostics (FINN) and Third World Network and national NGOs such as Treatment Action Group and Malaysian AIDS Council, and the private sector.

The HIV/STI/Hepatitis C, Communicable Disease Control and Family Health units at the state and district levels are responsible for the development and implementation of the viral hepatitis prevention and control programme at the state and district levels, respectively. The nongovernmental sector in Malaysia has played a fundamental role in advocating for access to medicines and in providing technical guidance.

Since October 2018, the country has been developing a national strategic plan for hepatitis B and C. All relevant stakeholders were involved in developing the national plan and programme, providing technical review, coordinating the implementation of the plan, and providing the provisions for monitoring and evaluation. The priority areas in the National Strategic Plan that are aligned with WHO strategies include:

- » advocacy, communication and social mobilization;
- » improving quality and coverage of prevention;
- » improving access to diagnostics, treatment and care;
- » ensuring quality strategic information and its use by policy-makers and planners through monitoring, evaluation and implementation research; and
- » capacity building and enhancement.

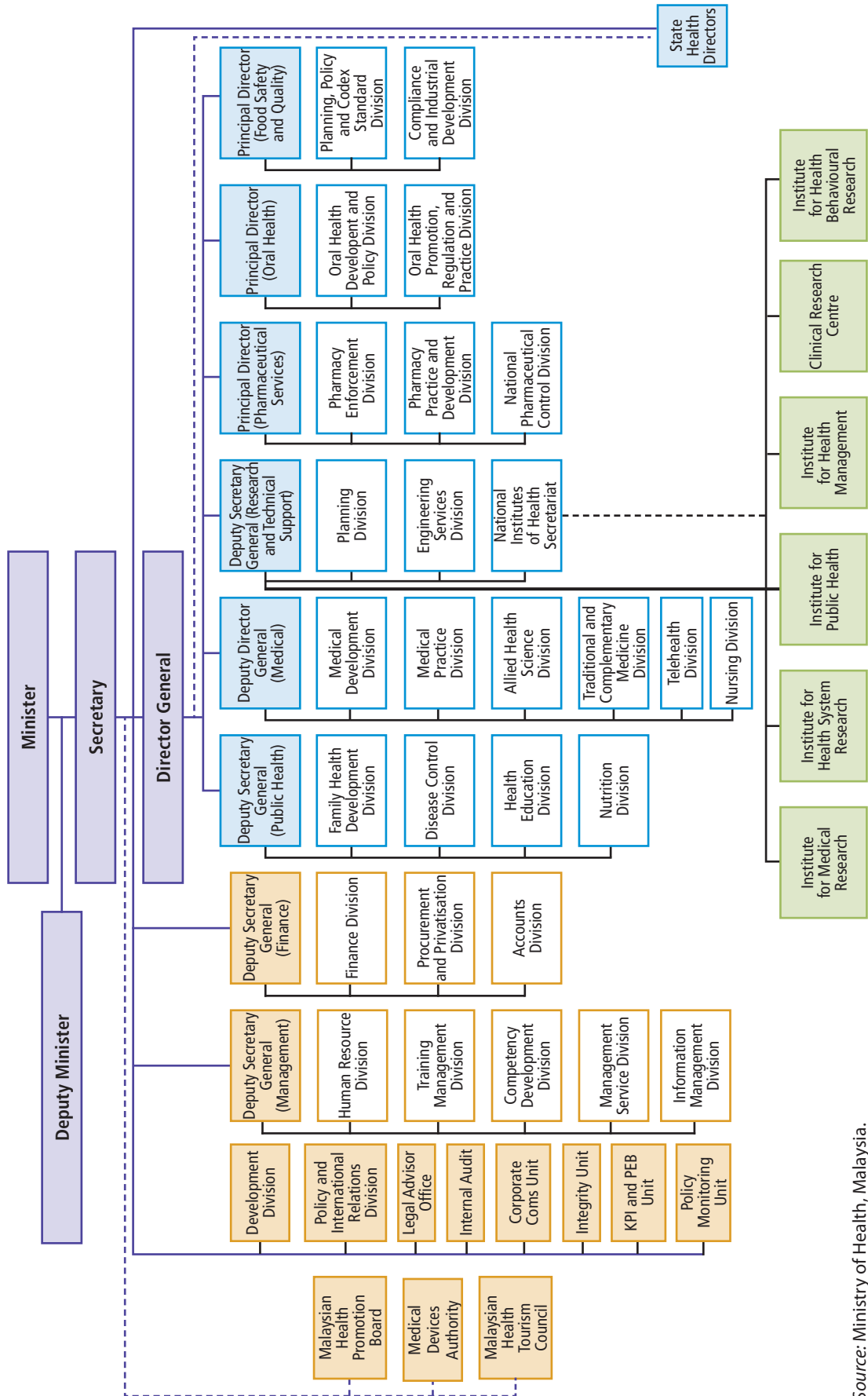
The National Strategic Plan includes a framework that describes the processes and contents related to monitoring, evaluation and review activities.

**THE AWARENESS
INITIATIVES WERE
IMPLEMENTED
WITH THE
HIGHEST
FIDELITY, DOSE
AND REACH.**

2.2 Workforce development and decentralization

Currently, the clinical management of viral hepatitis is performed mainly at hospitals, particularly those with hepatologists. However, Malaysia is aiming to decentralize viral hepatitis management, including testing and treatment for HBV and HCV, to primary care levels by 2020. An important facet in this initiative is the training of health professionals.

FIG. 2 Organization chart of the Ministry of Health Malaysia



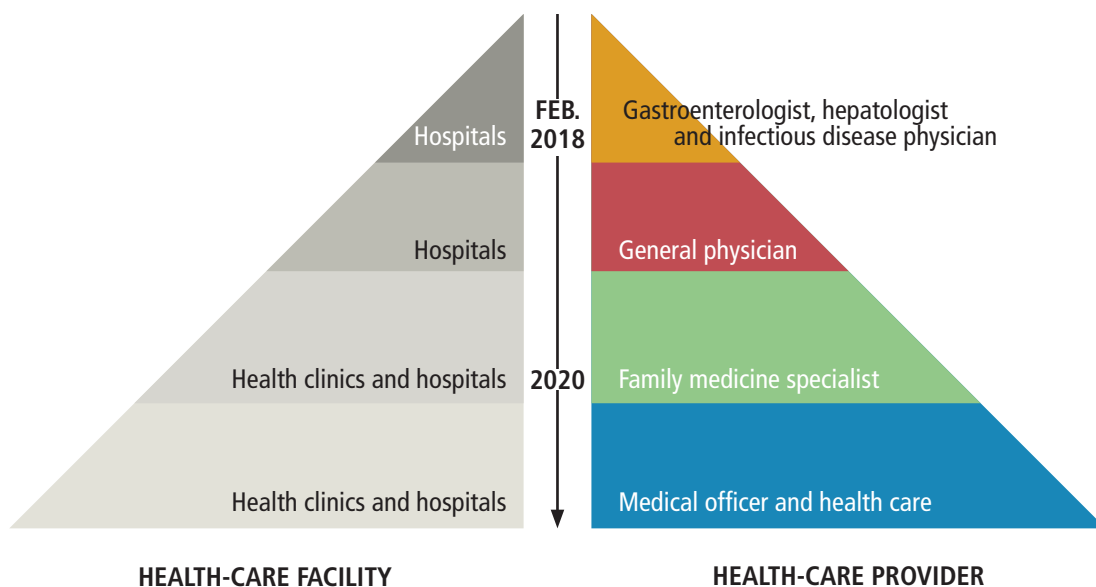
Source: Ministry of Health, Malaysia.

Training-of-trainers programmes for clinicians have been initiated through conferences and workshops, coupled with general competency assessments. A training and development programme has been developed for the clinical assessment and treatment of HBV and HCV in primary care facilities (including training for pharmacists, nurses and laboratory technicians) and other community settings (Fig. 3). In 2018, four such training sessions were conducted, two in Putrajaya and one each in Sabah and Sarawak. A reporting system for training under the Ministry of Health is being established. One of the challenges, however, is the lack of family medicine specialists nationally, which would need to be addressed as part of the greater development of the health workforce.

Viral hepatitis is a component of continuing medical education for health-care workers at national and regional levels. Activities have included:

- » National level
 - National Hepatitis Symposium
 - Asian-Pacific Association for the Study of the Liver (APASL)
 - Hepatitis Single Topic Conference
 - Annual Scientific Meeting of the Malaysian Society of Gastroenterology & Hepatology
- » Regional level
 - Regular continuing medical education by a gastroenterologist and/or hepatologist at the state and hospital levels for generalists, family medicine specialists and other specialists.

FIG. 3 Hierarchy and timeline for the decentralization of viral hepatitis management training and development to primary care levels by 2020



3. CLINICAL CARE AND TREATMENT

3.1 Overview

**SINCE JUNE 2019,
44 HOSPITALS
AND
25 PRIMARY CARE
CENTRES OFFER
TREATMENT WITH
NEW DAAs.**

Hepatitis C treatments have undergone a revolution with the development of an effective combination treatment of oral DAAs. Because of them, hepatitis C is finally curable. The use of sofosbuvir in HCV treatment can increase cure rates when compared to previously recommended interferon alpha and/or PEGylated interferon alpha injection (17). Sofosbuvir is the main drug used in combination with many other oral DAAs (18). The current coverage of treatment of hepatitis C is low. As of June 2019, 44 hospitals and 25 primary care centres were offering treatment with new DAAs. The Pharmaceutical Division recorded 2437 patients on sofosbuvir and daclatasvir, with or without ribavirin, since March 2018. Moreover, 315 patients were receiving sofosbuvir and ravidasvir under the DNDi clinical trial. Treatment of chronic HCV infections is provided free of charge at government facilities, as recommended by the national *Hepatitis C Screening, Testing and Treatment Guideline 2017*, which was developed based on WHO recommendations. Furthermore, clinical practice guidelines on the management of chronic hepatitis C are being developed. In the meantime, international guidelines from WHO, APASL, the European Association for the Study of the Liver and the American Association for the Study of Liver Diseases are being used. For hepatitis B, diagnosis, care and treatment has long been fully integrated into government health-care services. As of 2018, there were 7709 patients receiving HBV treatment.

3.2 Access to medicines

The objective of the Malaysian National Medicines Policy (*Dasar Ubat Nasional* or *DUNas*) is to promote equitable access to and rational use of safe, effective and affordable medicines of good quality to the population, including medication for hepatitis treatment (19). Generic drug registration before the expiration of the product patent is permitted under Section 37 (1A) of the Patent Act (Amendment) 2000. The generic product can only be marketed after the innovator product patent has expired. Table A.1 in the annex lists HBV and HCV drugs currently in the national formulary.

HCV treatment and government-use licensing

One of the most widely used registered sofosbuvir 400 mg tablets in Malaysia is Sovaldi® 400 mg. The patent duration for this drug ends in April 2024, with patent

extension granted until March 2028. Generic drugs, therefore, will not be marketed in Malaysia until the patent protection period expires. The price of originator sofosbuvir at market price was MYR 300 000 (US\$ 73 170²) for a 12-week course. Due to the high cost of HCV treatment and the high number of patients with chronic hepatitis C, the Ministry of Health had applied for the Cabinet’s approval to implement the Rights of Government, provided under Section 84 under Patent Act 1983 (Act 291) in September 2017. This refers to the exploitation of the patented invention by the Government to import or manufacture patented products only for use in government-owned facilities. By exploiting the patented invention of sofosbuvir tablet 400 mg, a government-use license allows for the use of generic sofosbuvir, a cheaper option for treatment, in government health facilities covering the Ministry of Health and Armed Forces hospitals. The criteria for selecting patients who will receive this treatment are in accordance with the national clinical guidelines. Through this compulsory license, the Ministry of Health is now able to acquire sofosbuvir at a reduced price of US\$ 300 from *Pharmaniaga* (20). Thus, in 2017, Malaysia became the first country to issue a government-use license for HCV treatment. Hospitals under the Ministry of Education are not included.

HBV treatment

For chronic HBV, both generic and originator drugs are registered in Malaysia. In 2017, nearly MYR 10 million (US\$ 2.4 million) was spent on 7709 patients for HBV treatment (Table 2). Tenofovir or entecavir are considered the first line of treatment for patients with chronic hepatitis B. Both are listed in the National Pharmaceutical Formulary (also known as the Drug Formulary or the “blue book” of the Ministry of Health). Other drugs such as telbivudine and lamivudine continue to be used.

TENOVIOR OR ENTECAVIR ARE CONSIDERED THE 1ST LINE OF TREATMENT FOR PATIENTS WITH CHRONIC HEPATITIS B.

TABLE 2. Expenditure on hepatitis B treatment by drug in Malaysia, 2017

DRUG	TOTAL COST (MYR)	TOTAL COST (US\$) ^a	TOTAL PATIENTS
Entecavir	5 610 607.03	1 368 440.7	1 638
Tenofovir	1 013 284.50	247 142.5	4 431
Telbivudine	489 643.55	119 425.2	363
Adefovir	584 338.28	142 521.5	216
Lamivudine	2 294 281.62	559 580.9	1 061
TOTAL	9 992 154.98	2 437 110.9	7 709

a. US\$ 1 = MYR 4.1

2. US\$ 1 = MYR 4.1

4. TESTING AND DIAGNOSIS

Hepatitis B and C serology testing is widely available in public and private health-care facilities. However, it has been estimated that less than 10% of hepatitis B and C cases have been diagnosed (4). Hepatitis B testing is fully subsidized in public health-care facilities, including the assessment of liver staging and treatment. Upon acquiring access to DAAs since early 2018, hepatitis C testing and treatment services guidelines have been updated (21).

4.1 Hepatitis testing strategies

While hepatitis B and C screening is offered by health-care providers to individuals assessed to be of high risk, individuals with low risk may also request screening. Following national guidelines, PWID are provided hepatitis testing annually.

With the current HCV testing strategies, patients with a positive hepatitis C antibody (anti-HCV) result undergo viral load testing to confirm viraemic infection of hepatitis C and genotyping (21). After the completion of 12 weeks of treatment, a follow-up viral load test is done to document cure (that is, sustained virological response 12 weeks after completion of treatment [SVR12]). Assessments include liver function tests (for example, measure of aspartate transaminase [AST] and alanine transaminase [ALT]), the international normalized ratio (INR), full blood count including platelet, ultrasound to screen for hepatomas and cirrhosis symptoms and, where available, transient elastography such as FibroScan® (Echosens, Paris, France). If interferon and ribavirin are used, then a full blood count is conducted at regular intervals to monitor anaemia.

4.2 Rapid diagnostic tests

Current national hepatitis B and C testing algorithms do not include the use of available rapid diagnostic tests (RDTs) in government clinics. A study on HCV testing is being piloted by FIND and the Ministry of Health Malaysia with support from DNDi. Announced in July 2018, FIND is assessing the feasibility of using RDTs in decentralized local health-care facilities, and people diagnosed with HCV will be given treatment via the national HCV programme or an ongoing DNDi clinical trial (20). In October 2018, IMR began collaborating with FIND on a study, "Assessing the implementation of decentralized

HCV testing at primary health-care facilities in Malaysia”. A total of 24 primary health-care facilities with high-risk populations will be selected as study sites. Individuals who test positive with anti-HCV RDTs will be referred for confirmatory tests to one of the five selected hospitals, namely Hospital Selayang, Hospital Ampang, Hospital Sungai Buloh, Hospital Sultanah Bahiyah and Hospital Raja Perempuan Zainab II, where they will be linked either to the standard of care or to the DNDi trials. The duration of the study is 18 months. This pilot study involves collaboration with civil society organizations in recruiting high-risk populations, mainly PWID, for hepatitis C screening and treatment under the new treatment regimen. The FIND project will introduce HCV rapid testing at targeted health clinics. The evidence regarding patients’ responses to the treatment will be used to guide a more effective HCV public health approach in Malaysia. There are several NGOs that are using RDTs and sending positives samples for confirmatory testing to IMR.

4.3 Access to testing services

Table 3 shows the cost of various screening and testing options available in Malaysia as of October 2018. It is recommended that hepatitis C treatment be guided by viral load findings. Guidelines were released stipulating that only a medical specialist is allowed to order a test. The request must include the patient’s clinical history. For ordering a HCV genotype test, the viral load test results must be included.

TABLE 3. Cost of hepatitis screening and testing options in Malaysia, October 2018

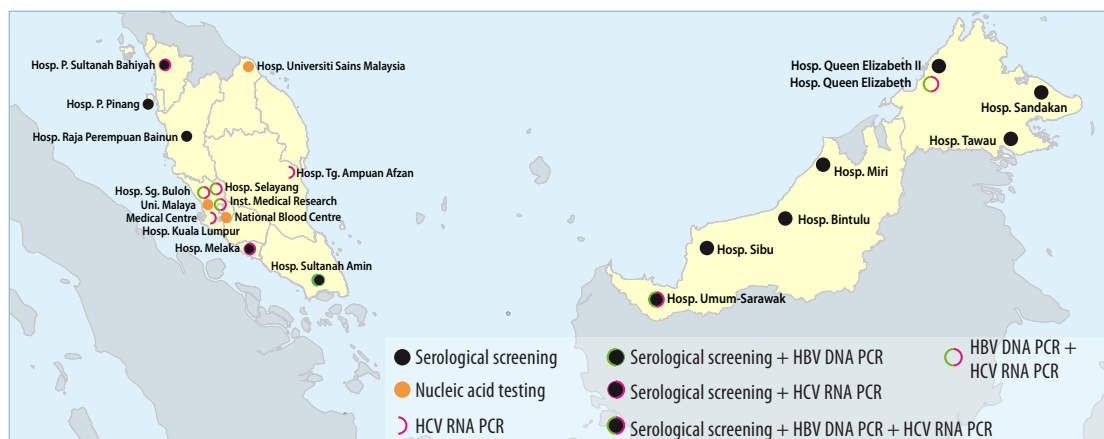
TEST	UNIT COST	
	MYR	US\$
HBsAg screening	2	0.5
anti-HCV	~2	0.5
HCVcAg	30	7.3
HCV viral load	~230	56.0
HBV viral load	~200	48.8
HCV genotyping	400	97.6
HCV nucleic acid amplification testing*	900	219.0

Anti-HCV, hepatitis C antibody; HBsAg, hepatitis B surface antigen; HBV, hepatitis B virus; HCV, hepatitis C virus; HCVcAg, hepatitis C virus core antigen

* Currently each hospital has its own tender for nucleic acid amplification testing assays.

The IMR Malaysia is expected to be designated as the National Reference Laboratory (NRL) for viral hepatitis by the Ministry of Health. IMR, which is ISO 15189 accredited, is already the NRL for HIV and other testing. Samples are referred to IMR by hospitals. Its main hepatitis service is to perform HCV RNA viral load and genotyping. Fig. 4 depicts the viral hepatitis screening centres in Malaysia as of 2018.

FIG. 4 Viral hepatitis screening centres in Malaysia, 2018



BOX 1. Considerations for the Institute for Medical Research as the National Reference Laboratory for viral hepatitis

External quality assessment schemes

The Institute for Medical Research (IMR) currently provides an external quality assurance scheme (EQAS) to 76 HIV serology laboratories, of which 20 are located in primary health clinics, 54 in government hospitals and two in university hospitals (five samples, two times per year, free of charge). As the National Reference Laboratory (NRL) for viral hepatitis, IMR would initiate an EQAS for hepatitis B and C testing, specifically for serology and nucleic acid amplification testing (NAAT). This would require a ramp-up of technical expertise, resources and consumables. There are plans to expand EQAS to HCV clinical laboratories in 2019.

Developing and validating testing strategies

IMR will be responsible for the evaluation of assays. While this only determines the performance characteristics of the assay, their use should be determined based on scientific evidence.

Enabling laboratory data collection for epidemiological purposes

Although IMR might not be the implementer of data collection systems, IMR is well placed to provide advice and support to facilitate the collection, storage and analysis of such data.

Sample bank

Aliquots of samples in appropriate volumes can be stored long term. IMR's function in conducting assay evaluations can be supported by the development of a sample bank of well-characterized proficiency test panel samples. Aliquots of positive samples can also be used for research by IMR, the NBC and other institutions.

5. PREVENTION OF HEPATITIS B AND C TRANSMISSION

5.1 Vaccination and elimination of mother-to-child transmission of hepatitis B

In Malaysia, the hepatitis B vaccination programme for children was initiated in 1989. By 2017, the coverage rate of hepatitis B vaccination was high, with 90% of newborns receiving the first birth dose and 98% receiving the third dose (Table 4).

TABLE 4. Hepatitis B vaccination coverage in Malaysia, 2017

Indicator	Health Information System, 2017	National Health and Morbidity Survey, 2016 (<i>n</i> = 10 136)	WHO/UNICEF Joint Reporting Form, 2017
Timely birth dose*	90.21% (<i>p</i>)	92.2% verified + 7.8% self-reported	98%
Second dose	95.00%	89.8% verified + 9.6% self-reported	–
Third dose	98.15%	88.4% verified + 9.9% self-reported	98%

* Timely birth dose (within 24 hours of birth): The current reporting system in Malaysia only notes whether the birth dose administration was done; it does not verify whether it was done within 24 hours.

The clinical practices of the public and private sectors vary for the management of pregnant women. For public sector clinics, a national policy recommends HBV screening for high-risk pregnant women. Universal screening for all pregnant women is not recommended. In private sector clinics and hospitals, however, all pregnant women are routinely offered HBV testing for a fee. Babies born to mothers with hepatitis B infection receive HBV immunoglobulin as well as the routine hepatitis B vaccination schedule and are followed up by paediatricians. However, post-vaccination serologic testing (PVST) to document the outcome of interventions for these HBV-exposed babies is not normally conducted. There are currently no standardized guidelines on how to document the outcomes of HBV-exposed infants. Paediatricians noted that drawing blood may be an issue for PVST, especially in peripheral health facilities where capacity and skills to perform venepuncture among infants is inadequate. The use of heel prick for blood sampling has been considered as an option.

In the public sector, there are reports such as from Sarawak that pregnant women with hepatitis B infection are referred to hospitals and offered tenofovir and HBV immunoglobulin according to the APASL guidelines (22). Sabah, in particular, has started offering universal screening using RDT kits at certain hospitals based on the epidemiological context, identified high-risk locations and funding availability.

Health-care workers, military personnel and personnel working for immigration services and prisons receive free HBV vaccination. Personnel working for immigration services and prisons are not tested for HBV, HCV and anti-HBs during annual medical check-ups. These personnel are not screened for hepatitis markers (HbsAg, anti-HCV and anti-HBs) before receiving HBV vaccine. Military personnel, on the other hand, undergo hepatitis markers screening before being given the full three-dose HBV vaccination. In contrast, police personnel have neither HBV vaccination programme nor hepatitis screening.

TABLE 5. Hepatitis B virus incidence rate and mortality rates by state in Malaysia, 2017

Country or Area	Incidence rate (per 100 000 population)	Mortality rate (per 100 000 population)
Malaysia	15.41	0.17
Perlis	5.46	0.39
Kedah	3.03	–
Pulau Pinang	2.92	–
Perak	9.66	–
Selangor	16.23	0.30
Wilayah Persekutuan Kuala Lumpur	32.32	0.05
Wilayah Persekutuan Labuan	13.99	–
Negeri Sembilan	12.81	0.18
Melaka	8.62	0.54
Johor	15.13	0.05
Pahang	14.24	0.30
Terengganu	9.31	0.82
Kelantan	34.56	0.05
Sabah	25.13	–
Sarawak	15.41	0.36

Source: Health Facts 2018 (reference data for 2017). Putrajaya: Ministry of Health Malaysia; 2018.

BOX 2. Elimination of mother-to-child transmission of hepatitis B

There has been substantial progress in the prevention of mother-to-child transmission of HIV and syphilis. In October 2018, Malaysia received validation on the dual EMTCT of HIV and syphilis (23). In February 2018, a joint meeting of WHO and the Ministry of Health Malaysia was held to discuss EMTCT of hepatitis B and how to reduce HBV seroprevalence among children from 0.3% to reach the new target of 0.1% (24). In an effort towards reaching triple EMTCT for HIV, syphilis and hepatitis B, the Ministry of Health is developing a proposal for the states of Kedah, Kelantan, Pahang and Terengganu to pilot the implementation of universal HBV screening through the use of rapid tests among pregnant women in 2019. It is anticipated that the introduction of antenatal screening and other interventions can be easily accommodated into existing maternal and child health services for EMTCT of HIV and syphilis. As of June 2019, the pilot implementation of the universal HBV screening of pregnant women has been rolled out throughout the states of Kedah and Pahang, and initiated in selected districts in Kelantan and Terengganu.

5.2 Blood safety

More than 90% of blood donations are collected by blood banks, through 13 state hospital screening sites and 115 hospital-based blood banks. Around 80% of blood donations are collected at mobile centres. The National Blood Centre (NBC) provides services to 106 public and private hospitals, including clinical transfusion at the 3000-bed Hospital Kuala Lumpur. As of 2017, the NBC had screened 452 906 donations, with 60% of these being repeat donations. Screening of blood for donation at the NBC showed an overall HBV prevalence of 0.115% and HCV prevalence of 0.039%. Data from the NBC estimate an HCV prevalence rate of 0.6–0.7%. These data do not represent general population prevalence rates since potential blood donors are assessed for risk.

**DATA FROM THE
NBC ESTIMATE
AN HCV
PREVALENCE RATE
OF 0.6–0.7%.**

There is a plan to centralize blood screening sites into four regional centres. The priority areas for the NBC and blood banks include:

- » maintenance of blood supply and quality;
- » increasing nucleic acid amplification testing (NAAT) for HCV;
- » strengthening current Good Manufacturing Practice;
- » appropriate use of blood;
- » self-sufficiency; and
- » reduction of wastage of blood.

BOX 3. National Blood Centre**Blood safety strategies and policies**

All donors must be assessed for suitability prior to collection on each occasion, as outlined in the *Transfusion Practice Guidelines for Clinical and Laboratory Personnel* (25). All donated blood undergoes mandatory screening for HIV, HBV, HCV and syphilis. National policies are established to provide regular blood donors with HBV vaccination free of cost. However, this service requires blood donors to return to the main centre, that is, the NBC or the state-level blood and transfusion service. This results in relatively low uptake of HBV vaccination among adults.

Serology and nucleic acid amplification testing

Currently, the NBC conducts NAAT screening for donated blood from all states except Perak, Pulau Pinang, Sabah, Sarawak and Terengganu. It is planned for three regional centres (for northern region, Sabah and Sarawak) that can do NAAT.

Quality assurance for laboratory services at the National Blood Centre

The Malaysian Society for Quality in Health has worked with the blood bank to develop a quality management system. Quality management systems are required throughout the manufacturing process of blood products.

Blood donation centres as alternative testing facilities

According to numerous anecdotal reports from staff of blood donation centres, people at risk of infection have been using blood donation centres as “alternative” testing facilities. Many people do not return for follow-up when notified of positive findings, but those who do return only then admit to high-risk behaviours. This may be due to the relative comfort and neutrality of blood donation centres, as opposed to the perceived stigma associated with attending a health clinic for testing, especially for people who are associated with higher risk of infection, such as PWID.

5.3 Harm reduction for people who inject drugs

Both the national guideline on methadone treatment and the *National Strategic Plan for Ending AIDS 2016–2030* address the following activities related to the prevention of transmission of viral hepatitis and other blood-borne diseases among PWID:

- » HBV, HCV and HIV testing and counselling;
- » programmes to provide PWID with clean needles and syringes and other injecting equipment;
- » peer-delivered harm reduction interventions; and
- » opioid substitution therapy (OST) to treat opioid dependence (and integration of OST services with those providing hepatitis care and treatment).

Despite of drug use being a legal offence, Malaysia has implemented a harm reduction programme to reduce the risk of HIV and hepatitis C transmission among PWID since 2005. The programme started initially with the Opioid Substitution Programme and was followed by the introduction of the Needle & Syringe Exchange Programme in February 2006. Remarkable progress has been made with increasing clients for both programmes. The Integrated Bio-Behavioural Surveillance (IBBS) surveys (2009–2014) revealed a significant decline in HIV prevalence among PWID (from 22.1% in 2009 to 16.3% in 2014).³ The survey also found that more than 90% of clients used clean needles at the last injection (97.5% in 2012 to 92.8% in 2014). Over the same period of time, needle and syringe return rates also increased from 61.5% to 70.4%. The estimate of service coverages cannot be determined given that the denominator, that is, the number of people injecting drugs, was unknown when the size estimation exercise was conducted (26). Similar to other countries, Malaysia has showed changing trends in drug use from injecting of heroin to the use of (non-injecting and injecting) amphetamine-type stimulants.

Needle and syringe exchange services and OST services are often provided through a collaboration between public health-care services and NGOs. Outreach is usually done by collaborating NGOs that provide methadone replacement therapy and Needle & Syringe Exchange Programme services. PWID who are reached by the NGO services are also encouraged to be followed up with annual screening of HIV, HBV and HCV. Some PWID access methadone replacement therapy at general practitioners' clinics, although the methadone is provided through the government system. Awareness of HCV and access to services by PWID vary across the country, depending on factors such as the existing relationship between NGOs that support PWID and health-care centres, and access to information.

5.4 Risks associated with tattooing

It is the current practice at blood donation centres to prescreen potential donors for tattoos. Potential donors who have had a new tattoo in the past six months are not eligible to donate and are asked to return at least six months after the acquisition of a tattoo. In Sarawak, about 10% of notified hepatitis cases were among potential donors who have tattoos, although it was not clear whether this was a representation of the tattooing practices in the general population. Tattoos are a common traditional practice among many ethnic groups in East Malaysia and in recent years have also become more mainstream. Currently, the tattooing and body piercing industry is not regulated. Data on the prevalence of tattooing and body piercing and the risks associated with hepatitis transmission are also lacking. The possibility of tattooing as a risk factor for acquisition of hepatitis infection should be further assessed.

3. The most recent (unpublished) IBBS findings for 2017 indicate that the prevalence has further declined to just 13.5%.

5.5 Sexual transmission

In recent years, sexual transmission among key populations including female sex workers (FSW), men who have sex with men (MSM) and transgenders (TG) people has been on the rise. The IBBS 2017 reported that 65.5% of TG and 42.7% of FSW received an HIV prevention package in the past 12 months, and 30.8% of MSM received condoms along with information related to HIV. Overall, safer sex practices have improved significantly among FSW (60.9% in 2009 and 83.5% in 2017) and TG (72.5% in 2012 and 83.3% in 2017), while among MSM, condom use behaviour declined from 74.2% in 2012 to 54.6% in 2014 and increased again to 65.4% in 2017. Three consecutive IBBS surveys highlighted overlapping risks among key populations with alarming trends in alcohol and psychotropic drugs use prior to having sex and having multiple sexual partners, where these overlapping risks certainly inhibit the proper use of condom during sexual intercourse (27).

5.6 Awareness and community engagement

**SEVERAL
NGOs HAVE
PROGRAMMES
FOCUSED ON HIV
AND HEPATITIS.**

The Ministry of Health engages civil society organizations, NGOs and external donor organizations in three different ways: (1) raising awareness and knowledge about hepatitis in the community; (2) increasing access to hepatitis medicines (see Section 3.2); and (3) engaging them in clinical trials. The Ministry of Health celebrates World Hepatitis Day annually and invites NGOs and civil society organizations to participate in the events. Special funding is allocated to selected states to carry out activities for the celebration, with wide media coverage to increase public awareness about hepatitis.

Several NGOs such as *Pertubuhan Kebajikan Komuniti Ikhlas*, *INSAF MURNI* and *Komuniti Intervensi Dadah* Malaysia have programmes focused on HIV and hepatitis. There are many more NGOs that are working on hepatitis, and there are opportunities to further engage them in hepatitis interventions. These include integrated delivery of services for advocacy, treatment literacy and awareness, education and counselling, promotion of testing and prevention/harm reduction interventions, linkage to care and treatment, and peer support.

6. SURVEILLANCE AND DATA FOR POLICY AND ACTION

Good epidemiological data underpin many aspects of the health system, including procurement, intervention initiatives and monitoring of the efficacy of intervention. Currently, no reliable population-based estimates of the prevalence of HBV and HCV infections are available. An integrated health and morbidity survey for chronic hepatitis surveillance, one that uses biomarker surveys to document prevalence, is planned for 2020. The survey could potentially be used as a platform for updated population-based surveillance. Currently, there are no performance indicators to assess the quality and performance of surveillance systems.

6.1 Case notification

Hepatitis B and C infections are notifiable diseases under the Prevention and Control of Infectious Diseases Act 1988 (Act 342). The case definition of acute hepatitis is outlined in *Case Definitions for Infectious Diseases in Malaysia, 2017* (28). Most hospitals have the capacity to perform laboratory diagnosis of viral hepatitis. The e-Notification system is a reporting tool that is managed by the Disease Control Division of the Ministry of Health for the notification of specified diseases. It was formerly known as the Communicable Disease Control Information System, which was launched in 2011. Initial notifications of cases diagnosed by a physician or attending doctor are followed up by health inspectors at state and district health departments. Case verification, investigation and contact tracing are conducted for risk factor identification and prevention of further transmission. The e-Notification system includes information such as demographic information, test results and diagnoses but excludes information on risk factors, which is only obtained through a follow-up investigation. Thus, notified cases are being recorded as having “unknown” risk factors. One major limitation of the current notification system is that hepatitis B and C are reported using a case definition that does not differentiate acute hepatitis from chronic infection. These cases, of which a large proportion are probably chronic infections, are being reported as acute hepatitis. Given that the reported cases of acute hepatitis cannot be distinguished from the larger number of chronic infections, it is not possible to describe trends or to identify potential risk factors for infection. The aggregated data on viral hepatitis cases and deaths are published annually in *Health Facts Malaysia* and are available online on the Ministry of Health’s website. Notably, only the number of cases is published.

IN HEPATITIS B AND C INFECTIONS DETECTION, THERE IS NO DIFFERENTIATION BETWEEN CHRONIC INFECTIONS AND ACUTE HEPATITIS.

6.2 Monitoring system and estimates of mortality

Notification of deaths to the general death registry, which is maintained by the National Registry Department, is made through death certificates or burial certificates that list underlying causes of death. There is currently no registry for chronic hepatitis infection, and there is no requirement to report hepatitis-related complications and deaths. While hepatocellular carcinoma cases are reported to the National Cancer Registry, it does not collect data on the proportion of hepatocellular carcinoma with HBV or HCV infection. There are plans, however, for the National Cancer Registry to collect these data as part of the Malaysian Health Data Warehouse.

The 2016 estimated mortality from HBV (57 deaths) and HCV (95 deaths) infections represents only a small fraction of the mortality estimated using the WHO Global Health Estimates (GHE) (29). These use ICD-10 codes for hepatitis B and C that exclude deaths resulting from sequelae of cirrhosis and hepatocellular carcinoma.

To monitor mortality from sequelae, several methods are used to estimate mortality on the basis of surveillance data and/or death certificates. To generate more accurate results, the GHE estimates were adjusted for the fraction of hepatocellular carcinomas attributable to HBV and HCV infection according to the International Agency for Research on Cancer (IARC) (30) and the fraction of cirrhosis attributable to HBV and HCV according to a published case series from Malaysia (460 cirrhosis and 136 hepatocellular carcinomas) (31). The revised estimates suggest that 3100 deaths are caused by HBV and HCV infections each year. In 2016, the estimates of mortality from HBV infection remains high (2500 deaths), compared to 892 deaths from HIV/AIDS in that same year, reflecting the higher prevalence of infection in the older age groups that were born before universal immunization. An estimated 600 people died in 2016 from the long-term consequences of HCV infection.

6.3 Diagnostic and laboratory surveillance

Laboratory test data are a valuable resource if collected in a systematic manner. Activities in terms of testing, diagnosing, treating and monitoring treatment effectiveness are well documented in laboratories and in health-care facilities. However, information systems at the laboratories are varied in terms of quality and reporting platforms. As a result, most systems are not compatible with or linked to one another. The laboratories report test results to the referring clinicians, according to the Notifiable Diseases Act, as part

of its operational procedure, and do not report to the central public health monitoring mechanism. There is no system in place to systematically extract clinical and laboratory data on testing and treatment or to report the data to the national level. Some laboratories, however, are independently looking at designing reporting systems. One such laboratory in Seremban, Negeri Sembilan, has implemented such a system and is now being assigned as a pilot project, with the intention to be reviewed and potentially expanded to other laboratories nationwide.

For the blood bank laboratory systems, an in-house consolidated cloud-based system was initiated in 2014. It has been deployed to 22 centres in phases, covering about 80% of blood donations. The aim is to have 40 centres in the system, and eventually to roll out to all blood banks within five more years.

6.4 Other surveillance

An HBsAg biomarker survey was conducted in 2009 among children ages 9–10 years to document Malaysia's achievement in reaching the WHO control goals through universal childhood immunization. The National Health and Morbidity Survey (NHMS), which was initiated in 1986, is conducted approximately every five years. In the 2005 NHMS, samples were collected to look at HBV and HCV seroprevalence, led by IMR in collaboration with several institutions including academic departments. If coupled with a modelling component, this cross-sectional estimate of hepatitis prevalence may be projected to give estimates over time.

6.5 WHO 10 core indicators

In 2018, the Ministry of Health and WHO conducted a joint situation analysis for viral hepatitis in order to inform the development of national policy and plans. In the context of this situation analysis, a review of strategic information systems for viral hepatitis was also conducted, to extract information to generate the baseline working estimate of WHO's 10 core indicators for the Global Reporting System for Hepatitis (Table 6).

TABLE 6. Baseline estimates for WHO's 10 core indicators for the Global Reporting System for Hepatitis, Malaysia, as of October 2018

Indicator	Estimate			Data quality 1 = Best to 3 = least good	Sources and notes
	General	HBV	HCV		
C1. Prevalence of infections (for year 2017)	Blood donors	0.09%	0.03%	2	National blood transfusion services
	Population	1.1% (N = 328 000)	1.2–2.5% (N = 382 000)	3	Modelled estimates
C2. Capacity for testing	Serology	40	40	2	Ministry of Health reports excluding some private labs
	NAT	5	5	2	
C3. Hepatitis B vaccine coverage (for year 2016)	Third dose	99.4%	–	1	National survey – Timely birth dose should be defined as administered within 24 hours of birth. For HBV, data did not specify time
	Birth dose	100%	–	1	
C4. Needle and Syringe Programme/PWIDs (for year 2018)	19/PWID	–	–	1	Global AIDS Monitoring 2018. Based on PWID population size estimate of 170 000
C5. Injection safety	98.8%	–	–	3	Western Pacific regional estimate.
C6. Proportion diagnosed	–	10.5% (N = 34 419)	6.1% (N=23 258)	3	Notifiable disease reporting
C7. Treatment coverage/ initiation	–	22.4% (N = 7 709)	1.4% (N = 331)	2	Reports from treatment centres
C8. Treatment effectiveness	–	N/A	N/A	3	–
C9. Incidence of infections	–	0.3% (2009, among children aged 9–10)	2.51 per 100 000	1–3	Biomarker survey and blood donors
C10. Mortality infections	–	2500	600	2	Mortality envelope/ fractions; 2016 WHO Global Health Estimates, adjusted for IARC and Malaysian data

Source: National Strategic Plan for hepatitis B and C 2019–2023. Putrajaya: Ministry of Health; 2019.

7. CHALLENGES

1. *Under-diagnosis: the largest gap in the cascade of care for viral hepatitis*

In Malaysia, nine out of 10 people living with viral hepatitis are unaware of their status. A study by Lindsey et al in 2019 revealed that 6 million people in Malaysia will have to be screened for HCV between 2018 and 2030 in order to achieve the targets set by WHO (32). Indeed, the World Hepatitis Alliance's call to "find the missing millions" reflects the gap in screening success.⁴ Another unique setting for hepatitis testing is in the antenatal clinic. Currently, the hepatitis B screening strategy is risk-based rather than universal screening. Identification of infected women is thus limited because of either undisclosed risk factors by pregnant women or lack of inquiry regarding risk factors by service providers. Furthermore, the lack of knowledge and awareness about hepatitis B and hepatitis C in the community often leads to misinformation. Although there have been no large-scale, population-based, controlled studies on community knowledge about hepatitis B and hepatitis C, all published surveys have shown that knowledge about these diseases is limited (33).

2. *Under-treatment*

Drug costs remain as a huge barrier to the hepatitis elimination agenda globally. Some countries with a high burden and limited resources have received substantial price reductions; for example, Egypt has brought down the drug price to US\$ 84 per patient (34). Between October 2018 and March 2019, the Egyptian Government screened 35 million people for HCV in a national campaign and provided them with free treatment and care through public hospitals. Since 2014, the Government has been able to provide free treatment to 88% of all patients (35). In Malaysia, only one in five people living with HBV (22.4%) and one in 100 people living with HCV (1.4%) were being treated in 2017. In 2017, Malaysia issued a government-use license for HCV treatment, reducing the drug cost to US\$ 300 per treatment and thus making the scaling up of HCV treatment more affordable.

However, scaling up diagnosis and linking more people to treatment require a broader screening approach, such as expanding and strengthening harm reduction programmes, disseminating awareness and information on correct preventive steps, increasing the identification of new infections, and increasing health-care providers' capacity to test and treat patients. In addition to drug costs, there are high costs for diagnostics, liver assessment tests and health-care equipment, as well as human resources capacity, staffing, and training costs. Another challenge associated with under-treatment is limited awareness of HCV treatment, for example, the availability of free HCV treatment at public hospitals.

THE COST OF HCV TREATMENT HAS BEEN REDUCED TO US\$ 300.

4. "Finding the missing millions" is a three-year global awareness-raising and advocacy campaign launched by the World Hepatitis to tackle the main barriers to diagnosis by putting civil society organizations and the affected community at the heart of the solution.

3. Limited access to care for key populations at higher risk of hepatitis

Until now, there has been a lack of emphasis on HCV in harm reduction programmes. Intervention strategies should integrate HCV into these programmes, and adequate support should be given to the NGOs that are implementing them, particularly in the areas of outreach, training and service delivery.

4. Stigma and discrimination

The negative consequences of stigma and discrimination on the health and well-being of affected individuals and communities in relation to hepatitis C are well documented (36). Particularly, stigma and discrimination affects health care-seeking behaviour, thus access to screening and testing services.

5. Limited availability of reliable epidemiological data

Without reliable epidemiologic data, the true measure of the disease burden is missing, thus affecting the strategic planning and allocation of resources for hepatitis services. Furthermore, the impact of intervention strategies and service coverage is not likely to be adequately assessed. The improvements of data availability are needed to better inform policy.

6. Human resources

Human resource constraints continue to be one of the challenges in the health-care sector. For the hepatitis response, this includes the limited numbers of family medicine specialists and insufficient numbers of adequately trained personnel in transfusion and apheresis sciences.

7. Financial resources

Another challenge associated with hepatitis elimination by 2030 is the lack of financial resources. In addition to competing priorities in domestic health-care financing, only a few of the major global donor agencies have promised financial commitment to eliminate viral hepatitis. In order to achieve hepatitis elimination, the country needs strong financial and political commitment, support from civil societies, and support from the pharmaceutical and medical sector.

CONCLUSIONS

The situational analysis of viral hepatitis in Malaysia provides a comprehensive understanding of the current situation in the country. It was revealed that in Malaysia there is strong high level commitment and capacities at all levels to achieve elimination of viral hepatitis.

The infrastructure and health systems in Malaysia are well-established service delivery platforms and are supported by well-trained human resources and domestic financing. These are Malaysia's strengths to implement hepatitis prevention activities, diagnosis and treatment. One of the next steps forward will be to implement the National Strategic Plan for Hepatitis B and C, 2019–2023 (37).

There is potential to further strengthen the hepatitis response through multisectoral, cross-programme and public-private collaborations. Strategies to further strengthen the response have been identified for consideration. These include setting up a national working group or steering committee on viral hepatitis, strengthening prevention and harm reduction programmes and continued community engagement.

Measures are also required to ensure sustainable financing, management of emerging risks and improvements in testing and diagnostic procedures. The designation and role of the Institute for Medical Research as the National Reference Laboratory is a very important component in this endeavour to ensure that testing data are accurate.

Other pertinent issues that need further consideration pertaining to periodical review and updates of diagnostic, treatment and clinical management guidelines, increasing access to services, cost-effectiveness assessments and scaling up service coverage. Finally, there is a need to improve the surveillance systems in order to adequately monitor the burden of viral hepatitis in Malaysia.

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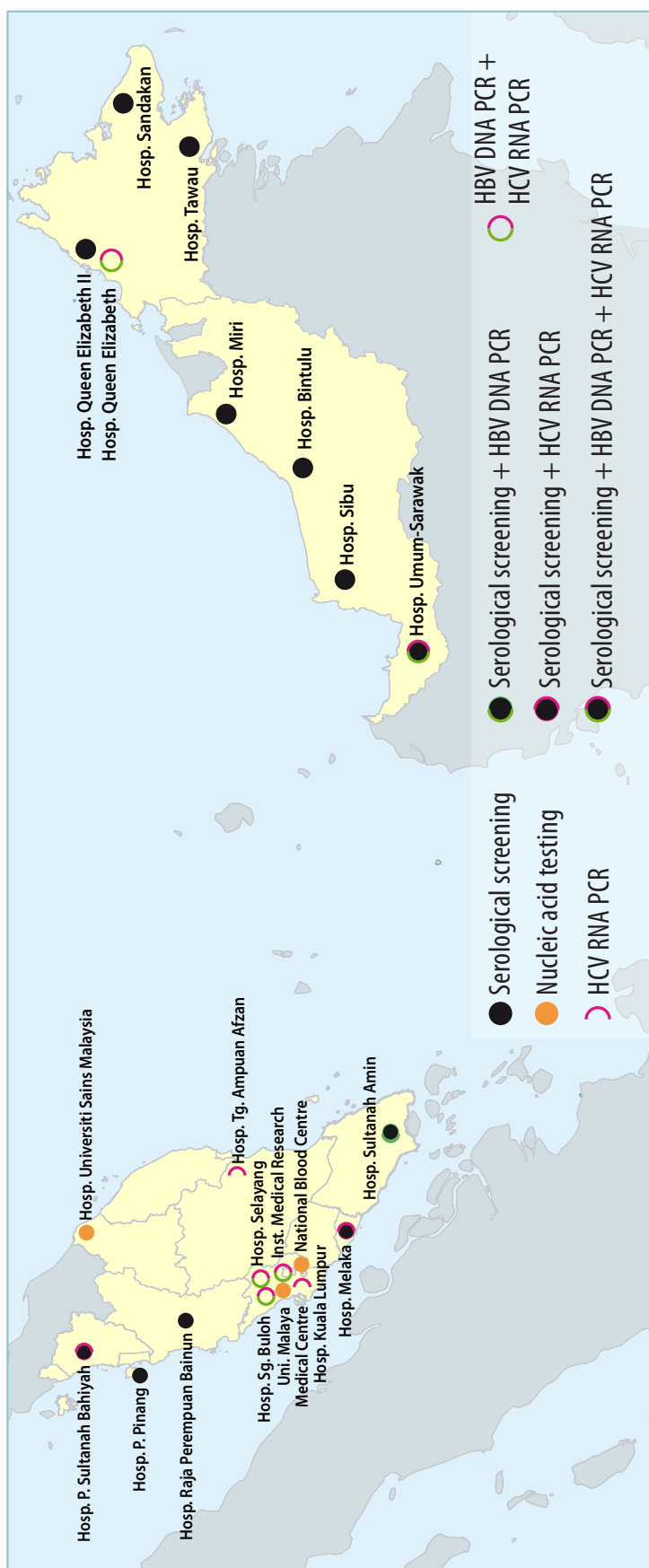
ANNEXES

ANNEX 1.

TABLE A.1 List of HBV and HCV drugs in the national formulary (as of August 2018)

No.	DRUG	INDICATION	Listed in the national formulary
1.	Interferon Alfa-2a 3 MIU Injection	Hepatitis B & C	Yes
2.	Interferon Alfa-2a 4.5 MIU Injection	Hepatitis B & C	Yes
3.	Interferon Alfa-2b 18 MIU Injection	Hepatitis B & C	Yes
4.	Interferon Alfa-2b 30 MIU Multidose Injection Pen	Hepatitis B & C	Yes
5.	Interferon Alfa-2b 3 MIU Injection	Hepatitis B & C	Yes
6.	Peginterferon Alpha-2a 135 mcg Pre-filled Syringe	Hepatitis B & C	Yes
7.	Peginterferon Alpha-2a 180 mcg Pre-filled Syringe	Hepatitis B & C	Yes
8.	Peginterferon Alfa-2b 80 mcg Injection	Hepatitis B & C	Yes
9.	Pegylated Interferon Alpha-2b 100 mcg Injection	Hepatitis B & C	Yes
10.	Pegylated Interferon Alpha-2b 120 mcg Injection	Hepatitis B & C	Yes
11.	Pegylated Interferon Alpha-2b 150 mcg Injection	Hepatitis B & C	Yes
12.	Pegylated Interferon Alpha-2b 50 mcg Injection	Hepatitis B & C	Yes
13.	Adefovir Dipivoxil 10 mg Tablet	Hepatitis B	Yes
14.	Entecavir 0.5 mg Tablet	Hepatitis B	Yes
15.	Lamivudine 100 mg Tablet	Hepatitis B	Yes
16.	Telbivudine 600 mg Tablet	Hepatitis B	Yes
17.	Tenofovir Disoproxil Fumarate 300 mg Tablet	Hepatitis B	Yes
18.	Ribavirin	Hepatitis C	Yes
19.	Ombitasvir + Paritaprevir + Ritonavir	Hepatitis C	No
20.	Daclatasvir	Hepatitis C	No
21.	Sofosbuvir	Hepatitis C	No
22.	Dasabuvir	Hepatitis C	No

ANNEX 2. Viral hepatitis screening centres in Malaysia, 2018





Ministry of Health Malaysia



**World Health
Organization**

Representative Office
for Malaysia, Brunei Darussalam,
and Singapore

