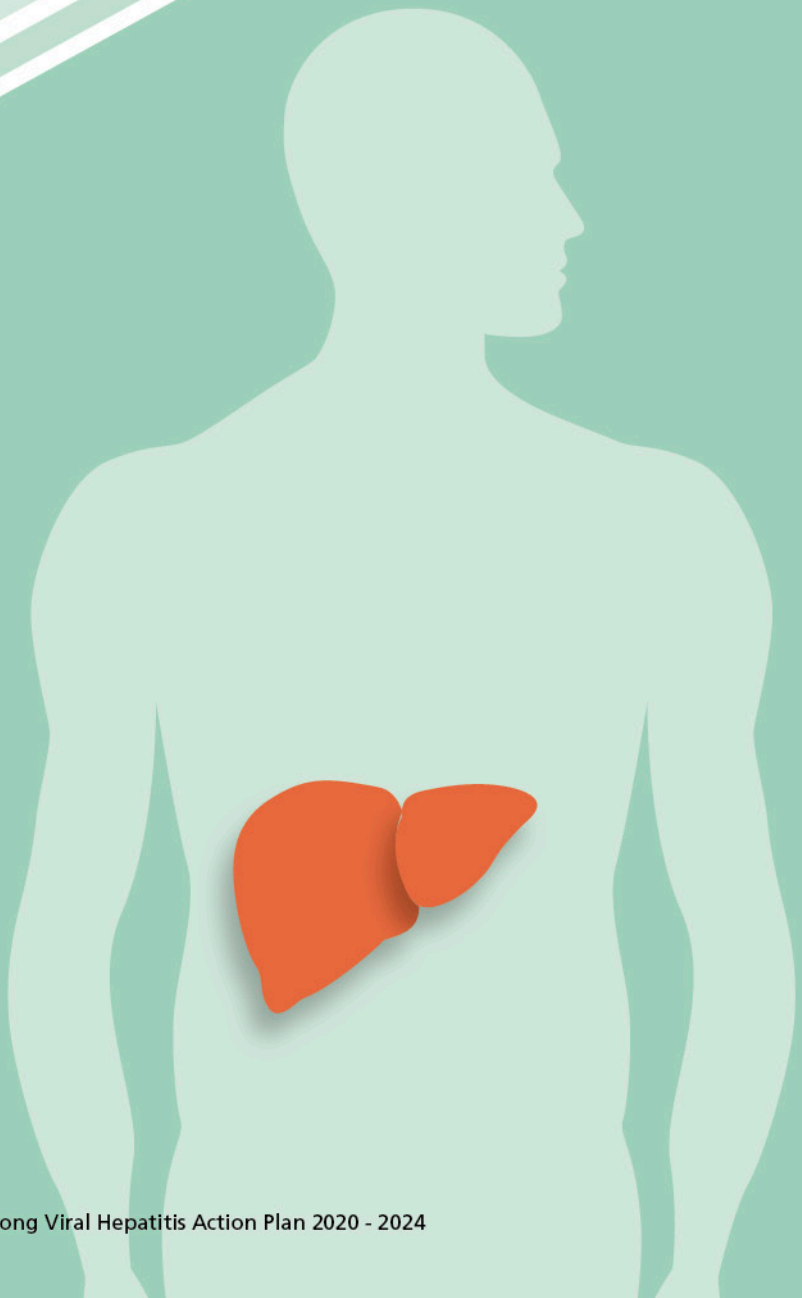
Introduction



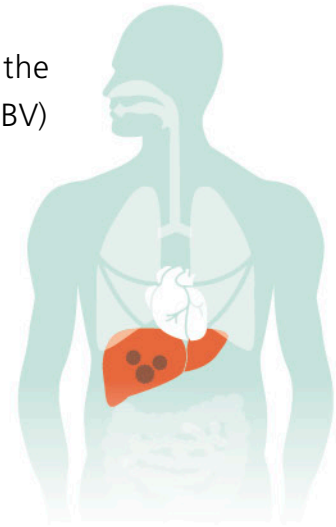
Overview of HBV and HCV infection

- Transmission of HBV and HCV
- Acute HBV and HCV infection
- Chronic HBV and HCV infection
- Diagnosis
- Vaccine
- Antiviral treatment

WHO targets

Local situation

- Surveillance of viral hepatitis
- Epidemiology of hepatitis B
- Epidemiology of hepatitis C
- Liver cancer
- Care continuum



1. **Viral Hepatitis** is an inflammatory condition of the liver caused by virus. Infection with hepatitis B virus (HBV) and hepatitis C virus (HCV) is present worldwide and a leading cause of liver-related morbidity and mortality. Both can cause chronic or lifelong infection with serious and fatal complications and constitute most of the disease burden associated with viral hepatitis [1].

2. Globally, viral hepatitis caused 1.34 million deaths in 2015 and 96% of these deaths were due to the sequelae of HBV or HCV infections [2]. An estimated 257 million people, or 3.5% of the population, were living with chronic HBV infection in the world in 2015, while an approximate 1% of the world population, or 71 million people, were living with HCV infection.

257 million infected with hepatitis B

71 million infected with hepatitis C

3. Prevalence of HBV infection was the highest in the African and Western Pacific regions, accounting for 68% of those infected. Compared with HBV, the prevalence of HCV infection was more heterogeneously distributed, with differences across and within World Health Organization (WHO) regions and countries.

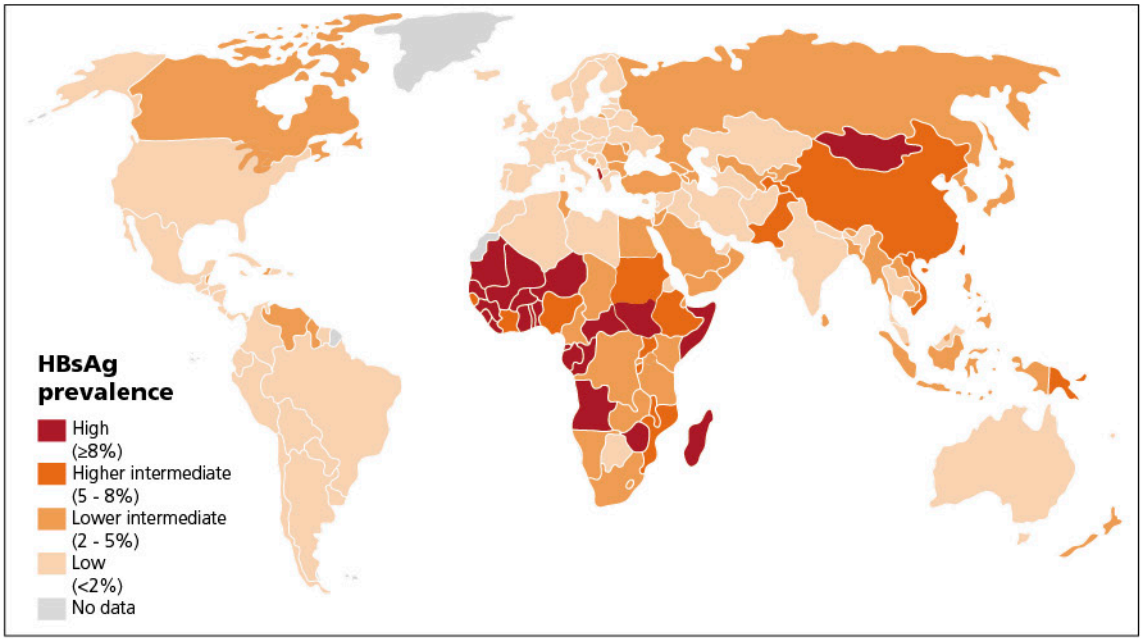


Figure 1. Global prevalence of HBV infection
(Source: WHO)

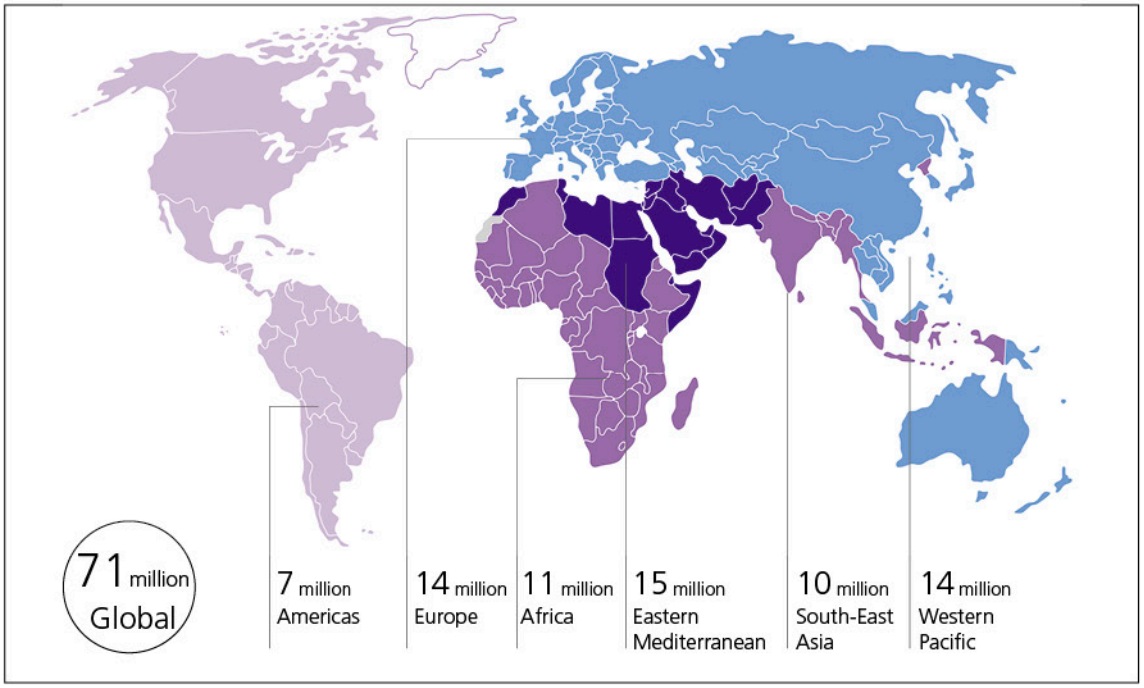


Figure 2. Number of people having HCV infection
(Source: WHO)

Overview of HBV and HCV infection

4. The epidemic of HBV and HCV infections is characterised by their transmission modes, disease progression and availability of vaccine and anti-viral treatment for disease prevention and management. An understanding of HBV and HCV epidemiology, given in the pursuing paragraphs, would support the formulation of strategies and priority setting for actions for controlling hepatitis B and C.

Transmission of HBV and HCV

5. Both HBV and HCV share similar modes of transmission, including **mother-to-child transmission (MTCT), sexual contact** and **contact with contaminated blood or body fluid**. However, the public health implications of these transmission modes differ significantly.

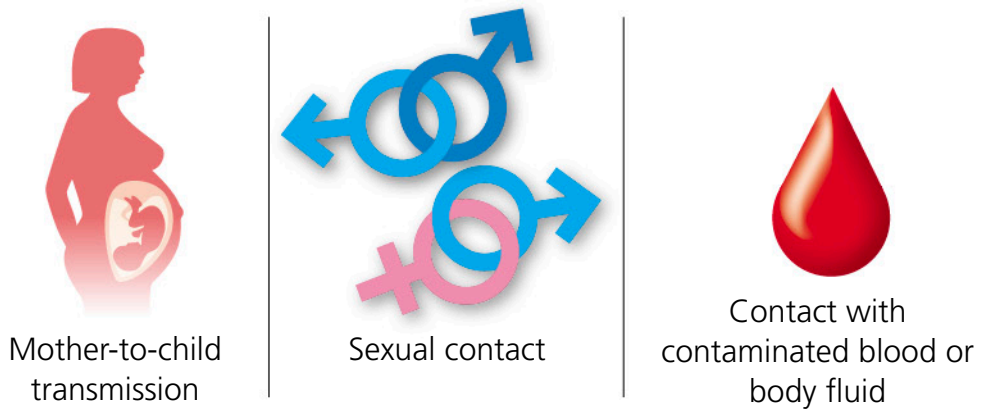


Figure 3. Routes of transmission of HBV and HCV

6. Most of the disease burden of HBV infection comes from infections acquired in infancy through perinatal or early childhood exposure to HBV, as an infection acquired at an early age is more likely to become a chronic infection [3]. In areas of high endemicity, MTCT of HBV is, therefore, the most common mode of transmission [4].

7. The predominant forms of transmission of HCV are unsafe therapeutic injections and blood transfusion in developing countries [5]. In developed countries, injecting drug use and unsafe sexual activities of people living with human immunodeficiency virus (HIV) infection are the main forms of transmission [6]. HCV epidemics related to injecting drug use occur in all WHO regions, with an estimated 60 - 80% of people who inject drugs (PWID) having been infected with HCV [7].

8. HCV can also be passed from an infected mother to her baby. The estimated risk of transmission of HCV from infected mothers to babies is about 4 - 8% when the mother is viraemic, and can be twofold to fourfold higher when she is co-infected with HIV [5].

Acute HBV and HCV infection

Most HBV and HCV infection are asymptomatic.

9. Most acute HBV or HCV infections go unnoticed and only a small subset of people may develop acute hepatitis disease.

- Symptomatic acute disease of HBV infection occurs in less than 10% of children aged 10 or below and in 30 - 50% of individuals infected after the age of 10 years [8].

- Following initial infection with HCV, approximately 80% of people do not exhibit any symptoms [9].

- The common symptoms of acute viral hepatitis are fever, jaundice, nausea, loss of appetite, vomiting, fatigue, upper abdominal discomfort, diarrhoea and tea-coloured urine.

Chronic HBV and HCV infection

10. A proportion of people infected with HBV and HCV will evolve into chronic infections.

- The risk of developing chronic infection with HBV depends on the age at which a person becomes infected: 90% among perinatal infections, 30 - 50% among young children aged five or below, and less than 5% in healthy adults [3].

- The development of chronicity following HCV infection is common, and about two thirds of acute infection will develop chronic infection [10].

11. Chronic HBV and HCV infection can persist for decades without symptoms. Many infected persons are not aware of their infection status and not seeking appropriate care and treatment. Untreated persons with chronic HBV or HCV infection may develop progressive scarring of the liver (cirrhosis) and primary liver cancer (hepatocellular carcinoma [HCC]), which are the major burden from viral hepatitis [11].

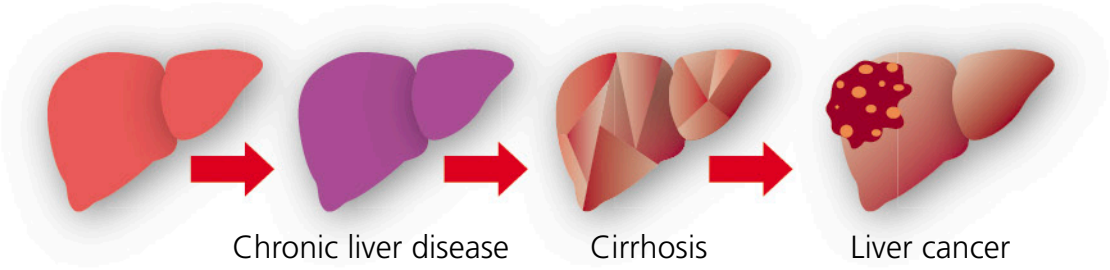
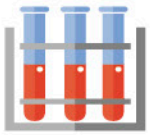


Figure 4. Progression of chronic viral hepatitis

12. Overall, the lifetime risk of developing HCC from 30 to 75 years, for men and women, was 27.38% and 7.99% in chronic hepatitis B patients, and 23.73% and 16.71% in chronic hepatitis C patients [12].

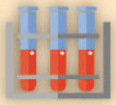
Diagnosis



13. HBV and HCV infection is diagnosed by blood test (Table 1).

Table 1. Blood test for diagnosing HBV and HCV infection

	Blood test	InterOpretation
HBV	Hepatitis B surface antigen (HBsAg)	A positive test result indicates an HBV infection. Chronic HBV infection is characterised by the persistence of HBsAg for at least 6 months.
HCV	HCV antibody (anti-HCV)	A positive result indicates past or present HCV infection. It cannot distinguish a current HCV infection from one that was cleared spontaneously or cured by treatment.
	HCV ribonucleic acid (RNA)	A positive result confirms an active HCV infection.



Blood test is required to diagnose HBV and HCV infection.

Vaccine

14. There are safe and effective vaccines for preventing HBV infection. A three-dose series of hepatitis B vaccine can induce protective antibody concentration in more than 95% of healthy babies, children and young adults [13]. Preventing HBV infection averts the development of complications including development of cirrhosis and liver cancer.

Safe and effective hepatitis B vaccine is available.

15. No vaccine is available for HCV infection.

Antiviral treatment

16. **Chronic HBV infection can be treated,** but not cured:

- Use of effective antivirals can inhibit the replication of HBV and reduce the risk of cirrhosis, liver failure, liver cancer and long-term complications of chronic HBV infection.

- However, the use of antivirals is unable to clear HBV completely, and life-long treatment is usually indicated in most patients.

17. **Chronic HCV infection can be cured:**

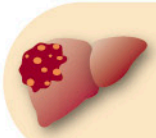
- A cure is associated with significant improvement in clinical outcomes, by reducing the risk of long-term complications such as cirrhosis and liver cancer. Therefore, in principle, all patients with chronic HCV infection can be treated and cured.

- Traditionally, treatment of HCV was based on interferon. However, interferon-based treatment is fraught with significant adverse effects that are difficult to manage, and the rate of treatment success is limited (40 - 70%), depending on the genotypes [14].

- Effective, well-tolerated and all-oral direct-acting antivirals (DAA) are now available and they can clear HCV in more than 90% of cases [15]. As stated in the updated WHO guidelines in 2018, the recommended therapy for chronic hepatitis C is pan-genotypic DAA, rather than interferon-based regimens [5].

Table 2. Chronic HBV and HCV infection at a glance

	Chronic HBV infection	Chronic HCV infection
Estimated number of cases globally	257 million people 3.5% of the population	71 million people 1% of the population
Mode of transmission	Blood-borne Mother-to-child transmission is the major route of transmission	Blood-borne In developed countries, injecting drug use and unsafe sexual activities of people living with HIV are the main modes of transmission
Symptoms	Mostly asymptomatic	Mostly asymptomatic
Diagnosis	Blood test: HBsAg	Blood test: anti-HCV; if positive, test HCV RNA
Lifetime risk of liver cancer if untreated	Male: 27% Female: 8%	Male: 24% Female: 17%
Vaccine	Safe and effective vaccine available	Not available
Treatment	Regular monitoring and consider antiviral drug	Curative antiviral treatment available



Both hepatitis B and C can cause chronic infection, cirrhosis, liver cancer and even deaths.

WHO targets

18. To address the disease burden in the region, the *Regional action plan for viral hepatitis in the Western Pacific 2016 - 2020* was approved by Members States at the 66th WHO Regional Committee for the Western Pacific and endorsed as part of Resolution WPR/RC66.R1 on 14 October 2015 [16].

19. *The Global health sector strategy on viral hepatitis, 2016 - 2021*, endorsed in the World Health Assembly in 2016, outlines a global goal of eliminating viral hepatitis as a major public health threat by 2030 [17]. The strategy provides a set of global targets, covering both **service coverage** and **impact** (incidence and mortality).

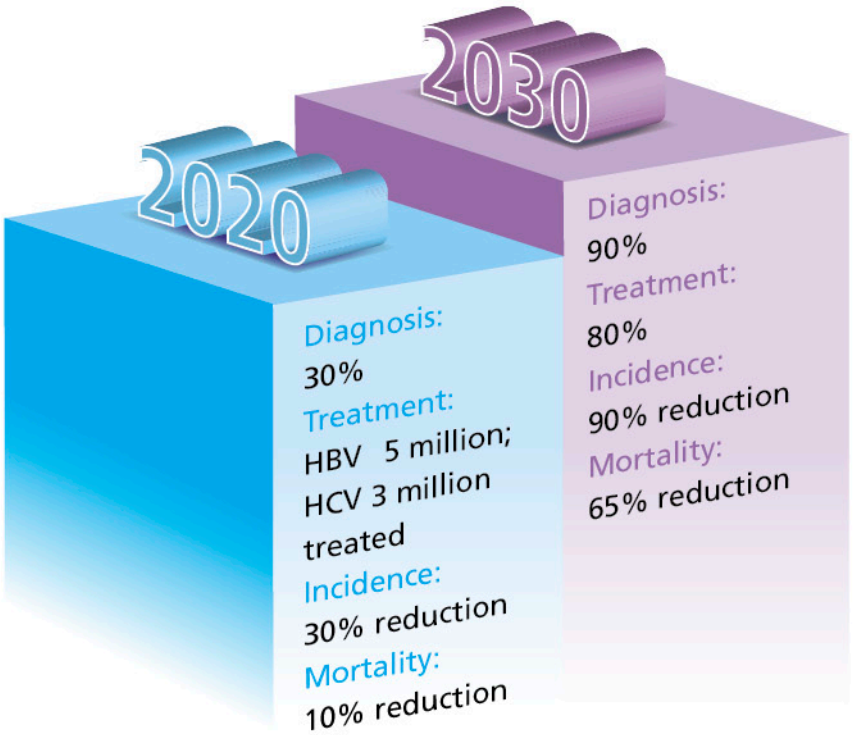


Figure 5. WHO 2030 impact targets and selected service coverage targets

20. A list of impact and service coverage targets is available in Table 3.

Table 3. Service coverage and impact targets in Global Health Sector Strategy on viral hepatitis

Target Areas	2020 Targets	2030 Targets
Service coverage targets		
Hepatitis B vaccination: childhood vaccine coverage (third dose coverage)	90%	90%
Prevention of HBV mother-to-child transmission: hepatitis B birth-dose vaccination coverage or other approach to prevent mother-to-child transmission	50%	90%
Blood safety: percentage of donations screened in a quality-assured manner	95%	100%
Safe injections: percentage of injections administered with safety-engineered devices in and out of health facilities	50%	90%
Harm reduction: number of sterile needles and syringes provided per person who injects drugs per year	200	300
Viral hepatitis B and C diagnosis	30%	90%
Viral hepatitis B and C treatment	The number of people receiving HBV and HCV treatment globally reaches 5 and 3 million respectively	80% of eligible persons with chronic HBV or HCV infection treated
Impact targets		
Incidence: New cases of chronic viral hepatitis B and C infections	30% reduction* (equivalent to 1% prevalence of HBsAg among children)	90% reduction* (equivalent to 0.1% prevalence of HBsAg among children)
Mortality: Viral hepatitis B and C deaths	10% reduction*	65% reduction*

* As compared with the baseline number in 2015

Local situation

Surveillance of viral hepatitis

21. Acute viral hepatitis is a statutory notifiable disease in Hong Kong. The Centre for Health Protection, Department of Health (DH) is responsible for the surveillance of communicable diseases, including acute viral hepatitis.

22. Seroprevalence of HBsAg regularly reported to DH includes those from new blood donors, pre-marital and pre-pregnancy services, antenatal women, police officers, new healthcare workers, clients seeking post-exposure management, tuberculosis patients and HIV/AIDS patients.

23. Seroprevalence data of HCV infection, which are reported to DH on a regular basis, include those from new blood donors, persons having needlestick injuries or mucosal contacts of blood and body fluids and HIV/AIDS patients attending Integrated Treatment Centre (ITC), and patients having clinical HCV testing in two hospital clusters.

Epidemiology of hepatitis B

24. In Hong Kong, most of the disease burden of HBV infection comes from infection acquired perinatally or during early childhood. Universal neonatal vaccination programme has been in place in Hong Kong since 1988. The coverage rate for three doses of hepatitis B vaccine among babies born locally is high (>98%).

25. Apart from universal neonatal hepatitis B vaccination programme, supplementary Primary 6 vaccination programme was introduced in 1998 and the coverage rate for three doses of hepatitis B vaccine had been consistently above 97%.

26. With the high coverage of hepatitis B vaccination programme, Hong Kong was verified by the WHO Western Pacific Regional Office (WPRO) in July 2011, as having successfully achieved the goal of hepatitis B control. In a study conducted by DH in 2009, an HBsAg seroprevalence at 0.78% was shown among more than 1 900 children aged between 12 and 15, who were born after the implementation of universal hepatitis B vaccination programme [18]. In 2013, Hong Kong was verified as having met the final regional control goal of achieving an HBsAg seroprevalence of less than 1% in children.

27. A general downward trend of HBsAg prevalence in populations without specific HBV risk, as well as the number of notified acute HBV infection, has been observed locally (Table 4) [19].

Hong Kong has gradually evolved from a region of high-intermediate to intermediate-low hepatitis B endemicity.

Table 4. Comparison of the number of notified cases and prevalence of HBV infection between 1990 and 2018

	1990	2018
Number of notified acute HBV infection	178	29
HBsAg prevalence		
New blood donors	8%	0.8%
Antenatal women	11.3%	4.5%
Pre-marital / pre-pregnancy screening clients	9.6%	4.9%

28. The latest territory-wide epidemiological study gave an age- and sex-adjusted prevalence of HBsAg at 7.2% [20], while the prevalence of HBV infection was estimated at 6.4% in 2016 in a modelling study [21]. With a population of 7.5 million, the estimated HBsAg prevalence at 7.2% actually amounts to around 540 000 cases of HBV infection.

Epidemiology of hepatitis C

29. In contrast with HBV, the local prevalence of hepatitis C has remained generally low. A 0.05% positivity rate of anti-HCV was detected from new blood donors in 2018 [19], reflecting the uncommon occurrence of HCV infection among the general population. The latest territory-wide epidemiological study also gave a low prevalence of viraemic HCV infection at 0.3% [20], while an estimated HCV prevalence at 0.2% in 2016 was found in a modelling study [22].

HCV in specific populations

30. Studies published in the early 1990s showed that anti-HCV was more commonly found in PWID (66.8%), haemophilia (56.0%), haemodialysis (4.6 - 18%) and other patients requiring frequent transfusions of blood or blood products [23,24].

31. With the introduction of HCV screening for blood donation in 1991, the rate of transfusion-transmitted HCV infections has reduced to a very low percentage.

32. Knowingly, the prevalence of HCV in PWID is high and PWID represent a large reservoir for transmission of HCV. An HCV seroprevalence study in 2006 conducted in methadone clinics, which provide methadone treatment to opiate abusers as part of the overall Government service for abusers, showed the prevalence of anti-HCV among PWID at 85% [25]. More recent studies involving PWID recruited at their gathering places gave an anti-HCV prevalence at similar level at 81.7% in 2011 and 76.4% in 2014 respectively [26,27]. Among the subjects participating in a targeted screening and assessment programme for ex-PWID between 2009 and 2018, 73.4% were found to be anti-HCV positive [28].

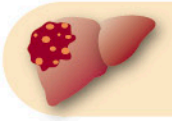
33. Another population disproportionately affected by HCV infection was HIV/AIDS patients. New HIV/AIDS patients attending ITC gave a prevalence of anti-HCV at baseline screening of 4.7% in 2018 [19]. Of these, HIV-positive men who have sex with men (MSM) have emerged as a risk group of sexually

transmitted HCV infection. It may be concurrently acquired with other sexually transmitted infections and associated with the use of recreational drugs for sex, so called chemsex. It now accounts for the majority of new reports of acute HCV infection in Hong Kong. Although its epidemiologic importance is still behind that of parenterally acquired HCV infection in PWID, it cannot be underestimated.

HCV genotypes

34. Six genotypes of HCV have been identified. Genotype 1b is the most prevalent one in Hong Kong (around 60%). Others include Genotype 6 (around 30%) and Genotype 3 (around 10%). Infections with other genotypes are diagnosed sporadically.

Liver cancer

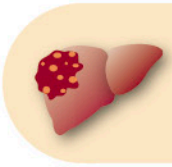


Worldwide, the most common risk factor for liver cancer is chronic HBV and HCV infection.

35. Globally 782 000 people died of liver cancer in 2018 [29], and HBV and HCV infection generally accounted for approximately 80% of liver cancer cases [11]. Local studies showed that 75 - 80% of hepatocellular cancers in Hong Kong were related to chronic HBV infection, and 3 - 6% of the cases were related to chronic HCV infection. HBV and HCV co-infection accounted for another 0.4 - 3% [30].

36. According to the data from the Hong Kong Cancer Registry [31], liver cancer, including neoplasm of liver and intrahepatic bile ducts, was **the 5th most common cancer and the 3rd leading cause of cancer deaths in 2017**:

- 1 834 newly registered cases of liver cancer
- 1 552 registered deaths from liver cancer



Liver Cancer in Hong Kong
• The 5th most common cancer
• The 3rd leading cause of cancer deaths

Care continuum

37. Care continuum of services for HBV and HCV infection spans the entire range of interventions – from reducing vulnerability and prevention, diagnosis and linkage to care, through to treatment and monitoring of disease and related complication. It provides a good framework for establishing a monitoring and evaluation system, with indicators measuring coverage and performance along each step of the "cascade". Key measurements include coverage for diagnosis and treatment for HBV and HCV infection.

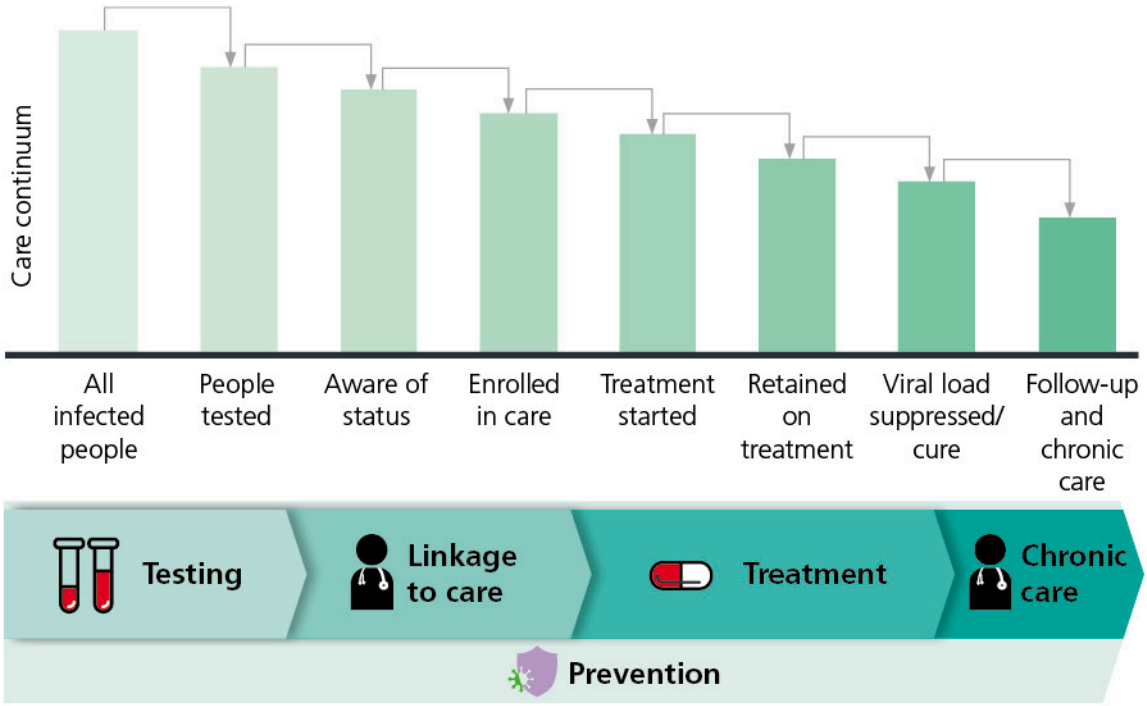


Figure 6. Care continuum of hepatitis services

HBV infection

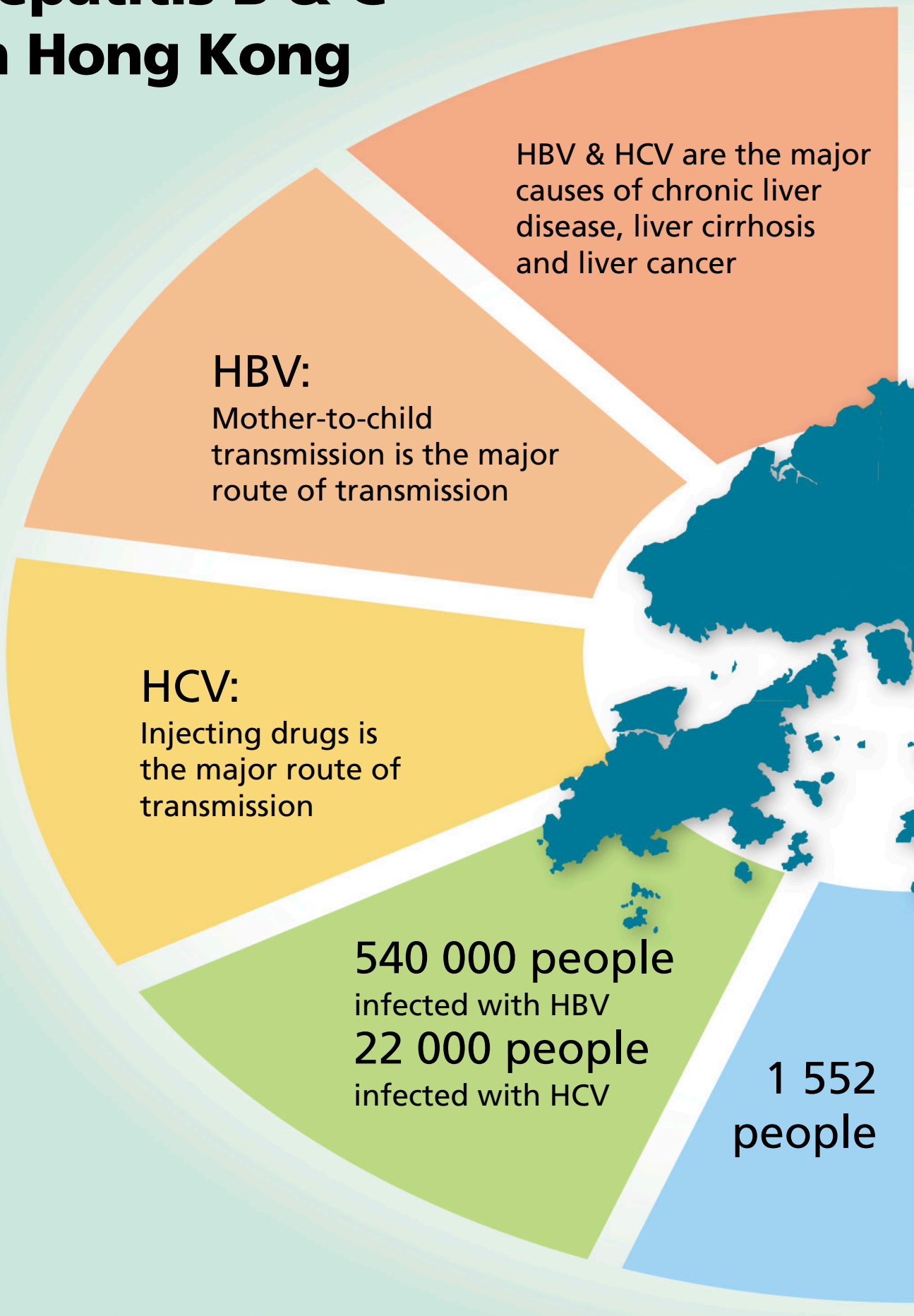
38. Access to diagnosis and treatment of hepatitis B in the community is still limited. In 2016, of the 257 million people living with HBV infection worldwide, 10.5% (27 million) were aware of their infection. Of those diagnosed, the global treatment coverage was 16.7% (4.5 million) [32]. In Hong Kong, close to 50% of the HBsAg-positive participants in an epidemiological study conducted in 2015 - 16 were not aware of their infection status [20]. As described, the latest territory-wide epidemiological study conducted in 2015 - 2016 gave an age- and sex-adjusted prevalence of HBsAg at 7.2%, which could be translated to around 540 000 chronic HBV infection in Hong Kong. As of the end of 2015, an estimated cumulative number of around 194 000 alive patients ever diagnosed with HBV infection in Hospital Authority (HA). A modelling study gave a much lower diagnosis rate for HBV infection at 27% in 2016, while an estimated 22% of those eligible for HBV treatment were being treated [21].

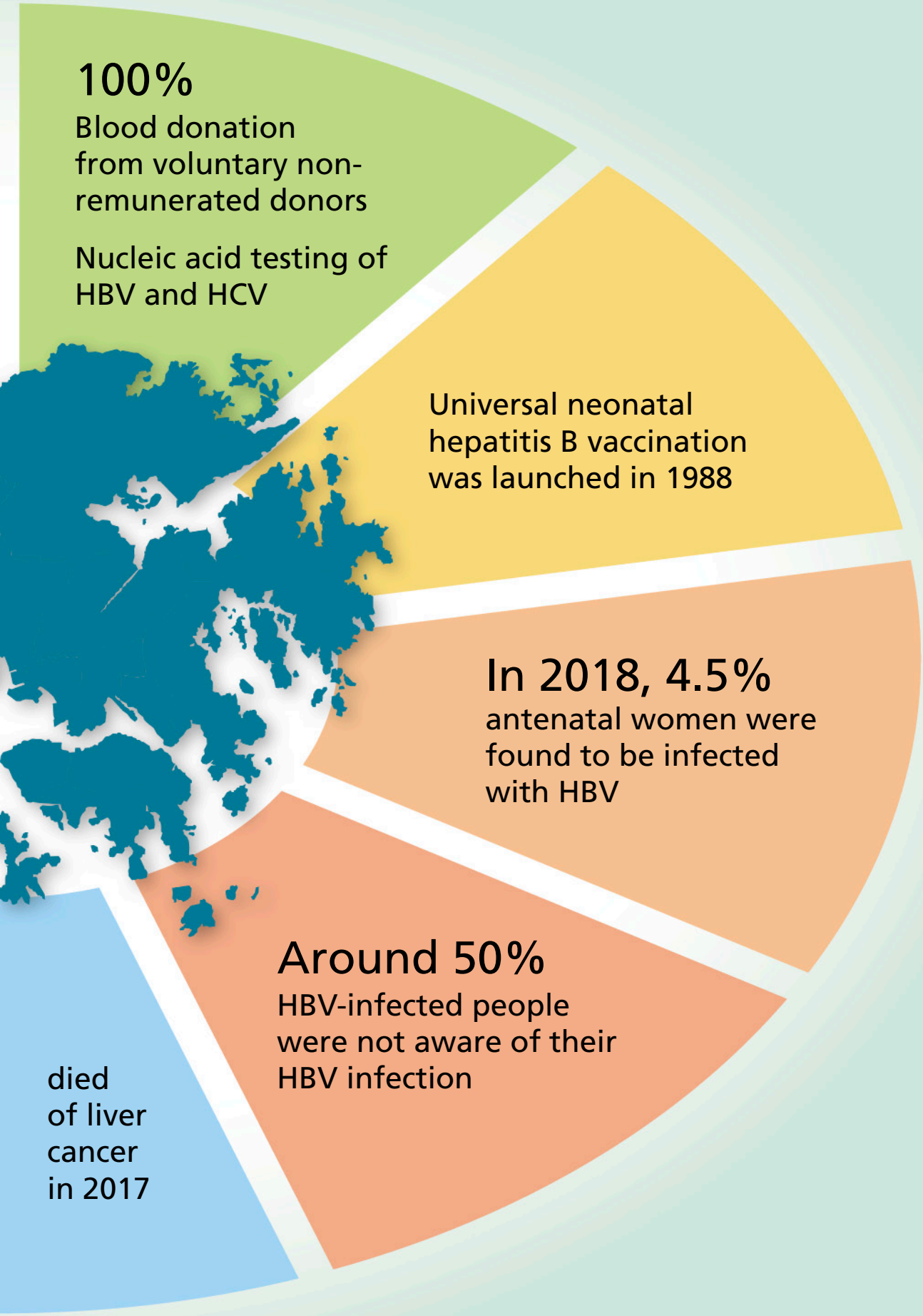
HCV infection

39. The access to HCV treatment remained limited globally and locally. In 2015, only 20% of persons living with HCV infection globally knew their diagnosis, of which 7% started on treatment. In Hong Kong, a modelling study gave a diagnosis rate at 22% and treatment coverage rate of those diagnosed at 6% [33].

40. The estimated prevalence of chronic HCV infection is 0.3%, which corresponds to approximately 22 000 persons infected with the virus. As reported in an epidemiological study using data retrieved from the Hong Kong HCV Registry, a total of 11 309 anti-HCV-positive patients were identified, giving an estimated territory-wide diagnosis rate at 51% [34]. The same study also gave a treatment coverage rate of around 12.4%.

Hepatitis B & C in Hong Kong




100%
Blood donation from voluntary non-remunerated donors
Nucleic acid testing of HBV and HCV
Universal neonatal hepatitis B vaccination was launched in 1988
In 2018, 4.5%
antenatal women were found to be infected with HBV
Around 50%
HBV-infected people were not aware of their HBV infection
died of liver cancer in 2017

Box 1. WHO targets for diagnosis and treatment coverage

Much effort would be required to improve access to diagnosis and treatment for both HBV and HCV infection in Hong Kong, as the WHO targets for diagnosis and treatment rate in 2030 were set at 90% and 80% respectively.