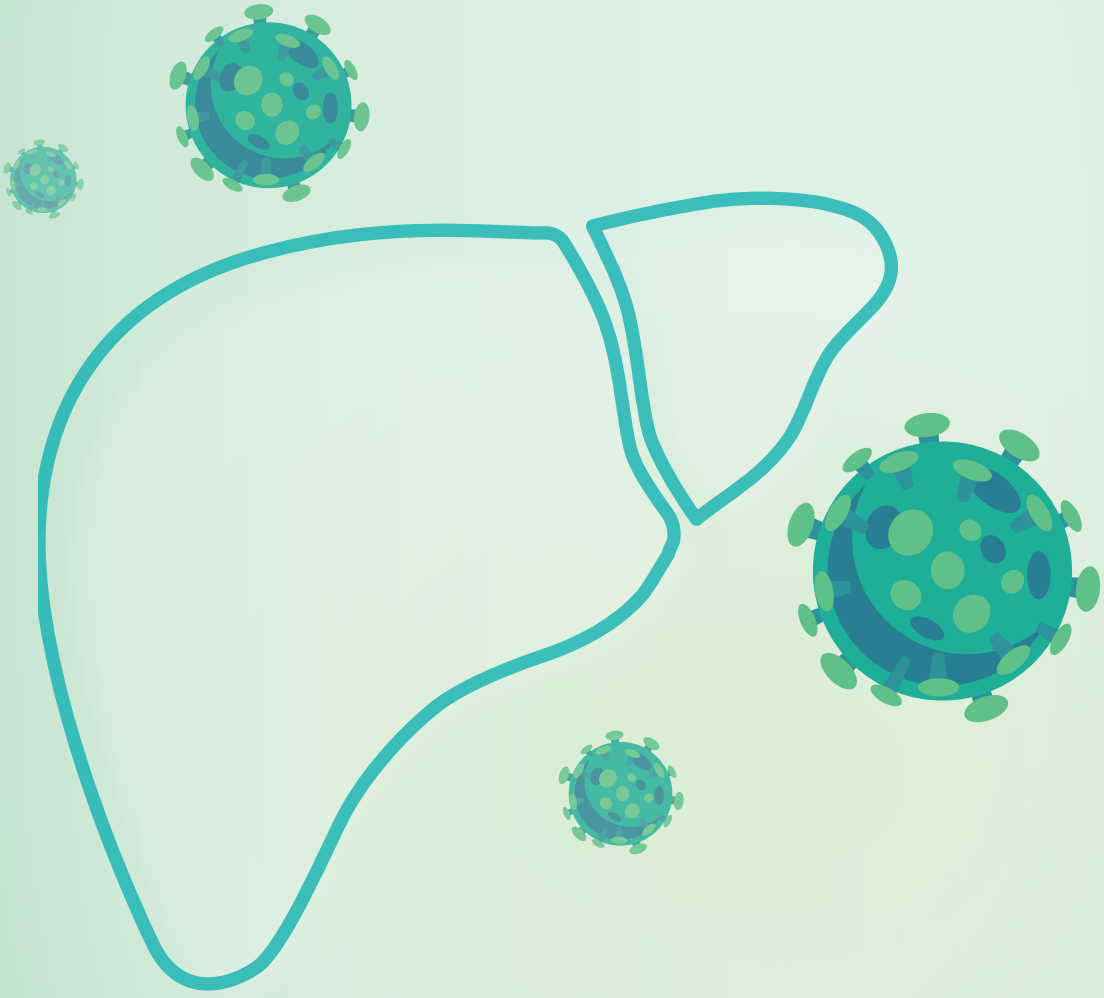
Thematic Report on Viral Hepatitis

Population Health Survey 2020-22



控制病毒性肝炎辦公室
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Results at a glance

Household questionnaire (aged 15 or above)

Number of domestic households	**7 448**
Number of respondents	**16 655**
Household response rate	**73.3%**

Health examination (aged 15 to 84)

Number of participants	**2 072**
Participation rate	**55.2%**

Self-reported viral hepatitis status *(aged 15 or above)*

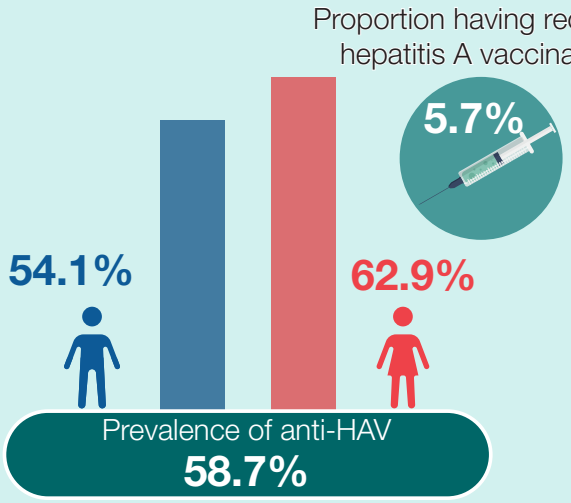
2.4% diagnosed with viral hepatitis

2.1% diagnosed with hepatitis B

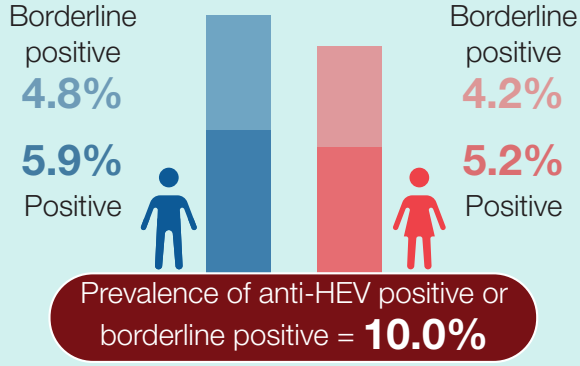
3 400 persons with hepatitis B diagnosed in the 12 months preceding the survey

Prevalence of viral hepatitis *(aged 15 to 84)*

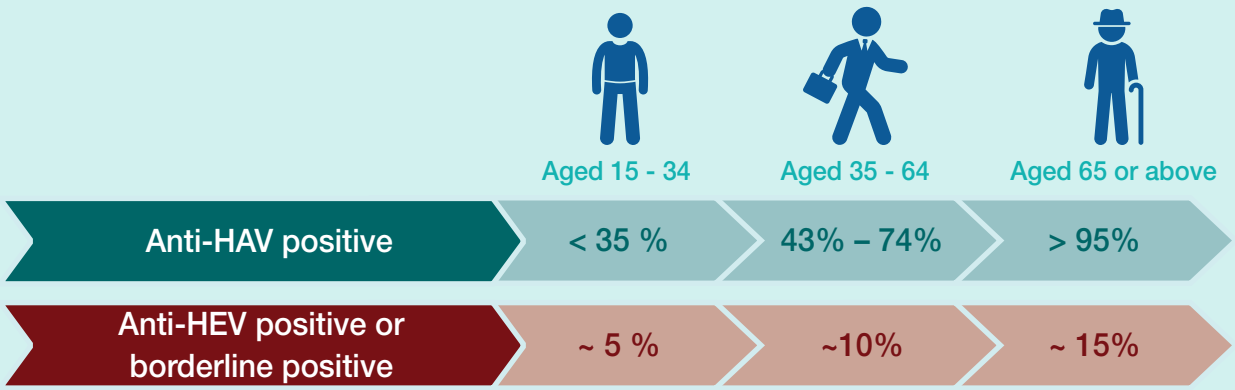
Hepatitis A



Hepatitis E

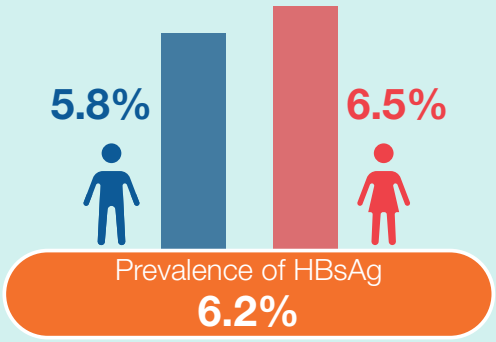


Prevalence of anti-HAV and anti-HEV increases with increasing age.

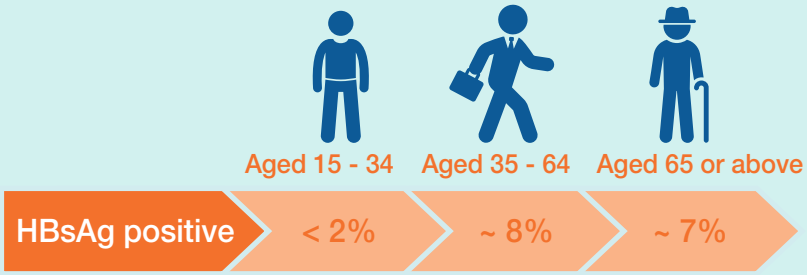


Prevalence of viral hepatitis (aged 15 to 84)

Hepatitis B

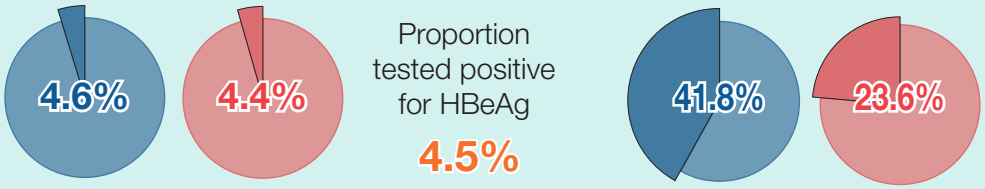


HBsAg prevalence was low in young adults, as compared with those aged 35 or above

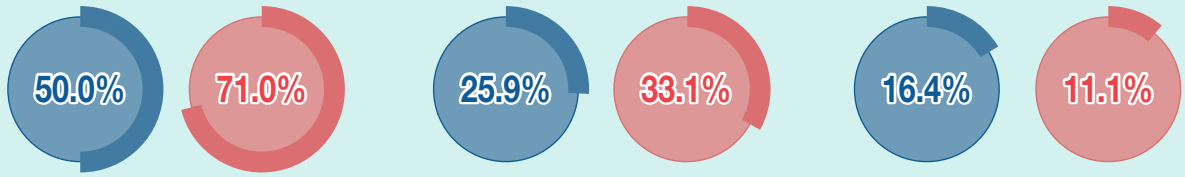


Among HBsAg+ participants

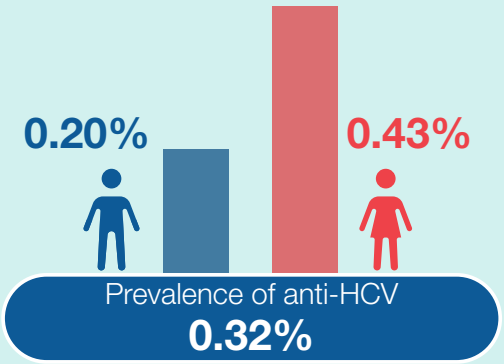
Markers of HBV replication

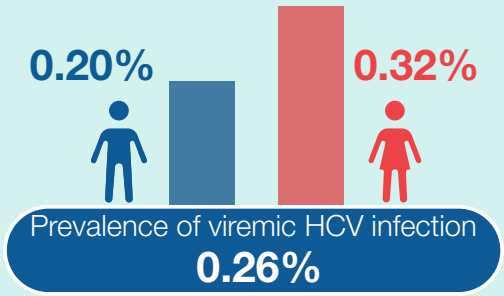


Care continuum

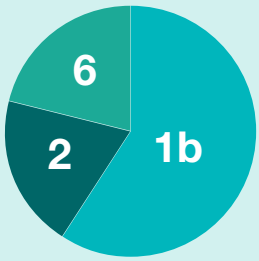


Hepatitis C





HCV genotype distribution



Executive Summary

The Population Health Survey (PHS) 2020-22 is the third territory-wide Population Health Survey conducted by the Department of Health (DH). The PHS 2020-22 comprised two parts, namely (I) household survey and (II) health examination. Survey questions and tests for viral hepatitis markers were first included in the PHS 2020-22, covering four, out of the five main hepatitis viruses, namely hepatitis A (HAV), B (HBV), C (HCV), and E (HEV) virus.

HAV and HEV infections predominantly cause acute hepatitis, while a substantial proportion of HBV or HCV cases would develop chronic infection lasting beyond six months. The major disease burden of viral hepatitis comes from the sequelae of chronic HBV or HCV infection, including cirrhosis and primary liver cancer. Chronic infection with HBV or HCV is usually lifelong without treatment, and can be asymptomatic until complications develop. Early diagnosis and treatment with antiviral medication are the mainstay to reduce the morbidity and mortality related to HBV and HCV.

The Hong Kong Viral Hepatitis Action Plan 2020-2024 sets out twelve local indicators, including the prevalence of chronic HBV and HCV infection in the general population, to monitor and evaluate the current actions in reducing the morbidity and mortality due to viral hepatitis, with the ultimate goal of eliminating viral hepatitis as a public health threat in Hong Kong by 2030 in accordance with the World Health Organisation (WHO) target. Measurement of viral hepatitis markers provides information for assessing the disease burden in the community. These include antibodies against HAV, HCV and HEV, hepatitis B surface antigen (HBsAg), hepatitis B envelope antigen (HBeAg), HBV DNA level, and viral load and genotyping of HCV.

The Study

The main objective is to assess the viral hepatitis status of land-based non-institutional population aged 15 – 84 in Hong Kong, excluding foreign domestic helpers and visitors. The fieldwork of the household survey was conducted between 2 November 2020 and 2 January 2022, with temporary suspension between 2 December 2020 and 22 February 2021 due to COVID-19 pandemic. Health examination was conducted between 1 March 2021 and 19 February 2022. Age-gender stratified random subsample of respondents aged between 15 and 84, who were successfully enumerated in the household survey and had signed consent for health examination, were further invited to

undergo health examination. A total of 16 655 individuals aged 15 or above were enumerated in the household interview, 3 757 respondents out of 6 373 consented respondents were randomly selected and invited to make appointment for health examination, including 2 072 respondents who completed blood tests. The survey data were adjusted for the differential participation rates by type of housing and grossed up to control for the age and gender profile of the study population for the second quarter (Q2) of 2021. PHS 2020-22 Part I and Part II Survey Reports, which presented findings on household survey and health examination, were published in December 2022 and April 2023 respectively. The details of survey method and characteristics of the sample could be referred to Chapter 1 of the Part I Report.

Questions from the household interview and the health examination covered various aspects including physical, psychosocial health and health-related lifestyle. Information on self-reported history of viral hepatitis, time of diagnosis, carrier status, antiviral treatments received, as well as complications possibly related to viral hepatitis (cirrhosis, liver cancer) was collected. Blood specimens were tested for viral hepatitis antigens, antibodies, DNA/RNA level as well as genotyping.

Key Findings

Results of household survey

2.4% of persons aged 15 or above reported to have been diagnosed with viral hepatitis by a doctor. Hepatitis B was the most common type in both males (2.1%) and females (2.1%), and the proportion of self-reported doctor-diagnosed viral hepatitis generally increased with age. Among those with doctor-diagnosed hepatitis B, 2.6% were first diagnosed during the 12 months preceding the survey. 76.0% of those with doctor-diagnosed hepatitis B reported themselves as current carriers, whereas 42.8% of those with doctor-diagnosed hepatitis C claimed themselves as ex-carriers. Among the self-reported current hepatitis B carriers, 49.6% did not have any follow-up medical care for their liver diseases, and 24.7% had ever received antiviral therapy from a western medical practitioner. Among those with self-reported chronic hepatitis C, 52.6% had ever received antiviral therapy from a western medical practitioner. Among those who had doctor-diagnosed cirrhosis, the proportion having self-reported doctor-diagnosed hepatitis B and C was 14.2% and 3.8% respectively. Among those who had doctor-diagnosed liver cancer, 23.1% were diagnosed with hepatitis B, while no respondent was diagnosed with hepatitis C, based on self-reported data.

Results of health examination

Hepatitis A

Among health examination participants aged 15 – 84, 58.7% were positive for anti-HAV. The proportion of positive results generally increased with age, from 30.9% among those aged 15 – 24 to 95.1% among those aged 65 – 84. Prevalence was higher in females than males in all age groups. Only 5.7% of participants reported having received hepatitis A vaccination.

Hepatitis B

Among participants aged 15 – 84, 6.2% were tested positive for HBsAg. The prevalence peaked at 8.4% among those aged 35 – 54 and decreased to 7.0% among those aged 65 – 84. In younger age groups, the HBsAg prevalence was much lower at 0.3% and 1.5% among those aged 15 – 24 and 25 – 34 respectively. The prevalence in females (6.5%) was slightly higher than that in males (5.8%). Among those tested positive for HBsAg, 4.5% (4.4% for females and 4.6% for males) were tested positive for HBeAg, and the proportion having HBV DNA level ≥ 2 000 IU/mL and ≥ 20 000 IU/mL was 31.8% and 17.3% respectively. Among those tested positive for HBsAg, 72.9% reported having a history of doctor-diagnosed hepatitis B in the household survey and 61.6% reported being current carriers. 70.1% of the participants tested positive for HBsAg did not have any medical follow-up for their liver diseases, whereas 24.8% and 5.0% were having follow-up in public and private sector respectively. 13.5% reported having received antiviral therapy from a western medical practitioner.

Hepatitis C

Among participants aged 15 – 84, 0.32% were tested positive for anti-HCV. The prevalence was similar between females (0.43%) and males (0.20%). The overall prevalence of viremic HCV infection was 0.26% among persons aged 15 – 84. Among persons tested positive for HCV RNA, the majority (59.2%) were infected by HCV genotype 1b. The viral load ranged from 523 000 IU/mL to 6 150 000 IU/mL. None of the respondents having viremic HCV infection was aware of their infection status.

Hepatitis E

Among participants aged 15 – 84, 5.5% (5.2% for females and 5.9% for males) were tested positive for anti-HEV, while 4.5% was tested borderline for anti-HEV (4.2% for females and 4.8% for males). The prevalence of anti-HEV positive cases generally increased with age, from 1.9% for those aged 15 – 24 to 7.7% for those aged 45 – 84.

Conclusion

This survey gauged an HBsAg prevalence among land-based non-institutional population aged 15 - 84 in Hong Kong, excluding foreign domestic helpers and visitors, at 6.2%, suggesting a further reduction of the prevalence of HBV infection following the implementation of universal childhood immunisation programme and other interventions preventing mother-to-child transmission of HBV in the 1980s. This survey also shed light on the local continuum of care for chronic viral hepatitis, where an increasing proportion of HBsAg-positive participants knew their current HBV carrier status but with a substantial proportion remained unlinked to medical follow-up for their liver diseases. On the other hand, prevalence of anti-HCV found in the survey at 0.32% was largely consistent with the findings in previous local seroprevalence studies over an extended period, suggesting a consistently low prevalence of HCV infection in the general population of Hong Kong in the past few decades. However, the majority of anti-HCV-positive cases in the survey were also tested positive for HCV RNA, giving a prevalence of viremic HCV infection at 0.26%. The unawareness of their viremic infection status posed a challenge in timely linkage to HCV care and treatment among population with unknown risk of HCV infection.

The PHS 2020-22 has provided important epidemiological information of viral hepatitis among the general population and up-to-date information for estimating prevalence of chronic infections and monitoring trend in populations without apparent risk of infection. Continual and regular monitoring through measurement of the local indicators is important to gauge the progress towards the WHO targets. The results show that further work on strengthening surveillance, as well as enhancing diagnosis and treatment coverage, is needed.

Chapter 1 Background

1.1 Background

Hepatitis is inflammation of the liver and may result from various causes including viruses, alcoholism, drugs or hereditary disorders. Viral hepatitis refers to those caused by infection with hepatitis viruses. There are five main hepatitis viruses, namely hepatitis A (HAV), B (HBV), C (HCV), D (HDV) and E (HEV) virus. All of them can cause acute hepatitis, but different types of viral hepatitis may differ in their routes of transmission, disease progression, management approach and thus the disease burden. This report would cover viral hepatitis that is caused by HAV, HBV, HCV and HEV.

HAV and HEV are mainly transmitted via the faecal-oral route, while HBV and HCV can be acquired via contact with blood or body fluid of an infected person, for example, through sexual contact, sharing needles or during delivery. In Hong Kong, mother-to-child transmission (MTCT) is the major route of acquiring HBV infection, while most HCV infections occur through exposure to blood from an infected person.

Infection with HAV can cause acute hepatitis only, and HEV mostly causes acute hepatitis with chronic HEV infections rarely reported. In contrast, a substantial proportion of persons infected with HBV or HCV would develop chronic infection, defined as an infection lasting beyond six months. [1,2] Chronic HBV or HCV infection can lead to liver fibrosis and serious complications, including cirrhosis and primary liver cancer (hepatocellular carcinoma). While most infection with HAV and HEV is self-limiting and resolves within several weeks or months, chronic infection with HBV or HCV is usually lifelong without treatment and may remain asymptomatic for decades until severe complications develop.

The likelihood of progression to cirrhosis and liver cancer in patients with chronic HBV or HCV can be significantly reduced by early diagnosis and treatment. Antiviral medication is effective in inhibiting HBV replication [3], while HCV infection is literally curable with direct-acting antiviral (DAA) treatment. [4,5] Regular follow-up and monitoring, such as measurement of liver cancer tumour marker and liver ultrasound, are essential for early detection of liver cancer in chronic hepatitis patients. [3]

Knowingly, the majority of disease burden of viral hepatitis comes from HBV or HCV infection, the sequelae of which accounts for 96% of viral hepatitis mortality worldwide. [6] Measurement of viral hepatitis markers in public health studies not only reflects subjects' disease activity, but also provides information for monitoring and evaluation of the disease burden in the community. For example, positive results of antibodies against HAV, HCV and HEV imply past exposure to the respective viruses or vaccination (HAV and HEV).

Hepatitis B surface antigen (HBsAg) is a serological marker of current infection, which is used for assessing the prevalence of HBV infection. Interpreting HBsAg results with that of hepatitis B envelope antigen (HBeAg), a serological marker for active viral replication, could help determine the clinical phases of chronic HBV infection. [7] The risk of developing liver cancer in HBV-infected persons is positively correlated to the HBV DNA level, which reflects viral load inside the body. [8] In addition, virologic testing for HCV, including viral load and genotyping, is important for clinical management as well as the evaluation of the prevalence of viremic HCV infection and circulating genotypes in the community. These laboratory parameters were measured in the Population Health Survey (PHS) 2020-22 and findings reported in this report.

As set out in the ***Hong Kong Viral Hepatitis Action Plan 2020-2024***, a set of twelve local indicators were developed [9] , in addition to ongoing surveillance on acute viral hepatitis, reported as a statutory notifiable infectious disease in Hong Kong, and existing mechanism on assessing the seroprevalence of hepatitis B and C in specific groups. [10, 11] Data on viral hepatitis status of the Hong Kong population were collected in the PHS 2020-22 conducted by the Department of Health (DH), which aims at measuring the prevalence of chronic HBV and HCV infection in the general population as two of the local indicators. [9] The information would facilitate evaluation of current actions in reducing the morbidity and mortality due to viral hepatitis, with the ultimate goal of eliminating viral hepatitis as a public health threat in Hong Kong by 2030 in accordance with the World Health Organisation (WHO) target. [12, 13]

1.1.1 Aim and objectives

The survey aims to assess the viral hepatitis status of land-based non-institutional population aged 15 – 84 in Hong Kong, excluding foreign domestic helpers and visitors, with specific objectives, including –

(i) estimating the disease burden of hepatitis A, B, C and E by measuring their respective prevalence;
(ii) evaluating the disease activity for individuals with chronic hepatitis B and C; and
(iii) assessing the linkage to care, as well as diagnosis and treatment coverage, of chronic hepatitis B and C.

Chapter 2 Methodology

2.1 Survey method

The PHS 2020-22 comprised two parts, namely (I) household survey; and (II) health examination including biochemical testing. The biochemical tests included blood tests for viral hepatitis. The DH commissioned a private research firm and a private healthcare organisation with laboratory service to conduct the fieldworks of household survey and health examination respectively. Data analysis and reporting of the PHS 2020-22 was commissioned to the Jockey Club School of Public Health and Primary Care, The Chinese University of Hong Kong. The DH was responsible for the overall planning of the survey, including the study design and development of questionnaire, as well as monitoring the quality of various parts of the survey.

2.1.1 Target population coverage

The household survey covered the land-based non-institutional population aged 15 or above in Hong Kong, excluding foreign domestic helpers and visitors. The health examination covered persons aged between 15 and 84 (both ages inclusive) who had been enumerated in the household survey.

2.1.2 Sampling frame and sample selection

The survey adopted the Frame of Quarters maintained by the Census and Statistics Department (C&SD) as the sampling frame. Systematic replicated sampling was deployed for selecting a sample of replicates of living quarters in built-up areas from the Register of Quarters and a sample of area segments in non-built-up areas from the Register of Segments. Each replicate of living quarters is a representative sample of domestic households in Hong Kong (For details, please refer to the main reports of PHS 2020-22). [14]

2.1.3 Participants of health examination

All domestic households in the selected living quarters and all members aged 15 or above, excluding foreign domestic helpers and visitors, were enumerated individually. All enumerated persons aged between 15 and 84 were invited to sign consent for health examination. For respondents under 18 years of age, their consents were signed by parents or guardians. Eligible and consented members of enumerated households, stratified into gender and age groups, were randomly invited to undergo the health examination.

2.1.4 Data collection method

Respondents who consented for health examination after completing the household interview were stratified into gender and age groups. For each group, the randomly selected respondents were contacted by telephone to make appointment at designated health examination centres. Identities of respondents attending health examination were verified. Respondents were requested to complete a self-administered questionnaire on the day of the health examination.

All laboratory reports were reviewed by registered medical laboratory technologists before passing to the DH. Medical staff of DH further reviewed all laboratory results before sending to the respondents concerned. Health advice was provided to the respondents with results outside reference range.

Procedures of biochemical tests followed the WHO STEPS Surveillance Manual. [15] Procedures for handling biochemical specimens followed the Safety Guidelines on Transport of Clinical Specimens and Infectious Substances for Courier Team and the relevant Infection Control Guidelines issued by the Centre for Health Protection of the DH.

2.1.5 Survey instrument

Information on self-reported history of viral hepatitis, time of diagnosis, carrier status, antiviral treatments received, as well as complications possibly related to viral hepatitis (cirrhosis, liver cancer), was collected via the household survey. Participants of the health examination were also required to complete a self-administered questionnaire prior to blood taking to collect information on hepatitis vaccination (For details on the survey methods and instrument, including the arrangement of health examinations, please refer to the main reports of PHS 2020-22). [14]

Blood specimens were tested for the following parameters (with the corresponding assay):

(i) Hepatitis A virus antibodies (anti-HAV) Total (Roche Cobas e602 system (Anti-HAV) assay)
(ii) Hepatitis B surface antigen (HBsAg) (Roche Cobas e602 system (HBsAg II) assay)
(iii) Hepatitis B envelope antigen (HBeAg) (if applicable) (Roche Cobas e602 system (HBeAg) assay)
(iv) Hepatitis B virus DNA (IU/mL) (if applicable) (Roche Cobas 8800 System Cobas® HBV Kit)
(v) Hepatitis C virus antibodies (anti-HCV) Total (Roche Cobas e602 system (Anti-HCV II) assay)
(vi) Hepatitis C virus RNA (IU/mL) (if applicable) (Roche Cobas 8800 System Cobas® HCV Kit)
(vii) Hepatitis C virus genotype (if applicable) (Versant kPCR (Siemens) & Auto-LiPA 48 (Siemens) Versant Sample Prep 1.0 & Versant HCV Genotype 2.0 Assay LiPA)
(viii) Hepatitis E virus IgG antibodies (EUROIMMUN Anti-Hepatitis E Virus (HEV) IgG ELISA Kit)

2.1.6 Main fieldwork

Household survey

The fieldwork of the household survey was conducted between 2 November 2020 and 2 January 2022, with temporary suspension between 2 December 2020 and 22 February 2021 due to COVID-19 pandemic. A total of 10 160 domestic households were found in the sample of 10 113 occupied quarters. Among these 10 160 domestic households, 7 448 were successfully enumerated, representing an overall response rate of 73.3% at household level. By types of housing, the response rates are 85.0%, 78.2% and 65.1% for public rental housing, subsidised sale flats and private housing respectively. The response rate also varied by District Council district, from the highest of 84.8% for Tuen Mun District to the lowest of 65.0% for North District. A total of 16 655 persons aged 15 or above were successfully enumerated from these 7 448 domestic households in the fieldwork.

Health examination

The fieldwork of health examination was conducted between 1 March 2021 and 19 February 2022. A total of 3 757 respondents out of 6 373 consented respondents were selected according to age-gender stratified sampling and invited to make appointment for health examination. Among these 3 757 invited respondents, 2 072 respondents completed physical measurements and blood test (participation rate: 55.2%).

2.1.7 Grossing-up method

The data collected from the study were adjusted by the differential participation rates for the three types of housing (i.e. public rental housing, subsidised sale flats and private housing), and grossed-up to the control for the age and gender profile of the target population for the second quarter (Q2) of 2021. One set of statistical weights each was derived for (i) household survey and (ii) health examination. After these adjustments, the survey estimates can represent those in the study population during the survey period.

2.1.8 Confidentiality

All questionnaires and data files were regarded as confidential documents, and the research team exercised due care in handling the records to avoid the leakage of information. At the beginning of the survey, all relevant staff of the private data collection firm commissioned for the survey were required to sign an undertaking that no confidential information related to the survey would be disclosed.

In accordance with the Personal Data (Privacy) Ordinance (Cap. 486) and the code of conduct of the research agency, all data collected from the survey were used only for research and statistical purposes. All worksheets filled with households' information would be destroyed within six months after completion of the survey.

2.1.9 Ethics approval

Ethical approval for the study was granted from the Ethics Committee of the DH.

Chapter 3 Results from household survey

3.1 Self-reported diagnosis of viral hepatitis

The PHS collected data on self-reported doctor-diagnosed viral hepatitis. 2.4% of persons aged 15 or above had ever been diagnosed with viral hepatitis by a doctor, with similar proportion between males (2.5%) and females (2.4%). Hepatitis B was the most common type of viral hepatitis diagnosed in both males (2.1%) and females (2.1%). The majority of respondents (97.2%) did not report to have viral hepatitis (Table 3.1a). Of those with doctor-diagnosed hepatitis B, 2.6% (1.1% for female and 4.3% for male) were first diagnosed during the 12 months preceding the survey (Table 3.1b). Analysed by age group, the proportion of self-reported doctor-diagnosed viral hepatitis increased from 0.1% for those aged 15-24, peaked at 4.0% for those aged 55-64, and dropped to 0.5% for those aged 85 or above (Table 3.1c).

Table 3.1a: Proportion of population aged 15 or above, who had ever been diagnosed with viral hepatitis by a doctor, by sex

	Female		Male		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Yes (A)	76.8	2.4%	71.8	2.5%	148.5	2.4%
*A **	*2.3*	*0.1%*	*2.8*	*0.1%*	*5.1*	*0.1%*
*B **	*69.2*	*2.1%*	*61.8*	*2.1%*	*131.0*	*2.1%*
*C **	*1.3*	*< 0.05%*	*2.7*	*0.1%*	*4.0*	*0.1%*
*D **	-	-	-	-	-	-
*E **	*0.7*	*< 0.05%*	-	-	*0.7*	*< 0.05%*
Unknown	*3.6*	*0.1%*	*4.9*	*0.2%*	*8.5*	*0.1%*
No (B)	3 159.1	97.1%	2 819.0	97.2%	5 978.1	97.2%
Don't know (C)	16.0	0.5%	8.2	0.3%	24.2	0.4%
Total (A+B+C)	**3 251.8**	**100.0%**	**2 899.0**	**100.0%**	**6 150.8**	**100.0%**

Base: *All respondents (Size of representing population= 6 150 800)*
Notes: ** Multiple answers were allowed.*
Figures may not add up to the total due to rounding.

Table 3.1b: Proportion of population aged 15 or above, who was diagnosed with hepatitis B by a doctor in the 12 months preceding the survey, by sex

	No. of persons ('000)	% among the cases	Rate*
Female	0.7	1.1%	< 0.05%
Male	2.6	4.3%	0.1%
Total	**3.4**	**2.6%**	**0.1%**

Base: *Respondents who had doctor-diagnosed hepatitis B (Size of representing population = 131 000)*

Notes: ** The rate is expressed as a percentage of all Hong Kong land-based non-institutional population aged 15 or above (excluding foreign domestic helpers) in the respective sex sub-groups.*

Figures may not add up to the total due to rounding.

Table 3.1c: Proportion of population aged 15 or above, who had ever been diagnosed with viral hepatitis by a doctor, by age group

	15 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 - 74		75 - 84		85 or above		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Yes (A)	0.4	0.1%	3.0	0.3%	27.3	2.7%	35.8	3.3%	48.2	4.0%	27.4	3.3%	5.5	1.6%	0.9	0.5%	148.5	2.4%
*A **	-	-	-	-	*0.5*	*<0.05%*	*2.7*	*0.3%*	*1.6*	*0.1%*	*0.4*	*< 0.05%*	-	-	-	-	*5.1*	*0.1%*
*B **	*0.4*	*0.1%*	*3.0*	*0.3%*	*26.1*	*2.6%*	*31.6*	*2.9%*	*42.2*	*3.5%*	*22.2*	*2.7%*	*4.5*	*1.3%*	*0.9*	*0.5%*	*131.0*	*2.1%*
*C **	-	-	-	-	-	-	*1.3*	*0.1%*	*1.2*	*0.1%*	*1.4*	*0.2%*	-	-	-	-	*4.0*	*0.1%*
*D **	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*E **	-	-	-	-	-	-	-	-	*0.3*	*<0.05%*	*0.4*	*< 0.05%*	-	-	-	-	*0.7*	*<0.05%*
Unknown	-	-	-	-	*0.8*	*0.1%*	*0.6*	*0.1%*	*3.2*	*0.3%*	*3.0*	*0.4%*	*0.9*	*0.3%*	-	-	*8.5*	*0.1%*
No (B)	578.2	99.8%	889.6	99.6%	982.5	97.2%	1 044.6	96.5%	1157.2	95.5%	804.0	96.0%	333.7	97.2%	188.2	98.5%	5 978.1	97.2%
Don't know (C)	0.8	0.1%	0.4	<0.05%	0.8	0.1%	2.6	0.2%	6.8	0.6%	6.5	0.8%	4.3	1.2%	1.9	1.0%	24.2	0.4%
Total (A+B+C)	**579.4**	**100.0%**	**893.0**	**100.0%**	**1 010.7**	**100.0%**	**1 083.0**	**100.0%**	**1 212.3**	**100.0%**	**837.9**	**100.0%**	**343.5**	**100.0%**	**191.0**	**100.0%**	**6 150.8**	**100.0%**

Base: *All respondents (Size of representing population = 6 150 800)*

Notes: ** Multiple answers were allowed.*

Figures may not add up to the total due to rounding.

3.2 Chronic viral hepatitis

3.2.1 Self-reported carrier status of chronic viral hepatitis

Chronic hepatitis B

Respondents who had doctor-diagnosed hepatitis B were asked about their carrier status. 76.0% (81.5% for females and 69.8% for males) self-reported as current carriers of hepatitis B, while 13.2% claimed themselves as ex-carrier (8.9% for females and 18.1% for males). 3.4% (2.3% for female and 4.6% for male) reported that they were never a carrier, and 7.3% (7.2% for females and 7.5% for males) did not know their carrier status (Table 3.2.1a).

Table 3.2.1a: Distribution of HBV carrier status among population aged 15 or above, who had ever been diagnosed with hepatitis B by a doctor, by sex

	Female		Male		Total	
	No. of persons ('000)	**%**	**No. of persons ('000)**	**%**	**No. of persons ('000)**	**%**
Current carrier	56.4	81.5%	43.2	69.8%	99.6	76.0%
Ex-carrier	6.2	8.9%	11.2	18.1%	17.4	13.2%
Never a carrier	1.6	2.3%	2.9	4.6%	4.5	3.4%
Don't know the carrier status	5.0	7.2%	4.6	7.5%	9.6	7.3%
Total	**69.2**	**100.0%**	**61.8**	**100.0%**	**131.0**	**100.0%**

Base: Respondents who had doctor-diagnosed hepatitis B (Size of representing population = 131 000).
Notes: Figures may not add up to the total due to rounding.

Analysed by age group, among respondents with doctor-diagnosed hepatitis B and aged between 15 and 34 or aged 85 or above, all self-reported as current carriers. The proportions of self-reported current carriers of hepatitis B were lower in other age groups, ranging from 69.1% (respondents aged 75 - 84) to 77.2% (respondents aged 55 - 64). Respondents aged 75 - 84 had the highest proportion of self-reported as being ex-carriers (23.7%) among those with doctor-diagnosed hepatitis B (Table 3.2.1b).

Table 3.2.1b: Distribution of HBV carrier status among population aged 15 or above, who had ever been diagnosed with hepatitis B by a doctor, by age group

	15 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 - 74		75 - 84		85 or above		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Current carrier	0.4	100.0%	3.0	100.0%	20.1	76.9%	23.6	74.8%	32.6	77.2%	15.9	71.3%	3.1	69.1%	0.9	100.0%	99.6	76.0%
Ex-carrier	-	-	-	-	4.6	17.6%	3.0	9.5%	5.9	13.9%	2.8	12.7%	1.1	23.7%	-	-	17.4	13.2%
Never a carrier	-	-	-	-	0.3	1.3%	1.6	5.2%	1.4	3.4%	0.7	3.2%	0.3	7.2%	-	-	4.5	3.4%
Don't know the carrier status	-	-	-	-	1.1	4.2%	3.3	10.5%	2.4	5.6%	2.8	12.7%	-	-	-	-	9.6	7.3%
Total	**0.4**	**100.0%**	**3.0**	**100.0%**	**26.1**	**100.0%**	**31.6**	**100.0%**	**42.2**	**100.0%**	**22.2**	**100.0%**	**4.5**	**100.0%**	**0.9**	**100.0%**	**131.0**	**100.0%**

Base: *Respondents who had doctor-diagnosed hepatitis B (Size of representing population = 131 000)*
Notes: *Figures may not add up to the total due to rounding.*

Chronic hepatitis C

Among those who had doctor-diagnosed hepatitis C, 42.8% (23.9% for females and 51.7% for males) claimed themselves as ex-carriers, and 38.5% (48.1% for females and 34.0% for males) self-reported as current carriers. 9.8% claimed that they were never a carrier and 9.0% did not know their carrier status (Table 3.2.1c).

Table 3.2.1c: Distribution of HCV carrier status among population aged 15 or above, who had ever been diagnosed with hepatitis C by a doctor, by sex

Age group	Female		Male		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Current carrier	0.6	48.1%	0.9	34.0%	1.5	38.5%
Ex-carrier	0.3	23.9%	1.4	51.7%	1.7	42.8%
Never a carrier	-	-	0.4	14.3%	0.4	9.8%
Don't know the carrier status	0.4	28.0%	-	-	0.4	9.0%
Total	**1.3**	**100.0%**	**2.7**	**100.0%**	**4.0**	**100.0%**

Base: *Respondents who had doctor-diagnosed hepatitis C (Size of representing population = 4 000)*
Notes: *Figures may not add up to the total due to rounding.*

3.2.2 Treatment status of chronic viral hepatitis

Among those who reported as current hepatitis B carrier, 49.6% (46.8% for females and 53.2% for males) did not have any follow-up medical care for their liver diseases. For those having follow-up medical care for their liver diseases, about 90% had it in public sector, while the remaining 10% had follow-up in the private sector. Overall, 0.4% of the respondents who reported as current hepatitis B carrier had follow-up in both public and private sector (Table 3.2.2a).

Table 3.2.2a: Proportion of persons aged 15 or above with chronic hepatitis B, who sought follow-up medical care for liver disease, by sex and healthcare settings

	Female		Male		Total	
	No. of persons ('000)	**% among the cases**	**No. of persons ('000)**	**% among the cases**	**No. of persons ('000)**	**% among the cases**
No follow-up	26.4	46.8%	23.0	53.2%	49.3	49.6%
Public only	26.8	47.5%	17.9	41.5%	44.7	44.9%
Private only	2.8	5.0%	2.3	5.4%	5.1	5.2%
Both public and private	0.4	0.7%	-	-	0.4	0.4%
Total	**56.4**	**100.0%**	**43.2**	**100.0%**	**99.6**	**100.0%**

Base: Respondents who self-reported as current hepatitis B carrier (Size of representing population = 99 600)
Notes: Figures may not add up to the total due to rounding.

Analysed by age group, the proportion of respondents who self-reported as hepatitis B carriers but without follow-up decreased from 100% among those aged 15 – 24 to 41.8% among those aged 55 – 64, then increased to 54.2% among those aged 75 – 84. The proportion of respondents having follow-up in the public sector only generally increased with age, from 22.6% among those aged 25 – 34 to 100% among those aged 85 or above (Table 3.2.2b).

Table 3.2.2b: Proportion of persons aged 15 or above with chronic hepatitis B, who sought follow-up medical care for liver disease, by age group and healthcare settings

	15 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 - 74		75 - 84		85 or above		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
No follow-up	0.4	100.0%	1.9	63.1%	12.1	60.2%	13.0	55.0%	13.6	41.8%	6.7	42.0%	1.7	54.2%	-	-	49.3	49.6%
Public only	-	-	0.7	22.6%	7.6	37.6%	9.1	38.5%	16.2	49.8%	9.2	58.0%	1.1	34.2%	0.9	100.0%	44.7	44.9%
Private only	-	-	0.4	14.3%	0.5	2.2%	1.2	4.9%	2.7	8.4%	-	-	0.4	11.6%	-	-	5.1	5.2%
Both public and private	-	-	-	-	-	-	0.4	1.6%	-	-	-	-	-	-	-	-	0.4	0.4%
Total	**0.4**	**100.0%**	**3.0**	**100.0%**	**20.1**	**100.0%**	**23.6**	**100.0%**	**32.6**	**100.0%**	**15.9**	**100.0%**	**3.1**	**100.0%**	**0.9**	**100.0%**	**99.6**	**100.0%**

Base: *Respondents who self-reported as current hepatitis B carrier (Size of representing population = 99 600)*

Notes: *Figures may not add up to the total due to rounding.*

Among those with self-reported chronic hepatitis B, 24.7% had ever received antiviral therapy from a western medical practitioner. Such proportion was higher in males (30.0%) than that in females (20.0%). The majority of respondents (68.2%) had not received any antiviral therapy (Table 3.2.2c).

Table 3.2.2c: Proportion of persons aged 15 or above with chronic hepatitis B (including both current carriers and ex-carriers) who had ever received antiviral therapy from a doctor (western medical practitioner), by sex

	Female		Male		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
Yes	12.5	20.0%	16.3	30.0%	28.8	24.7%
No	44.8	71.6%	35.0	64.3%	79.8	68.2%
Don't know	5.2	8.4%	3.1	5.6%	8.3	7.1%
Total	**62.6**	**100.0%**	**54.3**	**100.0%**	**116.9**	**100.0%**

Base: *Respondents who had doctor-diagnosed chronic hepatitis B, including both current carriers and ex-carriers (Size of representing population = 116 900)*

Notes: *Figures may not add up to the total due to rounding.*

Among those with self-reported diagnosis history of chronic hepatitis C, 52.6% had ever received antiviral therapy from a western medical practitioner. Such proportion was also higher in males (60.3%) than that in females (33.1%). The proportion having received antiviral therapy for hepatitis C was higher than that for hepatitis B in both sexes (Table 3.2.2d).

Table 3.2.2d: Proportion of persons aged 15 or above with chronic hepatitis C (including both current carriers and ex-carriers) who had ever received antiviral therapy from a doctor (western medical practitioner), by sex

	Female		Male		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
Yes	0.3	33.1%	1.4	60.3%	1.7	52.6%
No	0.3	31.0%	0.3	13.1%	0.6	18.2%
Don't know	0.3	35.8%	0.6	26.6%	0.9	29.2%
Total	**0.9**	**100.0%**	**2.3**	**100.0%**	**3.2**	**100.0%**

Base: *Respondents who had doctor-diagnosed chronic hepatitis C, including both current carriers and ex-carriers (Size of representing population = 3 200)*

Notes: *Figures may not add up to the total due to rounding.*

3.3 Sequelae of viral hepatitis

The overall prevalence of cirrhosis (0.2%) and liver cancer (0.1%) in the population, regardless of diagnosis of viral hepatitis, were similar for respondents aged 15 or above. Among those with cirrhosis and liver cancer, 11.3% and 17.5% were diagnosed in the 12 months preceding the survey respectively (Table 3.3a).

Table 3.3a: Prevalence of cirrhosis and liver cancer and proportion of cases diagnosed by doctors in the 12 months preceding the survey among population aged 15 or above

	Prevalence		Diagnosed in the 12 months preceding the survey	
	No. of persons ('000)	**%**	**No. of persons ('000)**	**% among the cases***
Cirrhosis	9.4	0.2%	1.1	11.3%
Liver cancer	8.6	0.1%	1.5	17.5%

Base: *All respondents (Size of representing population = 6 150 800)*

Notes: ** Number of cases ever diagnosed with cirrhosis or liver cancer in the 12 months preceding the survey divided by number of cases ever diagnosed with the respective liver disease.*

Figures may not add up to the total due to rounding.

Among those who had doctor-diagnosed cirrhosis, 14.2% reported having been diagnosed with hepatitis B and 3.8% reported having been diagnosed with hepatitis C. Among those who had doctor-diagnosed liver cancer, 23.1% reported having been diagnosed with hepatitis B, while no respondent reported having been diagnosed with hepatitis C (Table 3.3b).

Table 3.3b: Proportion of cirrhosis and liver cancer cases among population aged 15 or above with doctor-diagnosed hepatitis B or C

	Cases with doctor-diagnosed hepatitis B		Cases with doctor-diagnosed hepatitis C	
	No. of persons ('000)	**% among the cases***	**No. of persons ('000)**	**% among the cases***
Cirrhosis	1.3	14.2%	0.4	3.8%
Liver cancer	2.0	23.1%	-	-

Base: *Respondents who had doctor-diagnosed cirrhosis (Size of representing population = 9 400) or liver cancer (Size of representing population = 8 600)*

Notes: ** Number of cirrhosis and liver cancer cases ever diagnosed with hepatitis B or C divided by number of cases ever-diagnosed with the respective liver disease.*

Figures may not add up to the total due to rounding.

Chapter 4 Results from health examination

The PHS collected blood samples from participants for testing various biomarkers of viral hepatitis, including serology test on antigen (for HBV) and antibody (for HAV, HCV and HEV), measurement of viral load (for HBV and HCV) and genotyping (for HCV). In addition to assessing the serologic and virologic status for individual participants, interpretation of these test statistics can also inform the latest epidemiology of viral hepatitis for better understanding of the public health burden posed.

4.1 Hepatitis A

Hepatitis A is caused by infection with HAV, which can lead to acute hepatitis but not chronic hepatitis. Hepatitis A epidemiology is usually assessed by measuring the prevalence of anti-HAV at population level, which may have implications on the past exposure to HAV and susceptibility to future HAV infection in the community. A positive test result of anti-HAV indicates past or present HAV infection, or immunity acquired from hepatitis A vaccination.

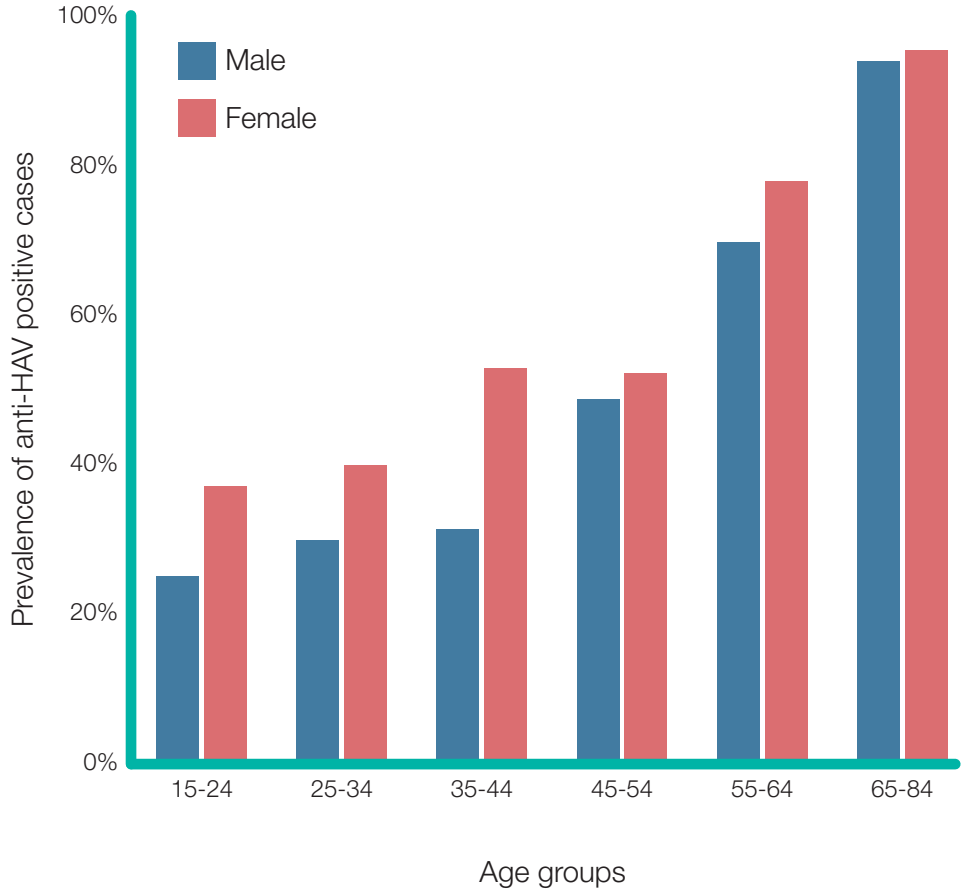
Among persons aged 15 – 84, the prevalence of anti-HAV positive cases was 58.7% (62.9% for females and 54.1% for males). The prevalence of anti-HAV positive cases among persons aged 15 – 84 generally increased with age, from 30.9% among those aged 15 – 24 to 95.1% among those aged 65 – 84 (Table 4.1a).

Table 4.1a: Prevalence of anti-HAV positive cases among persons aged 15 to 84 by sex and age group

Age group	Female		Male		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
15 – 24	105.0	37.1%	74.2	25.0%	179.2	30.9%
25 – 34	183.1	40.1%	131.1	30.0%	314.2	35.2%
35 – 44	291.0	53.1%	144.9	31.3%	435.8	43.1%
45 – 54	315.7	52.2%	232.4	48.6%	548.1	50.6%
55 – 64	497.2	78.1%	402.6	70.0%	899.8	74.2%
65 – 84	580.7	95.8%	542.2	94.3%	1 122.9	95.1%
Total	**1 972.6**	**62.9%**	**1 527.4**	**54.1%**	**3 500.0**	**58.7%**

Base: All respondents (Size of representing population = 5 959 700)
Notes: Figures may not add up to the total due to rounding.

Prevalence of anti-HAV positive cases by age group and gender



Respondents were also asked if they had received hepatitis A vaccination. Majority of the respondents (64.4%) reported that they had not received the vaccination, and 29.9% of the respondents were not sure if they had received the vaccination. Only 5.7% had received hepatitis A vaccination, with similar proportion between females (5.5%) and males (5.8%) (Table 4.1b).

Table 4.1b: History of hepatitis A vaccination among persons aged 15 to 84 by sex

	Female		Male		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Yes	173.1	5.5%	164.7	5.8%	337.8	5.7%
No	2 061.9	65.8%	1 776.1	62.9%	3 838.1	64.4%
Not sure	900.0	28.7%	883.9	31.3%	1 783.8	29.9%
Total	**3 135.0**	**100.0%**	**2 824.7**	**100.0%**	**5 959.7**	**100.0%**

Base: *All respondents (Size of representing population = 5 959 700)*
Notes: *Figures may not add up to the total due to rounding.*

Analysed by age group, the proportion of respondents who had not received hepatitis A vaccination generally increased with age, from 53.9% among those aged 15 – 24 to 84.3% among those aged 65 – 84. The proportion of respondents who were not sure if they had received the vaccination generally decreased with increasing age, from 42.6% among those aged 15 – 24 to 12.1% among those aged 65 – 84. The proportion of respondents having received hepatitis A vaccination peaked among those aged 35 – 44 (12.7%), while the lowest proportion of vaccinated respondents was observed among those aged 25 – 34 (3.0%) (Table 4.1c).

Table 4.1c: History of hepatitis A vaccination among persons aged 15 and 84 by age group

	15 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 - 84		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Yes	20.4	3.5%	27.0	3.0%	128.0	12.7%	62.2	5.7%	57.5	4.7%	42.6	3.6%	337.8	5.7%
No	312.1	53.9%	416.1	46.6%	478.7	47.4%	712.4	65.8%	922.9	76.1%	995.9	84.3%	3 838.1	64.4%
Not sure	247.0	42.6%	449.8	50.4%	404.0	40.0%	308.5	28.5%	231.8	19.1%	142.7	12.1%	1 783.8	29.9%
Total	**579.5**	**100.0%**	**892.9**	**100.0%**	**1 010.7**	**100.0%**	**1 083.0**	**100.0%**	**1 212.3**	**100.0%**	**1 181.3**	**100.0%**	**5 959.7**	**100.0%**

Base: *All respondents (Size of representing population = 5 959 700)*
Notes: *Figures may not add up to the total due to rounding.*

4.2 Hepatitis B

4.2.1 Prevalence of hepatitis B

Infection with HBV can cause both acute and chronic hepatitis B. The prevalence of hepatitis B is usually assessed by measuring the positivity rate of hepatitis B surface antigen (HBsAg) tests in the population concerned. HBsAg is a serologic marker indicating whether a person currently has HBV infection.

Among those aged 15 – 84, 6.2% (95% confidence interval (CI): 5.2% – 7.4%) were tested HBsAg-positive. The prevalence in females (6.5%; 95% CI: 5.0% – 8.3%) was slightly higher than that in males (5.8%; 95% CI: 4.5% – 7.5%), and such sex difference was more prominent for those aged between 35 – 54. Analysed by age group, HBsAg prevalence peaked at 8.4% among those aged 35 – 44 and 45 – 54, and decreased to 7.6% among those aged 55 – 64 and 7.0% among those aged 65 – 84 respectively. In younger age groups, the HBsAg prevalence was much lower at 0.3% and 1.5% among those aged 15 – 24 and 25 – 34 respectively (Table 4.2.1).

Table 4.2.1: Prevalence of HBsAg-positive cases among persons aged 15 to 84 by sex and age group

Age group	Female			Male			Total		
	No. of persons ('000)	%	95% CI	No. of persons ('000)	%	95% CI	No. of persons ('000)	%	95% CI
15 – 24	-	-	NA	1.9	0.7%	0.1% - 4.5%	1.9	0.3%	0.0% - 2.3%
25 – 34	5.8	1.3%	0.3% - 5.0%	7.6	1.7%	0.6% - 5.3%	13.4	1.5%	0.6% - 3.6%
35 – 44	54.5	9.9%	6.3% - 15.3%	30.8	6.7%	3.7% - 11.7%	85.3	8.4%	5.9% - 11.8%
45 – 54	55.3	9.2%	5.7% - 14.3%	36.1	7.5%	4.4% - 12.6%	91.4	8.4%	6.0% - 11.8%
55 – 64	46.8	7.4%	4.5% - 11.9%	45.8	8.0%	4.7% - 13.0%	92.6	7.6%	5.4% - 10.8%
65 – 84	40.4	6.7%	3.7% - 11.7%	42.6	7.4%	4.3% - 12.4%	83.0	7.0%	4.7% - 10.4%
Total	**202.9**	**6.5%**	**5.0% - 8.3%**	**164.7**	**5.8%**	**4.5% - 7.5%**	**367.6**	**6.2%**	**5.2% - 7.4%**

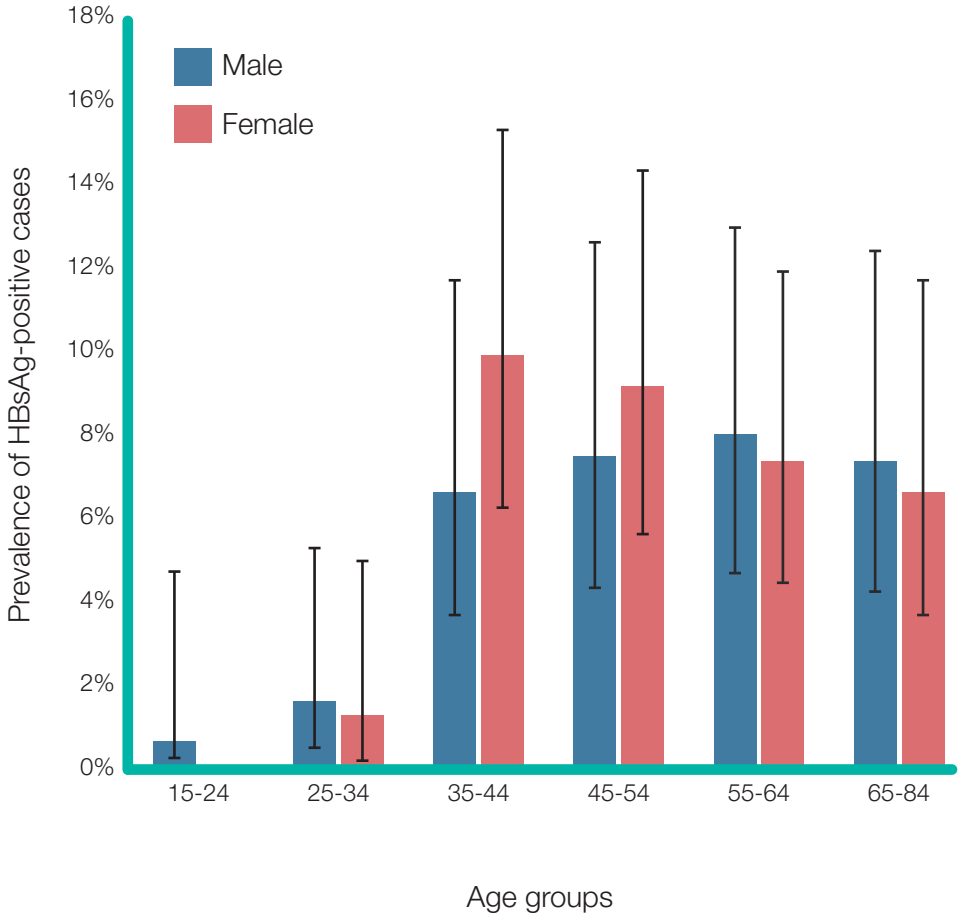
Base: All respondents (Size of representing population = 5 959 700)

Notes: CI: confidence interval

Figures may not add up to the total due to rounding.

Calibration of CIs of zero proportion of weighted data is not available.

Prevalence of HBsAg by age group and gender



4.2.2 Markers of hepatitis B virus replication

Hepatitis B envelope antigen (HBeAg)

Hepatitis B envelope antigen (HBeAg) is an antigen produced when there is active HBV replication in the human body. It is a marker of HBV replication and infectivity, and used to determine the clinical phases of chronic HBV infection. HBeAg is usually present during the early phase of chronic HBV infection. [7] Among those that were tested HBsAg-positive, 4.5% were also tested positive for HBeAg (Table 4.2.2a).

Table 4.2.2a: Prevalence of HBeAg-positive cases among HBsAg-positive persons aged 15 to 84 by sex

	No. of persons ('000)	% among the cases
Female	9.0	4.4%
Male	7.5	4.6%
Total	**16.5**	**4.5%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

Analysed by age group, the prevalence of HBeAg-positive cases among HBsAg-positive persons generally decreased as age increased, from 14.4% among those aged 15 – 39 to 3.8% among those aged 40 – 64. There were no HBeAg-positive cases among those aged 65 – 84 and tested positive for HBsAg (Table 4.2.2b).

Table 4.2.2b: Prevalence of HBeAg-positive cases among HBsAg-positive persons aged 15 to 84 by age group

Age group	No. of persons ('000)	% among the cases
15 - 39	7.6	14.4%
40 - 64	8.9	3.8%
65 - 84	-	-
Total	**16.5**	**4.5%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

Hepatitis B virus DNA (HBV DNA)

Hepatitis B virus DNA (HBV DNA) is also a marker of HBV replication by quantifying the HBV viral load in the serum of infected persons. HBV DNA is one of the commonly used indicators for assessing the needs of antiviral therapy among chronic hepatitis B patients. In some international guidelines and local guidance on HBV management, treatment initiation is indicated in the presence of active liver disease plus a high HBV DNA level (≥ 20 000 IU/mL for HBeAg-positive patients or ≥ 2 000 IU/mL for HBeAg-negative patients). [16, 17]

Among persons aged 15 – 84 who were tested HBsAg-positive, 17.3% had HBV DNA level ≥ 20 000 IU/mL. The proportion of males having HBV DNA level ≥ 20 000 IU/mL (21.6%) was higher than that for females (13.7%). 31.8% had HBV DNA level ≥ 2 000 IU/mL, and the proportion having HBV DNA level ≥ 2 000 IU/mL was also higher in males (41.8%), as compared with the females (23.6%). 18.9% (22.5% for females and 14.3% for males) had HBV DNA level < 10 IU/mL (not detected) (Table 4.2.2c).

Table 4.2.2c: HBV DNA level (IU/mL) among HBsAg-positive persons aged 15 to 84 by sex

	Female		Male		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
Not detected / < 10	45.7	22.5%	23.6	14.3%	69.3	18.9%
10 – 1 999	109.3	53.9%	72.1	43.8%	181.4	49.4%
2 000 – 19 999	20.0	9.9%	33.3	20.2%	53.4	14.5%
≥ 20 000	27.9	13.7%	35.6	21.6%	63.5	17.3%
Total	**202.9**	**100.0%**	**164.7**	**100.0%**	**367.6**	**100.0%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

Analysing the HBsAg-positive persons aged 15 - 84 by age group, the proportion having HBV DNA level ≥ 20 000 IU/mL was the highest among those aged 15 – 24 (31.4%), followed by those aged 55 – 64 (27.9%). Similar pattern was held for a lower threshold of HBV DNA level, where the highest proportion of persons with HBV DNA level ≥ 2 000 IU/mL was observed among those aged 15 – 24 (48.0%), followed by those aged 55 – 64 (45.4%). The proportion of persons having HBV DNA level < 10 IU/mL (not detected) peaked among those aged 55 – 64 at 23.8%, followed by those aged 65 – 84 (21.7%) (Table 4.2.2d).

Table 4.2.2d: HBV DNA level (IU/mL) among HBsAg-positive persons aged 15 to 84 by age group

	15 - 34		35 - 44		45 - 54		55 - 64		65 - 84		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
Not detected / < 10	-	-	14.9	17.4%	14.4	15.8%	22.1	23.8%	18.0	21.7%	69.3	18.9%
10 – 1 999	8.0	52.0%	47.1	55.2%	50.1	54.8%	28.5	30.8%	47.8	57.6%	181.4	49.4%
2 000 – 19 999	2.5	16.6%	8.6	10.1%	12.1	13.2%	16.2	17.5%	13.9	16.8%	53.4	14.5%
≥ 20 000	4.8	31.4%	14.7	17.3%	14.8	16.2%	25.8	27.9%	3.3	4.0%	63.5	17.3%
Total	**15.3**	**100.0%**	**85.3**	**100.0%**	**91.4**	**100.0%**	**92.6**	**100.0%**	**83.0**	**100.0%**	**367.6**	**100.0%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

4.2.3 Hepatitis B diagnosis coverage

In the household interview, respondents were asked if they had been diagnosed with hepatitis B by a doctor and if they were current carriers. Among persons tested positive for HBsAg in the health examination, 72.9% reported having a history of doctor-diagnosed hepatitis B, with a higher proportion in females (79.0%) than that in males (65.3%). 61.6% reported themselves as current carriers, and the proportion was also higher in females (71.0%) than that in males (50.0%) (Table 4.2.3a).

Table 4.2.3a: Self-reported diagnosis status among HBsAg-positive persons aged 15 to 84 by sex

	Female		Male		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
History of doctor-diagnosed hepatitis B	160.2	79.0%	107.6	65.3%	267.8	72.9%
Reported as current hepatitis B carrier	144.1	71.0%	82.4	50.0%	226.5	61.6%

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*

Notes: *Figures may not add up to the total due to rounding.*

Analysing the HBsAg-positive persons aged 15 – 84 by age group, the proportion who had been diagnosed with hepatitis B by a doctor was the highest among those aged 15 – 34 (83.4%), followed by those aged 55 – 64 (82.9%). The proportion of HBsAg-positive persons reporting themselves as current hepatitis B carriers decreased with increasing age, from 83.4% among those aged 15 – 34 to 42.4% among those aged 65 – 84 (Table 4.2.3b).

Table 4.2.3b: Self-reported diagnosis status among HBsAg-positive persons aged 15 to 84 by age group

	15 - 34		35 - 44		45 - 54		55 - 64		65 - 84		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
History of doctor-diagnosed hepatitis B	12.8	83.4%	64.7	75.9%	68.2	74.7%	76.7	82.9%	45.3	54.6%	267.8	72.9%
Reported as current hepatitis B carrier	12.8	83.4%	58.6	68.7%	59.4	65.0%	60.5	65.3%	35.2	42.4%	226.5	61.6%

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*

Notes: *Figures may not add up to the total due to rounding.*

4.2.4 Hepatitis B treatment coverage

Medical follow-up

Among persons aged 15 – 84 who were tested HBsAg-positive, more than two-thirds (70.1%) did not have any follow-up medical care for their liver disease. The proportion of male not having follow-up (74.1%) was higher than that in females (66.9%). 24.8% of the respondents reported having follow-up in public sector only, while 5.0% reported having follow-up in private sector only (Table 4.2.4a).

Table 4.2.4a: Proportion of HBsAg-positive persons aged 15 to 84, who sought follow-up medical care for liver disease, by sex and healthcare settings

	Female		Male		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
No follow-up	135.7	66.9%	122.1	74.1%	257.8	70.1%
Public only	60.6	29.9%	30.8	18.7%	91.3	24.8%
Private only	6.6	3.3%	11.8	7.2%	18.5	5.0%
Both public and private	-	-	-	-	-	-
Total	**202.9**	**100.0%**	**164.7**	**100.0%**	**367.6**	**100.0%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

Analysing the HBsAg-positive persons aged 15 – 84 by age group, the proportion having no follow-up medical care for their liver disease was the highest among those aged 15 – 34 (83.7%) and generally decreased with increasing age to 62.0% among those aged 55 – 64, but increased to 75.0% among those aged 65 – 84. The proportion of having follow-up in public sector increased from 24.5% among those aged 35 – 44 to 30.9% among those aged 55 – 64 and decreased to 20.6% among those aged 65 – 84. Whereas, among those below the age of 35, none had follow-up in public sector and 16.3% were followed up in private sector only (Table 4.2.4b).

Table 4.2.4b: Proportion of HBsAg-positive persons aged 15 to 84, who sought follow-up medical care for liver disease, by age group and healthcare settings

	15 - 34		35 - 44		45 - 54		55 - 64		65 - 84		Total	
	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases	No. of persons ('000)	% among the cases
No follow-up	12.8	83.7%	61.4	71.9%	63.9	70.0%	57.5	62.0%	62.2	75.0%	257.8	70.1%
Public only	-	-	20.9	24.5%	24.7	27.0%	28.6	30.9%	17.1	20.6%	91.3	24.8%
Private only	2.5	16.3%	3.0	3.5%	2.8	3.1%	6.5	7.1%	3.6	4.4%	18.5	5.0%
Both public and private	-	-	-	-	-	-	-	-	-	-	-	-
Total	**15.3**	**100.0%**	**85.3**	**100.0%**	**91.4**	**100.0%**	**92.6**	**100.0%**	**83.0**	**100.0%**	**367.6**	**100.0%**

Base: *Respondents who were HBsAg-positive (Size of representing population = 367 600)*
Notes: *Figures may not add up to the total due to rounding.*

Antiviral therapy

There were 13.5% of HBsAg-positive persons aged 15 – 84 having received antiviral therapy from a western medical practitioner, with a higher proportion in males (16.4%) than that in females (11.1%) (Table 4.2.4c).

Table 4.2.4c: Proportion of HBsAg-positive persons aged 15 to 84, who had ever received antiviral therapy from a doctor (western medical practitioner), by sex

	No. of persons ('000)	% among the cases
Female	22.6	11.1%
Male	27.1	16.4%
Total	**49.7**	**13.5%**

Base: Respondents who were HBsAg-positive (Size of representing population = 367 600)
Notes: Figures may not add up to the total due to rounding.

Analysing the HBsAg-positive persons aged 15 – 84 by age group, the proportion having received antiviral therapy from a western medical practitioner increased from 0% among those aged 15 – 34 to the peak at 19.8% among those aged 45 – 54 and decreased gradually to 8.4% among those aged 65 – 84 (Table 4.2.4d).

Table 4.2.4d: Proportion of HBsAg-positive persons aged 15 to 84, who had ever received antiviral therapy from a doctor (western medical practitioner), by age group

Age group	No. of persons ('000)	% among the cases
15 - 34	-	-
35 - 44	11.6	13.6%
45 - 54	18.1	19.8%
55 - 64	13.0	14.0%
65 - 84	7.0	8.4%
Total	**49.7**	**13.5%**

Base: Respondents who were HBsAg-positive (Size of representing population = 367 600)
Notes: Figures may not add up to the total due to rounding.

4.3 Hepatitis C

4.3.1 Prevalence of hepatitis C

Similar to HBV infection, infection with HCV can cause both acute and chronic hepatitis. The prevalence of HCV infection can be assessed by measuring the positivity rate of tests for serologic (anti-HCV) or virologic marker (HCV RNA) for HCV in the population concerned.

Anti-HCV is a serologic marker for past exposure to HCV. A positive anti-HCV result indicates that the individual has ever had HCV infection, without distinction between past or active (viremic) infection. People, whose HCV infection is resolved following spontaneous viral clearance or who have been cured after HCV treatment, would still test positive for anti-HCV. Nevertheless, prevalence of anti-HCV has long been used as a surrogate for prevalence of HCV infection in many public health studies, in view of a substantial proportion of infected persons developing chronic infection, lack of effective treatment in the past and limited access to confirmatory RNA test.

Overall, the prevalence of positive anti-HCV cases was 0.32% (95% CI: 0.14% – 0.71%) among persons aged 15 – 84. The prevalence was similar between females (0.43%; 95% CI: 0.16% – 1.14%) and males (0.20%; 95% CI: 0.05% – 0.79%) (Table 4.3.1a). Among those tested positive for anti-HCV in the health examination, none was tested positive for HBsAg.

Table 4.3.1a: Prevalence of anti-HCV among persons aged 15 to 84 by sex

	No. of persons ('000)	Prevalence (%)	95% CI
Female	13.4	0.43%	0.16% - 1.14%
Male	5.6	0.20%	0.05% - 0.79%
Total	**19.0**	**0.32%**	**0.14% - 0.71%**

Base: *All respondents (Size of representing population = 5 959 700)*
Notes: *CI: confidence interval*
Figures may not add up to the total due to rounding.

To determine whether one has an active (viremic) HCV infection, test for HCV RNA is needed, usually following a positive test for anti-HCV. An individual with detectable HCV RNA indicates an active (viremic) HCV infection.

The overall prevalence of viremic HCV infection (HCV RNA detected) was 0.26% (95% CI: 0.11% – 0.63%) among persons aged 15 – 84. The prevalence was also similar between females (0.32%; 95% CI: 0.10% – 1.00%) and males (0.20%; 95% CI: 0.05% – 0.79%) (Table 4.3.1b).

Table 4.3.1b: Prevalence of viremic HCV infection among persons aged 15 to 84 by sex

	No. of persons ('000)	Prevalence (%)	95% CI
Female	10.1	0.32%	0.10% - 1.00%
Male	5.6	0.20%	0.05% - 0.79%
Total	**15.7**	**0.26%**	**0.11% - 0.63%**

Base: All respondents (Size of representing population = 5 959 700)
Notes: CI: confidence interval
Figures may not add up to the total due to rounding.

Analysed by age group, the prevalence of viremic HCV infection was the highest at 0.43% among those aged 40 – 64, followed by that among those aged 65 – 84 (0.31%) (Table 4.3.1c).

Table 4.3.1c: Prevalence of viremic HCV infection among persons aged 15 to 84 by age group

Age group	No. of persons ('000)	Prevalence %
15 - 39	-	-
40 - 64	12.0	0.43%
65 - 84	3.7	0.31%
Total	**15.7**	**0.26%**

Base: All respondents (Size of representing population = 5 959 700)
Notes: Figures may not add up to the total due to rounding.

In the household interview, respondents were asked if they had been diagnosed with viral hepatitis by a doctor and if they were current carriers. Among persons found to have viremic HCV infection in the health examination, none reported to have doctor-diagnosed viral hepatitis.

Among persons aged 15 – 84 and tested positive for HCV RNA, the majority (59.2%) were infected by HCV genotype 1b. While 19.9% were infected by HCV genotype 2, and 20.9% were infected by HCV genotype 6 (Table 4.3.1d). The viral load among those tested positive for HCV RNA ranged from 523 000 IU/mL to 6 150 000 IU/mL.

Table 4.3.1d: HCV genotype distribution among persons aged 15 – 84 and tested positive for HCV RNA

Genotype	No. of persons ('000)	% among the cases
1b	9.3	59.2%
2	3.1	19.9%
6	3.3	20.9%
Total	**15.7**	**100.0%**

Base: *Respondents tested positive for HCV RNA (Size of representing population = 15 700)*
Notes: *Figures may not add up to the total due to rounding.*

4.4 Hepatitis E

Infection with HEV usually causes acute hepatitis only, and rarely leads to chronic hepatitis. Similar to hepatitis A, hepatitis E epidemiology is also assessed by measuring the prevalence of antibodies against the specific hepatitis virus (anti-HEV) at population level, which may have implications on the past exposure to HEV in the community. A positive test result of anti-HEV indicates a past or present HEV infection.

Majority of persons aged 15 – 84 (90.0%) were anti-HEV-negative. The prevalence of anti-HEV-positive cases was 5.5% (5.2% for females and 5.9% for males), while 4.5% was tested borderline for anti-HEV (4.2% for females and 4.8% for males) (Table 4.4a).

Table 4.4a: Prevalence of anti-HEV among persons aged 15 to 84 by sex

	Female		Male		Total	
	No. of persons ('000)	**%**	**No. of persons ('000)**	**%**	**No. of persons ('000)**	**%**
Negative	2 839.8	90.6%	2 521.6	89.3%	5 361.4	90.0%
Borderline	131.9	4.2%	136.6	4.8%	268.5	4.5%
Positive	163.3	5.2%	166.5	5.9%	329.8	5.5%
Total	**3 135.0**	**100.0%**	**2 824.7**	**100.0%**	**5 959.7**	**100.0%**

Base: *All respondents (Size of representing population = 5 959 700)*
Notes: *Figures may not add up to the total due to rounding.*

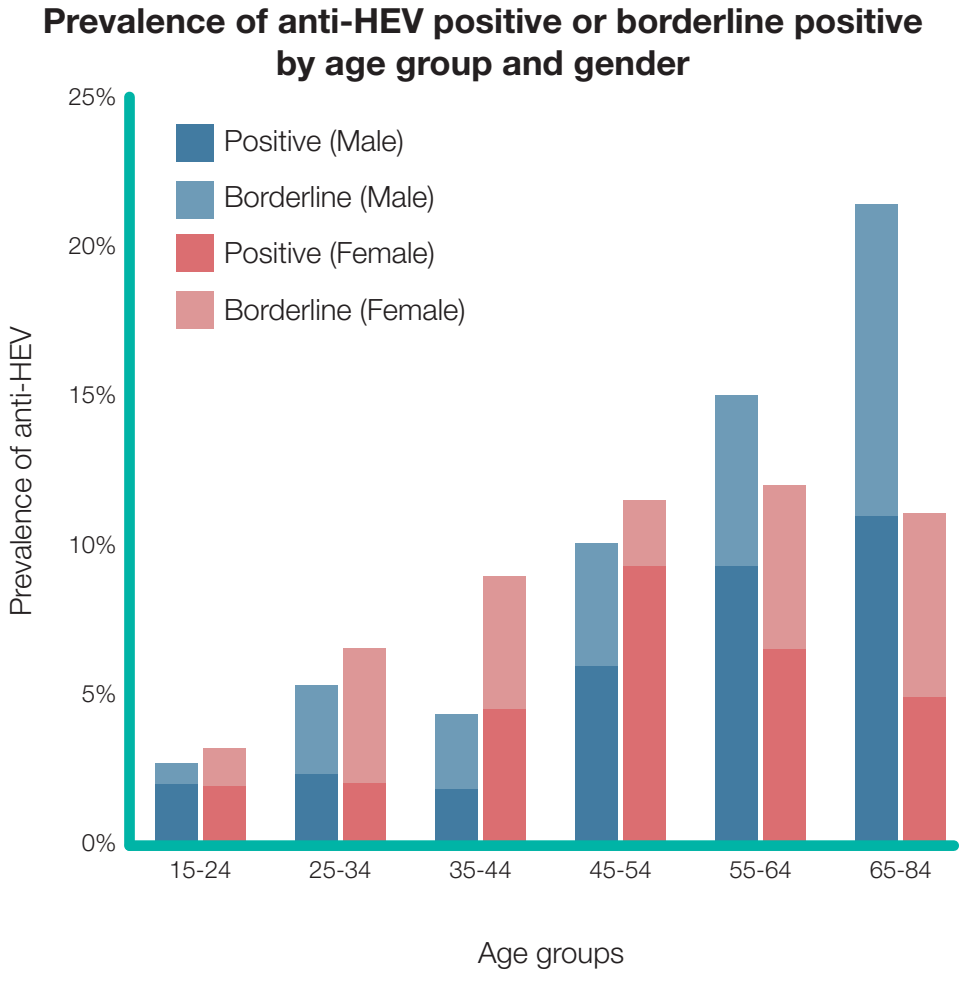
Analysed by age group, the prevalence of anti-HEV positive cases generally increased with age, from 1.9% for those aged 15 – 24 to 7.7% for those aged 45 – 84. The proportion that tested borderline for anti-HEV also increased with age, from 0.9% for those aged 15 – 24 to 8.1% for those aged 65 – 84 (Table 4.4b).

Table 4.4b: Prevalence of anti-HEV among persons aged 15 to 84 by age group

	15 - 24		25 - 34		35 - 44		45 - 54		55 - 64		65 - 84		Total	
	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%	No. of persons ('000)	%
Negative	563.1	97.2%	841.1	94.2%	942.7	93.3%	967.7	89.4%	1 052.5	86.8%	994.3	84.2%	5 361.4	90.0%
Borderline	5.4	0.9%	33.0	3.7%	35.4	3.5%	32.3	3.0%	66.9	5.5%	95.5	8.1%	268.5	4.5%
Positive	11.0	1.9%	18.8	2.1%	32.5	3.2%	83.1	7.7%	92.8	7.7%	91.5	7.7%	329.8	5.5%
Total	**579.5**	**100.0%**	**892.9**	**100.0%**	**1 010.7**	**100.0%**	**1 083.0**	**100.0%**	**1 212.3**	**100.0%**	**1 181.3**	**100.0%**	**5 959.7**	**100.0%**

Base: All respondents (Size of representing population = 5 959 700)

Notes: Figures may not add up to the total due to rounding.



Chapter 5 Discussion

This survey provides essential information for compiling three of the twelve local indicators for monitoring the progress towards WHO's goal of eliminating viral hepatitis as a public health threat by 2030, namely prevalence of chronic HBV infection, prevalence of chronic HCV infection, and people living with HBV and/or HCV diagnosed. [9]

Burden of hepatitis B

Based on HBsAg test results in this survey, prevalence of hepatitis B among land-based non-institutional population aged 15 - 84 in Hong Kong, excluding foreign domestic helpers and visitors, was 6.2%, and the corresponding number of hepatitis B cases was estimated at 367 600. From a surveillance point of view, a single HBsAg positive test result in this survey is considered as a case of chronic HBV infection [18], though two positive HBsAg results at least 6 months apart may be required to confirm the diagnosis of chronic infection in clinical settings. It is anticipated that the chance of picking up a chronic infection, which can last for decades, would be much higher than catching an acute infection that usually lasts for a few weeks only.

This survey suggested a further reduction of HBsAg prevalence in the general population (6.2% in population aged 15 – 84), as compared with that found in Community Research Project on Viral Hepatitis conducted in 2001 (8.8%) and a territory-wide seroprevalence study conducted in 2015 – 16 (7.2% after adjustment for age and sex). [11, 19] The survey finding is largely consistent with another seroprevalence study conducted in 2018 – 20, which showed an HBsAg prevalence at 6.3% among the general population of all ages. [20] It is also consistent with the general downward trend observed in HBsAg surveillance in communities without apparent risk of contracting HBV (e.g. blood donors and pregnant women) in Hong Kong over the past few decades. [11]

This survey provides updated information on age and sex distribution of the HBsAg seroprevalence. The HBsAg prevalence was much higher in older adults, as compared with those aged below 35. While less than 1% of population aged below 35 were HBsAg-positive due to universal childhood immunisation launched in November 1988 in Hong Kong, the prevalence in older age groups ranged between 7.0% and 8.4%, lower than but comparable to the historical prevalence in 1970s at about 10%. [21] The range of HBsAg prevalence in older adults in this survey was also in line with the findings in recent seroprevalence studies (7.3% - 10.9% among participants aged 36 or above in the study conducted in 2015 – 16 [19]; 8.4% among participants who were born in or before 1990 in the study conducted in 2018 – 20 [20]). In contrast, there was a significant reduction in the HBsAg prevalence among the younger adults aged below 35, who were mostly born after the implementation of a series of interventions initiated in 1980s for preventing MTCT of HBV. These MTCT prevention strategies have substantially reduced new HBV infection in the younger generation.

This survey also found a slightly higher HBsAg prevalence in females, an observation that was different from the epidemiological patterns found in some older seroprevalence studies [11, 19] but consistent with the latest seroprevalence study conducted in 2018 – 20. [20] The exact reasons for the sex difference in HBsAg prevalence, especially among those aged 35 and 54, could not be determined by this survey mainly due to the unavailability of information on some key risk factors, such as place of birth, HBV carriage status of family members and history of hepatitis B vaccination.

Diagnosis of HBV infection is the gateway for access to treatment and care services, forming a crucial component for effective response to the public health burden posed by hepatitis B. [22] As chronic HBV infection is usually asymptomatic, the infected persons may be unaware of it and remain undiagnosed, missing the opportunity of timely treatment to prevent hepatitis B complications. This would certainly undermine the effort on reducing HBV-related morbidity and mortality. This survey showed that only 61.6% HBsAg-positive participants reported themselves as HBV carrier. The percentage is similar to the finding in a local study conducted in 2018-20 (61.9%) [20] and higher than that in another study conducted earlier in 2015 – 16 (47.6%). [19] Furthermore, this survey found a higher proportion of female HBsAg-positive participants being able to report themselves as HBV carrier (71.0% in females and 50.0% in males). Whether this sex difference was associated with a higher health consciousness, awareness of hepatitis B or difference in testing opportunities in females (e.g. universal antenatal screening for hepatitis B), or other factors, requires further investigation. Overall, enhanced effort is needed to meet the target of 90% of HBV-infected persons being diagnosed by 2030. [12, 13]

For assessing the hepatitis B treatment coverage, this survey reveals that 13.5% of HBsAg-positive participants had ever received antiviral therapy. The treatment uptake was much higher than the situation in Western Pacific Region, where less than 2% (1.4 million) and about 5% (5.6 million) of people living with HBV infection received treatment in 2015 and 2019 respectively. [6, 23] Notably, the monitoring and evaluation of treatment coverage shall take into account of the prevailing treatment eligibility per clinical guidelines and practice. A systematic review and meta-analysis found a pooled estimate of eligibility for treatment, according to WHO or any other guidelines, at 19%, ranging from 12% for studies in community settings to 25% in clinic settings. [24] While thorough assessment for hepatitis B treatment eligibility for each participating individuals was not one of the purposes in this survey, the proportion of participants having high viral load found in the health examination may shed light on the size of population aged 15 – 84 requiring hepatitis B antiviral therapy. A rough estimation of the proportions of participants requiring hepatitis B antiviral therapy may possibly be somewhere between 17.3% (HBV DNA ≥ 20 000 IU/mL) and 31.8% (HBV DNA ≥ 2 000 IU/mL), without taking into account of one's treatment status and presence of active liver disease. Yet, without concrete information on the proportion eligible for HBV treatment, this survey is unable to provide a directly comparable estimate for evaluating the progress towards the target of 80% eligible persons with HBV infection treated by 2030. [12, 13]

Although only a proportion of people living with chronic HBV infection are indicated for antiviral therapy, essentially all of them require long-term medical care for monitoring their hepatitis B conditions. However, this survey found that over 70% of HBsAg-positive participants not having any medical follow-up in either the public or private sector. Even excluding about 40% of HBsAg-positive participants who were unaware of their carrier status, there was a substantial proportion of people with hepatitis B, who knew their infection status but did not have any medical follow-up for their liver disease. This missing linkage-to-care situation warrants further attention for necessary actions.

Burden of hepatitis C

The survey found that, among land-based non-institutional population aged 15 – 84 in Hong Kong, excluding foreign domestic helpers and visitors, 0.32% had ever had HCV infection (positive for anti-HCV) and 0.26% were currently having viremic HCV infection (positive for HCV RNA), with an estimated 15 700 HCV cases correspondingly. The anti-HCV prevalence observed in this survey is largely consistent with the findings in previous local seroprevalence studies conducted between 1988 and 2016 (0.3% - 0.5%), suggesting a consistently low prevalence of HCV infection in the general population of Hong Kong over the past few decades. [11, 19, 25] This anti-HCV prevalence is much lower than that in groups with apparent risk of HCV infection, such as new HIV/AIDS patients (3 – 4 %) [11] and persons who inject drugs (PWID) (>60%). [26]

The overall prevalence of viremic HCV infection at 0.26% was comparable to that in the latest seroprevalence study conducted in 2015 – 16 (0.3%). [19] It was the highest among those aged 40 – 64 (0.43%), in line with the epidemiological patterns reported in other local studies. For example, the mean age of HCV RNA-positive participants in the prevalence study conducted in 2015 – 16 was 54.2 years for males and 56.0 years for females. [19]

The minor difference in prevalence between anti-HCV (0.32%) and HCV RNA (0.26%) implies that the majority of anti-HCV-positive cases in the general population aged 15 – 84 were having viremic HCV infection, despite the availability of effective DAA treatment. The survey found that none of the respondents having viremic HCV infection was aware of their infection status, and thus none had received HCV treatment. Diagnosing hepatitis C for treatment in groups with unknown risk of HCV infection has known to be challenging, as a local study reported that identifiable route of HCV transmission could not be traced in up to 70% of HCV-positive blood donors. [27]

This survey found that the most common HCV genotype was 1b (59.2%), followed by genotype 6 (20.9%) and genotype 2 (19.9%), among the general population aged 15 – 84. The distribution of HCV genotypes was also comparable to those reported in previous territory-wide studies. In the prevalence study conducted in 2015 – 16, the top three HCV genotypes were 1b (37.9%), 6 (34.5%) and 2 (13.8%), while the majority of HCV cases in public hospitals between January 2005 and March 2017 belonged to genotype 1 (48.8%) and 6 (33.6%) in another population-based study. [19, 28]

Burden of hepatitis A and E

Regarding hepatitis A, this survey shows that the overall prevalence of anti-HAV positive cases, which usually signifies past infection or active immunisation, was 58.7% among persons aged 15 – 84, similar to that (52.2%) in a seroprevalence study conducted in 2015 - 16. Only 5.7% of the participants of health examination reported hepatitis A vaccination history, at the similar level of vaccination coverage reported in studies conducted in 2001 (7.9%) and 2015 – 16 (5.9%) respectively. [19, 29] The much higher anti-HAV prevalence in the community in comparison with the hepatitis A vaccination coverage implies most of the anti-HAV-positive cases acquired the immunity via natural infection.

The prevalence of anti-HAV increased with age, and this pattern was consistent with the aging cohort effect as suggested from a series of past epidemiological studies. This survey reported an anti-HAV prevalence as high as 95.1% among those aged 65 – 84 and 74.2% among those aged 55 – 64. In comparison, an anti-HAV prevalence exceeding 80% could be observed in adults of younger age in earlier studies, for example in those aged 56 or above in the study conducted in 2015 – 16 and in those aged 41 or above in the study conducted in 2001. [19, 29] These findings signify the right shifting of the age-specific prevalence of anti-HAV over the years. In contrast, the anti-HAV prevalence was consistently low among the young adults aged below 30 (30.9% among those aged 15 – 24 in this survey; < 30% among those aged 35 or below in the study conducted in 2015 – 16; 19.7% among those aged below 30 in the study conducted in 2001). [19, 29] An overall interpretation of the above aging pattern of anti-HAV positivity suggests a low activity of circulating HAV in the community and a much lower endemicity of hepatitis A nowadays.

For hepatitis E, the prevalence of anti-HEV positive cases, which usually signifies past infection, was 5.5%. Similar to HAV, the prevalence increased with age. Other previous local studies showed prevalence of anti-HEV ranging from 15.8 - 32.0% [19, 30, 31], however, it is important to note that the anti-HEV detection method used in PHS 2020-22 differs from that used in the previous studies. Direct comparison of the results is not appropriate due to the different detection limits.

Limitations

The household interview sampling was conducted using a systematic replicated method, utilizing the Frame of Quarters maintained by the C&SD. While this method can generate a representative sample of the local population, there may be a potential consent bias in recruiting participants for health examination. Individuals with a higher health awareness might have been more inclined to participate in the survey and health examination. The sampling frame of PHS 2020-22 only included land-based non-institutional local residents in the age range of 15 – 84, amounting to about 5.96 million, out of a total of 7.4 million Hong Kong population of all ages. Therefore, the results may not reflect accurately the situation of local people outside this sampling frame.

In this survey, information on diagnosis of hepatitis and carrier status, vaccination history and healthcare utilization, are provided by self-report instead of medical records. It would be prone to recall bias from unequal memory of the situation in minds of the respondents and other information bias, systematically or non-systematically.

For other general limitations of the PHS 2020-22, please refer to the main survey reports available at https://www.chp.gov.hk/en/features/37474.html.

Conclusion

The PHS 2020-22 is an important tool to provide the epidemiological information of viral hepatitis among the general population, complementing other existing surveillance mechanisms, which focus on specific high-risk groups or rely on opportunistic screening. [11] Findings from periodic seroprevalence studies of chronic viral hepatitis in the general population, preferably through a consistent and systematic approach, can provide up-to-date information for estimating prevalence of chronic infections and monitoring trend in populations without apparent risk of infection. [18] Such epidemiological information could inform policy formulation and implementation for prevention and control of viral hepatitis in the general public.

Continual and regular monitoring through measurement of the local indicators is important to gauge the progress towards the WHO targets. Previously, Hong Kong was verified to have achieved the goal of hepatitis B control by the WHO in 2011, signified by reducing the HBsAg prevalence among children aged 5 years or older to less than 1%, a goal set by WHO Western Pacific Regional Office. [32] Nevertheless, for the 2030 WHO global targets of eliminating viral hepatitis as a public health threat, further work on strengthening surveillance, as well as enhancing diagnosis and treatment coverage, is still needed. [12, 13, 23]

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Abbreviations

Anti-HAV:	Antibody against hepatitis A virus
Anti-HCV:	Antibody against hepatitis C virus
Anti-HEV:	Antibody against hepatitis E virus
CI:	Confidence interval
COVID-19:	Coronavirus disease 2019
C&SD:	Census and Statistics Department
DAA:	Direct-acting antiviral
DH:	Department of Health
DNA:	Deoxyribonucleic acid
HAV:	Hepatitis A virus
HBV:	Hepatitis B virus
HBeAg:	Hepatitis B envelope antigen
HBsAg:	Hepatitis B surface antigen
HCV:	Hepatitis C virus
HDV:	Hepatitis D virus
HEV:	Hepatitis E virus
HIV/AIDS:	Human immunodeficiency virus/ acquired immunodeficiency syndrome
MTCT:	Mother-to-child transmission
PHS:	Population Health Survey
PWID:	Persons who inject drugs
RNA:	Ribonucleic acid
WHO:	World Health Organization

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