Surveillance of Viral Hepatitis in Hong Kong

- 2013 Update Report

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The information contained in this Report is up to year 2013 for the surveillance data, service statistics and published research findings.

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CONTENTS

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1. COMMENTARY

Surveillance Mechanisms of Viral Hepatitis in Hong Kong

1. Similar to many other places worldwide, viral hepatitis is a statutory notifiable disease in Hong Kong. Locally, voluntary reporting was started in as early as 1966 and, since 1974, the disease has become notifiable. It was not until 1988 that the reported cases are classified by viral etiology, namely hepatitis A, hepatitis B, non-A non-B hepatitis and unclassified hepatitis. Since 1996, non-A non-B hepatitis is further categorized into hepatitis C, hepatitis E and hepatitis (not elsewhere classified). Under the current reporting system, hepatitis A and B are defined by the presence of IgM anti-HAV and IgM anti-HBc respectively, whereas hepatitis C and E are diagnosed by positive tests for anti-HCV and anti-HEV.

2. Expectedly, virtually all of the notified cases were acute viral hepatitis. While the figures captured under the local system could be a good reflection of the acute disease burden of viral hepatitis, the extent of chronic infections resulting from some hepatitis, notably hepatitis B and C, has to be determined by other mechanisms. Insight of the epidemiology of various forms of hepatitis in Hong Kong can be gained by an analytical interpretation of regular statistics collected by health care or other institutions, and the information generated from designated studies. This Report presents the latest findings from collation and analysis of viral hepatitis data obtained from the disease notification system, service statistics, seroprevalence studies and other research findings. Much hopeful that the local viral hepatitis picture can be painted accurately and fully, this is certainly limited by the nature and availability of data. The presence of biases in data per se and their interpretation need to be acknowledged in reading this Report.

Changing Epidemiology of HAV and HEV

3. Hepatitis A virus (HAV) and hepatitis E virus (HEV) are both transmitted by faecal-oral route, albeit their different local epidemiology in the past two decades. Hong Kong is of intermediate endemicity for HAV [1, 2]. Since 1988 with the breakdown of reported hepatitis according to etiologic agents, the largest epidemic of hepatitis A occurred in 1992, with over 3,500 cases reported to the Department of Health (DH) (Box 1). This represents a notification rate of 63 per 100,000 population (Box 4) and since then, a gradual declining trend in HAV incidence has been observed. In 2013, only 44 cases of acute hepatitis A were reported (Box 1). Overall, case fatality rates from hepatitis A had been low and ranged between 0 and 0.7% (Box 4). A seasonal pattern of acute hepatitis A is present, with cases more commonly reported between January and May each year. Over the years, there is an overall increase in age, with decrease in the proportion of 15-24 age group people but increase in those over 35 years old (Box 5). The discernible decline in hepatitis A led to a parallel declining trend in overall reported viral hepatitis since 2002 (Box 3).

4. An analysis was made by the Surveillance and Epidemiology Branch (SEB) of Centre for Health Protection (CHP), DH on the 227 HAV cases notified between 2003 and 2004. The incidence rates were 1.57 per 100,000 in 2003 and 1.78 per 100,000 in 2004, which were lower than the rates in Mainland China (7.4 per 100,000 in 2003 and 6.9 per 100,000 in 2004). The male to female ratio was 1.83 to 1. There were five clusters of hepatitis A infection involving 2 persons in each cluster. No large single source outbreak was identified. During that period, 17 cases were classified as imported cases, with 8 from Mainland China, and the remaining from Asian and South-east Asian countries such as Indonesia, Pakistan and Thailand. One hundred and thirty-three (58.6%) required hospitalization. Patients were hospitalized for an average of 5.5 days, with a range of 1 to 25 days and a median stay of 5 days. Out of the 227 cases, 154 (67.8%) were in the working population. The majority of those affected was plant and machine operators and assemblers (34%) or were working in elementary occupations (26%). One hundred forty-two cases (63%) had history of consumption of marine products, of which 128 had eaten shellfish.

5. From the available data, prevalence of hepatitis A infection has been falling in Hong Kong, which echoes the finding of a higher median age in reported HAV cases that reflects the increased susceptibility of the adult population. In a local household study conducted in 2001, (Community Research Project for Viral Hepatitis 2001, CRPVH), anti-HAV positivity was less frequent ($P<0.001$) across all age groups among subjects >21 years old [2] than subjects in the same age groups of another

study conducted in late 1980s [3]. HAV prevalence has only increased insignificantly in every 10-year age groups of people aged 21-50 when compared with their corresponding 10-year younger age groups, signifying an aging cohort effect with no major infections in the last 10 years in that study [2]. Similar conclusions can be drawn when comparing the late 1980s findings with those of a late 1970s study on local HAV seroprevalence [4]. Overall, these 3 studies suggest that age-specific prevalence of HAV has right-shifted locally since 1980s. As of 2001, anti-HAV was present in about 20% of adults below 30 years old while it was over 80% in people aged >=40 years in the general Chinese population (Box 9). Data from a serosurvey in 2010 on 691 subjects with blood collected for conditions unrelated to hepatitis [unpublished data of DH, Box 10] found that anti-HAV was present in more than 60% of adults aged over 40 years. Besides an increasing prevalence with higher age, people born outside Hong Kong were more likely to test positive for anti-HAV whereas the reverse was true for people of non-labour work [2]. From the telephone interview part of the CRPVH 2001, some 11% of 4,564 subjects reported a history of HAV vaccination, with about 80% of which completed the course. More people less than 40 years old had received the vaccination. Over 98% had the cost paid by them or covered by their employers.

6. Cross-sectional surveys of anti-HAV at Kowloon Bay Integrated Treatment Centre (ITC), the HIV specialist clinic under Department of Health, have been started since 2007. The subjects consisted of all new HIV/AIDS patients who first attended ITC between Jul 2007 and 2013 and convenient samples of all active HIV/AIDS patients who first attended ITC before Jul 2007 (Box 11). It appeared that the prevalence of anti-HAV increased with age of HIV/AIDS patients, and the overall positivity rate among these patients tested between 2007 and 2013 appeared to be comparable with that of the 2010 serosurvey data. Confounding factors, such as different levels of past infection, immunodeficiency in HIV patients, history of HAV vaccination and difference in years of testing, may have affected the results. As compared with patients infected HIV via other routes, those infected via homosexual or bisexual routes were at the highest risk of hepatitis A infection, as reflected by the lowest level of anti-HAV prevalence in this group of patients (Box 12). Though this could be partially explained by the larger proportion of younger patients aged <40 years infected HIV via homosexual or bisexual routes, this finding may shed light on the clinical management regarding recommendation on hepatitis A vaccination in HIV/AIDS patients.

7. Hepatitis E appeared to run an opposite trend to hepatitis A over the last decade. The annual notification of hepatitis E infection jumped from 11 in 1996 to a record high of 150 in 2012 (Box 1). Though the number of reported cases in 2013 was down to 90, Hepatitis E remained the most common viral hepatitis reported to Department of Health from 2010 onwards. Seasonal pattern was observed with the peak season in February to May (Box 13), indicating that the infection was more common during winter and spring seasons. Of 934 cases reported, 625 (66.9%, Box 14) were male, giving male to female ratio of 2:1. The majority were adults, with the highest notification rate at 55-64 years age group, followed by 45-54 years old (Box 15). The death rate could be as high as 0.44 per million population as in 2002 (Box 16).

8. In the CRPVH study conducted in 2001, 18.8% of adult subjects were found to have serologic evidence of HEV infection. People in the 40-49 years age group had the highest positivity rate of 24.1% (Box 17). A more recent local seroprevalence study on anti-HEV using serum 450 samples submitted for virological investigation in 2008-2009 in a local hospital found a higher rate of HEV IgG seropositivity [5]. The HEV IgG seropositivity rate increased from 8% among 1-10 years old to >56% among those aged over 80. The overall seropositivity rate was higher among male than female (32.9% vs 24.4%, p=0.048). Despite the limitations of small sample size and bias sampling in this study, the finding of an overall increase in the seropositivity rate is compatible with the changing local epidemiology of Hepatitis E notified to Department of Health in recent years.

9. Similar rising trend of hepatitis E infection was observed in neighbouring areas including mainland China, Singapore and Japan. According to the Ministry of Health of mainland China, the number of cases of hepatitis E infection increased from 15,965 in 2004 to 20,854 in 2009. Similarly in Singapore, the Ministry of Health recorded 90 cases in 2009, compared to the 5-year median number of 30 cases between 2004 and 2008. In Japan, the Infectious Disease Surveillance Centre reported 56 cases of hepatitis E in 2007, compared with 3 cases in 2000 [6].

10. The Centre for Health Protection reviewed all Hepatitis E cases recorded between 2001 to 2010 [7]. Of the 524 cases, the commonest presentations were tea-coloured urine, jaundice, anorexia, fever, myalgia and nausea. 78.2% were hospitalized with a median stay of 7 days. A total of 12 cases were fatal (9 males and 3 females), age ranged from 53 to 82 (median age 67.5 years). The case fatality rate was 2.3%, which was comparable with reported figures from other countries. None of the fatal cases were pregnant. Most cases (99.4%) were sporadic infection

and 87.4% acquired the disease locally. A small family cluster involving 2 males (aged 15 and 44 years) was identified. The 2 victims had shared multiple high-risk food items at home during the incubation period. It proved difficult to determine the exact source of infection of individual sporadic cases as hepatitis E has a long incubation period of 15-64 days. Nonetheless, epidemiological investigation has not identified any outbreak linked to a particular food premises.

11. In view of the rising trend of infections, the Centre for Health Protection analysed the 93 cases of acute hepatitis E reported from January to August, 2011 [8]. The male: female ratio was 1.82:1. Hospitalization was required in 80% of the cases and the median length of stay was 7 days. One of them was a pregnant woman who recovered uneventfully. All cases were sporadic infections, except for an elderly couple who shared most of their meals. None of the cases was related to outbreak involving food premises. A significant proportion of the victims recalled consuming pig offals (45%) and shellfish (33%) during the incubation period. Among the 60 viruses sequenced by the Public Health Laboratory in 2011, 59 belonged to genotype 4.

12. Another published study identified differences in epidemiology and clinical features between sporadic hepatitis E and hepatitis A cases. Of 105 acute hepatitis A and 24 hepatitis E patients seen at Princess Margaret Hospital (PMH) in 2002, HAV patients were significantly younger (median age of 27 years) and had recent history of shellfish consumption while HEV patients were older (median age = 53 year) and most had a recent travel history. Moreover, whereas hepatitis A was milder and recovery was uneventful, hepatitis E was more severe, associated with significant mortality and frequently complicated by protracted coagulopathy and cholestasis [9].

13. A local study examined the genotype of 57 patients with acute HEV infection who were admitted to Prince of Wales Hospital (PWH). Fifty-six patients (98%) were Chinese. All cases were sporadic. No fulminant hepatitis was recorded and all patients recovered. Phylogenetic analyses of the open reading frame ORF2 fragments from 46 patients and ORF1 fragments from 33 patients showed complete agreement, with most (n= 45 [98%]) belonging to genotype 4. The remaining isolate was genotype 3 obtained from a woman who had no history of travel. Most of the Hong Kong isolates clustered closely with a swine isolate reported from Guangxi Province, China[10].

14. Apart from pregnancy, coinfection with chronic Hepatitis B virus might be associated with more fulminant clinical outcome in patients infected with Hepatitis E. Among 3 cases of serious infection of Hepatitis E reported to Department of Health in

the first two months of 2012, two patients who were also tested positive for hepatitis B died [11]. Moreover, a 10-year retrospective study on acute Hepatitis E in local hospitals showed that chronic HBV carriers with acute Hepatitis E were found to have higher liver failure rate, liver-related mortality and all-cause mortality, though the association was not statistically significant [12].

15. There is evidence suggesting a zoonotic source of Hepatitis E in overseas studies, and that pigs may be an important reservoir. In light of these observations, the Centre for Food Safety conducted a risk assessment study titled “Hepatitis E Virus in Fresh Pig Livers” [13] to determine the HEV prevalence in fresh pig liver samples obtained in local markets. One hundred fresh pig liver samples were collected from pigs slaughtered between mid-January to May. Sixteen (31%) out of 51 roaster pig (around four months old) liver samples were positive for HEV, while none of the 49 porker pig (around six months old) liver samples tested positive. Partial sequences of some HEV isolates from roaster pigs were identical to those from 7 among 48 local human cases with date of onset from January to July 2009, as well as local cases recorded in the past. The findings suggest the possibility of roaster pigs as one of the sources of local human hepatitis E infections.

Pattern of Hepatitis B in Various Communities and its Significance

16. Parenterally-transmitted viral hepatitis B resulting in chronic infection state is endemic in Hong Kong. The number of reported acute hepatitis B virus (HBV) infections has been decreasing over the last decade, from 121 cases reported in 2002 to 40 cases reported in 2013 (Box 1). In an epidemiologic study of acute HBV by the Department of Health and Hong Kong Red Cross Blood Transfusion Service (HKRCBTS), 149 of 351 eligible subjects recruited from 2000 to 2003 participated in risk factor assessment with or without blood screening. Repeat blood donors who tested positive for HBsAg for the first time and were then confirmed IgM anti-HBc positive were reported as having acute HBV. There were 43 such clients, yielding an incidence rate of HBV seroconversion in repeat donors as 9.4/100,000 (n=148,366), 9.3/100,000 (n=150,420), 4.6/100,000 (n=151,410) and 3.5/100,000 (n=143,230) in 2000, 2001, 2002 and 2003 respectively. Nearly 70% of the study subjects were male; 99% were Chinese and the mean age was 31 years. Over half could not have risk factor of acute HBV determined despite undergoing a standardized questionnaire interview by nurses. Sexual contact was assessed to be the commonest risk (85%) in the rest. Of 124 subjects who had hepatitis B screening at 6 months post-IgM anti-HBc positivity, 50% developed anti-HBs while 9.7% were HBsAg positive. The results suggested a higher rate of HBV chronicity than what was previously reported

in the literature. However, these findings have to be interpreted with extreme caution owing to the relative small number of samples, incompleteness of data and potential biases from the subjects sampling and other study design.

17. Determining the seroprevalence of hepatitis B surface antigen (HBsAg) sheds light on how common chronic HBV infection is in different communities, as well as informing its chronic disease burden. The various adult communities can be categorized into 3 groups according to the risk of contracting HBV: those (a) without apparent risk, (b) with undetermined risk, and (c) with apparent risk. Groups without apparent risk for which data was available include blood donors, pre-marital/ pre-pregnancy service users, antenatal women, police officers, new health care workers (HCW). Clients seeking post-exposure management and tuberculosis patients are those with undetermined risk. Drug users, HIV/AIDS patients and female sex workers are at apparent risk of contracting HBV related to their risk behaviours.

18. A majority of the available seroprevalence data in different populations were limited to overall positivity rate of HBV markers. Still, temporal trend can be discerned as most have yearly data for the past decade or so. For groups with some demographic characteristics available, such as age and gender, further analyses have been made per the aggregate data. Several features on the current pattern of HBV could be observed from the serologic investigations, namely (a) chronic HBV infection is in a general declining trend in community groups without apparent risk of contracting HBV, (b) HBV prevalence increases with increasing age, and (c) chronic HBV infection is commoner in male than female. A word of caution in the interpretation of data though, is that testing for HBV markers has been performed for a variety of reasons in different communities, with heterogeneous mix of population characteristics.

19. The temporal decline of chronic HBV infection has been most obvious in new blood donors. Its HBsAg prevalence follows a continual falling trend since early 1990s, from 8% in 1990 to1.1% in year 2013 (Box 18). The falling trend was also observed in other community groups without apparent HBV risk, albeit less prominent(Box 34). The HBsAg prevalence in antenatal mothers has been decreasing from over 10% in the early 1990s to 6.5% in 2013 (Box 22). As compared with other groups without apparent risk, the overall HBsAg prevalence in antenatal mothers is higher and confounded by the place of birth. A study of 2480 pregnant women attending the Maternal and Child Health Centre (MCHC) of DH in 1996 found a 13.1% in those born in Mainland China as compared to 8.4% in local mothers [14]. Data from Virus Unit, Department of Health also showed a higher prevalence of 12.5% and 13.8% in the

subset of non-resident expectant mothers versus the overall positivity rate of 8.5% and 8.6% in 2004 and 2005 respectively. The prevalence in pre-marital/ pre-pregnancy package service users has dropped from 9.6% in 1990 to remain static in the range of 6.3% to 7.4% in the past decade (Box 21). The prevalence in newly recruited health care workers as determined at pre-HBV vaccination screening also showed a decreasing trend from 5.9% in 2001 to 4.5% in 2013 among female, and from 6.1% in 2001 to 2.8% in 2013 among male (Box 27).

20. Of 1,033 tuberculosis patients attended TB & Chest Clinics, Department of Health between March and May in 2013, 95 (9.2%, Box 28) were detected HBsAg positive, with the highest prevalence rate in the middle age group (40-59 years old: 12.8%, Box 29) followed by the more elderly group (>= 60 years old: 9.3%, Box 29). The HBsAg positivity rate was also found to be higher in male clients (10.5%) than in female (6.8%, Box 28). Both the age (Box 29) and gender pattern (Box 28) were consistently observed over the last eight years. Among clients attended for post exposure management, HBsAg rate was found higher in non-health care workers than in health care workers (Box 30), which may be partly explained by the success of pre-employment vaccination programme for healthcare workers.

21. The HBsAg prevalence in HIV/AIDS patients under care of DH was in the range of 5.6% to 15.9% in the past decade (Box 32). Due to the underlying immunosuppression, HIV/AIDS patients could be more prone to becoming chronically infected with HBV after acute infection [15].The HBsAg prevalence in female sex workers attending the clinic of Action for REACH OUT tested between 2007 to 2011 ranged from 5.0% to 10.4% (Box 34).The data regarding prevalence of HBsAg in drug users in recent years was hardly able to be interpreted due to the small number of subjects tests since 2006 (Box 31). Overall, the difference in HBsAg prevalence between groups with or without apparent risk of contracting HBV has not been prominent in the past few years.

Age and Gender Difference in Prevalence of Hepatitis B

22. For some groups, evidence supported age as an important correlate of HBV infection, with a higher proportion of the older population having viral markers or being chronically infected. In 2013, the HBsAg prevalence of new blood donors was higher in those aged over 30 years as compared with those younger, the observation being found in both genders (Box 19). Similarly, HBsAg prevalence also appeared to be higher in antenatal women aged over 25 years, though the difference is not as prominent in 2013 as in the previous five years (Box 23). The

HBsAg prevalence rate among police officers was highest among subjects aged 41-50 years(11.3%) as compared with a lower rate ranged from 0% to 4.2% among those aged below 40 (Box 25).

23. Male had a higher HBV prevalence than female, as observed in several groups. In 2013, the HBsAg positivity rate among new blood donors was higher in male across all age groups (Box 19). Among tuberculosis patients treated at chest clinics, the rate in 2013 was 10.5% in male and 6.8% in female (Box 28). The HBsAg prevalencerate in male police officers (2.9%) was slightly higher than female police officers (2.6%, Box 24) in 2013. The 2001 household study also showed that a higher overall HBsAg seropositivity rate in male (Box 26).

Genotypes of Hepatitis B and their Disease Course

24. Genotyping studies of HBV in Hong Kong became more common in the last decade. A study of 776 chronic hepatitis B patients seen at the University of Hong Kong Liver clinic from 1999 to mid-2003 found that genotype C was the commonest (486, 62.6%), followed by B (252, 32.5%), with a majority of genotype B belonged to subgroup Ba [16]. Similarly, another study of 426 chronic HBV patients recruited consecutively from 1997 to mid 2000 at the Hepatitis clinic of Princess of Wales Hospital (PWH) found a prevalence of 57% (242) and 42% (179) of genotypes C and B respectively [17].

25. A study of 49 HBV genotype C ethnic Chinese patients under the care of PWH Hepatitis clinic identified 2 distinct groups with different epidemiological distribution and virologic characteristics – 80% being genotype “Cs” (found mostly in Southeast Asia) and 20% “Ce” (predominated in Far East) [18]. In addition, subgenotype Cs appears to be more common in Hong Kong than other parts of China. In the recent analysis of a cohort of patients with HBeAg-negative chronic liver disease from three different parts of China (Beijing, Shanghai and Hong Kong), 69% of genotype C patients in Hong Kong belonged to sub genotype Cs whereas 97% of genotype C HBV in Shanghai and Beijing belonged to subgenotype Ce ($P< 0.0001$) [19].

26. Regarding HBV disease course, recent studies found that patients infected with genotype C may have a more aggressive clinical course than those infected with genotype B. It was shown that genotype B patients had earlier HBeAg seroconversion than genotype C patients in an early study[16]. Moreover, local studies have shown a higher risk of cirrhosis and HCC development [17,20], as well as more severe histological fibrosis, with genotype C [21]. A recent meta-analysis

concluded that genotype C hepatitis B virus was associated with a higher risk of HCC than other major hepatitis B virus genotypes [22].Among HBV genotype C, subgenotype Cs appears to carry a worse prognosis than subgenotype Ce [19]. In a local study by the Chinese University of Hong Kong, patients infected by subgenotype Cs had the lowest serum albumin and highest alanine aminotransferase levels compared with subgenotypes Ce and Ba. And, patients infected by subgenotype Cs also had more severe histological necroinflammation than subgenotype Ce [19]. However, the meta-analysis did not find significant difference in the risk of HCC between HBV-infected patients with subgentype Ce and Cs [22].

27. Nevertheless, in a study of end-stage HBV-related liver disease patients requiring transplantation, those with genotype B had significantly more pre-transplant acute flare and worse liver function while genotype C patients had a greater risk and severity of recurrence due to lamivudine-resistant mutants [23].

28. In a case control study, it was concluded that HCC patients had a significantly higher prevalence of core promoter mutations and genotype C but the association with HCC is mediated via the former [24]. A study of 5080 chronic HBV patients focusing on familial HCC found 22 such families, giving a prevalence of 4.3 families/1000 HBV carriers [25]. Age of onset of HCC is significantly younger in familial HCC than sporadic cases, and it progressively decreased down the generations, suggesting an anticipation phenomenon.

Hepatitis B Vaccination

29. Occurrence of new HBV infection is dependent on the interplay of multiple factors, including size of HBV pool, proportion of susceptible population and chance of exposure to the virus. It is likely that the circulating pool of HBV has reduced over the years in Hong Kong, thereby lessening the risk of exposure which can lead to acute infection. The reduced HBV pool in the community might have resulted from the universal vaccination programme for newborns, increased vaccination coverage in adults, practice of universal precaution in health care settings, screening of blood donors and promotion of safer sex [26].

30. A 16-year follow up study of 1112 neonates born to HBV carrier mothers who received HBV vaccine and hepatitis B immunoglobulin at different schedules demonstrated the long term protective efficacy of immunization [27]. Upon completion of the vaccination schedules, 92.6% developed antibody against surface antigen (anti-HBs) seroconversion. Only 39 (3.5%) babies were tested positive for HBsAg and

had become chronic carriers, 35 of which occurred before one year of age. At the end of the 16th year, 610 subjects (54.9%) returned for blood test evaluation. Although the anti-HBs seroconversion rate dropped to 33.3% at the 16th year and a total of 90 (8%) vaccinees developed anti-HBc seroconversion, none was found to have breakthrough infection to become chronic HBV infection. At the 30th year of follow-up, 246 (22.1%) vaccinees returned for blood tests [28]. The anti-HBs seroconversion rate was maintained at 37.4% at the 30th year. Although two and one subjects developed anti-HBc seroconversion at the 21st and 25th year respectively, there was no new development of HBsAg positivity detected. These findings demonstrated the long-term protective efficacy of neonatal hepatitis B immunization among high risk individuals up to at least 30 years. In another study of 2/3-doses HBV vaccine regimen without boosters to 318 HBV negative children recruited at age 3 months to 11 years and followed up annually, no subjects became HBsAg up to 18 years of follow up (88 subjects). A total of 88 anamnestic responses with significant increase in anti-HBs titers were documented in 70 subjects; 3 subjects had benign breakthrough HBV infection with isolated anti-HBc seroconversion [29].

31. Universal neonatal HBV vaccination programme has been in place in Hong Kong since 1988.The coverage rate for the birth dose of HBV vaccine among infants born locally in 2009 and 2010 was 97.7% and 98% respectively (unpublished DH data). However there is generally a drop of coverage rate in the second or the third dose. The drop may be related to two factors: more local-births have returned to Mainland after delivery and did not attend MCHC for services, and more babies received combined vaccine in the private sector instead of MCHC.

32. DH has been conducting immunization coverage surveys (ICS) every two or three years starting from 2001 to determine immunization the coverage rates of all vaccines, including HBV vaccination among children aged 2 to 5 years and attending pre-primary institutions including kindergartens and child care centers. Results from ICS conducted in 2001, 2003, 2006 and 2009 confirmed high coverage rates of hepatitis B vaccination [30, 31, 32], including Hong Kong–born and Mainland China-born children. Another round of ICS was conducted in 2012 (unpublished DH data). A total of 6386 children enrolled in 52 pre-primary institutions participated in the survey, reaching an overall response rate of 81.1%. Similar to previous years, the 2012 survey demonstrated a satisfactorily high coverage rate of HBV vaccination (Box 36).

33. Apart from universal neonatal HBV vaccination programme, supplementary Primary 6 vaccination programme was introduced in 1998. The coverage rate for

three doses of HBV vaccine has been consistently above 99% over the years (Box 37).

34. In 2009, a HBsAg seroprevalence study was conducted among 1913 children aged 12 to 15 years (unpublished DH data). The study found an HBsAg seroprevalence of 0.78% (95% confidence interval 0.39 -1.16%, Box 38) in these children who were born after the implementation of universal neonatal HBV vaccination programme. This result showed that Hong Kong has already achieved a time-bound goal of reducing chronic HBV infection rate to less than 2% among 5 year-old children by the year 2012, as set by the Western Pacific Regional Office (WPRO) of the World Health Organization (WHO). In July 2011, Hong Kong was verified by WPRO as having successfully achieved the goal of HBV control.

35. In the CRPVH 2001 study, about 16% of the telephone-interviewed subjects reported a history of HBV vaccination, with a higher frequency in persons below 50 years of age. Some 83% of them reported having completed the vaccination course. Over 99% had the cost paid by them or borne by their employers. In another recent local survey by face-to-face questionnaire interview on over 1900 adult Chinese, fifty-eight percent (n=1151) of the subjects had been tested for HBV during adulthood. Among those tested negative for HBV infection, fifty-eight percent (n=506) of them reported subsequent HBV vaccination [33].Age, occupation, having children, and family monthly income, were independent factors associated with vaccination in the study. Overall, the persistent significant level of HBsAg seroprevalence in the local population, though declining, means a significant disease burden in the years to come. Continued tracking of the trends of new infections and prevalent cases in different community groups could inform more of the changing HBV situation in our locality.

Current Situation of Hepatitis C

36. Although HCV shares similar transmission routes with hepatitis B, the two infections may not be of equal prevalence in a locality, as what epidemiological data points to in Hong Kong. While HBV is still prevalent in many populations in Hong Kong, HCV prevails only in isolated communities from available evidence. Conceivably related to the different epidemiology, HCV is of relatively less public health significance regarding chronic liver diseases when compared to HBV in Hong Kong.

37. From 1996-2013, a total of 44 cases of acute hepatitis C infection were reported to DH under the statutory notification system (Box 1), with one to eleven cases reported annually. A review by the Centre for Health Protection entitled “Hepatitis C in Hong Kong, 2008 to 2011” [34] showed that among the 22 laboratory confirmed acute hepatitis C cases reported to DH from January 2008 to October 2011, there were 17 males and 5 females, mostly (86%) acquired the infection locally. The median age was 47.5 years. Majority (86%) was ethnic Chinese. Five (23%) of them reported history of injecting drug use while no particular risk factor was identified for the remaining cases.

38. Data from new blood donors who were mostly adolescents and young adults in the last decade suggested that HCV infection is around 0.1% locally, with the figure in 2013 being 0.09% (95% confidence interval 0.06 - 0.12%) (Box 39). From the data in 2013, anti-HCV was most commonly detected in males aged above 49 years, and males were slightly more commonly affected than females (Box 40). Findings of the household study of the entire spectrum of adult age groups conducted in 2001 further supported the uncommon scene of HCV infection among general population in Hong Kong; the overall positive rate was 0.3% in 936 subjects (95% confidence interval, 0.07%-0.94%) (Box 41). From 1999 to 2012, seven of 1542 (0.4%) clients who attended the Therapeutic Prevention Clinic (TPC) at Integrated Treatment Centre (ITC) of CHP, DH for post-exposure management were tested positive for anti-HCV. All 7 cases were non-HCW and already HCV infected at time of injury (Box 42).

39. From the studies published in the early 1990s, it was shown that anti-HCV was more commonly found in injecting drug users (IDU, 66.8%), haemophilia (56%), haemodialysis (4.6%) and other patients requiring frequent blood/blood product transfusions but not persons at risk through sexual contact [35].In a more recent analysis of HCV positive blood donors, of those with identifiable risk factors, history of blood transfusion (43.7%) was the most common risk factor, followed by intravenous drug use (34.9%) and tattoo (28.6%). The source of infection was unknown in more than half of the respondents in the study [36].

40. A survey in 2011 on haemophiliacs under local public care found 100 of 222 patients (45%) infected with hepatitis C [37]. Another study conducted for 51 haemodialysis patients found that 8 (16%) were positive for anti-HCV by second generation enzyme immunoassay and 1 (2%) for HCV RNA alone, giving an overall infection rate of 18% [38]. This study also found a new infection rate of 4.9% per patient-year upon longitudinal follow up of 19 months.

41. Injecting drug use has been an important route of HCV acquisition. Results of testing non-random samples from drug users under treatment showed a HCV positive rate of 74% in 1988/1989 and 46% in 2000/2001 (Box 43).An HCV seroprevalence study in 2006 conducted in methadone clinics targeting IDU echoed the high prevalence rate of HCV in this community [39]. Of 567 IDU participants recruited in 2006, the prevalence of anti-HCV was 85% (95% confidence interval 82.5 – 88.3%). Another study in 2011 involving 622 IDU recruited at their gathering places found a similar figure of 81.7% (95% confidence interval 78.6 - 84.7%) infected with HCV [40]. In this study, the majority (84.7%) were male with a median age of 53 years. The median heroin injection duration was 25 years. Injection duration, current or recent injection, ever sharing injecting equipments and concomitant use of other drugs e.g. midazolam were independent factors associated with HCV infection in the two studies.

42. HIV/AIDS patients, with a proportion being IDU, is another group with consistent data showing a comparatively high HCV prevalence (Box 44, 45). From 2000 to 2013, HCV/HIV coinfection among patients attending ITC ranged from 3.6% to 24.9%. The prevalence rate appears to be higher in male than female patients, likely related to the differential risk of parenteral and blood product exposure (Box 44). While HCV infection is present in 1.3–6.7% of HIV/AIDS patients infected due to sexual contact, HCV was nearly universal in patients infected through drug injection (Box 45). It should be noted that, among male patients who acquired HIV via heterosexual contact and tested anti-HCV positive, 62.8% (27 out of 43 subjects) had a past history of injecting drug use(Box 45). Among those heterosexual male HIV infected patients without history of injecting drug use, the prevalence of anti-HCV was 2.6%.

43. There has been overseas data supporting sexual transmission of HCV among HIV-infected men who have sex with men[41].The anti-HCV prevalence of subjects who contracted HIV via homosexual or bisexual contact in the ITC HIV/AIDS patient cohort remained below 2% from screening since 2005.However, from July to November 2013, ITC identified seven cases of recent HCV infection in Chinese HIV-infected MSM [42]. Five of the seven cases were also diagnosed to have recent syphilis infection during the period. None of them had history of injecting drug use. Phylogenetic analyses revealed that all cases belonged to the same genotype (genotype 3) although preliminary investigation showed no apparent linkage on their sexual exposure. An analysis on HIV-infected MSM attending ITC who had HCV seroconversion in the period 1999-2013 was subsequently performed [43]. Fourteen (1.1%) patients seroconverted, with an overall incidence rate of 0.22 per 100 patient-years. The incidence rate increased from 0.13 per 100 patient-years before

2002 to 0.19 per 100 patient years in 2002-2007 and 0.47 per 100 patient-years in 2008-2013. Genotype 3 was most commonly detected. Compared with the non-seroconverters, the seroconverters were of higher education level and had prior history of sexually transmitted infection. The overall higher HCV prevalence, and the increasing incidence of HCV among HIV-positive MSM, coupled with the hastened liver disease progression in HIV-infected patients [44], would no doubt result in a unique HCV/HIV coinfection that demands attention.

44. Since 2003, laboratory surveillance for HCV in Hong Kong was enhanced to monitor the trend of anti-HCV among selected population groups in the local community, including blood donors from HKRCBTS, and selected in-patients from the Princess Margaret Hospital (PMH) and Prince of Wales Hospital (PWH, joined since 2005). Some 180,000-240,000 new and repeated blood donors of HKRCBTS were tested for anti-HCV each year, among which the prevalence was consistently low at less than 0.1% since 2003. Whereas among the selected hospital patients tested in the past eleven years, the overall anti-HCV prevalence was 3.0% (Box 46).Anti-HCV was most commonly found in drug users, of which 49.8% were found positive, followed by patients with history of blood transfusion at 10.1%. Overall, the male-to-female ratio of HCV positive subjects was about 2.3 to 1, with a mean age of 53.7 years old (Box 47).

45. Genotypic studies in Hong Kong has identified that 1b and 6a were the prevalent HCV genotypes locally, a scenario different from that in western countries where 1a predominated [45]. In an early study of 212 blood donors tested anti-HCV positive from 1991 to 1994, the commonest genotype found was 1b (58.8%), followed by 6a (27.0%) [46]. In another study of hospitalized patients with HCV testing for clinical indications 1b was the commonest type found in patients with chronic liver diseases and chronic renal failure[47]. According to a local study of patients on renal replacement therapy, the predominant genotype was 1b, followed by 1a and 6a [48]. Yet, the commonest genotype in intravenous drug users was genotype 6. A retrospective analysis of 106 intravenous drug users and 949 non-drug users with samples collected between December 1998 and May 2004 also confirmed the significant high prevalence of genotype 6a in drug users (58.5%) followed by 1b (33.0%), in contrast to 63.6% for 1b and 23.6% for 6a in non-drug users [49]. Besides intravenous drug use, age and sex were independent factors associated with HCV genotypes in this study. In a methadone clinic-based study published in 2011, out of 273 IDUs with different periods of initiating injection, 52% had genotype 6a and 38% had 1b. Both genotypes 1b and 6a were prevalent among older injectors, while subtype 3a was more common in young injectors and those initiating injection more

recently during 1995-2006. Moreover, phylogenetic analysis revealed no specific clustering of any subtype or genotype, which did not suggest any outbreak of HCV among the study population. The extensive use of methadone widely available since 1980s may have protected Hong Kong from the emergence of HCV clusters among injection drug users [50].

46. The natural history of 138 HCV genotype 1 patients (median age:50 years) was compared with that of 78 HCV genotype 6 patients (median age: 46.5 years) in Queen Mary Hospital [51]. Both genotypes share a similar natural history based on liver biochemistry, HCV viral load, and on probability of cirrhotic complications and mortality after a median follow-up period of over 5 years.

Liver Cancer – Major Morbidity and Mortality from Viral Hepatitis

47. Chronic HBV and HCV infection are important risk factors for cirrhosis and liver cancer. Globally 700 thousand people died of liver cancer in 2008, and HBV and HCV accounted for 78% of liver cancer cases [52]. Local studies showed that 75-80% of hepatocellular cancers in Hong Kong were related to chronic HBV infection, and 3-6% cases were related to chronic HCV infection. HBV and HCV co-infection accounted for another 0.4-3% [53]. Among 76 liver transplants performed in Queen Mary Hospital due to cirrhosis from 1999 to 2000, 51 and 7 were related to hepatitis B and C respectively [54].

48. Apart from chronic HBV and HCV infection, other risk factors for liver cancer include excessive alcohol consumption, consumption of aflatoxin contaminated food, etc [55]. In Hong Kong, the age-standardized incidence rate and death rate of liver cancer is higher in male. According to the data from the Hong Kong Cancer Registry [56], liver cancer, including neoplasm of liver and intrahepatic bile ducts, was the fourth commonest cancer in men and seven commonest cancer in women in 2011. There were 1858 new registered cases of liver cancer, with 1399 cases of males and 459 cases of females, which accounted for 10% and 3.5% respectively of all new cancer cases in the same year. There was a downward trend for the age-standardized incidence rate for male in the past decade whereas that for female has remained static (Box 48). The figures were 26.8 for male and 7.5 for female per 100 000 standard population in 2011.

49. In 2011, liver cancer was the third leading cause of cancer deaths in Hong Kong. There were 1536 registered mortality from liver cancer, which accounted for 11.6% of all cancer deaths [57]. There was a downward trend for the age-standardized

mortality rate for both sexes in the past decade (Box 49). The figures were 21.2 for male and 5.9 for female per 100 000 standard population in 2011 [55].

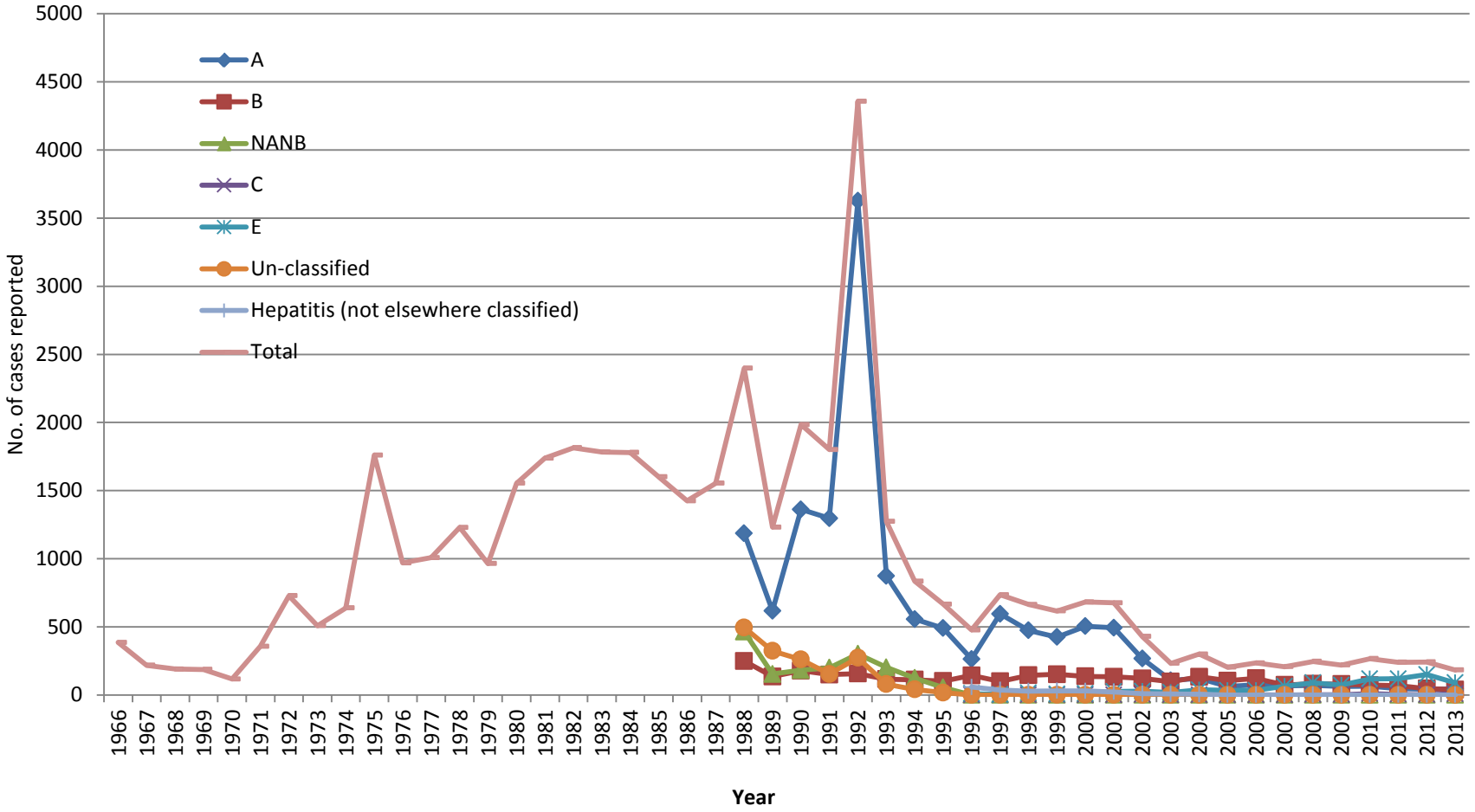
2. Tabulated results of acute viral hepatitis under the disease notification system

Box Title **Page**

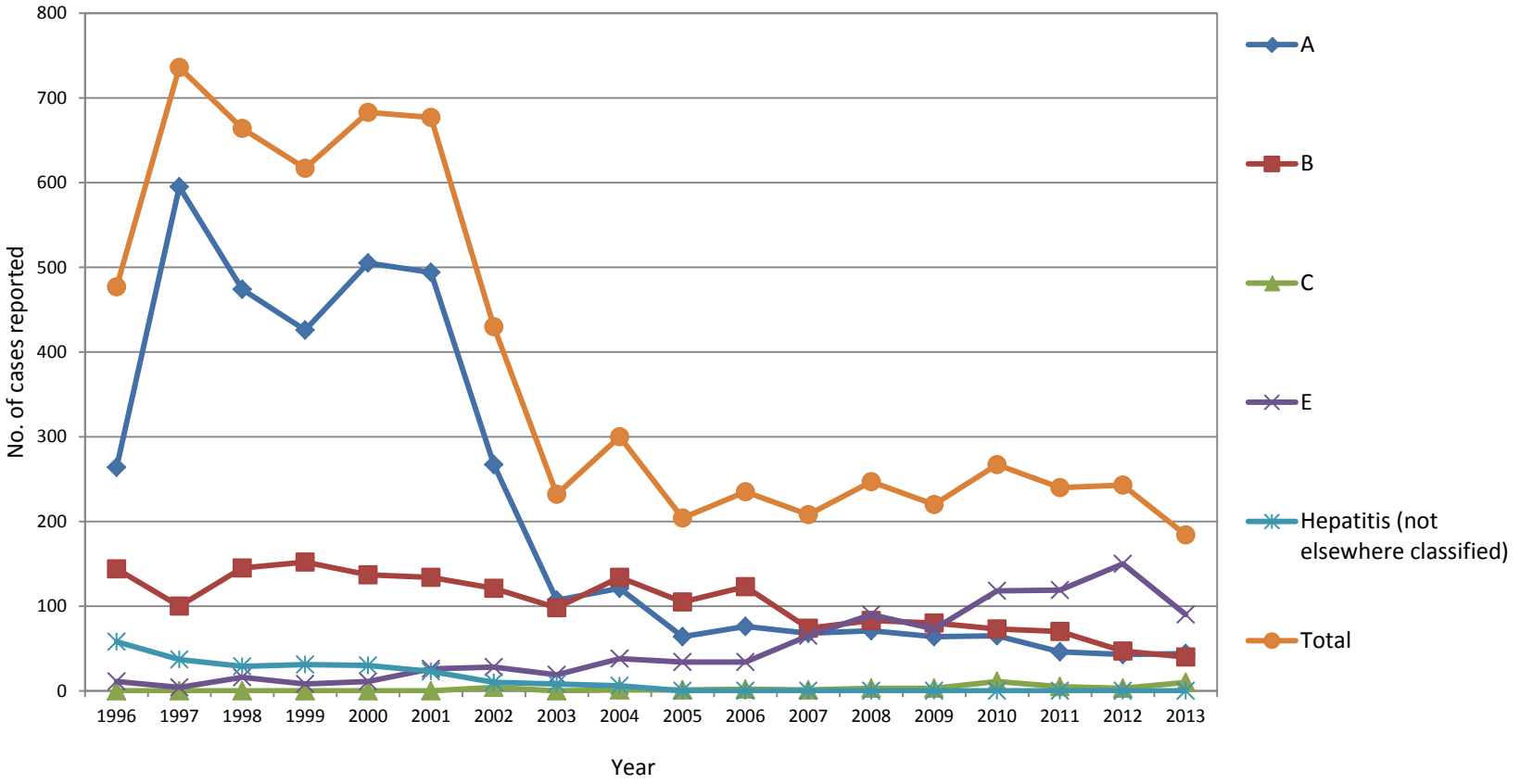
Box 1. Number of cases of viral hepatitis reported to the Department of Health between 1966 and 2013 (Data source: DH)

Year	A	B	NAN B	C	E	Un-clas sified	Hepatitis (not elsewhere classified)	Total
1966		*voluntary reporting since 1966*						386
1967								218
1968								191
1969								188
1970								117
1971								357
1972								729
1973								509
1974		*notifiable since 1974*						639
1975								1761
1976								969
1977								1008
1978								1230
1979								964
1980								1554
1981								1738
1982								1814
1983								1783
1984								1780
1985								1601
1986								1425
1987								1554
1988	1187	250	465			496		2398
1989	618	136	154			324		1232
1990	1362	178	183			261		1984
1991	1297	150	200			154		1801
1992	3626	157	301			273		4357
1993	874	116	203			80		1273
1994	557	112	125			41		835
1995	491	102	55			18		666
1996	264	144	-	-	11	-	58	477
1997	595	100	-	-	4	-	37	736
1998	474	145	-	-	16	-	29	664
1999	426	152	-	-	8	-	31	617
2000	505	137	-	-	11	-	30	683
2001	494	134	-	-	26	-	23	677
2002	267	121	-	4	28	-	10	430
2003	107	98	-	-	19	-	8	232
2004	121	134	-	1	38	-	6	300
2005	64	105	-	1	34	-	-	204
2006	76	123	-	2	34	-	-	235
2007	68	74	-	1	65	-	-	208
2008	71	83	-	3	90	-	-	247
2009	64	80	-	3	73	-	-	220
2010	65	73	-	11	118	-	-	267
2011	46	70	-	5	119	-	-	240
2012	43	47	-	3	150	-	-	243
2013	44	40	-	10	90	-	-	184

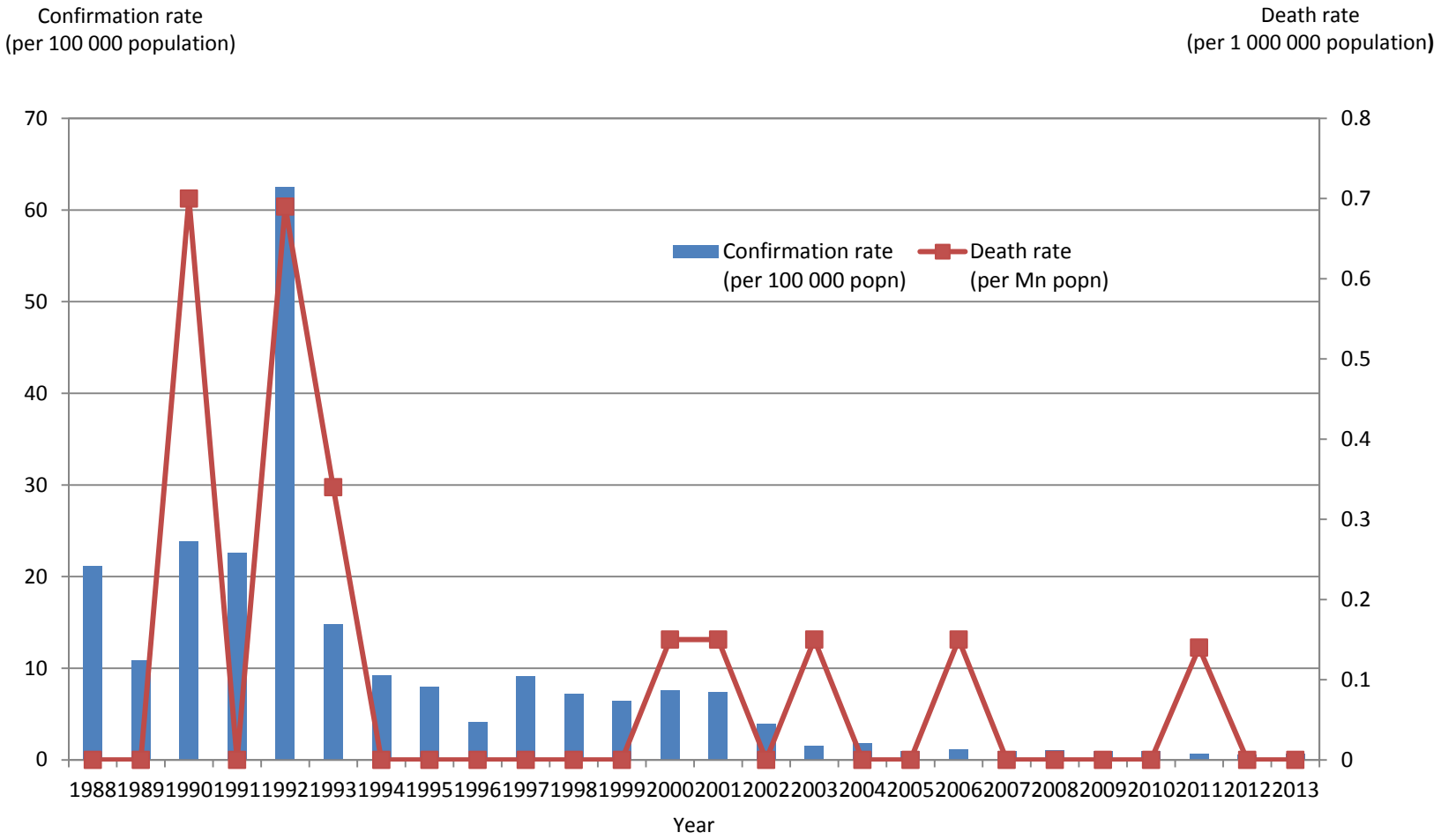
Box 2. Reported viral hepatitis from 1966 to 2013 (Data source: DH)



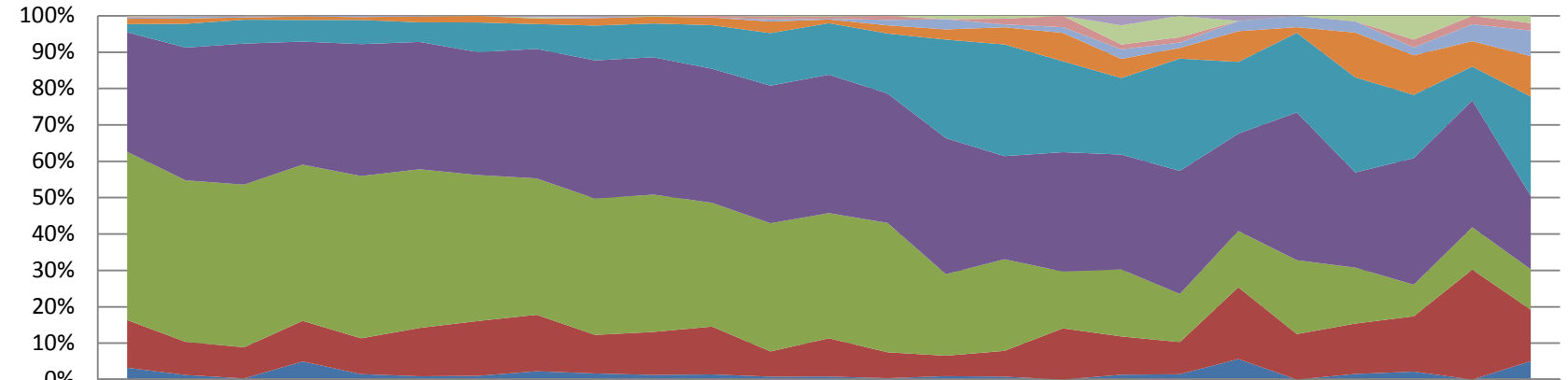
Box 3. Breakdown of different types of reported viral hepatitis from 1996 to 2013 (Data source: DH)



Box 4. Rates and death rates of confirmed cases of Hepatitis A, 1988 - 2013 (Data source: DH)



Box 5. Age distribution by proportion of total confirmed cases of Hepatitis A, 1989-2013 (Data source: DH)



	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
>84	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	1%	0%	0%	0%	0%	0%
75-84	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%	5%	6%	0%	0%	2%	7%	0%	2%
65-74	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	1%	0%	2%	3%	1%	1%	0%	0%	0%	2%	2%	2%
55-64	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	3%	1%	2%	3%	1%	3%	3%	3%	2%	5%	7%
45-54	1%	1%	1%	1%	1%	2%	2%	2%	2%	2%	2%	3%	1%	2%	3%	5%	8%	5%	3%	8%	2%	12%	11%	7%	11%
35-44	2%	7%	7%	6%	7%	5%	8%	7%	10%	9%	12%	14%	14%	16%	27%	31%	25%	21%	31%	20%	22%	26%	17%	9%	27%
25-34	33%	36%	39%	34%	36%	35%	34%	36%	38%	38%	37%	38%	38%	36%	37%	28%	33%	32%	34%	27%	41%	26%	35%	35%	20%
15-24	46%	44%	45%	43%	45%	44%	40%	38%	37%	38%	34%	35%	34%	36%	22%	25%	16%	18%	13%	15%	20%	15%	9%	12%	11%
5-14	13%	9%	9%	11%	10%	13%	15%	16%	11%	12%	13%	7%	11%	7%	6%	7%	14%	11%	9%	20%	13%	14%	15%	30%	14%
<5	3%	1%	0%	5%	1%	1%	1%	2%	2%	1%	1%	1%	1%	0%	1%	1%	0%	1%	1%	6%	0%	2%	2%	0%	5%

Year

Box 6. Sex distribution of confirmed cases of Hepatitis B from 1995 to 2013 (Data source: DH)

Year	Male	Female	Total
1995	74	28	102
1996	106	38	144
1997	73	27	100
1998	109	36	145
1999	113	39	152
2000	105	32	137
2001	107	27	134
2002	86	35	121
2003	65	33	98
2004	103	31	134
2005	79	26	105
2006	87	36	123
2007	59	15	74
2008	66	17	83
2009	56	24	80
2010	60	13	73
2011	47	23	70
2012	35	12	47
2013	30	10	40
Total	1460	502	1962

Box 7. Age distribution of confirmed cases of Hepatitis B from 1995 to 2013 (Data source: DH)

Year	<1-14	15-24	25-34	35-44	45-54	55-64	≥65	Total
1995	1	44	34	13	7	3	0	102
1996	4	48	45	27	13	4	3	144
1997	2	32	31	21	9	3	2	100
1998	4	44	46	32	14	4	1	145
1999	3	44	49	29	18	4	5	152
2000	2	39	48	32	8	5	3	137
2001	1	41	42	30	17	2	1	134
2002	1	37	29	26	17	8	3	121
2003	0	24	32	25	7	6	4	98
2004	0	31	46	34	17	4	2	134
2005	0	22	30	25	14	9	5	105
2006	0	22	45	30	16	6	4	123
2007	0	7	21	23	16	5	2	74
2008	0	6	32	25	14	4	2	83
2009	0	9	24	20	14	9	4	80
2010	0	0	23	25	17	3	5	73
2011	0	4	22	20	12	8	4	70
2012	0	4	12	14	12	3	2	47
2013	0	3	9	14	10	1	3	40
Total	18	461	620	465	252	91	55	1962

3. Tabulated results of seroprevalence of hepatitis A and hepatitis E

Box Title **Page**

Box 8. Prevalence of anti-HAV in a collection of studies/testings between 1978 and 2009 (Data sources: Multiple sources)

Age groups	1978	1987	1989	1993^	1995	1996		1998	2000	2001	2001	2002	2003	2004	2005	2006	2007	2008	2009
0 – 20	12.9% (0 - 10) 44.8% (11 - 20)	5.3% (0 - 10) 17.1% (11 - 20)	6.8% (0 - 10) 11.2% (11 - 20)	59.4% (M) 53.3% (F)	8.3%	- (0 - 10) 7.0% (11 - 20)	6.1%	5.4%	9.3%	4.58%	- (0 - 10) 12.5% (11 - 20)	5.3%	10.3%	14.7%	15.4%	20.0%	14.3%	16.7%	25.0%
21 – 30	75.0%	53.8%	58.8%	59.4% (M) 53.3% (F)	11.3%	-	11.8%	7.6%	17.5%	13.2%	26.8%	12.6%	13.2%	21.0%	28.2%	25.8%	19.4%	26.3%	30.3%
31 – 40	82.9%	85.1%	83.5%	59.4% (M) 53.3% (F)	49.0%	-	37.7%	40.8%	35.0%	41.3%	53.2%	46.7%	52.4%	43.8%	35.7%	50.0%	37.5%	47.4%	36.4%
>40	91.1%	94.7%	91.1% (41 - 50) 93.9% (>50)	94.5% (M) 91.0% (F)	70.5%	-	58.6%	66.7%	60.0%	71.1%	88.3% (41 - 50) 97.7% (>50)	58.1%	100.0%	50.0%	72.7%	80.0%	62.5%	71.4%	26.7%
Data source	A	B	C	D	E	F	E	E	E	E	G	E	E	E	E	E	E	E	E

^Figure is the average of age 0 – 40

Data sources:

A. Study on left-over sera of 362 subjects, by Tsang et al of the University of Hong Kong [4]

B. Study on stored sera of 702 healthy subjects, by Chin et al of the University of Hong Kong.[3]

C. Study on 1028 serum samples collected from individuals attending a health exhibition, by Lim et al of Department of Health. [42]

D. Seroprevalence results reported in the press by Lai et al of the University of Hong Kong. [43]

E. Pre-vaccination screening on students and staff of City University of Hong Kong: 553 (1995), 669 (1996), 608 (1998), 395 (2000), 592 (2001), 371 (2002), students and staff of Baptist University of Hong Kong 240 (2001), 259 (2002), 153 (2003), 55 (2004), 77 (2005), 53 (2006), 54 (2007), 70(2008),63(2009) and students and staff of Lingnan University 125 (2003), 84 (2004). [44]

F. Seroprevalence study in school children by Lee et al of the Chinese University of Hong Kong. [45]

G. Community Research Project on Viral Hepatitis 2001. [2]

Box 9. Prevalence of anti-HAV in participants of Community Research Project for Viral Hepatitis (CRPVH) 2001 (Data source: DH)

Age group	No. Tested	Anti-HAV +ve (%)
18-29	137	27 (19.7%)
30-39	223	116 (52.0%)
40-49	291	248 (85.2%)
50-59	170	161 (94.7%)
60 & over	115	113 (98.3%)
All	936	665 (71.0%)

Box 10. Prevalence of anti-HAV in individuals with blood collected for serological diagnosis of conditions unrelated to hepatitis in 2010 (Data source: PHLSB, CHP, DH)

Age group	No. Tested	Anti-HAV +ve (%)
0-10	96	15 (15.6%)
11-20	100	22 (22.0%)
21-30	100	37 (37.0%)
31-40	95	51 (53.7%)
41-50	100	64 (64.0%)
51-60	100	91 (91.0%)
>60	100	100 (100.0%)
All	691	380 (55.0%)

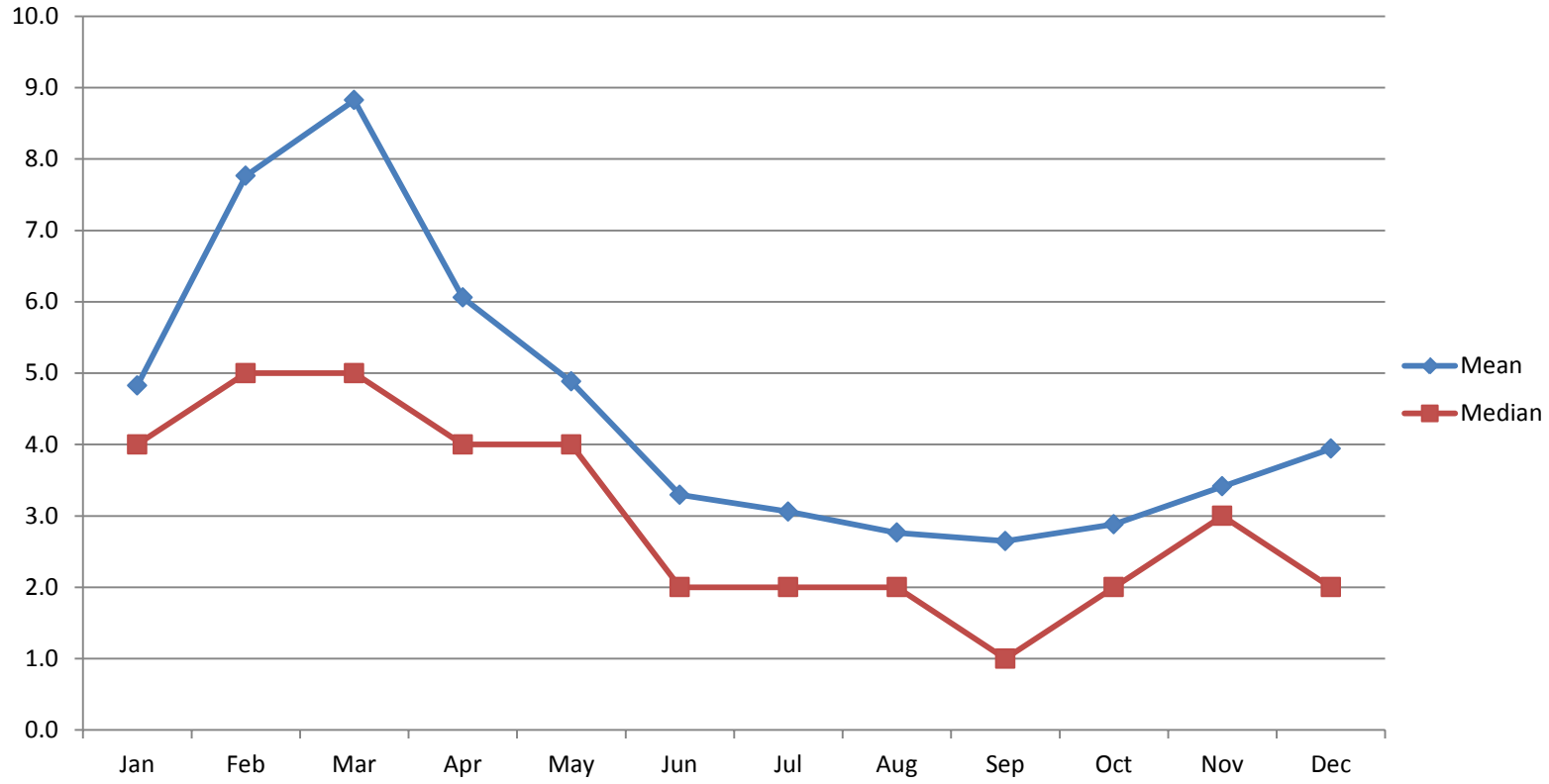
Box 11. Anti-HAV prevalence in HIV/AIDS patients first HAV marker in ITC between Jul 2007 and 2013 (Data source: ITC, CHP, DH)

Year (No. of patients)	Age	No. tested	Anti-HAV+ve (%)
2007 Jul-Dec (n=309)	<20	0	0 (0.0%)
	20-29	64	28 (43.8%)
	30-39	203	90 (44.3%)
	40-49	30	17 (56.7%)
	>=50	12	10 (83.3%)
2008 (n=506)	<20	2	1 (50.0%)
	20-29	101	39 (38.6%)
	30-39	282	142 (50.4%)
	40-49	77	49 (63.6%)
	>=50	44	42 (95.5%)
2009 (n=228)	<20	2	0 (0.0%)
	20-29	57	22 (38.6%)
	30-39	92	44 (47.8%)
	40-49	52	31 (59.6%)
	>=50	25	23 (92.0%)
2010 (n=223)	<20	3	0 (0.0%)
	20-29	41	18 (43.9%)
	30-39	82	49 (59.8%)
	40-49	55	34 (61.8%)
	>=50	42	35 (83.3%)
2011 (n=208)	<20	2	0 (0.0%)
	20-29	45	18 (40.0%)
	30-39	57	29 (50.9%)
	40-49	66	44 (66.7%)
	>=50	38	34 (89.5%)
2012 (n=361)	<20	6	0 (0.0%)
	20-29	64	18 (28.1%)
	30-39	105	44 (41.9%)
	40-49	111	70 (63.1%)
	>=50	75	56 (74.7%)
2013 (n=436)	<20	5	2 (40.0%)
	20-29	91	21 (23.1%)
	30-39	102	44 (43.1%)
	40-49	115	65 (56.5%)
	>=50	123	107 (87.0%)

Box 12. Prevalence of anti-HAV per HIV risk in HIV/AIDS patients first HAV marker in ITC between Jul 2007 and 2013 (Data source: ITC, CHP, DH)

HIV risk	No. tested	Anti-HAV +ve (%)
Heterosexual male	507	353 (69.6%)
Heterosexual female	340	251 (73.8%)
Homo/Bi-sexual	1207	448 (37.1%)
Drug user	172	146 (84.9%)
Blood/blood product recipient	20	15 (75.0%)
Perinatal	4	0 (0.0%)
Undetermined	21	13 (61.9%)
Total	2271	1226 (54.0%)

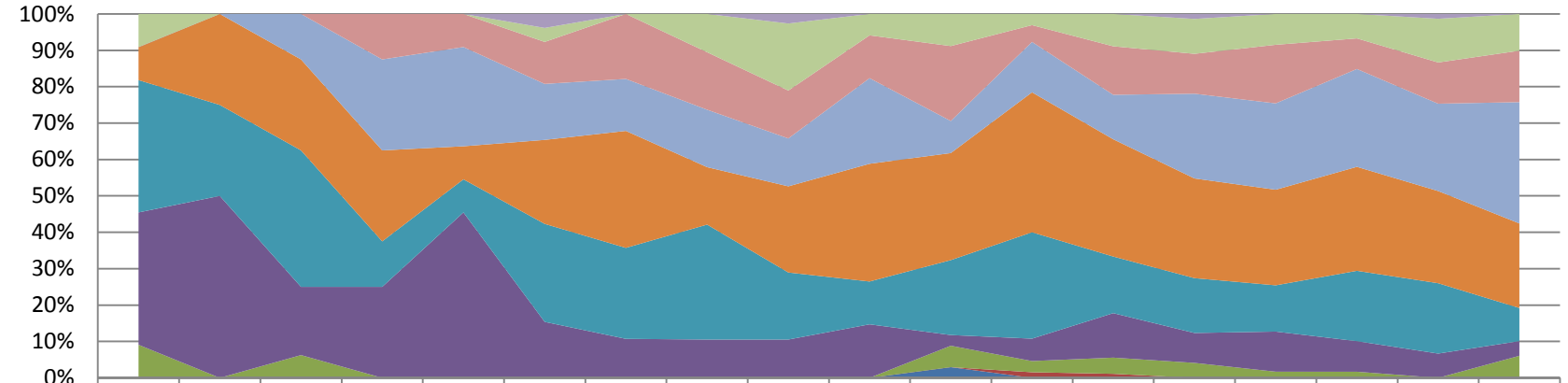
Box 13. Mean and median plot of notification cases of Hepatitis E by month from 1997 to 2013 (Data source: CHP, DH)



Box 14. Sex distribution of confirmed cases of Hepatitis E from 1996 to 2013 (Data source: PHIS)

Year	Male (%)	Female (%)	Total
1996	11 (100.0%)	0 (0.0%)	11
1997	3 (75.0%)	1 (25.0%)	4
1998	15 (93.8%)	1 (6.3%)	16
1999	8 (100.0%)	0 (0.0%)	8
2000	8 (72.7%)	3 (27.3%)	11
2001	19 (73.1%)	7 (26.9%)	26
2002	17 (60.7%)	11 (39.3%)	28
2003	14 (73.7%)	5 (26.3%)	19
2004	27 (71.1%)	11 (28.9%)	38
2005	29 (85.3%)	5 (14.7%)	34
2006	19 (55.9%)	15 (44.1%)	34
2007	45 (69.2%)	20 (30.8%)	65
2008	61 (67.8%)	29 (32.2%)	90
2009	43 (58.9%)	30 (41.1%)	73
2010	78(66.1%)	40(33.9%)	118
2011	77(64.7%)	42(35.3%)	119
2012	97 (64.7%)	53 (35.3%)	150
2013	54 (60.0%)	36 (40.0%)	90
Total	625(66.9%)	309(33.1%)	934

Box 15. Age distribution by proportion of total confirmed cases of Hepatitis E from 1996 to 2013 (Data source: PHIS)



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
>84	0%	0%	0%	0%	0%	4%	0%	0%	3%	0%	0%	0%	0%	1%	0%	0%	1%	0%
75-84	9%	0%	0%	0%	0%	4%	0%	11%	18%	6%	9%	3%	9%	10%	8%	7%	12%	10%
65-74	0%	0%	0%	13%	9%	12%	18%	16%	13%	12%	21%	5%	13%	11%	16%	8%	11%	14%
55-64	0%	0%	13%	25%	27%	15%	14%	16%	13%	24%	9%	14%	12%	23%	24%	27%	24%	33%
45-54	9%	25%	25%	25%	9%	23%	32%	16%	24%	32%	29%	38%	32%	27%	26%	29%	25%	23%
35-44	36%	25%	38%	13%	9%	27%	25%	32%	18%	12%	21%	29%	16%	15%	13%	19%	19%	9%
25-34	36%	50%	19%	25%	45%	15%	11%	11%	11%	15%	3%	6%	12%	8%	11%	8%	7%	4%
15-24	9%	0%	6%	0%	0%	0%	0%	0%	0%	0%	6%	3%	4%	4%	2%	2%	0%	6%
5-14	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	2%	1%	0%	0%	0%	0%	0%
<5	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%	0%	0%	0%	0%

Year

Box 16. Rates and death rates of confirmed cases of Hepatitis E from 1996 to 2013 (Data source: CDSIO & PHIS)

Year	Total Cases	Rate (per 100 000 popn)	Total registered deaths	Death rate (per Mnpopn)
1996	11	0.17	0	0.00
1997	4	0.06	0	0.00
1998	16	0.24	0	0.00
1999	8	0.12	0	0.00
2000	11	0.17	0	0.00
2001	26	0.39	2	0.30
2002	28	0.42	3	0.44
2003	19	0.28	1	0.15
2004	38	0.56	2	0.29
2005	34	0.50	1	0.15
2006	34	0.50	0	0.00
2007	65	0.94	1	0.14
2008	90	1.29	0	0.00
2009	73	1.05	0	0.00
2010	118	1.68	2	0.28
2011	119	1.68	1	0.14
2012	150	2.10	2	0.28
2013	90	1.25	0	0.00

Box 17. Prevalence of anti-HEV in participants of Community Research Project for Viral Hepatitis (CRPVH) 2001 (Data source: DH)

Age group	No. Tested	Anti-HEV +ve (%)
18-29	137	11 (8.0%)
30-39	222	32 (14.4%)
40-49	290	70 (24.1%)
50-59	170	39 (22.9%)
60 & over	115	24 (20.9%)
All	934	176 (18.8%)

4. Tabulated results of hepatitis B seroprevalence and vaccination coverage

Box Title **Page**

Box 18. Prevalence of HBsAg in new blood donors from 1990 to 2013 (Data source: HKRCBTS)

Year	% HBsAg +ve
1990	8.0
1991	8.0
1992	7.4
1993	6.7
1994	5.9
1995	6.0
1996	5.6
1997	5.2
1998	4.9
1999	4.4
2000	4.2
2001	4.0
2002	3.6
2003	3.2
2004	2.9
2005	2.6
2006	2.2
2007	1.8
2008	1.8
2009	1.6
2010	1.2
2011	1.1
2012	1.1
2013	1.1

Box 19. HBsAg prevalence and its gender and age breakdown in new blood donors in 2013 (Data source: HKRCBTS)

	Male		Female	
Age Group	No. tested	No. HBsAg +ve (%)	No. tested	No. HBsAg +ve (%)
16-19	10080	37 (0.4%)	12222	51 (0.4%)
20-29	4850	77 (1.6%)	5078	64 (1.3%)
30-39	1909	68 (3.6%)	2412	48 (2.0%)
40-49	846	33 (3.9%)	1635	28 (1.7%)
>49	453	18 (4.0%)	735	15 (2.0%)
Total	18138	233 (1.3%)	22082	206 (0.9%)

Box 20. HBsAg prevalence among university students/staff (Data source: City University Health Centre (till 2002), Baptist University Health Centre (2001 to 2009) &Lingnan University Health Service (2003 and 2004)

	Aged below 21		Aged 21 – 30		Aged < 30	
Year	Total no. of cases	HBsAg+ve (%)	Total no. of cases	HBsAg+ve (%)	Total no. of cases	HBsAg+ve (%)
1994	305	7 (2.3%)	830	29 (3.5%)	1135	36 (3.2%)
1995	324	10 (3.1%)	768	33 (4.3%)	1092	43 (3.9%)
1996	348	4 (1.1%)	762	30 (3.9%)	1110	34 (3.1%)
1998	371	5 (1.3)	608	21 (3.5%)	979	26 (2.7%)
2000	230	7 (3.0%)	391	12 (3.1%)	621	19 (3.1%)
2001	508	13 (2.6%)	814	28 (3.4%)	1322	41 (3.1%)
2002	266	10 (3.8%)	483	13 (2.7%)	749	23 (3.1%)
2003	121	5 (4.1%)	214	8 (3.7%)	335	13 (3.9%)
2004	114	3 (2.6%)	217	4 (1.8%)	331	7 (2.1%)
2005	57	1 (1.8%)	115	0 (0.0%)	172	1 (0.6%)
2006	26	3 (11.5%)	104	1 (1.0%)	130	4 (3.1%)
2007	16	0 (0.0%)	82	1 (1.2%)	98	1 (1.0%)
2008	18	0 (0.0%)	82	1 (1.2%)	100	1 (1.0%)
2009	8	0 (0.0%)	56	0 (0.0%)	64	0 (0.0%)

Box 21. HBsAg prevalence from the FPAHK's Clinical Services (Data source: FPA)

Year	Total no. of cases	HBsAg +ve (%)
1990	17251	1659 (9.6%)
1991	19142	1831 (9.6%)
1992	18445	1708 (9.3%)
1993	19193	1661 (8.7%)
1994	16466	1210 (7.3%)
1995	16798	1320 (7.9%)
1996	19959	1575 (7.9%)
1997	17109	1301 (7.6%)
1998	13163	897 (6.8%)
1999	12686	851 (6.7%)
2000	15348	862 (5.6%)
2001	16611	844 (5.1%)
2002	15077	1033 (6.9%)
2003	13489	957 (7.1%)
2004	13773	1019 (7.4%)
2005	11772	799 (6.8%)
2006	11831	879 (7.4%)
2007	9787	699 (7.1%)
2008	10669	686 (6.4%)
2009	9553	656 (6.9%)
2010	14137	914 (6.5%)
2011	13163	837(6.4%)
2012	12191	836 (6.9%)
2013	13850	868 (6.3%)

Note: 1990-2010 only contain pre-marital check up
Start from 2011 contain both pre-marital and pre-pregnancy check up

Box 22. HBsAg prevalence in antenatal women from 1990 to 2013 (Data source: FHS and PHLSB, CHP, DH)

Year	No. tested	HBsAg +ve (%)
1990	31749	3574 (11.3%)
1991	30075	3278 (10.9%)
1992	31394	3391 (10.8%)
1993	34221	3456 (10.1%)
1994	32470	3247 (10.0%)
1995	30962	3016 (9.7%)
1996	31508	3072 (9.7%)
1997	25892	2417 (9.3%)
1998	24678	2223 (9.0%)
1999	23934	2114 (8.8%)
2000	19090	1701 (8.9%)
2001	23373	2142 (9.2%)
2002	22202	2005 (9.0%)
2003	21445	1890 (8.8%)
2004	22119	1883 (8.5%)
2005	21256	1821 (8.6%)
2006	22537	1900 (8.4%)
2007	26541	2252 (8.5%)
2008	27350	2291 (8.4%)
2009	26937	2209 (8.2%)
2010	27762	2193 (7.9%)
2011	32180	2381(7.4%)
2012	31192	2183 (7.0%)
2013	29820	1953 (6.5%)

Box 23. HBsAg prevalence and age breakdown of antenatal mothers from 1990 to 2013(Data source: FHS, DH)

	No. tested (% HBsAg +ve) according to age group				
Year	15-19	20-24	25-29	30-34	>34
1990	1044 (10.3%)	4671 (13.4%)	15228 (10.7%)	7639 (12.6%)	2780 (12.9%)
1991	987 (10.7%)	4620 (10.7%)	13151(10.4%)	8168 (11.5%)	3063 (11.8%)
1992	928 (9.6%)	5065 (11.4%)	13093 (10.6%)	8788 (10.6%)	3470 (11.7%)
1993	984 (9.0%)	5589 (10.5%)	12345 (10.3%)	9395 (11.6%)	3798 (11.0%)
1994	951 (7.8%)	5723 (9.8%)	11590 (9.7%)	10158 (10.6%)	3998 (10.4%)
1995	922 (8.4%)	4979 (9.7%)	10619 (9.6%)	10112 (9.8%)	4283 (10.3%)
1996	842 (7.8%)	4765 (10.3%)	10137(9.5%)	9759 (9.5%)	5908 (10.6%)
1997	902 (7.1%)	4207 (9.3%)	8895 (9.6%)	7982 (9.3%)	3897 (9.3%)
1998	911 (5.8%)	3887 (9.2%)	8507(9.3%)	7418 (8.8%)	3851 (9.3%)
1999	794 (7.7%)	3777 (8.6%)	8068 (9.3%)	7196 (8.2%)	3975 (9.3%)
2000	618 (6.8%)	2974 (10.1%)	6466 (9.5%)	5818 (8.0%)	3192 (8.7%)
2001	659 (7.3%)	3516 (9.5%)	8330 (10.1%)	6936 (8.3%)	3915 (9.0%)
2002	484 (5.0%)	2829 (9.7%)	9120 (9.7%)	6351 (8.5%)	3414 (8.1%)
2003	548 (4.9%)	2880 (9.9%)	7614 (9.4%)	6789 (8.3%)	3602 (8.2%)
2004	510 (6.1%)	2854 (8.4%)	7161 (8.9%)	7732 (8.6%)	3856 (8.1%)
2005	445 (3.4%)	2753 (8.9%)	6063 (9.5%)	7869 (8.6%)	4114 (7.4%)
2006	516 (4.8%)	2590 (8.0%)	6271 (8.7%)	8637 (8.6%)	4514 (8.4%)
2007	520 (4.0%)	2929 (8.4%)	7301 (9.3%)	10232 (8.7%)	5551 (7.5%)
2008	533 (3.2%)	2968 (8.0%)	7652 (8.6%)	10354 (8.8%)	5838 (8.0%)
2009	434 (3.2%)	2830 (8.7%)	7444 (9.3%)	10156 (7.9%)	6071 (7.7%)
2010	442 (2.2%)	2903 (8.0%)	7817 (8.5%)	10211 (7.9%)	6385 (7.6%)
2011	440 (2.5%)	2898 (6.5%)	9010 (8.1%)	12273 (7.3%)	7552 (7.5%)
2012	460 (2.6%)	2467 (4.4%)	8161 (7.5%)	12664 (7.2%)	7437 (7.1%)
2013	419 (5.0%)	2237 (4.1%)	7526 (6.7%)	12466 (6.7%)	7168 (7.3%)

Box 24. Prevalence of hepatitis B markers in police officers, by sex from 1996 to 2006 and 2013 (Data source: DH)

	Male			Female			All		
Year	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)
1996	2080	138 (6.6%)	740 (35.6%)	413	15 (3.6%)	113 (27.4%)	2493	153 (6.1%)	853 (34.2%)
1997	4227	346 (8.2%)	1489 (35.2%)	472	26 (5.5%)	152 (32.2%)	4699	372 (7.9%)	1641 (34.9%)
1998	2316	177 (7.6%)	678 (29.3%)	284	16 (5.6%)	74 (26.1%)	2600	193 (7.4%)	752 (28.9%)
1999	1399	93 (6.6%)	424 (30.3%)	322	17 (5.3%)	91 (28.3%)	1721	110 (6.4%)	515 (29.9%)
2000	1300	83 (6.4%)	395 (30.4%)	244	3 (1.2%)	65 (26.6%)	1544	86 (5.6%)	460 (29.8%)
2001	1058	69 (6.5%)	330 (31.2%)	221	6 (2.7%)	78 (35.3%)	1279	75 (5.9%)	408 (31.9%)
2002	1374	77 (5.6%)	416 (30.3%)	270	10 (3.7%)	81 (30%)	1644	87 (5.3%)	497 (30.2%)
2003	1415	69 (4.9%)	388 (27.4%)	259	8 (3.1%)	71 (27.4%)	1674	77 (4.6%)	459 (27.4%)
2004	1105	58 (5.2%)	361 (32.7%)	188	5 (2.7%)	79 (42%)	1293	63 (4.9%)	440 (34%)
2005	1613	68 (4.2%)	562 (34.8%)	323	13 (4.0%)	137 (42.4%)	1936	81 (4.2%)	699 (36.1%)
2006	195	9 (4.6%)	74 (37.9%)	44	2 (4.5%)	20 (45.5%)	239	11 (4.6%)	94 (39.3%)
2012*	1494	49 (3.3%)	635 (42.5%)	338	6 (1.8%)	165 (48.8%)	1832	55 (3.0%)	800 (43.7%)
2013	1812	52 (2.9%)	751 (41.4%)	506	13 (2.6%)	207 (40.9%)	2318	65 (2.8%)	958 (41.3%)

Note: Data was not available from 2007-Feb 2012
** For a period between Mar-Dec 2012*

Box 25. Prevalence of hepatitis B markers in police officers, by age from 1996 to 2006 and 2013(Data source: DH)

	Age group														
	≤20			21-30			31-40			41-50			51-60		
Year	No. tested	% HBsAg +ve	%Anti-HBs +ve	No. tested	% HBsAg +ve	%Anti-HBs +ve	No. tested	% HBsAg +ve	%Anti-HBs +ve	No. tested	% HBsAg +ve	%Anti-HBs +ve	No. tested	% HBsAg +ve	%Anti-HBs +ve
1996	17	0.0	35.3	733	4.8	24.4	1155	6.8	32.9	544	5.9	49.6	44	18.2	40.9
1997	15	6.7	46.7	1494	6.1	25.4	2081	7.3	35.0	999	11.4	46.6	110	13.6	55.5
1998	387	5.9	20.7	969	5.5	25.0	828	8.3	30.8	356	12.4	40.4	60	6.7	51.7
1999	270	4.4	24.1	799	6.1	27.5	428	6.8	31.8	202	8.9	42.1	22	9.1	40.9
2000	72	4.2	22.2	746	6.4	24.3	460	4.3	31.3	242	5.8	44.6	24	4.2	45.8
2001	68	4.4	30.9	602	5.8	28.4	339	5.6	30.7	225	6.2	40.0	45	8.9	48.9
2002	145	4.8	29.7	697	4.9	25.3	443	3.6	29.6	307	9.1	37.5	52	3.8	61.5
2003	72	1.4	16.7	702	4.8	22.9	505	4.6	26.5	357	5.0	38.1	38	2.6	42.1
2004	8	0.0	37.5	466	5.2	35.6	441	3.4	28.6	321	5.9	39.6	57	8.8	31.6
2005	80	1.3	52.5	791	3.8	32.7	533	4.3	31.0	427	4.2	43.3	105	8.6	45.7
2006	0	-	-	39	0.0	51.3	86	5.8	36.0	90	4.4	36.7	24	8.3	41.7
2012*	267	0.7	20.2	1169	2.1	47.3	122	6.6	53.3	203	5.9	47.8	71	11.3	43.7
2013	393	0.0	24.4	1635	2.7	43.8	95	4.2	57.9	133	11.3	46.6	62	3.2	46.8

Note: Data was not available from 2007-Feb 2012
** For a period between Mar-Dec 2012*

Box 26. Prevalence of HBsAg from the Community Research Project on Viral Hepatitis (CRPVH) 2001 (Data source: DH)

	Male		Female		Total	
Age Group	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)
18-30	72	6 (8.3%)	87	6 (6.9%)	159	12 (7.5%)
31-40	93	5 (5.4%)	144	20 (13.9%)	237	25 (10.5%)
41-50	100	20 (20.0%)	183	10 (5.5%)	283	30 (10.6%)
51 & Over	111	8 (7.2%)	146	7 (4.8%)	257	15 (5.8%)
Total	376	39 (10.4%)	560	43 (7.7%)	936	82 (8.8%)

Box 27. Prevalence of hepatitis B markers in newly recruited health care workers from 2001 to 2013 (Data source: DH)

	Male		Female	
Year	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)
2001	440	27 (6.1%)	613	36 (5.9%)
2002	499	23 (4.6%)	730	38 (5.2%)
2003	373	20 (5.4%)	531	27 (5.1%)
2004	307	13 (4.2%)	644	37 (5.7%)
2005	396	22 (5.6%)	956	51 (5.3%)
2006	220	8 (3.6%)	449	25 (5.6%)
2007	204	8 (3.9%)	102	4 (3.9%)
2008	232	7 (3.0%)	187	9 (4.8%)
2009	226	14 (6.2%)	328	14 (4.3%)
2010	307	15 (4.9%)	239	10 (4.2%)
2011	370	12 (3.2%)	233	3 (1.3%)
2012	318	18 (5.7%)	377	12 (3.2%)
2013	282	8 (2.8%)	418	19 (4.5%)

Box 28. HBsAg prevalence among tuberculosis patients treated at chest clinics from 2005 to 2013 (March to May) (Data source: TB and Chest Service, CHP, DH)

	Male		Female		Total	
Year	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)
2005	442	52 (11.8%)	242	17 (7.0%)	684	69 (10.1%)
2006	821	97 (11.8%)	446	27 (6.1%)	1267	124 (9.8%)
2007	768	96 (12.5%)	420	29 (6.9%)	1188	125 (10.5%)
2008	648	62 (9.6%)	382	30 (7.9%)	1030	92 (8.9%)
2009	759	73 (9.6%)	438	30 (6.8%)	1197	103 (8.6%)
2010	669	64 (9.6%)	353	22 (6.2%)	1022	86 (8.4%)
2011	674	77 (11.4%)	382	29 (7.6%)	1056	106 (10.0%)
2012	651	59 (9.1%)	367	27 (7.4%)	1018	86 (8.4%)
2013	664	70 (10.5%)	369	25 (6.8%)	1033	95 (9.2%)

Box 29. HBsAg prevalence, stratified by age and by years, among tuberculosis patients treated at chest clinics from 2005 to 2013 (March to May) (Data source: TB and Chest Service, CHP, DH)

	Age group									
	0-19		20-39		40-59		≥60		Total	
Year	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)
2005	31	1 (3.2%)	168	11 (6.5%)	204	34 (16.7%)	281	23 (8.2%)	684	69 (10.1%)
2006	47	2 (4.3%)	314	21 (6.7%)	402	57 (14.2%)	504	44 (8.7%)	1267	124 (9.8%)
2007	57	1 (1.8%)	287	20 (7.0%)	374	60 (16.0%)	470	44 (9.4%)	1188	125 (10.5%)
2008	26	1 (3.8%)	256	14 (5.5%)	316	42 (13.3%)	432	35 (8.1%)	1030	92 (8.9%)
2009	45	0 (0.0%)	275	22 (8.0%)	370	56 (15.1%)	507	25 (4.9%)	1197	103 (8.6%)
2010	34	0 (0.0%)	224	15 (6.7%)	315	39 (12.4%)	449	32 (7.1%)	1022	86 (8.4%)
2011	35	0 (0.0%)	259	18 (6.9%)	303	45 (14.9%)	459	43 (9.4%)	1056	106 (10.0%)
2012	32	0 (0.0%)	261	21 (8.0%)	315	32 (10.2%)	410	33 (8.0%)	1018	86 (8.4%)
2013	54	1 (1.9%)	228	13 (5.7%)	320	41 (12.8%)	431	40 (9.3%)	1033	95 (9.2%)

Box 30. Prevalence of hepatitis B markers in persons attending Therapeutic Prevention Clinic of Integrated Treatment Centre (ITC) for post-exposure management, from July 1999 to 2012 (Data source: ITC, CHP, DH)

	Health care workers			Non- Health care workers			Total		
Year	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)
Jul-Dec 1999	23	2 (8.7%)	11 (47.8%)	87	13 (14.9%)	41 (47.1%)	110	15 (13.6%)	52 (47.3%)
2000	77	5 (6.5%)	56 (72.7%)	217	20 (9.2%)	91 (41.9%)	294	25 (8.5%)	147 (50.0%)
2001	103	2 (1.9%)	78 (75.7%)	313	20 (6.4%)	143 (45.7%)	416	22 (5.3%)	221 (53.1%)
2002	99	9 (9.1%)	62 (62.6%)	252	22 (8.7%)	133 (52.8%)	351	31 (8.8%)	195 (55.6%)
2003	96	6 (6.3%)	66 (68.8%)	201	24 (11.9%)	81 (40.3%)	297	30 (10.1%)	147 (49.5%)
2004	66	4 (6.1%)	41 (62.1%)	182	15 (8.2%)	97 (53.3%)	248	19 (7.7%)	138 (55.6%)
2005	49	3 (6.1%)	31 (63.3%)	206	13 (6.3%)	99 (48.1%)	255	16 (6.3%)	130 (51.0%)
2006	54	6 (11.1%)	33 (61.1%)	289	15 (5.2%)	151 (52.2%)	343	21 (6.1%)	184 (53.6%)
2007	54	1 (1.9%)	45 (83.3%)	228	18 (7.9%)	88 (38.6%)	282	19 (6.7%)	133 (47.2%)
2008	54	2 (3.7%)	39 (72.2%)	235	20 (8.5%)	111 (47.2%)	289	22 (7.6%)	150 (51.9%)
2009	56	1 (1.8%)	41 (73.2%)	297	22 (7.4%)	138 (46.5%)	353	23 (6.5%)	179 (50.7%)
2010	47	1 (2.1%)	33 (70.2%)	245	10 (4.1%)	137 (55.9%)	292	11 (3.8%)	170 (58.2%)
2011	54	1 (1.9%)	35 (64.8%)	270	12 (4.4%)	159 (58.9%)	324	13 (4.0%)	194(59.9%)
2012	70	2 (2.9%)	54 (77.1%)	311	16 (5.1%)	173 (55.6%)	381	18 (4.7%)	227 (59.6%)
Total	902	45 (5.0%)	625 (69.3%)	3333	240 (7.2%)	1642 (49.3%)	4235	285 (6.7%)	2267 (53.5%)

Box 31. Prevalence of hepatitis B markers in drug users from 1990 to 2010 (Data source: PHLSB, CHP, DH)

Year	No. tested	HBsAg (% +ve)	Anti-HBs (%+ve)	Anti-HBc* (%+ve)	Any marker (%+ve)
1990	1067	13.4	59.0	15.7	90.8
1991	1517	14.4	54.4	20.5	89.3
1992	832	13.9	49.0	21.4	84.4
1993	744	14.4	43.4	16.4	69.2
1994	607	12.9	38.1	13.5	64.1
1995	190	10.5	36.8	12.1	58.9
1996	358	8.7	43.0	12.6	62.8
1997	290	6.6	36.2	15.9	53.4
1998	290	10.0	43.4	7.9	59.3
1999	725	11.2	44.8	13.8	67.2
2000	892	11.4	42.5	15.8	67.8
2001	654	11.6	41.3	17.3	70.2
2002	553	12.7	43.0	16.6	72.3
2003	198	10.1	42.4	12.6	65.2
2004	45	11.1	57.8	4.4	73.3
2005	26	11.5	46.2	11.5	69.2
2006	6	33.3	50.0	16.7	100.0
2007	11	0.0	81.8	9.1	90.9
2008	7	28.6	28.6	14.3	71.4
2009	11	9.1	72.7	9.1	100.0
2010	12	8.3	58.3	8.3	100.0

**Anti-HBc was not tested in specimens that were HBsAg positive*

Box 32. HBsAg prevalence in HIV/AIDS patients first HBV marker in ITC between 2000 and 2013 (Data source: ITC, CHP, DH)

	Male		Female		Total	
Year	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)	No. tested	HBsAg +ve (%)
2000	57	6 (10.5%)	17	1 (5.9%)	74	7 (9.5%)
2001	75	11 (14.7%)	23	1 (4.3%)	98	12 (12.2%)
2002	112	14 (12.5%)	22	1 (4.5%)	134	15 (11.2%)
2003	93	12 (12.9%)	15	2 (13.3%)	108	14 (13.0%)
2004	115	20 (17.4%)	23	2 (8.7%)	138	22 (15.9%)
2005	132	8 (6.1%)	29	1 (3.4%)	161	9 (5.6%)
2006	188	26 (13.8%)	22	3 (13.6%)	210	29 (13.8%)
2007	216	27 (12.5%)	27	1 (3.7%)	243	28 (11.5%)
2008	203	22 (10.8%)	33	1 (3.0%)	236	23 (9.7%)
2009	170	16 (9.4%)	27	1 (3.7%)	197	17 (8.6%)
2010	160	20 (12.5%)	34	2 (5.9%)	194	22 (11.3%)
2011	167	17 (10.2%)	33	2 (6.1%)	200	19 (9.5%)
2012	226	27 (11.9%)	44	2 (4.5%)	270	29 (10.7%)
2013	263	15 (5.7%)	41	2 (4.9%)	304	17 (5.6%)

Box 33. Prevalence of HBV infection per HIV risk in HIV/AIDS patients first HBV marker in ITC between 2000 and 2013 (Data source: ITC, CHP, DH)

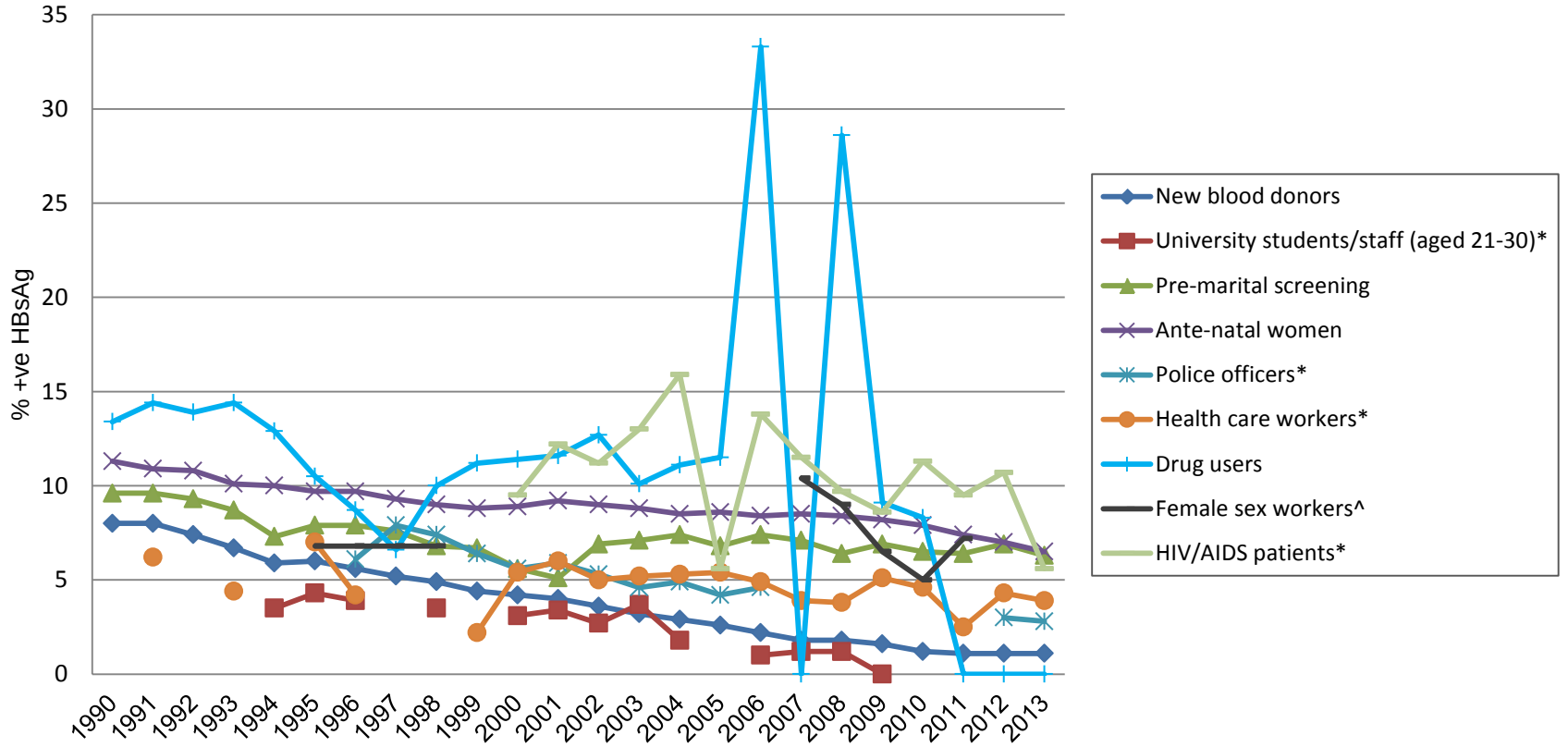
HIV risk	No. tested	HBsAg +ve (%)	Anti-HBs +ve (%)
Heterosexual male	647	78 (12.1%)	294 (45.4%)
Heterosexual female	366	22 (6.0%)	155 (42.3%)
Homo/Bi-sexual	1273	122 (9.6%)	691 (54.3%)
Drug user	241	39 (16.2%)	118 (49.0%)
Blood/blood product recipient	11	0 (0.0%)	5 (45.5%)
Perinatal	4	0 (0.0%)	1 (25.0%)
Undetermined	25	2 (8.0%)	10 (40.0%)
Total	2567	263 (10.2%)	1274 (49.6%)

Box 34. HBsAg prevalence in different population groups from 1990 to 2013 (Data source: multiple sources)

	% HBsAg+										
Year	New blood donors	University students/staff (aged 21-30)	Pre-marital screening	Antenatal women	Police officers	Health care workers	Drug users	Female sex workers	HIV/AIDS patients	Tuberculosis patients	TPC patients
1990	8.0	-	9.6	11.3	-	-	13.4	-	-	-	-
1991	8.0	-	9.6	10.9	-	6.2	14.4	-	-	-	-
1992	7.4	-	9.3	10.8	-	-	13.9	-	-	-	-
1993	6.7	-	8.7	10.1	-	4.4	14.4	-	-	-	-
1994	5.9	3.5	7.3	10.0	-	-	12.9	-	-	-	-
1995	6.0	4.3	7.9	9.7	-	7.0	10.5	6.8^	-	-	-
1996	5.6	3.9	7.9	9.7	6.1	4.2	8.7	6.8^	-	-	-
1997	5.2	-	7.6	9.3	7.9	-	6.6	6.8^	-	-	-
1998	4.9	3.5	6.8	9.0	7.4	-	10.0	6.8^	-	-	-
1999	4.4	-	6.7	8.8	6.4	2.2	11.2	-	-	-	13.6*
2000	4.2	3.1	5.6	8.9	5.6	5.4	11.4	-	9.5	-	8.5
2001	4.0	3.4	5.1	9.2	5.9	6.0	11.6	-	12.2	-	5.3
2002	3.6	2.7	6.9	9.0	5.3	5.0	12.7	-	11.2	-	8.8
2003	3.2	3.7	7.1	8.8	4.6	5.2	10.1	-	13	-	10.1
2004	2.9	1.8	7.4	8.5	4.9	5.3	11.1	-	15.9	-	7.7
2005	2.6	-	6.8	8.6	4.2	5.4	11.5	-	5.6	10.1	6.3
2006	2.2	1.0	7.4	8.4	4.6	4.9	33.3	-	13.8	9.8	6.1
2007	1.8	1.2	7.1	8.5	-	3.9	0.0	10.4**	11.5	10.5	6.7
2008	1.8	1.2	6.4	8.4	-	3.8	28.6	9.0	9.7	8.9	7.6
2009	1.6	0.0	6.9	8.2	-	5.1	9.1	6.5	8.6	8.6	6.5
2010	1.2	-	6.5	7.9	-	4.6	8.3	5.0	11.3	8.4	3.8
2011	1.1	-	6.4	7.4	-	2.5	-	7.2***	9.5	10.0	4.0
2012	1.1	-	6.9	7.0	3.0****	4.3	-	-	10.7	8.4	4.7
2013	1.1	-	6.3	6.5	2.8	3.9	-	-	5.6	9.2	-

For a period between Jul-Dec 1999; **For a period between Aug-Dec 2007, * For a period between Jan-Jul 2011, **** For a period between Mar-Dec 2012*
^Figure is the average of 1995-1998

Box 35. Trends of HBsAg in selected population groups from 1990 to 2013 (Data source: multiple sources)



**No data for university students/staff (aged 21-30) in year 1990-1993, 1997, 1999, 2005, 2009-2012. No data for police officers in year 1990-1995, 2007-2011. The figure for 2012 for police officers is for a period between Mar-Dec 2012. No data for health care workers in year 1990, 1992, 1994, 1997-1998. No data for HIV/AIDS patients in year 1990-1999.*

^No data for female sex workers in year 1990-1994, 1999-2006. The figures for 1995-1998 are the average of the four years. The figure for 2007 is for a period between Aug-Dec 2007. The figure for 2011 is for a period between Jan-Jul 2011

Box 36. Hepatitis B immunisation coverage rates among children aged 2 to 5 by year of birth (Data source: ref 30, 31, 32& unpublished DH data)

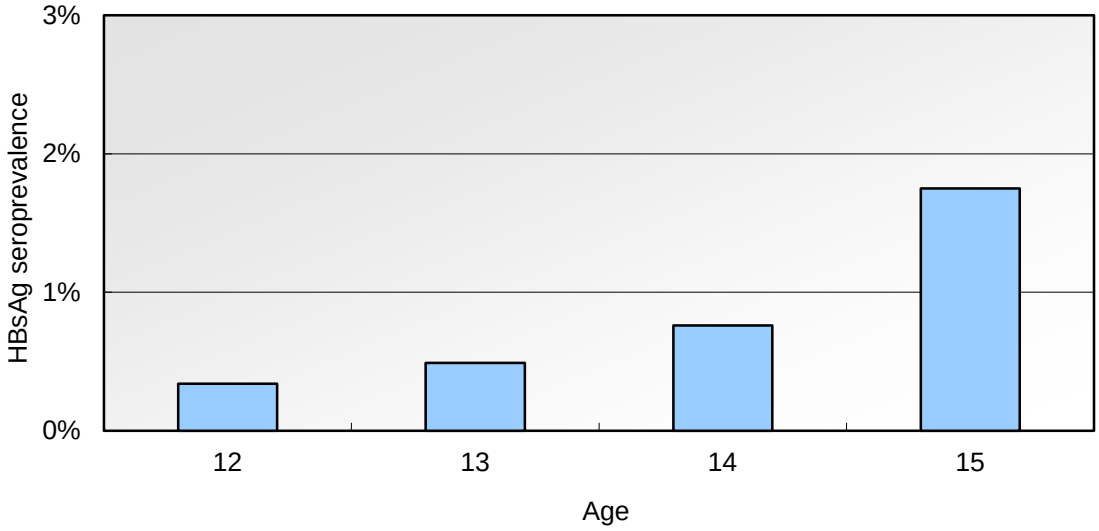
Year of Survey	Year of Birth	First dose (%)	Second dose (%)	Third dose (%)
2001	1995	99.5	99.5	99.1
	1996	99.1	99	98.6
2003	1997	99.5	99.3	99.1
	1998	99.9	99.9	99.6
	1999	100	100	99.7
2006	2000	99.9	99.8	99.6
	2001	99.9	99.9	99.6
	2002	99.9	99.8	99.5
2009	2003	99.9	99.8	99.5
	2004	99.9	99.9	99.8
	2005	99.7	99.7	99.5
	2006	100	100	99.7
2012	2006	99.6	99.5	99.0
	2007	99.8	99.8	99.3
	2008	99.8	99.8	99.3
	2009	100	100	98.8

Box 37. Cumulative statistics (as of September) of the supplementary hepatitis B vaccination programme for Primary 6 students from the school years 1998 to 2013 (Data source: DH)

	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Cumulative no. of Primary 6 students	79641	86481	85612	86052	86515	86208	83974	83164	81818	77273	73757	67310	63332	63394	57487
First Dose															
Cumulative no. eligible for vaccination	26624	25813	17171	15479	14245	10625	8433	6648	6351	6204	5165	4698	3736	2509	2376
Cumulative no. administered	26248	25511	16985	15333	14084	10519	8313	6591	6262	6095	5043	4520	3563	2318	2237
Acceptance rate (at the present campaign)	98.60%	98.80%	98.90%	99.10%	98.90%	99.00%	98.60%	99.10%	98.60%	98.20%	97.60%	96.2%	95.4%	92.4%	94.1%
Coverage rate (for the whole Primary 6 population)	99.50%	99.70%	99.80%	99.80%	99.80%	99.90%	99.80%	99.90%	99.90%	99.90%	99.80%	99.7%	99.7%	99.7%	99.8%
Second Dose															
Cumulative no. eligible for vaccination	26626	25829	17182	15485	14250	10626	8545	6710	6392	6243	5165	4698	3787	2573	2432
Cumulative no. administered	26096	25361	16890	15206	13800	10341	8185	6573	6278	6068	4969	4398	3516	2286	2203
Acceptance rate (at the present campaign)	98.00%	98.20%	98.30%	98.20%	96.80%	97.30%	95.80%	98.00%	98.20%	97.20%	96.20%	93.6%	92.8%	88.8%	90.6%
Coverage rate (for the whole Primary 6 population)	99.30%	99.50%	99.70%	99.70%	99.50%	99.70%	99.60%	99.80%	99.80%	99.80%	99.70%	99.5%	99.6%	99.5%	99.6%
Third Dose															
Cumulative no. eligible for vaccination	26647	25845	17771	16119	14918	11222	9300	7397	6986	6741	5575	5032	4104	2825	2692
Cumulative no. administered	25420	24559	16741	14947	13999	10069	8478	6965	6607	6273	4817	4409	*3526	2344	2229
Acceptance rate (at the present campaign)	95.40%	95.00%	94.20%	92.70%	93.80%	89.70%	91.20%	94.20%	94.60%	93.10%	86.40%	87.6%	85.9%	83.0%	82.8%
Coverage rate (for the whole Primary 6 population)	98.50%	98.50%	98.80%	98.60%	98.90%	98.70%	99.00%	99.50%	99.50%	99.40%	99.00%	99.1%	99.1%	99.2%	99.2%

*Note: * figure revised by CHP*

Box 38. HBsAg seroprevalence by age among children aged 12 to 15 years in 2009 (Data source: unpublished data of DH)



5. Tabulated results of seroprevalence of hepatitis C

Box Title **Page**

Box 39. Anti-HCV prevalence in new blood donors, 1991 to 2013 (Data source: HKRCBTS)

Year	No. of new donors	Anti-HCV+ve (%)
1991	48769	17 (0.04%)
1992	43674	28 (0.06%)
1993	36146	36 (0.10%)
1994	38077	24 (0.06%)
1995	39778	28 (0.07%)
1996	40875	24 (0.06%)
1997	40419	35 (0.09%)
1998	43756	29 (0.07%)
1999	40960	40 (0.10%)
2000	41166	24 (0.06%)
2001	43415	30 (0.07%)
2002	42292	34 (0.08%)
2003	36732	25 (0.07%)
2004	41679	37 (0.09%)
2005	42643	41 (0.10%)
2006	40029	33 (0.08%)
2007	40287	40 (0.10%)
2008	40909	44 (0.11%)
2009	38679	40 (0.10%)
2010	41953	40 (0.09%)
2011	45298	44 (0.10%)
2012	42068	33 (0.08%)
2013	40220	35 (0.09%)

Box 40. Anti-HCV prevalence and its gender and age breakdown in new blood donors in 2013 (Data source: HKRCBTS)

	Male		Female	
Age Group	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)
16-19	10080	3 (0.03%)	12222	9 (0.07%)
20-29	4850	4 (0.08%)	5078	4 (0.08%)
30-39	1909	5 (0.26%)	2412	3 (0.12%)
40-49	846	2 (0.24%)	1635	2 (0.12%)
>49	453	3 (0.66%)	735	0 (0.00%)
Total	18138	17 (0.09%)	22082	18 (0.08%)

Box 41. Prevalence of anti-HCV in participants of Community Research Project on Viral Hepatitis (CRPVH) 2001 (Data source: DH)

Age group	No. Tested	Anti-HCV +ve (%)
18-29	137	0 (0.0%)
30-39	223	1 (0.4%)
40-49	291	0 (0.0%)
50-59	170	2 (1.2%)
60 & over	115	0 (0.0%)
All	936	3 (0.3%)

Box 42. Prevalence of anti-HCV at baseline screening of injured persons attending Therapeutic Prevention Clinic of Integrated Treatment Centre (ITC), from July 1999 to 2012 (Data source: ITC, CHP, DH)

	Health care workers		Non- Health care workers		Total	
Year	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)
Jul-Dec 1999	2	0 (0.0%)	3	0 (0.0%)	5	0 (0.0%)
2000	15	0 (0.0%)	20	1 (5.0%)	35	1 (2.9%)
2001	22	0 (0.0%)	50	1 (2.0%)	72	1 (1.4%)
2002	27	0 (0.0%)	50	1 (2.0%)	77	1 (1.3%)
2003	18	0 (0.0%)	43	0 (0.0%)	61	0 (0.0%)
2004	17	0 (0.0%)	40	0 (0.0%)	57	0 (0.0%)
2005	10	0 (0.0%)	57	0 (0.0%)	67	0 (0.0%)
2006	33	0 (0.0%)	139	0 (0.0%)	172	0 (0.0%)
2007	36	0 (0.0%)	118	0 (0.0%)	154	0 (0.0%)
2008	23	0 (0.0%)	126	3 (2.4%)	149	3 (2.0%)
2009	25	0 (0.0%)	160	1 (0.6%)	185	1 (0.5%)
2010	25	0 (0.0%)	131	0 (0.0%)	156	0 (0.0%)
2011	17	0 (0.0%)	145	0 (0.0%)	162	0 (0.0%)
2012	37	0 (0.0%)	153	0 (0.0%)	190	0 (0.0%)
Total	307	0 (0.0%)	1235	7 (0.6%)	1542	7 (0.4%)

Box 43. Anti-HCV prevalence in drug users on rehabilitation (Data source: PHLSB, CHP, DH)

Year	No. tested	Anti-HCV +ve (%)
1988/1989	134	99 (73.9%)
2000/2001	210	97 (46.2%)

Box 44. Anti-HCV prevalence in HIV/AIDS patients first HCV marker in ITC between 2000 and 2013 (Data source: ITC, CHP, DH)

	Male		Female		Total	
Year	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)
2000	54	5 (9.3%)	15	0 (0.0%)	69	5 (7.2%)
2001	72	9 (12.5%)	22	1 (4.5%)	94	10 (10.6%)
2002	118	9 (7.6%)	23	1 (4.3%)	141	10 (7.1%)
2003	89	13 (14.6%)	14	0 (0.0%)	103	13 (12.6%)
2004	108	21 (19.4%)	21	3 (14.3%)	129	24 (18.6%)
2005	137	19 (13.9%)	31	1 (3.2%)	168	20 (11.9%)
2006	186	49 (26.3%)	23	3 (13.0%)	209	52 (24.9%)
2007	215	41 (19.1%)	27	1 (3.7%)	242	42 (17.4%)
2008	201	40 (19.9%)	33	3 (9.1%)	234	43 (18.4%)
2009	168	33 (19.6%)	27	1 (3.7%)	195	34 (17.4%)
2010	164	15 (9.1%)	33	0 (0.0%)	197	15 (7.6%)
2011	168	12 (7.1%)	33	4 (12.1%)	201	16 (8.0%)
2012	226	10 (4.4%)	45	2 (4.4%)	271	12 (4.4%)
2013	264	11 (4.2%)	40	0 (0.0%)	304	11 (3.6%)

Box 45. Prevalence of HCV infection per HIV risk in HIV/AIDS patients first HCV marker in ITC between 2000 and 2013 (Data source: ITC, CHP, DH)

HIV risk	No. tested	Anti-HCV +ve (%)
Heterosexual male	642	43* (6.7%)
Heterosexual female	363	7 (1.9%)
Homo/Bi-sexual	1272	16 (1.3%)
Drug user	240	237 (98.8%)
Blood/blood product recipient	11	3 (27.3%)
Perinatal	4	0 (0.0%)
Undetermined	25	1 (4.0%)
Total	2557	307 (12.0%)

** 27 out of 43 had a past history of injecting drug use*

Box 46. Prevalence of hepatitis C from screening of blood donors and clinical testing of patients in 2 major public hospitals from 2003 to 2013 (Data source: HKRCBTS, PMH Microbiology Laboratory, PWH Microbiology Laboratory (since 2005))

	2003		2004		2005		2006		2007		2008		2009		2010		2011		2012		2013		Overall	
Category	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	Anti-HCV +ve (%)	No. tested	No. tested	No. tested	No. tested	No. tested	Anti-HCV +ve (%)
1. BLOOD DONATION	178188	28 (< 0.1%)	197426	42 (< 0.1%)	197975	50 (< 0.1%)	196353	35 (< 0.1%)	205682	42 (< 0.1%)	211963	52 (< 0.1%)	231375	47 (< 0.1%)	226775	40 (< 0.1%)	234444	51 (< 0.1%)	243525	37 (< 0.1%)	247069	46 (< 0.1%)	2370775	470 (< 0.1%)
2. SCREENING																								
Pre-transplant	7	0 (0.0%)	20	0 (0.0%)	18	2 (11.1%)	17	0 (0.0%)	31	1 (3.2%)	18	0 (0.0%)	48	1 (2.1%)	68	2 (2.9%)	80	0 (0.0%)	96	0 (0.0%)	82	0 (0.0%)	485	6 (1.2%)
Drug users	167	87 (52.1%)	202	100 (49.5%)	298	144 (48.3%)	177	59 (33.3%)	118	29 (24.6%)	134	66 (49.3%)	154	93 (60.4%)	116	75 (64.7%)	84	61 (72.6%)	103	53 (51.5%)	112	63 (56.3%)	1665	830 (49.8%)
Needlestick injuries	90	1 (1.1%)	130	1 (0.8%)	438	8 (1.8%)	478	7 (1.5%)	546	6 (1.1%)	542	6 (1.1%)	574	5 (0.9%)	550	5 (0.9%)	559	4 (0.7%)	592	6 (1.0%)	610	4 (0.7%)	5109	53 (1.0%)
Haemodialysis/ peritoneal dialysis	508	5 (1.0%)	463	13 (2.8%)	1527	40 (2.6%)	1762	35 (2.0%)	1706	37 (2.2%)	1656	31 (1.9%)	1936	34 (1.8%)	2016	36 (1.8%)	2251	34 (1.5%)	2452	34 (1.4%)	2449	37 (1.5%)	18726	336 (1.8%)
Post-renal transplant	36	2 (5.6%)	48	0 (0.0%)	401	17 (4.2%)	446	18 (4.0%)	413	19 (4.6%)	470	21 (4.5%)	650	19 (2.9%)	680	25 (3.7%)	722	18 (2.5%)	737	17 (2.3%)	718	16 (2.2%)	5321	172 (3.2%)
Haematology (pre-chemotherapy)	36	1 (2.8%)	43	0 (0.0%)	118	3 (2.5%)	208	1 (0.5%)	223	0 (0.0%)	260	5 (1.9%)	262	2 (0.8%)	344	6 (1.7%)	399	1 (0.3%)	415	4 (1.0%)	444	2 (0.5%)	2752	25 (0.9%)
Rheumatology (pre-methotrexate)	55	0 (0.0%)	56	1 (1.8%)	149	1 (0.7%)	207	1 (0.5%)	210	1 (0.5%)	332	1 (0.3%)	396	5 (1.3%)	430	1 (0.2%)	464	2 (0.4%)	449	2 (0.4%)	471	4 (0.8%)	3219	19 (0.6%)
History of blood transfusion	35	2 (5.7%)	46	7 (15.2%)	132	12 (9.1%)	95	11 (11.6%)	125	12 (9.6%)	197	18 (9.1%)	263	32 (12.2%)	239	21 (8.8%)	168	19 (11.3%)	197	17 (8.6%)	275	28 (10.2%)	1772	179 (10.1%)
Pre-vaccination	1	0 (0.0%)	0	0 (0.0%)	0	0 (0.0%)	0	0 (0.0%)	1	0 (0.0%)	1	0 (0.0%)	5	0 (0.0%)	0	0 (0.0%)	0	0 (0.0%)	0	0 (0.0%)	0	0 (0.0%)	8	0 (0.0%)
TOTAL (2)	935	98 (10.5%)	1008	122 (12.1%)	3081	227 (7.4%)	3390	132 (3.9%)	3373	105 (3.1%)	3610	148 (4.1%)	4288	191 (4.5%)	4443	171 (3.8%)	4727	139 (2.9%)	5041	133 (2.6%)	5161	154 (3.0%)	39057	1620 (4.1%)
3. *CLINICAL INDICATION	501	30 (6.0%)	710	51 (7.2%)	3147	155 (4.9%)	3499	170 (4.9%)	4054	179 (4.4%)	5984	215 (3.6%)	7971	216 (2.7%)	8661	262 (3.0%)	8196	293 (3.6%)	9815	308 (3.1%)	10911	323 (3.0%)	63449	2202 (3.5%)
4. OTHERS OR UNKNOWN	193	10 (5.2%)	567	23 (4.1%)	6365	192 (3.0%)	6752	205 (3.0%)	8131	229 (2.8%)	8297	128 (1.5%)	7472	131 (1.8%)	8269	102 (1.2%)	8835	132 (1.5%)	9026	131 (1.5%)	9615	136 (1.4%)	73522	1419 (1.9%)
TOTAL (2+3+4)	1629	138 (8.5%)	2285	196 (8.6%)	12593	574 (4.6%)	13641	507 (3.7%)	15558	513 (3.0%)	17891	491 (2.7%)	19731	538 (2.7%)	21373	535 (2.5%)	21758	564 (2.6%)	23882	572 (2.4%)	25687	613 (2.4%)	176028	5241 (3.0%)

**includes suspected hepatitis, work up for liver function derangement and others*

Box 47. Characteristics of anti-HCV positive subjects detected at HKRCBTS and 2 major public hospitals from 2003 to 2013 (Data source: HKRCBTS, PMH Microbiology Laboratory, PWH Microbiology Laboratory (since 2005))

		2003 (n=166)	2004 (n=238)	2005 (n=624)	2006 (n=542)	2007 (n=555)	2008 (n=543)	2009 (n=585)	2010 (n=575)	2011 (n=615)	2012 (n=609)	2013 (n=659)	Overall (n=5711)
		No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Lab	HKRCBTS	28 (16.9%)	41 (17.2%)	49 (7.9%)	35 (6.5%)	40 (7.2%)	49 (9.0%)	43 (7.4%)	38 (6.6%)	50 (6.6%)	35 (5.7%)	43 (6.5%)	451 (7.9%)
	PMH	138 (83.1%)	197 (82.8%)	229 (36.7%)	142 (26.2%)	89 (16.0%)	208 (38.3%)	273 (46.7%)	271 (47.1%)	280 (47.1%)	298 (48.9%)	279 (42.3%)	2404 (42.1%)
	PWH	-	-	346 (55.4%)	365 (67.3%)	426 (76.8%)	286 (52.7%)	269 (46.0%)	266 (46.3%)	285 (46.3%)	276 (45.3%)	337 (51.1%)	2856 (50.0%)
Sex	Male	115 (69.3%)	157 (66.0%)	413 (66.2%)	390 (72.0%)	377 (67.9%)	378 (69.6%)	415 (70.9%)	405 (70.4%)	434 (70.4%)	438 (71.9%)	464 (70.4%)	3986 (69.8%)
	Female	51 (30.7%)	81 (34.0%)	211 (33.8%)	152 (28.0%)	178 (32.1%)	165 (30.4%)	170 (29.1%)	170 (29.6%)	181 (29.6%)	171 (28.1%)	195 (29.6%)	1725 (30.2%)
	Unknown	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Age at diagnosis	Mean	41.6	44	46.8	47.4	50.3	49.8	52.9	51.2	50.8	51.1	51.0	53.7
	S.D.	14.6	14.7	15.9	16.6	16.3	17.9	16.9	17	16.5	16.3	16.6	17.9
	Range	17 - 83	11 - 86	0 - 87	0 - 101	0 - 94	0 - 88	1 - 102	0 - 90	0 - 90	0 - 99	0 – 113	0 - 113
Category	Blood donation	28 (16.9%)	42 (17.6%)	50 (8.0%)	35 (6.5%)	42 (7.6%)	52 (9.6%)	47 (8.0%)	40 (7.0%)	51 (8.3%)	37 (6.1%)	46 (7.0%)	470 (8.2%)
	Pre-transplant	0 (0.0%)	0 (0.0%)	2 (0.3%)	0 (0.0%)	1 (0.2%)	0 (0.0%)	1 (0.2%)	2 (0.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (0.1%)
	Drug users	87 (52.4%)	100 (42.0%)	144 (23.1%)	59 (10.9%)	29 (5.2%)	66 (12.2%)	93 (15.9%)	75 (13.0%)	61 (9.9%)	53 (8.7%)	63 (9.6%)	830 (14.5%)
	Needle-stick injuries	1 (0.6%)	1 (0.4%)	8 (1.3%)	7 (1.3%)	6 (1.1%)	6 (1.1%)	5 (0.9%)	5 (0.9%)	4 (0.7%)	6 (1.0%)	4 (0.6%)	53 (0.9%)
	Pre-haemodialysis/ peritoneal dialysis	5 (3.0%)	13 (5.5%)	40 (6.4%)	35 (6.5%)	37 (6.7%)	31 (5.7%)	34 (5.8%)	36 (6.3%)	34 (5.5%)	34 (5.6%)	37 (5.6%)	336 (5.9%)
	Post-renal transplant	2 (1.2%)	0 (0.0%)	17 (2.7%)	18 (3.3%)	19 (3.4%)	21 (3.9%)	19 (3.2%)	25 (4.3%)	18 (2.9%)	17 (2.8%)	16 (2.4%)	172 (3.0%)
	Haematology	1 (0.6%)	0 (0.0%)	3 (0.5%)	1 (0.2%)	0 (0.0%)	5 (0.9%)	2 (0.3%)	6 (1.0%)	1 (0.2%)	4 (0.7%)	2 (0.3%)	25 (0.4%)
	Pre-methotrexate	0 (0.0%)	1 (0.4%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	5 (0.9%)	1 (0.2%)	2 (0.3%)	2 (0.3%)	4 (0.6%)	19 (0.3%)
	History of blood transfusion	2 (1.2%)	7 (2.9%)	12 (1.9%)	11 (2.0%)	12 (2.2%)	18 (3.3%)	32 (5.5%)	21 (3.7%)	19 (3.1%)	17 (2.8%)	28 (4.2%)	179 (3.1%)
	Clinical Indication	30 (18.1%)	51 (21.4%)	155 (24.8%)	170 (31.4%)	179 (32.3%)	215 (39.6%)	216 (36.9%)	262 (45.6%)	293 (47.6%)	308 (50.6%)	323 (49.0%)	2202 (38.6%)
	Others or unknown	10 (6.0%)	23 (9.7%)	192 (30.8%)	205 (37.8%)	229 (41.3%)	128 (23.6%)	131 (22.4%)	102 (17.7%)	132 (21.5%)	131 (21.5%)	136 (20.6%)	1419 (24.8%)

Box 48. Hong Kong liver cancer statistics, by age from 2001 - 2011 (Data source: Hong Kong Cancer Registry, Hospital Authority)

	0-19						20-44						45-64						65+						Crude rate			ASR		
	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Male	Female	Total	Male	Female	Total
Year	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	CR	CR	CR	ASR	ASR	ASR
2001	4	0.5	1	0.1	5	0.3	130	9.5	26	1.7	156	5.3	590	76.9	86	12.1	676	45.7	589	169.3	211	52	800	106.2	40	9.4	24.4	32.7	7.4	20.1
2002	4	0.5	2	0.3	6	0.4	130	9.7	17	1.1	147	5.1	534	67.1	79	10.5	613	39.5	565	157.6	245	58.5	810	104.2	37.6	9.9	23.4	30	7.4	18.6
2003	6	0.8	2	0.3	8	0.5	110	8.4	25	1.6	135	4.7	581	70.5	100	12.6	681	42.1	567	154.5	263	61.4	830	104.4	38.8	11.2	24.6	30.3	8.2	19.1
2004	2	0.3	1	0.1	3	0.2	121	9.4	18	1.2	139	4.9	554	64.6	91	10.9	645	38.1	601	159.2	275	62.3	876	107	39.1	10.9	24.5	29.6	7.8	18.4
2005	2	0.3	0	0	2	0.1	110	8.7	21	1.4	131	4.7	605	67.5	110	12.4	715	40.1	607	157.8	294	65.3	901	107.9	40.6	12	25.7	29.9	8.3	18.9
2006	6	0.8	1	0.1	7	0.5	88	7.1	21	1.4	109	3.9	637	68.5	109	11.8	746	40.2	600	152.6	283	61.7	883	103.6	40.7	11.5	25.4	29.3	8	18.4
2007	2	0.3	1	0.2	3	0.2	83	6.8	13	0.8	96	3.5	621	64.7	95	9.8	716	37.1	598	148.3	277	59.1	875	100.3	39.7	10.6	24.4	27.9	7.1	17.2
2008	1	0.1	1	0.2	2	0.1	90	7.5	24	1.6	114	4.2	636	64	135	13.2	771	38.3	592	144.6	266	56.2	858	97.2	40.1	11.6	25.1	27.4	7.6	17.2
2009	2	0.3	2	0.3	4	0.3	87	7.4	20	1.3	107	4	695	68	131	12.3	826	39.6	601	143.8	294	61.1	895	99.6	42.2	12.1	26.3	27.9	7.7	17.5
2010	0	0	4	0.7	4	0.3	78	6.7	23	1.5	101	3.8	711	67.9	140	12.6	851	39.5	609	142.4	298	60.7	907	98.7	42.4	12.5	26.5	27.1	8.1	17.3
2011	6	0.9	3	0.5	9	0.7	85	7.4	22	1.5	107	4	694	65	122	10.7	816	36.9	614	140.1	312	62	926	98.4	42.4	12.2	26.3	26.8	7.5	16.8
Average	3	0.4	2	0.2	5	0.3	101	8.1	21	1.4	122	4.4	623	67.5	109	11.7	732	39.5	595	151.3	274	60.1	869	102.3	40.3	11.3	25.2	28.9	7.7	18.0

Notes:
I: Incidence rate per 100000 population
N: No. of new cases by selected age groups
ASR: Age-standardized rate (per 100000 population) is calculated based on the reference standard population used
CR: Crude rate per 100000 population

Box 49. Hong Kong liver cancer mortality statistics, by age from 2001 - 2011 (Data source: Hong Kong Cancer Registry, Hospital Authority)

	0-19						20-44						45-64						65+						Crude rate			ASR		
	Male		Female		Total		Male		Female		Total		Male		Female		Total		Male		Female		Total		Male	Female	Total	Male	Female	Total
Year	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	N	I	CR	CR	CR	ASR	ASR	ASR
2001	3	0.4	2	0.3	5	0.3	101	7.4	16	1	117	4	434	56.6	74	10.4	508	34.3	533	153.2	261	64.4	794	105.4	32.6	10.3	21.2	26.8	7.8	17.1
2002	3	0.4	1	0.1	4	0.3	98	7.3	15	1	113	3.9	425	53.4	51	6.7	476	30.7	564	157.3	224	53.5	788	101.4	33.2	8.4	20.5	26.4	5.9	16.1
2003	2	0.3	0	0	2	0.1	80	6.1	15	1	95	3.3	436	52.9	69	8.7	505	31.2	557	151.8	253	59	810	101.8	33	9.7	21	25.6	6.8	15.9
2004	2	0.3	0	0	2	0.1	66	5.1	15	1	81	2.9	428	49.9	69	8.2	497	29.3	580	153.6	257	58.2	837	102.2	32.9	9.7	20.9	24.7	6.6	15.4
2005	0	0	1	0.1	1	0.1	93	7.4	17	1.1	110	3.9	432	48.2	75	8.5	507	28.5	594	154.4	294	65.3	888	106.4	34.3	10.9	22.1	24.8	7.2	15.8
2006	2	0.3	0	0	2	0.1	49	3.9	12	0.8	61	2.2	420	45.2	64	6.9	484	26.1	604	153.6	311	67.8	915	107.4	32.9	10.8	21.3	23.3	6.7	14.7
2007	3	0.4	0	0	3	0.2	57	4.7	7	0.5	64	2.3	470	49	62	6.4	532	27.6	568	140.8	282	60.1	850	97.5	33.4	9.7	21	23.1	5.9	14.2
2008	1	0.1	0	0	1	0.1	68	5.7	17	1.1	85	3.1	480	48.3	82	8	562	27.9	567	138.5	284	60	851	96.4	33.9	10.4	21.5	22.9	6.3	14.3
2009	2	0.3	0	0	2	0.2	43	3.7	10	0.7	53	2	442	43.3	95	8.9	537	25.7	585	140	311	64.7	896	99.7	32.6	11.3	21.3	21.2	6.7	13.7
2010	0	0	0	0	0	0	35	3	15	1	50	1.9	474	45.3	89	8	563	26.1	604	141.2	313	63.8	917	99.8	33.8	11.2	21.8	21.2	6.5	13.6
2011	1	0.2	1	0.2	2	0.2	52	4.5	8	0.5	60	2.2	462	43.3	72	6.3	534	24.1	625	142.6	315	62.6	940	99.9	34.5	10.5	21.7	21.2	5.9	13.2
Average	2	0.2	0	0.1	2	0.2	67	5.4	13	0.9	81	2.9	446	48.3	73	7.8	519	28	580	147.5	282	61.9	862	101.5	33.4	10.3	21.3	23.6	6.6	14.8

Notes:
I: Mortality rate per 100000 population
N: No. of death cases by selected age groups
ASR: Age-standardized rate (per 100000 population) is calculated based on the reference standard population used
CR: Crude rate per 100000 population

ABBREVIATIONS

AIDS	Acquired immune deficiency syndrome
Anti-HAV	Antibody against hepatitis A virus
Anti-HBc	Antibody against hepatitis B core antigen
Anti-HBs	Antibody against hepatitis B surface antigen
Anti-HCV	Antibody against hepatitis C virus
Anti-HEV	Antibody against hepatitis E virus
BUHC	Baptist University Health Centre
CDSIO	Communicable Disease Surveillance and Intelligence Office
CHP	Centre for Health Protection
CRPVH	Community Research Project on Viral Hepatitis
CUHC	City University Health Centre
CUHK	Chinese University of Hong Kong
DH	Department of Health
FHS	Family Health Service
FPA	Family Planning Association
HBsAg	Hepatitis B surface antigen
HAV	Hepatitis A virus
HBV	Hepatitis B virus
HCC	Hepatocellular carcinoma
HCV	Hepatitis C virus
HCW	Health care worker
HEV	Hepatitis E virus
HIV	Human immunodeficiency virus
HKRCBTS	Hong Kong Red Cross Blood Transfusion Service
IgM	Immunoglobulin M
IDU	Injecting drug users
ITC	Integrated Treatment Centre
LUHC	Lingnan University Health Centre
MCHC	Maternal and Child Health Centre
MSM	Men who have sex with men
PHIS	Public Health Information System
PHLSB	Public Health Laboratory Services Branch
PMH	Princess Margaret Hospital
PWH	Prince of Wales Hospital
SEB	Surveillance and Epidemiology Branch
TPC	Therapeutic Prevention Clinic

REFERENCES

1. Gust ID. The epidemiology of viral hepatitis. In: Vyas GN, Dienstag JL, Hoofnagle JH, editors: Viral Hepatitis and Liver Disease. Orlando: Grune& Stratton;1984. p. 415-21.

2. Wong KH, Liu YM, Ng PS, et al. Epidemiology of hepatitis A and hepatitis E infection and their determinants in adult Chinese community in Hong Kong. J Med Virol 2004;72:538-44.

3. Chin KP, Lok ASF, Wong LSK, et al. Current seroepidemiology of hepatitis A in Hong Kong. J Med Virol 1991;34:191-3.

4. Tsang CW, Chan CL. Epidemiology of viral hepatitis in Hong Kong. In: New trends in peptic ulcer and chronic hepatitis-Part II. Chronic Hepatitis. Tokyo: Excerpta Medica;1987. p. 43-50.

5. Chiu DM, Chan MC, Yeung AC. Seroprevalence of hepatitis E virus in Hong Kong, 2008-2009. J Med Virol. 2013;85(3):459-61.

6. Centre for Health Protection, Department of Health. Review of hepatitis A and hepatitis E in Hong Kong. CD Watch 2010;7:59.

7. Centre for Health Protection, Department of Health. Review of hepatitis E infection (2001-2010). CD Watch 2011;8:1.

8. Centre for Health Protection, Department of Health. Update on local situation of hepatitis E. CD Watch 2011;8:18.

9. Chau TN, Lai ST, Tse C, et al. Epidemiology and clinical features of sporadic hepatitis E as compared with hepatitis A. Am J Gastroenterol 2006;101:292-6.

10. Lam WY, Chan RCW, Sung JJY, et al. Genotype distribution and sequence variation of hepatitis E virus, Hong Kong. Emerging Infectious Diseases 2009;15:792-4.

11. Centre for Health Protection, Department of Health. Update in hepatitis E infection in Hong Kong. CD Watch 2012;9:5.

12. Chow CW, Tsang SW, Tsang OT, et al. Comparison of acute hepatitis E infection outcome in patients with and without chronic hepatitis B infection: a 10 year retrospective study in three regional hospitals in Hong Kong. J ClinVirol. 2014;60(1):4-10.

13. Centre for Food Safety, Food and Environmental Hygiene Department. Hepatitis E Virus in Fresh Pig Livers. Risk Assessment Studies Report HKSAR 2010;44:39.

14. Kwan LC, Ho YY, Lee SS. The declining HBsAg carriage rate in pregnant women in Hong Kong. Epidemiol Infect 1997;119:281-3.

15. Cooley L, Sasadeusz J. Clinical and virological aspects of hepatitis B co-infection in individuals infected with human immunodeficiency virus type-1. J ClinVirol 2003;26:185-93.

16. Yuen MF, Sablon E, Tanaka Y, et al. Epidemiological study of hepatitis B virus genotypes, core promoter and precore mutations of chronic hepatitis B infection in Hong Kong. J Hepatol 2004;41:119-25.

17. Chan HL, Hui AY, Wong ML, et al. Genotype C hepatitis B virus infection is associated with an increased risk of hepatocellular carcinoma. Gut 2004;53:1494-8.

18. Chan HL, Tsui SK, Tse CH, et al. Epidemiological and virological characteristics of 2 subgroups of hepatitis B virus genotype C. J Infect Dis 2005;191:2022-32.

19. Zhu L, Tse CH, Wong VSW, et al. A complete genomic analysis of hepatitis B virus genotypes and mutations in HbeAg-negative chronic hepatitis B in China. J Viral Hepatol 2008;15:449-58.

20. Chan HL, Tse CH, Mo G, et al. High viral load and hepatitis B virus subgenotype Ce are associated with increased risk of hepatocellular carcinoma. J ClinOncol 2008;26:177-82.

21. Chan HL, Wong GL, Tse CH et al. Hepatitis B virus genotype C is associated with more severe liver fibrosis than genotype B. Clin Gastroenterol Hepatol 2009;7:1361-6.

22. Wong GL, Chan HL, Yiu KK, et al. Meta-analysis: The association of hepatitis B virus genotypes and hepatocellular carcinoma. Aliment PharmacolTher. 2013;37:517-26.

23. Lo CM, Cheung CK, Lau GK, et al. Significance of hepatitis B virus genotype in liver transplantation for chronic hepatitis B. Am J Transplant 2005;5:1893-900.

24. Yuen MF, Tanaka Y, Mizokami M, et al. Role of hepatitis B virus genotypes Ba and C, core promoter and precore mutations on hepatocellular carcinoma: a case control study. Carcinogenesis 2004;25:1593-8.

25. Chan AO, Yuen MF, Lam CM, et al. Prevalence and characteristics of familial hepatocellular carcinoma caused by chronic hepatitis B infection in Hong Kong. Aliment Pharmacol Ther 2004;19:401-6.

26. Ho CF, Wong KH, Chan CW, et al. Current pattern and course of acute hepatitis B virus infection in Hong Kong. J Gastroenterol Hepatol 2003;19:602-3.

27. Young BWY, Lee SS, Lim WL, et al. The long-term efficacy of plasma-derived hepatitis B vaccine in babies born to carrier mothers. J Viral Hepatol 2003;10:23-30.

28. Lin AWC, Wong KH. Long-term protection of neonatal hepatitis B vaccination in a 30-year cohort in Hong Kong. J Hepatol 2013:59:1363-4.

29. Yuen MF, Lim WL, Chan AO, et al. 18-year follow-up study of a prospective randomized trial of hepatitis B vaccinations without booster doses in children. Clin Gastroenterol Hepatol 2004;2:941-5.

30. Tse W, Mok T. Survey on Immunisation coverage among children aged two to five. Public Health & Epidemiology Bulletin 2002;11:13-8.

31. Tse WKM, Yeung SWT. Immunisation coverage among children aged two to five: an update. Public Health & Epidemiology Bulletin 2004;13:7-15.

32. Wu T, Chan SK, Kung KH, et al. Immunization coverage among children aged two to five: findings of the 2006 survey. Public Health & Epidemiology Bulletin 2007:16:57-68.

33. Chung PW, Suen SH, Chan OK, et al. Awareness and knowledge of hepatitis B infection and prevention and the use of hepatitis B vaccination in the Hong Kong adult Chinese population. Chin Med J 2012;125:422-7.

34. Centre for Health Protection, Department of Health. Hepatitis C in Hong Kong, 2008 to 2011. CD Watch 2011;8:25.

35. Chan GCB, Lim WL, Yeoh EK. Prevalence of hepatitis C infection in Hong Kong. J Gastroen Hepatol 1992;7:117-20.

36. Wong HK, Lee CK, Leung JN, et al. Risk factor analysis of hepatitis C virus infection among Chinese blood donors in Hong Kong. Transfus Med 2012 Apr;22(2):133-6.

37. Au WY, Lee V, Kho B, et al. A synopsis of current haemophilia care in Hong Kong. Hong Kong Med J 2011 Jun;17(3):189-94.

38. Chan TM, Lok AS, Cheng IK, et al. Prevalence of hepatitis C virus infection in hemodialysis patients: a longitudinal study comparing the results of RNA and antibody assays. Hepatology 1993;17:5-8.

39. Lee KCK, Lim WWL, Lee SS. High prevalence of HCV in a cohort of injectors on methadone substitution treatment. J Clin Virol 2008;41:297-300.

40. Wong NS, Chan PC, Lee SS, et al., A multilevel approach for assessing the variability of hepatitis C prevalence in injection drug users by their gathering places. Int J Infect Dis 2013 Mar;17(3):e193-8.

41. Centers for Disease Control and Prevention (CDC). Sexual Transmission of Hepatitis C Virus Among HIV-Infected Men Who Have Sex with Men --- New York City, 2005--2010. MMWR Morb Mortal Wkly Rep. 2011 Jul 22;60:945-50.

42. Lin A, Wong P, Lo J. A case series of hepatitis C infection and syphilis among HIV positive men who have sex with men. Communicable Disease Watch 2014; 11.

43. Lin AWC, Wong KH, Chan K, More safer sex intervention needed for HIV-positive MSM with higher education level for prevention of sexually transmitted hepatitis C. Poster presentation P 131; HIV Drug Therapy Glasgow 2014.

44. Monga HK, Rodriguez-Barradas MC, Breaux K, et al. Hepatitis C virus infection-related morbidity and mortality among patients with human immunodeficiency virus infection. Clin Infect Dis 2001;33:240-7.

45. Delwart E, Slikas E, Stramer SL, et al. Genetic Diversity of Recently Acquired and Prevalent HIV, Hepatitis B Virus and Hepatitis C Virus Infections in US Blood Donars. JID 2012; 205:875-85.

46. Prescott LE, Simmonds P, Lai CL, et al. Detection and clinical features of hepatitis C virus type 6 infections in blood donors from Hong Kong. J Med Virol 1996;50:168-75.

47. Wong DA, Tong LK, Lim W. High prevalence of hepatitis C virus genotype 6 among certain risk groups in Hong Kong. Eur J Epidemiol 1998;14:421-6.

48. Chan TM, Lau JYN, Wu PC, et al. Hepatitis C virus genotypes in patients on renal replacement therapy. Nephrol Dial Transplant 1998;13:731-4.

49. Zhou DX, Tang JW, Chu IM, et al. Hepatitis C virus genotype distribution among intravenous drug user and the general population in Hong Kong. J Med Virol 2006;78:574-81.

50. Chan D, Lee SS, Lee KC. The effects of widespread methadone treatment on the molecular epidemiology of hepatitis C virus infection among injecting drug users in Hong Kong. J Med Virol 2011;83:1187-94.

51. Seto WK, Lai CL, Fung J, et al. Natural history of chronic hepatitis C: genotype 1 versus genotype 6. J Hepatol 2010;53:444-8.

52. World Health Organization. World Cancer Day 2012. (Available at http://www.who.int/cancer/events/world_cancer_day2012/en/. Accessed 29 November 2012)

53. Yuen MF, Hou JL, Chutaputti A, et al. Hepatocellular carcinoma in the Asia Pacific Region. J Gastroent Hepatol 2009;24:346-353.

54. Lo CM, Fan ST, Liu CL, et al. Ten-year experience with liver transplantation at Queen Mary Hospital: retrospective study. Hong Kong Med J 2002;8:240-4.

55. Centre for Health Protection, Department of Health. Non communicable diseases and risk factors. (Available at http://www.chp.gov.hk/en/notifiable1/10/26/43.html. Accessed 28 November 2014)

56. Hong Kong Cancer Registry, Hospital Authority. (Available at http://www3.ha.org.hk/cancereg/. Accessed March 2014)