Surveillance of Viral Hepatitis in Hong Kong - 2007 Update Report

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The information contained in this Report is up to year 2007 for the surveillance data, service statistics and published research findings.

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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 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 aetiology, 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. More local data on hepatitis A relative to hepatitis E was available over the last decades. Hong Kong is of intermediate endemicity for HAV [1]. Since 1988 with the breakdown of reported hepatitis according to aetiologic 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 2007, only 68 new cases of 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, from a median of 23 years in 1989 to 30 years in 2007, with decrease in proportion of 15-24 age group people but increase in those >25 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 1.72 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. The latest

epidemiology of hepatitis A in the local general population can be estimated from a study conducted in 2001 [2]. In this household study (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 [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 [2] when compared with their corresponding 10-year younger age groups [3], signifying an aging cohort effect with no major infections in the last 10 years [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 in the last two decades. 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 in the general Chinese population (Box 9). 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. A cross-sectional survey of anti-HAV was conducted at Kowloon Bay Integrated Treatment Centre (ITC) in 2007. The subjects consisted of all HIV/AIDS patients first attended ITC (n= 108) in the second half of 2007 and convenient samples of all active HIV/AIDS patients who were <40 years old and had their yearly blood check (n= 191). Although the number of sample tested in the older age group (>40 years old group) was relatively small, it appeared that the prevalence of anti-HAV increased with age of HIV/ADIS patients. The prevalence of anti-HAV was 43.8% in the 20-29 years old group (28/64 tested positive), 45% in the 30-39 years old group (90/200 tested positive), 56% in the 40-49 years old group (13/23 tested positive) and 83.3% in the >50 years old group (10/19 tested positive). Compared with the CRPVH 2001 findings, the positivity rate is higher in aged <30 but appears slightly lower in those >=30 years old HIV/ADS patients. Confounding factors may have affected the results, e.g. different levels of past infection, immunodeficiency in HIV patients, history of HAV vaccination and difference in years of testing.

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 65 in 2007 (Box 1). Seasonal pattern was observed with the peak season in March (Box 10), indicating that the infection was more common during winter and spring seasons. Of 294 cases reported, 215 (73%, Box 11) were male, giving male to female ratio of 2.7:1. The majority were adults, with the highest notification rate at 45-54 years age group, followed by 35-44 years old (Box 12). The death rate could be as high as 0.44 per million population (Box 13).

8. In the CRPVH study conducted in 2001, 19% 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% (Box 14). Unlike HAV infection, a pattern of right shift in HEV seroprevalence was not as prominent when temporal change was analysed. Both the overall and age-specific HEV prevalence were lower in 2001 [1], when compared with the findings of a study done in late 1980s [5], which could have been contributed by the use of different laboratory assays.

9. Another published study also identified differences in epidemiology and clinical features in sporadic hepatitis E as compared to 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 [6]. 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 [6].

Pattern of Hepatitis B in Various Communities and its Significance

10. Parenterally-transmitted viral hepatitis B resulting in chronic infection state is endemic in Hong Kong. The number of reported hepatitis B virus (HBV) infections has been relatively stable over the last decade, with an apparent drop to 74 cases reported in 2007 (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.

11. Determining the seroprevalence of HBV sheds light on how common the 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 in 2007 was available include blood donors, university students/staff, pre-marital screening attendees, antenatal women, police officers and new health care workers (HCW). Clients seeking post-exposure management and tuberculosis patients are those with undetermined risk. Drug users and HIV/AIDS patients are at apparent risk of contracting HBV, related to shared risk behaviours and transmission routes between human immunodeficiency virus (HIV) and HBV.

12. 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, (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 HBV testings have been performed for a variety of reasons in different communities, with heterogeneous mix of population characteristics.

13. The temporal decline of hepatitis B markers in most community groups without apparent risk was especially obvious in new blood donors. Its HBsAg prevalence follows a continual falling trend since early 1990s, to a record low of 1.81 % in year 2007 (Box 15). There is also a falling trend over the years, albeit less prominent, in antenatal women (Box 19). The HBsAg prevalence in antenatal mothers is 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 [7]. Recent 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 HBsAg rates in university students/staff remained to be low (0 – 1.2%) in 2007 (Box 17). However, the small number of subjects in this group (n = 16) could have affected the results of 2007. The prevalence in pre-marital package service users had increased slightly since 2001, to 7.1% in 2007 (Box 18). The prevalence in antenatal women however remained stable at 8.4 -9.2% since 2001 (Box 19). The prevalence in police officers (Box 21) and newly recruited health care workers (Box 24) as determined at pre-HBV vaccination screening showed a stable level in the last 3 years.

14. From March to May 2007, 1188 tuberculosis patients attended TB & Chest Clinics of the Department of Health. The overall prevalence rate of HBsAg was found to be 10.5%, with the highest rate being 16% in the middle-age group (Box 26). The rate was higher in male (12.5%) than female (6.9%), and increase with age except for those 60 years old or above. Similar pattern was noted in 2006 (Box 25). Among clients attended for post exposure management, HBsAg rate was higher in non-health care workers than in health care workers (Box 27), which may be partly explained by the success of pre-employment vaccination programme for health care workers. HBsAg prevalence was 10.4% in female sex workers attending the clinic of Action for REACH OUT, which is higher than the 6.8% found in Social Hygiene Service survey a decade ago (Box 31).

15. Compared with aforementioned groups, a higher HBsAg prevalence was generally noted in drug users (Box 28) and HIV-infected patients (Box 29), underscoring their infection risk. Furthermore, due to the underlying immunosuppression, HIV/AIDS patients are more prone to becoming chronically infected with HBV after acute infection [8]. Except for wide fluctuation in isolated years, HBsAg was present at 10-16% in these two groups of clients for the last

decade, which was substantially higher than the 2-10% in other clients (Box 31). However, caution is needed in interpreting the data for the last few years as the number of drug users tested for HBV markers dropped substantially since 2003 to only 11 in 2007 (Box 28). For unclear reason, there was an abrupt drop of HBsAg prevalence to 6.1% among HIV/AIDS patients in year 2005. The prevalence rate returned to a higher level of 12.5% in 2007.

16. 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. From the 1996 to 2006 data in police officers, the presence of HBV markers progressively increased with each 10-year age group. Concomitantly, there was a rise of HBsAg rate with increasing age in police officers, from 4.7% in <=20 years old to 9.1% in 51-60 years old subjects (Box 22). HBsAg positivity appears to be lower in antenatal women aged <19 years but not too different among older subjects. In a screening of convenient samples of persons of different age who underwent virologic investigations in 2001, HBsAg was absent in those below 10 years old but >10% in those over 20 years old. Yet, anti-HBc was present, at a rate of 1.3% in subjects 1-4 years of age and rose to 7% in those 5-9 years old. In a similar testing of 573 sera left over from persons up to 19 years old after virologic investigation in 2004, HBsAg rate was found to be 0.5% (1-<5 years old), 0% (5-9 years old), 0% (10-14 years old) and 8% (15-19 years old). Convenient sample testing was repeated in 2006. Of 896 sera left over after virologic investigation, HBsAg rate among persons over 20 years old (n = 300; 14% tested positive in subjects of 20-24 years old, 10% in 25-29 years old, 12% in 30-34 years old, 8% in 35-39 years old, 5% in >39 years old) was found to be substantially higher than persons under 19 years (n = 596; 0 -1%). HBsAg rate was consistently low among different age groups below age 20, i.e. 1% (1-4 years old), 0% (5-9 years old), 1% (10 -14 years old) and 1% (15-19 years old). The decrease in HBsAg rate for persons under 20 years old is likely accounted by the success of newborn HBV vaccination programme launched in 1988. A recently published study conducted in Tuen Mun Hospital (TMH) provided further evidence in this regard. Of 121 infants borne to HBsAg positive mothers from November 2000 to June 2001 at TMH, three (2.5%) became chronic HBV carriers at 12 months of age. One (0.8%) was suspected to be infected by the S-mutant [9].

17. Male had a higher HBV prevalence than female, as observed in several groups. The HBsAg positivity rate in new blood donors of 2007 was 2.3% in male and

1.4% in female (Box 16). From 1996 through 2006, the overall HBsAg rate was 6.6% and 4.0% in male and female police officers respectively (Box 21). The overall HBsAg rate was also higher in male from the 2001 household study (Box 21).

18. 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 [10]. 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 [11]. A study of 49 HBV genotype C ethnic Chinese patients under 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) [12]. Several local studies have yielded controversial and inconclusive differences in the natural disease course and occurrence of complications between genotype B and C chronic hepatitis B patients. A study found a higher chance of earlier HBeAg seroconversion in genotype B than C patients [10] but no significant reduction in the risk of developing cirrhosis and/or hepatocellular carcinoma (HCC) [13]. Another local cohort study found that genotype C chronic HBV infection is an independent risk factor for HCC development in addition to liver cirrhosis [11]. In a study of end-stage HBV-related liver disease patients requiring transplantation, it was found that 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 [14]. 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 [15]. A study of 5080 chronic HBV patients focusing on familiar HCC found 22 such families, giving a prevalence of 4.3 families/1000 HBV carriers [16]. 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.

19. 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, predonation blood screening and promotion of safer sex [17]. A 16-year follow up study of 1112 neonates of HBV carrier mothers who received HBV vaccine and hepatitis B immunoglobulin at different schedules demonstrated the long term protective efficacy of immunization [18]. Of 610 subjects (54.9%) attended the 16th year visit, none of those who developed anti-HBs after completion of vaccination course seroconverted to become HBsAg positive. However, about 9% developed anti-HBc seroconversion [18]. Three hundred fifty-seven (32.1%) vaccinees were followed up at 21 year [unpublished data]. Despite a 9.3% anti-HBc seroconversion, none of those who had anti-HBs seroconversion after vaccination became HBsAg positive. While the proportion of vaccinees with anti-HBs $\geq$10 iu/L fell over time, it stablised at about one-third of cases at 13 years to 21 years of follow up. The findings suggest that the protective efficacy of immunization can be as long as at least 21 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 [19].

20. Universal neonatal HBV vaccination programme has been in place in Hong Kong since 1988, and a supplementary Primary 6 vaccination programme was introduced in 1998. From the statistics collected and maintained by Family Health Services, DH, the overall first dose HBV vaccine coverage rate was consistently over 99% for newborns born between 2001 and 2007 in Hong Kong public and private hospitals (Box 33). Updated as of November 2007, reported completion rate of second and third dose fell gradually in the last 3 years, to 75% and 56% respectively in 2007. The drop in known post-first HBV vaccination coverage rate may be related to the fact that more local-births have returned to Mainland after delivery and did not attend MCHC for services, and also more babies received combined vaccine by private doctors and were not known to MCHC. A community-based cross-sectional survey on immunization coverage was conducted by DH in year 2001 for 4746 children aged 2 to 5 recruited from 16 kindergartens and 8 child care centres, 99.2% of locally born children (3669, 88.67% of all) versus 95.2% of Mainland China born children (273, 6.6%) received a full course of HBV vaccination.

A follow up survey using similar methodology was conducted by DH in year 2003 for 3345 children aged 2 to 5 recruited from 19 kindergartens and 8 child care centres [20]. The estimated full-course completion of HBV vaccine in yearly cohorts of local-born children (1997-2000) was 99.7-100%, as compared to 96.3-100% in the corresponding yearly cohorts of Mainland-born children. The survey on immunization coverage was repeated in 2006 with a larger number of participants [21]. Of 6720 children included in the final analysis, 89% were born in Hong Kong and 8% were born in the Mainland. These children were aged 2 to 5 at year 2006. Similar to previous survey result, very high HBV immunization coverage was recorded in both local-born and the Mainland-born children. The completion of 3-doses HBV vaccination among local-born children (who were born between 2000 and 2003) were 99.7 -100% versus 98.1 -100% of Mainland-born children who were born in the corresponding years.

21. In the last 9 years, the first dose coverage of the Primary 6 mop-up programme was consistently over 99.5% while that for the third dose is >98% (Box 34). 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. Nonetheless, the persistent high HBsAg prevalence, though declining, means a significant disease burden in the years to come. Continued tracking of the trends of new infections and prevalent cases could inform more of the changing HBV situation in our locality.

Current situation of hepatitis C

22. 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. In a local study published in 1992, while 80% of 424 consecutive HCC patients attending a single centre were tested positive for HBsAg, only 7.3% were found to be anti-HCV positive [22]; the figure included 3.5% from HBV-HCV coinfection and 3.8% with HCV infection alone. Among 76 liver transplants done in Queen Mary Hospital due to cirrhosis from 1999 to 2000, 7 and 51 were related to hepatitis B and C

respectively [23]. From 1996-2007, only 6 hepatitis C cases were reported to DH under the statutory notification system; four of which were reported in 2002, one case each in 2004 and 2005 and two cases in 2006 and 2007 respectively.

23. Data from new blood donors in the last decade suggested that HCV infection is below 0.1% in young adults locally, with the figure in 2007 being 0.099% (95% confidence interval 0.071% - 0.135% (Box 35). This is much lower than the prevalence of HAV, HBV and HEV. Among the new blood donors, anti-HCV was most commonly detected in middle-age group (30-39 year-old group in male; 40- 49-year-old group in female; Box 36). 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 37). From 1999 to 2006, 3 of 1092 (0.27%) 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 at 6 months. All 3 cases were non-HCW and already HCV infected at time of injury upon retrospective testing of baseline specimens (Box 38).

24. Experience of clinicians and virologists has previously confirmed that HCV was common 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 [24]. Another early 1990s 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% [25]. This study also found a new infection rate of 4.9% per patient-year upon longitudinal follow up of 19 months. 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 39). A recent HCV seroprevalence study conducted in methadone clinics targeting IDU echoed the high prevalence rate of HCV in this community. Of 567 IDU participants recruited in 2006, 84% were male and 98% were ethnic Chinese. The median age was 49 years and median injection duration was 17 years. Two-thirds (62%) admitted ever sharing injecting equipments. Prevalence of anti-HCV was 85% (95% confidence interval 82.5 – 88.3%). Injection duration, recent injection, ever sharing injecting equipments and concomitant use of other drugs were independent factors associated with HCV infection [26].

25. HIV/AIDS patients, with a proportion being IDU, is another group with consistent data showing a comparatively high HCV prevalence (Box 40). From 2000 to 2007, HCV-HIV coinfection among new patients attending ITC ranged from 8% to 26%. The prevalence rate appears to be higher in male than female patients, likely related to the differential risk of parenteral and blood product exposure. While HCV infection is present in some 1 - 6 % of HIV/AIDS patients infected due to sexual contact, HCV was nearly universal in patients infected through drug injection (Box 41). The higher HCV prevalence, coupled with the hastened liver disease progression in HIV-infected patients [27], would no doubt result in a unique HCV/HIV coinfection that demands attention.

26. Limited 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 [28]. 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%) [29]. A significantly greater number of donors infected with type 6a reported a history of drug abuse than those infected with type 1b. In a study of hospitalized patients with HCV testing for clinical indications, similar to the blood donors study, 1b was the commonest type in chronic liver diseases and chronic renal failure patients [30]. Yet, the commonest genotype in intravenous drug users was 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 [31]. Besides intravenous drug use, age and sex were independent factors associated with HCV genotypes in this study. In the methadone clinic-based study in 2006, of 273 IDUs, 52% had genotype 61, 38% had 1b and 5% 3a while others had genotypes 2a, 3b and 6h [32]. Another local study of renal failure patients and non-renal failure controls also showed the predominance of genotype 1b, followed by 1a and 6a [33].

27. Since 2003, a surveillance project has been piloted to enhance understanding of the HCV situation in Hong Kong, with the participation of the laboratories of HKRCBTS and PMH Department of Microbiology. Prince of Wales Hospital (PWH) joined the project in 2005. Some 180,000-200,000 new and repeat blood donors of HKRCBTS were tested for anti-HCV each year; the prevalence was consistent at 0.025% in 2005, 0.018% in 2006 and 0.020% in 2007. The overall anti-HCV prevalence detected in hospital patients tested over the last five years was 4.34%

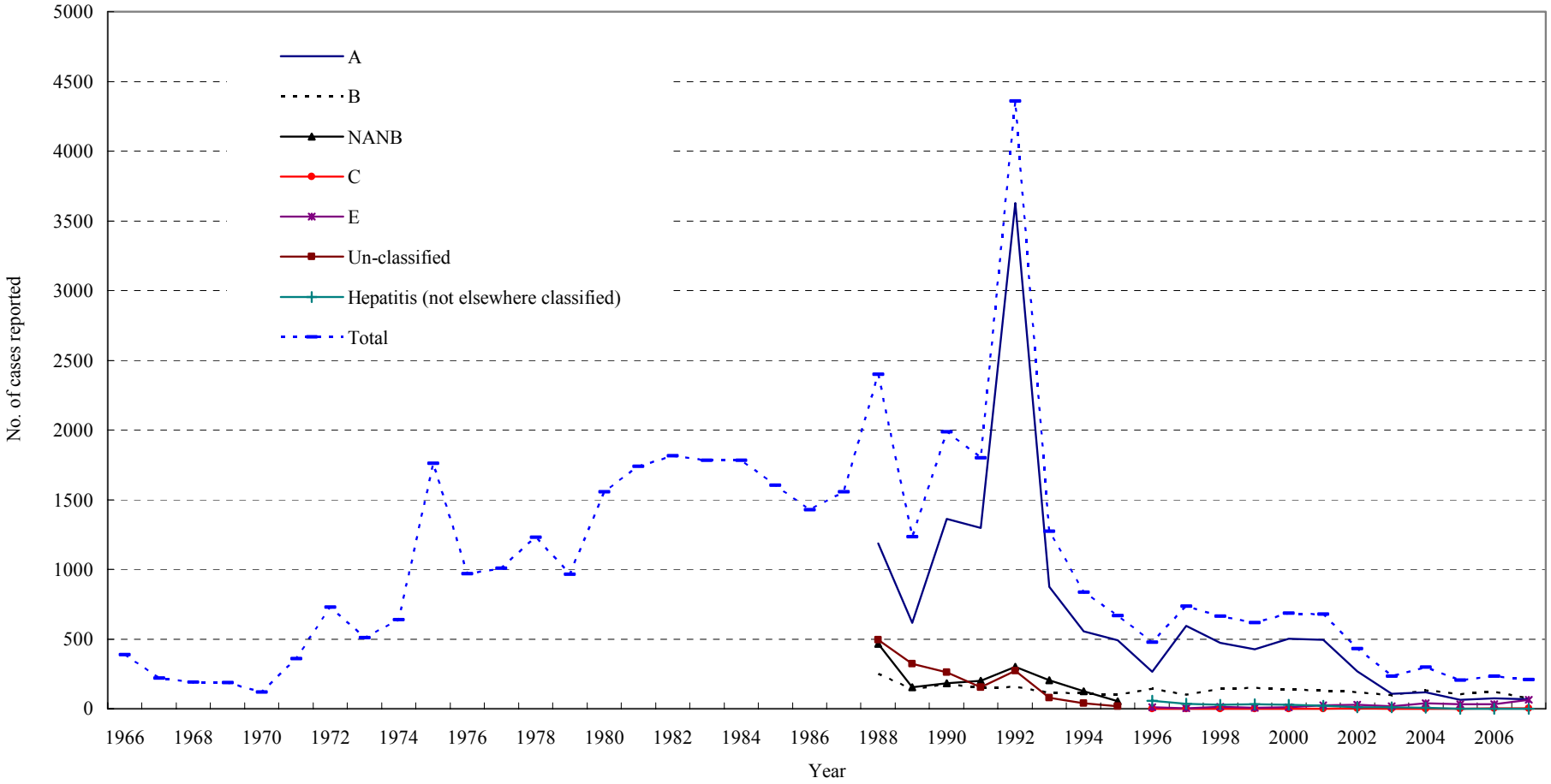
(Box 42). The highest anti-HCV rate was in drug users, of which 43.6% were found positive. This was followed by patients with history of blood transfusion at about 10.2%, and patients done for clinical indication (4.9%) not falling under the standardised categorisation of screening. Overall, the male-to-female ratio of HCV positive subjects was about 2 to 1, with a mean age of 47.3 years old.

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

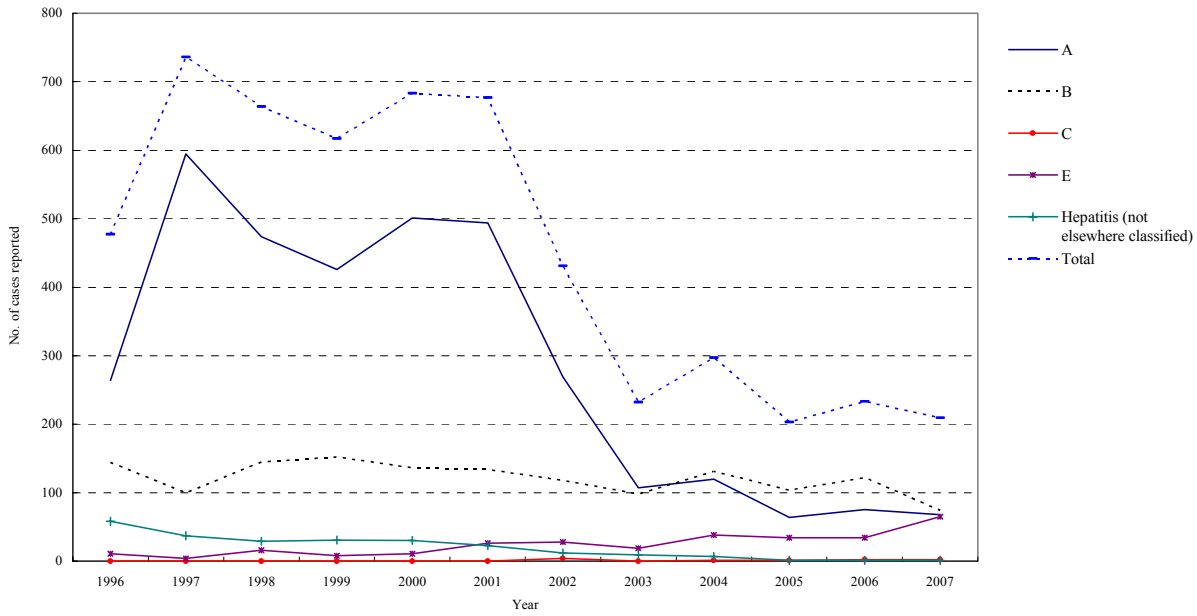
Box 1. Number of cases of viral hepatitis reported to the Department of Health between 1966 and 2007 (Data source: DH)

Year	A	B	NANB	C	E	Un-classified	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	120	131	-	1	38	-	7	297
2005	64	104	-	1	34	-	1	203
2006	75	122	-	2	34	-	1	234
2007	68	74	-	2	65	-	1	209

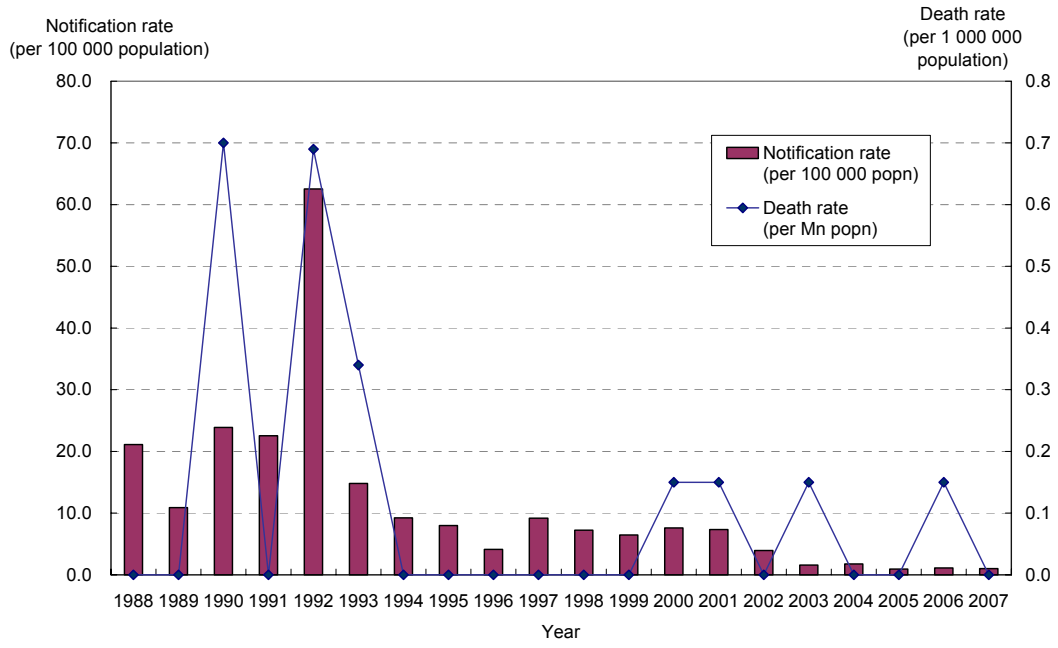
Box 2. Reported viral hepatitis from 1966 to 2007 (Data source: DH)



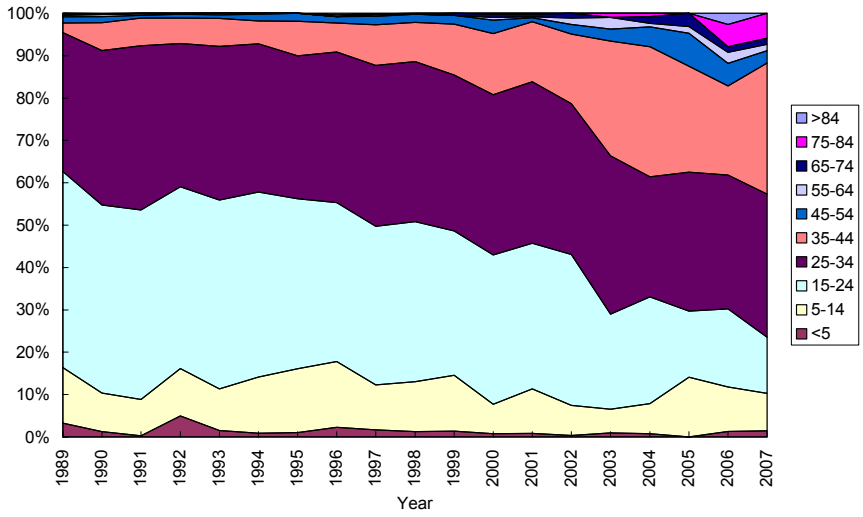
Box 3. Breakdown of different types of reported viral hepatitis from 1996 to 2007 (Data source: DH)



Box 4. Notification rates and death rates of viral hepatitis A, 1988 – 2007 (Data source: DH)



Box 5. Age distribution by proportion of total notifications of hepatitis A, 1989-2007 (Data source: DH)



Box 6. Sex distribution of hepatitis B cases notified from 1995 to 2007 (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	64	34	98
2004	100	34	134
2005	78	27	105
2006	86	37	123
2007	59	15	74
Total	1160	409	1569

Box 7. Age distribution of hepatitis B cases notified from 1995 to 2007 (Data source: DH)

	Age group (years)							
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	47	33	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
Total	18	435	499	346	173	63	35	1569

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

Box 8. Prevalence of anti-HAV in a collection of studies/testings between 1978 and 2007 (Data sources: Multiple sources.)

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

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. [34]

D. Seroprevalence results reported in the press by Lai et al of the University of Hong Kong. [35]

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) and students and staff of Lingnan University 125 (2003), 84 (2004). [36]

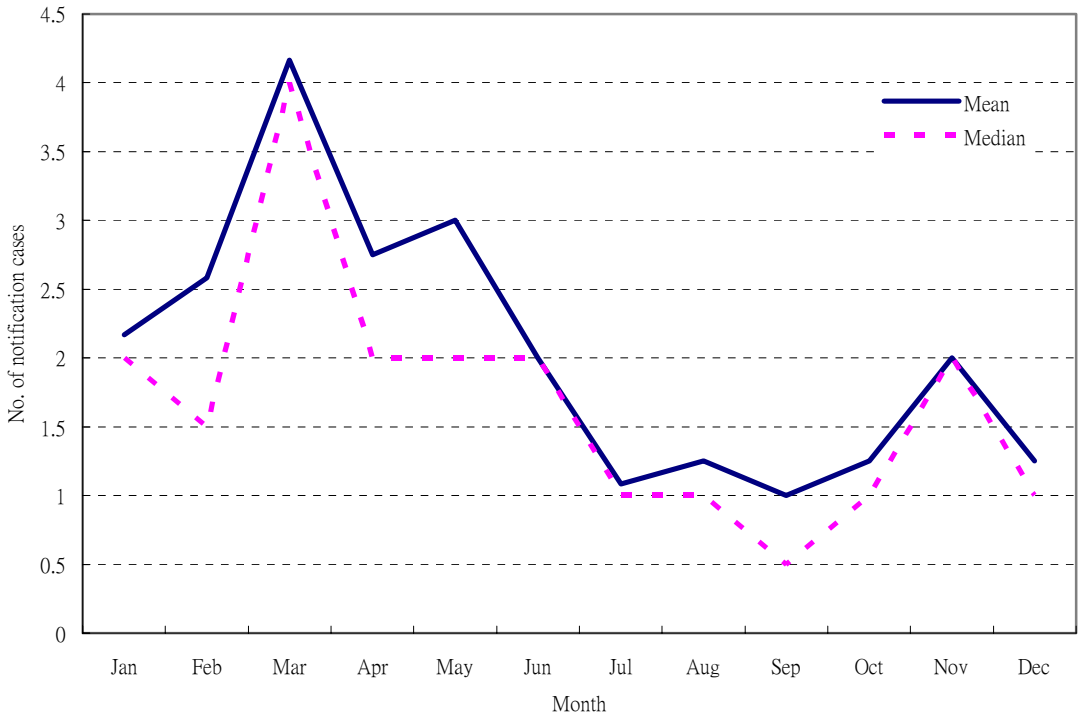
F. Seroprevalence study in school children by Lee et al of the Chinese University of Hong Kong. [37]

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

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

Age group	No. Tested	Anti-HAV +ve	
		No.	%
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

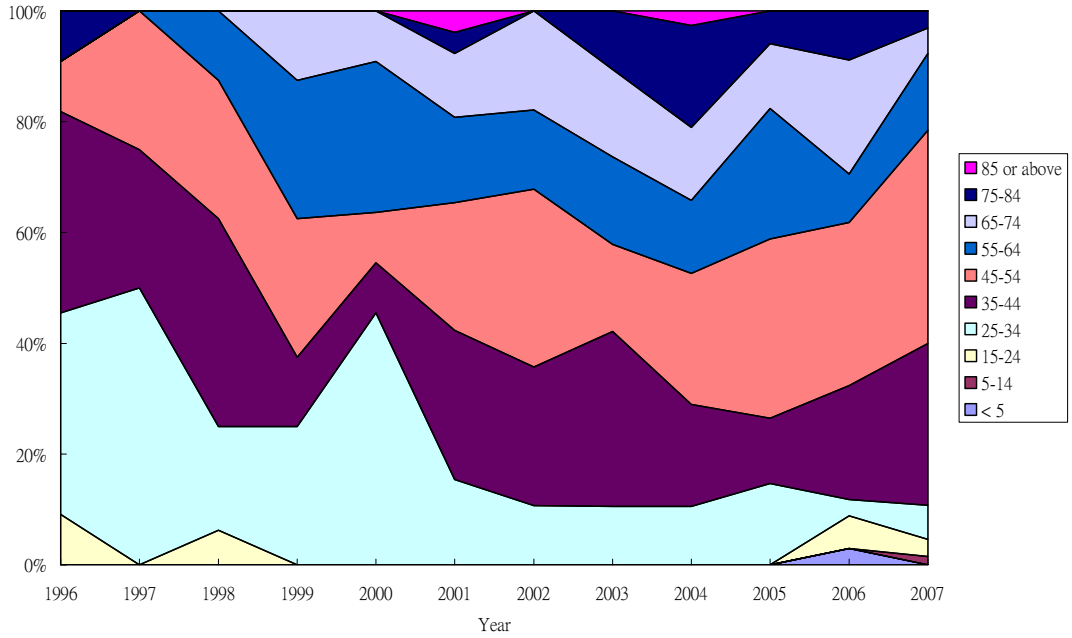
Box 10. Mean and median plot of notification cases of viral hepatitis E by month from 1996 to 2007 (Data source: PHIS)



Box 11. Sex distribution of hepatitis E cases notified from 1996 to 2007(Data source: PHIS)

Year	Male (%)	Female (%)	Total
1996	11 (100)	0 (0)	11
1997	3 (75)	1 (25)	4
1998	15 (93.8)	1 (6.3)	16
1999	8 (100)	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
Total	215 (73.1)	79 (26.9)	294

Box 12. Age distribution by proportion of total notifications of hepatitis E from 1996 to 2007 (Data source: PHIS)



Box 13. Notification rates and death rates of viral hepatitis E from 1996 to 2007 (Data source: CDSIO & PHIS)

Year	Total Cases	Notification Rate (per 100 000 popn)	Total registered deaths	Death rate (per Mn popn)
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

Box 14. Prevalence of anti-HEV in participants of Community Research Project on Viral Hepatitis (CRPVH) 2001 (Data source: DH)

Age group	No. Tested	HEV +ve	
		No.	%
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 15. Prevalence of HBsAg in new blood donors from 1990 to 2007 (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	2.0
2007	1.8

Box 16. HBsAg prevalence and its gender and age breakdown in first time blood donors in 2007 (Data source: HKRCBTS)

Age Group	Male			Female		
	No. tested	HBsAg No. positive	%	No. tested	HBsAg No. positive	%
16-19	11857	154	1.3	13241	104	0.8
20-29	4201	153	3.6	4146	110	2.7
30-39	1516	68	4.5	2212	40	1.8
40-49	829	42	5.1	1409	30	2.1
>49	328	17	5.2	548	10	1.8
Total	18731	434	2.3	21556	294	1.4

Box 17. HBsAg prevalence among university students/staff (Data source: City University Health Centre (till 2002), Baptist University Health Centre (since 2001) & Lingnan University Health Service (2003 and 2004)

Year	Aged below 21			Aged 21 - 30			Aged < 30		
	Total no. of cases	HBsAg+ve		Total no. of cases	HBsAg+ve		Total no. of cases	HBsAg+ve	
		No.	%		No.	%		No.	%
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	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

Box 18. HBsAg prevalence from the Premarital Package Service (Data source: FPA)

Year	Total no. of cases	HBsAg +ve	
		No.	%
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

Box 19. HBsAg prevalence in antenatal women from 1990 to 2007 (Data source: FHS, DH and Virus Unit, CHP, DH)

Year	No. tested	HBsAg +ve	
		No.	%
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

Box 20. HBsAg prevalence and age breakdown of antenatal mothers (Data source: FHS, DH)

Year	No. tested (% positive HBsAg) according to age group				
	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)

Box 21. Prevalence of hepatitis B markers in police officers, by sex from 1996 to 2006 (Data source: DH)

Year	Male					Female					All				
	No. tested	+ve for HBV markers		+ve for HBsAg markers		No. tested	+ve for HBV markers		+ve for HBsAg markers		No. tested	+ve for HBV markers		+ve for HBsAg markers	
		No.	%	No.	%		No.	%	No.	%		No.	%	No.	%
1996	2080	878	42.2	138	6.6	413	128	31.0	15	3.6	2493	1006	40.4	153	6.1
1997	4227	1836	43.4	346	8.2	472	178	37.7		5.5	4699	2014	42.9	372	7.9
1998	2316	855	36.9	177	7.6	284	90	31.7	16	5.6	2600	945	36.3	193	7.4
1999	1399	517	37.0	93	6.6	322	108	33.5	17	5.3	1721	625	36.3	110	6.4
2000	1300	478	36.8	83	6.4	244	68	27.9		1.2	1544	546	35.4	86	5.6
2001	1058	399	37.7	69	6.5	221	84	38.0		2.7	1279	483	37.8	75	5.9
2002	1374	493	35.9	77	5.6	270	91	33.7	10	3.7	1644	584	35.5	87	5.3
2003	1415	458	32.4	69	4.9	259	79	30.5		3.1	1674	537	32.1	77	4.6
2004	1105	419	37.9	58	5.2	188	84	44.7	5	2.7	1293	503	38.9	63	4.9
2005	1613	630	39.1	68	4.2	323	150	46.4	13	4.0	1936	780	40.3	81	4.2
2006	195	83	42.6	9	4.6	44	22	50.0	2	4.5	239	105	43.9	11	4.6
1996-2006	18082	7046	39.0	1187	6.6	3040	1082	35.6	121	4.0	21122	8128	38.5	1308	6.2

Box 22. Prevalence of hepatitis B markers in police officers, by age from 1996 to 2006 (Data source: DH)

Year	Age group														
	≤20			21-30			31-40			41-50			51-60		
	No. tested	% +ve for HBV markers	% +ve for HBsAg markers	No. tested	% +ve for HBV markers	% +ve for HBsAg markers	No. tested	% +ve for HBV markers	% +ve for HBsAg markers	No. tested	% +ve for HBV markers	% +ve for HBsAg markers	No. tested	% +ve for HBV markers	% +ve for HBsAg markers
1996	9	33.3	0.0	741	29.3	4.7	1155	39.7	6.8	544	55.5	5.9	44	59.1	18.2
1997	9	55.6	11.1	1500	31.5	6.1	2081	42.2	7.3	999	58.2	11.4	110	69.1	13.6
1998	225	24.9	5.8	1131	30.2	5.6	828	39.1	8.3	356	52.8	12.4	60	58.3	6.7
1999	149	30.9	5.4	920	32.6	5.8	428	38.6	6.8	202	51.0	8.9	22	50.0	9.1
2000	29	31.0	6.9	789	30.3	6.2	460	35.7	4.3	242	50.4	5.8	24	50.0	4.2
2001	31	35.5	6.5	639	34.3	5.6	339	36.3	5.6	225	46.2	6.2	45	57.8	8.9
2002	63	39.7	6.3	779	30.2	4.7	443	33.2	3.6	307	46.6	9.1	52	65.4	3.8
2003	72	18.1	1.4	702	27.8	4.8	505	31.1	4.6	357	43.1	5.0	38	47.4	2.6
2004	8	37.5	0.0	466	40.8	5.2	441	32.0	3.4	321	45.5	5.9	57	40.4	8.8
2005	80	53.8	1.3	791	36.5	3.8	533	35.3	4.3	427	47.5	4.2	105	54.3	8.6
2006	0	-	-	39	51.3	0.0	86	41.9	5.8	90	41.1	4.4	24	50.0	8.3
1996-2006	675	31.7	4.7	8497	32.0	5.3	7299	38.1	6.1	4070	51.2	7.9	581	56.8	9.1

Box 23. Prevalence of HBsAg from the Community Research Project on Viral Hepatitis (CRPVH) 2001 (Data source: DH)

Age Group	Male			Female			Total		
	No. tested	HBsAg +ve		No. tested	HBsAg +ve		No. tested	HBsAg +ve	
		No.	%		No.	%		No.	%
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 24. Prevalence of hepatitis B markers in newly recruited health care workers from 2001 to 2007 (Data source: DH)

Year	Male			Female		
	No. tested	+ve for HBsAg No.	%	No. tested	+ve for HBsAg No.	%
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

Box 25. The prevalence of HBsAg among tuberculosis patients treated at chest clinics from March to May 2006 (Data source: TB & Chest Service, CHP, DH)

Age Group	Male			Female			Total		
	No. tested	HBsAg +ve		No. tested	HBsAg +ve		No. tested	HBsAg +ve	
		No.	%		No.	%		No.	%
0-19	22	2	9.1	25	0	0.0	47	2	4.3
20-39	148	13	8.8	166	8	4.8	314	21	6.7
40-59	273	49	18.0	129	8	6.2	402	57	14.2
≥60	378	33	8.7	126	11	8.7	504	44	8.7
Total	821	97	11.8	446	27	6.1	1267	124	9.8

Box 26. The prevalence of HBsAg among tuberculosis patients treated at chest clinics from March to May 2007 (Data source: TB & Chest Service, CHP, DH)

Age Group	Male			Female			Total		
	No. tested	HBsAg +ve		No. tested	HBsAg +ve		No. tested	HBsAg +ve	
		No.	%		No.	%		No.	%
0-19	27	0	0.0	30	1	3.3	57	1	1.8
20-39	139	12	8.6	148	8	5.4	287	20	7.0
40-59	259	46	17.8	115	14	12.2	374	60	16.0
≥60	343	38	11.1	127	6	4.7	470	44	9.4
Total	768	96	12.5	420	29	6.9	1188	125	10.5

Box 27. Prevalence of hepatitis B markers in persons attending Therapeutic Prevention Clinic of Integrated Treatment Centre (ITC) for post-exposure management, from July 1999 to 2006 (Data source: ITC, CHP, DH)

	Health care workers					Non- Health care workers					Total				
	No. tested	+ve for HBsAg		+ve for anti-HBs		No. tested	+ve for HBsAg		+ve for anti-HBs		No. tested	+ve for HBsAg		+ve for anti-HBs	
		No.	%	No.	%		No.	%	No.	%		No.	%	No.	%
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	102	2	2.0	77	75.5	313	20	6.4	143	45.7	415	22	5.3	220	53.0
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	52	6	11.5	32	61.5	289	15	5.2	151	52.2	341	21	6.2	183	53.7
Total	564	37	6.6	376	66.7	1747	142	8.1	836	47.9	2311	179	7.7	1212	52.4

Box 28. Prevalence of hepatitis B markers in drug users from 1990 to 2007 (Data source: Virus Unit, CHP, DH)

Year	No. tested	% +ve			
		HBsAg	Anti-HBs	Anti-HBc*	Any marker
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

** Specimens positive for HBsAg were not tested for anti-HBc*

Box 29. HBsAg prevalence in HIV/AIDS patients first attended ITC between 2000 and 2007 (Data source: ITC, CHP, DH)

Year	Male			Female			Total		
	No. tested	No. HBsAg +	(%)	No. tested	No. HBsAg +	(%)	No. tested	No. HBsAg +	(%)
2000	64	9	(14.1%)	17	1	(5.9%)	81	10	(12.3%)
2001	71	14	(19.7%)	24	1	(4.2%)	95	15	(15.8%)
2002	119	14	(11.8%)	23	1	(4.3%)	142	15	(10.6%)
2003	90	14	(16.7%)	15	2	(13.3%)	105	16	(16.2%)
2004	111	21	(18.9%)	24	2	(8.3%)	135	23	(17.0%)
2005	135	9	(6.7%)	29	1	(3.4%)	164	10	(6.1%)
2006	194	27	(13.9%)	21	3	(14.3%)	215	30	(14.0%)
2007	214	29	(13.6%)	26	1	(3.8%)	240	30	(12.5%)

Box 30. Prevalence of HBV infection per HIV risk in HIV/AIDS patients first attended ITC between 2000 and 2007 (Data source: ITC, CHP, DH)

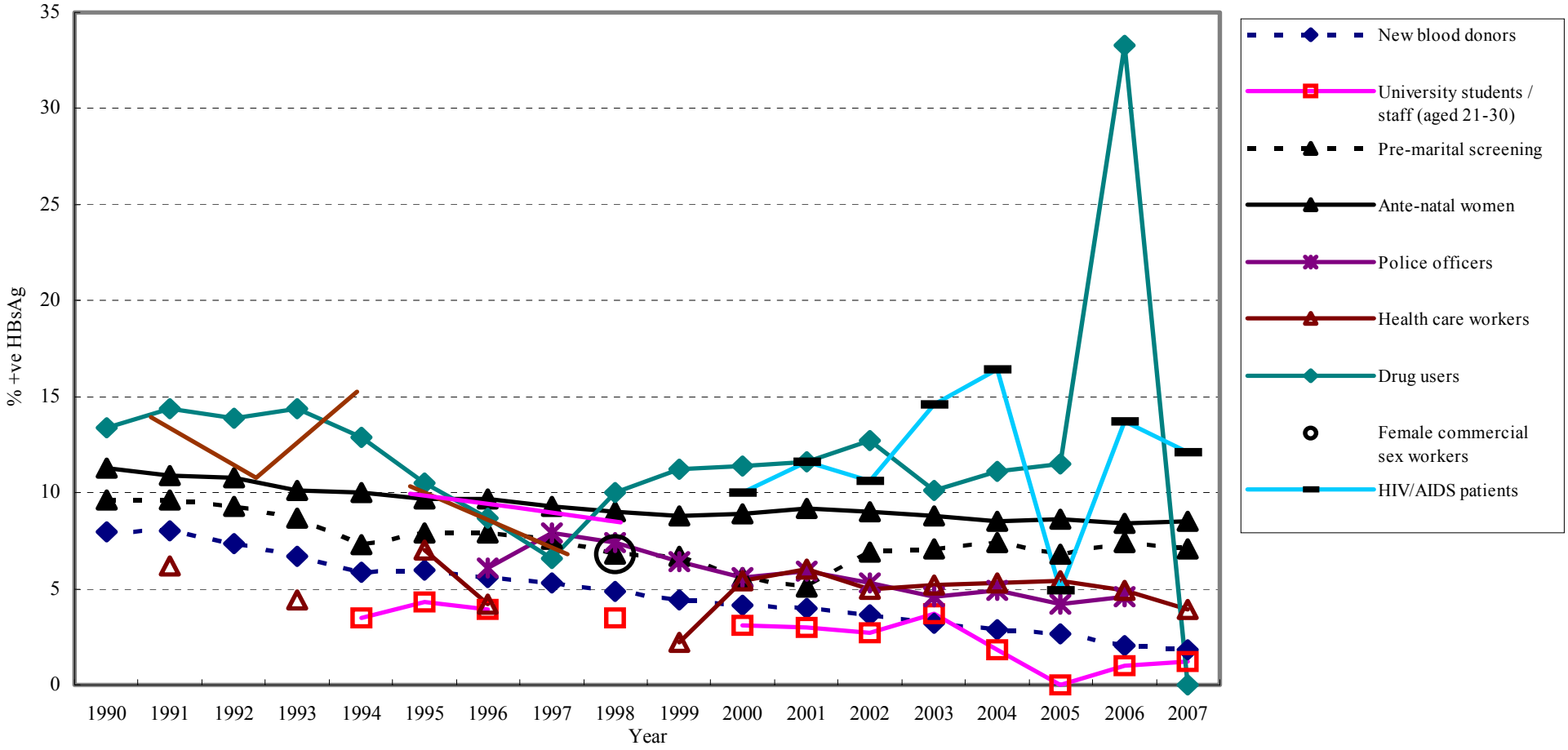
HIV risk	No. tested	HBsAg/anti-HBs			
		+/		-/+	
		No.	(%)	No.	(%)
Heterosexual male	381	49	(12.9%)	223	(58.5%)
Heterosexual female	168	12	(7.1%)	90	(53.6%)
Homo/Bi-sexual	466	54	(11.6%)	283	(60.7%)
Drug user	149	32	(21.5%)	78	(52.3%)
Blood/blood product recipient	3	0	(0.0%)	2	(66.7%)
Undetermined	10	2	(20.0%)	4	(40.0%)
Total	1177	149	(12.7%)	680	(57.8%)

Box 31. HBsAg prevalence in different population groups from 1990 to 2007 (Data source: multiple sources)

Year	% HBsAg+										
	New blood donors	University students/staff (aged 21-30)	Pre-marital screening	Ante-natal 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	10.5	6.8	-	-	-
1996	5.6	3.9	7.9	9.7	6.1	4.2	8.7		-	-	-
1997	5.2	-	7.6	9.3	7.9	-	6.6		-	-	-
1998	4.9	3.5	6.8	9.0	7.4	-	10.0		-	-	-
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	-	12.3	-	8.5
2001	4.0	3.4	5.1	9.2	5.9	6.0	11.6	-	15.8	-	5.3
2002	3.6	2.7	6.9	9.0	5.3	5.0	12.7	-	10.6	-	8.8
2003	3.2	3.7	7.1	8.8	4.6	5.2	10.1	-	16.2	-	10.1
2004	2.9	1.8	7.4	8.5	4.9	5.3	11.1	-	17.0	-	7.7
2005	2.6	0.0	6.8	8.6	4.2	5.4	11.5	-	6.1	10.1	6.3
2006	2.0	1.0	7.4	8.4	4.6	4.9	33.3	-	14.0	9.8	6.2
2007	1.8	1.2	7.1	8.5	-	3.9	0.0	10.4%**	12.5%	10.5	-

*For a period between Jul-Dec 1999; **For a period between Aug-Dec 2007

Box 32. Trends of HBsAg in selected population groups from 1990 to 2007 (Data source: multiple sources)



Box 33. Hepatitis B immunization coverage rates (updated as at 31 October 2008) for babies 2001 – 2007 (Data source: FHS, DH)

Hepatitis B vaccine (Age of vaccination)	Year born					
	2002	2003	2004	2005	2006	2007
1st dose (At birth)	99.66%	99.95%	99.70%	99.63%	99.89%	99.62%
2nd dose (1 month)	93.07%	90.50%	89.75%	85.33%	78.61%	76.26%
3rd dose (3-5 months / 6 months) (1)	87.42%	86.69%	83.51%	77.39%	71.50%	66.57%

Notes:

Coverage rate = (No. of children received vaccination at Maternal and Child Health Centre (MCHC) + no. of children known by MCHC to have received vaccination outside MCHC) / total live births

Immunisation coverage rates refer to the percentages of local live births in the year which are known to the Department of Health to have received the vaccinations up to August 2008. The cohort will be followed and the figures will be updated monthly.

(1) The standard regime for Hepatitis B vaccination has been adopted since 1.9.2000. As such, the recommended vaccination timing for the 3rd dose of Hepatitis B is 6 months after birth, instead of 3-5 months.

Box 34. Cumulative statistics (as of September) of the supplementary hepatitis B vaccination programme for Primary 6 students from the school years 1998 to 2007 (Data source: DH)

	School Year								
	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Cumulative no. of Primary 6 students	79641	86481	85612	86052	86515	86208	83974	83164	81818
First Dose									
Cumulative no. eligible for vaccination	26624	25873	17172	15504	14245	10625	8449	6648	6351
Cumulative no. administered	26248	25505	16986	15351	14079	10519	8329	6591	6262
Acceptance rate (at the present campaign)	98.6%	98.6%	98.9%	99.0%	98.8%	99.0%	98.6%	99.1%	98.6%
Coverage rate (for the whole Primary 6 population)	99.5%	99.6%	99.8%	99.8%	99.8%	99.9%	99.9%	99.9%	99.9%
Second Dose									
Cumulative no. eligible for vaccination	26626	25889	17183	15510	14250	10626	8561	6710	6392
Cumulative no. administered	26096	25334	16889	15215	13800	10338	8191	6573	6277
Acceptance rate (at the present campaign)	98.0%	97.9%	98.3%	98.1%	96.8%	97.3%	95.7%	98.0%	98.2%
Coverage rate (for the whole Primary 6 population)	99.3%	99.4%	99.7%	99.7%	99.5%	99.7%	99.6%	99.8%	99.9%
Third Dose									
Cumulative no. eligible for vaccination	26647	25905	17772	16144	14918	11222	9316	7397	6986
Cumulative no. administered	25420	24205	16664	14719	13912	10036	8348	6957	6602
Acceptance rate (at the present campaign)	95.4%	93.4%	93.8%	91.2%	93.3%	89.4%	89.6%	94.1%	94.5%
Coverage rate (for the whole Primary 6 population)	98.5%	98.0%	98.7%	98.3%	98.8%	98.6%	98.8%	99.5%	99.5%

5. Tabulated results of seroprevalence of hepatitis C

Box 35. Anti-HCV prevalence in new blood donors, 1991 to 2007 (Data source: HKRCBTS)

Year	No. of new donors	Anti-HCV+	
		No.	%
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

Box 36. Anti-HCV prevalence and its gender and age breakdown in new blood donors in 2007 (Data source: HKRCBTS)

Age Group	Male			Female		
	No. tested	Anti-HCV No. Positive	%	No. tested	Anti-HCV No. Positive	%
16-19	11857	11	0.1	13241	8	0.1
20-29	4201	3	0.1	4146	2	0.1
30-39	1516	5	0.3	2212	3	0.1
40-49	829	2	0.2	1409	5	0.4
>49	328	0	0.0	548	1	0.2
Total	18731	21	0.1	21556	19	0.1

Box 37. 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	
		No.	%
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 38. The prevalence of anti-HCV at baseline screening of injured persons attending Therapeutic Prevention Clinic of Integrated Treatment Centre (ITC), from July 1999 to 2006 (Data source: ITC, CHP, DH)

	Health care workers			Non- Health care workers			Total		
	No. tested	Anti-HCV +		No. tested	Anti-HCV +		No. tested	Anti-HCV +	
		No.	%		No.	%		No.	%
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
Total	144	0	0.0	402	3	0.7	546	3	0.5

Box 39. Anti-HCV prevalence in drug users on rehabilitation (Data source: Virus Unit, CHP, DH)

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

Box 40. Anti-HCV prevalence HIV/AIDS patients first attended ITC between 2000 and 2007 (Data source: ITC, CHP, DH)

Year	Male			Female			Total		
	No. tested	No. Anti-HCV +	(%)	No. tested	No. Anti-HCV +	(%)	No. tested	No. Anti-HCV +	(%)
2000	62	7	(11.3%)	17	0	(0.0%)	79	7	(8.9%)
2001	71	7	(9.9%)	23	1	(4.3%)	94	8	(8.5%)
2002	118	10	(8.5%)	23	1	(4.3%)	141	11	(7.8%)
2003	90	14	(15.6%)	15	1	(6.7%)	105	15	(14.3%)
2004	110	21	(19.1%)	23	4	(17.4%)	133	25	(18.8%)
2005	135	19	(14.1%)	29	1	(3.4%)	164	20	(12.2%)
2006	192	53	(27.6%)	21	2	(9.5%)	213	55	(25.8%)
2007	212	38	(17.9%)	26	1	(3.8%)	238	39	(16.4%)

Box 41. Prevalence of HCV infection per HIV risk in HIV/AIDS patients first attended ITC between 2000 and 2007 (Data source: ITC, CHP, DH)

HIV risk	No. tested	No. Anti-HCV +	(%)
Heterosexual male	375	24	6.4%
Heterosexual female	166	4	2.4%
Homo/Bi-sexual	466	5	1.1%
Drug user	147	145	98.6%
Blood/blood product recipient	3	1	33.3%
Undetermined	10	1	10.0%
Total	1167	180	15.4%

Box 42. Prevalence of hepatitis C from screening of blood donors and clinical testing of patients in 2 major public hospitals from 2003 to 2007 (Data source: HKRCBTS, PMH Microbiology Laboratory, PWH Microbiology Laboratory (since 2005))

Category		2003			2004			2005			2006			2007			Overall		
		No. tested	HCV +ve		No. tested	HCV +ve		No. tested	HCV +ve		No. tested	HCV +ve		No. tested	HCV +ve		No. tested	HCV +ve	
			No.	%		No.	%		No.	%		No.	%		No.	%		No.	%
1. BLOOD DONATION		178188	28	0.0	197426	42	0.0	197975	50	0.0	196353	35	0.0	205682	42	0.0	975624	197	0.0
2. SCREENING	Pre-transplant	7	0.0	0.0	20	0.0	0.0	18	11.1	11.1	17	0	0.0	31	1	3.2	93	3	3.2
	Drug users	167	52.1	52.1	202	49.5	49.5	298	48.3	48.3	177	59	33.3	118	29	24.6	962	419	43.6
	Needlestick injuries	90	1.1	1.1	130	0.8	0.8	438	1.8	1.8	478	7	1.5	546	6	1.1	1682	23	1.4
	Haemodialysis/ peritoneal dialysis	508	1.0	1.0	463	2.8	2.8	1527	2.6	2.6	1762	35	2.0	1706	37	2.2	5966	130	2.2
	Post-renal transplant	36	5.6	5.6	48	0.0	0.0	401	4.2	4.2	446	18	4.0	413	19	4.6	1344	56	4.2
	Haematology(pre-chemotherapy)	36	2.8	2.8	43	0.0	0.0	118	2.5	2.5	208	1	0.5	223	0	0.0	628	5	0.8
	Rheumatology(pre-methotrexate)	55	0.0	0.0	56	1.8	1.8	149	0.7	0.7	207	1	0.5	210	1	0.5	677	4	0.6
	History of blood transfusion	35	5.7	5.7	46	15.2	15.2	132	9.1	9.1	95	11	11.6	125	12	9.6	433	44	10.2
	Pre-vaccination	1	0.0	0.0	0	-	-	0	-	-	0	0	-		0	0.0	2	0	0.0
	TOTAL (2)	935	10.5	10.5	1008	12.1	12.1	3080	7.4	7.4	3390	132	3.9	3373	105	3.1	11786	684	5.8
3. *CLINICAL INDICATION		501	30	6.0	710	51	7.2	3147	155	4.9	3499	170	4.9	4054	179	4.4	11911	585	4.9
4. OTHERS OR UNKNOWN		193	10	5.2	567	23	4.1	6377	200	3.1	6793	235	3.5	8161	248	3.0	22091	716	3.2
TOTAL (2+3+4)		1629	138	8.5	2285	196	8.6	12604	582	4.6	13682	537	3.9	15588	532	3.4	45788	1985	4.3

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

Box 43. Characteristics of anti-HCV positive subjects detected at HKRCBTS and 2 major public hospitals from 2003 to 2007 (Data source: HKRCBTS, PMH Microbiology Laboratory, PWH Microbiology Laboratory (since 2005))

		2003 (n=166)		2004 (n=238)		2005 (n=632)		2006 (n=572)		2007 (n=574)		Overall (n=2182)	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Lab	HKRCBTS	28	(16.9)	41	(17.2)	49	(7.8)	35	(6.1)	40	(7.0)	193	(8.8)
	PMH	138	(83.1)	197	(82.8)	229	(36.2)	142	(24.8)	89	(15.5)	795	(36.4)
	PWH	-				354	(56.0)	395	(69.1)	445	(77.5)	1194	(54.7)
Sex	Male	115	(69.3)	157	(66.0)	413	(65.3)	390	(68.2)	377	(65.7)	1452	(66.5)
	Female	51	(30.7)	81	(34.0)	211	(33.4)	152	(26.6)	178	(31.0)	673	(30.8)
	Unknown	0	(0.0)	0	(0.0)	8	(1.3)	30	(5.2)	19	(3.3)	57	(2.6)
			-										
Age at diagnosis	Mean	41.6		44.0		46.9		47.4		50.5		47.3	
	S.D.	14.6		14.7		15.8		16.6		16.11		15.87	
	Range	17 – 83		11 - 86		12 - 87		0 - 101		2 - 94		0 - 101	
2003	Pre-transplant	0	(0.0)	0	(0.0)	2	(0.3)	0	(0.0)	1	(0.2)	3	(0.1)
	Drug users	87	(52.4)	100	(42.0)	144	(22.8)	59	(10.3)	29	(5.1)	419	(19.2)
	Needlestick injuries	1	(0.6)	1	(0.4)	8	(1.3)	7	(1.2)	6	(1.0)	23	(1.1)
	Pre-haemodialysis/ peritoneal dialysis	5	(3.0)	13	(5.5)	40	(6.3)	35	(6.1)	37	(6.4)	130	(6.0)
	Post-renal transplant	2	(1.2)	0	(0.0)	17	(2.7)	18	(3.1)	19	(3.3)	56	(2.6)
	Haematology	1	(0.6)	0	(0.0)	3	(0.5)	1	(0.2)	0	(0.0)	5	(0.2)
	Pre-methotrexate	0	(0.0)	1	(0.4)	1	(0.2)	1	(0.2)	1	(0.2)	4	(0.2)
	History of blood transfusion	2	(1.2)	7	(2.9)	12	(1.9)	11	(1.9)	12	(2.1)	44	(2.0)
	Clinical Indication	30	(18.1)	51	(21.4)	155	(24.5)	170	(29.7)	179	(31.2)	585	(26.8)
	Others or unknown	10	(6.0)	23	(9.7)	200	(31.6)	235	(41.1)	248	(43.2)	716	(32.8)

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
PHIS	Public Health Information System
PMH	Princess Margaret Hospital
PWH`	Prince of Wales Hospital
SEB	Surveillance and Epidemiology Branch
TMH	Tuen Mun Hospital
TPC	Therapeutic Prevention Clinic

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