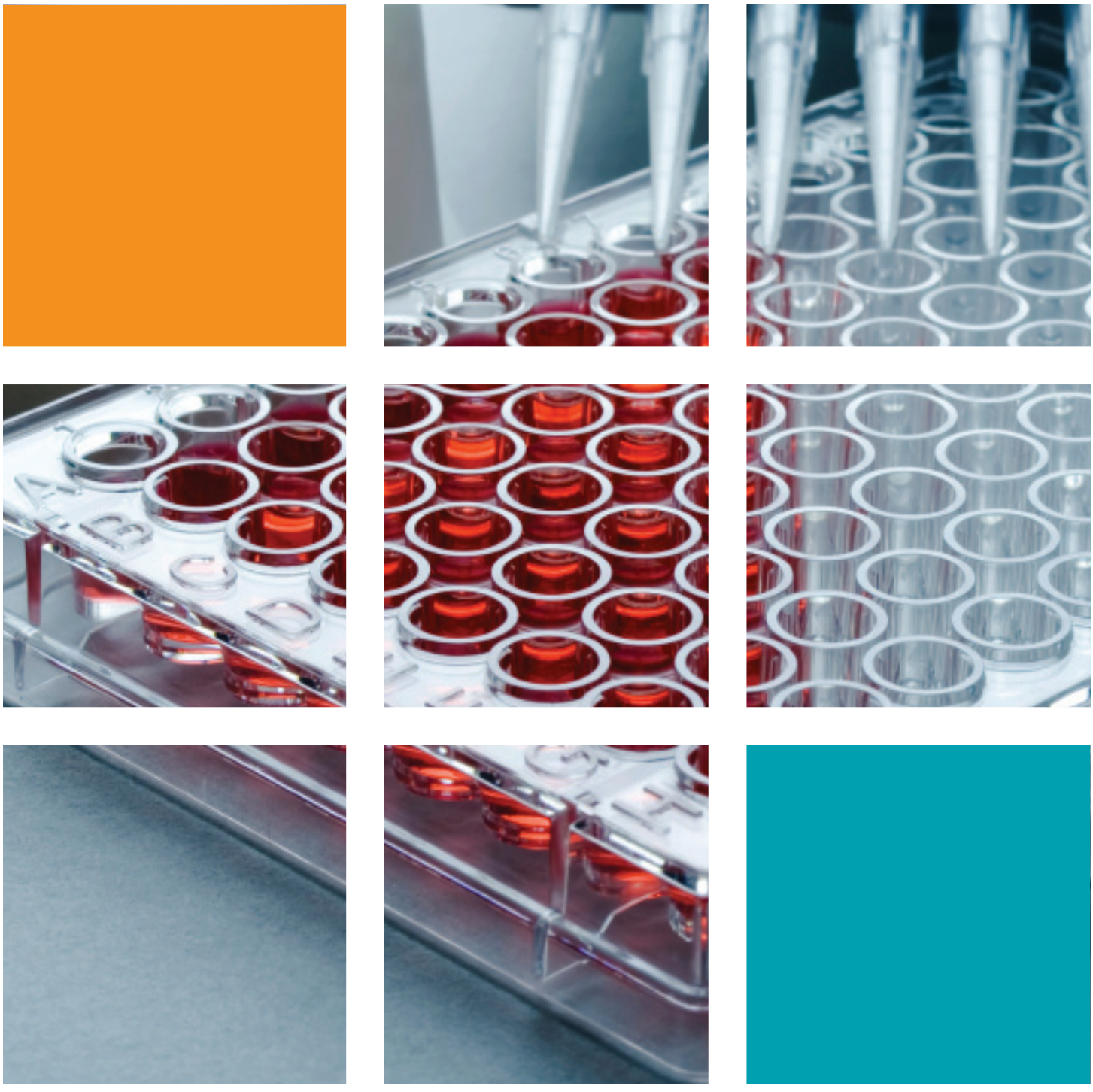
Health Protection Agency

Targeting Testing in England

Health Protection Services Sentinel Surveillance of Blood-Bourne Virus testing (SBV) in England, Annual review 2011.



Acknowledgements

We would like to thank the wide network of GPs and clinicians whose hepatitis, HIV and HTLV tests have contributed to the Sentinel Surveillance of Blood-Borne Virus testing (SBV), and all the laboratory staff who have undertaken these tests. We would also like to thank the numerous information technology and technical staff within each participating centre for assisting the project coordinator to establish the data extraction procedures.

In addition, we would also like to thank the members of the HIV/AIDS Reporting Section, as this year, HIV positive individuals reported to sentinel surveillance have been linked to the national HIV surveillance database.

Introduction

This is the 10th annual review from the Immunisation, Hepatitis and Blood Safety Department's Sentinel Surveillance of Blood-Borne Virus testing (SBV). This review presents data on hepatitis, HIV and HTLV testing undertaken through a network of 24 laboratories across England for 2011, and trends in testing from 2008 onwards.

2011 saw the expansion of the SBV programme both in terms of the infections included, and the number of participating sites. HIV was included as a routine component of the surveillance system in 2011 in response to the guidelines published by the National Institute for Health and Clinical Excellence (NICE) which builds upon the recommendations made by the British HIV association (BHIVA), the British Association for Sexual Health and HIV (BASHH) and the British Infection Society (BIS) to increase HIV testing across all healthcare settings. In collaboration with the HIV and AIDS Reporting Section (HARS) HIV positive individuals were also linked to the national database of new HIV diagnoses to obtain additional relevant information including risk factors.

By the end of 2011, SBV included over 6 million hepatitis A, B, C, D, E, HIV and HTLV test results among over 3 million individuals across England. The rich data collected through this surveillance scheme has been invaluable in enhancing knowledge and understanding of hepatitis HIV and HTLV testing, in terms of who is being tested and services through which individuals are accessing testing, and also in interpreting trends in the number of positive individuals identified over time

In this report we have focused entirely upon a combined ethnicity derived from a number of sources, either self reported, Nam Pechan and Onomap. Details described in Appendix 1. These rich data sources have enabled us to better reflect and report on the ethnic variability within our dataset. In addition, supplementary data tables referred to in this report are available to download separately at the following link:

http://www.hpa.org.uk/ssbbv

Executive summary

This is the 10th annual review from the Sentinel Surveillance of Blood-Borne Virus testing (SBV). Since 2002, the SBV programme has undergone continual expansion in terms of the number of sentinel laboratories which participate and also in the inclusion of HIV and HTLV-1 testing and demographic data alongside hepatitis (A-E). This review reflects these changes and provides information on testing in 2011 and trends in testing (2008-2011) for each infection in a single document. Methods have previously been described in detail [1] recent changes are described in Appendix 1.

Hepatitis A and E

In 2011, 28,095 individuals underwent first-line testing for anti-HAV IgM, 0.4% of whom tested positive. General practice accounting for half of tests undertaken, and diagnosed greatest number of positive individuals. The greatest proportion positive by age group was among children (aged <15), with Asian or Asian British children five-times more likely to test positive compared to white or white British children.

Of the 4,705 individuals who underwent first line testing for anti-HEV IgM in 2011, 7.9% tested positive, which included 1.9% of children who were tested and 8.2% of adults. The majority of HEV IgM test requests were requested from hospitals which referred all HEV samples to a sentinel laboratory; in these cases it was not possible to ascertain the original test request location.

Hepatitis B and D

In 2011, 184,125 individuals were newly tested for HBsAg of which 1.7% tested positive. The proportion of individuals of white British origin testing positive has been constantly lower than among other ethnic groups. Less than 10% of individuals testing positive for hepatitis B were identified as having an acute infection with the proportion of acute infections declining over time, suggesting an ongoing pool of undiagnosed individuals. An additional 73,290 women aged 12-49 years old underwent routine antenatal screening for HBsAg in 22 participating sentinel centres, of whom 0.5% tested positive.

The number of individuals tested for hepatitis D increased each year, and by 2011 2,192 individuals underwent front-line testing for hepatitis D total antibody and/or IgM, of whom 3.7% were positive.

Hepatitis C

A total of 160,590 individuals underwent first line testing for anti-HCV during 2011, of whom 2.6% tested positive. As reported previously, the greatest proportion of positive tests were seen among specialist drug services and prisons. Where known, four-fifths of all individuals tested and the highest proportion (2.7%) of those found positive were classified as being of white or white British ethnicity. Of those individuals testing positive for anti-HCV, 76% were tested for HCV RNA by PCR, of whom 69% tested positive. Approximately half of PCR positive individuals had a HCV genotype reported, of whom 46% were genotype 1 and a further 44% were reported as genotype 3.

HCV infections among young adults (aged 15 to 24) represent infections likely to have been acquired within the past few years, and can be considered a proxy for incident or recently acquired infections. The proportion of 15 to 19 year olds testing positive has been relatively stable at 0.4% per year, however, among 20 to 24 year olds, it decreased from 1.3% in 2008 to 1.1% in 2009 and then plateaued.

HIV[1]

In 2011, 293,590 individuals were tested for HIV through sentinel laboratories, of whom 0.9% tested positive. Of the 231,547 individuals tested for the first time in 2011, 1.0% tested positive compared to 0.7% among those with a previous HIV test. Between 2008 and 2011 the number of individuals tested for HIV increased year on year, with little variation in the proportion testing positive. Although two-thirds of all individuals testing for HIV each year did so through GUM services, between 2008 and 2011, testing in other primary and secondary services increased by one third, and two-thirds, respectively.

Approximately one third of HIV-negative individuals were also tested for anti-HCV between 2008 and 2011, of whom 3.0% tested positive, compared to approximately two-thirds of HIV-positive individuals of whom 4.4% tested positive.

HTLV

During 2011, a total of 7,027 individuals underwent first line testing for HTLV-1 specific antibodies, of whom 1.5% (n=107) tested positive. Where known, more females were tested than males (54.3% female), with a marginally higher proportion of females testing positive compared to males (1.7% vs. 1.4% respectively). The characteristics of individuals tested has been consistent over time with slightly more females tested than males with the majority (64.3%) of individuals undergoing testing aged 45 and over.

The highest proportion of positive test results were among individuals of black or black British ethnicity. The annual number of individuals tested for HTLV-1 has steadily increased, with an overall 38% increase between 2008 and 2011. This increase has been driven by an increase in testing through secondary care services, which increased by 29% during this period.

[1] HIV data differs from that presented for hepatitis and HTLV. HIV data extraction methods are described in Appendix 1

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1 Hepatitis A

1.1 Key findings

- Fewer individuals were tested for HAV IgM in 2011 compared to previous years, with the proportion positive declining from 0.6% in 2010 to 0.4%.
- Half of all HAV IgM tests undertaken and the greatest number of positive individuals were identified through general practice.
- The greatest proportion positive by known service type in 2011 was accident and emergency departments and paediatric services.
- The greatest proportion positive was among children (aged <15) and has been consistent over time.
- In 2011 7.5% of children of South Asian origin tested positive, compared to 1.5% of white or white British children.

1.2 Overview of testing in 2011

During 2011, 28,095 individuals underwent first-line testing for anti-HAV IgM in 22 participating sentinel centres, of whom 0.4% (n=115) tested positive.

Where known (>99% complete) more males were tested than females (56.4% males), with no difference in the proportion who tested positive (0.4%). Approximately half of all individuals tested (52.8%), and a third (33.6%) of those who tested positive were aged between 25-54 years old. The median age of individuals tested was 45.4 years (IQR=29.3 years) whereas the median age of individuals testing positive was 10.7 years younger (median 34.7 years; IQR=41.3; *p*=0.005). The greatest proportion positive was among children aged less than 15 (2.3%; n=20/879).

Ethnicity, either self reported or inferred, was available for 97% (n=27,259) of individuals. The majority of individuals (82.5%) were of white or white British (WB) ethnic origin, a further 12.8% were Asian or Asian British (AB), 2.9% were other or mixed (OM), and 1.8% were classified as black or black British (BB) ethnic origin. The highest proportion positive (0.9%) was among individuals of AB origin, compared to 0.8%, 0.3% and 0.3% among those of BB origin, WB and OM ethnic origin, respectively. Furthermore, children (aged <15), of AB origin were significantly more likely to test positive than children of WB children (p=0.001; 5.8% vs. 1.2%).

General practice (GP) accounted for over half of all anti-HAV IgM tests (54.0%). The proportion of individuals who accessed testing through GPs varied by ethnic group; a greater proportion of AB origin and OM ethnic origin individuals were tested via general practice (62.0% and 61.0% respectively) compared to 54.6% of BB origin individuals and 53.3% of WB origin individuals. The greatest proportion of positive tests was seen in unspecified hospital wards (3.5%), accident and emergency departments (1.2%), and paediatric services (1.2%).

Clinical details were available for half (n=14,533) of all individuals tested for anti-HAV IgM, among whom, 1.5% of individuals with jaundice tested positive (n=19/1,279) compared to 0.2% of individuals who had no symptoms of jaundice recorded (n=26/13,254; p<0.001).

1.3 Trends in testing 2008 to 2011

Between 2008 and 2011, 123,627 individuals were tested for anti-HAV IgM, in 22 sentinel centres, of whom 0.5% tested positive (Table 1). A similar number of individuals were tested for anti-HAV IgM in 2008 and 2009, but declined each year between 2009 and 2011. The proportion of individuals testing positive for anti-HAV IgM, however, remained stable until 2010 at 0.6%, but declined to 0.4% in 2011 (*p*=0.007).

Gender and age were well reported (>99%) and have showed little variation over time with individuals having a median age of 44.8 (range 44.1-45.5) and with males representing 55.5% of all individuals who tested. The proportion testing positive by gender has been similarly stable over time, with 0.5% of males and females tested positive (n=366/68,191 and n=279/54,570 respectively). However, as a result of the small number of individuals testing positive each year, the median age of individuals testing positive has varied slightly over time fluctuating between 31.4 and 41.3 years. The crude annual incidence of hepatitis A

has been stable at approximately 1.0 case per 100,100 population between 2008 and 2010, but decreased significantly to 0.6 per 100,000 in 2011 (p<0.001).

Table 1. Trends in individuals tested and testing positive for anti-HAV IgM (trend centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	32,077	32,200	31,255	28,095	123,627
Median age in years (IQR)	44.1 (27.8)	44.7 (28.3)	45.1 (28.9)	45.4 (29.3)	44.8 (28.5)
Number male (% known gender)	17,626 (55.4)	17,555 (55.0)	17,241 (55.6)	15,769 (56.4)	68,191 (55.5)
Number children <15 years old (% total known age)	1,063 (3.3)	978 (3.0)	938 (3.0)	879 (3.2)	3,857 (3.1)
Positive individuals					
Number positive (%)	177 (0.6)	192 (0.6)	176 (0.6)	115 (0.4)	660 (0.5)
Median age in years (IQR)	33.4 (31.9)	31.0 (34.8)	36.7 (31.4)	34.7 (41.3)	34.2 (33.4)
Number male (% total)	100 (56.8)	100 (53.8)	108 (63.2)	58 (51.8)	366 (56.7)
Number children <15 years old (% total)	21 (11.9)	36 (18.8)	29 (16.7)	20 (17.7)	106 (16.2)
Children % positive	2.0	3.7	3.1	2.3	2.7
Crude incidence per 100,000 population (95% CI)	1.00 (0.85-1.15)	1.07 (0.93-1.24)	0.98 (0.84-1.13)	0.64 (0.53-0.77)	0.92 (0.85-0.99)

* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

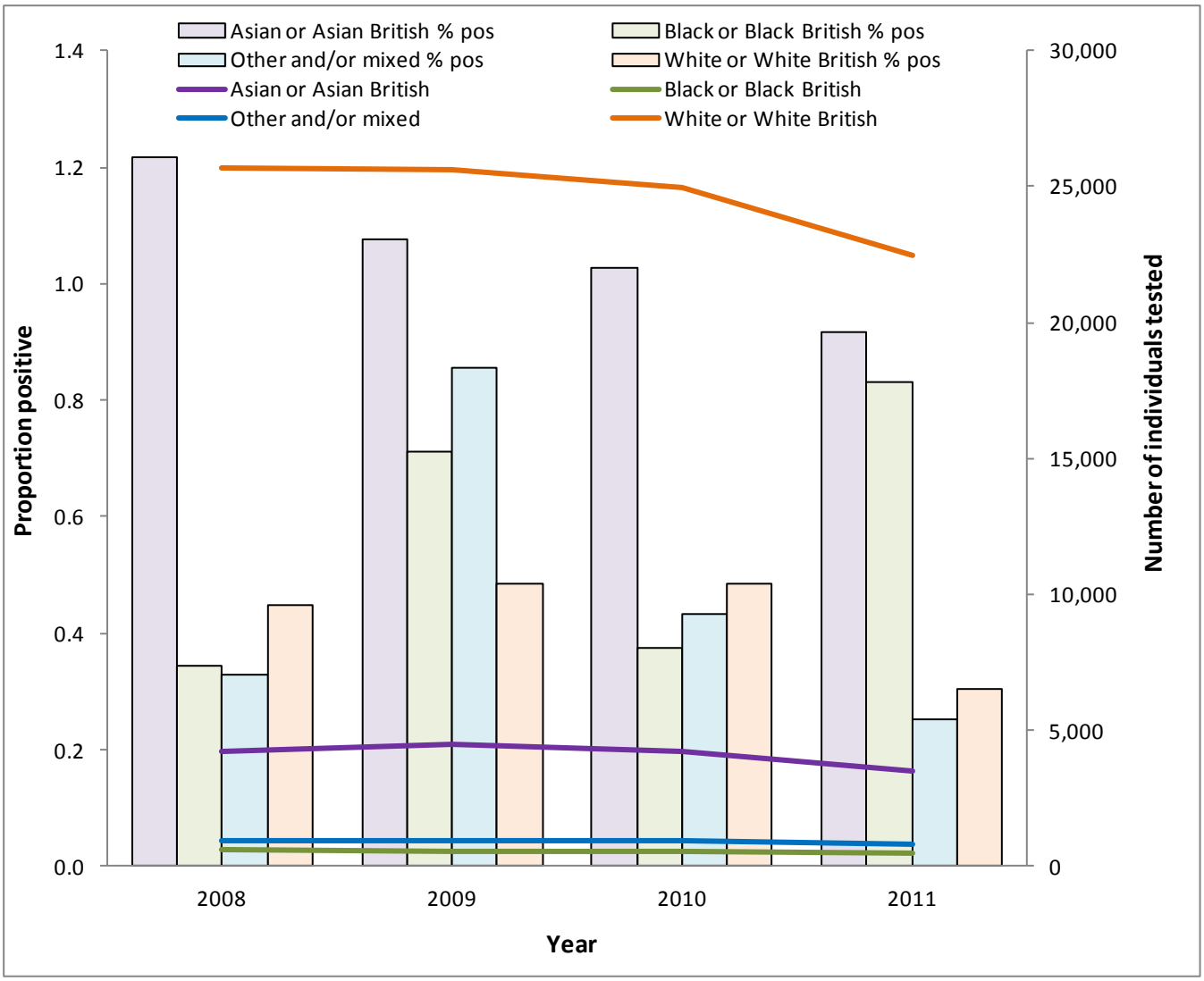
1.4 Trends in testing among key groups

1.4.1 Ethnicity

Ethnicity, either self reported or inferred, was available for 97.8% (n=120,859) of individuals (Table S 1). Overall, 4 in 5 (81.8%) of individuals were of WB, a further 13.5% were AB, 2.9% were OM, and 1.8% BB. The number of individuals tested over time declined across all ethnic groups (Figure 1). The median age of individuals tested showed little variation over time, however, individuals of WB ethnicity tested for anti-HAV IgM were consistently older than individuals from other ethnic groups (Table S 2).

The proportion of individuals who tested positive varied by ethnicity. Overall 1.1% of individuals of AB ethnicity tested positive compared to 0.6%, 0.5% and 0.4% among individuals of BB, OM and WB ethnicity, respectively, and fluctuated over time (Figure 1).

Figure 1. Individuals tested and testing positive for anti-HAV IgM by ethnic group, trend centres 2008-2011*

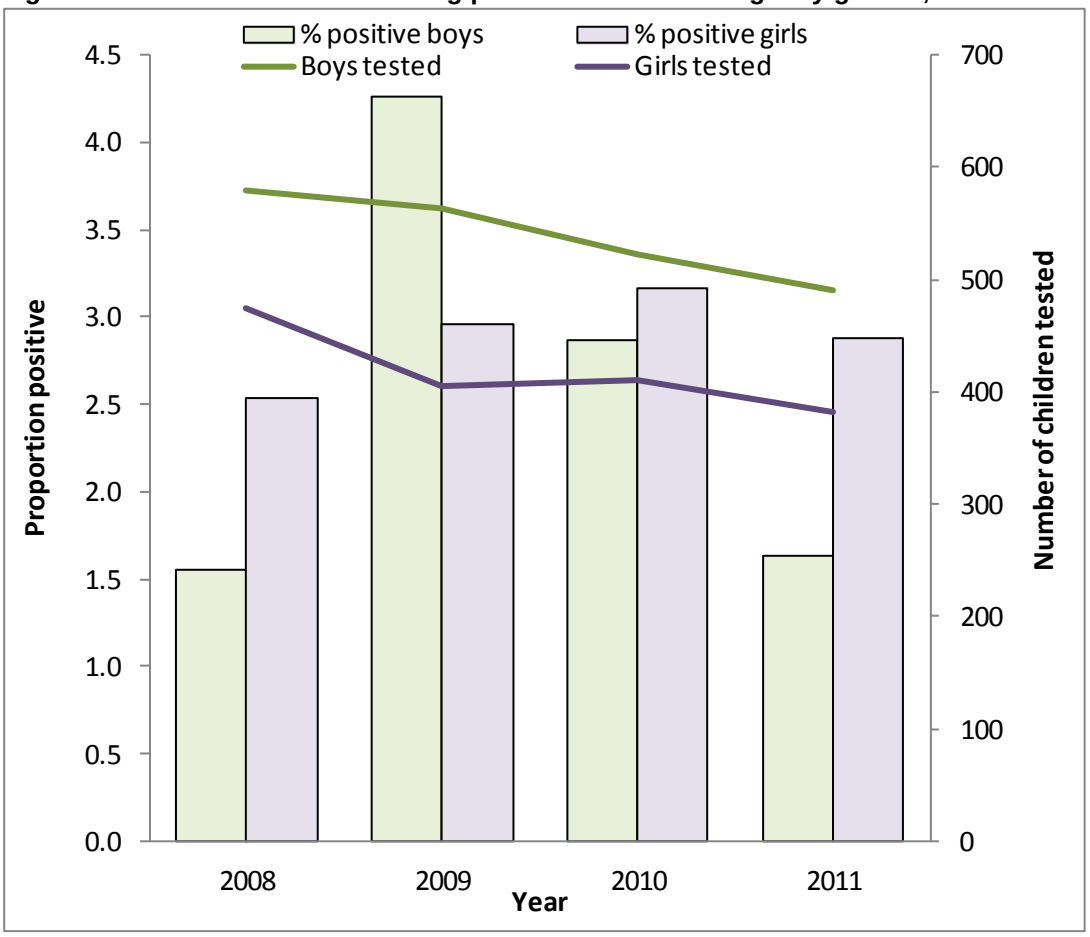


* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

1.4.2 Children

In total 3,858 children (aged <15) were tested for anti-HAV IgM between 2008 and 2011; 2.7% of whom tested positive (Table 1). Compared to individuals aged 15 and over, children were significantly more likely to test positive (2.7% vs. 0.5%; $p<0.001$). The total number of children tested decreased each year between 2008 and 2011, and by an overall 15.5%. Over half (56%; n=2,155/3,827) of all those tested were male however, there was no significant difference in the proportion of males testing positive compared to female (2.6% vs. 2.9%; $p=0.619$; Figure 2),

Figure 2. Children tested and testing positive for anti-HAV IgM by gender, trend centres 2008-2011*



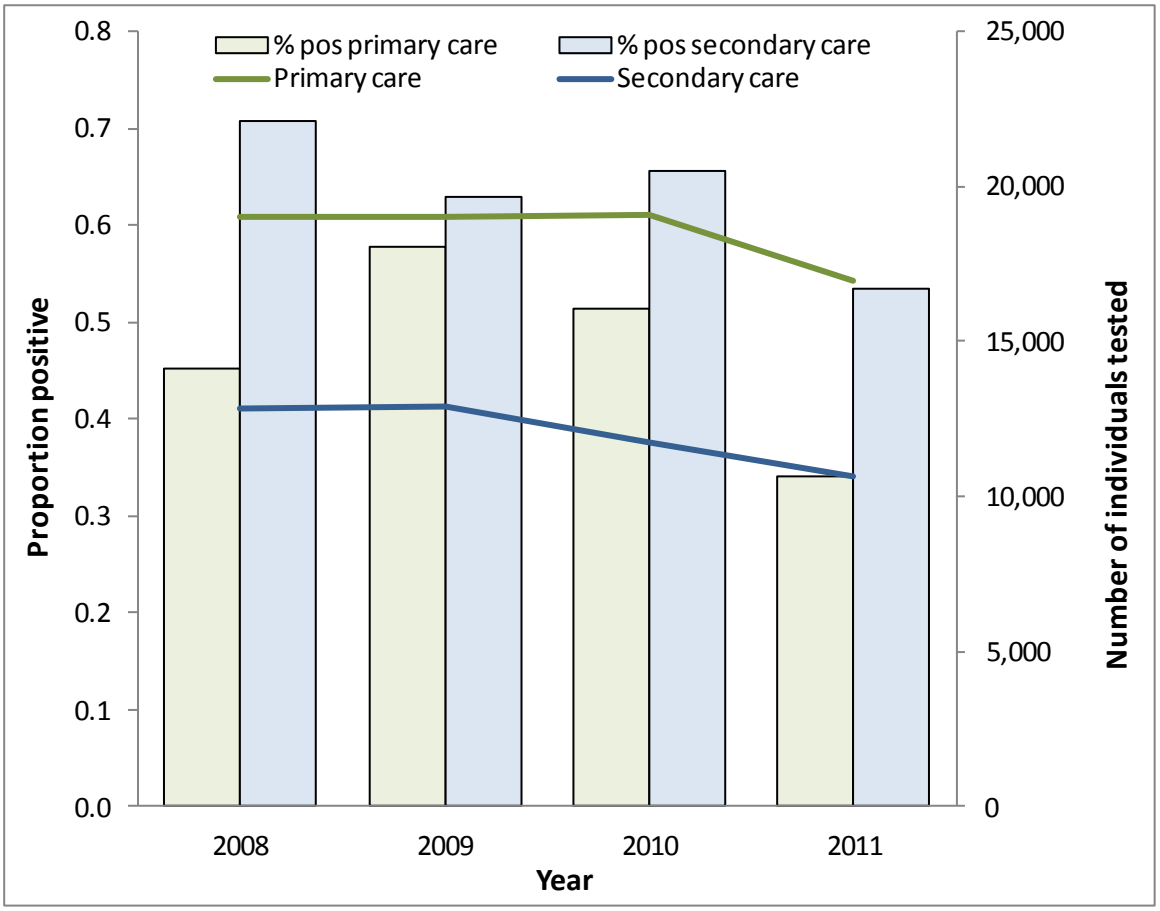
* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

Ethnicity, either self reported or inferred, was available for 98.4% (n=3,796) of children. Where known, 64.8% of children were WB, a further 27.8 % were AB, 4.3% were OM, and 3.0% were BB ethnicity. As reported previously [2], the highest proportion positive (7.5%) was seen among AB, compared to 2.4%, 1.5% and 0.9% among OM, WB and BB children, respectively.

1.5 Trends in testing by service type

The service type of the test request location was identified for >98% of all individuals (n=122,260) (Figure 3 and Table S 2).

Figure 3. Number of individuals tested and testing positive for anti-HAV IgM by service type, trend centres 2008-2011*



* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

1.5.1 Primary care services

Overall, three-fifths (61.4%) of individuals were tested in primary care services; with more individuals testing in primary care than secondary care each year. The number of individuals tested in a primary care setting was relatively stable between 2008 and 2010, and then declined from 19,096 in 2010 to 16,979 in 2011. This decline was driven by a reduction in testing in general practice during this period from 16,993 individuals tested in 2010 to 14,917 in 2011 with general practice testing 88.5% of individuals primary care overall (n=65,578). The number of individuals tested in prisons increase over time from 481 in 2008 to 870 in 2011. In all other primary services anti-HAV IgM has testing declined over time.

The greatest proportion of positive tests was observed in occupational health however very few individuals were tested by this service (2.0%; 8/450). A relatively high proportion positive was also observed in accident and emergency services (1.2%; n=42/2,372). However, more individuals with hepatitis A were identified through general practice than any other service (n=228).

1.5.2 Secondary care services

Similar numbers of individuals were tested in secondary care services during 2008 and 2009 (12,851 and 12,868 respectively), testing then declined year on year to 10,668 in 2011. Other known wards tested 45.1% of all individuals tested through secondary care, with a further 24.0% of individuals tested through general medical surgical and 9.2% in specialist infectious disease services. A greater proportion of individuals tested positive in secondary services than primary services (0.6% vs. 0.5% respectively; $p<0.001$), with the highest proportion of positive tested observed in paediatric services (2.2%).

2 Hepatitis E

2.1 Key findings

- Fewer individuals were tested for Hepatitis E (HEV) IgM than HAV IgM, however, the proportion positive was greater among those tested for HEV suggesting more targeted testing.
- In 2011, 1.9% of children tested were positive for HEV IgM compared to 8.2% of adults
- Most HEV IgM test requests were received from hospitals which referred all HEV samples to a sentinel laboratory; in these cases it was not possible to ascertain the original test request location.
- The number of individuals tested and proportion testing positive increased in 2011 compared to the previous three years. This may indicate better ascertainment of hepatitis E due to increase awareness and/or an increase in incidence of hepatitis E among the individuals undergoing testing.

2.2 Overview of testing in 2011

During 2011, a total of 4,705 individuals underwent first line testing for anti-HEV IgM in seven participating sentinel centres, of whom 7.9% (n=371) tested positive.

The age and gender of individuals tested for anti-HEV IgM was well reported (>95% complete). Where known, slightly more males were tested than females (53.2%); with a greater proportion of males testing positive compared to females (9.1% vs. 6.6%; p=0.004). Half of all individuals tested and two-fifths of individuals testing positive were aged between 24 and 55 years old. The median age of individuals tested was 46.8 years (IQR=31.6 years) compared to 5.16 among those who tested positive (IQR=30.0 years) however this difference was not statistically significant (p=0.791). The proportion of children aged under 15 testing positive was lower than the proportion positive among those 15 and over (1.9% vs. 8.2%; p<0.001).

Ethnicity, either self reported or inferred, was available for 93.4% (n=4,395) of individuals. Where known, 78.0% of individuals were classified as WB, 16.9% as AB, 3.5% as OM, and 1.6% as BB origin. The proportion positive varied by ethnic group; with 16.1% of individuals of AB ethnicity testing positive compared to 6.8%, 3.3% and 2.9% among those of WB, OM and BB ethnicity, respectively.

The majority of individuals were tested through a hospital that referred all samples to a sentinel centre (73.2%; n=3,441/4,701). In these cases it was not possible to determine the service type which originally requested the test. Where services types were available, a relatively high proportion of positive tests were seen in general medical surgical wards (10.2%) and in accident and emergency services (9.2%). The proportion of individuals testing positive from hospitals referring all samples was similar to that among individuals tested in general practice (8.3% vs. 8.7% respectively).

Clinical details were largely unavailable; 71.4% of individuals tested and 62.3% of individuals testing positive did not have a reported risk factor or reason for testing. Among the subgroup of individuals with clinical details a greater proportion tested positive when symptoms of jaundice were recorded compared to those without jaundice recorded (14.5% vs. 9.4%; p=0.026).

2.3 Trends in testing 2008 to 2011

Between 2008 and 2011, 17,327 individuals were tested for anti-HEV IgM, in seven sentinel centres, of whom 3.9% tested positive The number of individuals tested, and testing positive for anti-HEV IgM fluctuated slightly between 2008 and 2010, and increased in 2011(Table 2).

Gender and age were well reported (>94%). Slightly more males were tested each year than females (range 52.7-55.8%); overall 53.9% of individuals tested were male. There was little variation in median age of individuals tested each year (range 45.7-48.0 years).

A greater proportion of males tested positive each year compared to females, overall 8.1% of males and 5.8% of females tested positive, (n=719/8,838 and n=444/7,548 respectively; p<0.001). The median age of individuals testing positive varied over time (range 46.9-53.5 years). Overall, the median age of individuals testing positive was 13.4 years older than the median age of those tested however this was not statistically significant (median=34.6; p=0.400).

Following fluctuations in the annual incidence of hepatitis E between 2008 and 2010 (range 0.8-0.9 cases per 100,000 population), the incidence of infection increased significantly in 2011 to 1.0 cases per 100,000 population in 2011 (p<0.001).

Table 2. Trends in individuals tested and testing positive for anti-HEV IgM (all centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	4,138	4,292	4,192	4,705	17,327
Median age in years (IQR)	34.5 (21.7)	34.4 (21.6)	34.7 (22.1)	34.8 (22.4)	34.6 (21.9)
Number male (% known gender)	2,029 (52.7)	2,225 (54.1)	2,199 (55.8)	2,385 (53.2)	8,838 (53.9)
Number children <15 years old (% total known age)	86 (2.1)	124 (2.9)	241 (5.9)	206 (4.5)	657 (3.9)
Positive individuals					
Number positive (%)	276 (6.7)	318 (7.4)	275 (6.6)	371 (7.9)	1,240 (7.2)
Median age in years (IQR)	46.9 (29.5)	41.4 (30.8)	45.5 (27.6)	53.5 (30.0)	48.0 (30.4)
Number male (% total)	154 (61.6)	175 (59.3)	172 (66.7)	218 (61.2)	719 (62.0)
Number children <15 years old (% total)	4 (1.5)	13 (4.2)	8 (3.0)	4 (1.1)	29 (2.4)
Children % positive	4.7	10.5	3.3	1.9	4.4
Crude incidence per 100,000 population (95% CI)	0.78 (0.69-0.87)	0.89 (0.79-0.99)	0.76 (0.68-0.86)	1.03 (0.93-1.14)	0.87 (0.82-0.91)

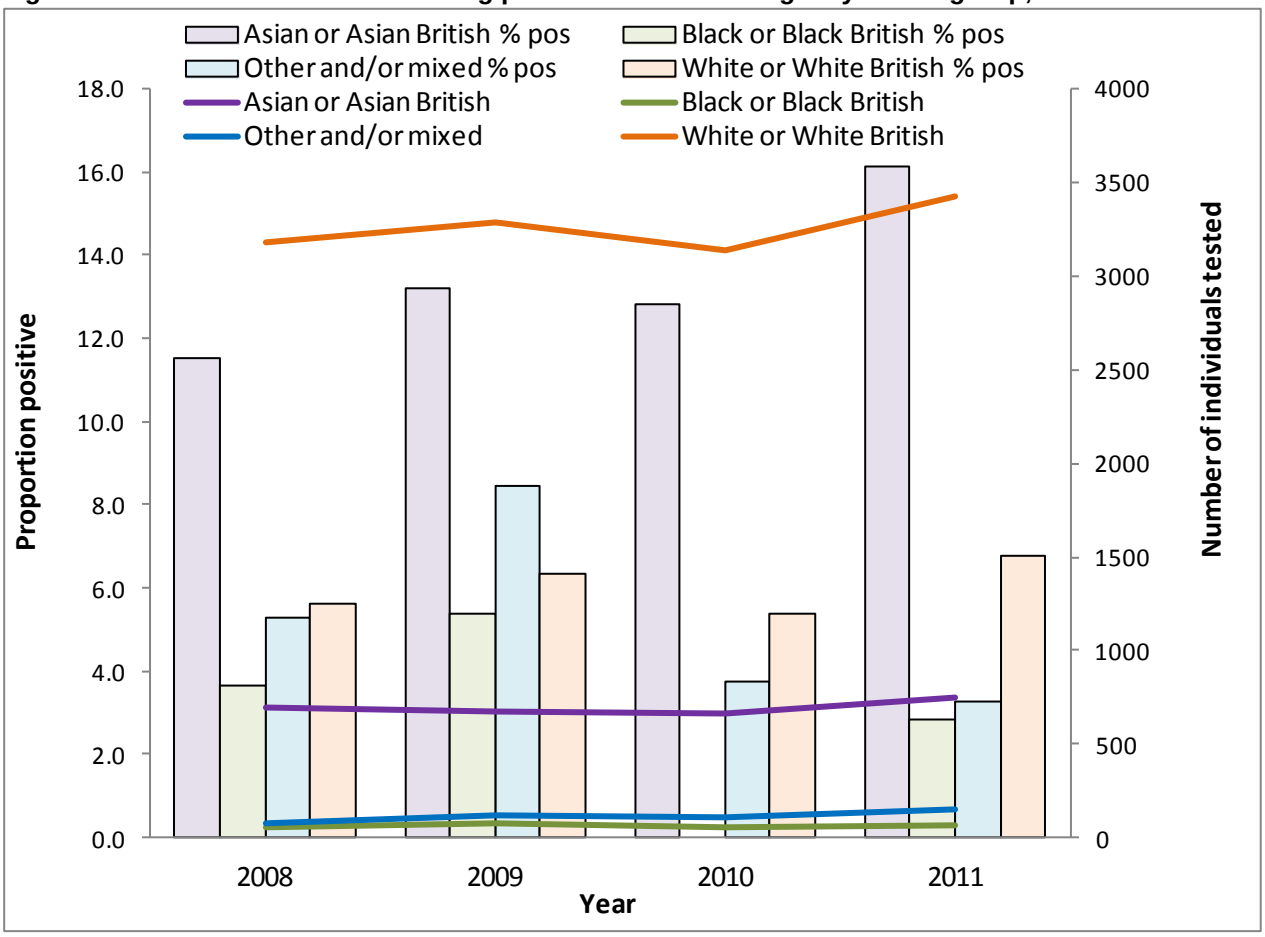
* At the seven centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

2.3.1 Ethnic groups

Ethnicity, either self reported or inferred, was available for 95.3% (n=16,515) of individuals tested during the 4 year period (Table S 3). The majority of individuals tested were of WB origin (78.9%), a further 16.8% were AB, 2.7% were OM, and 1.6% were of BB origin. The number of individuals tested within each ethnic group increased over time (Figure 4). More males were tested than females among AB, OM, and WB individuals, however slightly more females were tested than males among BB individuals (Table S 3). There was little variation in the median age of individuals tested by ethnic group.

The proportion of individuals testing positive varied by ethnic group; Overall 13.5% of individuals of AB ethnicity tested positive compared to 6.0% of WB individuals, 5.1% of OM ethnic origin individuals and 3.1% of BB individuals. The proportion of AB individuals testing positive increased over time from 11.5% in 2008 to 16.1% in 2011 (p=0.020).

Figure 4. Individuals tested and testing positive for anti-HEV IgM by ethnic group, all centres 2008-2011*



* At the seven centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

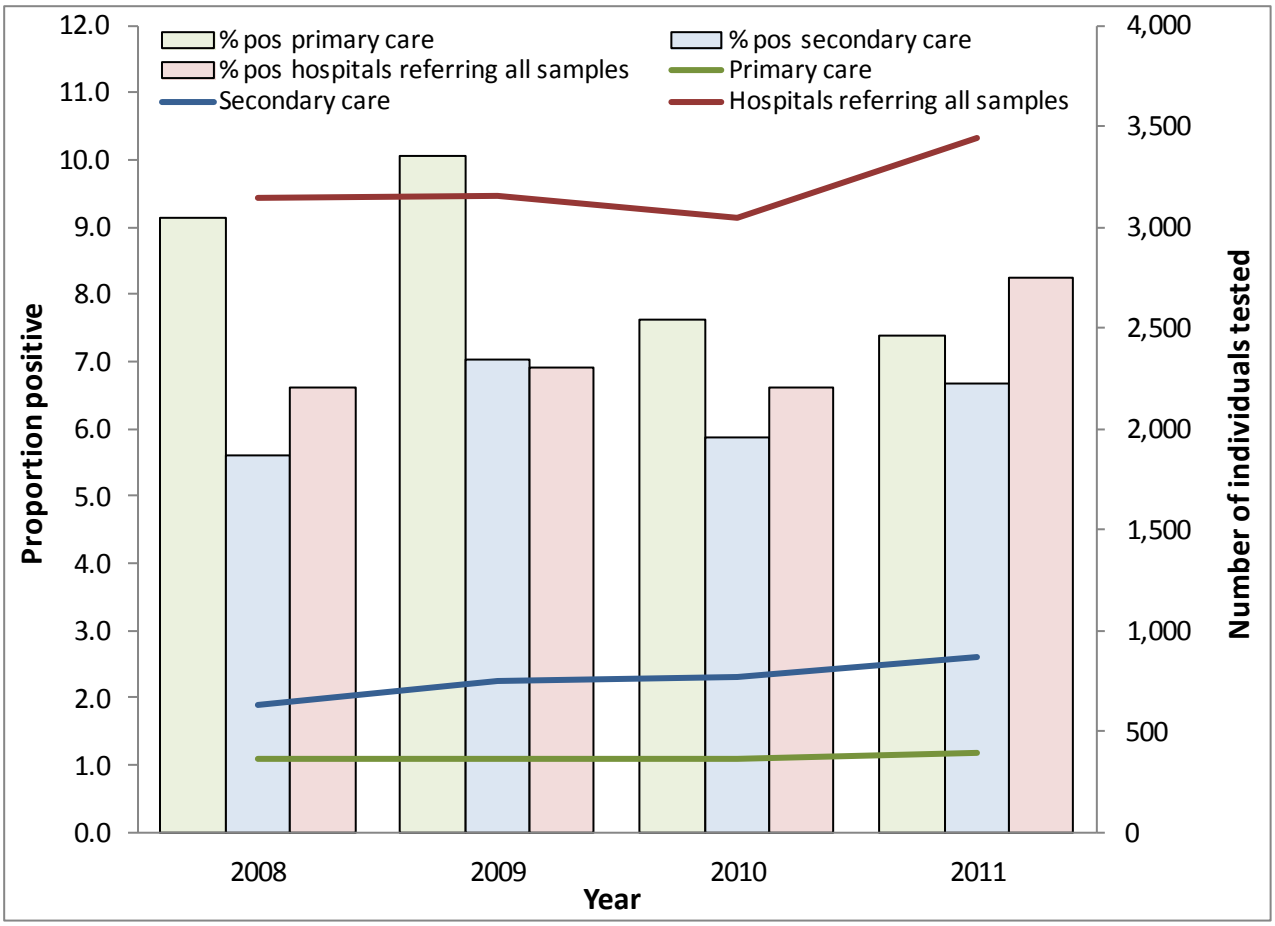
2.4 Trends in testing by service type

Between 2008 and 2011, three-quarters (74.0%) of all individuals tested for anti-HEV IgM were tested through a hospital which referred all samples to a sentinel laboratory. In these cases it was not possible to identify the original service which requested the test (Figure 5 and Table S 4). The number of individuals tested by hospitals referring all samples was relatively stable between 2008 and 2010, this increased by 13.0% in 2011. The proportion of individuals testing positive followed the same pattern with an increase in proportion positive from 6.6% in 2010 to 8.3% in 2011.

Testing in primary care services increased by 8.6% from 361 individuals tested in 2008 to 392 in 2011. GPs tested 58.8% of individuals with a further 19.7% tested in A&E services. The proportion of individuals testing positive increased from 9.1% in 2008 to 10.1% in 2010, then declined year on year to 7.4% in 2011.

More individuals were tested for anti-HEV IgM by secondary care services than primary care each year. Testing increased by 38.7% overall, with 626 individuals tested in 2008 compared to 868 in 2011. The greatest proportion positive was observed in specialist infectious disease services (8.2%).

Figure 5. Number of individuals tested and testing positive for anti-HEV IgM by service type, all centres 2008-2011*



* At the seven centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

3 Hepatitis B

3.1 Key findings

- The number of individuals newly tested for HBsAg has declined over time with 184,125 individuals tested in 2011 compared to 197,238 in 2008.
- The proportion of individual of white or white British origin testing positive has been constantly lower than the proportion positive seen among other ethnic groups.
- Less than 10% of individuals testing positive for hepatitis B were identified as having an acute infection with the proportion of acute infections declining over time, suggesting an ongoing pool of undiagnosed individuals.
- Between 2008 and 2011 prevalence of hepatitis B among women undergoing routine antenatal screening was low. This varied by ethnicity with a greater proportion testing positive for HBsAg and HBeAg among women of other or mixed ethnic origin.

3.2 Overview of testing in 2011

During 2011, excluding routine antenatal screening, a total of 184,125 individuals, underwent first line testing for HBsAg in 22 participating sentinel centres, of whom 1.7% (n=3,047) tested positive.

Where known (>98% complete), slightly more males (53.6%) were tested compared to females[2]. Males had a greater proportion testing positive compared to females (2.1% vs 1.1% $p<0.001$). Almost half of all individuals tested and three-fifths of individuals testing positive were aged between 25 and 44 years old. The median age of individuals tested was 34.8 years (IQR 22.4) and the median age of individuals testing positive was 34.0 years (IQR 16.5; $p<0.001$).

Ethnicity, either self reported or inferred, was available for three quarters (73.0%; n=134,362) of individuals. Where known, three-quarters (77.7%) were classified as WB ethnic origin, 15.7% as AB origin, 4.2% as OM, and 2.8% as BB ethnicity. The majority of individuals of unknown ethnic origin were tested by GUM services, for which demographic information is frequently lacking. The proportion positive varied by ethnic group with 9.3% of individuals of OM ethnicity tested positive compared to 7.1%, 2.7% and 0.8% among individuals of BB, AB and WB ethnicity, respectively

Where known (>99%), general practice tested the greatest proportion of individuals for HBsAg (30.1%), with a further 24.3% tested in GUM services and 15.5% tested in other known hospital wards. The highest proportion of positive tests was seen in specialist HIV and liver services (5.1% and 2.7% respectively).

3.2.1 Dried blood spot and oral fluid HBsAg testing

During 2011, 4,896 individuals were tested at least once for HBsAg by DBS testing, 0.7% of whom had a reactive test result. This includes 1,693 individuals tested through from drug action teams (DAT) by Concateno Plc of whom 0.4% were reactive and 3,203 individuals tested through sentinel laboratories, of whom 0.9% tested positive. A further 5,238 individuals were tested at least once for HBsAg by oral fluid testing, 2.4% of whom had a reactive result.

3.2.2 Antenatal HBsAg screening

During 2011, a total of 73,290 women aged 12-49 years old underwent routine antenatal screening for HBsAg in 22 participating sentinel centres, of whom 0.5% tested positive. Antenatal screening accounted for 28.5% of all HBsAg testing undertaken by sentinel centres in 2011. The median age of women undergoing antenatal screening was 29.0 years (IQR=8.7) and the median age of women tested positive was 28.2 years (IQR=9.0; p=0.459).

Ethnicity, either self reported or inferred, was available for the majority of women (n=71,951; 98.2%) who underwent antenatal screening. Most women (78.9%) were classified as being of WB ethnic origin, a further 15.1% were classified as AB origin, 3.7% were classified as OM ethnic origin, and 2.3% were classified as BB origin. The proportion testing positive was higher among women of BB origin and OM origin (3.9% and

[2] The number of females tested may include some undergoing routine antenatal screening which could not be identified as such from the information provided.

3.8% respectively) than women of AB origin and WB origin (0.5% and 0.3% respectively).The proportion of HBeAg positive women also varied by ethnic group with 26.9% of OM ethnic origin women testing positive compared to 14.3% of AB women, 7.4% of WB women, and 6.3% of BB women.

These results are similar to those reported last year [3].

3.3 Trends in testing 2008 to 2011

Between 2008 and 2011 excluding routine antenatal screening, 768,609 individuals were tested for HBsAg, in 22 sentinel centres, of whom 1.6% tested positive (Table 3). The number of individuals tested has declined over time from, 197,238 in 2008 to 184,125 in 2011. The characteristics of individuals tested and testing positive have been largely consistent over time, and with previous analyses [3]. Excluding antenatal screening, a similar number of individuals were tested for HBsAg in 2008 and 2009, this then declined year on year between 2009 and 2011. However, the proportion of individuals testing positive declined year on year between 2008 and 2010, then increased back to 2008 levels in 2011.

Gender and age were well reported during this four year period (>98%). The proportion of males tested compared to females increased slightly year on year from 50.2% males in 2008 to 53.4% males in 2011. This may be due to increased numbers of males undergoing testing compared to females and/or improved ascertainment of the female population undergoing routine antenatal screening. There was little variation in median age of individuals tested each year (range 34.4-34.8 years).

A greater proportion of males tested positive compared to females each year. Overall, 2.1% of males and 1.2% females tested positive (n=8,039/391,281 and n=4,258/365,198 respectively; p<0.001). The median age of individuals testing positive varied slightly over time (range 34.0-35.1 years).

The crude annual frequency of new diagnoses declined from 19.3 per 100,000 in 2008 to 16.2 per 100,000 in 2010, and then increased slightly to 16.9 per 100,000 in 2011.

Table 3. Trends in individuals tested and testing positive for HBsAg, and in women undergoing routine antenatal screening for HBsAg[$] (trend centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	197,128	197,649	189,707	184,125	768,609
Median age in years (IQR)	34.5 (21.7)	34.4 (21.6)	34.7 (22.1)	34.8 (22.4)	34.6 (21.9)
Number male (% known gender)	97,489 (50.2)	98,820 (50.9)	97,773 (52.4)	97,199 (53.6)	391,281 (51.7)
Positive individuals					
Number positive (%)	3,432 (1.7)	3,149 (1.6)	2,910 (1.5)	3,047 (1.7)	12,538 (1.6)
Median age in years (IQR)	35.1 (17.3)	34.3 (16.4)	34.7 (16.2)	34.0 (16.5)	34.6 (16.6)
Number male (% total)	2,121 (63.1)	1,985 (64.3)	1,874 (65.7)	2,059 (68.7)	8,039 (65.4)
Number acute[^] infections (%)	335 (9.8)	269 (8.5)	215 (7.4)	160 (5.3)	979 (7.8)
Annual frequency of new diagnoses per 100,000 population (95% CI)	19.32 (18.68-19.97)	17.61 (17.00-18.24)	16.16 (15.58-16.76)	16.92 (16.33-17.53)	17.50 (17.19-17.81)
Women undergoing routine antenatal screening					
Number women antenatal screened (% total all HBsAg)	67,788 (25.6)	62,415 (24.0)	62,534 (24.8)	73,290 (28.5)	266,027 (25.7)
Median age in years (IQR)	28.9 (9.3)	29.0 (9.1)	29.0 (8.8)	29.0 (8.7)	29.0 (9.0)
Number positive antenatal women (% total)	390 (10.2)	368 (10.5)	347 (10.7)	340 (10.0)	1,445 (10.3)
Antenatal women % positive	0.6	0.6	0.6	0.5	0.5
Median age in years (IQR)	28.2 (8.6)	28.0 (8.9)	27.8 (8.1)	28.2 (9.0)	28.0 (8.6)
Number HBsAg positive women tested for HBeAg (%)	375 (96.2)	349 (94.8)	328 (94.5)	296 (87.1)	1,348 (93.3)
Number HBeAg positive (%)	56 (14.9)	43 (12.3)	49 (14.9)	41 (13.9)	189 (14.0)

* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.
[$] Routine antenatal screening shown separately.
[^] See Appendix 1 for method.

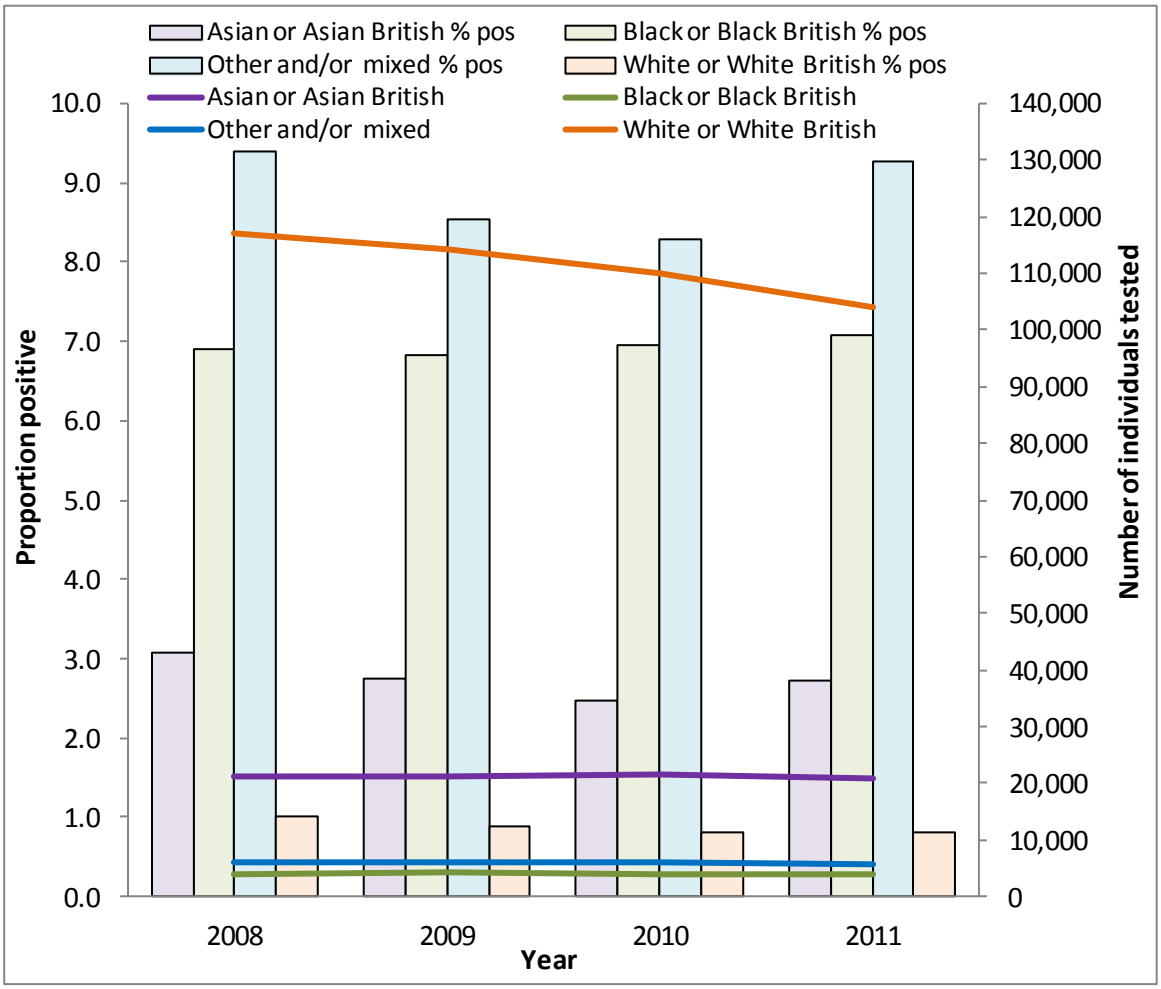
3.4 Trends in testing among key groups

3.4.1 Ethnic groups

Excluding antenatal screening, ethnicity, either self reported or inferred, was available for three-quarters (74.1%; n=569,747) of individuals tested for HBsAg (Table S 5). Where known, the majority of individuals tested were of WB origin (78.2%), a further 14.9% were classified as AB, 4.1% as OM origin, and 2.8% as BB. The number of individuals tested within each ethnic group increased over time (Figure 6). This decline was most apparent among WB individuals with an 11.2% decrease in testing between 2008 and 2011, compared to a 1.1% decline in testing of AB individuals. More males than females were tested among individuals of WB and unknown ethnic origin, conversely more females than males were tested among AB**,** BB, and OM origin individuals. The median age of WB individuals undergoing testing was greater than the median age of individuals from other ethnic groups.

The proportion of individuals testing positive varied by ethnic group. Overall 8.9% of BB individuals and 6.9% of OM origin individuals tested positive compared to 2.8% of AB individuals and 0.9% of WB individuals. A greater proportion of males tested positive than females in all ethnic groups.

Figure 6. Number of individuals tested and testing positive for HBsAg by ethnic group, trend centres 2008-2011*



* At the 22 centres for which full data were available 2008-2011. Excludes routine antenatal screening, reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

3.4.2 Antenatal HBsAg screening

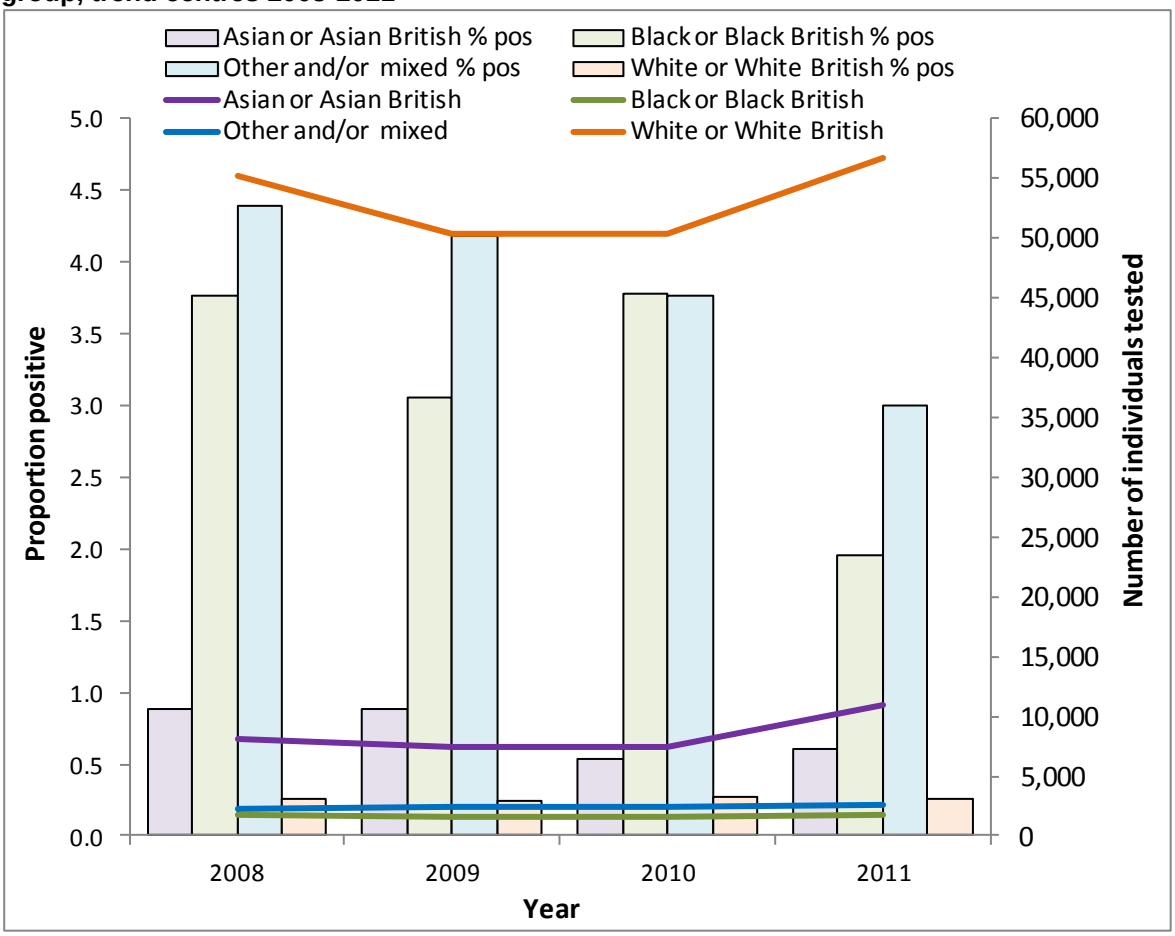
The number of women identified as undergoing routine antenatal screening decreased between 2008 and 2009, plateaued in 2010, then increased in 2011 (Table 3). These variations are likely to be due to changes to the provision of antenatal screening, with screening moving from sentinel laboratories to NHSBT in 2009 then returning back to sentinel laboratories in 2011. Ethnicity, either self reported or inferred, was available for the majority of women undergoing antenatal screening (98.8% n=262,865) (Figure 7 and Table S 6).

Four-fifths (80.9%) of women were of WB origin, a further 12.8% were AB, 3.7% were OM origin, and 2.5% were BB.

The median age of women screened and testing positive has been stable over time (median range 27.8-29.0 years). The proportion of women testing positive was stable at 0.6% between 2008 and 2010, and then declined slightly to 0.5% in 2011. The proportion of women who tested positive varied by ethnic group. Overall, 3.8% of OM origin and 3.1% of BB women tested positive compared to 0.7% of AB and 0.3% of WB women. The proportion of WB origin women who test positive has remained relatively constant over time, whereas the proportion of AB, BB, and OM origin women has declined since 2008.

Of those women who tested HBsAg positive (n=1,445), 94.7% were tested for HBeAg of whom 14.0% overall had a positive HBeAg test result (Table 3). The proportion positive varied considerably by ethnic group with 30.7% of OM ethnic origin women testing HBeAg positive compared to 8.3% of AB and WB women, and 4.4% of BB women (Table S 6).

Figure 7. Number of women undergoing antenatal screening and proportion positive for HBsAg by ethnic group, trend centres 2008-2011*

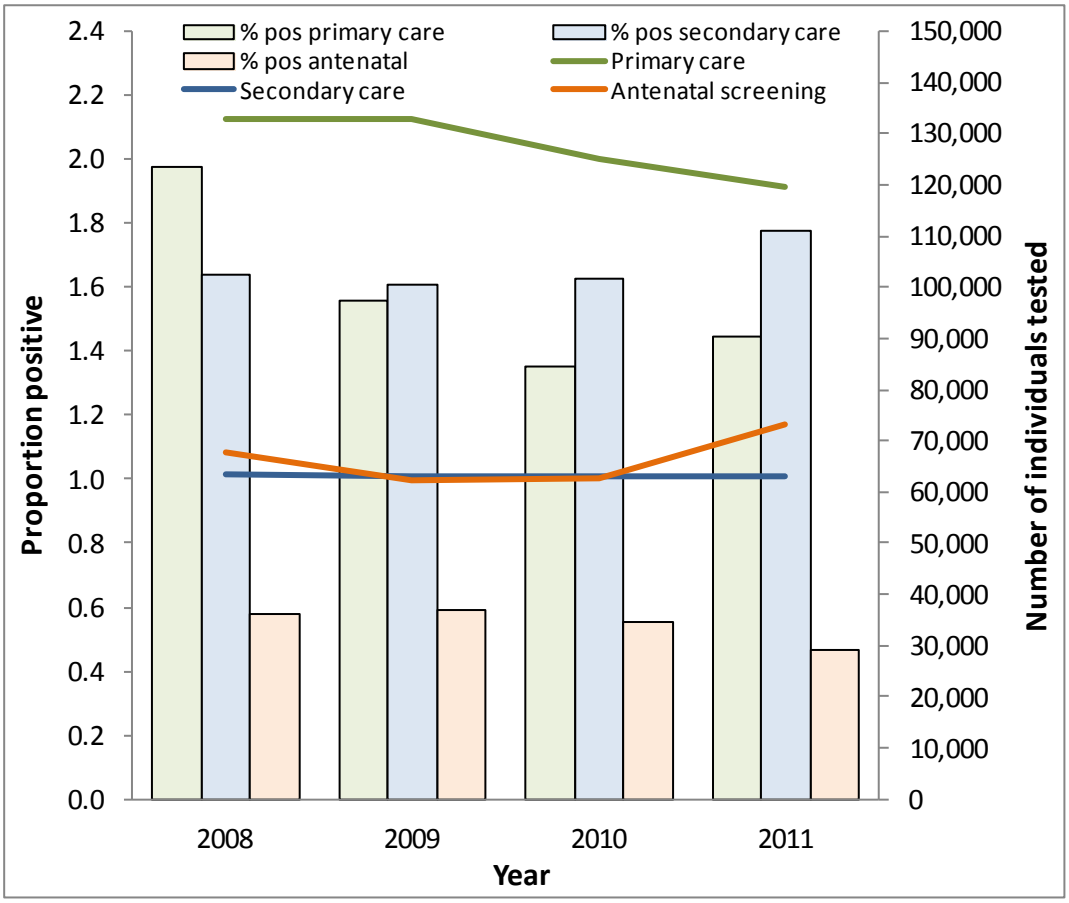


* At the 22 centres for which full data were available 2008-2011. Includes routine antenatal screening of woman aged 12-49 years old. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

3.5 Trends in testing by service type

The service which originally requested an HBsAg test was known for 99.2% of individuals tested between 2008 and 2011 (Table S 7).

Figure 8. Number of individuals tested and testing positive for HBsAg by service type, trend centres 2008-2011*



* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

3.5.1 Primary care services

A similar number of individuals were tested in 2008 and 2009, testing then declined year on year from 132,829 individuals tested in 2009 to 119,427 in 2011 (Figure 8). Testing in GUM clinics underwent a 14.5% decline during this period from 51,958 in 2008 to 44,399 in 2011. Testing by general practice and occupational health also decreased by 3.5% and 29.3% respectively. The proportion of individuals testing positive was stable at 1.6% between 2008 and 2010, then increased to 1.8% in 2011. The greatest proportion of positive tests was observed in accident and emergency and general practice (2.2% and 2.1% respectively).

3.5.2 Secondary care services

The number of individuals tested in secondary services showed little variation over time (range 69,940-63,259; Figure 8). Overall, 43.8% of individuals were tested for HBsAg in other known ward types which did not specialise in infectious diseases. A further 14.4% were tested by fertility services and 10.6% by general medical surgical wards. The proportion positive declined from 2.0% in 2008 to 1.4% in 2011. The greatest proportion positive was observed in specialist HIV services (3.9%; n=58/1,493) and specialist liver services (3.4%; n=607/17,724).

4 Hepatitis D

4.1 Key findings

- The number of individuals tested for hepatitis D has increase year on year from 1,531 in 2008 to 2,192 in 2011. This may indicate increasing awareness of the need to test for hepatitis D.
- The characteristics of individuals tested have been consistent over time.
- Most HDV IgM test requests were received from hospitals which referred all hepatitis D samples to a sentinel laboratory; in these cases it was not possible to ascertain the original test request location.

4.2 Overview of testing in 2011

During 2011, a total of 2,192 individuals underwent front-line testing for HDV total antibody (TA) and/or HDV IgM in four participating sentinel centres, of whom 3.7% (n=82) tested positive.

Where known (>97%), a greater proportion of those tested were males (57.5%) with a larger proportion of males testing positive compared to females (4.1% vs. 3.4%), although the difference was not statistically significant (p=0.251). Three-fifths (59.8%) of individuals tested and testing positive were aged 25-44 years old. The median age of individuals tested was 35.1 years (IQR=16.8 years), the median age those testing positive was 37.4 years (IQR=17.4, p=0.07).

Ethnicity, either self reported or inferred was available for four-fifths (n=1,750; 79.8%) of individuals tested for HDV. Where known, 42.2% of individuals were classified as being of WB ethnic origin, a further 25.8% were classified as OM ethnic origin, 20.3% were classified as AB origin, and 11.7% were classified as BB origin. The proportion positive varied by ethnic group; 5.1% of individuals of AB ethnic origin tested positive compared to 3.0% of WB origin individuals, 2.2% of other or mixed ethnic origin individuals and 2.0% of BB origin individuals.

Where known (n=2,187), over half of individuals were tested by a hospital which referred all HDV samples to a sentinel centre (50.7%). In these cases the original service that initially requested the test could not be determined.

4.3 Trends in testing 2008 to 2011

Between 2008 and 2011, 7,667 individuals were tested for HDV TA and/or HDV IgM, in four sentinel centres, of whom 4.3% tested positive (Table 4). The number of individuals tested for HDV TA and/or HDV IgM increase year on year from 1,531 in 2008 to 2,192 in 2011. The proportion of individuals testing positive, however, declined year on year from 4.6% in 2008 to 3.7% in 2011.

Gender and age were well reported during this four year period (>94%). The ratio of males to females tested was relatively consistent with more males tested compared to females each year; overall 56.5% of individuals tested were male (range 54.7-57.8%). There was little variation in the median age of individuals tested each year (range 38.4-39.7 years).

Overall, a greater proportion of males tested positive compared to females however this difference was not significant (n=183/4,125 and n=127/3,173 respectively; p=0.786). Slight fluctuations in the median age of individuals testing positive over time were observed (range 36.1-40.1 years). This variation may be due to the small number of individuals testing positive per year.

Table 4. Trends in individuals tested and testing positive for HDV TA and/or HDV IgM (all centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	1,531	1,860	2,084	2,192	7,667
Median age in years (IQR)	35.3 (16.6)	34.6 (16.5)	35.2 (16.1)	35.1 (16.8)	35.0 (16.5)
Number male (% known gender)	779 (54.7)	967 (55.4)	1,148 (57.8)	1,231 (57.5)	4,125 (56.5)
Positive individuals					
Number positive (%)	71 (4.6)	83 (4.5)	90 (4.3)	82 (3.7)	326 (4.3)
Median age in years (IQR)	35.0 (14.8)	36.7 (14.4)	35.4 (13.6)	37.4 (17.4)	36.1 (0.0)
Number male (% total)	34 (51.5)	43 (57.3)	56 (63.6)	50 (61.7)	183 (59.0)
Annual frequency of new diagnoses per 100,000 population (95% CI)	0.19 (0.15-0.24)	0.22 (0.17-0.27)	0.23 (0.19-0.29)	0.21 (0.17-0.26)	0.21 (0.19-0.24)

* At the four centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

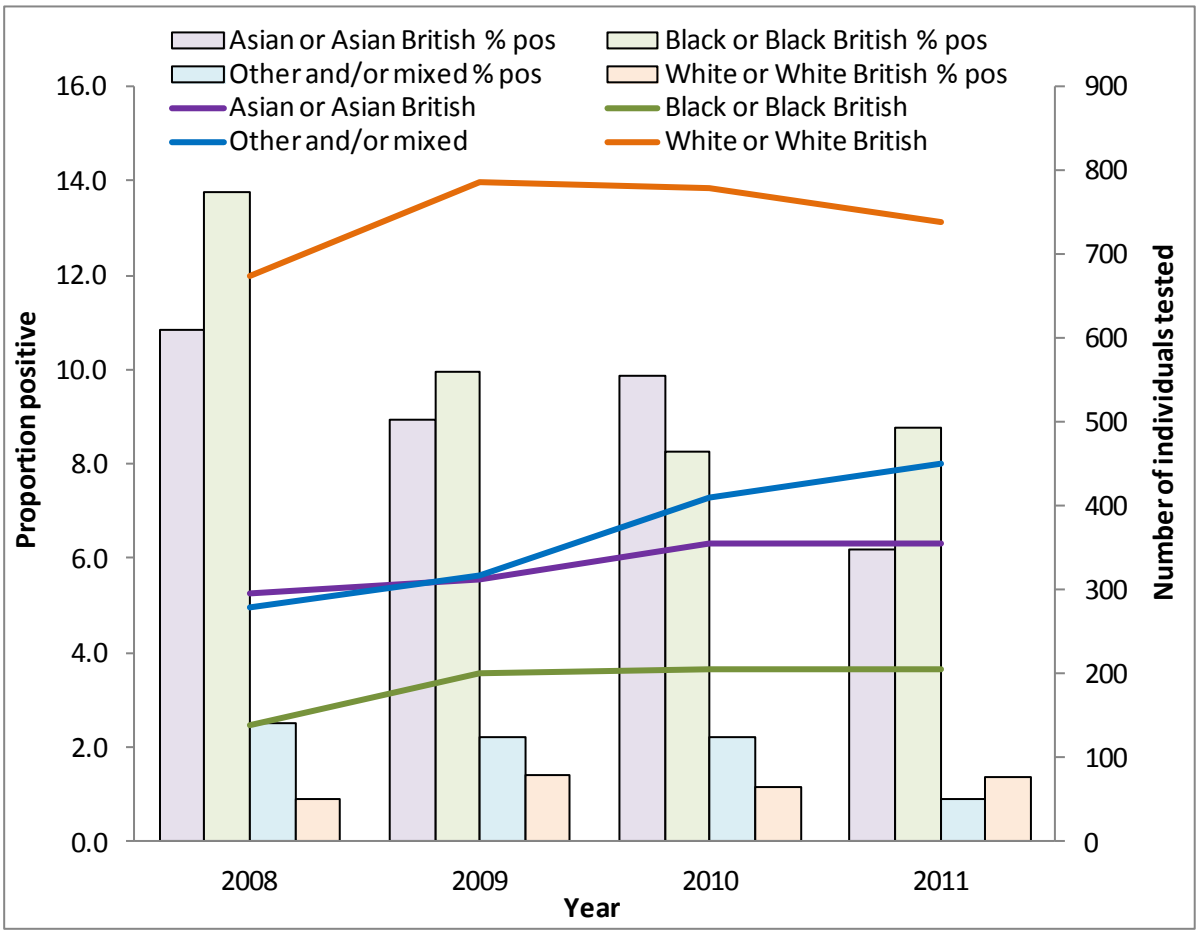
4.4 Trends in testing among key groups

4.4.1 Ethnic groups

Overall 84.8% of individuals tested for HDV TA and/or HDV IgM were classified as belonging to a broad ethnic group (n=6,500) (Table S 8). Slightly under half of all individuals tested were of WB origin (45.8%), a further 22.4% were classified as OM origin, 20.3% as AB, and 11.5% as BB. The number of individuals tested within each ethnic group increased over time (Figure 9). The comparatively low proportion of WB individuals testing reflects the low prevalence of 0.9% of HBsAg positive individuals among this ethnic group.

The proportion of individuals testing positive varied by ethnic group; Overall 9.9% of BB and 8.9% of AB individuals tested positive compared to 1.9% of OM ethnic origin and 1.2% of WB individuals. The proportion of WB individuals testing positive increased over time from 0.9% in 2008 to 1.4% in 2011. The proportion of individuals tested positive among AB, BB, and OM ethnic origin individuals has declined over the same period (Figure 9).

Figure 9. Number of in individuals tested and testing positive for HDV TA and/or HDV IgM by ethnic group, all centres 2008-2011*



* At the four centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

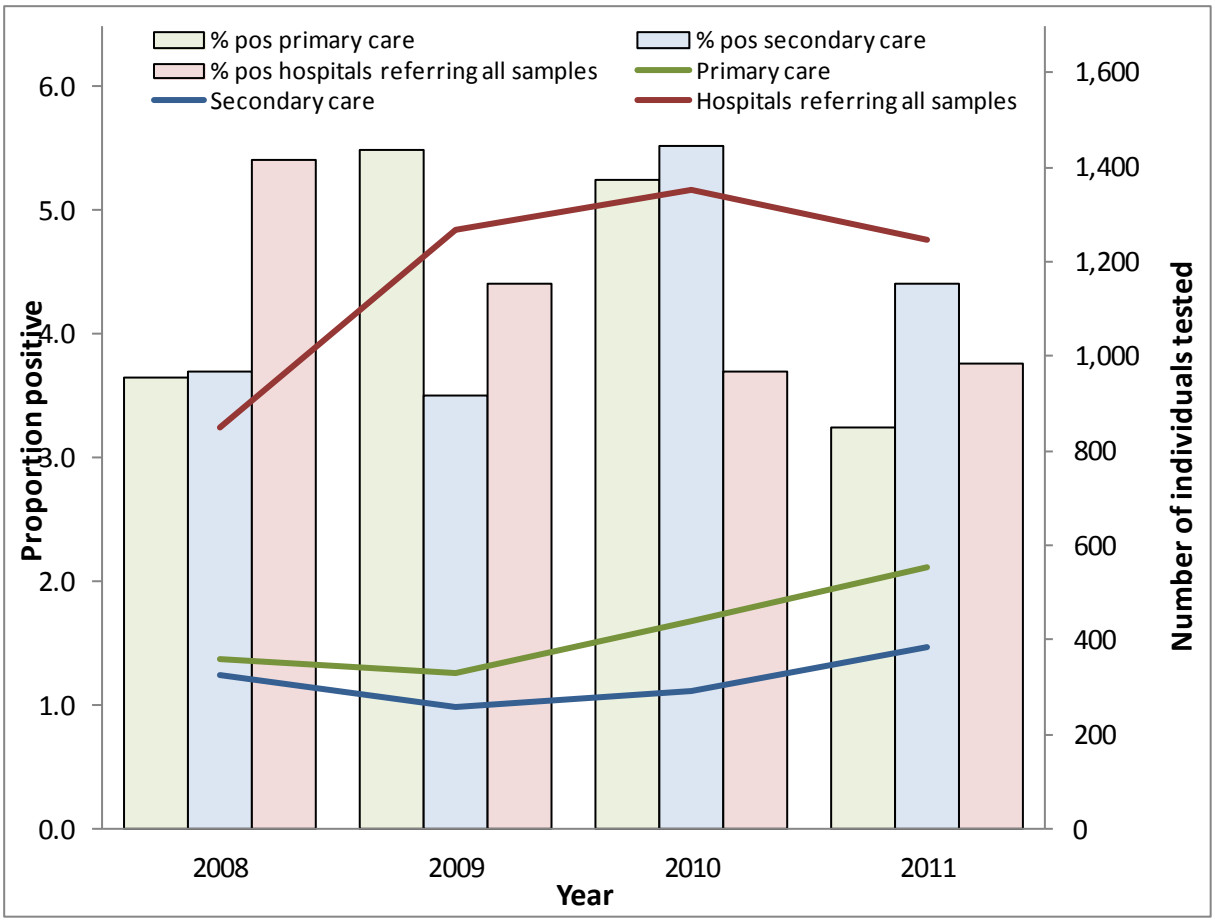
4.5 Trends in testing by service type

Overall, 61.6% of individuals tested for HDV TA and/or HDV IgM were tested through a hospital which referred all samples to a sentinel laboratory (Figure 10 and Table S 9). In these cases it was not possible to identify the original service which requested the test. Testing by hospitals referring all samples increased from 849 individuals tested in 2008 to 1,351 in 2010, and then declined to 1,247 in 2011. Conversely, the proportion of individuals testing positive declined from 5.4% in 2008 to 3.7% in 2010, but increased to 3.8% in 2011.

Testing within primary care services declined from 357 in 2008 to 328 in 2009, and then increased year on year to 555 individuals tested in 2011. The proportion of individuals testing positive fluctuated over time (range 3.2-5.5%).

Testing in secondary care services followed a similar pattern to that of primary care with a decline in the number of individuals tested from 325 in 2008 to 257 in 2009, then a year on year increase in testing to 385 in 2011. The proportion of individuals testing positive also fluctuated over time (range 3.5-5.5%).

Figure 10. Number of in individuals tested and testing positive for HDV TA and/or HDV IgM by service type, all centres 2008-2011*



* At the four centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

5 Hepatitis C

5.1 Key findings

- The number of individuals tested for hepatitis C has declined year on year from 167,872 in 2008 to 160,590 in 2011.
- The proportion of individuals testing positive declined between 2008 and 2010, from 3.4% to 2.5% then increased slightly in 2011 to 2.6%.
- Overall, a greater proportion positive was observed among males compared to females. However, females testing in prisons had a consistently high proportion positive than males.
- As reported previously the greatest proportion of positive tests were observed in specialist drug services and prisons; these data suggest that injecting drug usage is still a significant route of transmission. However, the number of individuals reported as being PWID was consistently low, (even among individuals tested in prison or specialist drug services) indicating under ascertainment of this population.
- Three quarters of anti-HCV positive individuals were tested for HCV RNA by PCR, of whom 69% tested positive.
- Where reported, 46% of individuals had a genotype 1 virus and a further 44% were genotype 3.
- Between 2008 and 2011, the proportion of 15 to 19 year olds testing positive has been stable at 0.4% per year, however, among 20 to 24 year olds, it decreased from 1.3% in 2008 to 1.1% in 2009 and then plateaued.

5.2 Overview of testing in 2011

During 2011, a total of 160,590 individuals underwent first line testing for anti-HCV in 22 participating sentinel centres, of whom 2.6% (n=4,221) tested positive.

Age and gender were well reported (>98% complete). Where known, slightly more males (55.4%) were tested than females. Half of all individuals tested and testing positive were aged between 25 and 44 years old. A greater proportion of males tested positive compared to female (3.3% vs 1.8% respectively, $p<0.001$). The mean age of those tested was 36.5 years (IQR=23.1), where as the median age of those tested positive was 4.3 years older (median=40.8 years; IQR=16.9; $p<0.001$).

Most individuals (n=124,639; 77.6%) tested for anti-HCV were classified as belonging to one of four broad ethnic groups. Where known, 79.5% of individuals were classified as being of WB ethnic origin, a further 14.5% were classified as AB origin, 3.5% were classified as OM ethnic origin, and 2.5% were classified as BB origin. The proportion positive varied slightly by ethnic group; 2.7% of individuals of WB ethnic origin tested positive compared to 2.6% of AB origin individuals, 1.7% of other or mixed ethnic origin individuals and 0.9% of BB origin individuals.

Where known (n=159,380), general practice tested the greatest proportion of individuals for anti-HCV (29.8%), with a further 17.8% tested in GUM services and 17.4% tested in other known hospital wards. The highest proportion of positive tests was observed in specialist drug services (18.0%) and prison services (11.9%).

Clinical details were available for just over a third of individuals tested for anti-HCV (n=59,025/160,590). Where known, 0.8% of individuals tested were recorded as being a PWID compared to 2.2% of individuals testing positive ($p>0.001$). Where known, the majority of anti-HCV positive PWID were of WB origin (n=296/304).

Of those individuals testing positive for anti-HCV 75.7% were tested for HCV RNA by PCR, of whom 68.5% tested positive (n=2,188). Of the PCR positive individuals 51.1% had a HCV genotype recorded; 46.2% of whom were genotype 1 with a further 44.4% genotype 3.

5.2.1 DBS and OF anti-HCV testing

During 2011, a total of 6,294 individuals were tested at least once for anti-HCV by DBS testing, 23.1% of whom had a reactive test result. Concateno Plc tested 2,086 individuals from drug action teams (DAT) of whom 27.7% has a reactive test result. A further 4,208 individuals were tested by sentinel laboratories, of

whom 20.7% tested positive. The comparatively lower proportion of positive test results among individuals who were tested by sentinel laboratories may reflect differences in testing; for example DBS testing has been trialled in pharmacies and other primary care settings as well as by specialist drug services, where as all samples tested by DBS by Concateno Plc. were taken in or by drug action teams. A further 3,974 individuals were tested at least once for anti-HCV by oral fluid testing, of which 14.6% had a reactive result

5.3 Trends in testing 2008 to 2011

From January 2008 to December 2011, 657,128 individuals aged over one year were tested for anti-HCV in 22 sentinel centres, of whom 2.8% tested positive (Table 5). Since 2008, there has been a 4.3% decrease in the number of individuals tested for anti-HCV. This decline was most apparent in 2010 when testing decreased by 3.9% compared to 2009 levels. The proportion of individuals testing positive declined year on year between 2008 and 2010, then increased slightly in 2011.

Gender and age were well reported (>98%). Where known, a greater proportion of males were tested each year compared to females (overall 54.1% male), the proportion of males tested also increased slightly year on year from 52.9% in 2008 to 55.4% in 2011. There was little variation in median age of individuals tested each year (range 36.1-36.1 years).

A greater proportion of males tested positive than females each year. Overall, 3.5% of males and 2.0% females tested positive (12,325/349,411 and 5,901/297,029 respectively; $p<0.001$). Little variation was observed in the median age of individuals testing positive over time (range 39.6-40.8 years). The median age of individuals testing positive was 1.5 years older than that of individuals undergoing testing ($p=0.001$).

The crude annual frequency of new diagnoses declined year on year from 31.8 per 100,000 in 2008 to 22.3 per 100,000 in 2010, and then increased slightly to 23.4 per 100,000 in 2011.

Table 5. Trends in individuals tested and testing positive for anti-HCV (trend centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	167,872	167,596	161,070	160,590	657,128
Median age in years (IQR)	36.1 (22.7)	36.0 (22.7)	36.5 (22.9)	36.5 (23.1)	36.3 (22.9)
Number male (% known gender)	87,561 (52.9)	87,758 (53.2)	86,552 (54.7)	87,540 (55.4)	349,411 (54.1)
Number young adults 15-24 years old (% total known age)	32,409 (19.4)	32,637 (19.6)	27,918 (17.4)	27,384 (17.2)	120,348 (18.4)
Positive individuals					
Number positive (%)	5,650 (3.4)	4,636 (2.8)	4,017 (2.5)	4,221 (2.6)	18,524 (2.8)
Median age in years (IQR)	39.9 (15.3)	39.6 (15.8)	40.4 (16.4)	40.8 (16.9)	40.2 (16.1)
Number male (% total)	3,770 (67.6)	3,041 (66.5)	2,662 (67.6)	2,852 (69.0)	12,325 (67.6)
Number young adults 15-24 years old (% total)	330 (5.9)	272 (5.9)	244 (6.1)	236 (5.6)	1,082 (5.8)
Young adults % positive	1.0	0.8	0.9	0.9	0.9
Crude prevalance per 100,000 population (95% CI)#	31.80 (30.98-32.64)	25.93 (25.18-26.68)	22.31 (21.62-23.01)	23.44 (22.74-24.16)	25.85 (25.48-26.22)

* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Individuals aged less than one year are excluded since positive tests in this age group may reflect the presence of passively-acquired maternal antibody rather than true infection. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

5.4 Trends in testing among key groups

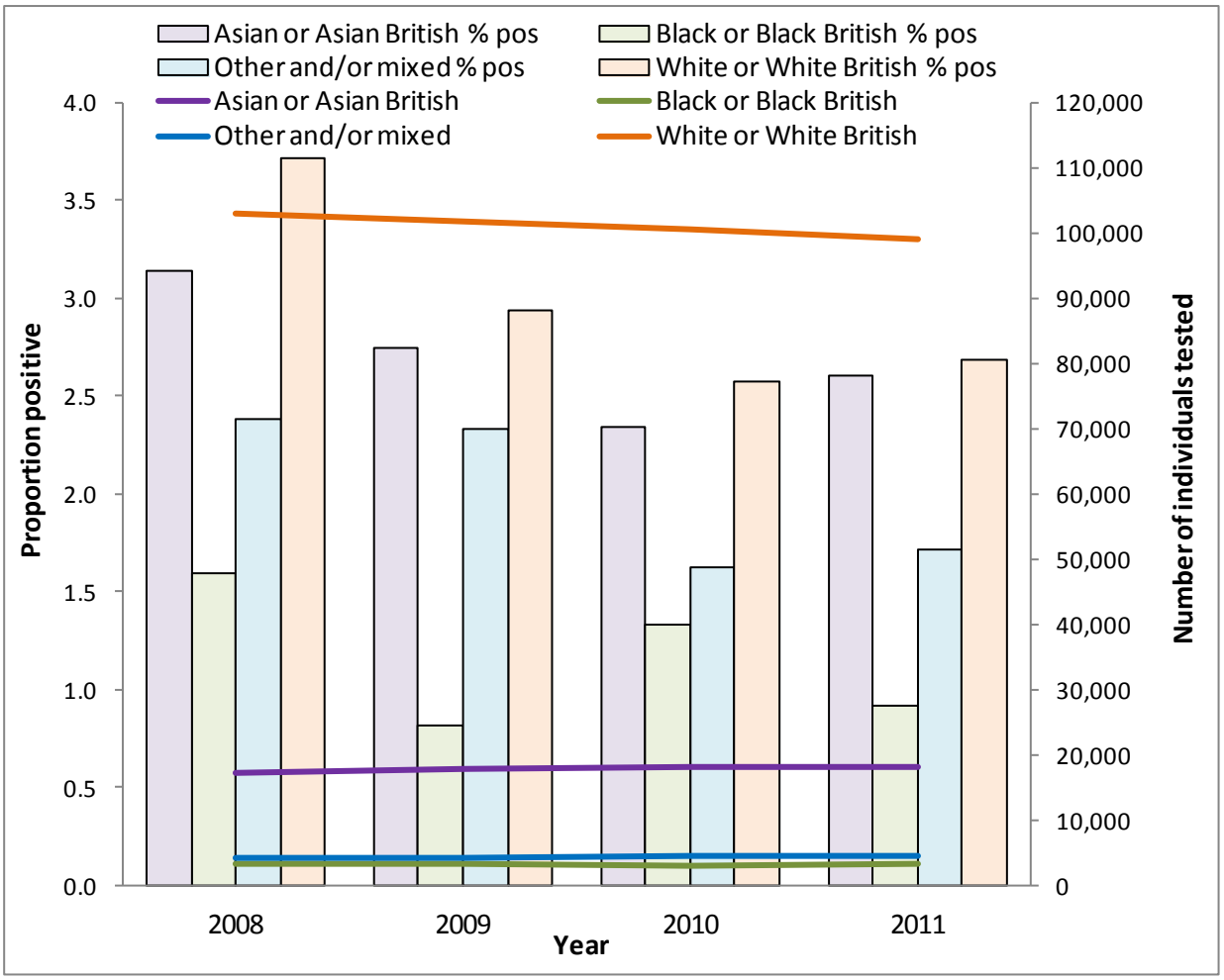
5.4.1 Ethnic groups

Ethnicity, either self reported or inferred was available for three-quarters of individuals tested for anti-HCV (76.9%; n=505,520) (Table S 10). Where known, four-fifths of individuals were of WB origin, a further 14.0% were of AB origin, 3.4% were OM origin, and 2.5% were of BB origin. The number of WB and BB individuals tested over time declined by 3.9% and 1.4% respectively whereas the number of AB and OM origin individual tested over time increased by 5.5% and 3.0% respectively (Figure 11). The median age of individuals of unknown ethnic origin was younger than for individuals of known ethnic origin, however, this

was likely to be driven by individuals accessing GUM services who are generally younger (where names are not available for analysis) and not by ethnicity.

The proportion of individuals testing positive varied by ethnic group. Overall, 3.0% of WB individuals tested positive compared to 2.7% of AB individuals, 2.0% of OM ethnic origin individuals, and 1.2% of BB individuals. The proportion of individuals testing positive among each ethnic group fluctuated during this four year period. However, an overall decline in the proportion positive in 2011 compared to 2008 was observed for each ethnic group (Figure 11). A greater proportion of males tested positive than females in each ethnic group apart from BB individuals where more females tested positive than males.

Figure 11. Number of individuals tested and testing positive for anti-HCV by ethnic group, trend centres 2008-2011*



* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Individuals aged less than one year are excluded since positive tests in this age group may reflect the presence of passively-acquired maternal antibody rather than true infection. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

5.4.2 Young adults

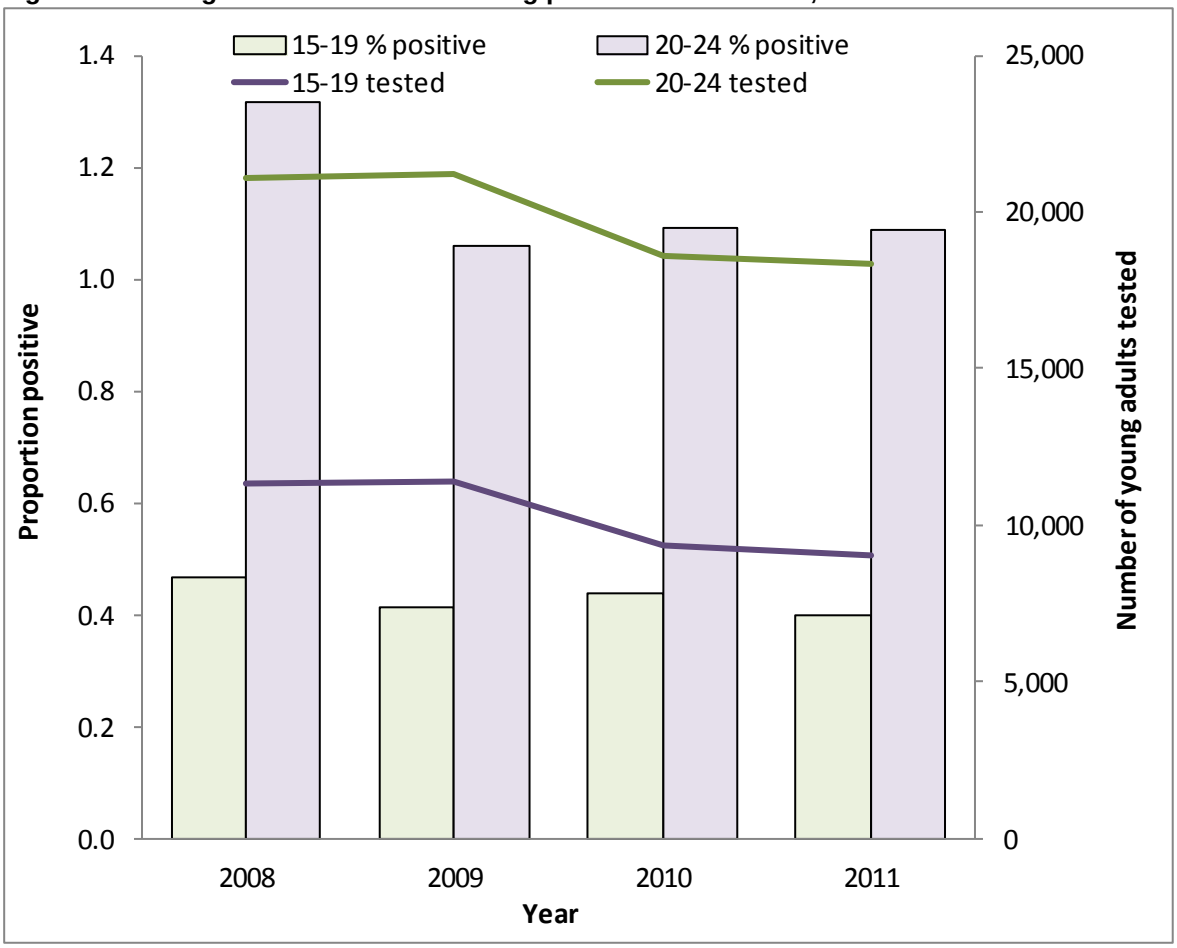
The proportion of anti-HCV positive young adults aged 15 to 24 are likely to have acquired their infection within the past few years, and can be considered a proxy for incidence or recently acquired infections.

In total, 6.5% (n=41,111) of individuals tested for anti-HCV were aged 15 to 19 years old and a further 12.5% (n=29,237) were aged 20 to 24 years old (Figure 12). Testing among both age-groups followed a similar pattern with similar numbers tested in 2008 and 2009, followed by a decline in tested which was most pronounced between 2009 and 2010. A third of young adults were tested by GUM services (36.2%), a further 24.7% were tested by general practice and 16.4% by occupational health services.

The proportion of 15 to 19 year olds testing positive has been relatively stable at 0.4% per year, however, among 20 to 24 year olds, it decreased from 1.3% in 2008 to 1.1% in 2009 and then plateaued. The greatest proportion of positive tests were from specialist drug services (9.2%; n=101/1,072).

These data suggest that the rate of newly acquired hepatitis C infection has been relatively unchanged over the past four years.

Figure 12. Young adults tested and testing positive for anti-HCV, trend centres 2008-2011*



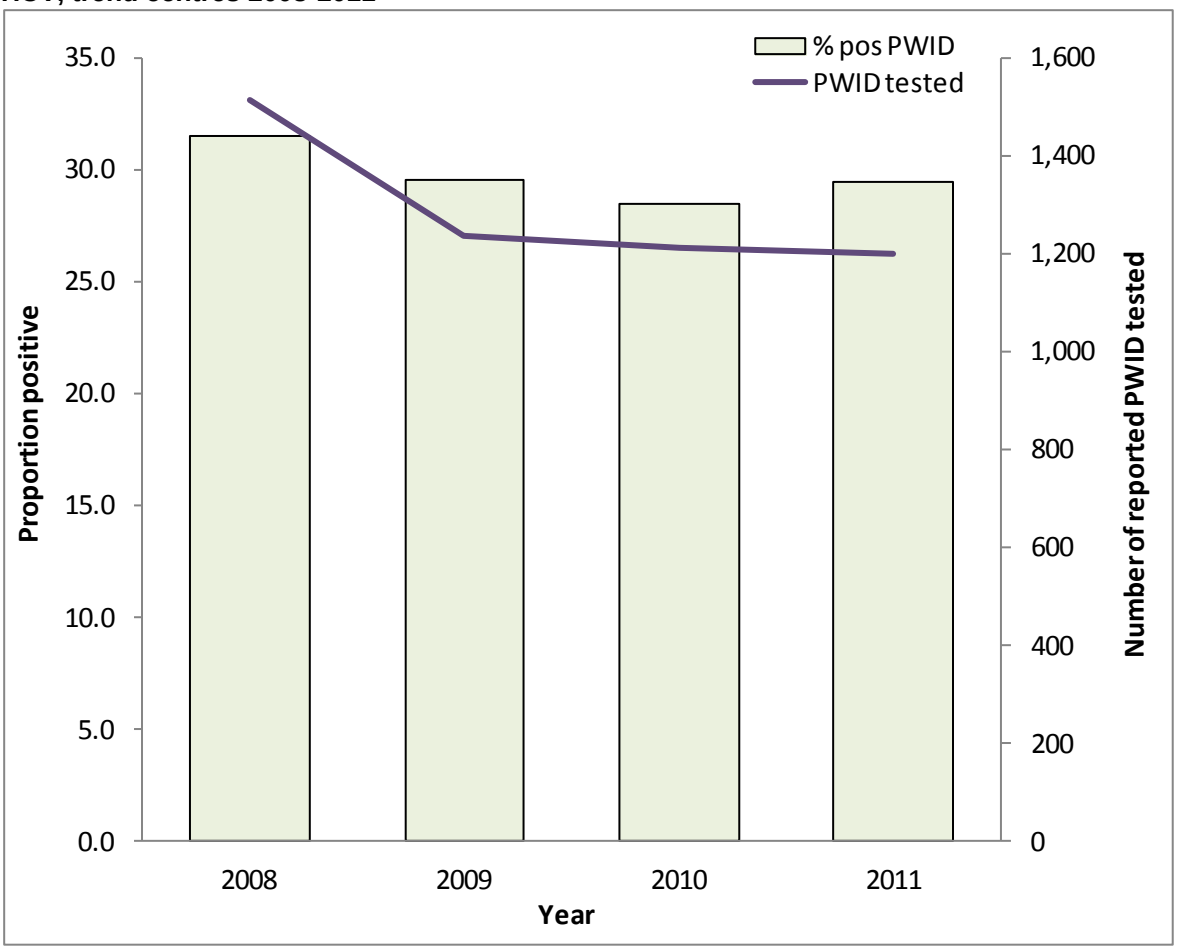
* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

5.4.3 People who inject drugs

The proportion of individuals with a known risk factor and/or reason for testing was consistently low with information available for 33.6% of all individuals tested and 31.4% of all individuals testing positive for anti-HCV. In total 5,159 individuals were reported as a current or ex PWID from all service types (Figure 13). Overall, 29.8% of PWID tested positive with little variation observed over time.

However, it should be noted that comparatively few individuals tested in specialist drug services, or in prisons, were recorded as PWID (12.4% and 8% respectively). In specialist drugs services 35.1% of PWID tested positive compared to 18.7% of people not reported as having injected, in prisons the same pattern was observed with 30.2% of PWID and 14.8% of people not reported as having injected testing positive. Given the comparatively high proportion positive among individuals not reported as having injected there is likely to be considerable under ascertainment of PWID among this population.

Figure 13. Number of individuals identified as being current or ex PWID tested and testing positive for anti-HCV, trend centres 2008-2011*

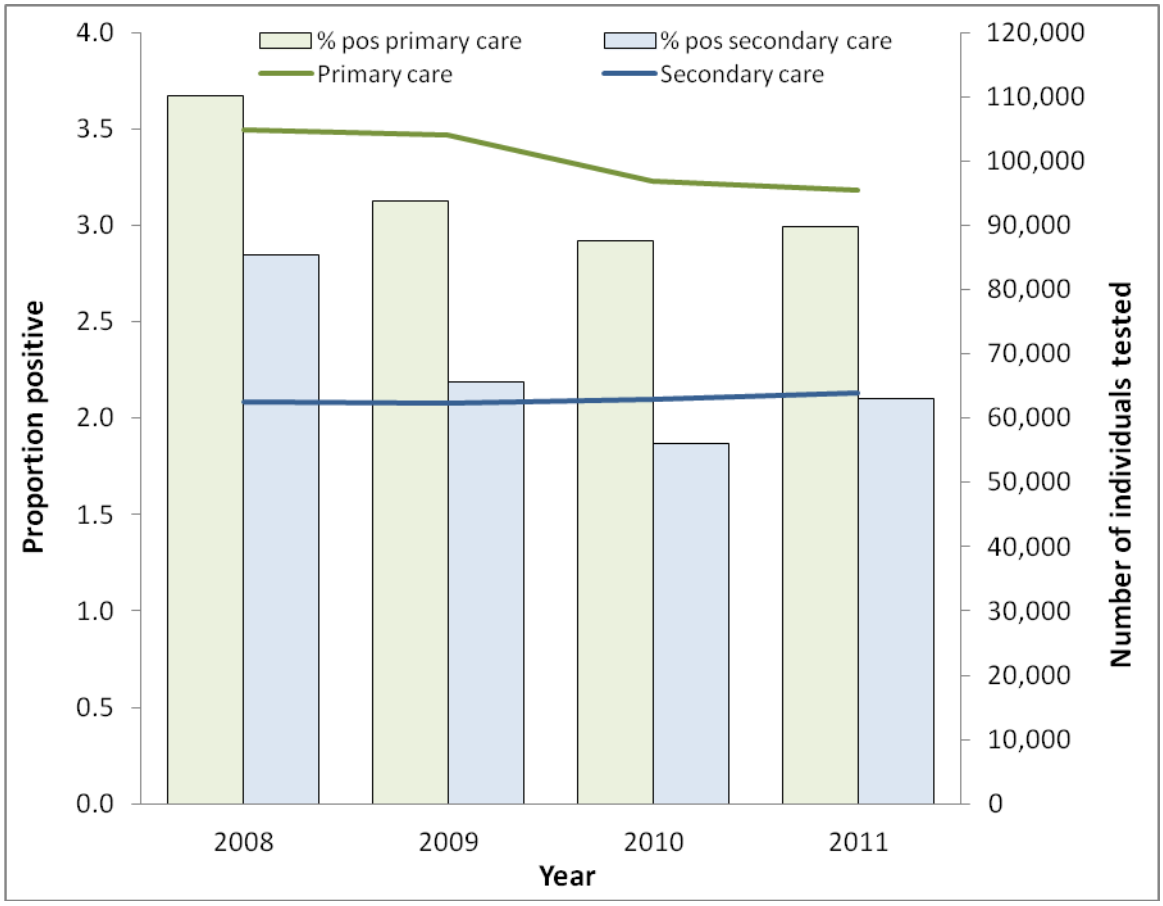


* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

5.5 Trends in testing by service type

Between 2008 and 2011 the service type which requested anti-HCV testing was identified in 99.3% of cases (Figure 14 and Table S 11).

Figure 14. Number of individuals tested and testing positive for anti-HCV by service type, trend centres 2008-2011*



* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Individuals aged less than one year are excluded since positive tests in this age group may reflect the presence of passively-acquired maternal antibody rather than true infection. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

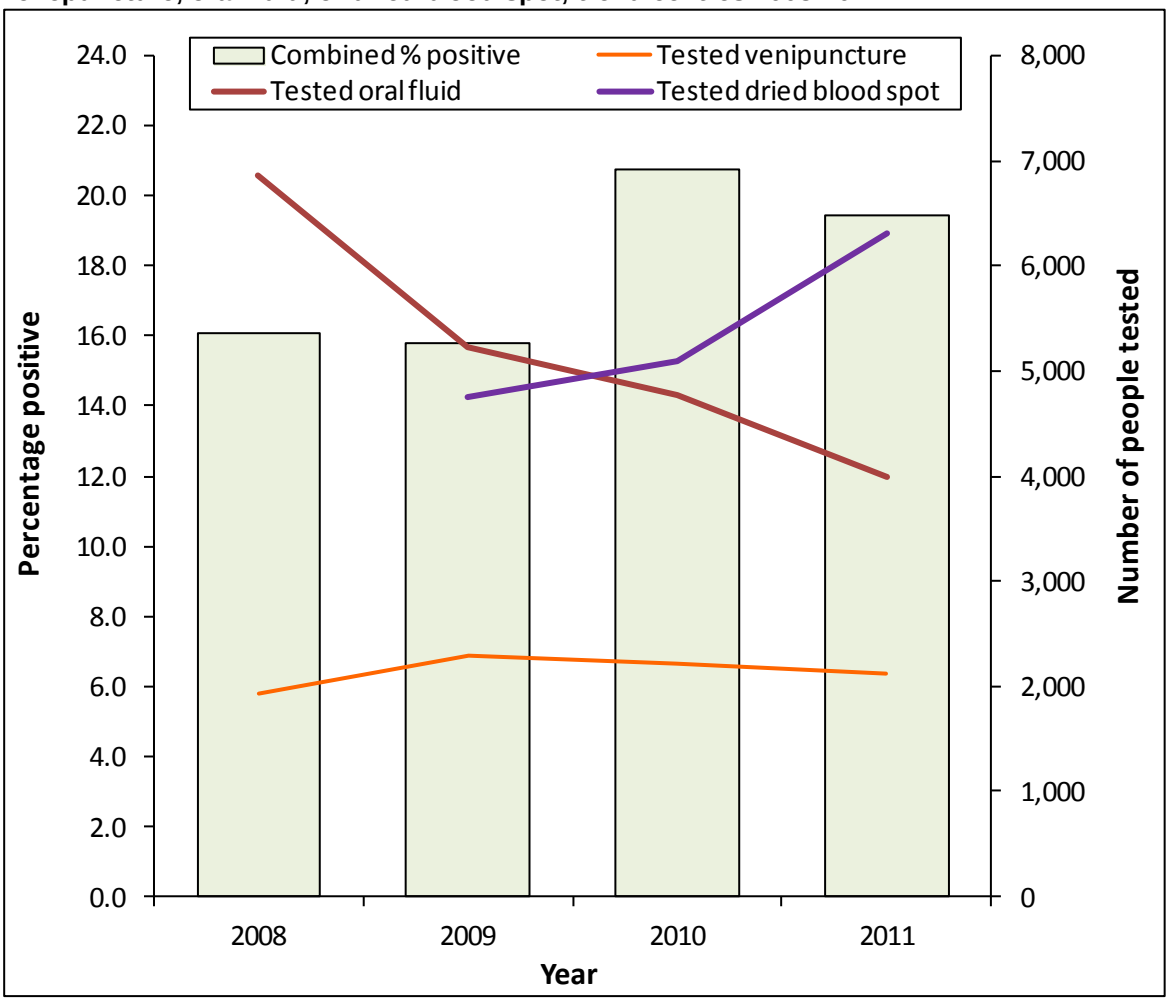
5.5.1 Primary care services

Overall, three-fifths of individuals were tested in primary care services (n=401,205). However, a slight decline was seen in the proportion of individuals tested in primary care compared to secondary care over time. Testing in primary care was relatively stable between 2008 and 2009, and then declined from 104,076 in 2010 to 95,499 in 2011. Overall, GPs tested 45.8% of individuals, a further 33.6% were tested in GUM services, and 13.2% by occupational health services. The decline in testing through primary care was driven by a 27% reduction in testing in GUM services from 38,969 individuals tested in 2008 to 28,324 in 2011 and in occupational health services from 14,904 individuals tested in 2008 to 11,039 in 2011. Testing in A&E services, GPs, specialist drug services, and prisons increased over time (Figure 14 and Table S 11).

The proportion of individuals testing positive declined overall, and within each primary care service. The greatest proportion positive was observed in specialist drug services and prisons (20.7% and 15.4% respectively). Unlike other services, where a greater proportion of males tested positive compared to females, in prisons 24.6% of females tested positive compared to 12.0% of males. This may reflect differences in the risk of female offenders acquiring hepatitis C, and/or differences in the offer and acceptance of testing.

Using data from multiple sources (sentinel surveillance and Concateno Plc.) the overall number of individuals tested by specialist drugs services increased over time from 8,784 in 2008 to 12,412 in 2011 (Figure 15). The overall proportion of individuals testing positive varied during this period (range 15.8-20.8%).

Figure 15. Number of individuals tested and testing positive for anti-HCV in specialist drug services by venepuncture, oral fluid, or dried blood spot; trend centres 2008-2011*



* Sentinel surveillance data excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. Oral fluid and dried blood spot testing data excludes samples tested where a drug action team could not be identified. All data are provisional.

5.5.2 Secondary care services

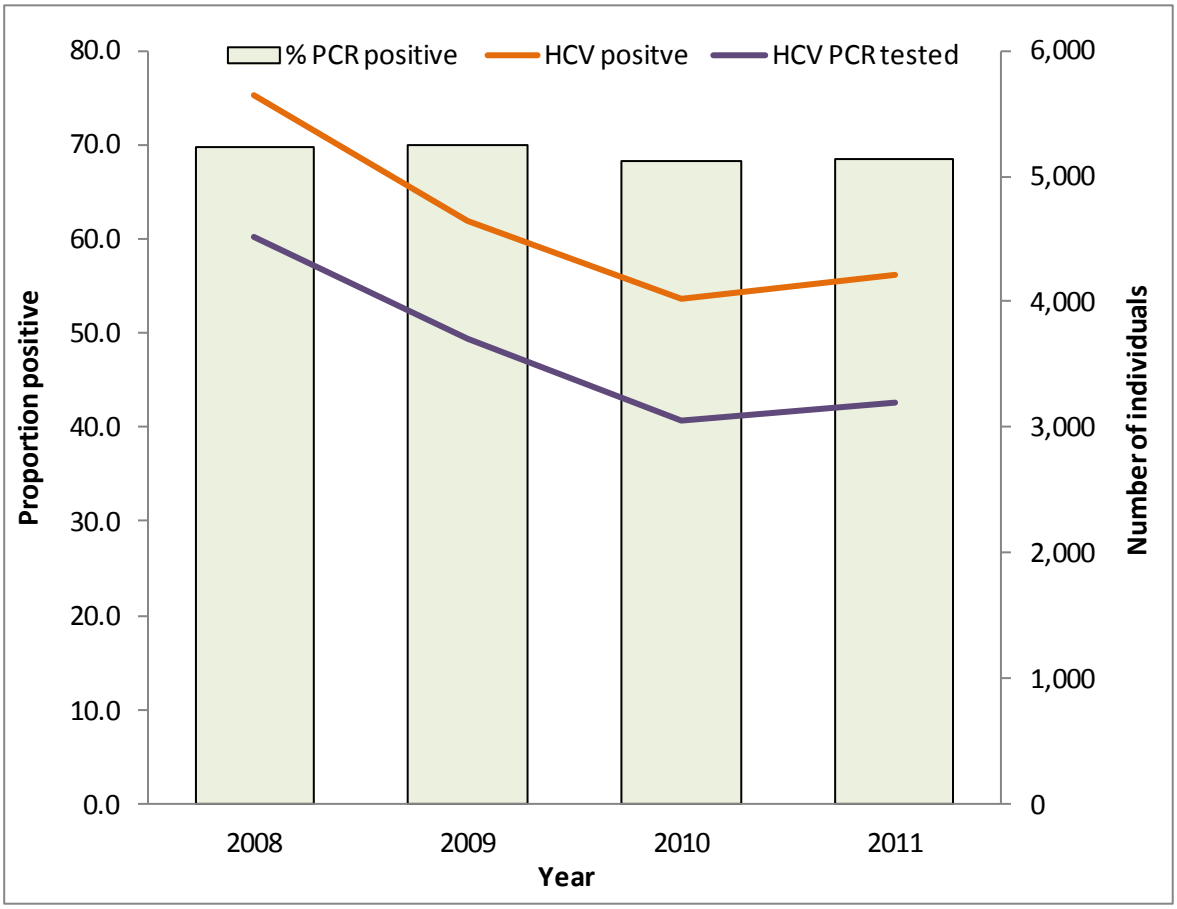
Similar numbers of individuals were tested in secondary care services each year between 2008 (n=62,487) and 2011 (n=63,881). Other known wards tested 41.2% of all individuals tested through secondary care, with a further 16.7% of individuals tested through fertility services, 10.6% in general medical surgical wards and 9.8% in renal units.

The overall proportion of individuals testing positive within secondary care services declined from 2.8% in 2008 to 1.9% in 2010, then increased to 2.2% in 2011. The greatest proportion positive was observed in specialist HIV services, although few individuals were tested by this service type (5.4%; n=86/1,958). A comparatively high proportion of positive tests were also observed in specialist liver services and general medical surgical wards (4.9% and 3.5% respectively).

5.6 HCV PCR testing

There was a slight decline in the proportion of anti-HCV positive individuals tested by PCR over time from 79.9% (n=4,515/5,650) in 2008 to 75.6% (n=3,191/4,219) in 2011 (p<0.001) (Figure 16). Overall, 69.2% of anti-HCV positive individuals tested positive by PCR with little variation over time (range 68.2-69.9% positive). Two-thirds of individuals tested (67.6%; n=9,639/14,258) and testing positive (70.1%; n=6,999/9,862) were male, which reflects the overall proportion of anti-HCV positive males (67.6%).

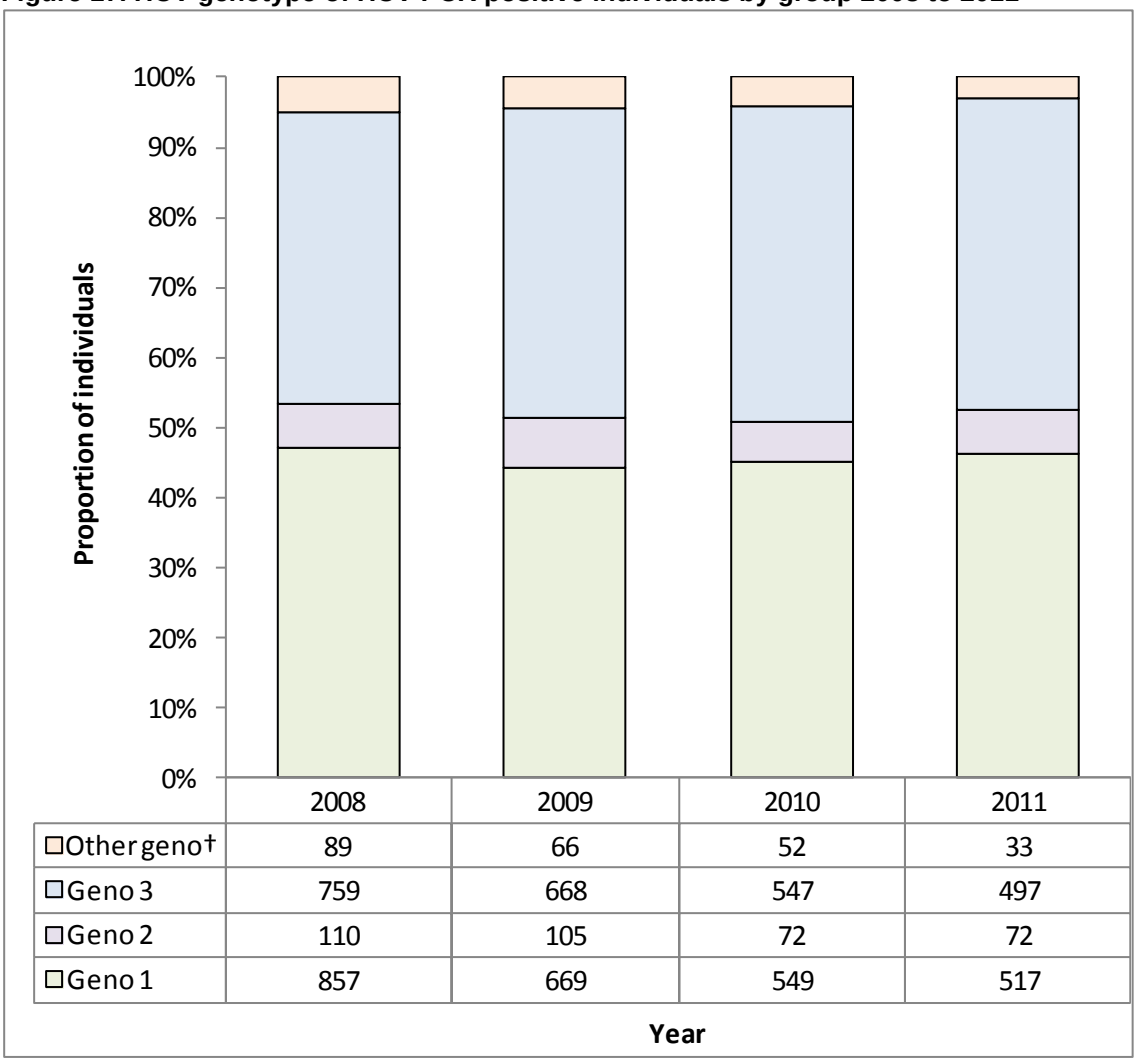
Figure 16. Number of anti-HCV positive individuals tested by HCV PCR and proportion PCR positive 2008 to 2011*



5.7 Trends in HCV genotype

Half (56.6%) of the PCR positive individuals had a known HCV genotype (n=5,662/10,005). The proportion of individuals with a known genotype was relatively stable from 2008 to 2010 (range 57.6-58.7%), then declined to 51.1% in 2011. Overall 45.8% of individuals were genotype 1, a further 43.6% were genotype 3, 6.3% were genotype 2, and the remaining 4.2% were genotype 4, 6, 7, 10, or had a duel infection. The distribution of HCV genotypes among individuals undergoing testing was relatively unchanged over time. Among AS origin individuals 71.5% were genotype 3 (n=590/825), a further 20.1% were genotype 1. In comparison 44.9% of BB individuals were genotype 1 (n=22/49) and a further 10.2% were genotype 3; 54.6% of OM individuals were genotype 1 (n=59/108) and a further 18.5% were genotype 3; and 50.0% of WB individuals were genotype 1 (n=2,071/4,144) and a further 39.8% were genotype 3.

Figure 17. HCV genotype of HCV PCR positive individuals by group 2008 to 2011*



	2008	2009	2010	2011
Other geno†	89	66	52	33
Geno 3	759	668	547	497
Geno 2	110	105	72	72
Geno 1	857	669	549	517

* At the 22 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Individuals aged less than one year are excluded since positive tests in this age group may reflect the presence of passively-acquired maternal antibody rather than true infection. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

† Includes HCV genotype 4, 5, 6, 7, 10 and individuals with a duel infection.

6 HIV

6.1 Key findings

- In 2011, 293,590 individuals were tested for HIV through sentinel laboratories, of whom 0.9% tested positive. Of the 231,547 individuals tested for the first time 1.0% tested positive compared to 0.7% testing positive among the 62,043 repeat testers.
- Between 2008 and 2011 the number of individuals tested for HIV increased year on year, with little variation in the proportion testing positive.
- A consistently higher proportion of males tested positive compared to females.
- Although the majority of HIV tests requested each year were from GUM services, testing in other primary and secondary care services has increased year on year, with an overall increase of 46.9% in testing during 2011 compared to 2008.
- The proportion of women undergoing routine antenatal screening who tested positive for HIV was consistently low, varying between 0.1% and 0.3%. Positivity varied by ethnicity with the greatest proportion positive among black or black British women.

Please note: HIV data differs from that presented for hepatitis and HTLV. HIV data extraction methods are described in Appendix 1.

6.2 Overview of testing in 2011

During 2011 excluding routine antenatal screening, a total of 293,590 individuals, with no previous positive test, underwent first line testing for HIV specific antibodies in 17 participating sentinel centres; of whom 0.9% (n=2,721) tested positive. The majority of individuals (78.9%; 231,547/293,590) tested in 2011 were undertaking a voluntary HIV test for the first time (as known to sentinel surveillance), of whom 1.0% tested positive. Among the 62,043 individuals undergoing repeat testing for HIV 0.7% tested positive.

Where known (>97% complete), a greater proportion of males tested positive (1.4% vs. 0.5% $p<0.001$), although there was no difference in the proportion of tests by gender. Two-thirds of all individuals tested and testing positive were aged between 25 and 44 years old. The median age of individuals tested was 29 years (IQR=16); the median age of individuals testing positive was 7 years older (median=36 years; IQR=15; $p<0.001$).

Ethnicity, either self reported or inferred was available for two-fifths (n=113,822) of adults tested for HIV. Where known, 81.5% of individuals were classified as being of WB ethnic origin, a further 11.9% were classified as AB origin, 3.4% were classified as OM ethnic origin, and 3.2% were classified as BB origin. The proportion positive varied by ethnic group; 3.8% of individuals of BB origin tested positive compared to 1.2% of individuals of WB origin, 1.0% of OM origin individuals and 0.7% of AB origin individuals. Most individuals of unknown ethnic origin were tested in GUM services, and frequently lacked demographic information.

Where known (n=293,469), GUM services tested the greatest proportion of individuals for HIV (60.3%), with a further 12.9% tested in general practice, and 8.5% tested in other known hospital wards (Table S 12). The highest proportion of positive tests were from specialist HIV and liver services (41.4% and 3.5% respectively).

6.2.1 DBS and OF HIV testing

During 2011, a total of 1,399 individuals were tested at least once for HIV by DBS testing, 0.1% of whom had a reactive result. A further 3,451 individuals were tested at least once for HIV by oral fluid testing, 0.1% of whom had a reactive result.

6.2.2 Antenatal HIV screening

During 2011, a total of 75,030 women aged 16-49 years old underwent routine antenatal screening for HIV in 17 participating sentinel centres, of whom 0.2% tested positive. Women undergoing routine antenatal screening accounted for 20.4% of all HIV testing undertaken by sentinel centres in 2011. The median age of women undergoing antenatal screening was 28 years (IQR=9) and the median age of women tested

positive was 2 years older (median=30 years; IQR=9; *p*<0.0014).The majority of women (n=73,862; 98.4%) who underwent antenatal screening for HIV were classified as belonging to one of four broad ethnic groups. Most women (77.3%) were classified as being of WB ethnic origin, a further 16.2% were classified as AB origin, 3.7% were classified as OM ethnic origin, and 2.7% were classified as BB origin. These results were similar to those observed in women undergoing antenatal screening for HBsAg. The proportion of women testing positive was higher among women of BB origin (1.6%) compared to women of OM origin (0.3%), WB origin (0.2%) and AB origin (0.1%). However, it should be noted that the number of BB origin tested and testing positive was relatively small (n=33/2,012).

6.3 Trends in testing 2008 to 2011

Between January 2008 to December 2011 excluding routine antenatal screening, 841,154 adults (16+ years) were tested for HIV, in 14 sentinel centres, of whom 0.9% tested positive (Table 6). The number of individuals tested increased by 18.8% between 2008 and 2011, whereas the proportion of individuals testing positive declined from 1.0% in 2008 to 0.9% in 2009 then remained constant.

Gender and age were well reported (>97%). Similar number of males and females were tested each year, with slightly more males tested overall (50.2% male). The median age of individuals tested was relatively stable over time (range 27.8-28.9 years). Overall, 1.2% of males and 0.6% females tested positive (5,007/410,525 and 2,408/406,585 respectively; *p*<0.001); with a greater proportion of males testing positive compared to females each year. The median age of individuals testing positive was 8 years older than the median age of individuals undergoing testing (median=36.5, IQR=14.5; *p*<0.001).

There was little variation in the crude annual frequency of new diagnoses, on average there were 14.53 cases per 100,000 population per year (95% CI=14.20-14.86) with the number annual cases falling within the overall 95% CI. However, these results should be interpreted with caution as individuals with a previous diagnosis of HIV who transferred care and/or were originally tested outside of a sentinel laboratory, may be included.

Table 6. Trends in adults (16+ years old) tested and testing positive for HIV, and in women undergoing routine antenatal screening for HIV[$] (trend centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	194,069	204,581	211,964	230,540	841,154
Median age in years (IQR)	27.8 (14.5)	28.4 (15.2)	28.7 (15.8)	28.9 (16.4)	28.5 (15.4)
Number male (% known gender)	94,482 (50.4)	99,398 (50.0)	103,196 (50.0)	113,449 (50.5)	410,525 (50.2)
Positive individuals					
Number positive (%)	1,844 (1.0)	1,845 (0.9)	1,858 (0.9)	2,038 (0.9)	7,585 (0.9)
Median age in years (IQR)	36.4 (13.9)	36.4 (14.2)	36.7 (14.9)	36.9 (15.2)	36.5 (14.5)
Number male (% total)	1,159 (64.8)	1,251 (69.3)	1,213 (66.6)	1,384 (69.1)	5,007 (67.5)
Annual frequency of new diagnoses per 100,000 population (95% CI)	14.53 (13.87-15.21)	14.44 (13.79-15.12)	14.45 (13.80-15.12)	14.67 (14.04-15.32)	14.53 (14.20-14.86)
Individuals undergoing a first HIV test[†]					
Number tested (% total)	157,209 (81.0)	161,009 (78.7)	159,420 (75.2)	169,403 (73.5)	647,041 (76.9)
Median age in years (IQR)	27.0 (14.0)	28.0 (15.0)	28.0 (16.0)	29.0 (17.0)	28.0 (16.0)
Number male (% known gender)	75,162 (49.6)	76,971 (49.3)	76,416 (49.3)	82,617 (50.1)	311,166 (49.6)
Number positive (% all positive)	1,561 (84.7)	1,562 (84.7)	1,557 (83.8)	1,681 (82.5)	6,361 (83.9)
% positive	0.99	0.97	0.98	0.99	0.98
Median age in years (IQR)	36.0 (13.5)	37.0 (15.0)	37.0 (15.0)	36.0 (15.0)	36.0 (15.0)
Number male (% total)	977 (64.7)	1,057 (69.2)	1,014 (66.6)	1,144 (69.4)	4,192 (67.5)
Individuals undergoing repeat HIV testing[†]					
Number tested (% total)	36,860 (19.0)	43,572 (21.3)	52,544 (24.8)	61,137 (26.5)	194,113 (23.1)
Median age in years (IQR)	31.0 (16.0)	30.0 (17.0)	31.0 (16.0)	31.0 (17.0)	31.0 (16.0)
Number male (% known gender)	19,320 (54.0)	22,427 (53.0)	26,780 (52.1)	30,832 (51.6)	99,359 (52.5)
Number positive (% all positive)	283 (15.3)	283 (15.3)	301 (16.2)	357 (17.5)	1,224 (16.1)
% positive	0.77	0.65	0.57	0.58	0.63
Median age in years (IQR)	36.0 (15.0)	35.0 (13.0)	36.0 (14.0)	37.0 (14.0)	36.0 (14.0)
Number male (% total)	182 (65.7)	194 (70.3)	199 (66.8)	240 (67.8)	815 (67.6)
Women undergoing routine antenatal screening					
Number women antenatal screened (% total all HIV testing)	47,632 (19.7)	53,045 (20.6)	58,064 (21.5)	62,209 (21.2)	220,950 (20.8)
Median age in years (IQR)	28.7 (9.4)	28.6 (9.2)	28.7 (9.0)	28.8 (8.9)	28.7 (9.1)
Number positive antenatal women (% total)	128 (6.5)	114 (5.8)	84 (4.3)	184 (8.3)	510 (6.3)
Median age in years (IQR)	29.4 (9.0)	30.5 (7.0)	31.8 (9.0)	31.7 (7.1)	30.6 (8.5)
Antenatal women % positive	0.3	0.2	0.1	0.3	0.2

* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.
[$] Routine antenatal screening shown separately.
[†] Includes individuals who do not have a prior HIV test known to the sentinel surveillance system and/or the HIV new diagnoses database in the case of individuals testing HIV positive

6.4 Trends in testing among key groups

6.4.1 First and repeat HIV testers

The number of individuals undertaking a voluntary HIV test for the first time was relatively consistent each year between 2008 and 2010, but increased by 6% in 2011 (Table 6). However, the proportion of first time testers among all individuals who were tested declined over time from 81.0% in 2008 to 73.5% in 2011. This is likely to be due in part to an increase in individuals undergoing repeat HIV testing; but also as more individuals were known to surveillance each year the identification of individuals who have undergoing previous HIV testing may be more complete.

Gender and age were well reported (>95%). Among first time testers a similar number of males and females were tested each year, with slightly more females tested overall (50.4% female). The median age of first time testers was relatively stable over time (range 27.0-29.0 years). Among repeat testers slightly more males were tested than females (52.5% male). The median age of repeat testers was also stable over time (range 30.0-31.0 years). Overall, the median age of first time testers was 28.0 years (IQR=16); 3 years younger than individuals who had a prior HIV test (median=31.0; IQR=16.0; $p<0.0001$).

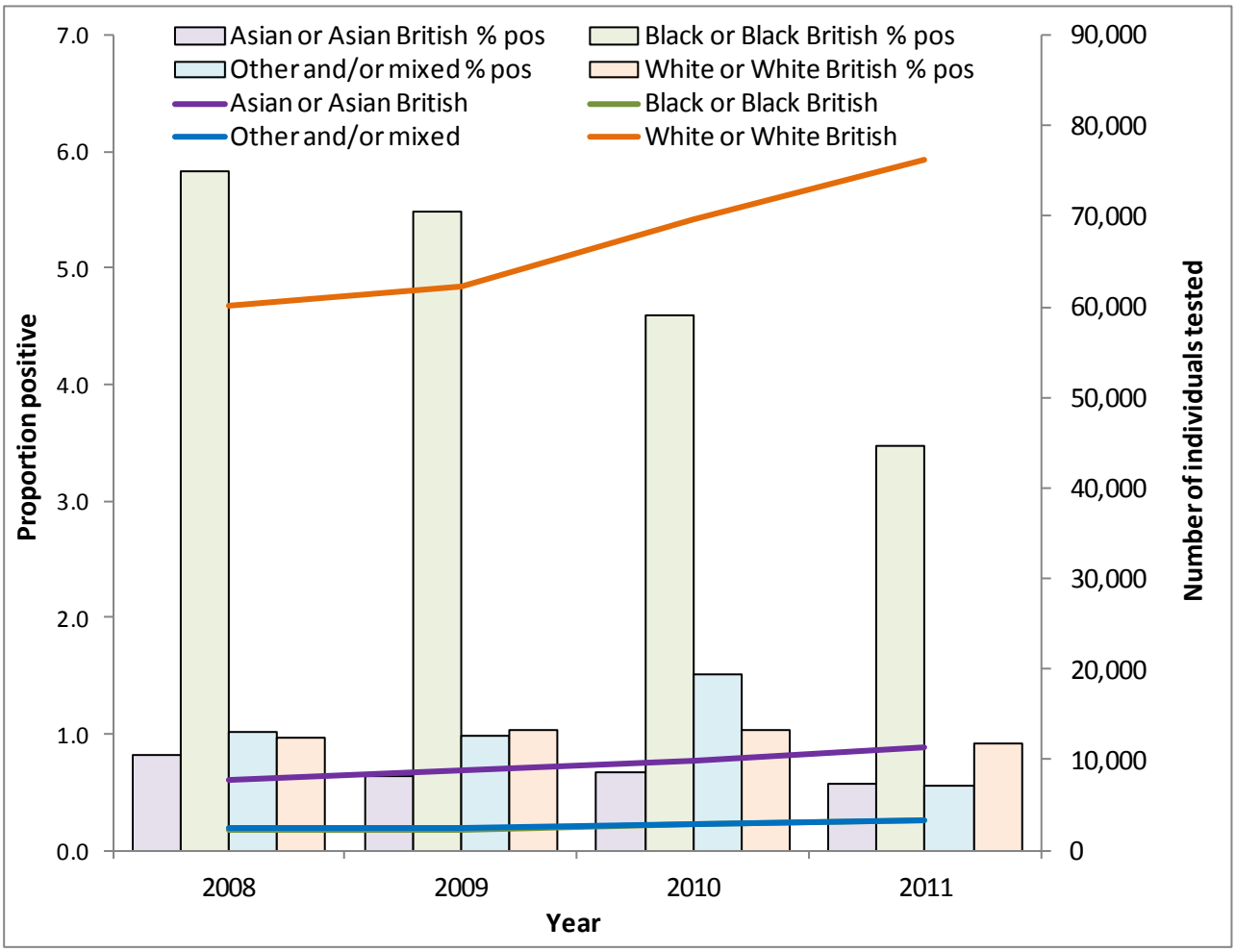
Overall, among first time testers 1.3% of males and 0.6% females tested positive (4,192/311,166 and 2,018/316,687 respectively; $p<0.001$); with a greater proportion of males testing positive compared to females each year. The median age of first time testers testing positive was 8 years older than the median age of first time testers undergoing testing ($p<0.001$). Among repeat testers 0.8% of males and 0.4% females tested positive (n=390/89,898 and n=815/99,359 respectively; $p<0.001$); with a greater proportion of males testing positive compared to females each year. The median age of first time testers who tested positive (median=36.0; IQR=15.0) was not significantly different from that of individuals who had a prior HIV test (median=35.5; IQR=14.0; $p=0.0646$).

6.4.2 Ethnic groups

Ethnicity, either self reported or inferred was available for over a third (38.3%; n=245,554) of adults tested for HIV (Table S 13). The low level of classification was due to the high proportion of individuals tested in GUM services with no reported surname and/or ethnicity. Where known, 81.5% of individuals were of WB origin, a further 11.7% were AB, 3.5% were BB and 3.3% were of OM origin. The number of individuals tested within each ethnic group increased year on year; this was driven by the increase in the number of individuals tested outside of GUM services (Figure 18).

The proportion of individuals who tested positive for HIV varied by ethnic group. Overall 4.7% of individuals of BB ethnic origin tested positive compared to 1.0% of OM and WB ethnic origin individuals, and 0.7% of AB individuals. Positivity also varied by gender with greater proportion of males testing positive compared to females among WB (1.4% vs. 0.6%; $p<0.001$), OM (1.4% vs. 0.7%; $p=0.001$), and AB (0.7% vs. 0.6%; $p=0.175$) ethnic origin individuals whereas a greater proportion of BB females tested positive compared to males (5.1% vs. 4.3%; $p=0.068$).A decline in the proportion positive over time was observed in each ethic group, but was most marked among those of BB ethnic origin.

Figure 18. Number of adults (16+ years old) tested and testing positive for HIV by ethnic group, trend centres 2008-2011*



* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

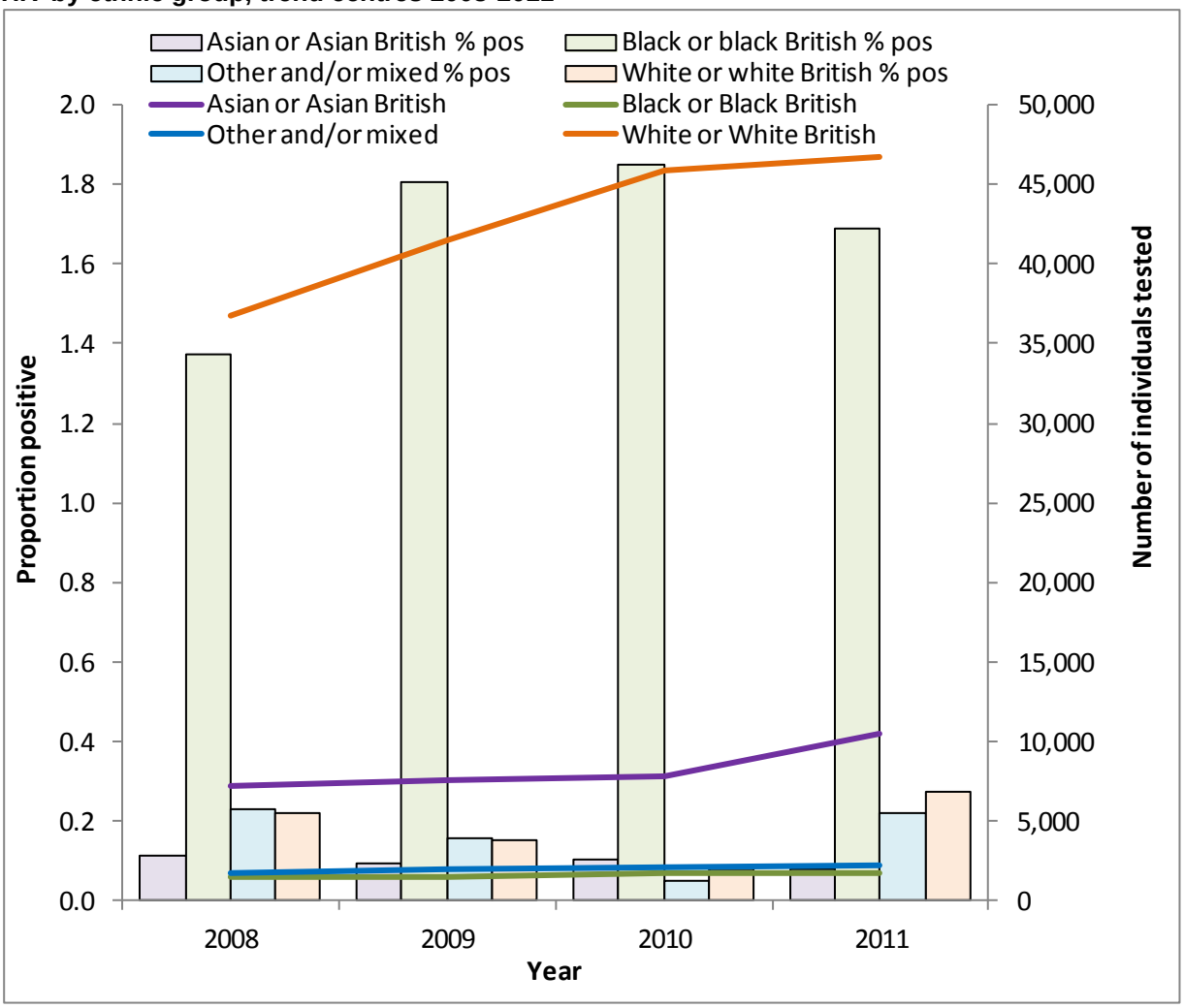
6.4.3 Antenatal HIV screening

The number of women identified as undergoing routine antenatal screening increased each year from 47,632 in 2008 to 62,209 in 2011 (Table 6 and Table S 14).

The median age of women screened showed little variation over time (range 28.6-28.8 years). The median age of women testing positive was slightly old than those undergoing screening (range 29.4-31.8 years; $p<0.001$). Ethnicity, either self reported or inferred was available for most women undergoing antenatal HIV screening (98.8% n=218,201). Overall, 78.3% of women were of WB origin, a further 15.1% were AB, 3.7% were OM origin, and 2.9% were BB. The number of individuals tested within each ethnic group increased over time (Figure 19).

The proportion of women testing positive was low ranging from 0.1-0.3% and varied by ethnic group. Overall 1.7% of women of BB ethnic origin tested positive compared to 0.2% of OM and WB women and 0.1% of AB women. The comparatively high proportion positive among BB women should be interpreted with caution as few women were tested within this group (n=6,412) and these data may not be representative of the population as a whole.

Figure 19. Number of women (16+ years old) undergoing routine antenatal screening and testing positive for HIV by ethnic group, trend centres 2008-2011*



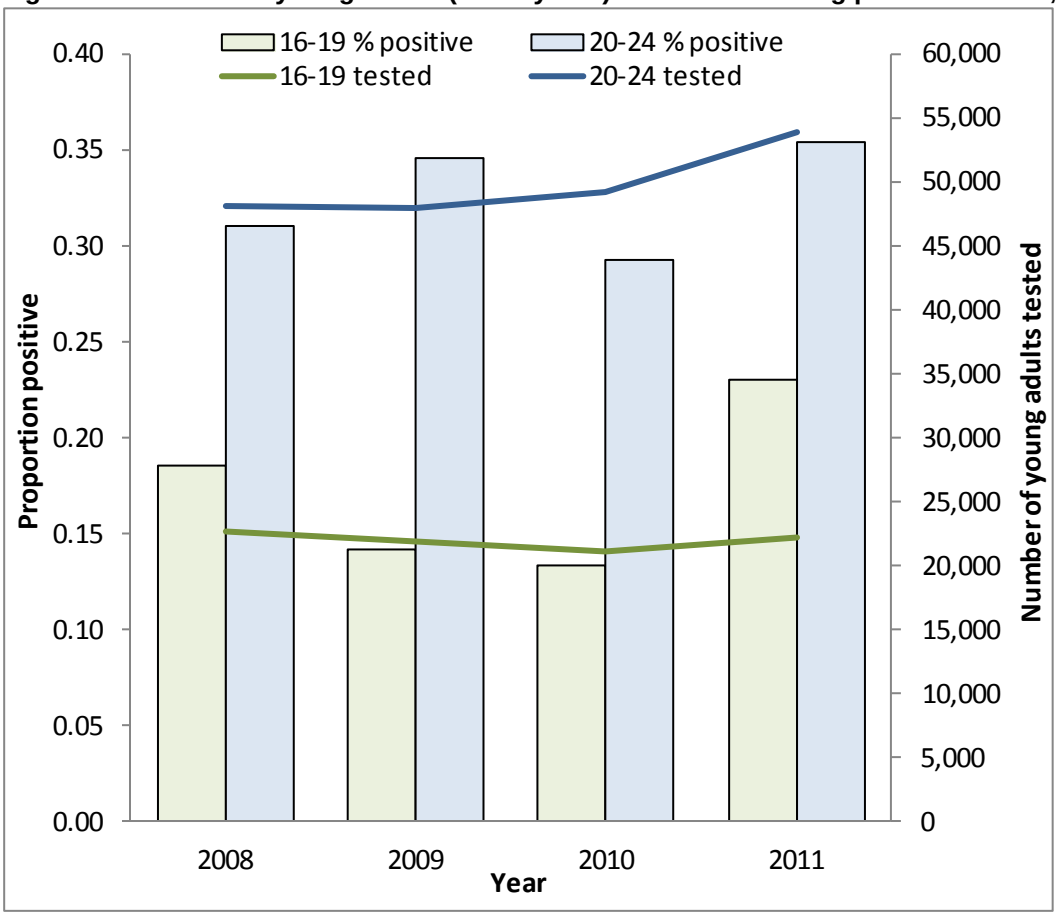
* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

6.4.4 Young adults

Between 2008 and 2011, 10.5% of adults tested for HIV were aged 16 to 19 years; a further 23.9% were aged 20 to 24 years old (Figure 20). The number of 16 to 19 year olds tested decreased from 22,695 in 2008 to 21,052 in 2010, and then increased to 22,188 in 2011. Testing among 20 to 24 year olds declined from 48,084 in 2008 to 47,974 in 2009 and then increased year on year to 53,939 in 2011. Over three-quarters of all young adults were tested for HIV in GUM services (78.7%), further 11.5% were tested by general practice. Testing by GPs increased by 43.4% from 6,833 in 2008 to 9,799 in 2011. In comparison testing in GUM services showed little variation in the number of young adults tested over time (range 54,773-58,138).

The proportion of 16 to 19 year olds testing positive was consistently less than the proportion positive among of 20 to 24 year olds (0.2% vs. 0.3%, $p<0.001$).

Figure 20. Number of young adults (16-24 years) tested and testing positive for HIV, trend centres 2008-2011*



* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

6.4.5 Trends in risk factors among positive individuals

Nearly half of all HIV positive individuals identified between 2008 and 2011 were matched to an individual within the HIV new diagnosis database (n=3,610/7,585) (Table 7). In most cases, individuals could not be matched due to a lack of demographic information. Of the individuals that were matched, a risk factor or route of transmission was available for 93.6%. Where known, the risk factor / route of transmission for 54.9% of all HIV positive individuals was heterosexual sex (n=1,855). More females were observed in this risk group than males (57.1% female; 1,049/1,837). Half (47.8.2%) were tested in GUM services, with a further 10.2% tested by GP, 10.4% tested in specialist liver services, and 10.0% testing in other known hospital wards.

Overall, 42.4% of all HIV positive individuals were MSM. The number of HIV positive MSM increased year on year from 309 in 2008 to 384 in 2011. However, the proportion of all HIV positive individuals who were identified as being MSM fluctuated during this period (range 36.1-48.7%). The majority of MSM were tested by GUM services (71.5%), a further 8.4% were tested in GP, 6.1% tested by specialist liver services, and 6.0% tested in other known hospital wards.

Few HIV positive individuals were identified as having injected drugs (n=64), where known the majority of PWID were male (77.1%; 47/61). The number of HIV positive PWID fluctuated over time (range 8-22).

Table 7. Number of HIV positive adults (16+ years) matched to the HIV new diagnoses database with risk factor and/or route of transmission (excludes routine antenatal screening, trend centres 2008-2011)*

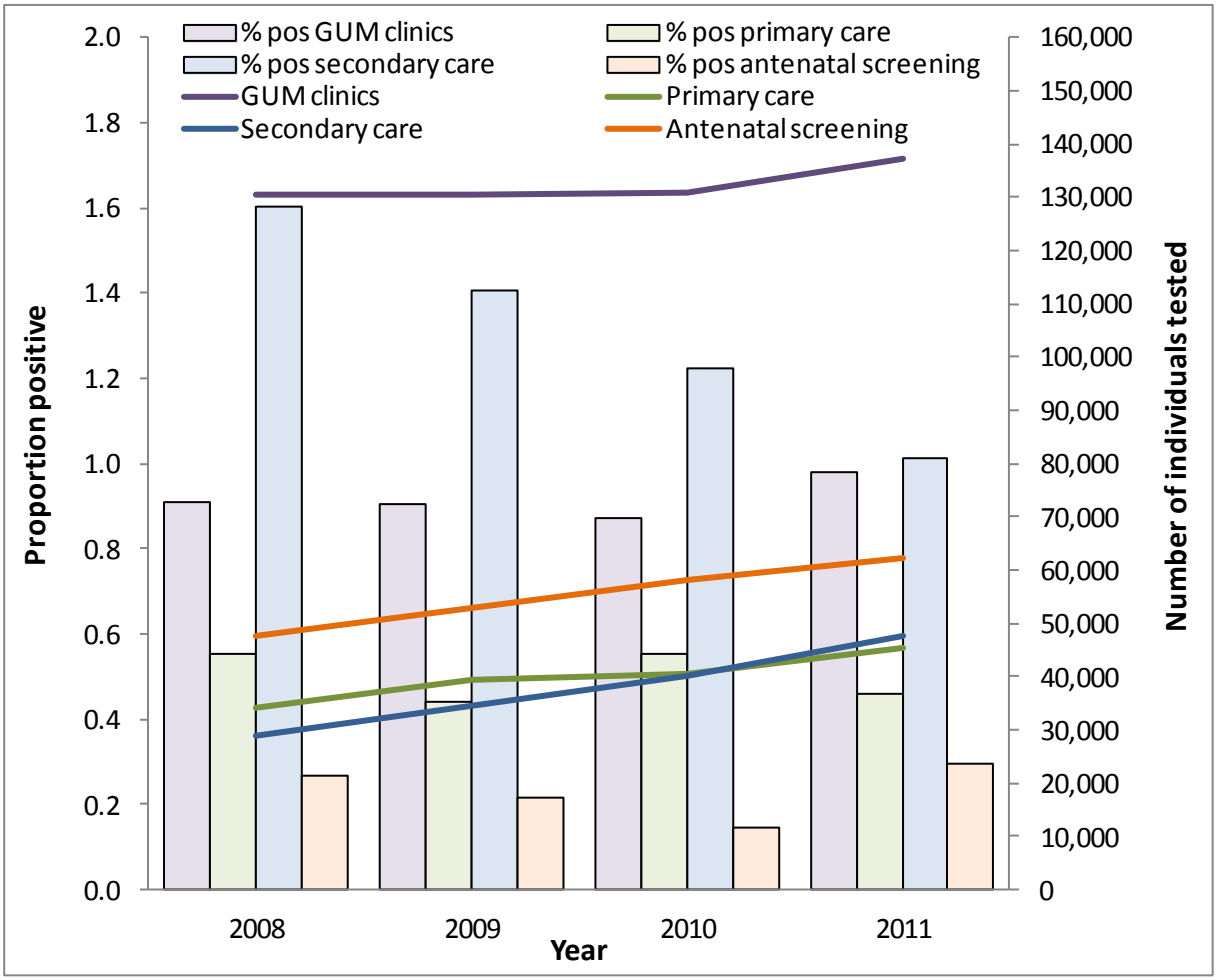
	2008	2009	2010	2011	Total
Matched to HIV new diagnosis (%)	882 (47.8)	869 (47.1)	970 (52.2)	889 (43.6)	3,610 (47.6)
Known risk factor / route of transmission (%)	855 (96.9)	830 (95.5)	907 (93.5)	788 (88.6)	3,380 (93.6)
Person who injects drugs (% known)	22 (2.6)	13 (1.6)	21 (2.3)	8 (1.0)	64 (1.9)
Heterosexual (% known)	516 (60.4)	448 (54.0)	501 (55.2)	390 (49.5)	1,855 (54.9)
MSM (% known)	309 (36.1)	363 (43.7)	377 (41.6)	384 (48.7)	1,433 (42.4)

* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

6.5 Trends in testing by service type

The service which first requested a HIV test was identified for 99.9% of individuals. Between 2008 and 2011, excluding routine antenatal screening, 64.1% of all HIV tests were from GUM services; these data are therefore shown separately (Figure 21 and Table S 15).

Figure 21. Number of adults (16+ years old) tested and testing positive for HIV by service type, trend centres 2008-2011*



* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and hospital referring all samples. Includes women 16-49 years old who underwent routine antenatal screening for HIV. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

6.5.1 Primary care services

Most individuals tested for HIV in primary care were tested in GUM services (76.8%) From 2008 to 2010 number of individuals tested in GUM services was relatively stable with an average of 130,655 individuals tested per year. In 2011 testing increased to 137,361. The proportion of individuals testing positive remained relatively constant over this period (range 0.87-0.98%).

The number of individuals testing in primary care service, excluding GUM services increased year on year from 34,256 in 2008 to 45,285 in 2011; this was driven by a 43.9% increase in the number of individuals tested by GPs from 22,434 in 2008 to 32,286 in 2011. The proportion of individuals testing positive varied slightly (range 0.44-0.55%). Although few individuals were tested in A&E services, the overall proportion testing positive was relatively high (1.9%; n=87/4,505).

6.5.2 Secondary care services

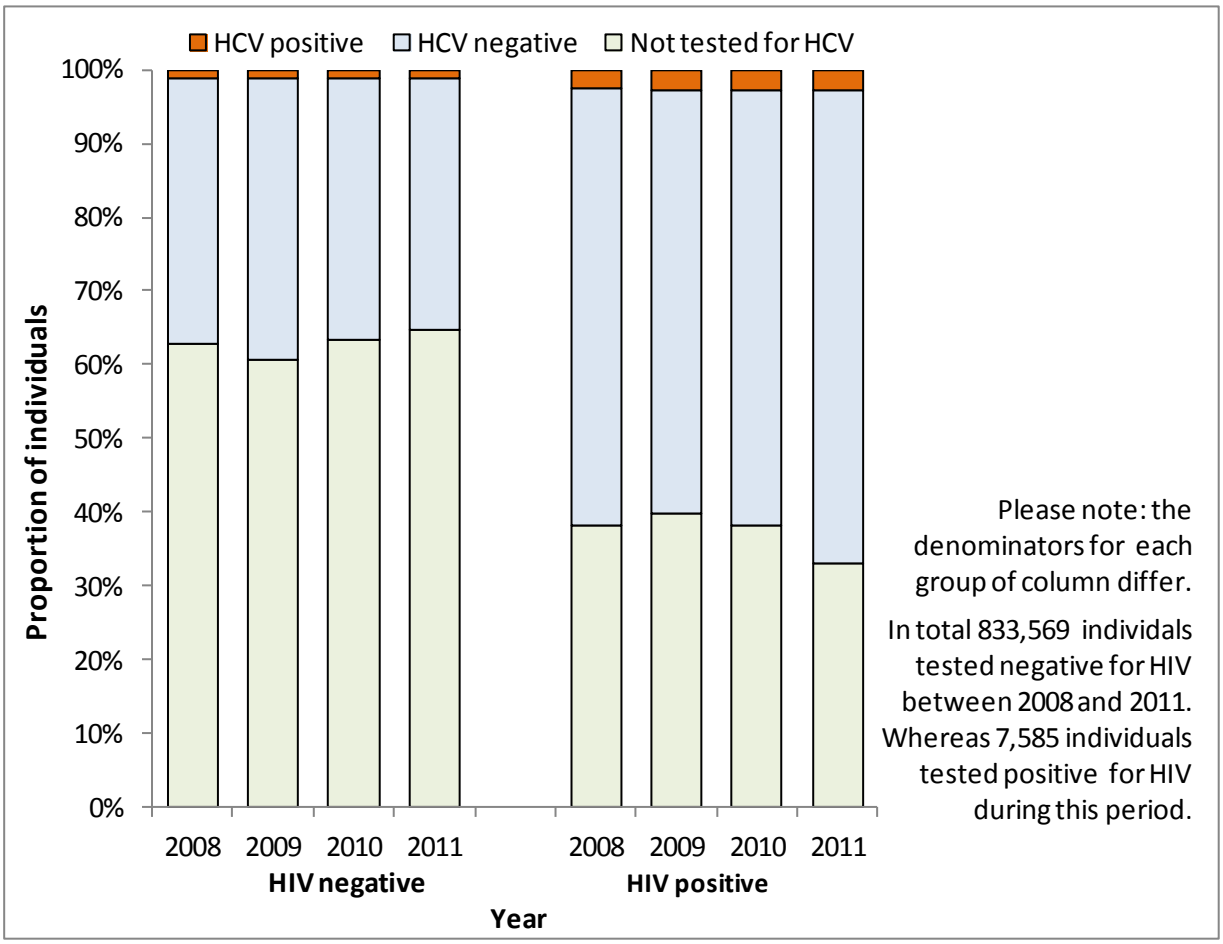
HIV testing in secondary care services increased by 64.2% overall with a year on year increase from 29,098 in 2008 to 47,774 in 2011. Testing in general medical surgical wards, obstetrics and gynaecology, specialist liver services and other known wards more than doubled during this period.

The proportion of individuals testing positive for HIV declined year on year from 1.6% in 2008 to 1.0% in 2011. Overall, 1.3% of individuals tested positive; however, this may include individuals with a known HIV diagnosis who have transferred care. Nearly half of all individuals identified as undergoing testing in specialist HIV services tested positive (52.0%, n=336/646).

6.6 HCV co-infection

In total, 37.1% of individuals testing negative for HIV were tested for anti-HCV, of whom 3.0% tested positive (Figure 22). In comparison, among individuals testing positive for HIV 62.8% were tested for anti-HCV, of whom 4.4% tested positive ($p<0.001$). Among HIV positive individuals a greater proportion of males were tested for hepatitis C than females (65.2% of males vs. 58.6% of females; $p<0.001$). Overall, 5.1% of males were co-infected with hepatitis C (n=166/3,097) compared to 2.7% of females (n=38/1,372; $p<0.001$). There was no significant difference in the median age of individuals tested for anti-HCV compared to those not tested, or between individuals testing positive for hepatitis C compared to those who tested negative (p=0.232 and p=0.197 respectively).

Figure 22. Number of adults (16+ years old) tested and testing positive for HIV by service type, trend centres 2008-2011*



* At the 14 centres for which full data were available 2008-2011. Excludes reference testing and hospital referring all samples. Includes women 16-49 years old who underwent routine antenatal screening for HIV. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

7 HTLV

7.1 Key findings

- The number of individuals tested for HTLV-1 increased year on year, with a 40% increase between 2009 and 2011
- The characteristics of individuals tested has been relatively consistent over time with slightly more females tested than males and most (63.5%) individuals undergoing testing being 45 plus years of age.
- The proportion of individuals testing positive increased in 2011 compared to 2008-2011 (1.5% vs. 1.0%).

7.2 Overview of testing in 2011

The review contains the first description of individuals tested and testing positive for HTLV-1 in eleven participating sentinel centres. During 2011, a total of 7,027 individuals underwent first line testing for HTLV-1 specific antibodies; of whom 1.5% (n=107) tested positive.

The age and gender of individuals tested for HTLV-1 was well reported (>80%). Where known, more females were tested than males (54.3% female). Although not statistically significant (p=0.234) a marginally higher proportion of females tested positive compared to males (1.7% vs. 1.4% respectively). Two-thirds (63.5%) of all individuals tested and three-quarters (74.8%) of individuals testing positive were aged 45 years and older. The median age of individuals tested was 46.5 years (IQR=26.0 years) whereas the median age of those testing positive was 6.3 years older (median 52.8 years, IQR=22.5 years, p<0.001).

Most individuals (n=5,421; 77.1%) tested for HTLV-1 in 2011 were classified as belonging to one of four broad ethnic groups. Where known, 87.4% were classified as being of WB ethnic origin, a further 8.2% were classified as AB origin, 2.8% were classified as BB origin, and 1.6% were classified as OM ethnic origin. The proportion positive varied by ethnic group; 3.3% of individuals of BB ethnic origin tested positive compared to 1.6% of AB and WB origin individuals, no individuals of other or mixed ethnic origin individuals tested positive.

Half of all individuals tested for HTLV-1 were tested by a hospital which referred all samples to a participating sentinel centre (49.3%). In these cases it was not possible to ascertain which service type made the original request. Of the individuals tested by a known service type (n=3,564) most (56.0%) were tested by other known hospital wards, a further 9.7% were tested by specialist infectious disease services, and 7.9% by renal units. Few individuals (n=328; 9.2% of known) were tested for HTLV by primary care services. The highest proportion of positive tests was observed in paediatric services (2.8%), although very few individuals were tested by this service type (n=178).

7.3 Trends in testing 2008 to 2011

From January 2008 to December 2011 excluding routine antenatal screening, 23,692 individuals were tested for HTLV-1, in 11 sentinel centres, of whom 1.1% tested positive (Table 8). Similar numbers of individuals were tested for HTLV-1 in 2008 and 2009, a year on year increase was then observed with 38.4% more individuals tested in 2011 compared to 2008. The proportion of individuals testing positive varied slightly between 2008 and 2010 (range 0.9-1.1%), then increased to 1.5% in 2011 (p=0.001).

Gender and age were well reported during this four year period (>90%). More females were tested each year compared to males; overall 56.4% of individuals tested were male (range 53.7-60.8%). There was little variation in the median age of individuals tested each year (range 45.5-47.0 years). Overall, 1.3% of females tested positive compared to 1.1% of males (153/12,063 vs. 98/9,320; p=0.145). Slight variations in the median age of individuals testing positive were observed (range 49.4-55.6 years). Overall, median age of individuals testing positive was 6.3 years older than the median age of those tested (median 53.5; IQR=24.2; p<0.001).

The crude annual frequency of new HTLV diagnoses was relatively consistent at approximately 0.3 cases per 100,000 population between 2008 and 2010; in 2011 this increased to 0.6 cases per 100,000 population (p=0.001).

Table 8. Trends in individuals tested and testing positive for HTLV (all centres 2008-2011)*

	2008	2009	2010	2011	Total
Individuals tested					
Number tested	5,079	5,007	6,579	7,027	23,692
Median age in years (IQR)	46.9 (27.1)	46.0 (26.6)	47.6 (27.6)	47.7 (26.0)	47.2 (26.7)
Number male (% known gender)	2,020 (46.3)	1,826 (44.0)	2,455 (39.2)	3,019 (45.7)	9,320 (43.6)
Positive individuals					
Number positive (%)	51 (1.0)	54 (1.1)	59 (0.9)	107 (1.5)	271 (1.1)
Median age in years (IQR)	49.4 (28.1)	54.7 (24.5)	55.6 (20.5)	52.7 (22.5)	53.5 (24.2)
Number male (% total)	16 (34.8)	20 (43.5)	21 (37.5)	41 (39.8)	98 (39.0)
Annual frequency of new diagnoses per 100,000 population (95% CI)	0.29 (0.21-0.38)	0.30 (0.23-0.39)	0.33 (0.25-0.42)	0.59 (0.49-0.72)	0.38 (0.33-0.43)

* At the 11 centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

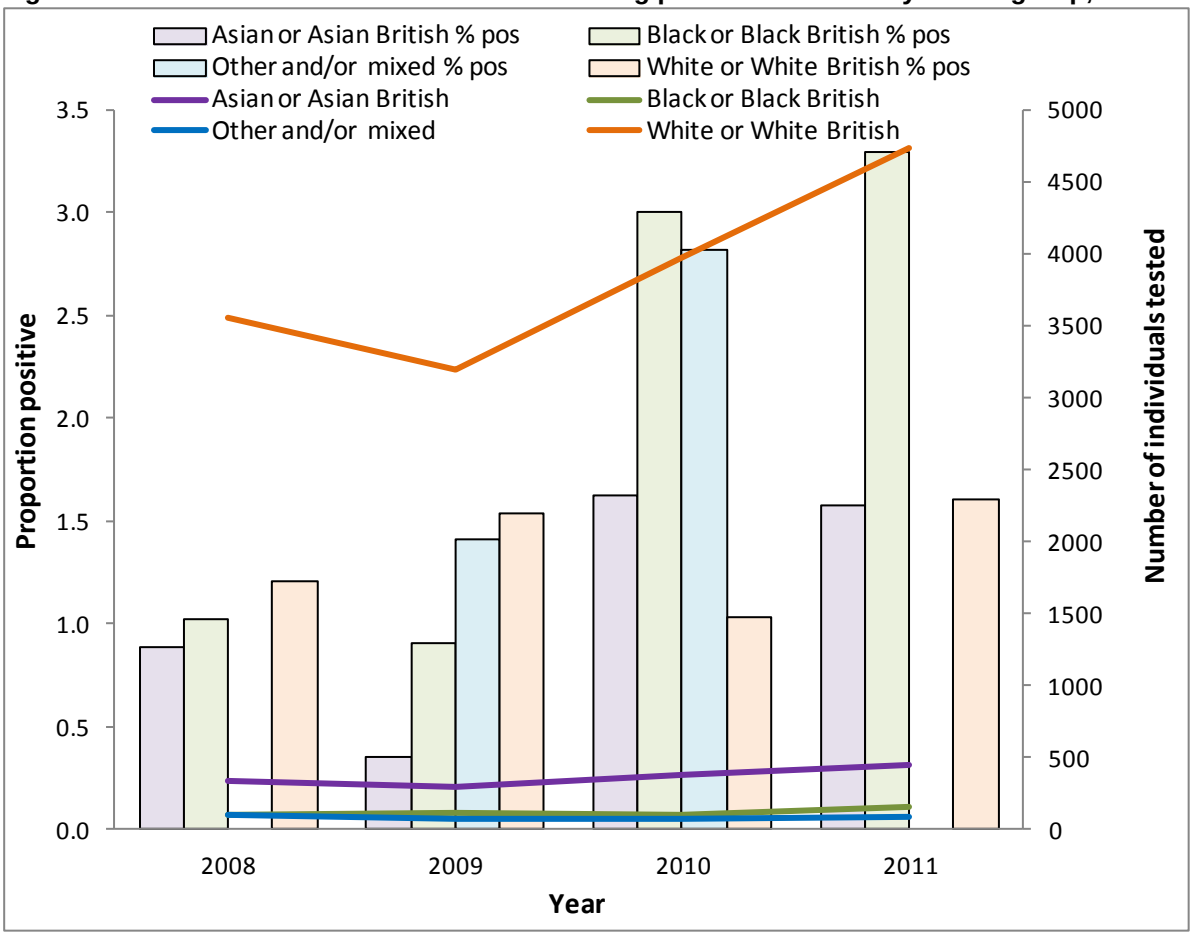
7.4 Trends in testing among key groups

7.4.1 Ethnic groups

Ethnicity, either self reported or inferred was available for three-quarters of individuals tested for HTLV-1 (n=17,688) (Table S 16). The majority of individuals tested were of WB origin (87.4.9%), a further 8.1% were AB, 2.6% were BB, and 1.8% were of OM origin. Apart from a decline in the number of OM origin individuals tested, the number of individuals tested within each ethnic group increased over time (Figure 23).

The proportion of individuals testing positive varied by ethnic group; overall 2.2% of BB individuals tested positive compared to 1.4% of WB individuals, 1.2% of AB individuals, and 0.9% of OM ethnic origin individuals and. The proportion of individuals testing positive over time increased for all ethnic groups apart from OM ethnic origin individuals. The number of positive individuals identified per year were very low in this group making any overall trend difficult to determine (range 0.0-2.8% positive).

Figure 23. Number of individuals tested and testing positive for HTLV by ethnic group, all centres 2008-2011*



* At the 11 centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

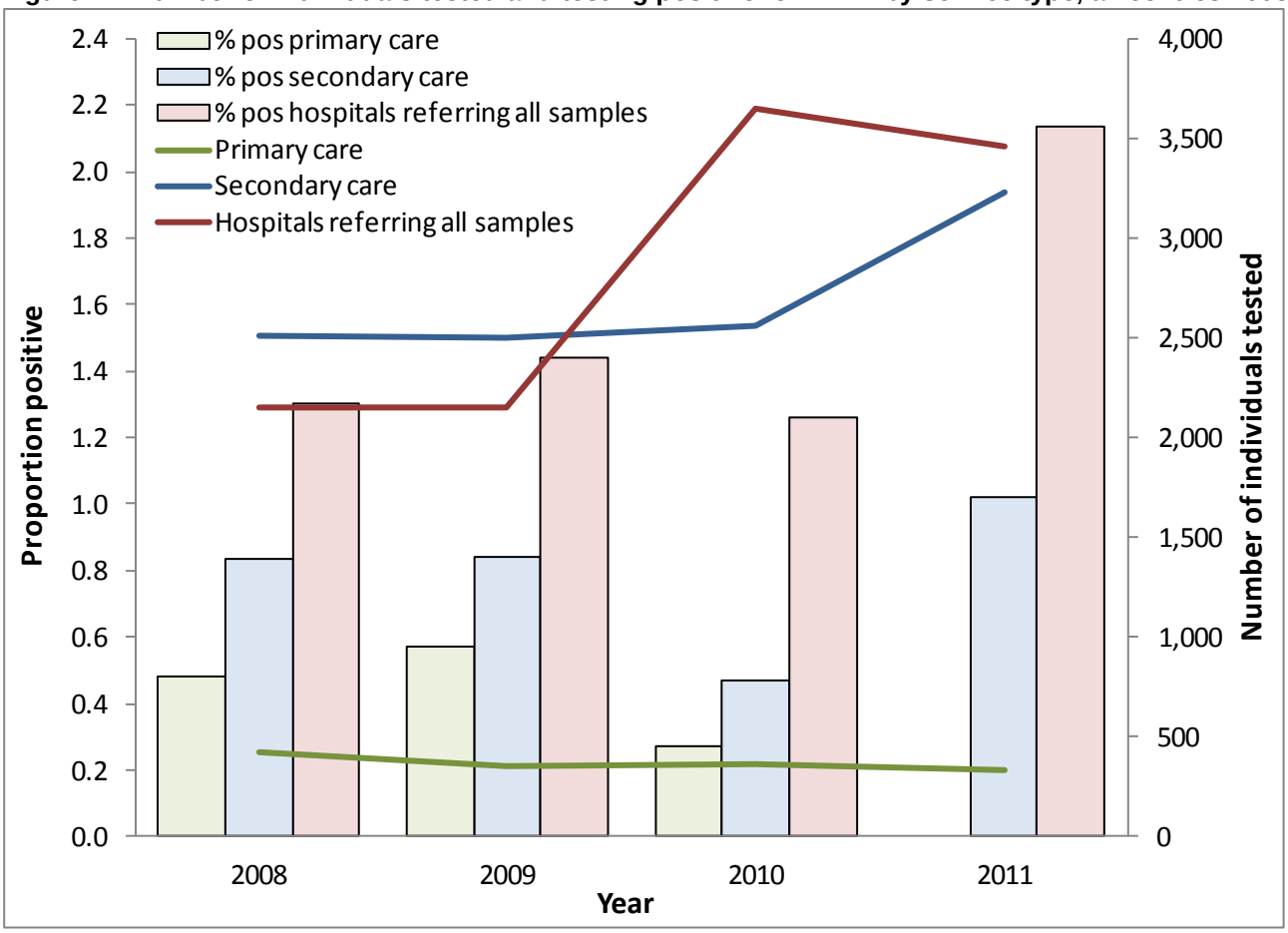
7.5 Trends in testing by service type

Nearly half of all individuals tested for HTLV-1 were tested through a hospital which referred all samples to a sentinel laboratory. In these cases it was not possible to identify the original service which requested the test (Figure 24 and Table S 17). Although similar numbers of individuals were tested through hospitals referring all samples in 2008 and 2009, testing increased by 69.9% to 3,655 individuals in 2010, and declined slightly to 3,461 in 2011.

The number of individuals tested in primary care declined by 21.5% over time from 418 in 2008 to 328 in 2011. Few positive individuals were identified through testing by primary care services with the proportion positive varying from 0.6% in 2009 to 0.0% in 2011.

Unlike primary care services the number of individual tested by secondary care increased from 28.8% in the same period, with the sharpest increase being from 2,557 individuals tested in 2010 to 3,236 in 2011. The proportion of individuals testing positive varied slightly over time, 0.8% testing positive in 2008 and 2009, this decrease to 0.5% in 2010, and then increased to 1.0% in 2011.

Figure 24. Number of individuals tested and testing positive for HTLV by service type, all centres 2008-2011*



* At the 11 centres for which full data were available 2008-2011. Includes testing from hospitals referring all samples. Data were de-duplicated subject to availability of date of birth, soundex and first initial. All data are provisional.

Glossary of abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ART	Anti-Retroviral Therapy
BASHH	British Association for Sexual Health and HIV
BHIVA	British HIV Association
BME	Black and Minority Ethnic
CD4	Cluster of Differentiation 4
DBS	Dried Blood Spot
DH	Department of Health
GP	General Practice / General Practitioner
GUM	Genito-Urinary Medicine
HAART	Highly Active Anti-Retroviral Therapy
HIV	Human Immunodeficiency Virus
HTLV	Human T-Lymphotropic Virus
HAV	Hepatitis A Virus
HBV	Hepatitis B Virus
HCV	Hepatitis C Virus
HDV	Hepatitis D Virus
HEV	Hepatitis E Virus
PWID	Person Who Injects Drugs
NAAT	Nucleic Acid Amplification Test
NHS	National Health Service
NICE	National Institute for Clinical Excellence
OF	Oral Fluid
PCT	Primary Care Trust
SHA	Strategic Health Authority
STI(s)	Sexually Transmitted Infection(s)
UK	United Kingdom

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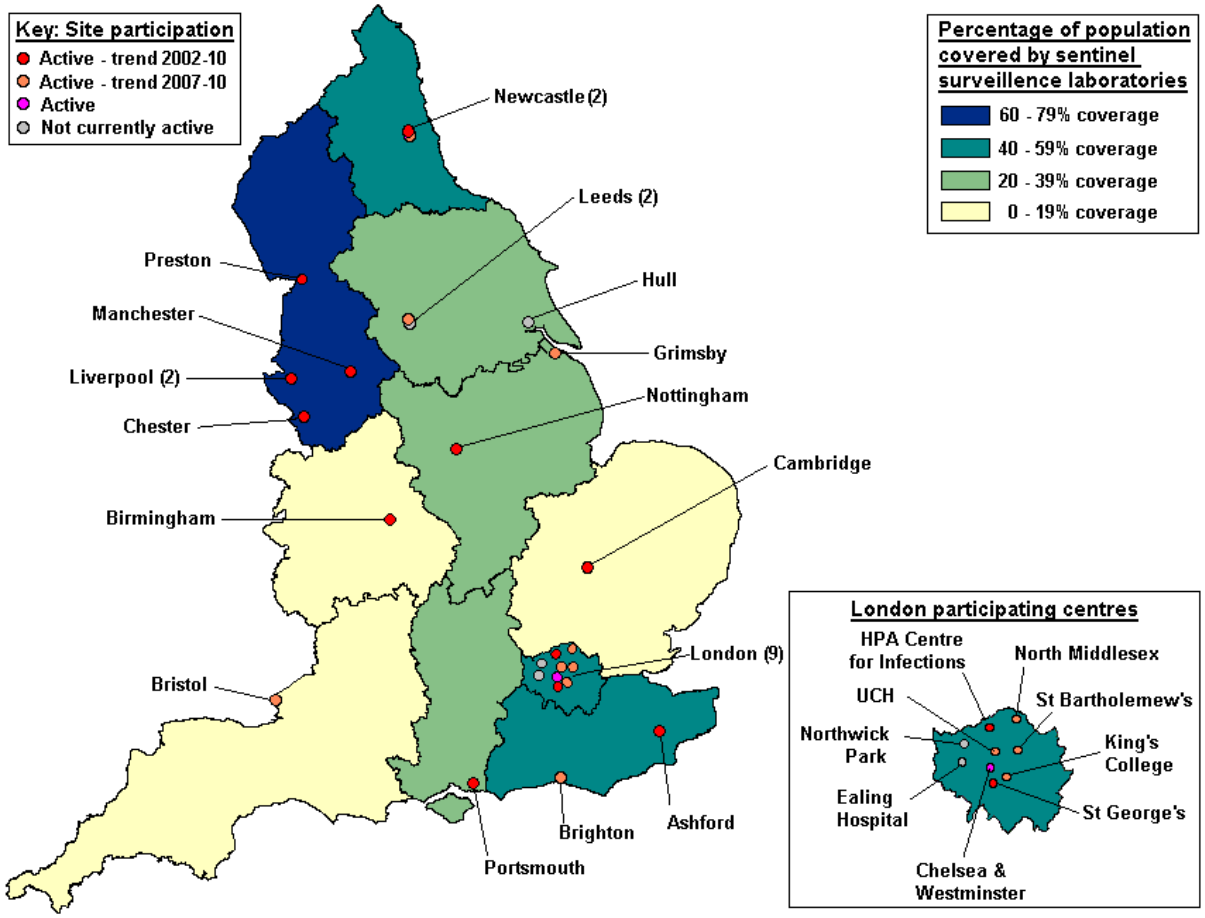
Appendix 1 – Methods

Methods of the sentinel surveillance study have been described elsewhere[4]. Details of participating laboratories are given in Appendix 2.

Although the sentinel surveillance began in 2002, participating laboratories joined the program at different dates. The second phase of prospective data collection has been ongoing since September 2004, with some but not all sites provided retrospective data on joining the program. One site joined the program since the last review, bring the total to 24 currently active sentinel sites (as of July 2012; see Figure 25 and Appendix 2). Consequently full data between 2002 and 2011 for use in trends analysis was only available for a limited number centres. Therefore, trends in testing are described here since 2008 in order to maximise the number of sentinel centres that were included in the trends analysis. The data presented represents testing from 24 sentinel centres with full data between 2008 and 2011 (of a total 28 which have ever participated).

Figure 25. Map of sentinel laboratories.



The de-duplication process reported on in 2010, using patient soundex, first initial, date of birth and where available NHS number, has continued on a prospective basis. The earliest record for each patient was identified and used in the analyses. Duplicate patient records were excluded. Where available, test results from subsequent samples were linked to the earliest patient record. The removal of duplicate patients and use of testing data from subsequent samples has allowed us to produce even more accurate data.

Since 2010, sentinel laboratories have prospectively provided testing and demographic data for individuals tested for hepatitis D and E in addition to data for hepatitis A, B and C. Retrospective hepatitis D and E data has been integrated into the existing dataset to allow analysis of trends over time. In 2011, HIV and HTLV-1 testing and demographic data have been integrated alongside hepatitis testing, with most sentinel

laboratories providing these data prospectively. Retrospective HIV and HTLV-1 data has also been provided by some sentinel laboratories.

The majority of samples tested for HDV, HEV, and HTLV were from hospitals that referred all sample to a sentinel laboratory. In these cases the specific service that initially requested the test was not available. In some cases the requestor location was from a laboratory which only sent reference samples for hepatitis A, B, and/or C testing to a sentinel laboratory. The sentinel laboratories confirmed the HDV, HEV, and HTLV tests they performed were as part of a primary diagnostic service. These samples, and hence the individuals tested, have therefore been classified as having undergone first line testing and were classified as belonging to the 'hospitals referring all samples' service type.

Demographic data and test results for individuals undergoing HIV testing were extracted and analysed separately. All individuals tested for HIV between 2008 and 2011 were extracted from the master database in yearly cohorts. Where an individual had multiple HIV tests during one calendar year a summary result was generated using hierarchical coding (positive, equivocal, negative, and referred). Individuals with a positive test result were excluded from analysis in subsequent years. Therefore, individuals who were tested multiple times could be included in the analyses for multiple years within the trend dataset if they tested consistently negative or seroconvert during this period but individuals with an initial positive test result would only be counted once. Age was calculated at time of first test per year. The test request location was assigned from the first sample taken during that year. The HIV trend data presented represents testing from 14 sentinel centres with full data between 2008 and 2011. HIV positive individuals were matched to individuals reported to the new diagnosis database using a combination of soundex, data of birth, sex, clinical and hospital identifiers, and region. A subgroup analysis of HIV positive individuals who had sufficient demographic information to match them to the new diagnosis dataset was performed to assess trends in risk factors / routes of transmission among HIV positive individuals.

Women undergoing routine antenatal testing were identified using a combination of test location and/or data from the freetext clinical details field. Where a date of birth was available only women aged between 12 and 49 years were included. A review of the small proportion of individuals who were of unknown gender or classified as male indicated that most were male. These individuals were therefore included in the analysis of antenatal women.

In previous reports ethnicity classification was based on name analysis using Nam Pechan software[5]. In 2010 additional ethnicity analysis was performed using OnoMap[6]. These data were hierarchically coded into a summary ethnicity field using i) self-reported ethnicity where available, ii) OnoMap 2001 Census classification, iii) Nam Pechan South Asian name analysis. Due to the small numbers of individuals tested identified as belonging to certain ethnic groups (e.g. mixed White and Black Caribbean) a grouped-ethnicity field was created; where individuals were classified as belonging to one of four broad ethnic groups – "Asian or Asian British", "black or black British", "mixed and/or other ethnic groups", "white or white British", or as being of an unknown ethnic group. The use of grouped-ethnicity indicates a broad ethnicity classification based on the hierarchical assessment of multiple data sources has been used.

The characteristics of individuals tested and testing positive were described in sections 2 to 6. Statistical significance between groups was tested for using chi-squared and Mann-U Whitney as appropriate. The classification of newly diagnosed hepatitis B infections has been described elsewhere[7]. The annual incidence or annual frequency of new diagnoses for an infection was calculated as number of positive individuals identified that year divided by the population of England covered by the sentinel study. This number represents a rough estimate and it should be remembered that each laboratory and region have different approaches as to how people are identified for testing. Data were managed in MS Access and ORACLE and analysed in STATA and MS Excel.

Ethical approval was obtained from the Northern & Yorkshire Multi-Centre Research Ethics Committee and the Public Health Laboratory Service (PHLS) ethics committee. The study was funded until 30th September 2009 by the English Department of Health (study ref: GHP/003/002/02, previous ref: AIDB 2/28) and is now funded by the HPA.

Appendix 2 – Participating laboratories

	Participating sentinel laboratory	HPA Region	Dates for which data are available		Included in analysis		
					2011	Trends*	HIV trends*
1	Ashford laboratory	South East Coast	01/01/2002	31/12/2011	✓	✓	✓
2	Birmingham laboratory	West Midlands	01/01/2002	31/12/2011	✓	✓	✓
3	Brighton laboratory	South East Coast	16/10/2006	31/12/2011	✓	✓	✓
4	Bristol laboratory	South West	01/04/2006	31/12/2011	✓	✓	×
5	Cambridge HPA laboratory	Eastern	01/01/2002	31/12/2011	✓	✓	✓
6	Centre for Infections	n/a	01/01/2002	31/12/2011	✓	✓	✓
7	Chelsea and Westminster Hospital	London	01/01/2008	31/12/2011	✓	✓	×
8	Chester HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2011	✓	✓	✓
9	Dulwich laboratory	London	01/09/2004	31/12/2011	✓	✓	✓
10	Ealing Hospital	London	16/11/2002	15/10/2003	×	×	×
11	Freeman Hospital	North East	02/01/2002	31/12/2011	✓	✓	×
12	Grimsby laboratory	East Midlands	01/04/2002	31/12/2011	✓	✓	✓
13	Hull laboratory	Yorkshire and Humberside	01/04/2002	30/11/2007	×	×	×
14	Leeds General Infirmary	Yorkshire and Humberside	01/09/2004	31/12/2011	✓	✓	✓
15	Leeds HPA laboratory	Yorkshire and Humberside	01/01/2002	29/07/2005	×	×	×
16	Liverpool HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2011	✓	✓	✓
17	Manchester HPA laboratory	North West	01/01/2002	31/12/2011	✓	✓	✓
18	Newcastle laboratory[$]	North East	01/01/2002	31/12/2011	✓	✓	×
19	Micropathology	n/a	01/01/2005	31/12/2011	✓	✓	✓
20	North Middlesex Hospital	London	29/07/2002	31/12/2011	✓	✓	✓
21	Northwick Park Hospital	London	Data not yet available		×	×	×
22	Nottingham laboratory	East Midlands	02/09/2002	31/12/2011	✓	✓	×
23	Portsmouth laboratory	South Central	01/01/2002	31/12/2011	✓	✓	×
24	Preston HPA laboratory (via Manchester)	North West	01/01/2002	31/12/2011	✓	✓	✓
25	Royal Liverpool Hospital	North West	01/01/2002	31/12/2011	✓	✓	✓
26	St Bartholomew's Hospital	London	01/08/2004	31/12/2011	✓	✓	×
27	St Georges Hospital	London	01/01/2002	31/12/2011	✓	✓	×
28	University College Hospital	London	01/09/2004	31/12/2011	✓	✓	✓

[$] Recent data received via Freeman Hospital.

* Trend data based on the centres for which complete 2008-2011 data were available.

Appendix 3 – Sentinel surveillance participants

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