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Retrospective cohort study assessing coverage, uptake and associations with hepatitis B vaccination among females who engage in sex work attending sexual health services in England between 2015 and 2019

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ABSTRACT

Objectives Females who engage in sex work (FSW) are at high risk of hepatitis B virus (HBV) and are eligible for HBV vaccination. The objective of this analysis was to explore coverage, uptake and correlates of HBV vaccination among FSW who attend sexual health services (SHS) in England.

Methods Data on all attendances at SHS in England were obtained from the GUMCAD STI Surveillance System. Attendees were eligible for inclusion if they were female, had not been previously diagnosed with HIV and sex work was recorded between 2015 and 2019. Bivariable and multivariable logistic regression models were used to investigate sociodemographic factors (age, ethnicity, region of birth and region of residence) associated with having received an HBV vaccination on or after an attendance where sex work was reported.

Results There were 13 769 FSW attending SHS in England between 2015 and 2019 (median age 30 years, 71% white ethnicity). HBV vaccination coverage was 37% (n=5050/13 751, 95% CI 35.9%–37.5%). Among those that first reported sex work between 2015 and 2019, HBV vaccination uptake was 30% (n=3249/10 681, 95% CI 29.6%–31.3%). In multivariable analyses, HBV vaccination uptake was associated with younger age (5-year increase: OR=0.87, 95% CI 0.85, 0.89) and being born in South America (37%, adjusted OR (aOR)=1.40, 95% CI 1.18, 1.66) compared with being born in the UK. Being of Asian ethnicity (19%, aOR=0.63, 95% CI 0.45, 0.89) compared with white ethnicity was associated with reduced odds of HBV vaccination. Sixteen FSW were diagnosed with HBV after their first attendance where sex work was recorded.

Conclusions To achieve the WHO goals of elimination of HBV as a public health threat by the year 2030, further research is needed to understand the individual and structural barriers to the offering and uptake of HBV vaccination among FSW, as well as using health promotion methods to improve uptake.

INTRODUCTION

In 2016, WHO released the global health sector strategy on viral hepatitis that aimed to eliminate viral hepatitis as a public health threat by 2030, as well as reduce the incidence of and deaths from

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Females who engage in sex work (FSW) are at high risk for hepatitis B virus (HBV) and are eligible for HBV vaccination.

WHAT THIS STUDY ADDS

⇒ Coverage and uptake of HBV vaccination was low and varied by age, ethnicity and region of birth.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ FSW should be included in hepatitis elimination strategies and future research should focus on interventions to improve uptake of HBV vaccination among this population.

chronic viral hepatitis.¹ It is estimated that 95% of deaths from viral hepatitis are attributable to hepatitis B virus (HBV) and hepatitis C virus (HCV).¹ The UK has committed to the WHO's strategy to eliminate hepatitis as a public health threat, which includes identifying and providing care to marginalised individuals at risk of HBV and HCV transmission.² In 2018, three hundred and eighty-one acute cases of HBV were reported in England, with a low annual incidence rate of 0.68 per 100 000.³ However, the incidence of chronic infection in adults is not known as not all HBV infection has a symptomatic acute phase.⁴ If left untreated, chronic hepatitis B (HBV) can lead to liver cirrhosis, end-stage liver disease and liver cancer, and due to the frequently asymptomatic nature of HBV, people can remain undiagnosed until liver complications develop.⁴

Females who engage in sex work (FSW) are at high risk for bloodborne viruses (BBV) like HBV through behaviours such as having multiple sexual contacts and injecting drug use.⁵ Due to this increased risk, HBV vaccination is recommended for FSW in England.⁶ Various factors have been found to influence whether FSW are vaccinated for HBV and compliance to vaccination schedules, such as drug use, being born in HBV-endemic countries and conducting outreach work.^{7–10}

Previous research from England has found that there was low HBV vaccination uptake (24%) among a sample of FSW and less than half (46%) had been screened for an STI in the past year, which may also indicate low screening for BBVs like HBV.¹¹ Among sexual health service (SHS) attendees in England in 2011, FSW have been found to have a higher prevalence of chlamydia, gonorrhoea, HBV and HCV compared with other female SHS attendees, which may indicate a sexual risk for HBV transmission.¹² FSW in England are more likely to disclose their sex work when attending a local SHS compared with those attending services elsewhere,¹³ and therefore attending an SHS provides a good opportunity for HBV vaccination.

Considering England's commitment to WHO elimination targets, more recent research on FSW in England is needed to understand the need for HBV vaccination among this population to help achieve HBV elimination goals. The aim of this analysis was to understand overall coverage of HBV vaccination among FSW who attend SHS services in England, to explore HBV vaccination uptake among FSW and to understand sociodemographic correlates of HBV vaccination uptake among FSW at SHS in England.

METHODS

Study design

A retrospective cohort design was used using the routine STI surveillance system in England (GUMCAD) that records pseudonymised and depersonalised data on all HIV/STI tests, diagnoses and interventions at SHS in England.¹⁴ Attendances by females who were aged 15 years and over between 2015 and 2019 were included. This 5-year period was chosen as the most recent 5-year period preceding the COVID-19 pandemic given the sharp reduction in face-to-face SHS attendances and sharp reductions in vaccinations provided in 2020.¹⁵ FSW who had been previously diagnosed with HIV prior to their first attendance between 2015 and 2019 were excluded from analyses, because HBV vaccination is recommended for people living with HIV and is likely to be administered when attending HIV care,¹⁶ which would not be reported through GUMCAD. The UK Health Security Agency has approval to handle the data obtained by GUMCAD under Regulation 3 of the Health Service (Control of Patient Information) Regulations 2002.

Methods

Sex work status, sociodemographic factors (gender, ethnicity, region of birth), HBV vaccination status and HBV diagnoses were obtained through GUMCAD. To assess coverage of HBV vaccination among all eligible FSW, all females aged 15 years and over who attended between 2015 and 2019 and who had sex work recorded at any attendance were included as the denominator. FSW were excluded from coverage estimates if an HBV diagnosis was made prior to sex work being reported. To assess overall HBV vaccine coverage among FSW, all eligible FSW with any dose of HBV vaccine across all records from 2008 to 2019 were included as the numerator.

To assess uptake of HBV vaccination among FSW attending SHS for the first time and to understand whether current guidance is being implemented, the first attendance that sex work was reported was used as baseline, and only HBV vaccine doses received at or after that attendance were included. FSW were excluded from the uptake analysis if sex work was reported prior to 2015.

Statistical analysis

Univariable and multivariable logistic regression analyses were conducted using STATA (V.15) to assess if sociodemographic factors (age, ethnicity, region of birth and region of residence) were associated with HBV vaccination uptake among FSW. Age was included as a continuous variable rescaled to 5-year increments. Attendees were excluded from bivariable and multivariable analyses if sex work was reported prior to 2015 or HBV vaccination was received prior to sex work being reported to assess uptake of vaccination among recent reporting of sex work. A Kaplan-Meier curve was produced to display the cumulative time to HBV vaccination in days, stratified by region of attendance using RStudio (V.2023.03.0).

RESULTS

Between 2015 and 2019, a total of 13 769 FSW who had not been previously diagnosed with HIV were reported as attending SHS in England. Eighteen FSW were excluded from the coverage estimates due to receiving an HBV diagnosis prior to sex work being recorded. Among the remaining 13 751 FSW there were 62015 attendances between 2015 and 2019, half (51%, $n=6986/13\ 751$) attended an SHS in London, the median age of FSW at the first attendance between 2015 and 2019 where sex work was reported was 30 years (IQR: 25–38), 45% ($n=6176/13\ 751$) were UK born and 71% ($n=9844/13\ 751$) were of white ethnicity. Overall, 37% ($n=5050/13\ 751$, 95% CI 35.9%–37.5%) of all FSW had received at least one HBV vaccine dose at an SHS.

To investigate sociodemographic factors associated with HBV vaccination among FSW, a further 2455 FSW were excluded due to sex work being recorded before 2015 and 615 were excluded due to receiving an HBV vaccination before sex work was recorded. Among the remaining 10 681, there were 38 896 attendances, 51% ($n=5423/10\ 681$) attended an SHS in London and the demographic distribution was similar to that of all FSW (median age: 30 (IQR: 24–37), 43% ($n=4628/10\ 681$) UK born, 70% ($n=7528/10\ 681$) white ethnicity). Among this cohort, 30% ($n=3249/10\ 681$, 95% CI 29.6%–31.3%) had received an HBV vaccination dose, 70% ($n=2280/3249$) of whom received a vaccine on the same day they were first recorded as having engaged in sex work. The median time to vaccination for those not vaccinated when first reported as engaging in sex work was 56 days (IQR: 14–196 days). [Figure 1](#) displays the Kaplan-Meier curve for the cumulative time to HBV vaccination by region of attendance.

Findings from the bivariable and multivariable analyses are presented in [table 1](#). In the multivariable analysis, being of younger age was associated with an increased odds of HBV vaccination. Being of Asian ethnicity was associated with reduced odds of HBV vaccination compared with being of white ethnicity. HBV vaccination also varied by region of birth, whereby FSW born in South America were at increased odds of receiving an HBV vaccination dose compared with UK-born FSW and being born elsewhere in Europe, North America or Australasia was associated with reduced odds of HBV vaccination compared with UK-born FSW. HBV vaccination uptake also varied by region of residence.

There were 16 FSW diagnosed with HBV after their first attendance where sex work was recorded, two of whom had received an HBV vaccination.

DISCUSSION

Vaccination coverage among FSW attending SHS is low; our analysis shows that only 37% of FSW attending SHS have a

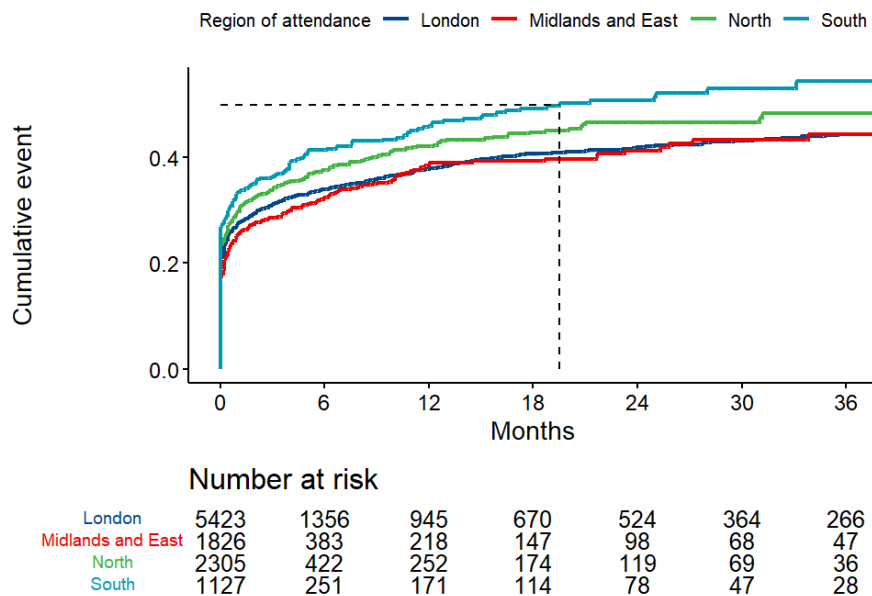


Figure 1 Kaplan-Meier curves displaying cumulative probability for hepatitis B virus (HBV) vaccination by region of attendance among females who first reported sex work and attended sexual health services in England between 2015 and 2019.

recorded HBV vaccination. Despite guidelines recommending offer of HBV vaccination to all FSW,⁶ uptake of vaccination was only 30% among those first recorded as FSW over the study period and varied by ethnicity, age, region of birth and region of residence. Where vaccination was offered, it was encouraging that the majority (70%) were at the same attendance as the first record of sex work. Our estimate of uptake is slightly higher than that of a community sample of FSW from Bristol,¹¹ although this research was conducted in the early 2000s and therefore access to healthcare and opinions of vaccination may have changed since. Also, it may be that uptake is higher among our sample, as they are a population who are engaging in healthcare, compared with a sample obtained through outreach work, where engagement in healthcare may be less common. We found 14 FSW in this cohort who were eligible for vaccination but did not receive one and went on to be diagnosed with HBV. We were unable to determine if vaccination had not been offered in this group, or if it had been offered and declined.

HBV vaccination rates varied by ethnicity and FSW of Asian ethnicity had a low uptake of vaccination. This is similar to previous research in England, where people of South Asian and Chinese ethnicity had very low HBV vaccination rates (5% and 12%, respectively) despite relatively high hepatitis B surface antigen test positivity (1.7% and 8.7%).¹⁷ Research has found a lack of knowledge and stigma of hepatitis may be a barrier to testing and vaccination among South Asian and Chinese people in England.^{18 19} Behavioural interventions may be needed to increase knowledge and improve vaccination for HBV among FSW generally and tailoring these to be specific for different communities may further aid uptake.¹⁹

Vaccination uptake also varied by region of birth, which may be due to the person's birth country's policy and programmes on immunisation of infants, children and groups at increased risk of HBV, although we have no data on previous immunity obtained through vaccination elsewhere or reasons for not receiving vaccination. However, being from North America was associated with reduced odds of vaccination, and childhood HBV vaccination has been recommended in the USA since 1991.²⁰

Being born in South America was associated with increased odds of HBV vaccination. Most countries in South America have adopted a universal birth-dose vaccination strategy, but this does vary between countries and the strategies may have been implemented more recently, meaning that FSW from South America in this study may have arrived not being vaccinated previously for HBV.²¹ Given the age range of this cohort and the range in childhood HBV vaccination rollout internationally, as well as potential differences in access to childhood vaccination, HBV immunity among FSW who were born in a country with a childhood HBV vaccination strategy should still be assessed and a vaccination offered when required.

HBV vaccination was associated with FSW who were of younger age, which may be reflective of first or early engagement in healthcare after engagement of risk behaviour (ie, sex work), and therefore older FSW may have already been identified at risk of HBV (through sex work or other unrelated factors) and received a vaccine in another SHS or other services. HBV vaccination among babies in the UK was introduced in 2017 and therefore people born in the UK attending SHS are unlikely to have received HBV vaccination previously,²² so it is not surprising that FSW who are younger are at an increased odds of receiving an HBV vaccination, as this may be their first opportunity to receive one.

HBV vaccination also varied by region of residence, but caution is needed when interpreting findings, as vaccination rates may differ due to reporting issues or outreach work not being reported through GUMCAD. Local audits and health needs assessments may be needed to assess if certain regions of England need to improve HBV vaccination for FSW, for example, through the provision of specialised SHS for FSW. Similar to previous research, FSW were more likely to attend for care in London,¹² possibly due to specialised SHS for FSW, but it could also be true there are more FSW residing in London. Regardless, there may be a need for specialised services outside of London and services should evaluate if there is a need within their local area.

Table 1 Bivariable and multivariable analyses for sociodemographic factors associated with hepatitis B virus (HBV) vaccination among females who first reported sex work and attended sexual health services in England between 2015 and 2019

	No vaccination (n=7432)		HBV vaccination (n=3249)		Row %	Univariable OR (95% CI)	P value	Multivariable aOR (95% CI)
	n (mean)	Col % (SD)	n (mean)	Col % (SD)				
Age	32.2	9.3	29.8	9	–	0.87 (0.85, 0.89)	<0.0001	0.87 (0.85, 0.89)
Ethnicity							<0.0001	
White	5216	70	2312	71	31	Ref		Ref
Mixed	430	6	167	5	28	0.88 (0.73, 1.05)		0.77 (0.63, 0.95)
Asian	352	5	80	2	19	0.51 (0.40, 0.66)		0.63 (0.45, 0.89)
Black	329	4	124	4	27	0.85 (0.69, 1.05)		0.83 (0.64, 1.06)
Other	267	4	174	5	39	1.47 (1.21, 1.79)		1.42 (1.14, 1.76)
Unknown	838	11	392	12	32	1.06 (0.93, 1.20)		1.04 (0.89, 1.22)
Region of birth							<0.0001	
UK	3236	44	1392	43	30	Ref		Ref
Europe excluding UK	1987	27	871	27	30	1.02 (0.92, 1.13)		0.87 (0.77, 0.98)
Africa	120	2	48	1	29	0.93 (0.66, 1.31)		1.02 (0.69, 1.53)
Asia	333	4	85	3	20	0.59 (0.46, 0.76)		0.99 (0.71, 1.40)
Australasia	63	1	16	0.5	20	0.59 (0.34, 1.03)		0.53 (0.28, 0.97)
North America	41	1	8	0.2	16	0.45 (0.21, 0.97)		0.49 (0.22, 0.97)
South America	668	9	388	12	37	1.35 (1.17, 1.55)		1.40 (1.18, 1.66)
Unknown	984	13	441	14	31	1.04 (0.92, 1.18)		1.02 (0.86, 1.21)
Region of residence							<0.0001	
London	3236	44	1448	45	31	Ref		Ref
North East	119	2	101	3	46	1.90 (1.44, 2.49)		1.95 (1.44, 2.65)
North West	506	7	199	6	28	0.88 (0.74, 1.05)		0.98 (0.81, 1.20)
East Midlands	803	11	179	6	18	0.50 (0.42, 0.59)		0.58 (0.48, 0.70)
West Midlands	205	3	95	3	32	1.04 (0.81, 1.34)		1.18 (0.89, 1.55)
East of England	364	5	188	6	34	1.15 (0.96, 1.39)		1.27 (1.03, 1.57)
South East	471	6	260	8	36	1.23 (1.05, 1.45)		1.34 (1.12, 1.62)
South West	306	4	171	5	36	1.25 (1.03, 1.52)		1.45 (1.17, 1.80)
Yorkshire and the Humber	772	10	396	12	34	1.15 (1.00, 1.31)		1.18 (1.01, 1.38)
UK—outside England	106	1	32	1	23	0.67 (0.45, 1.01)		0.63 (0.40, 0.97)
Unknown	494	7	174	5	26	0.79 (0.66, 0.95)		0.82 (0.66, 1.00)

aOR, adjusted Odds Ratio; OR, Odds Ratio.

This analysis excluded data from 2020 onwards due to the impact of the COVID-19 pandemic on engagement in healthcare, particularly on face-to-face attendances and therefore the ability to vaccinate attendees.¹⁵ In addition to barriers to attendance, the COVID-19 vaccine programme may have also influenced attitudes towards other vaccinations. An international review of the literature found that influenza vaccination uptake may have been negatively affected by the COVID-19 pandemic.²³ Conversely, studies from Italy found that the COVID-19 pandemic had increased acceptance of influenza vaccination.^{24,25} It is therefore unclear how the COVID-19 pandemic may have affected attitudes to the HBV vaccination in England and further research should investigate whether there is a need for education and targeted health promotion among this population regarding HBV vaccination.

A limitation of the data set is that movement between clinics cannot be tracked or controlled for. Therefore, it is hard to estimate how many FSW received a complete course of HBV vaccines to be fully protected against HBV or whether a full vaccination course had been received elsewhere. International research suggests vaccination completion is low among this population.^{7,8} Additionally, this means that FSW could have attended other SHS prior to 2015 and received an HBV vaccination dose. There is

also an under-reporting of HBV immunity within the GUMCAD STI Surveillance System and vaccination doses received elsewhere would not be reported.²⁶ Therefore, the proportion of FSW that have achieved HBV immunity through vaccination or resolved infection may be higher than the estimates presented. The proportion of FSW who have HBV immunity may also be under-reported due to vaccination status being reliant on clinician coding and a site's ability to report vaccination status to GUMCAD. A lower-than-expected vaccination rate has also been observed for human papillomavirus (HPV) vaccination among men who have sex with men, which was partially attributed to an under-reporting of vaccination in GUMCAD.²⁷ It is not clear how many of those who were reported as engaging in sex work were offered an HBV vaccination but declined, whether an assessment of HBV risk was missed or whether FSW had received vaccination through another source (eg, another SHS, outreach work). Sex work is a broad category with varying degrees of risk (online, pornography, street based, escort), as the coding of sex work in GUMCAD is based on reporting by clinicians on assessment of their clients' sexual history and different types of sex work are not reported. However, any declaration of sex work may be an indication of risk and therefore eligible for HBV vaccination under current guidance.⁶ Other relevant risk

