












Self-reported vaccine uptake across six infectious diseases among gay, bisexual, transgender, and non-binary individuals in Australia: findings from a 2024 national survey

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ABSTRACT

Background. Gay and bisexual men who have sex with men (GBMSM) and trans and gender diverse people (TGD) are disproportionately affected by several vaccine-preventable diseases. However, research on vaccine uptake for both sexually transmitted and non-sexually transmitted infections among GBMSM and TGD remains limited. Understanding differences in uptake between selective (e.g. hepatitis A; meningococcal; human papillomavirus; HPV; mpox) and universal (e.g. influenza, COVID-19) is important for informing future immunisation policy and strategies. **Methods.** We surveyed past vaccine uptake among GBMSM and TGD people living in Australia in July–November 2024. Participants were asked to self-report their vaccination status for the following six vaccines: COVID-19, influenza, hepatitis A, hepatitis B, HPV, meningococcal disease, and mpox. Vaccine uptake was calculated for each vaccine and stratified by age group, HIV status and PrEP use, gender, education, Medicare status, world region of birth, and jurisdiction of residence. **Results.** The median age of the 2095 participants was 39 years (IQR: 31–50). The majority of the participants identified as cisgender men (94.7%). Overall, the COVID-19 vaccine had the highest uptake (97.5%), followed by hepatitis A/B (80.6%), influenza (72.8%), mpox (64.0%), HPV (35.9%), and meningococcal disease (30.3%). HIV-negative participants not using pre-exposure prophylaxis (PrEP) had lower vaccine uptake compared with HIV-negative PrEP users and people living with HIV. Higher education and having a Medicare card were associated with an overall increased vaccine uptake. **Conclusion.** Factors that increase vaccine uptake included being PLHIV and using PrEP, increased education, and having a Medicare card. Public health policies should consider targeted outreach, integration of vaccination into routine care and innovative health communication strategies.

Keywords: GBMSM, health disparities, sexual health, sexually transmitted diseases, TGD, vaccine, vaccine-preventable diseases, vaccine uptake.

Introduction

Vaccination is a critical public health strategy to prevent transmission and reduce disease morbidity and mortality among affected populations.¹ Gay, bisexual, and other men who have sex with men (GBMSM) and trans and gender diverse people (TGD) are disproportionately affected by several vaccine-preventable diseases due to interconnected sexual and social networks, a higher prevalence of immunocompromising conditions (e.g. people living with HIV, PLHIV) and structural barriers to accessing vaccines or healthcare services including limited clinic operating hours, the direct and indirect costs of care and travel distances to the clinic.^{2–4} Since the late 2010s, this has been highlighted by several outbreaks of mpox, hepatitis A, and meningococcal disease in many countries, including Australia.^{5–8}

Vaccines against hepatitis A, meningococcal disease, mpox, and human papillomavirus (HPV) are important for GBMSM to reduce their risk of acquiring these infections.⁹ Countries with robust public health systems, such as Australia, have implemented free vaccination campaigns to enhance population immunity in affected communities during outbreaks of these diseases;⁷ for example, implementing a free mpox vaccination program for GBMSM in 2022 in response to the global mpox outbreak.^{7,8} Some Australian jurisdictions also introduced time-limited free vaccination programs for hepatitis A, meningococcal disease (ACWY vaccine), and HPV for GBMSM.^{5,6,10} In contrast, COVID-19 and influenza vaccines are offered broadly to the general population but particularly those who are immunocompromised (e.g. PLHIV). Understanding differences in uptake between selective (e.g. hepatitis A, meningococcal, HPV, mpox) and universal (e.g. influenza, COVID-19) vaccines among GBMSM and TGD people is therefore important for informing future immunisation policy. Modelling studies have demonstrated that improved vaccination coverage in these groups could substantially reduce infection incidence and the cost of health care.^{11,12}

Despite the availability of free vaccination campaigns, evidence suggests that vaccine uptake among GBMSM and TGD may be lower than in the general population, even when acceptability is high.¹³ Although there have been several studies examining the uptake of some vaccines among GBMSM and TGD,^{5,14–16} there have been a lack of national studies comparing uptake across multiple vaccines in these populations. In addition, individuals may face additional challenges such as not holding or not being eligible for a Medicare card,¹⁷ which can increase the cost and thus accessibility of vaccines. This study aimed to provide a national estimate of vaccine uptake across six vaccines (COVID-19, influenza, hepatitis A/B, HPV, meningococcal disease and mpox) among GBMSM and TGD and identify potential gaps in other disproportionately affected groups, which could inform future targeted vaccination strategies for GBMSM, TGD, and other priority groups in Australia.

Methods

Study design

This study was part of a larger national study, known as the ‘DoxyAWARE’ study. The primary aim of the study was to assess the awareness, knowledge, and uptake of doxyPEP (i.e. doxycycline post-exposure prophylaxis to be taken within 72 h after sexual exposure to reduce the risk of STIs, particularly syphilis and chlamydia) among GBMSM and TGD in Australia. The primary doxyPEP findings were published separately.¹⁷ In this paper, we present a secondary analysis investigating vaccine uptake among GBMSM and TGD that has not been published elsewhere.

In brief, the DoxyAWARE study was an online, anonymous cross-sectional survey conducted between July and November 2024 in Australia. The survey was co-designed by sexual health researchers, clinicians, and LGBTQIA+ community members. The survey was administered on Qualtrics (Provo, USA). Informed consent was assumed upon reading the information sheet and proceeding with the survey. Eligible participants clicked ‘agree’ to consent or ‘disagree’ to exit the survey. Participants had the option to enter a draw to win one of five AUD200 gift vouchers.

Participants were recruited through clinical (including 13 sexual health and community clinics and 6 general practices) and non-clinical settings through social media platforms (e.g. Facebook, Instagram, X), university student portals, community organisations focused on HIV and LGBTQIA+ health (e.g. Thorne Harbour Health, ACON), and geosocial networking apps (e.g. Scruff, Jack’d, Grindr).

Study population

Participants were eligible if they fulfilled the following four criteria: (1) were currently living in Australia; (2) were aged 18 years or older; (3) were a man (cisgender or transgender man), transgender woman, or non-binary person who has sex with men; and (4) had at least Year 10 level of English (can read most newspaper articles).

We excluded participants located outside of Australia based on GeoIP location data collected through Qualtrics. We also excluded potential bots and fraudulent responses using built-in Qualtrics functions, such as reCAPTCHA score and honeypot questions, which were widely used in previous studies.¹⁸ Additionally, we included an attention question to ensure the quality of the survey and excluded participants who failed to answer the attention question from the analysis.

Data collection and measures

The survey comprised three sections. The first section collected demographic information including age, country of birth, and Medicare status (Australia’s universal health insurance, available to all permanent residents). The second section examined awareness, uptake, and concerns regarding the use of doxyPEP. The third section collected data on sexual practices and self-reported vaccination history for six vaccines including COVID-19, influenza, hepatitis A/B, HPV, meningococcal disease, and mpox. The question did not clarify whether they completed the full vaccination course (as some vaccines require more than one dose for the full schedule).

To assess vaccine uptake in relation to costs for each vaccine, we sourced costs from a major Australian pharmacy chain. Prices reflect the retail cost of the vaccine only and do not include consultation or administration fees. Costs were extracted on a per-dose basis, noting that some vaccines doses vary depending on age and eligibilities. For example, HPV requires only one dose if the patient is under the age

of 25 years, but three doses are needed for patients over the age of 26 years.

Statistical analyses

The primary outcome of this analysis was vaccine uptake, which was defined as the proportion of participants who self-reported receiving the specified vaccine any time in their life.

We stratified vaccine uptake by participant characteristics, including age group in years (18–25, 26–35, 36–45, 46–55 and >55), Medicare status, gender, Australian jurisdiction of residence, region of birth (as per the WHO classification), HIV status, the use of HIV pre-exposure prophylaxis (PrEP) over the past 12 months, and education level (completed or did not complete university). We used chi-squared tests to assess differences in vaccine uptake between subgroups and chi-squared trend tests for different age groups. A dumbbell plot was generated to visually compare vaccine prices across different products and schedules, based on retail prices from a large pharmacy chain in Australia (i.e. Chemist Warehouse) in 2025. Although this study was primarily descriptive, exploratory multivariable logistic regression analyses were conducted to examine potential associations.

All statistical analyses were conducted using Stata (ver. 18, Stata Corporation, College Station, TX, USA).

Ethics statement

This study was approved by the Alfred Hospital Ethics Committee (#107/24), ACON (#202405), Thorne Harbour Health (#THH_2024_010) and the Human Research Ethics Committee of Northern Territory Health and Menzies School

of Health Research (#2024-4878). The project was also registered with Monash University Human Research Ethics Committee (Project 48959).

Results

Among the 3940 participants who clicked on the survey link, 1845 participants did not meet the inclusion criteria and were excluded. Of the 2095 participants included in the final sample, the median age was 39 years (IQR: 31–50). Most participants identified as cisgender men (94.7%, 1984/2095), followed by non-binary individuals (2.8%, 59/2095), transgender men (1.5%, 32/2095), and transgender women (0.8%, 16/2095). Most (78.4%, 1643/2095) identified as gay, 13.5% (283/2095) as bisexual, 4.2% (87/2095) as queer, 2.2% (45/2095) as heterosexual, and 1.8% (37/2095) used a different term or preferred not to answer. More than half completed university (65.1%, 1363/2095) and were born in Australia (60.0%, 1256/2095). Of those who were born overseas (40.0%, 839/2095), the median duration of residence in Australia was 9 years (IQR: 3–20). Most participants were HIV-negative taking HIV PrEP (65.3%, 1368/2095), followed by HIV-negative not taking HIV PrEP (25.6%, 536/2095) and PLWHIV (9.1%, 191/2095).

Overall, the COVID-19 vaccine had the highest uptake (97.5%, 2042/2095), followed by hepatitis A/B (80.6%, 1688/2095), influenza (72.8%, 1525/2095), mpox (64.0%, 1341/2095), HPV (35.9%, 753/2095), and meningococcal disease (30.3%, 634/2095) vaccines (Fig. 1).

Table 1 shows that non-PrEP users in general had lower vaccine uptake than PLWHIV and PrEP users. However, there

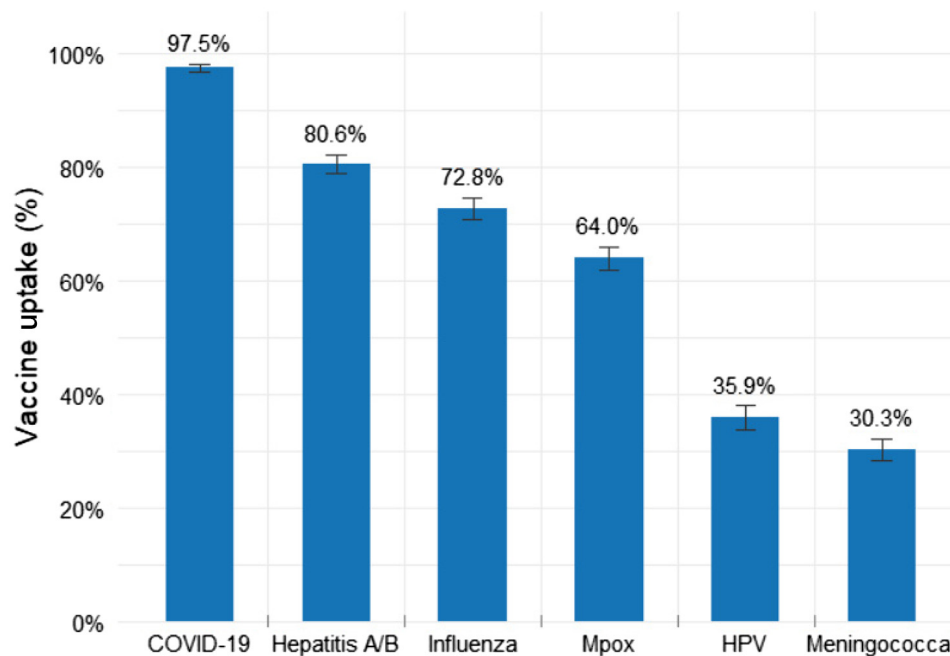


Fig. 1. Vaccine uptake in the study population.

Table 1. Proportion of vaccine uptake in participants stratified by HIV status and pre-exposure prophylaxis (PrEP) use.

Vaccines, n (%)	People living with HIV (N = 191)	HIV-negative, not taking PrEP (N = 536)	HIV-negative, taking PrEP (N = 1368)	P-value
COVID-19	183 (95.8%)	517 (96.5%)	1342 (98.1%)	0.038
Influenza	161 (84.3%)	367 (68.4%)	997 (72.9%)	<0.001
Hepatitis A/B	140 (73.3%)	370 (69.0%)	1178 (86.1%)	<0.001
HPV	72 (37.7%)	157 (29.3%)	524 (38.3%)	0.001
Meningococcal	68 (35.6%)	149 (27.8%)	417 (30.5%)	0.125
Mpox	146 (76.4%)	165 (30.8%)	1030 (75.3%)	<0.001

were some exceptions. For example, there was no significant difference between groups for meningococcal disease vaccination ($P = 0.125$). For COVID-19 vaccination, the difference was statistically significant between groups ($P = 0.038$), but non-PrEP users did not have the lowest uptake. The largest difference was observed for mpox vaccination where non-PrEP users had the lowest uptake at 30.8% (165/536), compared with PLHIV (76.4%, 146/191) and PrEP users (75.3%, 1030/1368) ($P < 0.001$).

The uptake of COVID-19 ($P_{\text{trend}} = 0.964$), hepatitis A/B ($P_{\text{trend}} = 0.099$) and mpox ($P_{\text{trend}} = 0.082$) vaccines were similar across all age groups (Table 2). Influenza vaccine uptake was higher in older age groups, from 69.8% (143/205) in participants aged 18–25 years to 82.7% (253/306) in those aged >55 years ($P_{\text{trend}} = 0.001$). In contrast, HPV and meningococcal disease vaccine uptake was higher in younger age groups. HPV vaccine uptake decreased from 72.2% (148/205) in participants aged 18–25 years to 14.4% (44/306) in those aged >55 years ($P_{\text{trend}} < 0.001$), and meningococcal disease vaccine uptake decreased from 56.1% (115/205) in those aged 18–25 years to 19.0% (58/306) in those aged >55 years ($P_{\text{trend}} < 0.001$).

In terms of educational level, vaccine uptake was significantly higher among those who completed university compared with those who did not complete university for all vaccines ($P < 0.05$) except the meningococcal disease vaccine ($P = 0.211$) (Table 3). The most pronounced difference was for mpox vaccination, with 68.5% (934/1363) among

Table 2. Proportion of vaccine uptake in participants stratified by age.

Vaccines, n (%)	Age 18–25 years (N = 205)	Age 26–35 years (N = 597)	Age 36–45 years (N = 612)	Age 46–55 years (N = 375)	Age >55 years (N = 306)	P_{trend}
COVID-19	202 (98.5%)	579 (97.0%)	594 (97.0%)	370 (98.7%)	297 (97.0%)	0.964
Influenza	143 (69.8%)	427 (71.5%)	426 (69.6%)	276 (73.6%)	253 (82.7%)	0.001
Hepatitis A/B	164 (80.0%)	478 (80.0%)	520 (85.0%)	298 (79.5%)	228 (74.5%)	0.099
HPV	148 (72.2%)	282 (47.2%)	203 (33.2%)	76 (20.3%)	44 (14.4%)	<0.001
Meningococcal	115 (56.1%)	209 (35.0%)	188 (30.7%)	64 (17.1%)	58 (19.0%)	<0.001
Mpox	98 (47.8%)	405 (67.8%)	405 (66.2%)	232 (61.9%)	201 (64.0%)	0.082

Table 3. Proportion of vaccine uptake in participants stratified by the highest education attained.

Vaccines, n (%)	Did not complete university (N = 732)	Completed university (N = 1363)	P-value
COVID-19	702 (95.9%)	1340 (98.3%)	0.001
Influenza	483 (66.0%)	1042 (76.6%)	<0.001
Hepatitis A/B	560 (76.5%)	1128 (82.7%)	0.001
HPV	232 (31.7%)	521 (38.2%)	0.003
Meningococcal	209 (28.6%)	425 (31.2%)	0.211
Mpox	407 (55.6%)	934 (68.5%)	0.003

those who completed university vs 55.6% (407/732) among those who did not complete university ($P = 0.003$), representing an absolute difference of 12.9%.

Individuals who had a Medicare card had a higher vaccine uptake for most vaccines except COVID-19 and HPV (Table 4).

Fig. 2 demonstrates that lower-cost and free vaccines (e.g. COVID-19, mpox, influenza) have higher uptake compared to higher-cost vaccines (e.g. HPV, meningococcal). However, the Pearson test of correlation was not statistically significant ($P = 0.118$ for those with Medicare and $P = 0.120$ for those without). This analysis does not include the cost of administration.

There were some disparities in vaccine uptake across jurisdictions. In general, the Australian Capital Territory had the highest vaccine uptake compared to other jurisdictions (Supplementary Table S1). In terms of region of birth, there was no difference in COVID-19 and hepatitis A/B vaccine uptake (Table S2); however, those who were born in the Western Pacific had the highest uptake of influenza ($P = 0.008$) and meningococcal disease vaccines ($P < 0.001$), while those who were born in the European region had the highest uptake of HPV ($P = 0.027$) while those in the Americas had the highest mpox vaccine uptake ($P < 0.001$). Furthermore, there was no difference in COVID-19, influenza, and hepatitis A/B vaccine uptakes across different genders (Table S3); however, transgender men had the highest HPV vaccine uptake (71.9%, 23/32) compared to other genders, such as cisgender men (34.4%, 683/1984) and non-binary people (67.8%, 40/59).

Table 4. Proportion of vaccine uptake in participants stratified by Medicare status.

Vaccines, n (%)	Medicare (N = 1846)	No medicare (N = 241)	P-value
COVID-19	1800 (97.5%)	234 (97.1%)	0.848
Influenza	1362 (73.8%)	157 (65.2%)	0.018
Hepatitis A/B	1501 (81.3%)	183 (75.9%)	0.006
HPV	671 (36.4%)	80 (33.2%)	0.581
Meningococcal	595 (32.2%)	37 (15.4%)	<0.001
Mpox	1194 (64.7%)	146 (60.6%)	0.001

Note: Eight participants were excluded from this table as they were missing or declined to answer their Medicare status.

Multivariable logistic analyses (Table S4) indicated that participant characteristics, including age group, education, Medicare status, HIV status, and PrEP use were significantly associated with uptake for one or more of the five vaccines examined (influenza, hepatitis A/B, HPV, meningococcal, and mpox), but not for COVID-19. The lack of significant associations for COVID-19 vaccination may reflect the uniformly high uptake across groups, consistent with widespread population-level vaccination policies.

Discussion

This national cross-sectional study of 2095 GBMSM and TGD people reveals substantial disparities in vaccine uptake that

extend beyond cost barriers. Overall, we found vaccination uptake was highest for COVID-19, hepatitis A/B, and influenza ($\geq 70\%$), with mpox slightly lower at 64.0%. In contrast, HPV and meningococcal disease vaccines had lower uptake ($\leq 40\%$). This may reflect the increase in availability of community pharmacists in administering COVID-19 and influenza vaccines.¹⁹ Engagement with the healthcare system is a key determinant of vaccination, and there are also some marked differences in education level and age, reflecting both the effects of health literacy and access to historical vaccination programs. Furthermore, the correlation between vaccine cost and uptake was not statistically significant ($P > 0.05$), suggesting that while cost may influence uptake, removing cost barriers alone may not be sufficient to address inequity. Public health programs must actively engage healthcare-disengaged populations through targeted outreach, improve system navigation support and address health literacy barriers.

Vaccine uptake is influenced by systemic factors, including Medicare eligibility. Vaccines such as COVID-19 and mpox were provided free of charge, which may have influenced the decision of individuals to receive the vaccine. However, for vaccines not covered by the Pharmaceutical Benefits Scheme, individuals without Medicare faced significant out-of-pocket costs, including the vaccine itself and associated consultation fees or pathology tests if required. For example, at a Melbourne general practice clinic, the cost of an influenza vaccine for Medicare cardholders is around AUD22, whereas

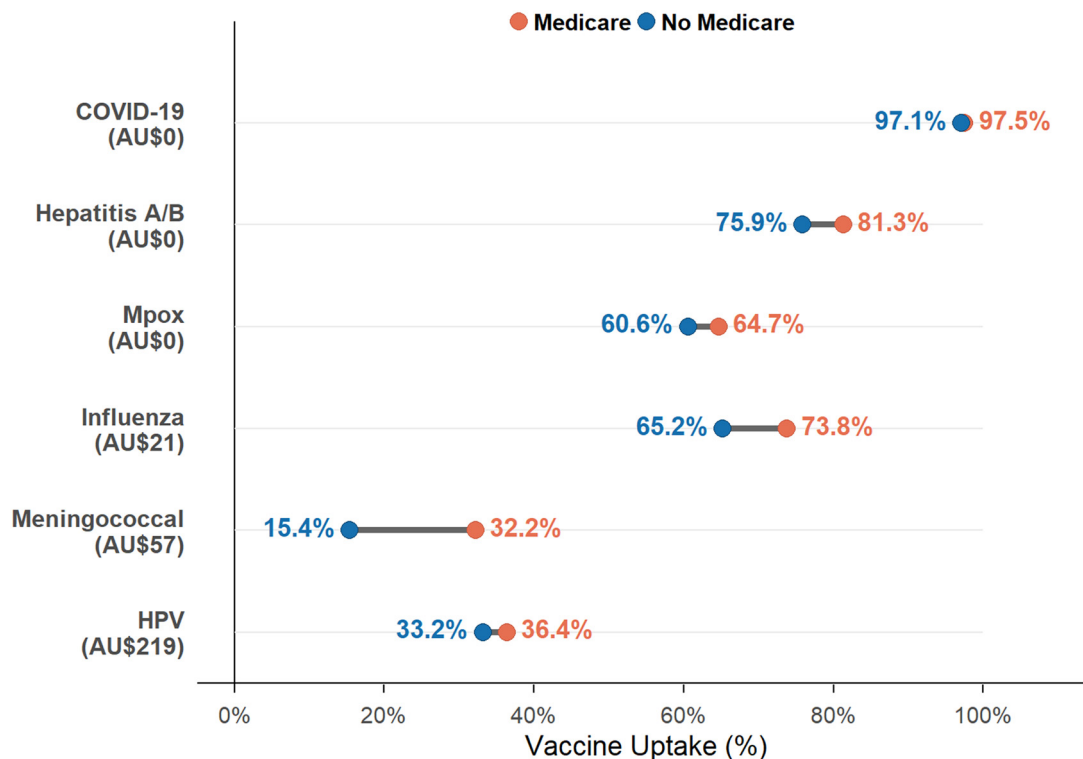


Fig. 2. Dumbbell plot of cost of vaccine (per-dose) to the participant/individual vs vaccine uptake.

the costs for non-Medicare cardholders can go up to AUD56.6 when the additional GP consultation fee for administering the vaccine is included,²⁰ representing a 157% increase and highlighting a financial barrier for non-Medicare cardholders. A report by the Australian National University found that individuals with parents born overseas were less likely to have been vaccinated in general, with differences observed between citizens (covered by Medicare) and non-citizens (some of whom may not be covered by Medicare) with a marginal effect of -0.056 .²¹ Nonetheless, cost alone is unlikely to explain the disparities in vaccine uptake. Other factors such as prior childhood vaccinations, travel requirements and overseas-born individuals' vaccination history are likely to play a role.

A key finding from our study is that participants engaged in regular clinical care for HIV prevention or management reported higher vaccine uptake. PLHIV and PrEP users demonstrated higher vaccine uptake compared to non-PrEP users for all vaccines included in this study, except COVID-19, and this is likely due to the mandatory requirement to receive the COVID-19 vaccine in some industries during the pandemic.²² These differences are likely due to their increased engagement with healthcare services through regular clinic attendance for monitoring and treatment. PrEP users usually have 3-month appointments²³ for monitoring, while those who are stable on antiretroviral therapy attend every 3–6 months.²⁴ This provides more opportunities for clinicians to recommend and administer vaccines. A 2024 United States study found that higher HIV viral load was associated with lower COVID-19 vaccine uptake.²⁵ The authors suggest that PLHIV with uncontrolled HIV viral load may already lack engagement in routine HIV and preventive care. However, we did not collect data on HIV treatment adherence in our study.

Vaccines delivered through universal programs such as COVID-19 (97.5%) and influenza (72.8%) demonstrated consistently high uptake, with only small differences in groups stratified by HIV status or PrEP use. In contrast, uptake of more selectively targeted vaccines (particularly for mpox) varied substantially. Uptake was higher among HIV-negative PrEP users (75.3%) and PLHIV (76.4%) compared with HIV-negative participants not using PrEP (30.8%). This pattern suggests that individuals who are more sexually active or more engaged in sexual health services may be more likely to access vaccines for sexually transmissible infections. PrEP use may act as a good proxy for both sexual behaviour and healthcare engagement. However, our analysis did not directly examine associations between reported sexual behaviours and vaccine uptake.

In terms of age, trends in vaccine uptake may reflect the national immunisation schedule. Influenza vaccine uptake was higher in older age groups, and this may reflect increased awareness of, and susceptibility to influenza-related complications in older groups.²⁶ In contrast, HPV and meningococcal disease vaccine uptake was higher in younger age groups, which may be because the HPV vaccine is typically administered

between ages 9 and 25 years and the meningococcal B vaccine is given earlier in life. Consequently, many adults may not recall receiving these vaccines.

Additionally, the higher health literacy and awareness of sexual health among PLHIV and PrEP users may contribute to their greater willingness to receive vaccines for prevention. This finding aligns with previous studies that have highlighted the importance of regular healthcare interactions in promoting vaccine uptake.²⁷ Higher levels of education were associated with increased vaccine uptake for all six vaccines included in our study. It is hypothesised that individuals with higher education may have higher health literacy²⁸ and hence more likely to seek healthcare services and adhere to vaccination recommendations. This finding is consistent with previous research that has identified health literacy as a critical determinant of vaccine acceptance and uptake.²⁹ Taken together, these findings underscore the critical role of healthcare engagement and health literacy in improving vaccine uptake, particularly among populations at higher risk.

Overall, while providing vaccines free or at a lower cost is a crucial step, it is not sufficient on its own to achieve high uptake, particularly among individuals who are disengaged from healthcare systems. Additionally, financial barriers must be addressed through policies that expand subsidies for key vaccines in Australia. Some countries, such as England and Australia, are offering free HPV and meningococcal disease (ACWY and 4CMenB) vaccines to GBMSM.^{5,30,31} Our findings support the need for broader and more consistent free access to selectively targeted vaccines in order to reduce inequities in uptake.

Targeted outreach strategies are therefore essential to reach underserved groups. Health services such as sexual health and GP clinics, and community pharmacies should be leveraged as vaccination hubs for proactive promotion and opportunistic vaccination, with vaccination history checks (through accessing Australian Immunisation Register) integrated into routine care. Embedding Australian Immunisation guidelines and assessing vaccine uptake as part of routine sexual health care and management could further improve coverage. Most GBMSM report meeting sexual partners through geosocial networking or dating apps,³² which provides an opportunity to increase awareness about disease outbreaks and promote vaccination,³³ thereby improving coverage in key populations. These platforms can therefore be utilised to disseminate timely information about disease outbreaks, promote vaccine awareness, and potentially link users to on-site vaccination initiatives. A UK study on the beliefs and knowledge of mpox among GBMSM shows that participants recruited through Grindr (i.e. a gay dating app) and Meta were more likely to either intend to be vaccinated or express an intention to be vaccinated.³⁴ Furthermore, some dating apps also allow users to display vaccination status (e.g. mpox, COVID-19, and meningococcal)³⁵ and safe sex practices on their profiles³⁶ that may foster informed decision-

making and reduce stigma, which may complement traditional public health strategies.

This study has several strengths, including a large sample size of diverse participants recruited from both clinical and community settings across Australia, and this is one of the very few studies examining a wide range of the uptake of different vaccines. However, our study has several limitations. First, recall bias may have occurred due to self-reported vaccination status. Previous studies have shown that the accuracy of self-reported vaccination status varies by the type of vaccine, the time since vaccination, and some demographic factors.^{37–39} It is reasonable to hypothesise that self-reported COVID-19 and mpox vaccination status may be more accurate compared to other vaccines due to their recent timing.⁴⁰ Second, we only collected data on meningococcal disease vaccination in general and did not differentiate between the 4CMenB vaccine and the ACWY vaccine. Similarly, we only asked whether participants have had hepatitis A/B vaccinations and not hepatitis A and hepatitis B individually. Although this distinction is clinically important, many participants in the general population are unlikely to be aware of, or able to recall, which vaccine they have received. Third, this was a cross-sectional anonymous study, and we were unable to verify the accuracy of self-reported vaccination status for each vaccine, as this is outside the scope of this study. Fourth, the data on vaccine uptake in certain subgroups (e.g. transgender men and transgender women) must be interpreted with caution due to small sample sizes. In addition, this study is a secondary analysis describing vaccine uptake, the questions asked in the original survey were not targeted to explore reasons for the differences in vaccine uptakes, which have important implications for vaccine awareness, literacy, availability and system roll outs. The analysis was also limited by the small number of vaccine types ($n = 6$), which reduces statistical power and may explain why the observed correlations were not statistically significant despite moderate to strong effect sizes.

Future research may include incorporating longitudinal designs or linked data (such as the Australian Immunisation Register) to validate self-reported vaccination status and help to track changes in uptake over time. In addition, qualitative research would help explore the underlying reasons for lower uptake observed in certain groups, including barriers related to access, awareness, perceived risk and acceptability.

To conclude, this study highlights disparities in vaccine uptake among GBMSM and TGD people in Australia, which were associated with factors such as HIV status, Medicare eligibility, education level, and age. These disparities could be addressed through targeted outreach, integration of vaccination into routine care and innovative health communication strategies.

Supplementary material

Supplementary material can be accessed from the article page online.

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Data availability. The data supporting this study's findings are not openly available due to sensitivity. De-identified data may be made available from the corresponding author upon reasonable request and with approval from the relevant ethics committees.

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