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Patchy protection

How to boost GPs' patient vaccination rates

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Overview

Some GPs in Australia have much lower patient vaccination rates than others. For some GPs, nine in 10 of their older patients are vaccinated for flu. For others, the rate is only four in 10. The differences for shingles and COVID are even bigger. For pneumococcal disease, there is a 13-fold difference among GPs.

GPs with low patient vaccination rates aren't necessarily to blame, because many of the barriers to vaccination are beyond their control. Vaccination rates are far lower for patients who are poorer, not proficient in English, and who see a GP less often.

Overcoming all the barriers to vaccination requires a comprehensive reform agenda, which was laid out in a 2023 Grattan Institute report, *A fair shot: How to close the vaccination gap*.

But while many actions are needed, the role of GPs is clearly crucial. GPs are responsible for promoting vaccination. They are trusted experts in preventive health. The vast majority of older people visit a GP, and GPs want to protect their patients from disease.

By looking deeper into patterns of vaccination rates, this report sheds new light on how to better support GPs to play their part.

It shows that the way general practice is funded needs to be overhauled, providing more money for the GPs whose patients face higher barriers to vaccination. Today, clinics with patients who are poorer, sicker, and who struggle with English tend to get less funding. They should get more, so they can spend more time explaining and promoting vaccination to their patients.

Our analysis also suggests some GPs could do more to promote vaccination. When we compared GPs who have similar patients, some GPs had lower rates than expected.

Even within neighbourhoods, GPs' patient vaccination rates vary widely. In Bankstown in south-western Sydney, there is a seven-fold difference in COVID vaccination rates and an 18-fold difference for pneumococcal vaccination.

There may be good reasons for this. But low vaccination rates will only rise if clinics with low rates are identified and given targeted support to improve.

That should start with GPs being given data, so they can easily see how their vaccination rates compare to GPs with similar patients.

Then, Australia's 31 Primary Health Networks should give GPs with low vaccination rates the help they need. That might include training, or information about best practices that work in similar clinics with higher vaccination rates.

And because pharmacists are playing a bigger role in vaccination, are trusted by the community, and can provide vaccination with short wait times and no fees, they too should get data and support to lift vaccination rates.

Vaccination isn't the only type of care that isn't going to the people who need it the most. But it is easy to measure, and relatively easy to provide. It's the right place to start using detailed data to target gaps in preventive healthcare, and shift resources to where they are needed most. This report shows how.

Recommendations

Grattan Institute's 2023 report, *A fair shot: How to close the vaccination gap*, made recommendations to increase vaccination. This report makes recommendations specifically to increase GPs' patient vaccination rates.

Recommendation 1: Reform GP funding to enable GPs to focus more on preventive care

- In the next stage of 'MyMedicare' reform, the federal government should reform the funding model so GPs get more money for looking after older, poorer, and sicker patients. This would enable GPs with more of these patients to spend more time on preventive care, including promoting vaccinations.

Recommendation 2: Give GPs better information

- The federal government should give Primary Health Networks data on GP and pharmacy vaccination rates. Primary Health Networks should then share these data with GPs and pharmacists so they can see how they compare to their peers.

Recommendation 3: Give GPs the support they need

- Primary Health Networks should give GPs and pharmacists support to improve vaccination rates, such as training and information about best practices.
- Primary Health Networks should offer additional targeted support to GPs with consistently low vaccination rates.

Recommendation 4: Lift vaccination rates in aged care

- The federal government should set vaccination targets for aged care residents. Primary Health Networks should be accountable for meeting these targets in their region, and boosting rates by, for example, coordinating mass vaccination drives.

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1 There are big differences in GPs' patient vaccination rates

GPs play an important role in protecting patients against vaccine-preventable diseases by ensuring they stay up-to-date with their recommended jabs.

Yet this report shows that some GPs have very low adult vaccination rates, and others outperform their peers. GP patient vaccination rates (which we will refer to as 'GP vaccination rates') range from a two-fold difference for flu to a 13-fold difference for pneumococcal.

1.1 GPs play an important role in promoting vaccination

GPs are the foundation of Australia's healthcare system. As well as diagnosing and treating many conditions, GPs give advice and treatment to prevent problems or stop them getting worse. This includes ensuring patients are up-to-date with their recommended vaccinations.

GPs are particularly important for older Australians, who have higher rates of chronic illness and need more regular check-ups.[1] About 95 per cent of Australians aged 65 and older see a GP at least once every year.[2]

Most adult vaccinations are provided in general practice (71 per cent of all vaccinations for people aged 65 and older), but vaccines are also provided in pharmacies (18 per cent), local government clinics (7 per cent), and, to a lesser extent, hospitals.[3] While recent changes to federal government funding for vaccinations are likely to result in more patients getting vaccinated in pharmacies for free,[4] it remains a GP's responsibility to promote vaccinations regardless of where their patient gets their jabs.[5]

1.2 Too many Australian adults are missing out on life-saving vaccinations

Vaccines reduce the risk of serious illness, hospitalisation, and death from a range of viruses and bacteria.[6] They are highly cost-effective and have made a huge contribution to Australians' health.[7]

The Australian Technical Advisory Group on Immunisation (ATAGI) recommends Australian adults at high risk of serious illness get an annual flu shot, receive a COVID vaccine every six months, and after turning 65 and 70, get a shingles and pneumococcal vaccine, respectively.[8]

The diseases that these adult vaccines target are dangerous. Flu typically kills about 600 Australians each year, but it varies.[9] Many Australians have suffered severe illness and death due to COVID,

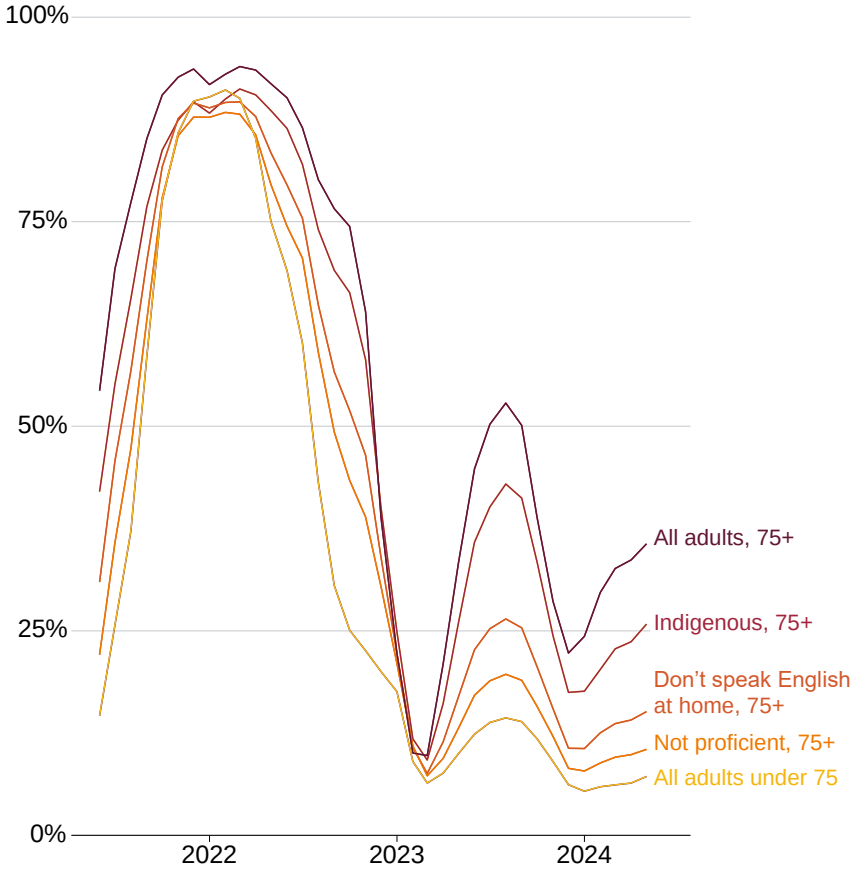
1. Breadon et al (2022).
2. About 94 per cent of people aged 65-74 and about 97 per cent of people aged 75+ saw a GP in 2022-23: ABS (2023a).
3. NCIRS (2022, p. 58).
4. From 1 January 2024, participating pharmacies can receive payment of $18.85 per vaccine on the National Immunisation Program schedule: Department of Health and Aged Care (2023a).
5. Evidence suggests recommendations by primary care physicians play an important role in building patient awareness of and improving patient attitudes to vaccinations. See, for example, Prieto-Campo et al (2022) and You et al (2023).
6. See Breadon and Burfurd (2023).
7. See Breadon and Burfurd (ibid).
8. Australian Technical Advisory Group on Immunisation (2024). Note eligibility criteria changes over time, and people considered at high-risk can include people over a certain age, Indigenous Australians, and people with specific health conditions.
9. Doherty Institute (2021).

and between 5 per cent and 10 per cent of people who get COVID suffer from 'long COVID'.[10] Shingles is a painful skin rash and can cause long-term nerve damage and – in rare cases – blindness.[11] And pneumococcal disease includes severe illnesses such as pneumonia, and infections of the blood stream or nervous system, such as meningitis,[12] and may kill hundreds of people a year.[13]

Yet too many older Australians are not getting protection against these diseases.[14] Vaccination coverage is particularly low for some groups, including people from disadvantaged areas, people from culturally and linguistically diverse backgrounds, and people in residential aged care.[15] For COVID, vaccination rates have fallen, and some groups are falling further behind, including Indigenous people and people from non-English-speaking backgrounds (see Figure 1.1).

This is despite these groups often being at greater risk of severe illness due to higher rates of underlying chronic illnesses.[16] And these groups often miss out on other types of healthcare, ranging from cancer screening, to GP visits, to dental care. That suggests structural barriers to vaccination are often to blame for low vaccination, not individual, or cultural, attitudes towards vaccines.

Figure 1.1: COVID vaccination coverage has plunged and remains low, particularly for people from non-English speaking backgrounds
COVID vaccination rates, up to May 2024



Note: The method to extract this data is similar to the vaccination coverage analysis in Breadon and Burfurd (2023).

Source: ABS PLIDA (2024).

10. AIHW (2022). There is also emerging evidence that COVID might lead to chronic health problems: Mayo Clinic (2022), Potter (2022) and Breadon and Burfurd (2023).
11. About one in five people experience post-herpetic neuralgia, which causes pain after a shingles infection: NHS (2021). Regarding blindness: Barshak (2021).
12. Department of Health, Victoria (2023).
13. 622 deaths reported between 1997 and 2016, and 159 between 2016 and 2018: AIHW (2018) and Patel et al (2023, p. 33). But deaths may be five-to-six times higher than reported: AIHW (2019, p. 18).
14. Breadon and Burfurd (2023).
15. Ibid.
16. See further in Breadon and Burfurd (ibid).

1.3 How we analysed GPs' patient vaccination rates

We used new data at the level of the patient and GP to determine how adult vaccination rates vary by GP, and to identify which GPs may need more targeted support.[17] Examining variation is a well established way to identify opportunities to improve healthcare (Box 1).

We did this by analysing average vaccination rates – as at August 2023 – by GP for flu, COVID, shingles, and pneumococcal, among older patients recommended to get these vaccines.[18]. Older patients must have been to the doctor at least once between March 2022 and August 2023 to be part of the analysis, and it doesn't matter where they got their vaccines.[19]

To better understand what may be causing the differences in GP vaccination rates, we also controlled for a wide range of patient characteristics and GP access factors that may affect a patient's likelihood of getting vaccinated (see Box 4 in Appendix A).

1.4 We found big differences in GP patient vaccination rates

For COVID vaccination, the bottom 5 per cent of GPs – about 1,600 GPs – had only 16 per cent of their patients aged 65 years and older up-to-date (see Figure 1.2 on page 10). This was less than one third of the average rate of 51 per cent.[20]

17. For flu and COVID, about 32,560 GPs were in the sample. For shingles and pneumococcal, about 18,000 GPs were in the sample. See Appendix A.3.1.
18. This includes people aged 65 years and older for COVID and flu vaccines, and people turning 71 to 75 in 12 months up to and including August 2023 for shingles and pneumococcal vaccines. For further detail, see Appendix A.1 on page 24
19. For example, if they got vaccinated at a pharmacy that would count. Our sample includes 3.9 million people aged 65 years and over for COVID and flu (about 85 per cent of people aged 65 and over), and 880,000 people aged 71 to 75 in 2023, for shingles and pneumococcal (about 75 per cent of people in this age group).
20. As at August 2023.

Box 1: Measuring variation to improve healthcare

Healthcare varies across regions, and among healthcare professionals. In some areas, and in some clinics, a given treatment might be common, while in others it is rare.

Variation is inevitable and much of it is legitimate. People in one region or clinic might be sicker than people in others, and so require more treatments. Variation can also stem from different patient preferences, which should guide patient-centred care.[a]

There is a long history of analysis to identify potentially 'unwarranted' variation. These differences aren't based on medical evidence, the health needs of patients, or their preferences. [b] 'Unwarranted' variation can suggest over-use, but for vaccination, it suggests under-use.[c]

Vaccination is a particularly good candidate for variation analysis, because it is strongly supported by medical evidence, and recommended for groups that can be easily identified in data (see Appendix A for limitations).

Measuring variation is not a perfect tool, and should not result in blame or punishment. Instead, it should be the first step in a 'learning health system' that uses data to identify potential problems and best practices, and continually improve care.[d]

Governments should use newly-available, detailed data to boost vaccination rates and also close many other gaps in care, such as those for cancer screening. This should be a business-as-usual way to develop policy and improve care.

a. Mulley (2023).
b. Wennberg et al (1987), Sutherland and Levesque (2002), ACSQHC (2024).
c. Wennberg (2002).
d. Pomare et al (2022); and Foley and Vale (2023).

For flu vaccination, there was a two-fold difference. GPs with the lowest flu rates had only 43 per cent of their patients vaccinated, while GPs with the highest flu coverage had 90 per cent of their patients vaccinated (see Figure 1.2 on the next page).[21]

Shingles had a four-fold difference in vaccination rates. The GPs in the lowest 5 per cent had 22 per cent of their patients vaccinated, on average. The top 5 per cent had 85 per cent of their patients up-to-date.

Pneumococcal had the biggest disparity. The bottom 5 per cent of GPs had only 6 per cent of their patients vaccinated, compared to the top 5 per cent who had 82 per cent of their patients vaccinated: a 13-fold difference.

While some variation is inevitable, these differences are unacceptably large, especially for COVID and pneumococcal. They suggest the system is failing to give everyone good access to potentially life-saving preventive healthcare.

1.5 GPs with low rates for one vaccine were also likely to have low rates for other vaccines

GPs tended to rank similarly for different vaccines. For example, about 60 per cent of GPs in the bottom fifth for flu vaccination rates were also in the bottom fifth for COVID vaccination rates.[22] Similarly, 60 per cent of GPs who had the highest flu vaccination rates, also had the highest COVID vaccination rates.

There were also about 1,000 GPs who had low vaccination rates across all four adult vaccines.[23]

1.6 How this report is structured

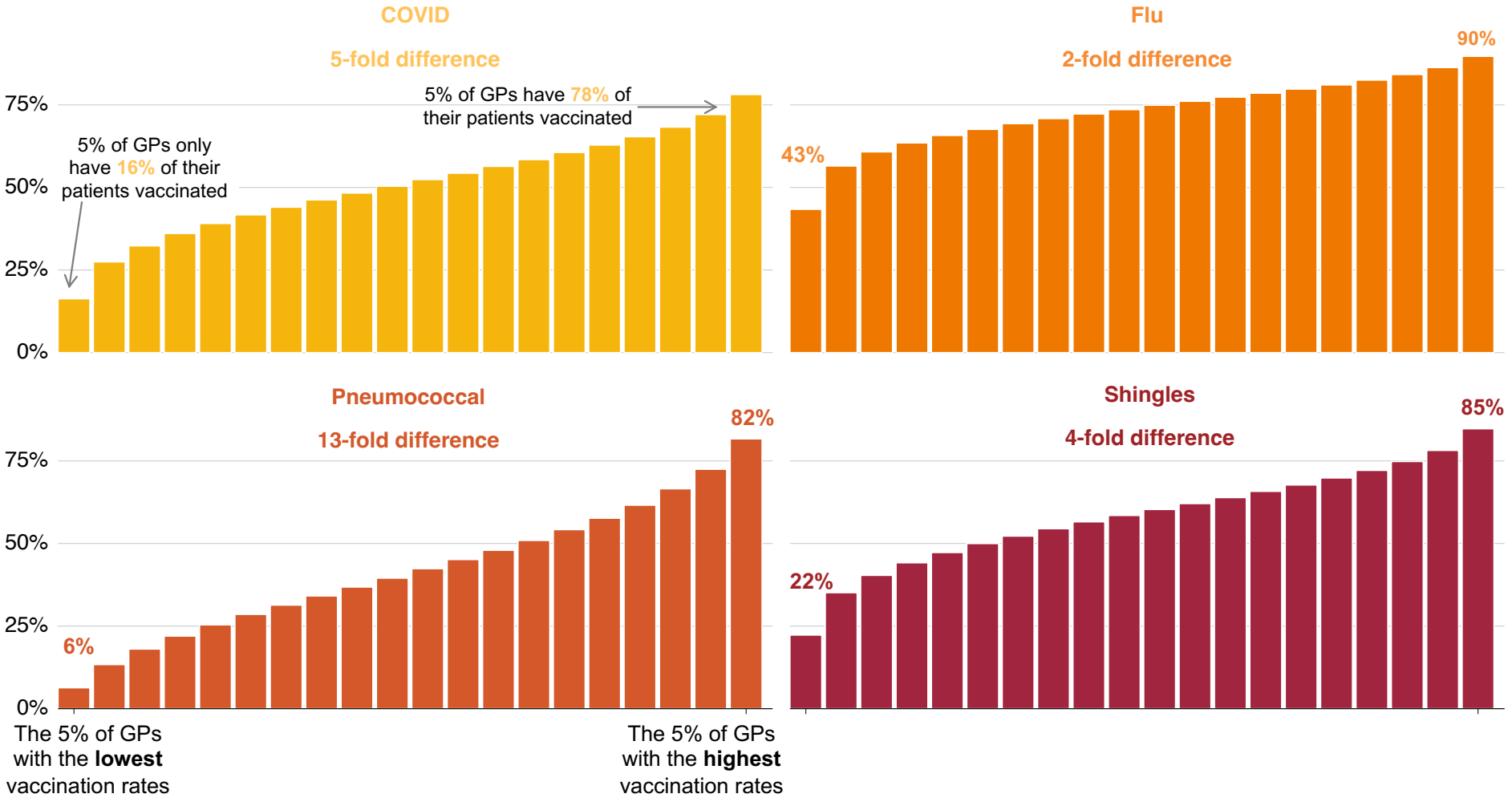
Chapter 2 shows that many drivers of variation in vaccination rates can be hard for GPs to overcome on their own.

But Chapter 3 shows that those factors don't fully explain some GPs' low patient vaccination rates – some of those low rates could be due to differences in GP practices.

Chapter 4 identifies what the federal government and Primary Health Networks should do to boost GPs' patient vaccination rates.

21. The lowest rate refers to those in the bottom 5 per cent.
22. Lowest rates refer to those GPs in the bottom fifth of vaccination rates.
23. GPs in the bottom fifth of vaccination rates.

Figure 1.2: The differences in GP adult vaccination rates are big
GP patients' average vaccination rates (among eligible patients)



Notes: For COVID and flu, each 5 per cent GPs includes about 1,600 GPs. For shingles and pneumococcal, each 5 per cent GPs includes about 900 GPs.

Source: Grattan Institute analysis of ABS PLIDA (2024).

2 Some patients face higher barriers to vaccination

Whether someone is vaccinated shouldn't be dictated by where they live, whether they are proficient in English, what language they speak at home, or whether they went to university. But our analysis found these factors have a big effect on whether a patient is up-to-date with their vaccinations.

People who go to the GP less often, or at irregular intervals, or who don't pay high fees when they do go, are also much less likely to be vaccinated.

This points to an imbalance in our health system: Australians who are more vulnerable to disease are less likely to get the high-quality, preventive care they need.

2.1 Cultural and language background affect vaccination rates

People who speak a language other than English at home, and do not speak English proficiently, are much less likely to be up-to-date with their vaccinations (see Figure 2.1 on the following page).

For example, even after taking all other factors into account, people who don't speak English at home are up to 15 per cent less likely to be vaccinated. People born in North Africa and the Middle East are 15-to-25 per cent less likely to be vaccinated than people born in Australia, and being born overseas is nearly always associated with lower vaccination.

These low vaccination rates could be due to a range of factors including discrimination, language barriers, lower health literacy, or higher rates of vaccine hesitancy.[24] But because vaccination is lower for virtually all non-English language groups,[25] and for migrants from almost all international regions, it is clear that the problem is not just about the beliefs or preferences of any specific cultural group.

2.2 Disadvantaged people are less likely to be vaccinated

Older people with higher rates of economic disadvantage are less likely to be vaccinated.[26]

Our analysis found that people with lower levels of education, or who live in more disadvantaged areas, are much less likely to be vaccinated (see Figure 2.2 on page 13). People living in outer regional and remote areas are also less likely to be vaccinated.

This is despite people from disadvantaged areas suffering greater rates of chronic disease and being more than twice as likely to die from potentially preventable causes.[27] Groups who need healthcare more having a greater risk of missing out is a systemic problem that goes well beyond vaccination.[28]

24. Seale et al (2020).
25. Breadon and Burfurd (2023).
26. A 2016 Australian systematic review noted similar findings in several studies: Dyda et al (2016).
27. Australian Institute of Health and Welfare (2022).
28. For example, women with low incomes are 21 per cent less likely to have had a recent PAP test and are also less likely to get screened for breast cancer: Taylor et al (2001) and Stuart et al (2022). And people living in very remote areas are 50 per cent less likely to get screened for bowel cancer, despite being up to 31 per cent more likely to die of bowel cancer: Australian Institute of Health and Welfare (2023).

2.3 Frail older people and aged care residents have very low vaccination rates

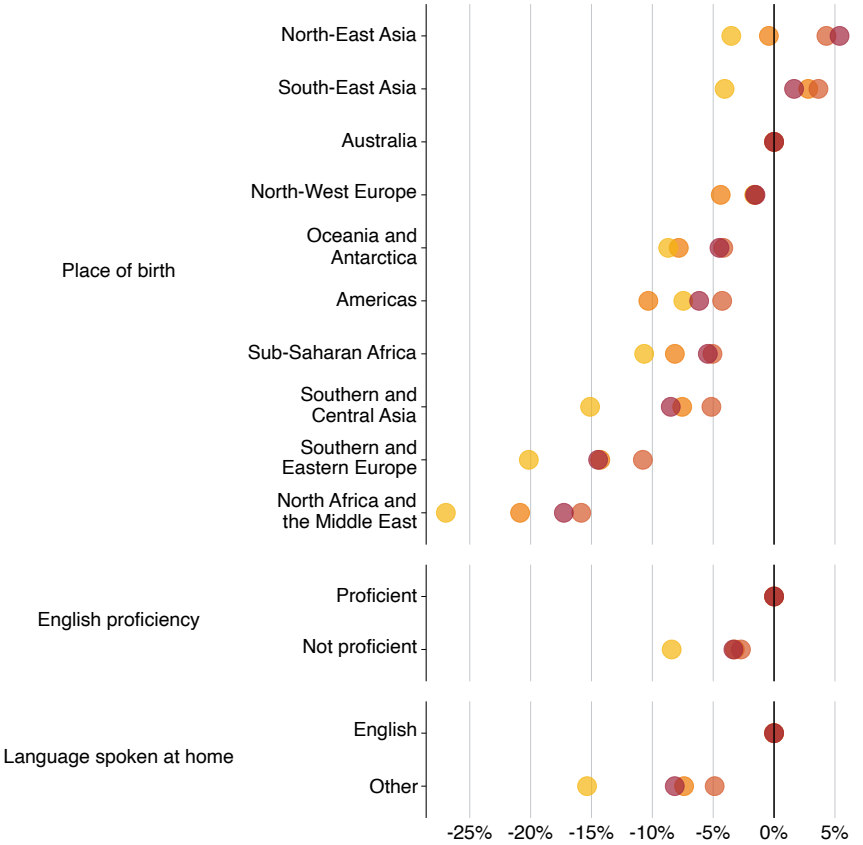
Aged care residents are at significant risk of severe illness and death from disease,[29] yet their vaccination rates are far too low. For example, in June 2024, only 38 per cent of aged care residents were up-to-date with their COVID vaccinations.[30]

Nearly 100 aged care facilities have had less than 10 per cent of residents vaccinated against COVID in the past year, and a quarter of facilities have less than half of their residents vaccinated.[31]

Australia's aged care vaccination rates for COVID are far below those in some similar countries. At the end of the 2023 winter season, Australia had only 54 per cent of aged care residents up-to-date, compared to 82 per cent in Ireland, and 90 per cent in England.[32]

Flu vaccination rates are also far too low. In June 2024, about 110 aged care facilities had less than 10 per cent of their residents up-to-date with their flu vaccinations.[33] And only a quarter of facilities had more than 80 per cent of their residents vaccinated.

Figure 2.1: People from culturally and linguistically diverse backgrounds are much less likely to be up-to-date with their vaccinations
Percent difference in likelihood, with all other factors held constant, that adults are up to date with COVID, **flu**, **pneumococcal**, and **shingles** vaccines



Notes: This shows the independent effect of each factor on the likelihood of being vaccinated. The sample includes only patients recommended to get these vaccines, and who visited the GP at least once between March 2022 and August 2023. All coefficients are statistically significant except people born in North-East Asia for flu.

Source: Grattan Institute analysis of ABS PLIDA (2024).

29. For example, a 2024 study found the COVID-19 death rates of aged care residents in NSW were much higher than the death rates of Australians aged 70 and older: Inacio et al (2024).
30. Department of Health and Aged Care (2024a).
31. Department of Health and Aged Care (2024b). This ranges from nearly 35 per cent in WA to just over 10 per cent in Tasmania.
32. Note each jurisdiction reports data differently. Australia reports on percentage vaccinated in the past six months, whereas Ireland and England report on cumulative uptake of a specific booster dose. We have classified the end of the winter season as February 2024 in the northern hemisphere, and September 2023 in the southern hemisphere. Department of Health and Aged Care (2024a), Ireland Health Protection Surveillance Centre (2024), England National Health Service (2024).
33. 'Up-to-date' includes any flu vaccination administered between 1 January 2024 to 18 June 2024: Department of Health and Aged Care (2024c). There does not appear to be a correlation between low vaccination rates for COVID and flu.

Aged care residents are also significantly less likely to be vaccinated against shingles and pneumococcal (see Figure A.2 on page 31).[34] This is despite them needing higher protection, because living in shared accommodation puts them at greater risk of infection, and they are more likely to be frail and get severely ill if they are infected.

This trend is also mirrored, to a lesser extent, for older people with chronic health conditions that are linked to frailty, such as dementia and stroke (see Figure A.3 on page 32). Despite needing greater levels of protection against disease, they are less likely to be vaccinated.[35]

2.4 People who don't see a GP frequently or regularly have lower vaccination rates

People who visit a GP frequently, regularly, or who visit more expensive GPs, are more likely to be vaccinated (Figure 2.3 on the next page).[36]

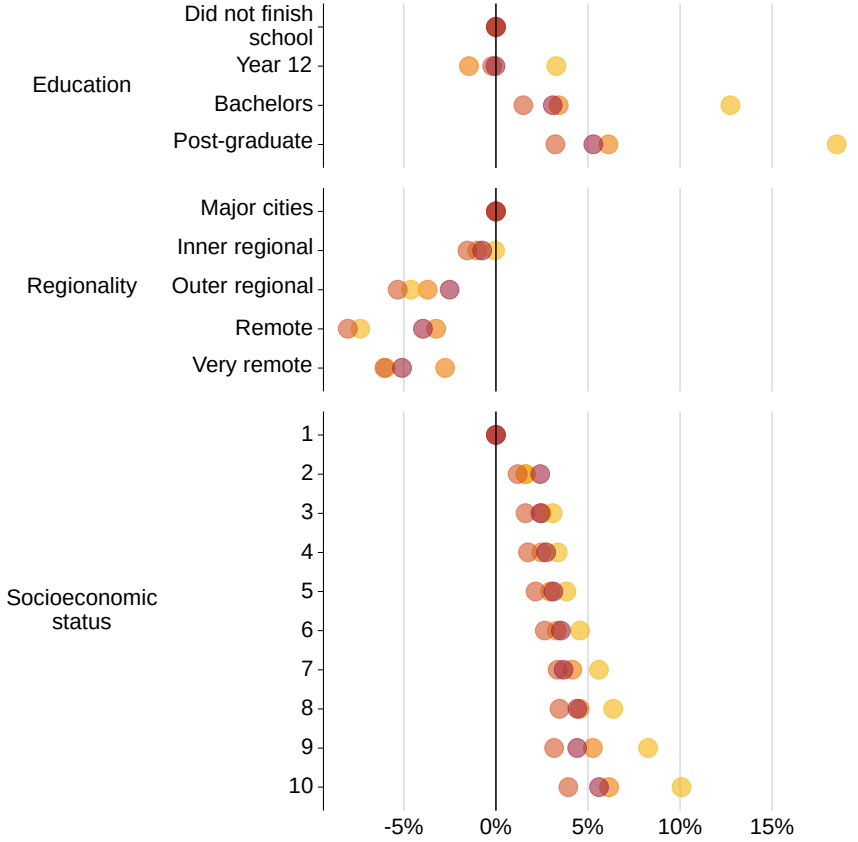
Visiting a GP often has the biggest impact. People who visit a GP frequently are up to 27 percent more likely to be vaccinated than people who don't visit a GP often.

Seeing a GP who charges more also increases your chance of being vaccinated, with high fees increasing the likelihood of vaccination by up to 17 percent, compared to low fees.

34. Note pneumococcal and shingles vaccination rates include only people aged between 71 and 75 as at August 2023, which would exclude many people living in aged care, who tend to be older. The residents must have been in residential aged care at the time of the 2021 Census.
35. This is in contrast to older people with other chronic health conditions, such as asthma, cancer, diabetes, and cardiovascular disease, who are more likely to be vaccinated. See Figure A.3 on page 32.
36. Frequency refers total number of visits. Regularity refers to how evenly spaced visits are. See Appendix A. This is consistent with previous Australian research. For example, a 2019 study found patients who saw a GP consistently once every year had higher flu vaccination rates than those who didn't: Bernardo et al (2019). And a 2020 study found pneumococcal vaccination rates were consistently high for patients who visited the same GP every year: Frank et al (2020).

Figure 2.2: People from disadvantaged backgrounds are much less likely to get vaccinated

Percent difference in likelihood, with all other factors held constant, that adults are up to date with **COVID**, **flu**, **pneumococcal**, and **shingles** vaccines



Notes: This shows the independent effect of each factor on the likelihood of being vaccinated. The sample includes only patients recommended to get these vaccines, and who visited the GP at least once between March 2022 and August 2023. All coefficients are statistically significant, except for inner regional areas for COVID and shingles, and Year 12 as the highest level of education for shingles and pneumococcal.

Source: Grattan Institute analysis of ABS PLIDA (2024).

2.5 GPs with the lowest vaccination rates have patients who face higher barriers to vaccination

Unsurprisingly, many GPs with low vaccination rates care for patients who face high barriers to vaccination (Figure 2.4 on the following page). For example, for GPs with lower COVID vaccination rates, 25 per cent of their patients are not proficient in English. For GPs with higher vaccination rates, the figure is only only 1 per cent.[37]

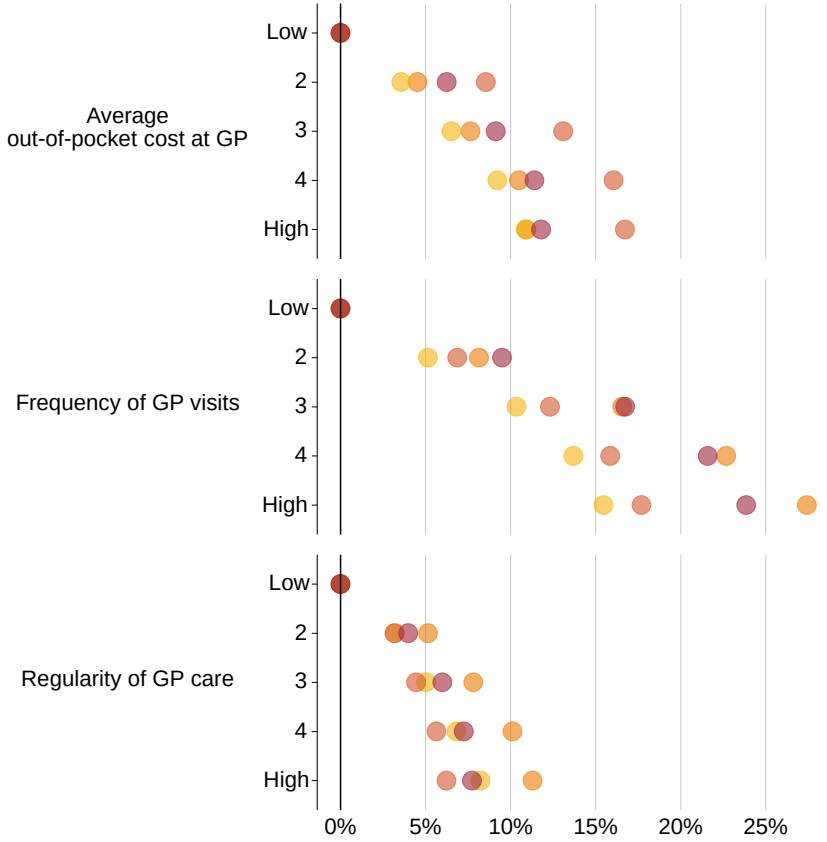
GPs with the lowest vaccination rates are also more likely to be located in disadvantaged areas (Figure 2.4 on the next page). For example, for GPs with lower COVID vaccination rates, a fifth of their patients live in disadvantaged areas, compared to only 4 per cent of patients for GPs with higher rates.[38]

GPs with lower vaccination rates also charge lower fees (Figure 2.4 on the following page). And interestingly, GPs with low rates also have many patients who visited GPs frequently, but not regularly, meaning their visits were bunched up or separated by long gaps. This could suggest sporadic, unplanned visits, with less preventive care.

This chapter showed that there are a range of barriers to vaccination, relating to patients' cultural or language background, education status, level of disadvantage, and access to GP care. Overcoming these barriers requires structural changes to healthcare, and it can't be left to GPs to address them on their own. But, as the next chapter shows, some differences in GP patient vaccination rates could be due to differences in GP practices.

37. Compares the bottom and top decile of GP COVID vaccination rates. About 3.4 per cent of Australians are not proficient in English: Australian Bureau of Statistics (2022).
38. Compares the bottom and top decile of GP COVID vaccination rates.

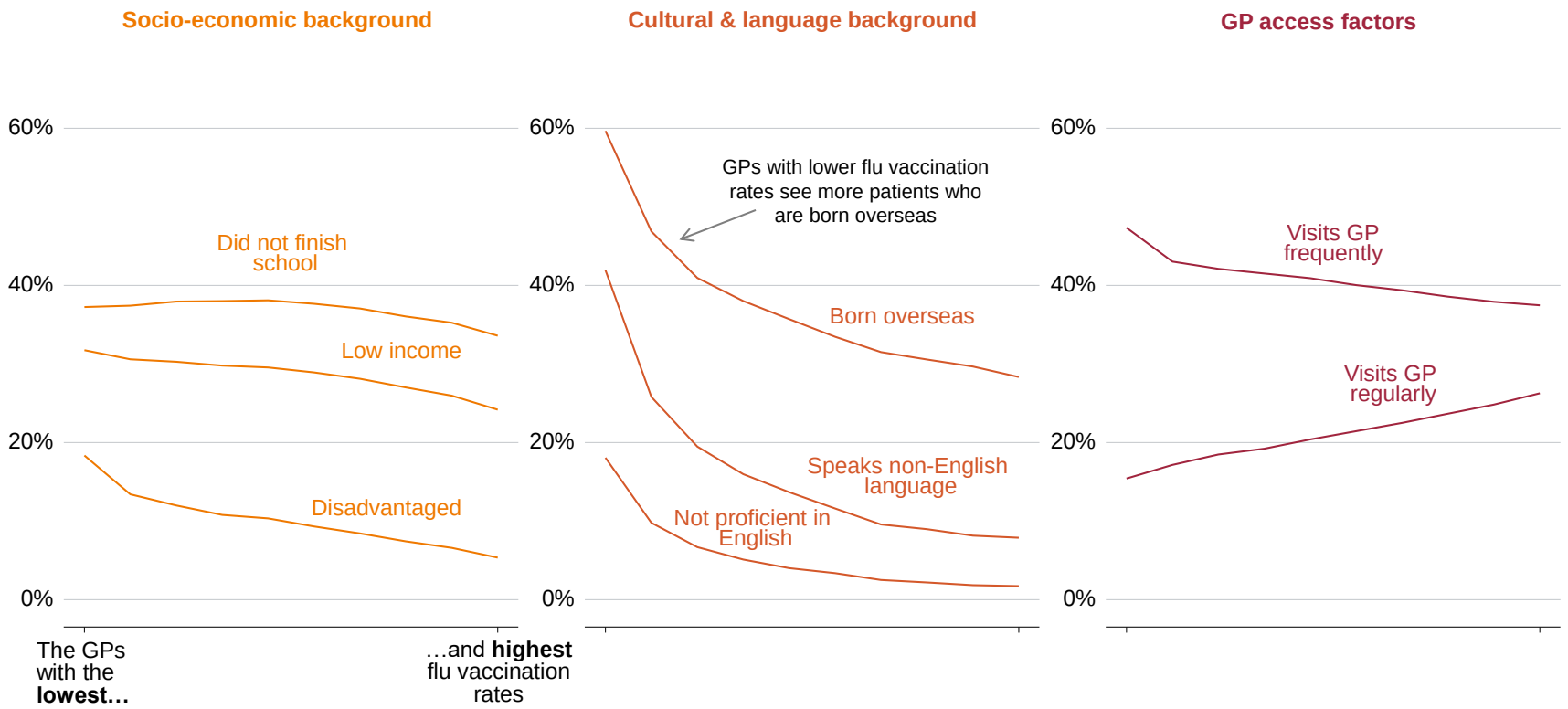
Figure 2.3: People who visit the GP more frequently and regularly, and go to more expensive GPs, have higher vaccination rates
Percent difference in likelihood, with all other factors held constant, that adults are up to date with **COVID**, **flu**, **pneumococcal**, and **shingles** vaccines



Notes: For details on how we classified out-of-pocket costs, frequency, and regularity of visits, see Appendix A. This shows the independent effect of each factor on the likelihood of being vaccinated. The sample includes only patients recommended to get these vaccines, and who visited the GP at least once between March 2022 and August 2023. All coefficients are statistically significant.

Source: Grattan Institute analysis of ABS PLIDA (2024).

Figure 2.4: GPs with low patient flu vaccination rates have patients who are culturally diverse, disadvantaged, and don't visit GPs regularly
Proportion of a GP's patients



Notes: GPs are ranked by deciles. Disadvantaged patients are those who live in the bottom decile of socio-economic advantage. Low-income patients are those who have a household income of less than $500 a week. Frequency refers to the total number of visits. Regularity refers to how evenly spaced GP visits are over time. The GP access factors are for patients who are in the top quintile for that category.

Source: Grattan Institute analysis of ABS PLIDA (2024).

3 Some differences in patient vaccination rates may be due to differences in GP practices

While some of the differences in GP patient vaccination rates are due to differences in a GP's patients and local access to care (as we showed in Chapter 2), that doesn't explain all the variation.

Even after accounting for a wide range of barriers to vaccination, some GPs still had lower vaccination rates than would be expected. This indicates other factors may be driving some of the low vaccination rates.

Whether a GP has support staff, such as a nurse on site, or whether the patient is opposed to vaccination, could contribute to a GP's patient vaccination rates. But high variation among GPs with similar patients, and in similar areas, suggests some of the difference in rates could be caused by differences in GP practices.

3.1 GPs working with similar patients have very different vaccination rates

We found that GPs with patients who have similar characteristics still have very different vaccination rates (Figure 3.1 on page 18). For example, among GPs predicted to have a flu vaccination rate of about 60 per cent, based on the kinds of patients they see, some had a rate of about 40 per cent, while others had a rate of 70 per cent (see Box 2 on the next page for an explanation of predicted rates).[39]

This is reflected at a geographic level too. Even in small geographic areas where GPs are probably treating similar patients, we found big differences in GP vaccination rates (see Figure 3.2, Figure 3.3, Figure 3.4, and Figure 3.5).

For example, in Bankstown in south-western Sydney, there was a seven-fold difference in GP COVID vaccination rates. Some GPs in Bankstown only had 8 per cent of their patients vaccinated against COVID, whereas others had 56 per cent of their patients vaccinated. For pneumococcal, GP vaccination rates ranged from 3 per cent to 53 per cent.

This pattern is evident in other parts of the country too. For example, in Wyndham on the western outskirts of Melbourne, there was a nearly three-fold difference in GP COVID vaccination rates, and a 10-fold difference in GP pneumococcal vaccination rates.

This suggests that some GPs are beating the odds to overcome barriers to vaccination, while others have room for improvement.

3.2 Several factors could be contributing to low GP patient vaccination rates

A range of factors which cannot easily be measured could be contributing to low GP patient vaccination rates.

First, the current primary care funding model has resulted in GPs trying to fit increasingly complex care into appointments that still average only about 15 minutes.[40] This puts GPs under pressure to get through appointments quickly and skip preventive healthcare.

GPs may struggle to find the time to spend with patients who are more hesitant about vaccination, to call in interpreters, or to handover to a nurse on site – if there is one – to make it easier for patients get their vaccine straight away.

39. This compares the bottom and top 10 per cent of GPs with similar predicted rates.

40. See Breadon et al (2022).

Primary care funding and regulatory barriers also mean GPs in Australia have less support from a broader team, such as nurses and allied health professionals, compared to many other countries.[41] This means explaining vaccine risks and benefits, and countering misinformation, often falls on the GP alone.

Second, GPs may have different levels of focus on vaccination and on informing and educating their patients about vaccination. Given the trusted relationship between a GP and a patient,[42] a strong recommendation from a GP can make a big difference to whether a patient gets vaccinated.[43] Yet one Australian study suggests GPs only initiate discussions about vaccinations in about 10 per cent of consultations.[44]

Third, GP's may be unaware of the latest vaccination information. Unclear and changing guidance about vaccine eligibility, particularly for COVID, results in confusion for doctors and patients. And GPs don't always have the information immediately available in their medical software programs to easily determine a patient's vaccination history.

Chapter 2 showed there are structural reasons vaccination rates are too low for some groups. This chapter shows that even after taking those reasons into account, some GPs still have vaccinations rates that appear to be too low.

41. See further in Breadon et al (2022).
42. Patients identify GPs as the most reliable source of information on vaccinations: Bayliss et al (2021).
43. A 2014 South Australian study found patients aged 60-85 who were recommended by their GP to get a shingles vaccine were much more likely to get vaccinated: Litt et al (2014). A 2021 Australian survey of GPs found 69-to-77 per cent of patients showed an intention to get vaccinated for whooping cough after it being recommended by their GP: Bayliss et al (2021).
44. Ibid.

Box 2: How we determined the expected or 'predicted' GP vaccination rates

'Predicted' rates account for patient characteristics

The 'predicted' GP vaccination rate is the rate a GP would be expected to have, based on the average GP's vaccination rate for similar patients. For example, if a GP has a lot of patients from disadvantaged backgrounds – who tend to have low vaccination rates – the 'predicted' rate for that GP would be lower than average.

The 'predicted' rate is not the 'ideal' rate for that GP

The 'predicted' GP vaccination rates should not be used as a target GP vaccination rate. Instead, governments should seek to ensure all Australians get their recommended vaccinations.

The 'predicted' GP vaccination rate doesn't account for all factors that affect vaccination rates

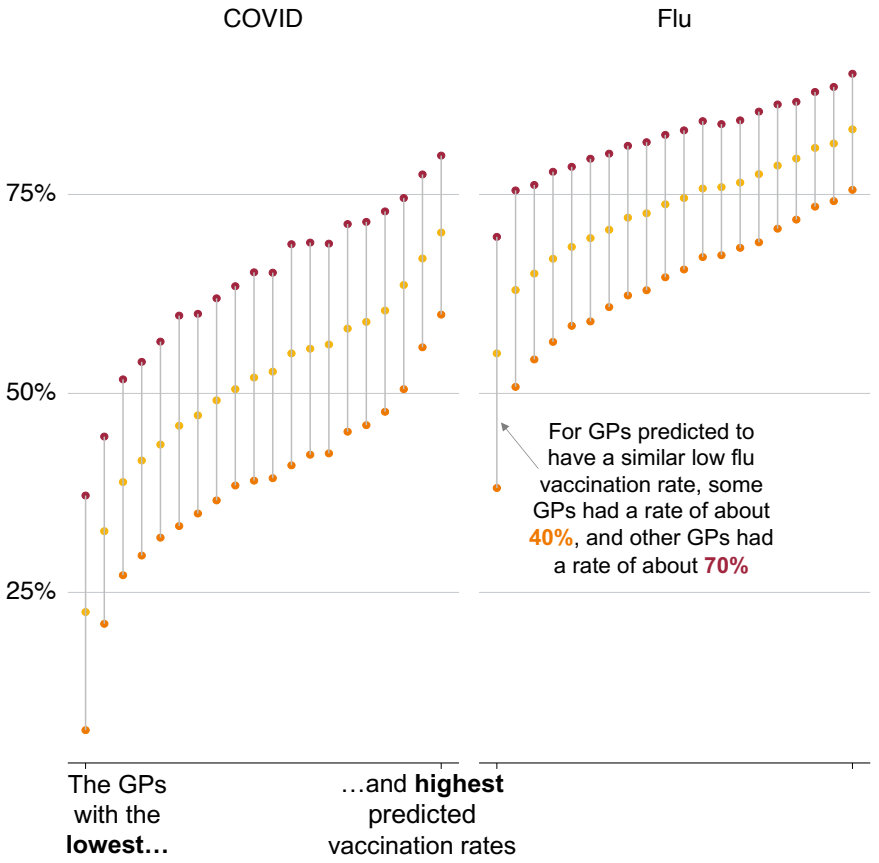
While we controlled for many factors that affect vaccination rates (see Box 4 on page 28), many other factors and interactions are not captured by our model, because of data limitations. For example, we could not measure patient vaccine hesitancy, lack of patient access to a nearby pharmacy, a GP's cultural and/or language background, or lack of resources available to GPs, such as having a nurse on site.[a]

But our predicted rate remains the best way to take structural barriers to vaccination into account, and begin to isolate differences that could be due to GP practices.

a. See further notes on limitations in Appendix A.

Governments should focus on both overcoming structural patient and access barriers to vaccination, and on helping ensure that all GPs promote vaccinations to their patients. The next chapter explains how.

Figure 3.1: We found huge variation in GP vaccination rates among GPs predicted to have similar rates
GP vaccination rates (**highest**, **average**, and **lowest**)

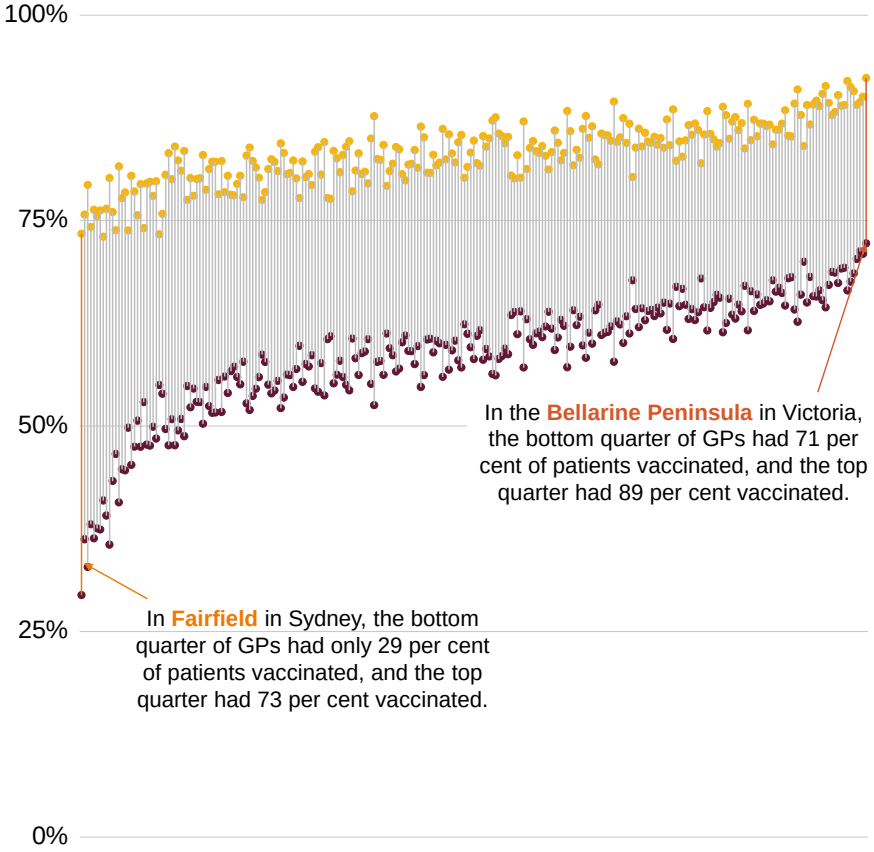


Notes: The highest and lowest rates are the average GP vaccination rates for the top and bottom decile. We ranked GPs into groups of 20 by their predicted vaccination rates.

Source: Grattan Institute analysis of ABS PLIDA (2024).

Figure 3.2: Even within small areas, there can be huge variation in GP flu vaccination rates

GP patients' average **flu** vaccination rate by SA3, **bottom quarter** and **top quarter**

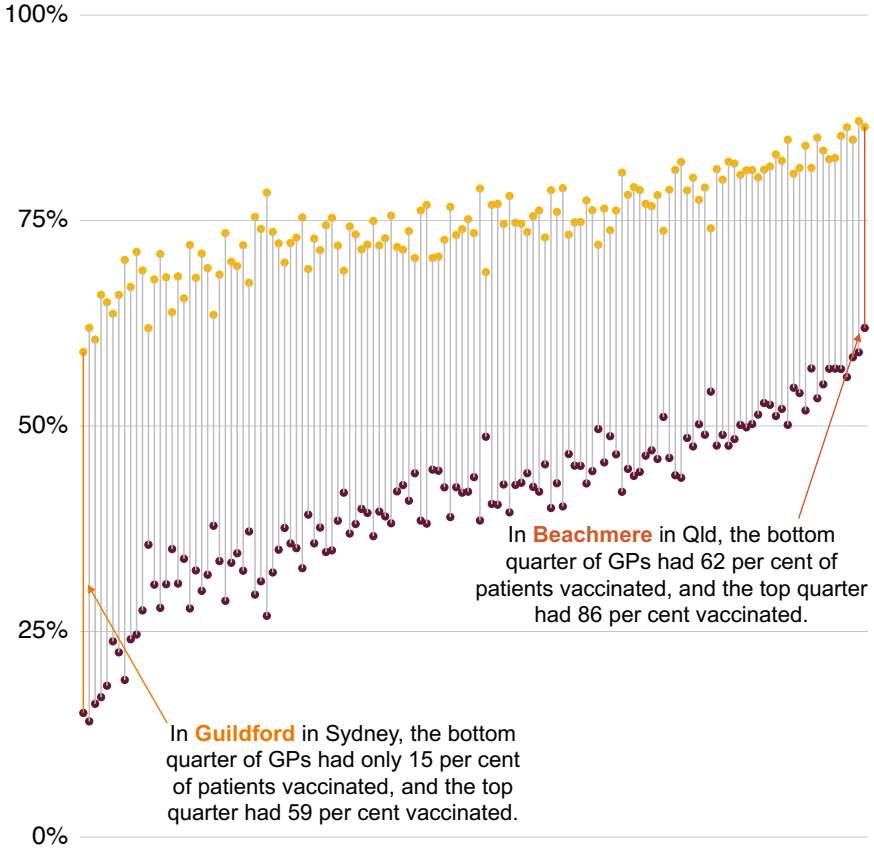


Notes: SA3s are small geographic areas with a population between 30,000 and 130,000. Some SA3s have been omitted due to a small GP sample size. GPs who have patients across two or more SA3s are counted in each of those SA3s.

Source: Grattan Institute analysis of ABS PLIDA (2024).

Figure 3.3: Even within small areas, there can be huge variation in GP shingles vaccination rates

GP patients' average **shingles** vaccination rate by SA3, **bottom quarter** and **top quarter**

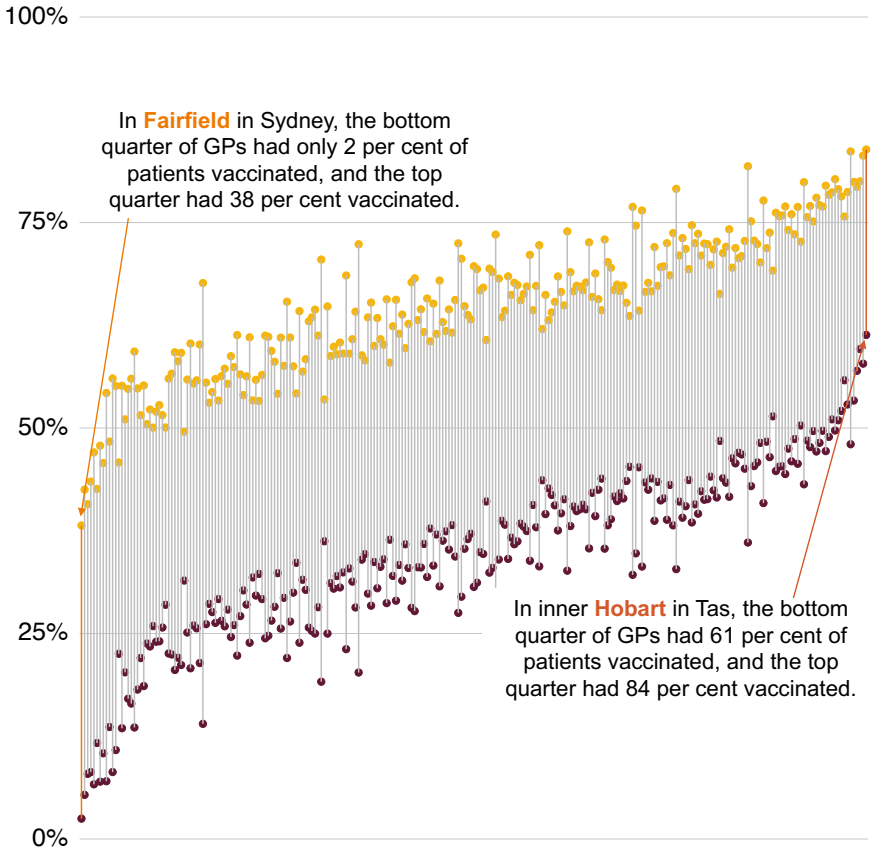


Notes: SA3s are small geographic areas with a population between 30,000 and 130,000. Some SA3s have been omitted due to a small GP sample size. GPs who have patients across two or more SA3s are counted in each of those SA3s.

Source: Grattan Institute analysis of ABS PLIDA (ibid).

Figure 3.4: Even within small areas, there can be huge variation in GP COVID vaccination rates

GP patients' average **COVID** vaccination rate by SA3, **bottom quarter** and **top quarter**

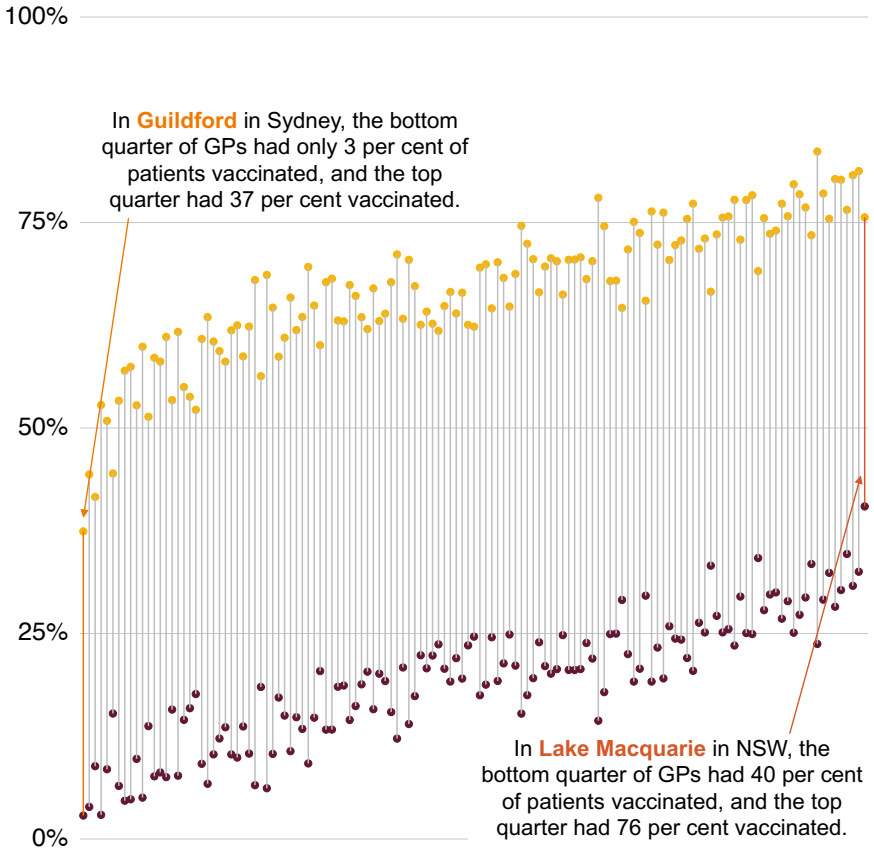


Notes: SA3s are small geographic areas with a population between 30,000 and 130,000. Some SA3s have been omitted due to a small GP sample size. GPs who have patients across two or more SA3s are counted in each of those SA3s.

Source: Grattan Institute analysis of ABS PLIDA (2024).

Figure 3.5: Even within small areas, there can be huge variation in GP pneumococcal vaccination rates

GP patients' average **pneumococcal** vaccination rate by SA3, **bottom quarter** and **top quarter**



Notes: SA3s are small geographic areas with a population between 30,000 and 130,000. Some SA3s have been omitted due to a small GP sample size. GPs who have patients across two or more SA3s are counted in each of those SA3s.

Source: Grattan Institute analysis of ABS PLIDA (ibid).

4 What governments should do

Australia must urgently increase adult vaccination rates. Grattan Institute's 2023 report, *A fair shot: How to close the vaccination gap*, explained why and set out a comprehensive reform agenda to improve vaccination rates.

That report proposed a combination of 'universal', 'targeted', and 'tailored' measures to overcome barriers to vaccination that range from minor to profound. All of those reforms are important, but this report focuses on targeted measures to increase the patient vaccination rates of GPs who have fewer patients vaccinated than expected.

Boosting GPs' patient vaccination rates will require a fairer GP funding model, better use of data, and focused support to help GPs with low vaccination rates. And aged care homes should meet minimum vaccination targets within two years.

Australia's health system can only get better and fairer if governments measure care and outcomes and strive to improve them at every level, using funding, data, and focused improvement support. As this report has shown, governments now have the data they need to do it.

4.1 Make GP funding fair and flexible to support preventive care

GP clinics should be able to choose a funding model that supports team care and allows GPs to spend more time with complex patients, by combining appointment fees with a flexible budget for each patient that is based on their level of need. We have previously recommended this approach, which is common in other countries and is known as a 'blended' funding model.[45]

In a welcome step, the federal government has introduced a blended funding model for some patients, as part of reforms called 'MyMedicare'.[46] Blended funding should now be expanded to all patients, increasing funding for older, poorer, and sicker patients.[47]

This funding based on *need* not *speed* would give GPs the opportunity to provide preventive care to the patients who need it most. With more resources to look after disadvantaged and high-risk patients, clinics could spend more time with them, checking that their vaccines are up-to-date, explaining the risks and benefits of vaccination, and combating misinformation.

Unlike the current funding model, which is dominated by fee-for-service payments, blended funding would also make it easier to plan regular care. Our analysis shows that the clinics with the lowest vaccination rates see their patients often, but not at regular intervals (Figure 2.4 on page 15). This suggests care that may be reactive, instead of planned and preventive.[48]

Blended funding can help combat this by giving clinics flexible and predictable funding for 'indirect' care, including planning and coordinating patient care, as well as quick check-ins with patients between visits.

45. Breadon et al (2022).

46. The new blended funding model only applies to a small minority of patients who live in residential aged care or attend hospital frequently.
47. These groups have higher healthcare needs, and lower access to vaccination: see Chapter 2.
48. The proportion of patients with two or more long-term conditions is similar for GPs with low and high patient vaccination rates, suggesting that high frequency, but low regularity could be partly due to how well patients' conditions are controlled.

4.2 Give GPs better information to guide action

GPs should be given better information on how their patient vaccination rates compare to their peers.

The federal government should give Primary Health Networks data to share with GPs on how their vaccination rates compare to other GPs, and especially to GPs with similar patient profiles.[49] This should extend to pharmacies too.

Primary Health Networks, rather than the federal government, should provide these data to GPs because they are closer to GPs than the federal government, are responsible for improving primary care, and better understand their local communities.[50]

4.3 Give GPs the support they need

Primary Health Networks are responsible for improving primary care, including reducing gaps in access to care for different communities.[51] As we recommended in *A fair shot*, our 2023 report on adult vaccination, Primary Health Networks should get new funding to expand their work supporting GP clinics to boost vaccination (see examples in Box 3 on the next page).[52]

This report has shown that barriers to vaccination vary by cultural background, level of disadvantage, geography, and access to GPs. That's why support to improve vaccination rates cannot be one-size-fits-all. Instead, it should respond to the different barriers in different communities, and provide the specific type of support that a GP clinic needs.

In some areas, online or hard-copy promotional materials for local language groups may help. In others, GP clinics may need more nurses to provide vaccinations, or pharmacies could be better promoted to groups who are missing out on vaccination. Some GP clinics may also need more help to make sure that a patient's vaccination history can be easily retrieved from their clinical information systems.[53]

Primary Health Networks should give additional support to GPs with consistently low vaccination rates, first confirming the data are accurate, then helping to ensure they promote vaccinations to all eligible patients.[54]

And because pharmacists are playing a bigger role in vaccination, are trusted by the community, and can provide vaccination with short

49. See Harrison et al (2019), Willmington et al (2022) and Stonko et al (2021). While this report is on adult vaccines, this should also extend to all age groups, including childhood vaccination coverage.
50. The analysis could initially be done by the federal health department. Once the Australian Centre for Disease Control is established, it should take over this role, since it will 'collate, monitor, and analyse disease surveillance data from international, state, and local sources': Australian Centre for Disease Control (2023).
51. DHAC (2022).
52. Primary Health Networks already receive some funding to help reduce gaps in COVID vaccination rates. See for example the 'Vulnerable Peoples Vaccination Program', which includes pop-up clinics, promotion and education sessions, and in-reach vaccination services: Eastern Melbourne Primary Health Network (n.d.). This could be extended to boost rates for other adult vaccines. Existing support for Primary Health Networks from the National Centre for Immunisation Research and Surveillance could also be increased, National Centre for Immunisation Research and Surveillance Austrlaia (2024).
53. GP clinic software is linked to My Health Record, where GPs can more easily check their patients' vaccination history than via the Australian Immunisation Register: Australian Digital Health Agency (2024a). About 90 per cent of Australians have My Health Record: Australian Digital Health Agency (2024b). The federal government should also work to embed pop-up alerts into clinical information systems, once this can be done.
54. In some cases, low apparent vaccination rates could be driven by GP clinics, pharmacies, or other vaccine providers, not recording vaccinations that they provide in the national register. This has been a legal requirement since 2021, and ensuring practices are recording vaccinations would be a good first step in investigating low vaccination rates. See Appendix A for more information.

wait times and no fees, they too should get data and support to lift vaccination rates.

Over time, governments should use detailed health data to monitor other gaps in care, such as gaps in breast and bowel cancer screening rates, and provide targeted support to close those gaps. This should become a business-as-usual way to help GP clinics, and other healthcare providers, improve their care.

4.4 Set and achieve goals for vaccination in aged care

Given the low vaccination rates in aged care facilities, Primary Health Networks should also work to overcome vaccination barriers for aged care residents. That should include initiating and coordinating mass vaccination drives in aged care facilities.[55] The federal government should set a minimum vaccination target for aged care homes to meet,[56] and Primary Health Networks should be accountable for meeting these targets within two years.

We welcome the federal government's public reporting of aged care facilities' vaccination rates for flu and COVID. This reporting should be updated regularly and expanded to other adult vaccines.

Box 3: How Primary Health Networks could support GPs

There are many ways that Primary Health Networks could support GPs including:

- Running vaccination clinics in GP clinics with low rates
- Promotional materials with tailored messaging in different languages
- Information or training on how to easily access a patient's vaccination status in clinical information systems
- Training about different cultural groups' beliefs about vaccines
- Training on how to work with patients from different backgrounds
- Funding for vaccination sessions with targeted groups
- Support with booking patients into pharmacies for vaccination
- Funding for GP services to aged care residents

55. The federal government has recently funded community pharmacy vaccination in aged care facilities, which will also help: Department of Health and Aged Care (2024d).
56. This target may be different for each vaccine.

Appendix A: How we calculated GPs' patient vaccination rates

A.1 How we analysed vaccination rates by GP

Our analysis looked at the variation in average adult vaccination rates by GP. We used unit-level record data that links the Australian Immunisation Register with Census and Medicare data to provide a full picture of every Australian's vaccination status, their demographic information, and their interactions with the health system.

Step 1: We calculated average vaccination rates for a GP's pool of patients

First, we looked at a GP's pool of patients eligible for an adult vaccine, and determined what proportion of those patients were vaccinated for flu, COVID, shingles, and pneumococcal.[57] We than analysed the variation in GP vaccination rates (see Figure A.1).

We made the following assumptions:

- **How was vaccination status defined?** The patient must have been up-to-date with their vaccinations.[58] It doesn't matter where the patient got vaccinated.
- **What patients were included?** The patient must have visited a GP,[59] and be recommended to be vaccinated and be able to get it for free under the National Immunisation Program.[60] Because

57. Given privacy data protections, we don't report individual GP vaccination rates. The averages were weighted by the size of a GPs' pool of patients.
58. As at August 2023. See Appendix A.3.3 on page 27 for further detail on how this was defined.
59. The patient must have visited a GP at least once between March 2022 and August 2023.
60. Definitions of people at high risk for different vaccine-preventable conditions are in Appendix A.3.2 on page 26. Nearly everyone in these high-risk groups would be safer if they received recommended vaccinations.

Figure A.1: We found there was between a two-fold and 13-fold difference in GP vaccination rates

Vaccine	Average GP vaccination rate	Difference between the top 5% and bottom 5% of GPs	Standard deviation	Coefficient of variation (standard deviation divided by the average)
Flu	73%	2.1-fold difference	11%	15% - smaller variability
Shingles	58%	3.8-fold difference	15%	26%
COVID	51%	4.8-fold difference	15%	30%
Pneumococcal	42%	12.9-fold difference	20%	47% - bigger variability

Source: Grattan Institute analysis of ABS PLIDA (2024).

nearly all older people visit a GP at least once every year, the patient sample includes most people in the recommended age cohort.[61] If a patient visited multiple GPs, the patient is counted in each GP's pool of patients. Predicted vaccination rates (see below) adjust for one-off patients, and low-continuity patients in the period 2016 to 2019, to reflect the reduced opportunity for GPs to influence these patients' vaccine uptake.[62]

- **What GPs were included?** The GP must have seen a minimum number of patients recommended to be vaccinated.[63] For COVID and flu, there were about 33,000 GPs in the sample. For pneumococcal and shingles, there were about 18,000 GPs in the sample.

Step 2: We controlled for patient characteristics and GP access factors to determine a GP's 'predicted' average vaccination rate

Second, we used a logistic regression model to account for factors that may be driving the variation in GP vaccination rates. This includes patient demographic factors, patient health status, and GP access factors (see Box 4 on page 28.)

We replicated the model for each adult vaccine – flu, COVID, shingles, and pneumococcal – for the patients recommended to receive these vaccines.[64]

61. Our sample includes 3.9 million people aged 65 years and over for COVID and flu (about 85 per cent of people aged 65 and over), and 880,000 people aged 71 to 75 in 2023, for shingles and pneumococcal (about 75 per cent of people in this age group).
62. The 2016 to 2019 period was chosen as a sufficient time window pre-COVID, given COVID disrupted people's pattern of healthcare use.
63. The minimum number was at least 30 patients in the eligible cohort between March 2022 and August 2023 (except for Figure 3.3 and Figure 3.2, where the minimum number was 25 patients). The eligible cohort includes those patients who are recommended to get the vaccine.
64. See information about vaccine eligibility in the Appendix A.3.2.

We used the model outputs to 'predict' the likelihood each patient would be vaccinated, given their characteristics and pattern of healthcare access, and we then calculated the average 'predicted' vaccination rate for each GP.

A.2 Data sources

We used de-identified unit-level record data from the Australian Bureau of Statistics' Person Level Integrated Data Asset (PLIDA), supplied by the ABS.[65] The data integrate information from various datasets into a single file. The data we used for this report are:

- the 2021 Census
- Medicare Benefits Schedule data from January 2011 to September 2023,
- the Australian Immunisation Register ('the AIR') and
- spine linkage between the 2021 Census, the AIR, and the Medicare Consumer Directory.

We restricted our sample to people in the 2021 Census who were not visitors to Australia.

Data linkage

We further restricted our sample to 2021 Census records that can be linked to the Medicare Consumer Directory and the Australian Immunisation Register.[66] We expect this to make our findings on any access gaps conservative, because data linkage tends to be lower for disadvantaged groups.

65. ABS PLIDA (2024).
66. Note that linkage between the Australian Immunisation Register and the Census resulted in a small number of AIR records matching to multiple Census IDs.

A.3 Key variable definitions

A.3.1 How we identified GPs

To identify GPs – as opposed to other healthcare providers – we identified providers in the Medicare dataset that had done at least 100 A01 Medicare consultations between 2011 and 2023. We further limited the dataset to GPs who had provided at least 30 'common' GP services to people in the relevant age cohort between March 2022 and August 2023.[67]

For flu and COVID, about 32,560 GPs were part of the sample. This accounts for almost all registered GPs.[68]

For shingles and pneumococcal, about 18,000 GPs were included in the sample. This GP sample is smaller because fewer GPs would have seen at least 30 patients between March 2022 and August 2023 who turned 71 to 75 in the 12 months up to the end of August 2023.

A.3.2 How we defined people as high-risk and eligible for free vaccines

The Australian Technical Advisory Group on Immunisation (ATAGI) makes recommendations for high-risk groups to be vaccinated against specific diseases. These people can receive recommended vaccines for free under the National Immunisation Program.[69]

Flu

While ATAGI recommends that everyone aged six months or older gets an annual flu vaccine,[70] people with the greatest risks from flu receive the vaccine for free under the National Immunisation Program schedule. This includes people aged six months to five years, people aged 65 and older, Indigenous people, pregnant people, and people with high-risk medical conditions.[71] For simplicity, our analysis defined people at high-risk of flu if they were 65 and older as at August 2022, as reported in the 2021 Census.

COVID

Until September 2023, ATAGI recommended people aged 65 or older, or people with medical comorbidities, receive a COVID vaccine every six months, because they are at increased risk of severe COVID. For simplicity, our analysis defined people at high-risk of COVID if they were aged 65 and older as at August 2022, as reported in the 2021 Census.

Shingles

Until November 2023, people aged 70 were eligible to receive the Zostavax vaccine for free under the National Immunisation Program. Until October 2023, people aged 71-79 could also get a catch-up Zostavax vaccine.[72] Only one dose is required.

67. Common GP services includes all MBS items in the categories of routine hours consultations, video and telehealth consultations, after-hours consultations, urgent appointments, diagnostic procedures, health assessments, and chronic disease/complex care plans, as defined in the Wentworth Healthcare guide: Wentworth Healthcare (2023). The relevant age cohorts are those listed in Appendix A.3.2.
68. The Medical Board of Australia reports that as at September 2023, there were 35,000 registered GPs: Medical Board (2024, p. 6).
69. Department of Health and Aged Care (2023b).
70. ATAGI (2023a).
71. DHAC (2023).
72. NCIRS (2021).

In November 2023, Zostavax was replaced by Shingrix on the National Immunisation Program schedule.[73] People aged 65 and older are now recommended to get the two-dose vaccine.[74]

Given our analysis window is prior to Shingrix being listed on the National Immunisation Program schedule, we defined people as high-risk for shingles if they turned 71 to 75 in the 12 months up to the end of August 2023.

Pneumococcal

Since July 2020, people aged 70 and older are recommended to receive the pneumococcal vaccine Prevenar 13.[75] People aged 70 and older are recommended Prevenar 13 even if they have already received 23vPPV, which was previously recommended for people aged 65 and older.

Therefore, we defined people as high-risk for pneumococcal if they turned 71-75 in the 12 months up to the end of August 2023.

A.3.3 How we measured whether someone was 'up-to-date' with their vaccinations

A patient was considered up-to-date with their vaccination as follows:

- **Flu**: The patient must have been vaccinated in the 12 months before 1 September 2023. Flu vaccines are recommended annually before the flu season starts.
- **COVID**: The patient must have been vaccinated in the nine months before 1 September 2023. COVID booster shots were recommended every six months for people aged 65 and older up until September 2023.[76] We used a nine-month window to acknowledge that some people may defer vaccination because of a recent COVID infection.
- **Shingles**: The patient must have been vaccinated at any time before 1 September 2023. Only one dose of Zostavax is required, at age 70 and older. If they had received two doses of Shingrix, they were considered vaccinated.
- **Pneumococcal**: The patient must have been vaccinated at any time before 1 September 2023. Only one dose of Prevenar 13 is required.

How we defined the analysis window

The analysis covered a period of March 2022 to end August 2023. Patients who visited a GP in this period were included.

A.4 Definitions of control variables in the regression model

We derived the control variables for our model (see Box 4 on the next page) from self-reported patient demographics in the 2021 Census, and patient interactions with the health system according to Medicare data.

Patient demographics

Indigenous – We defined a person as Indigenous if they identified in the 2021 Census as Aboriginal, Torres Strait Islander, or both Aboriginal and Torres Strait Islander; and not Indigenous if they identified as non-Indigenous.[77]

73. Department of Health and Aged Care (2023c).
74. Adults with specific medical conditions and Indigenous people aged 50 and older are also eligible for Shingrix.
75. Australian Technical Advisory Group on Immunisation (2020).
76. ATAGI (2021).
77. For more detail see: ABS (2021a).

Box 4: Factors we controlled for in the regression model

There are many factors that affect vaccination rates, including patient demographics, health status, and ability to access a GP.[a]

Where these factors could be measured, our regression model controlled for them so we could understand their affect on the likelihood of a patient being vaccinated.

Patient demographic factors included:

- Age
- Gender
- Residential care status
- Indigenous status
- Location (major city, regional, or remote)
- Country of birth
- English language proficiency
- Language other than English
- Highest level of education
- Income bracket (equivalised household income)
- Socio-economic status (in deciles)

Patient health conditions included:

- Asthma
- Cancer
- Lung disease
- Stroke
- Diabetes
- Dementia
- Heart disease
- Kidney disease
- Two or more chronic health conditions

GP access factors included:

- Patient's connection to a particular GP (continuity of care)
- Frequency of patient's GP visits
- Regularity of patient's access to GP care
- GP's average out-of-pocket costs per service
- Local GP services per capita

a. See for example, Breadon and Burfurd (2023).

Age – We used age at the 2021 Census, and date of birth from the Census data. We grouped people in five-year age buckets. We did not include this variable in the regressions for shingles and pneumococcal because the patient sample was already restricted to people turning 71-75 in the 12 months up to the end of August 2023.

Gender – We used gender (male or female) as self-reported in the Census.

Country of birth – The regions and corresponding country of birth (so-called BPLP) codes are:[78]

- Australia: 1; 1100 to 1199
- Oceania and Antarctica (excluding Australia): 1000; 1201 to 1607
- North-western Europe: any code in the 2000s
- Southern and Eastern Europe: any code in the 3000s
- North Africa and the Middle East: any code in the 4000s
- Southeast Asia: any code in the 5000s
- Northeast Asia: any code in the 6000s
- Southern and Central Asia: any code in the 7000s
- Americas: any code in the 8000s
- Sub-Saharan Africa: any code in the 9000s.

Education – We defined a person's education level according to their highest level of education attainment in the Census, known as their HEAP.[79]

78. For more detail see: ABS (2021b).
79. For more detail see: ABS (2021c).

English proficiency – We defined a person as being proficient in English if they speak English only, or use another language and speak English well/very well; and not proficient if they use another language and speak English not well/not well at all.[80]

Language other than English – We defined a person who speaks a language other than English at home as a binary variable, according to the Census.[81]

Index of Relative Social Disadvantage (IRSD) – We used each person's SA1-level IRSD decile where available, and SA2-level IRSD decile otherwise.[82]

Household income – We defined a person's income according to their Census-reported weekly equivalised household income, grouped into $500 increments from below $500 per week up to $3,500 and more per week.

Remoteness area – We used the remoteness area classification of a person's usual residence from the Census. For figures showing SA3s by remoteness, we used the modal remoteness classification in that SA3 by population.

Residential care – We used residential care status as reported in the Census ('Residential status in a non-private dwelling (RLNP)').[83]

Patient health status

Health conditions – We used the following self-reported long-term health conditions from the Census:[84]

80. For more detail see: ABS (2021d).
81. ABS (2021e).
82. For more detail see: ABS (2023b).
83. ABS (2021f).
84. Based on high-risk conditions listed in the Australian Immunisation Handbook: ATAGI (2023b).

- asthma (HASTP code 021)
- cancer (HCANP code 031)
- dementia (HDEMP code 041)
- diabetes (HDIAP code 051)
- heart disease (HHEDP code 061)
- kidney disease (HKIDP code 071)
- lung condition (HLUNP code 081)
- whether has had a stroke (HSTRP code 101).

If a patient had two or more of these conditions, this was defined in a separate variable.

GP access factors

We derived the measures for continuity, regularity, and frequency using Medicare data of patient visits to a GP between 2016 and 2019. This period was chosen to gauge a person's typical pre-COVID pattern of visits. Only GP visits that were defined as 'common' GP services were classified as a GP visit (see Appendix A.3.1 on page 26).

GP continuity of care

Continuity of care quantifies how much an individual visits the *same* GP within their GP visits:[85]

$$\frac{\sum_{j=1}^{S} n_j^2 - N}{N(N-1)}$$

where N is their total number of GP visits, n_j is the number of visits to GP j, and S is the number of different GPs they visit.

85. As per TW and SB (1977).

We categorised the index values into four groups:[86] low (index is below 0.5), moderate (0.5 and higher but below 0.75), high (0.75 and higher but below 1), and perfect (1).

Regularity of visits

Regularity is determined by a relative variance index that measures whether GP visits are evenly spaced:[87]

$$1/\left(1 + \frac{\mathrm{sd}(days)}{\mathrm{mean}(days)} \times 100\right)$$

where $days$ is the number of days between GP visits, and $\mathrm{sd}(days)/\mathrm{mean}(days)$ is the coefficient of variation. This measure can only be calculated where there are at least three GP visits in the period. We split this measure into quintiles across the Australian population, which means our sample size in each quintile of only older people is not equal.

Frequency of visits

Frequency is calculated by counting the number of GP visits over the period. We split this measure into quintiles across the Australian population, which means our sample size in each quintile of only older people is not equal.

Average out-of-pocket costs for GPs' patients

We calculated average out-of-pocket costs for GPs' patients by finding the average GP co-payment for all common consultation items over September 2022 to August 2023 (12 months).[88] We then linked the

86. As defined in Youens et al (2021).
87. Following Youens et al (2019).
88. This covers common GP services, similar to how we identified GPs, as outlined above, across the whole population (i.e. not just for older people). We calculated this by finding the total GP out-of-pocket income, divided by the number of MBS services. Bulk-billed services were included and would therefore lower a GP's average patient out-of-pockets.

GP's average to the patients they saw. If a patient saw more than one GP in this period, we linked the average of those GPs' out-of-pockets to the patient.

Local GP services per capita

We derived services per capita from 2022-23 GP service rates by SA3.[89]

A.5 Other model notes

Patients who have died

Some patients will have died between March 2022 (the earliest date for a GP visit in our sample) and August 2023 (the last date in our sample). To exclude patients who have died from our analysis, we removed patients who were identified in the Australian Immunisation Register as having died.[90] Removing these patients from the dataset means the GP patient pools are not artificially inflated with people who can't get an up-to-date vaccination because they have died.

A.6 What our regression model showed

We used a logistic regression to analyse the relationship between the likelihood of vaccination (binary outcome) and predictor variables (as listed in Appendix A.4 on page 27).[91]

We ran a separate regression for each vaccine with the relevant high-risk patient sample (see Appendix A.3.2 on page 26).

89. AIHW (2024).
90. The AIR identifies patients who have died or been de-registered from Medicare according to an 'end-date' variable. This includes patients who may have migrated overseas.
91. The predictor variables were chosen because they were all factors known to affect the likelihood of vaccination. See for example Breadon and Burfurd (2023).

Figure A.2: Other patient factors also affect likelihood of vaccination
Regression coefficients for each vaccine

Variable	Term	Flu	COVID	Shingles	Pneumo-coccal
Age	65-69 years	0 (baseline)	0 (baseline)	NA	NA
	70-74 years	7.4%***	7.4%***	NA	NA
	75-79 years	12.3%***	12.0%***	NA	NA
	80-84 years	13.7%***	13.7%***	NA	NA
	85+ years	12.9%***	14.1%***	NA	NA
Gender	Male	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	Female	1.5%***	-0.7%***	1.8%***	2.0%***
Indigenous status	Not Indigenous	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	Indigenous	-5.3%***	-9.0%***	-5.6%***	3.6%***
Residential care status	Not in residential care	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	In residential care	-2.2%***	12.6%***	-32%***	-28.5%***
Household income	<$500 per week	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	$500-$999 per week	2.9%***	3.1%***	2.5%***	2.1%***
	$1,000-$1,499	3.4%***	2.7%***	2.0%***	1.7%***
	$1,500-$1,999	3.5%***	3.1%***	0.6%**	0.4%
	$2,000-$2,499	4.3%***	3.8%***	0.0%	0.1%
	$2,500-$2,999	4.9%***	4.2%***	-0.3%	0.3%
	$3,000-$3,499	6.0%***	6.0%***	0.8%	-0.2%
	$3,500+	6.4%***	6.4%***	0.1%	-1.5%***

*Notes: Coefficients indicated by *, **, and *** are statistically significant at the 5%, 1%, and 0.1% level respectively. The sample includes only patients recommended to get these vaccines and who visited the GP at least once between March 2022 and August 2023.*

Source: Grattan Institute analysis of ABS PLIDA (2024).

Some factors, such socio-economic status and speaking a language other than English at home, account for more of the variation in vaccination rates than other factors, such as gender, health status, continuity of care, and services per capita (see Figure 2.1, Figure 2.2, Figure A.2, and Figure A.3).[92]

The logistic regression models for each vaccine explained only a small proportion of the total variation (see Table A.1 on the next page). This suggests that unmeasured factors, discussed in Appendix A.7, contribute substantially to whether or not someone is vaccinated.

A.7 Limitations

Unmeasured factors that could affect vaccination

Some patient and GP factors were not included in our model because they could not be easily identified in the data. These included:

- Patient's vaccine hesitancy
- Whether a patient is immuno-compromised and therefore not recommended to get a vaccine
- Patient's access to a nearby pharmacy
- A GP's cultural and language background
- Whether a GP has a nurse on-site
- The size of the clinic the GP worked within
- Proportion of GP's patients that are older

92. We converted the odds ratio output from the logistic regression into a percentage likelihood.

Figure A.3: Other GP access factors also affect likelihood of vaccination
Regression coefficients for each vaccine

Variable	Term	Flu	COVID	Shingles	Pneumo-coccal
Services per capita (by sa3)	1 (Low)	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	2	0.2%*	0.11%	-0.9%***	0%
	3	-0.6%***	0.6%***	0.1%	0.5%**
	4	-1.7%***	-1.0%***	0.9%***	0.2%
	5 (High)	-1.4%***	-0.5%***	0.2%	-2.0%***
Continuity of GP care	Low	0 (baseline)	0 (baseline)	0 (baseline)	0 (baseline)
	Moderate	2.5%***	2.2%***	1.2%***	0.9%***
	High	2.1%***	2.3%***	-0.6%***	-0.8%***
	Perfect	-0.9%***	0.5%***	-2.9%***	-4.0%***
	<2 visits	1.9%***	2.4%***	-0.9%	0.2%
Health status	Asthma	4.6%***	2.8%***	0.9%***	3.7%***
	Cancer	3.4%***	3.1%***	-3.6%***	1.3%***
	Dementia	-5.4%***	-1.6%***	-7.0%***	-3.7%***
	Diabetes	4.2%***	2.8%***	1.6%***	4.2%***
	Cardiovascular disease	2.1%***	1.5%***	0.4%*	1.4%***
	Kidney disease	0.44%*	-0.2%	-4.8%***	0.8%*
	Lung disease	2.9%***	1.7%***	-2.3%***	5.1%***
	Stroke	-3.4%***	-2.2%***	-3.6%***	-1.7%***
	2+ health conditions	-1.8%***	-1.1%***	-0.5%	-1.3%***

*Notes: SA3s are small geographic areas with a population between 30,000 and 130,000. Coefficients indicated by *, **, and *** are statistically significant at the 5%, 1%, and 0.1% level respectively. The sample includes only patients recommended to get these vaccines and who visited the GP at least once between March 2022 and August 2023.*

Source: Grattan Institute analysis of ABS PLIDA (2024).

- While reporting in the AIR is mandatory, there may be some cases where vaccinations are not recorded.[93]

There may also be interaction effects between these and other measured variables that are not accounted for.

We found the predicted rate was slightly lower for GPs with low vaccination rates, and slightly higher for GPs with high vaccination rates. This suggests there may be an omitted unmeasured variable(s) that is/are correlated with vaccination rates.

Data limitations affecting samples

- People in residential aged care are under-represented in the sample because only 60 per cent completed the Census.[94] Many residents would also have died since the Census.
- Household income is skewed to lower incomes, and is not representative of population-wide income distributions, because older people tend to have lower incomes. This might contribute to a smaller effect size for the income variable (see Figure A.2 on page 31).
- Mandatory reporting of vaccinations in the AIR was only introduced in 2021.[95] This is particularly relevant for shingles and pneumococcal, because some people turning 71-75 in the 12 months up to and including August 2023 would have been vaccinated before 2021, yet it may not have been recorded in the register. However, population vaccination rates for shingles and pneumococcal are very similar when restricting the sample to people turning 71 only, which suggests that the sample for 71-75 year-olds is fairly representative.

Table A.1: Our model explains a small proportion of the total variation

Vaccine	Variability explained by model
Flu	7%
COVID	8%
Shingles	5%
Pneumococcal	4%

Note: The proportion of variability explained by each model was determined using McFadden's psuedo R-squared.

93. Under the *Australian Immunisation Register Amendment (Reporting) Bill 2020*, providers are required to report vaccines administered unless it poses a risk to the health or safety of an individual. Civil penalties apply if this requirement is contravened.
94. ABS (2021f).
95. It was mandatory for COVID from 20 February 2021, for flu from 1 March 2021, and for National Immunisation Program vaccines from July 2021.

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