Australian Government
Australian Institute of Health and Welfare

Social determinants of health among culturally and linguistically diverse people in Australia

Web report | Last updated: **14 May 2024** | Topic: Culturally and linguistically diverse Australians

About

This web report describes how social determinants of health influence associations between cultural and linguistic diversity and long-term health conditions reported by people through the Australian Bureau of Statistics' 2021 Census of Population and Housing.

Cat. no: PHE 339

Findings from this report:

- Age and social determinants have varying effects on CALD groups reporting long-term health conditions
- Age and social determinants of health are not driving asthma reporting among CALD groups
- People are more likely to have a long-term health condition the longer they spend in Australia
- The effects of age and social determinants of health mask higher rates of diabetes amongst some CALD groups

Summary

This web report builds on two earlier reports by the AIHW investigating the health of people from culturally and linguistically diverse (CALD) backgrounds:

- Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper, and
- Chronic health conditions among culturally and linguistically diverse Australians, 2021.

Analysis of the Australian Bureau of Statistics' 2021 Census of Population and Housing (2021 Census) has been used to investigate the key social determinants of health that explain the differences in the reporting of long-term health conditions across CALD populations. Statistical modelling was used to understand how social determinants of health (education, labour force status, income, housing tenure, housing suitability, occupation, marital status, citizenship and remoteness) are associated with cultural and linguistic diversity (proficiency in spoken English, time since arrival in Australia, age at arrival in Australia, country of birth and languages used at home) and long-term health conditions reported in the 2021 Census.

Results

Statistical modelling indicates the strength of association between long-term health conditions and CALD variables is affected by age and the social determinants of health. For each CALD variable, the odds of reporting long-term health conditions generally approached those of a reference (or comparison) group, after adjusting for the effects of age and the social determinants of health.

However, this was not the case for all long-term health conditions as there were notable differences for asthma and mental health conditions. After adjusting for age and social determinants of health, the odds of reporting asthma or mental health conditions changed little compared with the reference group. The proportion of people reporting asthma or a mental health condition is similar from the age of 15 years, unlike the other health conditions investigated which become more common with age. This indicates factors beyond the scope of these analyses contribute to the development of these conditions.

Binomial logistic regression (statistical) modelling

Binomial logistic regression was used to estimate the probability of an event occurring (such as a long-term health condition). The statistical modelling shows association between variables but does not explain what is causing the association. For more information about the statistical modelling including use of reference groups, see the Technical notes and refer to the Methods section. For detailed findings, see Detailed results.

Proficiency in spoken English

People with low English proficiency (i.e. they indicated in the 2021 Census they spoke English 'not well' or 'not at all') are more likely to report most of the long-term health conditions examined than those with high English proficiency (i.e. speak English 'well' or 'very well'). But when adjusting for the effects of age and the social determinants of health, there is stronger alignment between both groups meaning that age and the social determinants of health influence people reporting these long-term health conditions.

Time since arrival

Similar patterns were found using the time since people arrived in Australia to analyse long-term health conditions; age was associated with much of the difference but sometimes the social determinants of health played a role. For example, males who have been in Australia more than 20 years have odds ten times higher of reporting heart disease than males who arrived in Australia in the last ten years. When accounting for the effects of age, and then age combined with the social determinants of health (fully adjusted models), the odds drop to a similar level to those who were born in Australia.

Age at arrival

After adjusting for the effects of age and the social determinants of health, people who arrived in Australia when they were 65 years or older had similar odds of reporting a long-term health condition to people who arrived in Australia when they were younger. Figure 1 demonstrates how the statistical models did not greatly change the odds ratios for females who came to Australia as children (0 to 14 years) reporting a long-term health condition, and this young age group was closest to people born in Australia.

Figure 1: Odds ratios of females reporting a long-term health condition by Age at arrival, compared with those born in Australia, 2021

The figure shows the odds ratios of females reporting a long-term health conditions by age at arrival, compared with those born in Australia. In 2021, those aged 15 to 24 years when they arrived were the least likely to report a long-term health condition.
"Born in Australia" is the reference group for these models

Source: Source: AIHW analysis of PLIDA, 2022 | Data source overview

For more details about interpreting the modelling results see the Detailed results and the Technical notes.

Figure 1 also highlights that while females who were 65 years or older when they came to Australia were more likely to report any long-term health condition(s) compared with those born in Australia, they were less likely to report any long-term health condition(s) compared with Australian-born people when adjusted for the effects of age and social determinants of health.

Country of birth

Country of birth is one of the more commonly used CALD variables in health datasets, so it is useful to understand how strongly age and the social determinants of health are associated with the odds of reporting long-term health conditions.

While people born in some countries were more likely to report conditions like diabetes and heart disease than people born in Australia, these differences disappeared when they were adjusted for the effects of age and the social determinants of health. Similarly, people born in other countries who were less likely to report particular diseases compared with the Australian population, became more likely to report those conditions after adjusting for the effects of age and social determinants of health.

Figure 2 shows how adjusting for the effects of age and the social determinants of health impacts on the odds of males born in different countries reporting diabetes in different ways. While the odds drop for males born in Italy and England, for males born in India and the Philippines the odds of reporting diabetes increase to more than twice the odds of Australian-born males reporting diabetes.

Figure 2: Odds ratios of males reporting diabetes by Country of birth, compared with males born in Australia, 2021

The figure shows the odds ratio of males reporting diabetes by country of birth in 2021. The fully adjusted model shows those born in the Philippines and India were most likely to report diabetes.
"Born in Australia" is the reference group for these models
Source: Source: AIHW analysis of PLIDA, 2022 | Data source overview

For more details about interpreting the modelling results see the Detailed results and Technical notes.

Language used at home

After adjusting for the effects of age and the social determinants of health, the odds of people who spoke a language other than English at home reporting a long-term health condition more closely aligned with that of people who spoke 'English only'. There were exceptions however, as shown in Figure 3 below. For example, after adjusting for the effects of age and the social determinants of health, males who spoke Hindi, Punjabi or Arabic at home were more likely to report diabetes compared with males who spoke 'English only'.

Figure 3: Odds ratios of males reporting diabetes by language used at home, compared with those who speak English (only), 2021

The figure shows the odds ratios of males reporting diabetes by language spoken at home in 2021. The fully adjusted model shows those speaking Arabic, Punjabi or Hindi were the most likely to report diabetes.
"English (only)" is the reference group for these models
Source: Source: AIHW analysis of PLIDA, 2022 | Data source overview

For more details about interpreting the modelling results see the Detailed results and the Technical notes.

Moving forward

People from CALD groups are varied in their migration experience, countries of birth, ethnic and cultural backgrounds, languages, traditions, religions and beliefs. But the analyses found many of the differences observed in the odds of reporting long-term health conditions are associated with age and the social determinants of health. However, the situation is far from uniform across the different CALD groups, indicating that other determinants of health (e.g. biology, environment, health service accessibility) are playing a role in whether people are reporting specific long-term health conditions.

The analyses also showed there are some groups within the CALD population who appear to have increased odds of reporting long-term health conditions that are currently being masked at the unadjusted level by their younger age and higher social determinants of health profile. This report provides valuable insights for additional research, policies, and future directions for these diverse populations.

Detailed results

Detailed results

According to the 2021 Census of Population and Housing (2021 Census), more than 7 million people (28%) in Australia were born overseas – an increase from 6.1 million (26%) in 2016 (ABS 2022a). Between 2016 and 2021, the number of people who reported speaking a language other than English at home also increased from almost 5 million people in 2016 (22%) to around 6 million (23%). In 2021, 3.4% of the Australian population indicated they spoke English not well or not at all.

People from CALD backgrounds are identified as a priority population in multiple Australian Government strategies (AIHW 2022a). This includes the National Strategic Framework for Chronic Conditions, which identifies people from CALD backgrounds as a priority population for the prevention and management of chronic conditions. People from CALD backgrounds have varied health needs and may experience inter-connected health and social disadvantages, and greater challenges when dealing with the health-care system and services (Australian Health Ministers' Advisor Council 2017; Henderson et al. 2011; Khatri and Assefa 2022). Challenges can include trust, language barriers and cultural sensitivities around some health issues such as sexual and mental health.

Although Aboriginal and Torres Strait Islander (First Nations) people are diverse in language and culture, their experiences and needs are unique and are therefore considered distinct from the CALD population for the purposes of this report.

Chronic health conditions among CALD Australians, 2021

The AIHW report Chronic health conditions among culturally and linguistically diverse Australians, 2021, used descriptive analysis of the 2021 Census to show the proportion of people reporting long-term health conditions in relation to the four CALD variables, used individually and in combination. This report showed on average, a higher proportion of people born in Australia reported one or more of any long-term health condition(s), compared with those born in any other country. One of the reasons for this may be the 'healthy migrant effect.' However, there were several exceptions when analysing the specific reported long-term health conditions and countries of birth at the most detailed level of data.

Healthy migrant effect

For first generation immigrants, in the early years following migration, some people have relatively better health than the Australian-born population (known as the 'healthy migrant effect') due to the combination of health screening checks and strict eligibility requirements before they migrate and through immigrant self-selection, particularly under the skilled migration stream (AIHW 2018; Jatrana et al. 2017; Kennedy et al. 2006; Kennedy et al. 2014; Khatri and Assefa 2022). Some studies suggest that the healthy migrant effect can disappear after immigrants have lived in a host country for a long time, and acculturation can vary for different immigrant populations depending on differences in education, income and language (AIHW 2018; Hamilton 2015; Jatrana et al. 2017). For more information on the healthy migrant effect, see the AIHW report Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper.

Data

This report uses the Australian Bureau of Statistics' (ABS) Person-Level Integrated Data Asset (PLIDA) to investigate data from the 2021 Census which contains comprehensive data on:

- social determinants of health including education, labour force status, income, housing tenure, housing suitability, occupation, marital status, citizenship and remoteness
- CALD variables including country of birth of person, year of arrival in Australia, languages used at home and proficiency in spoken English
- long-term health conditions.

Further details of the CALD variables and long-term health conditions reported in the 2021 Census, including limitations, are provided in the Technical notes.

The concepts of health literacy, intersectionality, and accessibility of culturally appropriate services are not examined in this report but could be considered in a future program of work.

Statistical models

The binomial logistic regression (statistical) models used in this report included:

- **unadjusted models** the odds ratios of reporting specific long-term health conditions were modelled based on the individual CALD variables (Country of birth, proficiency in spoken English, Age at arrival, time since arrival and Language used at home)

- **adjusted separately** for the CALD variable and a specific social determinant (including age) approach - the CALD variables and age and the social determinants of health (income, education, labour force status, housing tenancy, housing suitability, marital status, and remoteness) were modelled individually
- **fully adjusted** models used the individual CALD variables, age, and the social determinants of health.

Analysis published in Chronic health conditions among culturally and linguistically diverse Australians, 2021 suggest there may be an interaction occurring between proficiency in spoken English and time since arrival, so similar models were also produced for the interactions between these two variables.

More details are described in the Methods section of the Technical notes.

In these analyses, the odds ratio is the ratio of the odds of reporting a long-term health condition in one group compared with the odds of reporting the same long-term health condition among those in the reference (or comparison) group.

An odds ratio of less than 1 means that the odds of an outcome occurring for a group with a certain characteristic is lower than that for the reference group.	An odds ratio of 1 means that the odds of an outcome occurring for a group with a certain characteristic is not different than that for the reference group for the respective characteristic.	An odds ratio of greater than 1 means that the odds of an outcome occurring for a group with a certain characteristic is higher than that for the reference group.

References

ABS (Australian Bureau of Statistics) (2022a) *Cultural diversity of Australia*, ABS website, accessed 22 August 2022.

Australian Health Ministers' Advisor Council (2017) National Strategic Framework for Chronic Conditions, Australian Government, accessed 1 September 2023

AIHW (Australian Institute of Health and Welfare) (2018) *Australia's health 2018*, AIHW, Australian Government, accessed 3 May 2022.

AIHW (2022a) *Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper*, AIHW, Australian Government, accessed 17 October 2022.

Hamilton TG (2015) 'The healthy immigrant (migrant) effect: in search of a better native-born comparison group', Social Science Research 54:353–365, doi:10.1016/j.ssresearch.2015.08.008

Henderson S, Kendall E and See L (2011) 'The effectiveness of culturally appropriate interventions to manage or prevent chronic disease in culturally and linguistically diverse communities: a systematic literature review', *Health and Social Care in the Community* 19(3):225–49, doi:10.1111/j.1365-2524.2010.00972.x.

Jatrana S, Richardson K and Samba SRA (2017) 'Investigating the dynamics of migration and health in Australia: a longitudinal study', *European Journal of Population* 24:519–65, doi:10.1007/s10680-017-9439-z.

Kennedy S, McDonald JT and Biddle N (2006) 'The Healthy Immigrant Effect and immigrant selection: evidence from four countries', *Social and Economic Dimensions of an Aging Population Research Papers*, 164.

Kennedy S, Kidd MP, McDonald JT and Biddle N (2014) 'The Healthy Immigrant Effect: pattern and evidence from four countries', Journal of International Migration and Integration 16(2):317–322, doi:10.1007/s12134-014-0340-x.Khatri RB and Assefa Y (2022) 'Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: issues and challenges', *BMC Public Health* 22:880, doi:10.1186/s12889-022-13256-z.

Detailed results

People with low English proficiency (speaking English not very well or not at all) or who spoke 'English only' at home, were more likely to report long-term health conditions than those with high English proficiency.

Modelling the odds of selected long-term health conditions from proficiency in spoken English

Logistic regression modelling was used to explore the association between proficiency in spoken English with each long-term health condition. For this CALD variable, the high English proficiency group (those who spoke English very well or well) was used as the reference category to estimate odds ratios in all the models. Full outputs from all regression models are provided in the supplementary tables (Tables S1.1–S1.4).

Overall, the results observed from the set of regression models indicated that age was the strongest factor for the observed associations between the level of English proficiency and the reported long-term health conditions, with the exception of asthma and mental health conditions. Detailed findings from the modelling are presented below.

1. Unadjusted models

The unadjusted logistic regression models showed that the low English proficiency group (i.e. those who did not speak English well or at all) was associated with higher odds of reporting almost all reported long-term health conditions (except asthma) compared with the high English proficiency group.

2. Adjusting separately for age and social determinants

When the results were adjusted for the effects of age and social determinants of health, age appeared to have the largest effect on reported long-term health conditions, with the exception of asthma and mental health conditions. Controlling for age alone substantially changed the estimated odds ratio for measuring the association between English proficiency and reported long-term health conditions, other than for asthma and mental health conditions, particularly for people with low English proficiency.

However, the impacts of adjusting for most social determinants of health were much less apparent for all reported long-term health conditions regardless of the level of English proficiency, with the most notable effect generally observed when adjusting separately for labour force status or occupation, followed by income or marital status. For example, the unadjusted odds ratios for reporting one or more long-term health condition(s) was 2.2 higher for both males and females with low English proficiency than those with high English proficiency. When the same outcome was modelled using proficiency in spoken English and age or a single social determinant, these odds ratios dropped to:

- 1.4 for males and 1.5 for females after adjusting only for *labour force status*
- 1.7 for males and 1.8 for females after adjusting separately for *income*
- 1.9 for males and 1.8 for females after adjusting only for *marital status*.

These drops in odds ratios between the unadjusted models and those adjusting for another social factor were also apparent when considering some other reported long-term health conditions including multimorbidity, arthritis, diabetes, or heart disease.

3. Fully adjusted models

In the fully adjusted models, for both males and females, the odds ratios for the reported long-term health conditions generally remained similar to the age adjusted odds ratios. For example, when unadjusted, the odds of females with low English proficiency reporting diabetes were 3.1 times higher than the odds of females with high English proficiency. This odds ratio dropped to 1.5, when the effects of age were taken into account. This further dropped to 1.1, in the fully adjusted model – that is when the results were adjusted for the effects of education, labour force status, income housing suitability, tenure, citizenship status, remoteness and marital status (Table 1 below). When adjusting for the effects of age and the social determinants of health in the fully adjusted model, compared with those with high English proficiency:

- those who spoke 'English only' had higher odds of reporting all analysed long-term health conditions except diabetes, which had lower odds
- those with low English proficiency had similar or higher odds of reporting all long-term health conditions.

Table 1: Adjusted odds ratios for the association between level of English proficiency and reporting long-term health conditions in 2021, adjusted for age and social determinants of health in the fully adjusted model

Health outcome	Odds ratio (95% CI) Speaks English (only)	Odds ratio (95% CI) Not well or at all

1 or more of any chronic condition	Males: 1.78 (1.77–1.79) Females: 2.01 (2.00–2.02)	Males: 1.16 (1.15–1.17) Females: 1.32 (1.30–1.33)
Multimorbidity	Males: 1.79 (1.78–1.81) Females: 2.03 (2.02–2.05)	Males: 1.05 (1.03–1.06) Females: 1.21 (1.19–1.22)
Arthritis	Males: 1.83 (1.81–1.85) Females: 1.55 (1.54–1.56)	Males: 0.84 (0.82–0.85) Females: 0.87 (0.86–0.88)
Asthma	Males: 2.12 (2.10–2.14) Females: 2.25 (2.23–2.27)	Males: 0.98 (0.96–1.01) Females: 0.88 (0.87–0.90)
Diabetes	Males: 0.67 (0.67–0.68) Females: 0.71 (0.70–0.72)	Males: 0.88 (0.86–0.89) Females: 1.14 (1.12–1.16)
Heart disease	Males: 1.21 (1.20–1.22) Females: 1.28 (1.26–1.29)	Males: 0.82 (0.81–0.83) Females: 1.04 (1.02–1.06)
Mental health condition	Males: 3.04 (3.01–3.07) Females: 3.06 (3.03–3.08)	Males: 1.43 (1.40–1.46) Females: 1.55 (1.53–1.57)

Notes

1. Results are from the fully-adjusted model which included proficiency in spoken English language, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status and occupation. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,751,459 males and 8,065,784 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on proficiency in spoken English language, age, the selected determinants of health, and the long-term health conditions.
3. ‘Very well or well’ proficiency in spoken English was selected as the reference category, when calculating the odds ratios for the levels of proficiency in spoken English language.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

For people who migrated to Australia, the proportion with any of the long-term health conditions increased over time from when they first arrived in Australia.

Modelling the odds of selected long-term health conditions from time spent in Australia since first arrival

This section presents the results of logistic regression modelling the odds of each long-term health condition based on the length of time since first arriving in Australia. In these models, people who first arrived in Australia 0 to 10 years previously (before the 2021 Census) were used as the reference category, when estimating the odds ratios. Full output from all regression models is provided in the supplementary tables (Tables S2.1–S2.4).

The overall results observed from all regression models indicate that age had the largest effect on the odds of most reported long-term health conditions, with the exception of asthma and mental health conditions. Further data are needed to identify the social and economic drivers behind the observed associations between time spent in Australia since first arrival and reported long-term health conditions. Detailed findings from the modelling are presented below.

1. Unadjusted models

The odds ratios observed in the unadjusted models showed that a longer time spent in Australia since first arrival was associated with higher odds of reporting long-term health conditions. People who first arrived in Australia more than 10 years ago (i.e. 11 to 20 years ago or more than 20 years ago) had higher odds of reporting all long-term health conditions, compared with those who arrived 0 to 10 years ago. For both males and females, the odds ratios for:

- asthma and mental health conditions were highest for those born in Australia
- all reported long-term health conditions other than asthma were highest for those who arrived in Australia more than 20 years ago.

2. Adjusting separately for age and social determinants of health

When the results were separately adjusted for age and the social determinants of health, controlling for age substantially changed the odds ratios for the reported long-term health conditions other than asthma and mental health conditions. The effect of adjusting for age alone on the odds ratios was strongest for those who arrived in Australia more than 20 years ago. However, the effect of adjusting for other social determinants of health on the odds ratios showed a smaller, but still statistically significant effect. Adjusting for labour force (or occupation), marital status, housing tenure or income were all significant, particularly for people who arrived in Australia more than 20 years ago. For example, the unadjusted odds ratios for reporting heart disease were 10.0 for males and 8.1 for females who arrived in Australia more than 20 years ago compared with males and females who arrived in Australia 0 to 10 years earlier. These odds ratios dropped to:

- 1.4 for males and 1.3 for females after adjusting only for *age*
- 6.8 for males and 5.9 for females after adjusting only for *labour force status*
- 6.4 for males and 5.5 for females after adjusting only for *housing tenure*
- 7.1 for males and 4.9 for females after adjusting only for *marital status*.

This pattern was similar when considering some other reported multimorbidity, arthritis, diabetes, or heart disease.

3. Fully adjusted models

In the fully adjusted models, for both males and females, the odds ratios for reporting the long-term health conditions associated with time since arrived in Australia generally remained similar to the corresponding age adjusted odds ratios. For example, when unadjusted, the odds of males who arrived in Australia more than 20 years ago reporting multimorbidity was 12.4 higher than that of males who arrived in Australia 0 to 10 years ago. This odds ratio dropped to 3.0 when only the effect of age was taken into account. The odds ratio was 3.3 in the fully adjusted model, that is, when the results were adjusted for the effects of age, education, labour force status, income, housing suitability, tenure, citizenship status, remoteness and marital status (Table 2 below).

The odds ratios for the reported long-term health conditions increased as time spent in Australia since first arrival increased and was generally highest for those born in Australia, with some exceptions. For example, among males, the highest odds ratio for reported diabetes was observed in those who first arrived in Australia 11 to 20 years ago (1.2), followed by those who arrived more than 20 years ago (1.1) and was lower among those born in Australia (0.9).

Table 2: Adjusted odds ratios for the association between time since first arrival in Australia and reporting long-term health conditions in 2021, adjusted for age and social determinants of health in the fully adjusted model

Health outcome	Odds ratio (95% CI) Australia-born	Odds ratio (95% CI) 11 to 20 years	Odds ratio (95% CI) More than 20 years
1 or more of any chronic condition	Males: 3.13 (3.10–3.16) Females: 3.74 (3.71–3.77)	Males: 1.62 (1.61–1.64) Females: 1.68 (1.66–1.70)	Males: 2.43 (2.41–2.45) Females: 2.82 (2.79–2.84)
Multimorbidity	Males: 4.62 (4.51–4.72) Females: 5.98 (5.87–6.09)	Males: 1.82 (1.77–1.86) Females: 2.02 (1.98–2.07)	Males: 3.34 (3.27–3.41) Females: 4.27 (4.19–4.35)
Arthritis	Males: 3.75 (3.66–3.85) Females: 3.66 (3.59–3.73)	Males: 1.68 (1.63–1.72) Females: 1.74 (1.70–1.77)	Males: 2.62 (2.55–2.68) Females: 2.85 (2.80–2.91)
Asthma	Males: 4.31 (4.23–4.39) Females: 4.74 (4.67–4.82)	Males: 1.70 (1.67–1.73) Females: 1.76 (1.73–1.79)	Males: 2.89 (2.84–2.95) Females: 3.05 (3.00–3.10)
Diabetes	Males: 0.90 (0.89–0.92) Females: 1.04 (1.02–1.06)	Males: 1.20 (1.17–1.22) Females: 1.22 (1.19–1.24)	Males: 1.13 (1.11–1.15) Females: 1.37 (1.34–1.39)
Heart disease	Males: 1.79 (1.75–1.84) Females: 1.98 (1.92–2.04)	Males: 1.31 (1.27–1.34) Females: 1.24 (1.20–1.28)	Males 1.54 (1.50–1.58) Females: 1.60 (1.56–1.65)
Mental health condition	Males: 6.14 (6.02–6.27) Females: 6.14 (6.04–6.23)	Males: 2.03 (1.98–2.07) Females: 2.02 (1.99–2.06)	Males: 4.06 (3.97–4.14) Females: 4.15 (4.08–4.21)

Notes

1. Results are from the fully-adjusted model which included Time spent in Australia, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status and occupation. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,751,459 males and 8,065,784 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on year of arrival in Australia, age, the selected social determinants of health, and the long-term health conditions.
3. The '0 to 10 years' category was selected as the reference category, when calculating the odds ratios for the levels of time spent in Australia since first arrival.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

Reporting one or more long-term health condition(s), multimorbidity, arthritis, diabetes and heart disease were most common in people who were aged 65 or over when they first arrived in Australia. Asthma and mental health conditions were the most commonly reported conditions in people who arrived aged 0 to 14 years or who were born in Australia. People who were aged 15 to 24 when they arrived in Australia had the lowest odds of reporting one or more long-term health condition(s), multimorbidity, arthritis, asthma or heart disease; people born in Australia were least likely to report diabetes and those who arrived in Australia aged 65 years or more were least likely to report mental health conditions.

Modelling the odds of selected long-term health conditions from age at arrival in Australia

This section reports the results of logistic regression modelling the odds of each long-term health condition based on a person's age at arrival in Australia. In these models, the Australian-born population is used as the reference category, when estimating the odds ratios. Full output from all regression models is provided in the supplementary tables (Tables S3.1–S3.4).

The overall results observed from all regression models indicate after adjusting for the effects of age and social determinants of health, people who first came to Australia as children (aged 0 to 14 years) were more likely to report long-term health conditions, compared with people born in Australia. The exception was reporting diabetes, which increased in odds with increasing age at arrival. Detailed findings from the modelling are presented below.

1. Unadjusted models

The odds ratios from the unadjusted models showed that, compared with those born in Australia, the odds of reporting:

- one or more long-term health condition(s), multimorbidity, arthritis and heart disease were higher for people who arrived in Australia when aged 65 years and over, and similar or lower for those who arrived at younger ages
- asthma and mental health conditions were lower for overseas-born people regardless of their age at arrival in Australia
- diabetes was higher for overseas-born people regardless of their age at arrival in Australia, and in particular for those aged 65 years and over at arrival.

2. Adjusting separately for age and social determinants of health

When the results were separately adjusted for age and the social determinants of health, controlling for age substantially changed the odds ratios for reporting the long-term health conditions other than asthma and mental health conditions. The largest effect was for those who arrived in Australia at age 65 years or older. Adjusting separately for social determinants of health slightly changed the odds ratios for all reported long-term health conditions for those who arrived in Australia at ages younger than 65 years. However, for both males and females who came to Australia at ages 65 and over, controlling for labour force status or occupation more than halved the odds of reporting long-term health conditions compared with people born in Australia. Adjusting for citizenship status doubled the odds of those who arrived in Australia aged 65 years or more reporting long-term health conditions other than asthma and mental health conditions, compared with those born in Australia.

3. Fully adjusted models

In the fully adjusted models, the odds ratios for the reported long-term health conditions remained generally similar to the age adjusted odds ratios, regardless of age at first arrival in Australia. However, there were some exceptions for those who arrived in Australia when 65 years and over. For example, when unadjusted, the odds of reporting one or more long-term health condition(s) for males who arrived in Australia at ages 65 years and over was 2.3 times higher than the Australian-born males. The odds ratio dropped to 0.5 after adjusting for age alone, which was lower compared with an odds ratio of 0.7 when adjusting for the effects of age, education, labour force status, income, housing suitability, tenure, citizenship status, remoteness, and marital status (Table 3 below). For those aged 65 years or older at arrival, a similar pattern is seen when assessing the odds of reporting one or more long-term health condition(s) among females and the odds of reporting mental health conditions for both males and females. In the fully adjusted models, compared with those born in Australia, the odds of reporting:

- all reported long-term health conditions, except diabetes, were lower for overseas-born people, regardless of their age at arrival
- diabetes was higher for overseas-born people, regardless of age at arrival.

Table 3: Adjusted odds ratios for the association between age at arrival in Australia and reporting long-term health conditions in 2021, adjusted for age and social determinants of health in the fully adjusted model

Health outcome	Odds ratio (95% CI) Aged 0 to 14 at arrival	Odds ratio (95% CI) Aged 15 to 24 at arrival	Odds ratio (95% CI) Aged 25 to 64 at arrival	Odds ratio (95% CI) Aged 65 and over at arrival

1 or more of any chronic condition	Males: 0.78 (0.77–0.78) Females: 0.75 (0.75–0.76)	Males: 0.54 (0.54–0.55) Females: 0.52 (0.52–0.52)	Males: 0.63 (0.62–0.63) Females: 0.54 (0.54–0.55)	Males: 0.71 (0.69–0.73) Females: 0.71 (0.70–0.73)
Multimorbidity	Males: 0.82 (0.82–0.83) Females: 0.80 (0.79–0.81)	Males: 0.62 (0.62–0.63) Females: 0.59 (0.59–0.60)	Males: 0.58 (0.57–0.58) Females: 0.52 (0.51–0.52)	Males: 0.53 (0.51–0.55) Females: 0.58 (0.56–0.60)
Arthritis	Males: 0.81 (0.80–0.82) Females: 0.91 (0.90–0.92)	Males: 0.66 (0.65–0.67) Females: 0.76 (0.75–0.77)	Males: 0.57 (0.56–0.57) Females: 0.61 (0.61–0.61)	Males: 0.35 (0.33–0.36) Females: 0.45 (0.44–0.46)
Asthma	Males: 0.69 (0.68–0.70) Females: 0.70 (0.70–0.71)	Males: 0.41 (0.41–0.42) Females: 0.44 (0.43–0.44)	Males: 0.46 (0.46–0.47) Females: 0.42 (0.41–0.42)	Males: 0.49 (0.46–0.52) Females: 0.44 (0.42–0.46)
Diabetes	Males: 1.17 (1.16–1.18) Females: 1.16 (1.14–1.17)	Males: 1.24 (1.22–1.25) Females: 1.27 (1.26–1.28)	Males: 1.33 (1.32–1.34) Females:1.36 (1.34–1.37)	Males: 1.35 (1.31–1.40) Females: 1.66 (1.61–1.71)
Heart disease	Males: 0.97 (0.96–0.99) Females: 0.88 (0.87–0.90)	Males: 0.82 (0.81–0.83) Females: 0.79 (0.78–0.80)	Males: 0.78 (0.77–0.79) Females:0.74 (0.73–0.75)	Males: 0.70 (0.68–0.73) Females: 0.82 (0.79–0.85)
Mental health condition	Males: 0.73 (0.72–0.74) Females: 0.71 (0.70–0.71)	Males: 0.36 (0.36–0.37) Females: 0.39 (0.39–0.39)	Males: 0.38 (0.37–0.38) Females:0.36 (0.36–0.37)	Males: 0.40 (0.37–0.44) Females: 0.54 (0.51–0.57)

Notes

1. Results are from the fully-adjusted the model which included the covariates, age at arrival in Australia, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,751,459 males and 8,065,784 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on year of arrival in Australia, age, the selected determinants of health, and the long-term health conditions.
3. ‘Born in Australia' was selected as the reference category, when calculating the odds ratios for the age groups of arrival in Australia, and Australia includes External Territories.
4. OR (95% CI) refers to odds ratio odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

The analyses described below focus on the ten most common countries of birth as reported in the 2021 Census as they account for 54% of overseas born people in Australia and demonstrate the key results. There are 176 countries included in the full results presented in the supplementary tables. For the ten most common countries of birth:

- Italy, England, Australia and New Zealand had the highest proportion of people reporting one or more long-term health condition(s), multimorbidity, arthritis and heart disease, while India and China had the lowest.
- Diabetes was most commonly reported by those born in Italy, the Philippines, England, Vietnam, Malaysia and India. It was least commonly reported for those born in China.
- Asthma and mental health conditions were most commonly reported for people born in Australia, New Zealand or England and least commonly reported for those born in India and China.

Modelling the odds of selected long-term health conditions from country of birth

This section reports the results of logistic regression modelling the odds of reporting each long-term health condition based on a person's country of birth, including Australia which is used as the reference category. Full output from all regression models is provided in the supplementary tables (Tables S4.1–S4.4).

The results indicate after adjusting for the effects of age, sex and social determinants of health, most overseas born people were less likely to report long-term health conditions compared with Australian-born people. Detailed findings from the modelling are presented below.

1. Unadjusted models

The results from the unadjusted models showed that, among the most common ten countries of birth, compared with people born in Australia, the odds of reporting:

- one or more long-term health condition(s), multimorbidity, arthritis or heart disease were higher only for people born in Italy or England. The odds ratios were lowest for people born in China or India
- diabetes was similar or higher for other countries of birth. The odds ratio was highest for people born in Italy
- asthma or mental health conditions were lower for any country of birth whereas the odds ratios for reporting these conditions were highest for those born in England and New Zealand.

2. Adjusting separately for age and social determinants of health

When the results were adjusted for the effects of age and the social determinants of health, age generally appeared to have the largest effect on the odds of reporting long-term health conditions between some countries of birth and those born in Australia, with some exceptions. For example, after adjusting only for age, the odds ratios for reporting:

- one or more long-term health condition(s), multimorbidity, arthritis and heart disease were substantially reduced for people born in Italy or England, however only slight changes were observed for those born in other overseas countries.
- diabetes decreased for those born in Italy or England and increased for those born in the Philippines.
- asthma or a mental health condition did not change considerably for anyone born in overseas countries.

Adjusting separately for the social determinants of health generally did not affect the associations between country of birth and the reported long-term health conditions, with some exceptions. For example, the odds ratio for reporting one or more long-term health condition(s) was 0.8 for males and females born in New Zealand in the unadjusted models and increased to 1.3 for males and 1.2 for females, after adjusting only for citizenship status.

3. Fully adjusted models

In the fully adjusted models, the odds ratios for the reported long-term health conditions were generally similar to the age adjusted odds ratios for the nine most common overseas countries of birth, with some exceptions. For example, the age adjusted odds ratio for reporting one or more long-term-health condition(s) was 0.78 for both males and females born in New Zealand. After adjusting for the effects of age, education, labour force status, income, housing suitability, tenure, citizenship status, remoteness and marital status in the fully adjusted model, the odds ratios increased by around 30% to 1.1 for males and 1.0 for females born in New Zealand (Table 4 below).

Compared with the Australian-born population, adjusting for the effects of age and the social determinants of health impacts on the odds of people born in different countries reporting diabetes in different ways. For example, the odds ratio of reporting diabetes increased for those born in India and China compared with those born in Australia after adjusting for the effects of age and social determinants of health, while they decreased for those born in Italy. The odds ratios for reporting all other long-term health conditions were similar to, or lower, than those for people born in Australia.

Table 4: Adjusted odds ratios for the association between country of birth and reporting long-term health conditions in 2021, adjusted for

Table 4: Adjusted odds ratios for the association between country of birth and reporting long-term health conditions in 2021, adjusted for age and social determinants of health in the fully adjusted model

Health outcome and population size (n)	Odds ratio (95% CI) Males	Odds ratio (95% CI) Females
1 or more of any chronic condition (n= 7,694,494 males and 8,008,772 females)	China 0.33 (0.32–0.33) England 0.93 (0.92–0.94) India 0.42 (0.42–0.43) Italy 0.75 (0.74–0.77) Malaysia 0.57 (0.56–0.58) New Zealand 1.06 (1.05–1.07) Philippines 0.71 (0.70–0.73) South Africa 0.77 (0.75–0.78) Vietnam 0.46 (0.45–0.47)	China 0.28 (0.28–0.29) England 0.94 (0.93–0.94) India 0.34 (0.34–0.34) Italy 0.83 (0.82–0.85) Malaysia 0.49 (0.49–0.50) New Zealand 1.02 (1.01–1.03) Philippines 0.56 (0.56–0.57) South Africa 0.74 (0.73–0.75) Vietnam 0.39 (0.38–0.39)
Multimorbidity (n=7,684,786 males and 7,999,963 females)	China 0.24 (0.24–0.25) England 0.88 (0.87–0.89) India 0.42 (0.41–0.43) Italy 0.80 (0.79–0.82) Malaysia 0.50 (0.48–0.52) New Zealand 0.91 (0.89–0.93) Philippines 0.61 (0.59–0.64) South Africa 0.66 (0.64–0.68) Vietnam 0.33 (0.32–0.34)	China 0.20 (0.19–0.20) England 0.90 (0.89–0.91) India 0.32 (0.31–0.33) Italy 0.90 (0.88–0.92) Malaysia 0.40 (0.39–0.41) New Zealand 0.91 (0.90–0.93) Philippines 0.48 (0.47–0.49) South Africa 0.59 (0.57–0.61) Vietnam 0.28 (0.27–0.28)
Arthritis (n=7,680,261 males and 8,000,705 females)	China 0.19 (0.19–0.20) England 0.93 (0.92–0.94) India 0.36 (0.34–0.37) Italy 0.76 (0.75–0.78) Malaysia 0.40 (0.38–0.42) New Zealand 0.97 (0.95–0.99) Philippines 0.64 (0.62–0.67) South Africa 0.64 (0.62–0.66) Vietnam 0.27 (0.26–0.28)	China 0.23 (0.22–0.23) England 1.02 (1.01–1.03) India 0.50 (0.49–0.51) Italy 0.97 (0.95–0.99) Malaysia 0.45 (0.43–0.46) New Zealand 0.95 (0.93–0.96) Philippines 0.53 (0.52–0.54) South Africa 0.68 (0.66–0.70) Vietnam 0.32 (0.31–0.33)
Asthma (n=7,678,607 males and 7,999,224 females)	China 0.15 (0.14–0.16) England 0.88 (0.87–0.89) India 0.20 (0.20–0.21) Italy 0.52 (0.51–0.55) Malaysia 0.49 (0.47–0.51) New Zealand 1.14 (1.12–1.16) Philippines 0.55 (0.53–0.57) South Africa 0.67 (0.65–0.69) Vietnam 0.44 (0.43–0.46)	China 0.12 (0.11–0.12) England 0.84 (0.83–0.85) India 0.22 (0.21–0.23) Italy 0.53 (0.52–0.55) Malaysia 0.47 (0.46–0.49) New Zealand 1.11 (1.09–1.13) Philippines 0.56 (0.54–0.57) South Africa 0.64 (0.62–0.66) Vietnam 0.31 (0.30–0.32)

Diabetes (n=7,684,641 males and 7,996,488 females)	China 1.02 (1.00–1.04) England 0.95 (0.94–0.96) India 2.61 (2.57–2.66) Italy 1.43 (1.40–1.46) Malaysia 1.46 (1.41–1.51) New Zealand 0.98 (0.96–1.00) Philippines 2.34 (2.28–2.41) South Africa 1.06 (1.03–1.10) Vietnam 1.15 (1.12–1.18)	China 0.93 (0.91–0.95) England 0.95 (0.94–0.96) India 2.24 (2.20–2.29) Italy 1.66 (1.63–1.70) Malaysia 1.32 (1.27–1.36) New Zealand 1.01 (0.99–1.03) Philippines 2.29 (2.24–2.34) South Africa 0.98 (0.94–1.02) Vietnam 1.19 (1.17–1.22)
Heart disease (n=7,675,515 males and 7,971,847 females)	China 0.45 (0.44–0.46) England 0.91 (0.89–0.92) India 0.94 (0.92–0.97) Italy 0.87 (0.85–0.89) Malaysia 0.79 (0.75–0.82) New Zealand 0.98 (0.96–1.00) Philippines 0.90 (0.86–0.93) South Africa 0.92 (0.89–0.96) Vietnam 0.43 (0.42–0.45)	China 0.59 (0.58–0.61) England 0.83 (0.82–0.85) India 0.67 (0.65–0.70) Italy 0.92 (0.90–0.95) Malaysia 0.58 (0.54–0.61) New Zealand 0.99 (0.96–1.02) Philippines 0.78 (0.75–0.81) South Africa 0.74 (0.70–0.78) Vietnam 0.48 (0.46–0.50)
Mental health condition (n=7,680,198 males and 8,002,089 females)	China 0.12 (0.11–0.12) England 1.00 (0.98–1.01) India 0.13 (0.13–0.13) Italy 0.65 (0.63–0.68) Malaysia 0.28 (0.27–0.30) New Zealand 0.89 (0.87–0.90) Philippines 0.23 (0.22–0.24) South Africa 0.71 (0.69–0.73) Vietnam 0.22 (0.21–0.23)	China 0.15 (0.15–0.15) England 0.97 (0.96–0.98) India 0.13 (0.12–0.13) Italy 0.92 (0.89–0.95) Malaysia 0.31 (0.30–0.32) New Zealand 0.86 (0.85–0.88) Philippines 0.22 (0.21–0.22) South Africa 0.73 (0.71–0.75) Vietnam 0.21 (0.21–0.22)

Notes

1. Results are from the fully-adjusted model which included the covariates, country of birth or person, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included people aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on country of birth of persons, age, the selected social determinants of health, and the long-term health conditions.
3. ‘Australia’ was selected as the reference category, when calculating the odds ratios for countries of birth, and Australia includes External Territories.
4. China excludes Special Administrative Regions (SARs) and Taiwan.
5. OR (95% CI) refers to odds ratio and the 95% confidence interval.
6. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

Of the ten most common languages spoken at home, Italian, English, Arabic, Greek and Spanish language groups had the highest proportion of people reporting one or more long-term health condition(s), multimorbidity, arthritis, heart disease and mental health conditions, while the Punjabi and the Mandarin language groups had the lowest. The proportion of people reporting diabetes was highest for the Italian, Greek, Arabic, Hindi and Vietnamese languages groups and lowest for the Punjabi and Mandarin language groups.

Modelling the odds of selected long-term health conditions from main language used at home

This section reports the results of logistic regression modelling the odds of each long-term health condition based on a person's main language spoken at home. The commentary in this section focuses on the results for the ten most common languages spoken at home reported in the 2021 Census, including 'English (only)' which is used as the reference category. Full output from all regression models is provided in the supplementary tables (Tables S5.1–S5.4).

The results observed from all regression models indicate that after adjusting for the effects of age and social determinants of health, people who speak languages other than English at home were less likely to report long-term health conditions than those who only speak English at home, with the exception of diabetes. Detailed findings from the modelling are presented below.

1. Unadjusted models

The odds ratios for all reported long-term health conditions were generally highest relative to those who spoke English at home for people who spoke mainly Arabic or a European language such as Italian and Greek, and lowest for those who spoke an Asian language such as Punjabi and Mandarin.

2. Adjusting separately for age and social determinants of health

When the results were separately adjusted for age and the social determinants of health, controlling for age substantially changed the odds ratios for reporting the selected long-term health conditions among people who spoke languages other than English at home, with some exceptions. After adjusting only for age, compared with those who spoke 'English only' at home, the odds ratios for reporting:

- one or more long-term health condition(s), multimorbidity, arthritis and heart disease were substantially reduced for the Italian and Greek language groups and did not change significantly for other non-English languages
- diabetes considerably changed (increased or decreased) for most non-English languages except those who spoke mainly Cantonese at home
- asthma and mental health conditions did not change considerably for any non-English languages.

Adjusting separately for the effects of the social determinants of health however had only a small impact on the odds ratios for the reported long-term health conditions in all non-English language groups, with the odds ratios generally remaining similar to the corresponding unadjusted odds ratios.

3. Fully adjusted models

In the fully adjusted models, the odds ratios for the reported long-term health conditions remained generally similar to the age-adjusted odds ratios for all of the more commonly spoken non-English languages, relative to those who spoke 'English only' at home. For example, the odds of males who mainly spoke Italian at home reporting one or more long-term health condition(s) was around 1.4 times higher than for those who spoke 'English only'. This odds ratio dropped to 0.8 after adjusting for age alone. After adjusting for the effects of age, education, labour force status, income, housing suitability, tenure, citizenship status, remoteness and marital status, the odds ratio was 0.9. In the fully adjusted model, compared with those who spoke English (only) at home, the odds of reporting:

- one or more long-term health condition(s), multimorbidity, arthritis and mental health was higher for those who spoke mainly languages such as Italian and Greek or Arabic at home and lower for those who spoke mainly Punjabi or Mandarin
- heart disease and diabetes were higher amongst those who spoke mainly Hindi, Punjabi, Arabic, Italian or Greek languages at home and lower for those who spoke mainly Cantonese, Mandarin or Vietnamese.

Table 5: Adjusted odds ratios for the association between main language used at home and reporting long-term health conditions in 2021, adjusted for age and social determinants of health in the fully adjusted model

Health outcome and population size (n)	Odds ratio (95% CI) Males	Odds ratio (95% CI) Females

1 or more of any chronic condition (n=7,700,447 males and 8,010,197 females)	Arabic 0.65 (0.64–0.66) Cantonese 0.50 (0.49–0.50) Greek 0.69 (0.68–0.70) Hindi 0.57 (0.56–0.58) Italian 0.81 (0.80–0.82) Mandarin 0.36 (0.36–0.37) Punjabi 0.29 (0.28–0.29) Spanish 0.64 (0.62–0.65) Vietnamese 0.52 (0.52–0.53)	Arabic 0.61 (0.61–0.62) Cantonese 0.43 (0.42–0.43) Greek 0.72 (0.71–0.73) Hindi 0.47 (0.46–0.48) Italian 0.86 (0.84–0.87) Mandarin 0.29 (0.29–0.30) Punjabi 0.25 (0.24–0.25) Spanish 0.65 (0.64–0.66) Vietnamese 0.42 (0.41–0.42)
Multimorbidity (n=7,681,233 males and 7,995,574 females	Arabic 0.70 (0.68–0.71) Cantonese 0.33 (0.32–0.34) Greek 0.71 (0.69–0.72) Hindi 0.65 (0.62–0.68) Italian 0.87 (0.85–0.89) Mandarin 0.26 (0.25–0.27) Punjabi 0.26 (0.25–0.28) Spanish 0.58 (0.56–0.60) Vietnamese 0.37 (0.35–0.38)	Arabic 0.65 (0.64–0.67) Cantonese 0.29 (0.28–0.30) Greek 0.75 (0.74–0.77) Hindi 0.49 (0.47–0.51) Italian 0.92 (0.90–0.93) Mandarin 0.20 (0.19–0.20) Punjabi 0.20 (0.19–0.21) Spanish 0.61 (0.60–0.63) Vietnamese 0.29 (0.29–0.30)
Arthritis (n=7,676,283 males and 7,997,120 females)	Arabic 0.65 (0.64–0.67) Cantonese 0.27 (0.26–0.29) Greek 0.66 (0.64–0.67) Hindi 0.42 (0.40–0.45) Italian 0.83 (0.81–0.85) Mandarin 0.21 (0.20–0.22) Punjabi 0.22 (0.20–0.24) Spanish 0.65 (0.62–0.68) Vietnamese 0.29 (0.27–0.30)	Arabic 0.96 (0.94–0.98) Cantonese 0.31 (0.30–0.31) Greek 0.85 (0.83–0.86) Hindi 0.64 (0.62–0.67) Italian 0.97 (0.96–0.99) Mandarin 0.23 (0.22–0.23) Punjabi 0.43 (0.40–0.45) Spanish 0.84 (0.82–0.87) Vietnamese 0.32 (0.31–0.33)
Asthma (n=7,687,447 males and 7,999,113 females)	Arabic 0.56 (0.54–0.57) Cantonese 0.51 (0.50–0.53) Greek 0.63 (0.61–0.65) Hindi 0.34 (0.33–0.36) Italian 0.69 (0.67–0.71) Mandarin 0.25 (0.24–0.26) Punjabi 0.16 (0.15–0.17) Spanish 0.66 (0.64–0.68) Vietnamese 0.72 (0.70–0.73)	Arabic 0.55 (0.54–0.56) Cantonese 0.34 (0.33–0.35) Greek 0.61 (0.60–0.63) Hindi 0.37 (0.35–0.38) Italian 0.65 (0.63–0.66) Mandarin 0.17 (0.17–0.18) Punjabi 0.17 (0.16–0.17) Spanish 0.63 (0.61–0.64) Vietnamese 0.45 (0.44–0.46)

Diabetes (n=7,692,473 males and 7,999,929 females)	Arabic 1.87 (1.83–1.91) Cantonese 1.07 (1.05–1.10) Greek 1.14 (1.12–1.17) Hindi 3.21 (3.12–3.31) Italian 1.33 (1.30–1.36) Mandarin 1.04 (1.02–1.06) Punjabi 1.82 (1.76–1.89) Spanish 1.11 (1.07–1.15) Vietnamese 1.15 (1.12–1.18)	Arabic 1.78 (1.74–1.82) Cantonese 1.11 (1.08–1.13) Greek 1.23 (1.20–1.26) Hindi 2.89 (2.80–2.99) Italian 1.52 (1.49–1.56) Mandarin 0.90 (0.87–0.92) Punjabi 1.44 (1.37–1.50) Spanish 1.20 (1.16–1.25) Vietnamese 1.20 (1.17–1.23)
Heart disease (n=7,676,408 males and 7,977,007 females)	Arabic 0.99 (0.97–1.02) Cantonese 0.49 (0.47–0.51) Greek 0.87 (0.85–0.89) Hindi 1.36 (1.30–1.42) Italian 0.90 (0.88–0.92) Mandarin 0.49 (0.48–0.51) Punjabi 0.76 (0.71–0.80) Spanish 0.60 (0.57–0.63) Vietnamese 0.46 (0.44–0.48)	Arabic 0.97 (0.93–1.00) Cantonese 0.53 (0.51–0.56) Greek 0.79 (0.76–0.81) Hindi 0.94 (0.88–1.00) Italian 0.96 (0.93–0.98) Mandarin 0.64 (0.61–0.66) Punjabi 0.53 (0.49–0.58) Spanish 0.63 (0.59–0.66) Vietnamese 0.51 (0.49–0.54)
Mental health condition (n=7,677,552 males and 7,996,244 females)	Arabic 0.35 (0.34–0.36) Cantonese 0.23 (0.22–0.24) Greek 0.65 (0.63–0.67) Hindi 0.18 (0.17–0.19) Italian 0.74 (0.72–0.76) Mandarin 0.15 (0.15–0.16) Punjabi 0.10 (0.09–0.10) Spanish 0.51 (0.49–0.53) Vietnamese 0.24 (0.23–0.25)	Arabic 0.35 (0.34–0.36) Cantonese 0.25 (0.25–0.26) Greek 0.75 (0.74–0.77) Hindi 0.19 (0.19–0.20) Italian 0.86 (0.84–0.88) Mandarin 0.16 (0.16–0.17) Punjabi 0.10 (0.09–0.11) Spanish 0.54 (0.52–0.55) Vietnamese 0.23 (0.23–0.24)

Notes

1. Results are from the fully-adjusted model which included the covariates, main languages spoken at home, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included people aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on main languages spoken at home, age, the selected social determinants of health, and the long-term health conditions.
3. ‘English (only)’ was selected as the reference category, when calculating the odds ratios for main languages spoken at home.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

This section reports the results of logistic regression modelling for English proficiency in combination with time since arrival in Australia and each long-term health condition. The aim is to assess whether the increased proportion of people reporting the health conditions related to time since arriving in Australia varies by level of proficiency in spoken English, and whether the social determinants of health influence the findings.

Results are presented as time since arrival stratified by each of the English proficiency groups including:

a. people who spoke 'English only',
b. people with high English proficiency (those who spoke English very well or well) and,
c. people with low English proficiency (those who did not speak English well or at all).

The overall results observed indicate that:

- people who have arrived in Australia more recently who spoke 'English only' were less likely to report long-term health conditions in the 2021 Census, but the odds moved towards the levels observed among Australian-born people with increasing time spent in Australia.
- people who arrived in Australia more recently with high English proficiency were less likely to report long-term health conditions (with males with diabetes being the exception) than people who had been in Australia longer. The odds ratios moved towards the Australian-born levels with increasing time in Australia.
- people who arrived in Australia more recently with low English proficiency were less likely to report long-term health conditions in the 2021 Census, but the odds moved towards the Australian-born levels the longer they stayed in Australia.

In all regression models, people who first arrived in Australia 0 to 10 years ago (before the 2021 Census) were selected as the reference category, when estimating the odds ratios. Full output from all regression models is provided in the supplementary tables (Tables S6.1–S6.9).

Detailed findings from the modelling are presented below.

a. Modelling the odds of selected long-term health conditions from time spent in Australia since first arrival, for people who spoke 'English only'

This section reports the results of logistic regression modelling the odds of selected long-term health conditions from a person's time spent in Australia since first arrival for people who spoke 'English only'. Full output from all regression models is provided in the supplementary tables (Tables S6.1–S6.9).

The overall results observed from all regression models indicate people who have arrived in Australia more recently who spoke 'English only' were less likely to report long-term health conditions in the 2021 Census, but the odds moved towards the levels observed among Australian-born people with increasing time spent in Australia. Detailed findings from the modelling are presented below.

1. Unadjusted models

The results from the unadjusted models showed that, compared with people who spoke 'English only' and had arrived in Australia in the last 10 years, the odds of reporting the reported long-term health conditions were higher for those who arrived more than 10 years ago. For people who spoke 'English only' at home, the odds ratios increased as time since arrival increased and was highest in those who arrived in Australia more than 20 years ago, for all reported long-term health conditions, other than asthma and mental health conditions. For reported asthma and mental health conditions, the odds ratios were highest among people born in Australia and spoke 'English only' at home.

2. Adjusting separately for age and social determinants of health

When the results were separately adjusted for age and the social determinants of health, controlling for age substantially changed the odds ratios for reporting all long-term health conditions other than asthma and mental health conditions, particularly for people who arrived in Australia more than 20 years and spoke English only' at home. After adjusting for age alone, the odds ratios for people who arrived more than 20 years ago and spoke 'English only' at home reporting asthma and mental health conditions were slightly higher than the corresponding unadjusted odds ratios.

Adjusting separately for other social determinants of health had less effect on the odds ratios than adjusting for age alone. This impact was generally most notable when adjusting for labour force status or occupation, followed by marital status, income or housing tenure, for people who arrived in Australia more than 20 years ago. For example, the unadjusted odds ratios for reporting multimorbidity were 9.0 for males and 6.6 for females who spoke 'English only' and first arrived in Australia more than 20 years ago compared with those arrived in Australia up to ten years ago. These odds ratios dropped to:

- 2.3 for males and 2.5 for females after adjusting only for *age*

- 5.3 for males and 4.6 for females after adjusting only for *labour force status*
- 6.4 for males and 4.6 for females after adjusting only for *marital status*
- 6.5 for males and 4.9 for females after adjusting only for *income*.

3. Fully adjusted models

In the fully adjusted models, the odds ratios for the reported long-term health conditions in both males and females who spoke 'English only' were similar to those observed when adjusting only for age across all time since arrival groups, including those born in Australia. For example, when unadjusted, the odds of reporting heart disease for males who spoke 'English only' and first arrived in Australia more than 20 years ago was 9.9 times higher than that for those who arrived in Australia in the last 10 years and spoke 'English only' at home. The odds ratio was 1.5 when the odds of reporting heart disease were modelled using age and time since arrival for males who arrived in Australia more than 20 years ago. This odds ratio of 1.5 was maintained in the fully adjusted model (Table 6 below). In the fully adjusted models, for males and females who spoke 'English only', the odds ratios for reporting long-term health conditions increased with time since arrival and were generally higher in the Australian-born group.

Table 6: Adjusted odds of reporting selected long-term health conditions for people who spoke 'English only' across the levels of time spent in Australia, compared with those who had spent 0 to 10 years before the 2021 Census, adjusting for age and social determinants of health in the fully adjusted model

Health outcome	Odds ratio (95% CI) Australia-born	Odds ratio (95% CI) 11 to 20 years	Odds ratio (95% CI) More than 20 years
1 or more of any chronic condition	Males: 1.85 (1.82–1.87) Females: 2.09 (2.06–2.11)	Males: 1.31 (1.29–1.33) Females: 1.38 (1.36–1.40)	Males: 1.58 (1.56–1.60) Females: 1.72 (1.69–1.74)
Multimorbidity	Males: 2.65 (2.56–2.74) Females: 2.98 (2.89–3.06)	Males: 1.47 (1.41–1.53) Females: 1.59 (1.53–1.64)	Males: 2.13 (2.06–2.21) Females: 2.36 (2.29–2.42)
Arthritis	Males: 2.00 (1.93–2.07) Females: 2.05 (1.99–2.11)	Males: 1.35 (1.29–1.40) Females: 1.39 (1.35–1.44)	Males: 1.63 (1.57–1.69) Females: 1.76 (1.71–1.82)
Asthma	Males: 1.84 (1.80–1.89) Females: 2.16 (2.12–2.21)	Males: 1.21 (1.18–1.25) Females: 1.29 (1.26–1.32)	Males: 1.46 (1.42–1.49) Females: 1.69 (1.65–1.72)
Diabetes	Males: 1.22 (1.18–1.27) Females: 1.34 (1.29–1.39)	Males: 1.11 (1.06–1.16) Females: 1.18 (1.12–1.23)	Males: 1.29 (1.25–1.34) Females: 1.40 (1.35–1.46)
Heart disease	Males: 1.59 (1.52–1.66) Females: 1.93 (1.82–2.04)	Males: 1.20 (1.14–1.26) Females: 1.24 (1.16–1.33)	Males: 1.48 (1.41–1.54) Females: 1.64 (1.55–1.74)
Mental health condition	Males: 2.35 (2.29–2.41) Females: 2.42 (2.38–2.47)	Males: 1.51 (1.46–1.55) Females: 1.50 (1.47–1.54)	Males: 1.92 (1.88–1.98) Females: 1.93 (1.89–1.97)

Notes

1. Results are from the fully-adjusted model which included the covariates, time spent in Australia, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status for people who spoke 'English only' at home. Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,672,185 males and 7,986,177 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on year of arrival in Australia and proficiency in spoken English (combined), age, the selected social determinants of health, and the long-term health conditions.
3. The '0 to 10 years' category was selected as the reference category, when calculating the odds ratios for the levels of time spent in Australia since first arrival.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

b. Modelling the odds of selected long-term health conditions from time spent in Australia since first arrival, for people with high English proficiency

The overall patterns observed from all regression models for people with high English proficiency (who spoke English very well or well) were similar to those observed from the models for people who spoke 'English only' at home. Namely, people who arrived in Australia more recently with high English proficiency were less likely to report long-term health conditions (with males with diabetes being the exception) than people who had been in Australia longer. The odds ratios moved towards the Australian-born levels with increasing time in Australia. Detailed findings from the modelling are presented below.

1. Unadjusted models

The results from the unadjusted models showed that, compared with people with high English proficiency who arrived in Australia up to ten years ago, the odds of reporting long-term health conditions were higher than those who arrived in earlier periods, that is more than ten years ago. For people with high English proficiency, the odds ratios increased as time since arrival increased and were higher in those who arrived in Australia more than 20 years ago, for all reported long-term health conditions, other than asthma and mental health conditions. The odds of reporting asthma or mental health conditions were higher among the Australian-born population with high English proficiency.

2. Adjusting separately for age and social determinants of health

When the results were separately adjusted for age and the social determinants of health, controlling for the effects of age had the largest effect on the odds ratios for reporting long-term health conditions other than asthma and mental health conditions for the Australian-born population with high English proficiency. The effect of adjusting for age was greatest on the odds of those with high English proficiency who arrived in Australia more than 20 years ago reporting long-term health conditions. The effect was small for those who spent 11 to 20 years in Australia. As was seen for people who spoke 'English only', the impact of adjusting for other social determinants of health on the odds ratios was small. However, changes in the odds ratios for people who arrived in Australia more than 20 years ago and were highly proficient in spoken English were observed when adjusting for the effects of labour force status, occupation, marital status, income, or housing tenure.

3. Fully adjusted models

After adjusting for the effects of age and the social determinants of health, for males and females with high English proficiency, the odds ratios for all categories of time since arrival in Australia were consistent with the corresponding age-adjusted odds ratios. In the fully adjusted models, the odds ratios for the most reported long-term health conditions for the Australian-born population with high English proficiency were generally similar to or higher than that for those with high English proficiency and who first arrived in Australia more than 20 years ago. For example, among males with high English proficiency, the odds ratio for reported diabetes when compared with those who arrived in the last ten years was highest in those who first arrived in Australia 11 to 20 years ago (1.3) and lowest in those born in Australia (0.9) (Table 7).

Table 7: Adjusted odds of reporting selected long-term health conditions for people who spoke English very well or well, across the levels of time spent in Australia, compared with those who had spent 0 to 10 years before the 2021 Census, adjusting for age and social determinants of health in the fully adjusted model

Health outcome	**Odds ratio (95% CI)** **Australia-born**	**Odds ratio (95% CI)** **11 to 20 years**	**Odds ratio (95% CI)** **More than 20 years**
1 or more of any chronic condition	Males: 3.04 (3.00–3.09) Females: 3.50 (3.46–3.55)	Males: 1.69 (1.66–1.71) Females: 1.73 (1.71–1.75)	Males: 2.73 (2.70–2.77) Females: 3.35 (3.30–3.39)
Multimorbidity	Males: 5.29 (5.08–5.50) Females: 7.29 (7.04–7.56)	Males: 2.08 (1.99–2.17) Females: 2.31 (2.22–2.40)	Males: 4.46 (4.30–4.63) Females: 6.71 (6.49–6.93)
Arthritis	Males: 3.57 (3.42–3.73) Females: 3.44 (3.32–3.55)	Males: 1.56 (1.49–1.63) Females: 1.67 (1.61–1.73)	Males: 2.63 (2.53–2.74) Females: 3.15 (3.05–3.25)
Asthma	Males: 5.74 (5.58–5.89) Females: 4.92 (4.80–5.03)	Males: 1.71 (1.67–1.77) Females: 1.71 (1.66–1.75)	Males: 3.27 (3.19–3.36) Females: 3.09 (3.02–3.16)
Diabetes	Males: 0.86 (0.83–0.88) Females: 1.26 (1.22–1.30)	Males: 1.34 (1.31–1.38) Females: 1.43 (1.39–1.48)	Males: 1.23 (1.20–1.26) Females: 1.75 (1.70–1.80)
Heart disease	Males: 1.80 (1.73–1.88) Females: 2.52 (2.38–2.67)	Males: 1.36 (1.30–1.42) Females: 1.40 (1.32–1.49)	Males: 1.41 (1.36–1.46) Females: 1.95 (1.85–2.05)
Mental health condition	Males: 6.13 (5.93–6.33) Females: 5.65 (5.51–5.78)	Males: 1.88 (1.81–1.95) Females 1.91 (1.86–1.96)	Males: 4.73 (4.57–4.88) Females: 5.02 (4.91–5.15)

Notes

1. Results are from the fully-adjusted model which included the covariates, time spent in Australia, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status in people who spoke English very well or well (high English proficiency). Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,672,185 males and 7,986,177 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on year of arrival in Australia and proficiency in spoken English (combined), age, the selected social determinants of health, and the long-term health conditions.
3. The '0 to 10 years' category was selected as the reference category, when calculating the odds ratios for the levels of time spent in Australia since first arrival.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

c. Modelling the odds of selected long-term health conditions from time spent in Australia since first arrival, for people with low English proficiency

The overall patterns observed from all regression models for people with low English proficiency (who did not speak English well or at all) was similar to those observed from the models for people who spoke 'English only' at home or those with high English proficiency. Namely, people with low English proficiency who arrived in Australia more recently were less likely to report long-term health conditions in the 2021 Census, but the odds moved towards the Australian-born levels the longer they stayed in Australia. People with low English proficiency who had been in Australia more than 20 years were more likely to report having diabetes than Australian-born people with low English proficiency, after adjusting for the effects of age, sex and social determinants of health. Detailed findings from the modelling are presented below.

1. Unadjusted models

The results from the unadjusted models showed that people with low English proficiency who arrived in Australia in the last ten years were less likely to report long-term health conditions than those with low English proficiency who arrived more than ten years ago. This result was observed for all reported long-term health conditions other than asthma and mental health conditions. For reported asthma and mental health conditions, the odds ratios were highest among the Australian-born population with low English proficiency.

2. Adjusting separately for age and social determinants of health

Adjusting for age increased the odds ratios for the reported long-term health conditions other than asthma and mental health conditions for the Australian-born population with low English proficiency, compared with those who arrived in Australia in the last ten years. The effect of adjusting for age on the odds ratios was strongest for those with low English proficiency and who arrived in Australia more than 20 years ago, and was generally smaller for those who arrived 11 to 20 years ago, relative to the unadjusted odds ratios. As was seen for people who spoke 'English only' or for those with high English proficiency, the impact of adjusting for other social determinants of health on the odds ratios were much less consistent, and generally most notable when adjusting for employment or occupation, marital status, income or housing tenure, particularly for people who arrived in Australia more than 20 years ago.

3. Fully adjusted models

After adjusting for the effects of age and the social determinants of health, for both males and females with low English proficiency, the odds ratios for all categories of time since arrival in Australia remained similar to the age adjusted odds ratios. In the fully adjusted models, the odds ratios for reporting the long-term health conditions for the Australian-born population with low English proficiency was mostly higher than for those who first arrived in Australia more than 20 years ago and lowest for those who arrived 11 to 20 years ago (Table 8 below). The exceptions were:

- females who arrived more than 20 years ago were as likely to report arthritis as Australian-born females
- females who arrived more than 20 years ago were more likely to report a mental health condition than females born in Australia
- males and females who arrived in Australia more than 20 years ago were likely to report diabetes than people born in Australia.

Table 8: Adjusted odds of reporting selected long-term health conditions for people who did not speak English well or at all, across the levels of time spent in Australia, compared with those who had spent 0 to 10 years before the 2021 Census, adjusting for age and social determinants of health in the fully adjusted model

Health outcome	Odds ratio (95% CI) Australia-born	Odds ratio (95% CI) 11 to 20 years	Odds ratio (95% CI) More than 20 years ago
1 or more of any chronic condition	Males: 4.53 (4.32–4.75) Females: 3.56 (3.38–3.76)	Males: 1.45 (1.41–1.50) Females: 1.49 (1.46–1.53)	Males: 2.25 (2.20–2.30) Females: 2.66 (2.61–2.71)
Multimorbidity	Males: 3.77 (3.48–4.09) Females: 3.51 (3.22–3.82)	Males: 1.47 (1.39–1.55) Females: 1.76 (1.69–1.83)	Males: 2.56 (2.47–2.67) Females: 3.46 (3.35–3.57)
Arthritis	Males: 4.44 (4.01–4.92) Females: 2.79 (2.53–3.08)	Males: 1.41 (1.32–1.52) Females: 1.68 (1.62–1.75)	Males: 2.57 (2.45–2.71) Females: 2.88 (2.79–2.98)
Asthma	Males: 6.90 (6.31–7.56) Females: 5.32 (4.85–5.83)	Males: 1.93 (1.78–2.09) Females: 1.97 (1.86–2.09)	Males: 4.61 (4.33–4.90) Females: 3.79 (3.62–3.97)
Diabetes	Males: 1.23 (1.13–1.35) Females: 1.25 (1.13–1.37)	Males: 1.17 (1.12–1.22) Females: 1.22 (1.18–1.26)	Males: 1.40 (1.35–1.44) Females: 1.63 (1.58–1.67)
Heart disease	Males: 2.17 (1.95–2.42) Females: 1.75 (1.53–2.01)	Males: 1.15 (1.09–1.22) Females: 1.18 (1.12–1.25)	Males: 1.30 (1.25–1.35) Females: 1.30 (1.25–1.35)

Mental health condition	Males: 6.02 (5.59–6.49) Females: 4.27 (3.95–4.62)	Males: 1.76 (1.65–1.89) Females: 1.91 (1.82–2.00)	Males: 4.01 (3.80–4.22) Females: 5.02 (4.84–5.22)

Notes

1. Results are from the fully-adjusted model which included the covariates, time spent in Australia, age, education, income, employment, tenure, housing suitability, remoteness, citizenship, marital status in people who do not speak English well or at all (low English proficiency). Analysis excluded overseas visitors, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households.
2. Analyses included 7,672,185 males and 7,986,177 females aged 15 and over living in Australia in occupied private dwellings on Census Night, who were not overseas visitors and provided a valid response to the 2021 Census questions on year of arrival in Australia and proficiency in spoken English (combined), age, the selected social determinants of health, and the long-term health conditions.
3. The '0 to 10 years' category was selected as the reference category, when calculating the odds ratios for the levels of time spent in Australia since first arrival.
4. OR (95% CI) refers to odds ratio and the 95% confidence interval.
5. All odds ratios are rounded to two decimal places.

Source: AIHW analysis of PLIDA, 2021.

Detailed results

Data from the 2021 Census and other sources can be further analysed to identify differences in disease outcomes and health service use patterns among people from CALD backgrounds. Future investigations could include examining outcomes for people from different CALD backgrounds with particular long-term conditions compared with those who speak ‘English only’, investigating lower reporting of mental health conditions in relation to mental health service use, and more detailed analyses of CALD variables of interest, such as proficiency in spoken English. This information will assist service providers in understanding ways in which public health messages and health service provision can be adapted to better address the needs of this diverse group.

Technical notes

Technical notes

This project uses the Census of Population and Housing 2021 extract in the Australian Bureau of Statistic (ABS) Person-Level Integrated Data Asset (PLIDA) formerly named Multi-Agency Data Integration Project (MADIP) updated from May 2023. PLIDA (or MADIP) is a secure data asset combining information on healthcare, education, government payments, income and taxation, employment, and population demographics (including the Census) over time. For more information on PLIDA, see the ABS web page, Supporting Analysis of The Life Course.

The 2021 Census was conducted on 10 August 2021. However, people could complete the Census between July and September 2021. The scope of the Census is every person present in Australia on Census night residing in private and non-private dwellings, with the exception of:

1. people in Australian external territories
2. foreign diplomats and their families
3. foreign crew members on ships who remain on the ship and do not undertake migration formalities
4. people leaving an Australian port for an overseas destination before midnight on Census night.

The 2021 Census data collected data about 18,436,395 people aged 15 years and over living in Australia in occupied private dwellings on Census Night.

The 2021 Census included a new health topic to capture data about Australians reporting selected long-term health conditions. This allows for the analysis of long-term health conditions data at more detailed geographic and sub-population levels than ABS health surveys can support.

For more information on the 2021 Census, see About the Census.

Technical notes

The scope of the analyses was limited to people aged 15 years and over living in Australia in occupied private dwellings on Census Night. Children under the age of 15 were excluded as some questions in the Census are only asked of people aged 15 and over.

This project excluded unoccupied private dwellings, people who live in non-private dwellings or Migratory, offshore and shipping SA1s, non-classifiable households or Visitor only households, as these are out of scope for many of the social and economic variables in the Census. Overseas visitors were also excluded as they are out of scope for the Census CALD variables.

Although Aboriginal and Torres Strait Islander (First Nations) people are diverse in language and culture, their experiences and needs are unique and are therefore considered distinct from the CALD population for the purposes of this report. Information about the health and wellbeing of First Nations people can be viewed at First Nations people.

Assessment of behavioural and biomedical health risk factors as explanatory factors is also out of scope for this report as information was not collected in the Census.

This scope formed the basis of the study population for all analyses in the report. However, the study population was further restricted to valid responses to the Census questions for the variables used in each set of regression models used in the modelling component of the report:

- long-term health conditions
- age and the social determinants of health
- specific CALD variables of interest for each set of regression models.

Each set of the regression models used different CALD variables, but the same long-term health condition and social determinant of health variables. The number of invalid responses to the long-term health condition questions are based on a single Census question. Therefore, the sample size in each set of analyses differed depending on the CALD variables of interest.

The set of models that used the country of birth or the languages used at home included specific countries of birth and languages, respectively. Country and language groups with a denominator less than 30 or a numerator less than 20 for a selected long-term health condition were excluded from the analyses. This exclusion criteria resulted in different specific country and language groups for females and males depending on the long-term health condition, so sample sizes differed in each set of analysis depending on sex and each long-term health condition variable.

Non-response

People who did not provide a response to the long-term health condition question or the CALD variables in the 2021 Census were excluded from these analyses. The ABS provides item non-response rates for person-level items in their Guide to the Census (Understanding data quality: Item non-response rates). The person-level non-response rates for the long-term health conditions and CALD variables used in these analyses are provided below.

Table 9: Item non-response rates from 2021 Census

Variable	Item non-response (%)
Count of selected long-term health conditions	8.1
Country of birth of person	5.3
Language used at home	5.7
Proficiency in spoken English	5.5
Year of arrival in Australia	2.4

For more details, please see Understanding data quality: Item non-response rates.

Technical notes

The findings from the AIHW's previous report Chronic health conditions among culturally and linguistically diverse Australians, 2021 raised further questions about which specific influences drive the results. Previous research indicates the patterns observed are likely to reflect the diverse cultures, languages, migration trajectories, social and economic circumstances among CALD people in Australia (AIHW 2022b; AIHW 2023; Castañeda et al. 2015; Jatrana et al. 2017; Kennedy et al. 2006; Kennedy et al. 2014; Khatri and Assefa 2022). Within countries, health and illness generally follow a social gradient: the lower the socioeconomic position the poorer the health. Social determinants of health are more important than health care or lifestyle choices, accounting for between 30–55% of health outcomes (WHO 2022).

Key social determinants of health include:

- income and social protection
- education
- unemployment and job insecurity
- working life conditions
- food insecurity
- housing, basic amenities and the environment
- early childhood development
- social inclusion and non-discrimination
- structural conflict
- access to affordable health services of decent quality (WHO 2022).

Barriers to accessing health services and information include poor health literacy, lack of translated materials, limited use of interpreters and lack of culturally aware service provision (Khatri and Assefa 2022). People from CALD backgrounds experiencing mental health conditions are also recognised as facing additional challenges and vulnerabilities in accessing health services owing to shame, stigma and misunderstanding (Khatri and Assefa 2022). The process of migration is an important social determinant of health and can affect health directly or indirectly, through changes to other social circumstances such as housing and living conditions (Castañeda et al. 2015). In addition, immigration is a consequence of social factors such as poverty, educational and employment opportunities, and persecution. The findings in this report are limited to the data sources used but provide an opportunity for future investigation into the social determinants of health.

References

AIHW (Australian Institute of Health and Welfare) (2022b) *Australia's Health: Topic summaries*, AIHW, Australian Government, accessed 16 February 2024.

AIHW (2023) *Chronic health conditions among culturally and linguistically diverse Australians, 2021*, AIHW, Australian Government, accessed 05 April 2024.

Castañeda H, Holes SM, Madrigal DS, DeTrinidad Young M.-E, Beyeler N and Quesada J (2015) 'Immigration as a social determinant of health'. *Annual Review of Public Health* 36(1):375–392. doi: 10.1146/annurev-publhealth-032013-182419

Hamilton TG (2015) 'The healthy immigrant (migrant) effect: in search of a better native-born comparison group', *Social Science Research* 54:353–365, doi:10.1016/j.ssresearch.2015.08.008

Jatrana S, Richardson K and Samba SRA (2017) 'Investigating the dynamics of migration and health in Australia: a longitudinal study', *European Journal of Population* 24:519–65, doi:10.1007/s10680-017-9439-z.

Kennedy S, McDonald JT and Biddle N (2006) 'The Healthy Immigrant Effect and immigrant selection: evidence from four countries', *Social and Economic Dimensions of an Aging Population Research Papers*, 164.

Kennedy S, Kidd MP, McDonald JT and Biddle N (2014) 'The Healthy Immigrant Effect: pattern and evidence from four countries', *Journal of International Migration and Integration* 16(2):317–322, doi:10.1007/s12134-014-0340-x.

Khatri RB and Assefa Y (2022) 'Access to health services among culturally and linguistically diverse populations in the Australian universal health care system: issues and challenges', *BMC Public Health* 22:880, doi:10.1186/s12889-022-13256-z.

World Health Organization (WHO) (2022) *Social determinants of health*, WHO website, accessed 1 May 2023.

Technical notes

Country of birth of person

'Country of birth of person' is coded using the 'Standard Australian Classification of Countries (SACC), 2016'. For more information on the 'Country of birth of persons' data item in the 2021 Census, see *Country of birth of person (BPLP)*. In the set of logistic regression models that used the country of birth as the specific CALD variable of interest, people 'born in Australia' were selected as the reference group.

Country of birth is the most commonly used CALD variable, and the one for which most information is collected and reported (ABS 1999; AIHW 2022a). It is easy to define and is consistent over time, however it has its limitations. For example, country of birth alone does not provide information on the year that people arrived in Australia, which can impact their settlement and connection to community and health and support services.

Year of arrival in Australia

'Year of arrival in Australia' reports the year in which a person born overseas first arrived in Australia to live for one year or more. For more information on this indicator, see *Year of arrival in Australia (YARP)*. Time since arrival in Australia was calculated as the difference between the year of arrival and 2021, the Census year. This variable was categorised as '0 to 10 years', '11 to 20 years', and 'more than 20 years'. People who were born in Australia were also included as a separate category. In the set of logistic regression models that used the time spent time in Australia as the specific CALD variable of interest, people who first arrived in Australia '0 to 10 years' before the 2021 Census were selected as the reference group.

The length of time migrants have been in Australia can give an indication of how familiar they are with Australian society and health practices (ABS 1999; AIHW 2022a). It is also useful to explore how the social characteristics of migrants change with length of time spent in Australia (ABS 1999), such as changes in their risk of chronic disease. However, when used individually, it fails to inform on socio-cultural differences between the populations. It also does not take into account the fact that as an individual spends more time in the host country, their proficiency in the language can improve, thereby enhancing their ability to access healthcare (AIHW 2022a).

Language used at home

'Language used at home' identifies whether a person uses a language other than English at home and if so, records the main non-English language which is used. This indicator is coded, using the 'Australian Standard Classification of Languages (ASCL) 2016'. For more information on the 'Language used at home' data item in the Census see *Language used at home (LANP)*. In the set of logistic regression models where the language used at home was used as the specific CALD variable of interest, people who spoke 'English only' at home were selected as the reference group.

Proficiency in spoken English

'Proficiency in spoken English' in the 2021 Census was collected only for those who nominated speaking a language other than English at home and the indicator classifies a person's self-assessed proficiency in spoken English where they identified that they use a main language other than English at home. This item also includes the 'English (only)' category referring to people who use only English at home. For more information on this Census data item including measurement issues, see *Proficiency in spoken English (ENGLP)*. Proficiency in spoken English were categorised as high (very well or well) English proficiency, low (not well or not at all) English proficiency and 'English only'. In the set of logistic regression models where proficiency in spoken English was used as the specific CALD variable of interest, people with 'high English proficiency (Very well or well)' were selected as the reference group.

This information is useful to identify those who may experience barriers in accessing services due to their lack of ability in spoken English (ABS 1999). It is important to note that the indicator does not provide information on other aspects of communication such as listening, reading, writing, and comprehension, which are also relevant to understanding health information. Additionally, a person's assessment of their ability to speak English is subjective, as different people may have different requirements for spoken English proficiency in everyday life (ABS 1999; AIHW 2022a).

Proficiency in spoken English and Year of arrival combined

Combining the proficiency in spoken English and the year of arrival data may provide information on migrants for whom English language proficiency may have been a barrier to access health services over longer periods of time (ABS 1999; AIHW 2022a). It can help account for the differences in potential disadvantage between population groups by the years spent in Australia. In the set of logistic regression models that combined time spent in Australia and proficiency in spoken English, separate models were run for each category of proficiency in spoken English, with people who first arrived in Australia '0 to 10 years' before the 2021 Census selected as the reference group.

References

ABS (Australian Bureau of Statistics) (1999) *Standards for statistics on Cultural and Language Diversity*, ABS website, accessed 22 August 2022.

AIHW (Australian Institute of Health and Welfare) (2022a) *Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper*, AIHW, Australian Government, accessed 17 October 2022.

Technical notes

The 2021 Census collected a range of socioeconomic variables, some of which were considered as determinants of long-term health conditions among CALD populations in this project. The specific variables used are described in more detail below:

- *Level of highest educational attainment* was asked of people aged 15 and over and includes both school and non-school education. This variable provides a single measure of a person's overall level of highest educational attainment. For analysis, this variable was classified as secondary education or lower (including no education), high school certificate, bachelor's degree or higher. For more information on this Census data item, see Level of highest educational attainment (HEAP). In the regression models that included this variable, the 'Bachelor's degree or higher' category was selected as the reference category.
- *Labour force status* for people aged 15 and over was recorded and analysed as employed (full time or part time), unemployed or not in labour force for the week prior to the Census. For more information on this Census data item, see Labour force status (LFSP). In the regression models that included this variable, the 'Employed' category was selected as the reference category.
- *Occupation* describes the primary job or occupation held by employed people in the week prior to Census Night and who are aged 15 and over at the time of the Census. This variable was derived from the corresponding Census data item comprising an 8-level classification (managers, professionals, technicians and trade workers, community and personal service workers, clerical and administrative workers, sales workers, machinery operators and drivers, labourers), which is coded using the Australian and New Zealand Standard Classification of Occupations (ANZSCO), 2013, Version 1.3. The categories of 'unemployed' and 'not in the labour force' were included to ensure full coverage of the analysis population. For more information on this Census data item, see Occupation (OCCP). In the set of logistic regression models that included this variable, the 'Managers' category was selected as the reference category.
- *Income* was analysed using *equivalised total household income*. This variable is household income adjusted by the application of an equivalence scale to facilitate comparison of income levels between households of differing size and composition. This variable reflects that a larger household would normally need more income than a smaller household to achieve the same standard of living. For analysis, this variable was classified into 7 categories:
  - $0-$299 ($0-$15,599 per annum)
  - $300-$499 ($15,600-$25999 per annum)
  - $500-$799 ($26000-$41599 per annum)
  - $800-$1,249 ($41,600-$64,999 per annum)
  - $1,250-$1,749 ($65,000-$90,999 per annum)
  - $1,750-$2,499 ($91,000-$129,999)
  - $2,500 or more ($130,000 or more per annum).

For more information on this Census data item, see Equivalised total household income (HIED). In the regression models that included this variable, the '$2,500 or more ($130,000 or more annually)' category was selected as the reference category.

Housing circumstances included *tenure type* and *housing suitability*. Tenure describes whether a dwelling is owned, being purchased or rented. This variable is derived directly from the corresponding Census data item, which collects the information from people residing in occupied private dwellings. The categories for this variable include owned outright, owned with a mortgage, rented, and other. The 'Other' category of the tenure type variable includes 'rent-free', 'life tenure scheme', 'shared equity arrangement' and the 'other' category of the tenure type Census data item.

Housing suitability is a measure of housing utilisation based on a comparison of the number of bedrooms in a dwelling with a series of household demographics, such as the number of usual residents, their relationship to each other, age, and sex. For analysis, housing suitability was classified as 'at least 1 extra bedroom needed', 'no extra bedrooms needed or spare', 'has at least 1 spare bedroom available'. In the regression models that included the tenure type and/or the housing suitability data items, the 'no extra bedrooms needed or spare', and the 'Owner outright' categories were selected as the reference categories, respectively.

For more information on the tenure type Census data item, see Tenure type (TEND) and for information on the housing suitability Census data item, see Housing suitability (HOSD).

The remoteness of people's places of usual residence was classified using the Australian Statistical Geographical Standard (ASGS) remoteness structure. The derived *remoteness* variable included the 'Major cities', 'Inner Regional', 'Outer Regional', 'Remote' and 'Very remote' categories. In the models that included the derived remoteness variable, the 'Major cities' category was selected as the reference category.

Marital status was derived from the 'social marital status' variable which records a person's relationship status based on their current living arrangements as 'married in a registered marriage', 'married in a de facto marriage' or 'not married'. Social marital status is based on 'registered marital status' and 'relationship to other person in household'. Persons recorded as 'not married' were re-classified in this report as either 'never married', 'separated', 'divorced' or 'widowed' using the 'registered marital status' variable. Some people were classified in a married category in 'social marital status' and in an unmarried category on 'registered marital status'; these were left as married as it is most likely to reflect their current circumstances. Some people were classified as 'not married' on the 'social marital status' variable and married on registered marital status. These were kept as married as it could not be determined if they were separated,

divorced or widowed. For more information on the social marital and the registered marital status Census data items, please visit Social marital status (MDCP) and Registered marital status (MSTP). The scope of both data items includes people aged 15 and over. In the regression models that included this combined marital status variable, the 'Married in registered marriage' category was selected as the reference category.

Australian citizenship indicates whether a person is an Australian citizen after having met several requirements or permanent residency. This is a proxy measure of residency which can impact on a person's ability to access health services. Different migrant groups may vary in their tendency to seek citizenship. For more information on this Census data item, see Australian citizenship (CITP). In the regression models that included this variable, the 'Australian citizen' category was selected as the reference category.

Age is calculated in the Census from date of birth or stated age if date of birth is not provided. Where a respondent does not answer the question, age is imputed using other information on the form and using an age distribution of the population. For more information on this Census data item, see Age (AGEP).

Age group derived using this Census data item to include the '15-24', '25-34', '35-44', '45-54', '55-64', '65-74', and the '75 and over' age groups. In the regression models that included this variable, the '15-24' category was selected as the reference category.

Sex in the 2021 Census is based on a person's sex characteristics, such as their chromosomes, hormones and reproductive organs (ABS 2022b). While typically based upon the sex characteristics observed and recorded at birth or infancy, a person's sex can change over the course of their lifetime and may differ from their sex recorded at birth (AIHW 2022a). For more information on *Sex* in the 2021 Census, see the *Census Dictionary*. The regression analyses were stratified by sex, with data only available for the two categories 'male' and 'female'.

References

ABS (Australian Bureau of Statistics) (2022b) *Sex (SEXP)*, ABS website, accessed 1 November 2022.

AIHW (Australian Institute of Health and Welfare) (2022a) *Reporting on the health of culturally and linguistically diverse populations in Australia: An exploratory paper*, AIHW, Australian Government, accessed 17 October 2022.

Technical notes

In the 2021 Census, a question was included for the first time to capture information on the number of Australians with selected long-term health conditions. The Census included a single, long-term health conditions (LTHP) question which asked people of all ages if they have been told by a doctor or nurse that they have any of these long-term health conditions:

- arthritis
- asthma
- cancer (including remission)
- dementia (including Alzheimer's)
- diabetes (excluding gestational diabetes)
- heart disease (including heart attack or angina)
- kidney disease
- lung condition (including chronic obstructive pulmonary disease (COPD) or emphysema)
- mental health condition (including depression or anxiety)
- stroke
- any other long-term health condition(s).

Respondents were asked to include health conditions that have lasted, or are expected to last, for six months or more and to include health conditions that:

- may recur from time to time
- are controlled by medication
- are in remission.

This report analysed the five most common specific long-term health conditions reported in the 2021 Census and responsible for a significant burden of disease in Australia: mental health conditions, arthritis, asthma, diabetes and heart disease. In addition, analyses included reporting one or more long-term health condition (s) (i.e. one or more of any long-term health condition(s) and multimorbidity (i.e. two or more of the ten long-term health conditions that are included in the Census as listed above).

For more information, see Census dictionary: Health.

Strengths and limitations of long-term health condition data from the 2021 Census

The main advantages of the Census as a source of long-term health conditions data are:

- it includes the total Australian population, as opposed to ABS health surveys which are based on a sample of the total population. This means the data can be used to look at the proportion of the population reporting long-term health conditions among people in smaller geographic regions or in small population groups, which is not possible from surveys
- the data can be cross-classified with other data collected in the Census
- it includes people in non-private dwellings such as hospitals and nursing homes which are out of scope for most ABS health surveys.

The main limitations to the Census as a source of long-term health conditions data are:

- the data were collected for the first time in the 2021 Census so there is currently no time series data available
- the long-term health conditions data collected are based on a single question whereas ABS health surveys have a detailed set of questions to capture the proportion of people reporting these conditions more accurately
- data relies on the respondent reporting long-term health conditions, or in some cases reporting long-term health conditions of other people in the household, in most cases without an interviewer present to help
- data is only available for the listed conditions above
- under-reporting and over-reporting may occur for some conditions compared with surveys. This is due to self-reporting and reporting on behalf of other members of the household, as well as potential sensitivities about individual health conditions.

Information based on reported data only is likely to underestimate the rate of long-term health conditions due to respondents either not knowing or not accurately reporting their health condition (Liddell et al. 2021). These factors may be specifically relevant in the migrant populations who may have English as a second language and lack of trust in government due to previous experiences (Liddell et al. 2021). Additionally, there may be cultural sensitivities around reporting certain health conditions such as mental health conditions (Paudyal et al. 2021).

For more information on the purpose, collection method, advantages and limitations of the long-term health conditions in the Census see Comparing ABS long-term health conditions data sources.

References

Liddell BJ, Murphy S, Mau V, Bryant R, O'Donnell M, McMahon T, and Nickerson A (2021) 'Factors associated with COVID-19 vaccine hesitancy amongst refugees in Australia', *European Journal of Psychotraumatology*, 12(1), 1997173. doi:10.1080/20008198.2021.1997173.

Paudyal P, Tattan M and Cooper MJF (2021) 'Qualitative study on mental health and well-being of Syrian refugees and their coping mechanisms towards integration in the UK', *British Medical Journal open*, 11(8), e046065. doi:10.1136/bmjopen-2020-046065.

Technical notes

It is important to note the health of any population is a product of many factors beyond the social determinants of health at a point in time analysed in this report. For people from CALD backgrounds, these factors include environmental, economic, genetic and socio-cultural factors in their home country and Australia, as well as their migration experience.

Data were not available to examine long-term health conditions amongst CALD people also belonging to other vulnerable population groups such as people with disability and/or people who identify as lesbian, gay, bisexual, trans/transgender, intersex, queer, and other sexuality (including asexual), gender, and bodily diverse (LGBTIQ+).

While the effect of social determinants of health were able to be assessed in these analyses, further data are needed to identify the social and economic drivers behind the observed associations between time spent in Australia since the first arrival and reported long-term health conditions.

Technical notes

Logistic regression

A set of multivariable logistic regression models were used to estimate odds ratios and 95% confidence intervals (CI) for associations between the long-term health conditions and CALD variables, adjusting for age and social determinants of health variables. The models do not include biomedical risk factors, behavioural risk factors, environmental measures or other factors which influence a person's health outcomes (AIHW 2022).

Logistic regression is the most common method used to analyse the association between a binary outcome (the dependent variable) and a number of exposure variables (the independent variables). It is used in statistics to estimate the probability of an event occurring (such as a long-term health condition) based on the underlying data used to create a model.

It is important to note the modelling shows association between variables but does not explain what is causing the association.

Logistic regression models the association between the outcome variable and exposure variables producing odds ratios and 95% confidence intervals:

- The outcome variables in this report were the selected long-term health conditions – constructed in binary form (i.e. reporting the condition or not reporting the condition)
- The exposure variables (covariates) in this report were the selected CALD, age and social determinant of health variables.

Odds ratios

An odds ratio is used to measure the odds of an event occurring given an exposure or characteristic (for example reporting a certain cultural and linguistic background) compared with the odds of an outcome (for example reporting a long-term chronic health condition) in the absence of that exposure. It also represents the ratio of odds of an event in one group, compared with that in another (the reference) group.

An odds ratio of less than 1 means that the odds of an outcome occurring for a group with a certain characteristic is lower than that for the reference group.	An odds ratio of 1 means that the odds of an outcome occurring for a group with a certain characteristic is not different than that for the reference group for the respective characteristic.	An odds ratio of greater than 1 means that the odds of an outcome occurring for a group with a certain characteristic is higher than that for the reference group.

It is important to note that the odds ratio is a point estimate derived through a statistical process. For this reason, ninety-five per cent (95%) confidence intervals (CI) are also presented to indicate the statistical precision and significance. Confidence intervals show the likely range within which the true parameter value should fall. A wide confidence interval indicates that the true value may vary substantially from the reported estimate. The result is interpreted as having a statistically significant association (that is, less likely to chance) if the value of 1.00 does not sit within the confidence interval range.

Modelling strategy

Regression modelling may be used to predict future values of the outcome variable, or to develop an explanatory model of exposures that are associated with the outcome. The aim of the modelling strategy for these analyses was to develop a set of binomial logistic regression models to estimate odds ratios and 95% confidence intervals (CI) for associations between the long-term health conditions and CALD variables, adjusting for age and social determinants of health variables. Binomial logistic regression modelling was chosen as the dependent variables being modelled were binary and the data met the criteria for binomial logistic modelling. Results were stratified for males and females.

The modelling strategy consisted of several steps for each long-term health condition to answer the specific questions of this report:

1. Unadjusted associations between each long-term health condition (the dependent variable) and each CALD variable (the independent variable), separately.
2. A series of models where each model from step 1 was adjusted for age and each social determinant of health variable (covariates), separately.
3. A multivariable model for each long-term health condition and CALD variable that was adjusted for all covariates, together.
4. A set of models that specifically explored the interaction between English proficiency and the number of years since first arriving to Australia.

Results were stratified for males and females. The set of regression models that used the country of birth or the main languages used at home variables included specific countries of birth and languages, respectively. Country and language groups with a denominator less than 30 or a numerator less than 20 for a selected long-term health condition were excluded from the analyses. This exclusion criteria resulted in

different specific country and language groups for females and males depending on the long-term health condition, so sample sizes differed in each set of analysis depending on sex and each long-term health condition variable.

The commentary for the regression modelling component of this report focuses on the odds of reporting long-term health conditions for a population of certain CALD characteristic compared with the reference group, across the set of regression models from the unadjusted models to the fully adjusted models. The greater the change in the odds ratio (in the negative or positive direction), the greater was the impact adjusting (or controlling) for other covariates in the models (i.e., age, social determinants of health). This, in turn, indicates the extent that a social determinant of health explains associations between CALD variables and long-term health conditions.

References

AIHW (Australian Institute of Health and Welfare) (2022) *Australia's health: topic summaries*, AIHW, Australian Government, accessed 16 February 2024.

Notes

Acknowledgements

This work has been undertaken by the AIHW's Population Monitoring and COVID-19 Data Unit with reviews and feedback provided by various internal subject-matter experts and sections of the Department of Health and Aged Care. It has been funded by the Department of Health and Aged Care as part of the National Centre for Monitoring Chronic Conditions funding.

Data quality statement

For information on 2021 Census of Population and Housing data quality, see Quality declaration | Australian Bureau of Statistics (abs.gov.au)

Data

Related material

Resources

Related topics

- Chronic disease