



# VIRAL HEPATITIS MAPPING PROJECT

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## **Estimates of Hepatitis B prevalence, treatment, and care in NSW by Local Health District**

Summary Report 2020 (published 2022)

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*Report prepared by Jennifer MacLachlan, WHO Collaborating Centre for Viral Hepatitis, The Doherty Institute, in collaboration with the Hepatitis Programs Unit, NSW Health. Data provided by the Australian Bureau of Statistics, the Australian Government Department of Health and Aged Care, Services Australia, and NSW Health.*

*For queries, contact [Jennifer.maclachlan@mh.org.au](mailto:Jennifer.maclachlan@mh.org.au).*

## SUMMARY FINDINGS

- Nearly 80,000 people were living with chronic hepatitis B (CHB) in NSW in 2020, representing 1% of the population
- CHB prevalence varies widely according to LHD, and is highest in metropolitan regions
- Half of all people living with CHB in NSW in 2020 were resident in the three highest prevalence LHDs of Sydney, South Western Sydney, and Western Sydney
- Treatment uptake in NSW in 2020 was 13.7%, well below the National Hepatitis B Strategy target of 20% by 2022
- Treatment uptake increased only slightly between 2019 and 2020, meaning NSW is not on track to meet the target for treatment uptake
- Treatment uptake was greatest in the high-prevalence metropolitan LHDs, however only one has already met the 20% National Strategy target (South Western Sydney LHD)
- Only 27.8% of people living with CHB in NSW were receiving regular care (treatment or monitoring) in 2020, just over half the National Strategy care uptake target of 50% by 2022
- The number of people who received monitoring for hepatitis B declined in 2020, likely due to the impact of the COVID-19 pandemic on health service provision among other factors
- Areas with high monitoring uptake generally reflected those with high treatment uptake
- Coverage of hepatitis B immunisation in 12-month old children in NSW was 95.4%, reaching the National Strategy target of 95%, and coverage was above 95% in all but one LHD (Northern NSW)
- Liver cancer incidence in NSW varied widely by LHD, and was generally highest in metropolitan LHDs

**Table 1: Summary of treatment and care targets in current hepatitis B strategies**

STRATEGY AND INDICATOR	TARGET LEVEL	YEAR OF TARGET
<b><i>National Hepatitis B Strategy, 2018-2022<sup>1</sup></i></b>		
Treatment uptake	20%	2022
Care uptake	50%	2022
Immunisation coverage for 12-month-olds	95%	2022
<b><i>NSW Hepatitis B Strategy 2014-2020<sup>2</sup></i></b>		
Number treated	Increase by 300%	2020
Immunisation coverage for 12-month-olds	95%	2020

**Table 2: Summary table and heat map of CHB prevalence, treatment, and care in NSW in 2020, by LHD, ordered by CHB prevalence**

Local Health District	Total population	People living with CHB	CHB prevalence (%)	Treatment uptake (%)	Care uptake (%)
<b>NATIONAL TARGET</b>				<b>20%</b>	<b>50%</b>
Sydney	710,704	11,969	1.68%	11.9%	26.2%
Western Sydney	1,085,422	13,896	1.28%	15.8%	32.1%
South Western Sydney	1,063,869	13,121	1.23%	22.4%	40.7%
Northern Sydney	969,663	10,754	1.11%	15.5%	33.3%
South Eastern Sydney	967,326	10,617	1.10%	15.2%	30.4%
Far West	29,294	251	0.86%	*	*
Western NSW	282,541	2,097	0.74%	3.8%	*
Illawarra Shoalhaven	424,953	2,542	0.60%	5.5%	*
Southern NSW	209,543	1,236	0.59%	5.6%	*
Nepean Blue Mountains	389,465	2,213	0.57%	8.7%	16.0%
Mid North Coast	225,480	1,272	0.56%	6.1%	*
Hunter New England	941,608	5,015	0.53%	4.5%	9.3%
Central Coast	351,231	1,800	0.51%	5.9%	*
Northern NSW	307,494	1,542	0.50%	4.7%	*
Murrumbidgee	245,069	1,197	0.49%	5.1%	*
<b>NSW TOTAL</b>	<b>8,203,662</b>	<b>79,522</b>	<b>0.97%</b>	<b>13.7%</b>	<b>27.6%</b>

\*Data suppressed due to low numbers. See below tables for data source information.

Key: Green denotes the lowest prevalence and highest care and treatment uptake, with a colour gradient to red, denoting the highest prevalence and lowest care and treatment uptake.

Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and ABS population data. Treatment data sourced from Services Australia Medicare statistics via NSW Health.

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## PREVALENCE

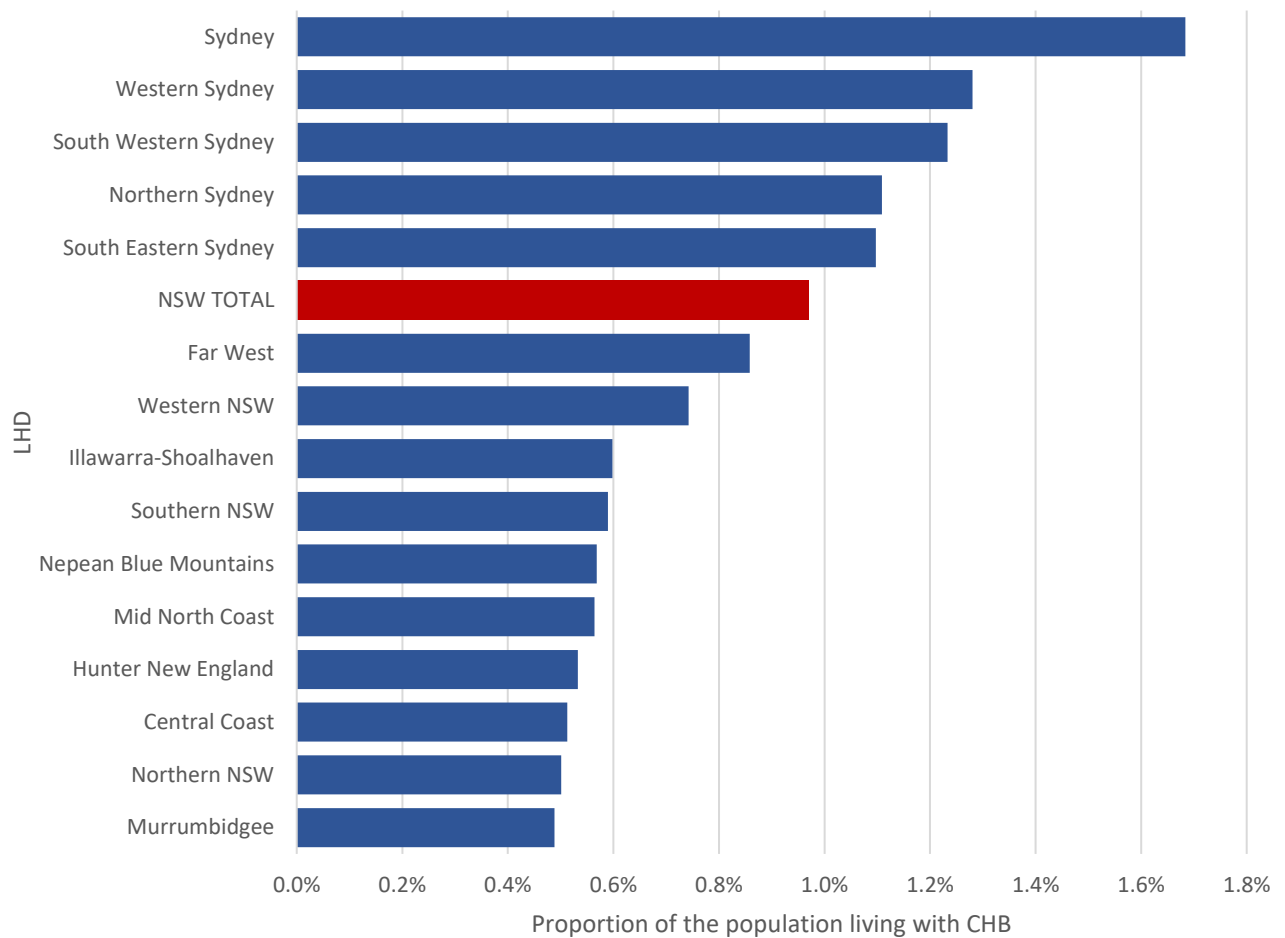
An estimated 79,522 people were living with chronic hepatitis B (CHB) in NSW in 2020, representing 0.97% of the population (Table 2). This prevalence is the second-highest of any jurisdiction in Australia, second only to the NT (1.84%).

The number of people estimated to be living with CHB in NSW declined during 2020, as it did Australia-wide. This was the first reduction in CHB prevalence in NSW since 1994, and was a result of the reduced migration intake due to the COVID-19 pandemic and international border closures. This decline occurred in all states and territories, but was most pronounced in VIC and NSW, where the number estimated to be living with CHB reduced by more than 1% between 2019 and 2020. This is in contrast to the stable increases of between 1-3% per year between 2012 and 2019.

### PREVALENCE BY LHD

CHB prevalence in NSW was highest in **Sydney LHD** (1.68%), **Western Sydney LHD** (1.28%), and **South Western Sydney LHD** (1.23%) (Figure 1). Half of all people living with CHB in NSW in 2020 were resident in these three highest-prevalence LHDs, despite making up only one-third of the population in total. Prevalence was also above the NSW average in **South Eastern Sydney LHD** (1.10%) and **Northern Sydney LHD** (1.11%). Of non-metropolitan LHDs, prevalence was highest in **Far West NSW LHD** (0.86%) and **Western NSW LHD** (0.74%), however like all LHDs outside of Sydney, prevalence was below the state average of 0.97%. There were limited variations in CHB prevalence among the remaining non-metropolitan LHDs, ranging from 0.49% (**Murrumbidgee LHD**) to 0.60% (**Illawarra Shoalhaven LHD**).

**Figure 1: CHB prevalence in NSW by LHD, 2020, ordered by prevalence**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and Australian Bureau of Statistics (ABS) population data. Distribution of population by LHD based on data from HealthStats NSW.

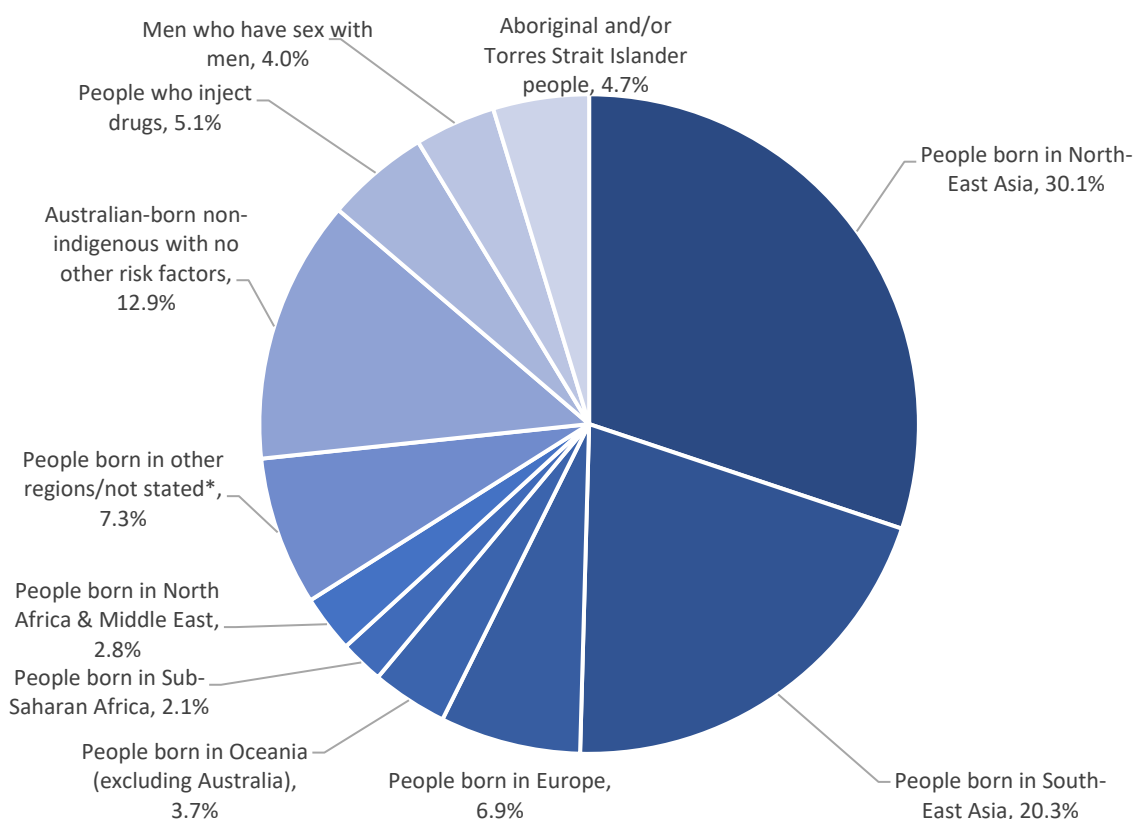
These estimates are based on the most recently available Australian Census data (from 2016) regarding demographics according to region. However, it is anticipated that the distribution of Australia’s population according to country of birth will have shifted significantly due to changes in migration patterns during the COVID-19 pandemic. In the next iteration of the Mapping Report these estimates will be comprehensively updated using data from the 2021 Census, as well as newly available literature about the prevalence of CHB in specific population groups. There have been some changes in estimated prevalence rankings compared to 2017, related to changes in the NSW Health data for estimated population by LHD. This has had the impact of increasing estimated prevalence in Western Sydney compared to South Western Sydney, among other changes.

## PREVALENCE BY PRIORITY POPULATION

The majority of people living with CHB in NSW were born overseas, with the most common regions of origin being North-East Asia (30.1% of the total) and South-East Asia (20.3% of the total, Figure 2). Smaller proportions were born in the regions of Europe (6.9%), Sub-Saharan Africa (2.1%), and North Africa and the Middle East (2.8%). Aboriginal and Torres Strait Islander people make up 4.7% of those affected. However, these proportions differ significantly across NSW due to differences in population distribution. For Aboriginal and Torres Strait Islander populations, in addition to differences in distribution, there are differences in prevalence according to region (See Table 3, below). Other population groups with a higher than average burden include people who inject drugs, who are estimated to represent 5.1% of the total population with CHB, and men who have sex with men, representing 4.0% of the total (Figure 2).

Note that while an individual may belong to more than one of these population groups, they were allocated to only one priority population based on the predominant transmission risk. Further detail regarding methodology for sourcing these estimates is available in the *Data sources and methodology* section.

**Figure 2: People living with CHB in NSW, by priority population, 2020**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and Australian Bureau of Statistics (ABS) population data. Note that while individuals may belong to more than one population group, they were allocated to only one in the model based on evidence regarding predominant transmission risk.

\*Born in other regions includes people born in the Americas and Southern and Central Asia.

## PREVALENCE BY CULTURAL AND LINGUISTIC DIVERSITY AND LHD

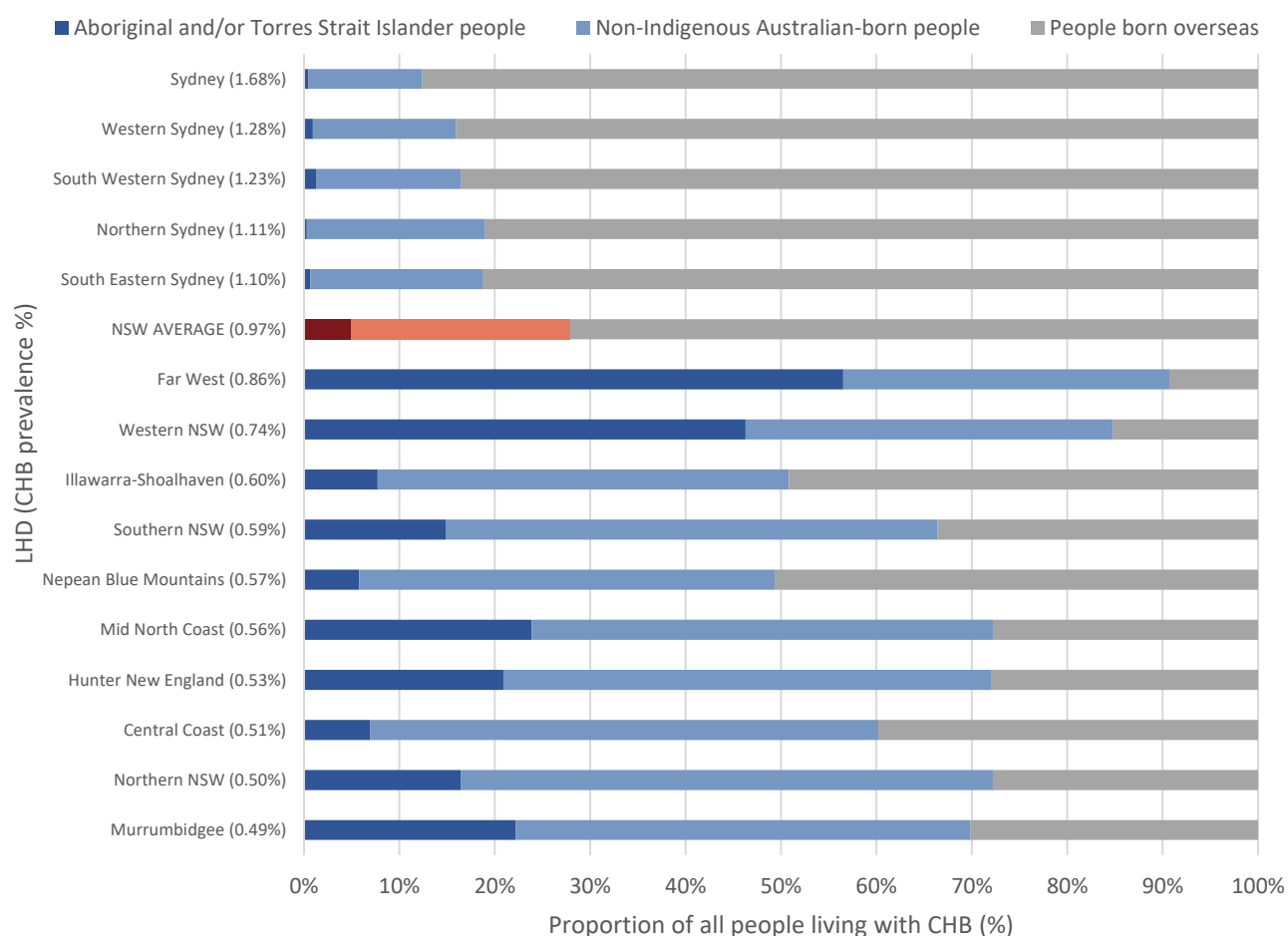
In many LHDs, people born overseas are the most common group living with CHB, reflecting the overall NSW distribution. However, in two LHDs, Aboriginal and Torres Strait Islander people make up the largest group of people living with CHB: **Far West NSW LHD** and **Western NSW LHD** (Figure 3).

In some LHDs in rural NSW, the Aboriginal and Torres Strait Islander population and/or the overseas-born population is lower than average, which means that the non-Indigenous Australian-born population is the most common group estimated to be living with CHB, despite low CHB prevalence in this group.

The responses to CHB in each local area and LHD must consider the particular priority populations affected in each region, in order to tailor culturally appropriate and effective public health approaches for the local community.

As discussed above, these estimates of top countries of birth and distribution according to LHD will be comprehensively revised in the next NSW Mapping Report, in accordance with the findings from the 2021 Australian Census.

**Figure 3: Proportion of people living with CHB in NSW, according to priority populations and LHD, 2020, ordered by CHB prevalence**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and Australian Bureau of Statistics (ABS) population data.



## PREVALENCE BY ABORIGINAL AND TORRES STRAIT ISLANDER STATUS AND REMOTENESS

Aboriginal and Torres Strait Islander Australians have a higher prevalence of CHB than the non-Indigenous Australian-born population, estimated to be around 2%<sup>3</sup>. However, this is an average figure for all Aboriginal and Torres Strait Islander people, and considerable variation has been demonstrated across geographic areas, with the burden of CHB generally being greater amongst people living in more rural and remote areas. The estimated prevalence in Aboriginal and Torres Strait Islander people has been modelled using available data sources<sup>4-6</sup> according to state/territory and remoteness classification.

These estimates are incorporated into LHD-specific CHB prevalence estimates. A summary of the prevalence variation among Aboriginal and Torres Strait Islander people in NSW is provided in Table 3. As seen at the national level, CHB prevalence is higher in more remote regions, and this is the cause of higher CHB prevalence in **Far West** and **Western NSW LHDs**, as reflected in Figure 3. Demographic factors are therefore important when identifying interventions to address CHB in the population to ensure they are tailored to local community needs.

**Table 3: Estimated prevalence of CHB among Aboriginal and Torres Strait Islander people in NSW, by Remoteness Area, 2020**

Remoteness Area	CHB prevalence (%)
Major cities	0.7%
Inner regional	0.8%
Outer regional	1.7%
Remote	6.7%
Very remote	N/A

Data source: CHB prevalence estimates in Aboriginal and Torres Strait Islander people based on established population prevalence from published studies, adjusted according to region using notifications data and ABS population distribution information.

N/A: No regions are majority 'very remote' and so this category is not used for prevalence calculations.

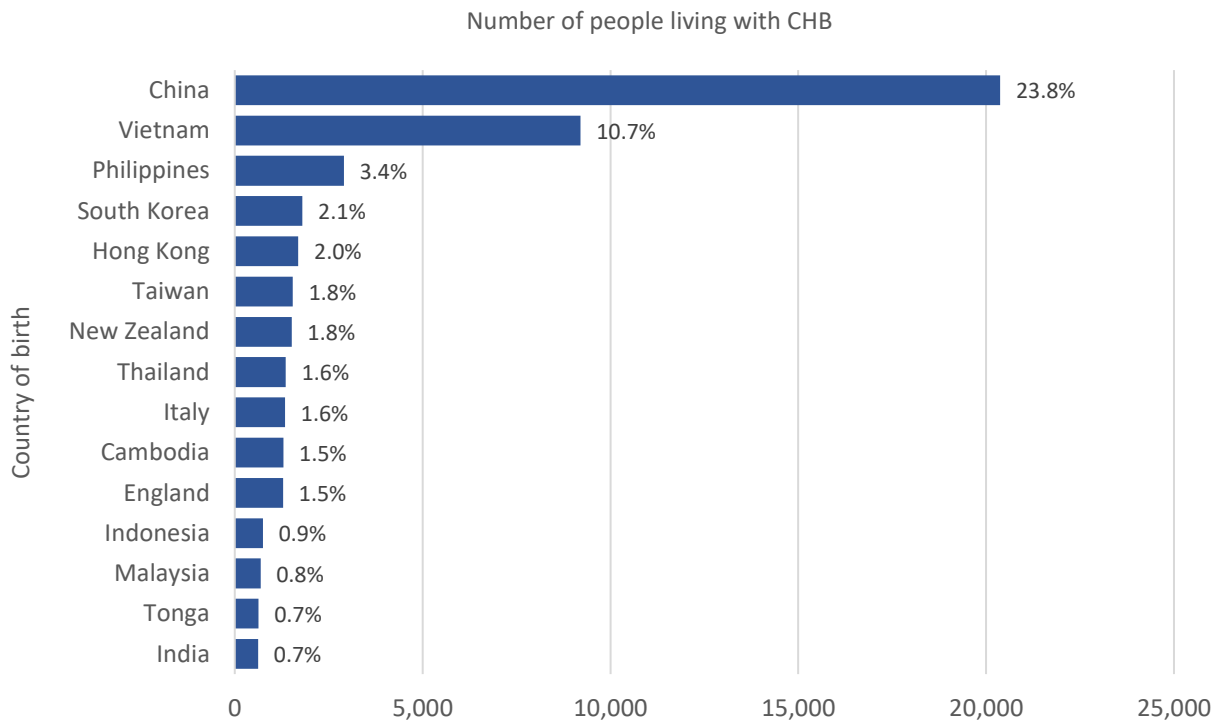
## PREVALENCE BY COUNTRY OF BIRTH AND ENGLISH PROFICIENCY

Among all people living with CHB in NSW who were born overseas, the majority were born in a relatively small number of countries, predominately in the Asia–Pacific region (Figure 4). The most common countries of birth in NSW are China (23.8% of people living with CHB) and Vietnam (10.7%) (Figure 4), which together represented more than one-third of people with CHB. The top 10 countries of birth comprise half of all people living with CHB in NSW. The distribution of top countries of birth generally reflects the distribution nationally, however of note is South Korea which is the 4<sup>th</sup> most common in NSW (2.1% of people living with CHB, Figure 4), compared to Australia overall where South Korea ranks 10<sup>th</sup>. Some countries, such as New Zealand and the United Kingdom, rank highly due to their very large populations within NSW, despite not being high-prevalence countries (although they may contain high-prevalence subpopulations, such as Māori).

The most common countries of birth vary according to LHD (Table 4). Although China is the most common country of birth in most LHDs, in **South Western Sydney LHD** the most common country of birth was Vietnam (36.5% of the total living with CHB). Additionally, in **South Western Sydney LHD**, Cambodia and Laos rank 3<sup>rd</sup> and 5<sup>th</sup> most common respectively, compared to 10<sup>th</sup> and 19<sup>th</sup> respectively in NSW overall (Figure 4).

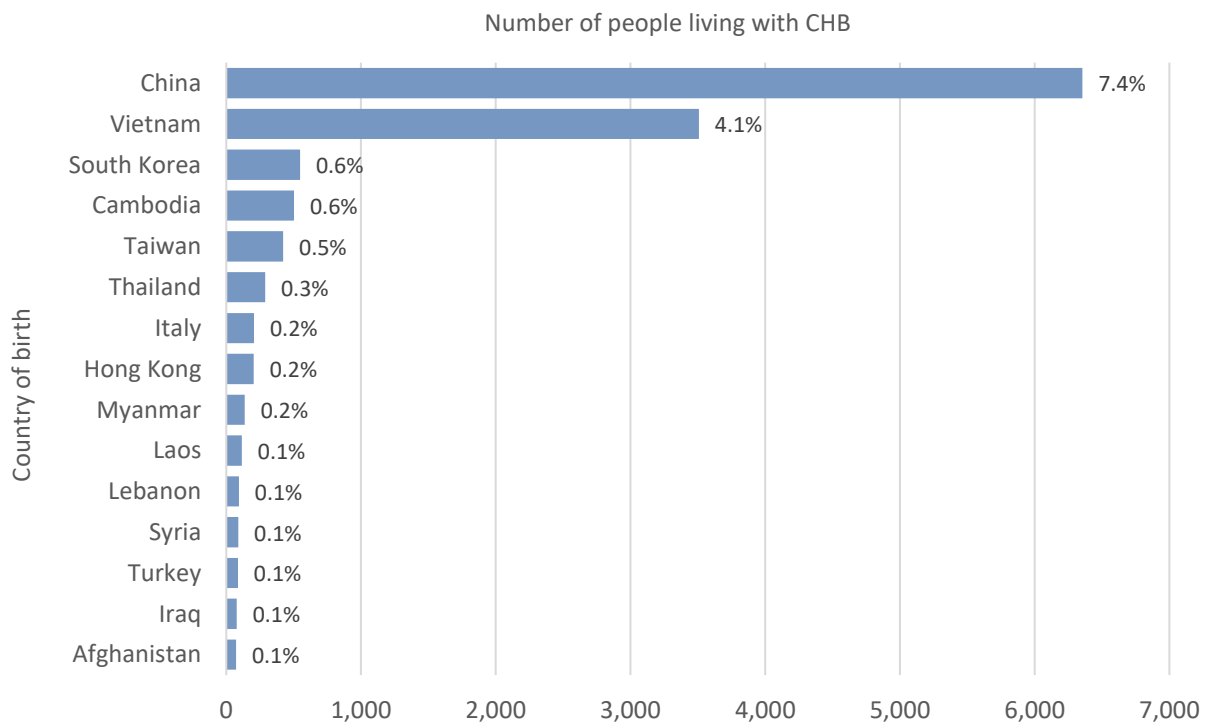
When assessing those who speak little or no English specifically, the most common countries of birth are broadly similar across LHDs, however there is greater representation from Cambodia, Myanmar and Laos (Figure 5), while the Philippines is less common than for the total population. The level of English proficiency amongst priority populations should be considered when identifying and implementing interventions to address CHB in the population. Where there is little or no English proficiency, a targeted approach is required to ensure interventions are informative and culturally appropriate within the specified group. The level of English proficiency by LHD will be available in the next iteration of the NSW Mapping Report.

**Figure 4: Number and proportion (in labels) of all people living with CHB in NSW, by country of birth, top 20 countries, 2020**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and Australian Bureau of Statistics (ABS) population data.

**Figure 5: Number and proportion (in labels) of people living with CHB in NSW who speak little or no English only, by country of birth, top 20 countries, 2020**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and Australian Bureau of Statistics (ABS) population data.

**Table 4: Top 5 countries of birth for people living with CHB in NSW LHDs<sup>^</sup>, 2020, ordered by CHB prevalence**

Local Health District	Country #1	% of all people with CHB	Country #2	% of all people with CHB	Country #3	% of all people with CHB	Country #4	% of all people with CHB	Country #5	% of all people with CHB
<b>Sydney</b>	China	37.9%	Vietnam	10.4%	Thailand	3.9%	South Korea	3.7%	Italy	2.5%
<b>Western Sydney</b>	China	27.9%	Vietnam	8.9%	Philippines	7.2%	South Korea	3.8%	Hong Kong	2.3%
<b>South Western Sydney</b>	Vietnam	36.5%	China	8.4%	Cambodia	7.0%	Philippines	3.0%	Laos	2.0%
<b>Northern Sydney</b>	China	38.4%	Hong Kong	4.9%	South Korea	4.5%	Taiwan	4.0%	Vietnam	3.1%
<b>South Eastern Sydney</b>	China	40.4%	Vietnam	4.2%	Hong Kong	3.1%	Philippines	2.6%	Taiwan	1.9%
<b>Illawarra Shoalhaven</b>	China	10.7%	Vietnam	4.5%	England	3.5%	Italy	3.4%	Philippines	2.1%
<b>Nepean Blue Mountains</b>	Philippines	6.8%	China	6.0%	New Zealand	3.3%	England	3.1%	Vietnam	2.5%
<b>Hunter New England</b>	China	5.0%	Philippines	2.3%	New Zealand	2.2%	England	2.1%	Vietnam	1.7%
<b>Central Coast</b>	China	6.5%	England	4.4%	New Zealand	3.7%	Philippines	3.0%	Vietnam	1.7%
<b>NSW TOTAL</b>	<b>China</b>	<b>23.8%</b>	<b>Vietnam</b>	<b>10.7%</b>	<b>Philippines</b>	<b>3.4%</b>	<b>South Korea</b>	<b>2.1%</b>	<b>Hong Kong</b>	<b>2.0%</b>

<sup>^</sup>LHDs where the number of people living with CHB was <30 for any of the top 5 countries of birth are not reported due to limited reliability of low numbers.

Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and ABS population data. Country-specific data sourced predominately from local antenatal studies.

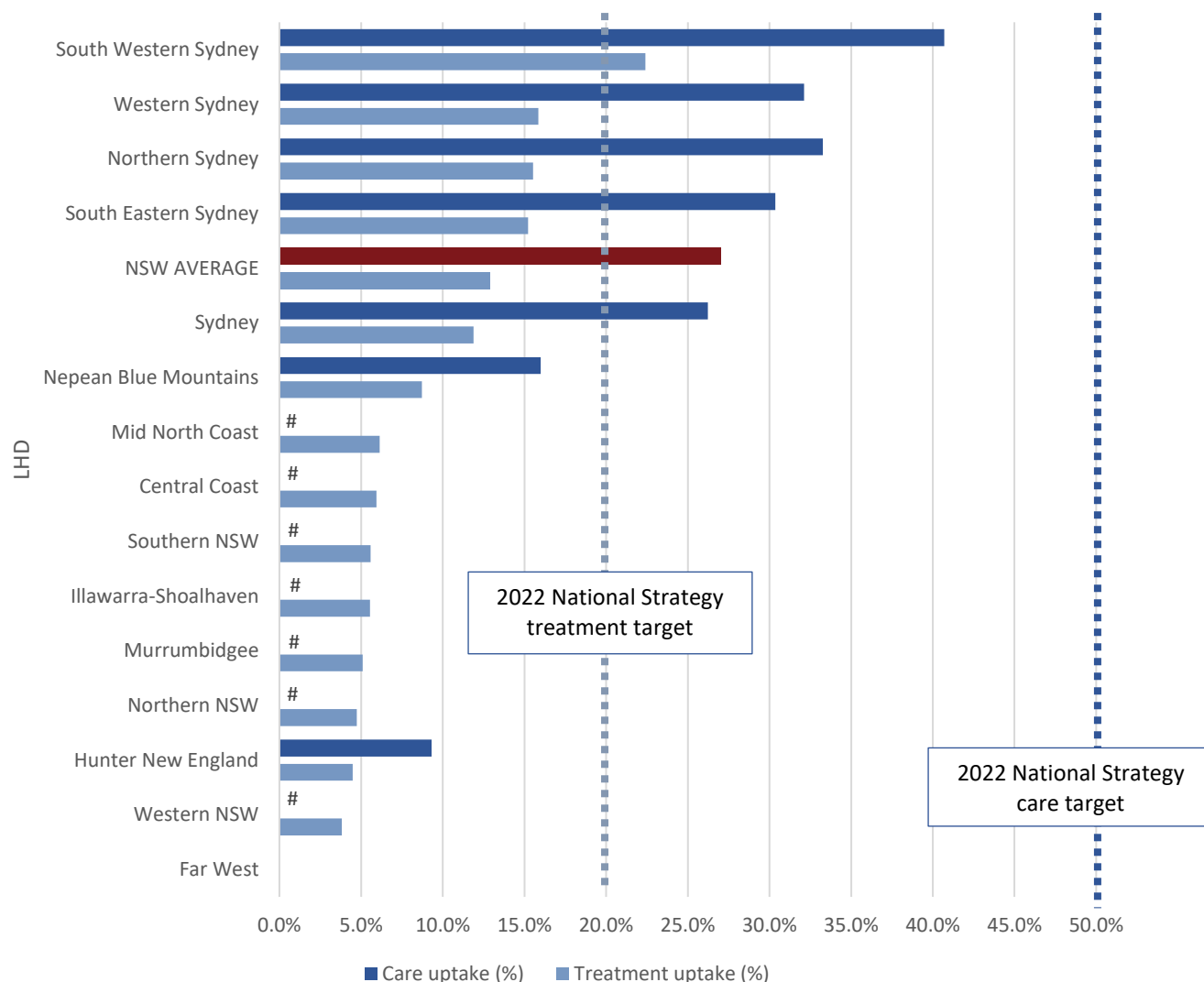
## TREATMENT AND CARE

During 2020, 10,886 people living with CHB in NSW were receiving treatment, or 13.7% of all people living with CHB. This was only two-thirds the 2018-2022 National Strategy target of 20%<sup>1</sup>. This target is based on the proportion of people living with CHB who are estimated to need treatment, and is reflected in the NSW Strategy targets for increases over time.

The number of people receiving treatment in NSW has increased gradually over time, from 7,424 in 2014 to 10,866 in 2020. However, this represents an increase of only 46%, well below the 300% increase which was set as the target in the 2014-2020 NSW Hepatitis B Strategy<sup>2</sup>. Notably, the increase between 2019 and 2020 was only 1.3%, below previous projections and likely resulting from health care service disruption and other factors related to the COVID-19 pandemic. Dramatic increases in the number of people receiving treatment in NSW are required in order to meet strategic targets.

Note this report uses data provided by LHD as the data source, and therefore treatment and care uptake estimates for NSW overall may vary slightly from the National Viral Hepatitis Mapping Report.

**Figure 6: Treatment and care uptake in NSW by LHD, 2020, ranked by treatment uptake**



Data source: CHB prevalence estimates based on mathematical modelling incorporating population-specific prevalence and ABS population data. Treatment and monitoring data sourced from the Services Australia Medicare statistics via NSW Health.

### TREATMENT AND CARE BY LHD

Treatment uptake varied widely between LHDs, and it exceeded the 20% target in **South Western Sydney LHD** (22.4%). Treatment uptake also reached above the state average of 13.7% in **Western Sydney LHD** (15.8%), **Northern Sydney LHD** (15.5%), **South Eastern Sydney LHD** (15.2%), and was similar to the average in **Sydney LHD** (11.9%) (Table 2, Figure 6). Treatment uptake was below the state average in all non-metropolitan LHDs, ranging from 3.8% (**Western NSW LHD**) to 8.7% (**Nepean Blue Mountains LHD**), which was less than half the National Strategy target of 20%. However, given the concentration of people living with CHB in urban areas, more than half of people in the state who likely require treatment but are not receiving it live in Greater Sydney.

Clinical guidelines recommend that all people living with hepatitis B should be receiving regular monitoring, and the National Strategy target for uptake of hepatitis B care (either treatment or regular monitoring) is 50% by 2022. In NSW in 2020, 11,030 people received a viral load for hepatitis B while not receiving treatment. When combining this figure with treatment numbers, care uptake in 2020 was estimated to be 27.6%, just over half of the National Strategy target. Care uptake declined from 28.4% in 2019, due to a reduction in the number of people receiving monitoring, likely in relation to health service access disruption during the COVID-19 pandemic.

As treatment uptake is a major component of the care uptake indicator, the variation according to geographic region largely reflected treatment uptake (Figure 6), in those areas that it could be assessed due to data suppression. The highest care uptake was seen in **South Western Sydney LHD** (40.7%), however it was still short of the national strategy target by 2022. Care uptake was also above the state average in **Northern Sydney LHD** (33.3%), **Western Sydney LHD** (32.1%), and **South Eastern Sydney LHD** (30.4%), while it was similar to the state average in **Sydney LHD** (26.2%). Care uptake was below the state average in the two LHDs with data available, and generally reflected treatment uptake.

#### TREATMENT AND CARE TRENDS BY LHD

Treatment and care trends varied substantially by LHD between 2019 and 2020. The number of people receiving treatment increased between 2019 and 2020 in nine LHDs, decreased in four LHDs, and remained stable in two LHDs. However, low numbers in a number of regional LHDs means assessment of trends is subject to considerable uncertainty. Assessing trends in treatment uptake between 2019 and 2020 is also limited as the denominator data regarding the number living with hepatitis B has not yet been updated with revised Census data, and the impacts of migration and demographic changes during 2020 will have varied by region.

Those regions with a decline in the number treated were **Northern NSW LHD**, **Central Coast LHD**, **South Eastern Sydney LHD** and **Sydney LHD**. The disruptive impact of the COVID-19 pandemic on health services was likely a direct factor especially in the Sydney regions, however indirect impacts of policies such as border closure and movement restriction may also have had impacts in areas less directly affected by high case numbers.

Trends in care uptake were only able to be assessed in seven LHDs, as the remaining LHDs could not be reported on due to low numbers. However, the number of individuals receiving monitoring for hepatitis B declined in all regions except **South Eastern Sydney LHD**.

**Table 5: CHB treatment uptake in 2019 and 2020, by LHD, ordered by CHB prevalence**

LHD	Number receiving treatment, 2019	Number receiving treatment, 2020	Proportional change in treatment, 2019 to 2020 (%)	Number receiving HBV viral load monitoring tests, 2019	Number receiving HBV viral load monitoring tests, 2020	Proportional change in monitoring, 2019 to 2020 (%)
Sydney	1,435	1,422	-0.9%	1,857	1,718	-7.5%
Western Sydney	2,185	2,202	0.8%	2,455	2,260	-7.9%
South Western Sydney	2,867	2,940	2.5%	2,632	2,401	-8.8%
Northern Sydney	1,617	1,670	3.3%	2,039	1,907	-6.5%
South Eastern Sydney	1,627	1,617	-0.6%	1,570	1,607	2.4%
Far West NSW	*	8		*	*	
Western NSW	73	80	9.6%	54	*	
Illawarra Shoalhaven	135	141	4.4%	241	*	
Southern NSW	68	69	1.5%	54	*	
Nepean Blue Mountains	185	193	4.3%	165	161	-2.4%
Mid North Coast	78	78	0.0%	*	*	
Hunter New England	219	225	2.7%	269	242	-10.0%
Central Coast	114	107	-6.1%	148	*	
Northern NSW	76	73	-3.9%	*	*	
Murrumbidgee	61	61	0.0%	*	*	
<b>NSW TOTAL</b>			<b>1.3%</b>			<b>-9.0%</b>

Data source: Treatment data sourced from Services Australia Medicare statistics via NSW Health.

\*Cell suppression applied where values are <50 for monitoring, and <6 for treatment.

As noted above, the number of people estimated to be living with CHB in NSW reduced in 2020 as a result of migration changes from international border closures due to COVID-19, which may have affected the number of new treatment initiations or viral load monitoring tests provided. However, given that treatment numbers need to significantly increase to prevent attributable morbidity and mortality, the observed decline in treatment and care is a problematic trend. Additionally, analysis of historical data demonstrates that 60% of people who initiated treatment in 2019 had a record of prior Medicare Benefits Scheme (MBS) testing, indicating the majority of new initiations in a given year are not occurring in those who have recently migrated, and suggesting there has been reduced treatment initiations.



## TREATMENT AND CARE BY PROVIDER TYPE AND LHD

Overall in NSW, 12.0% of people who received treatment had it prescribed by a GP. The proportion of treatment prescribed by GPs was generally higher in non-metropolitan LHDs, reflecting national trends.

The majority of monitoring tests were provided by GPs, and this proportion was relatively similar across LHDs, although this could not be assessed in most regional LHDs due to data suppression. The proportion of monitoring provided by GPs was highest in **Western Sydney LHD** (73.0%).

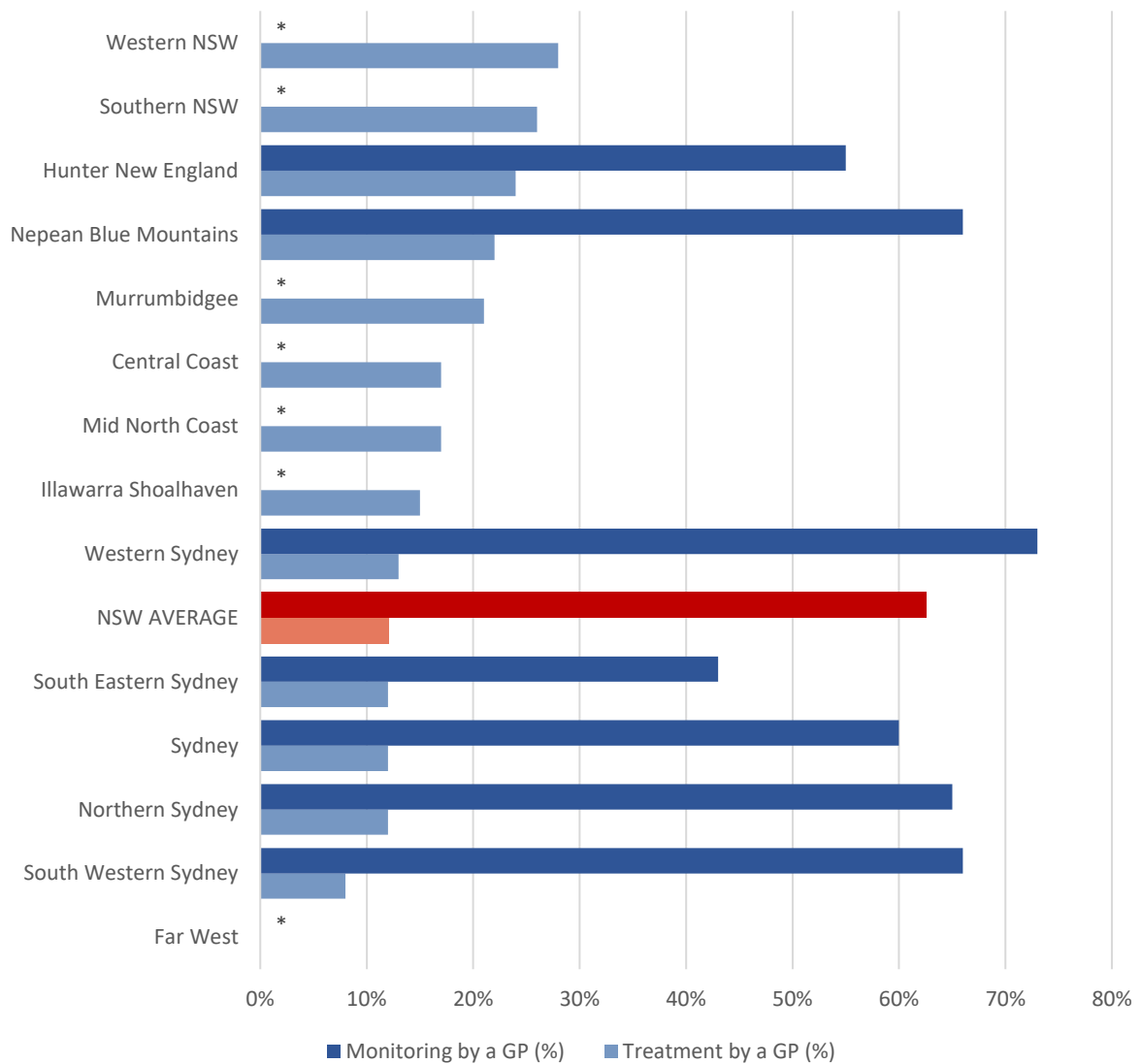
**Table 6: CHB treatment and monitoring by provider type by LHD, 2020, ordered by CHB prevalence**

LHD	Number receiving treatment, 2020	Proportion of treatment provided by a GP, 2020	Number provided monitoring, 2020	Proportion of monitoring provided by a GP, 2020
Sydney	1422	12%	1,718	60%
Western Sydney	2202	13%	2,260	73%
South Western Sydney	2940	8%	2,401	66%
Northern Sydney	1670	12%	1,907	65%
South Eastern Sydney	1617	12%	1,607	43%
Far West NSW	8	*	*	*
Western NSW	80	28%	*	*
Illawarra Shoalhaven	141	15%	*	*
Southern NSW	69	26%	*	*
Nepean Blue Mountains	193	22%	161	66%
Mid North Coast	78	17%	*	*
Hunter New England	225	24%	242	55%
Central Coast	107	17%	*	*
Northern NSW	73	30%	*	*
Murrumbidgee	61	21%	*	*
<b>NSW TOTAL</b>	<b>10,886</b>	<b>12.0%</b>	<b>11,233</b>	<b>61.0%</b>

Data source: Treatment and monitoring data sourced from Services Australia via NSW Health.

\*Cell suppression applied where values are < 50 for monitoring, and <6 for treatment.

**Figure 7: CHB treatment and monitoring by provider type by LHD, 2020, ordered by GP treatment proportion**

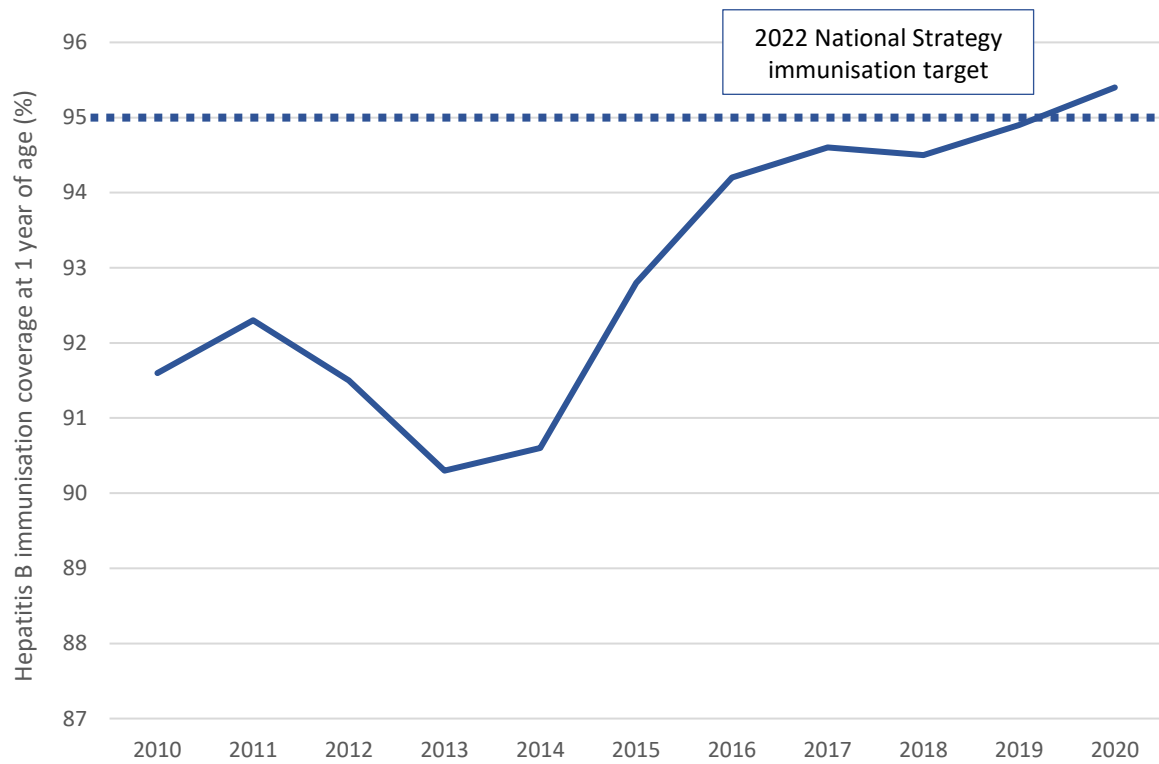


Data source: Treatment and monitoring data sourced from Services Australia via NSW Health.  
 \*Data suppressed due to low numbers.

## IMMUNISATION

For the first time in 2020, NSW reached the National Strategy target of 95% coverage for hepatitis B immunisation at 12 months of age (Figure 8).

**Figure 8: Hepatitis B immunisation coverage at 1 year of age, by year, 2011-2020**



Data source: Australian Immunisation Register via Health Protection NSW.

## IMMUNISATION BY LHD

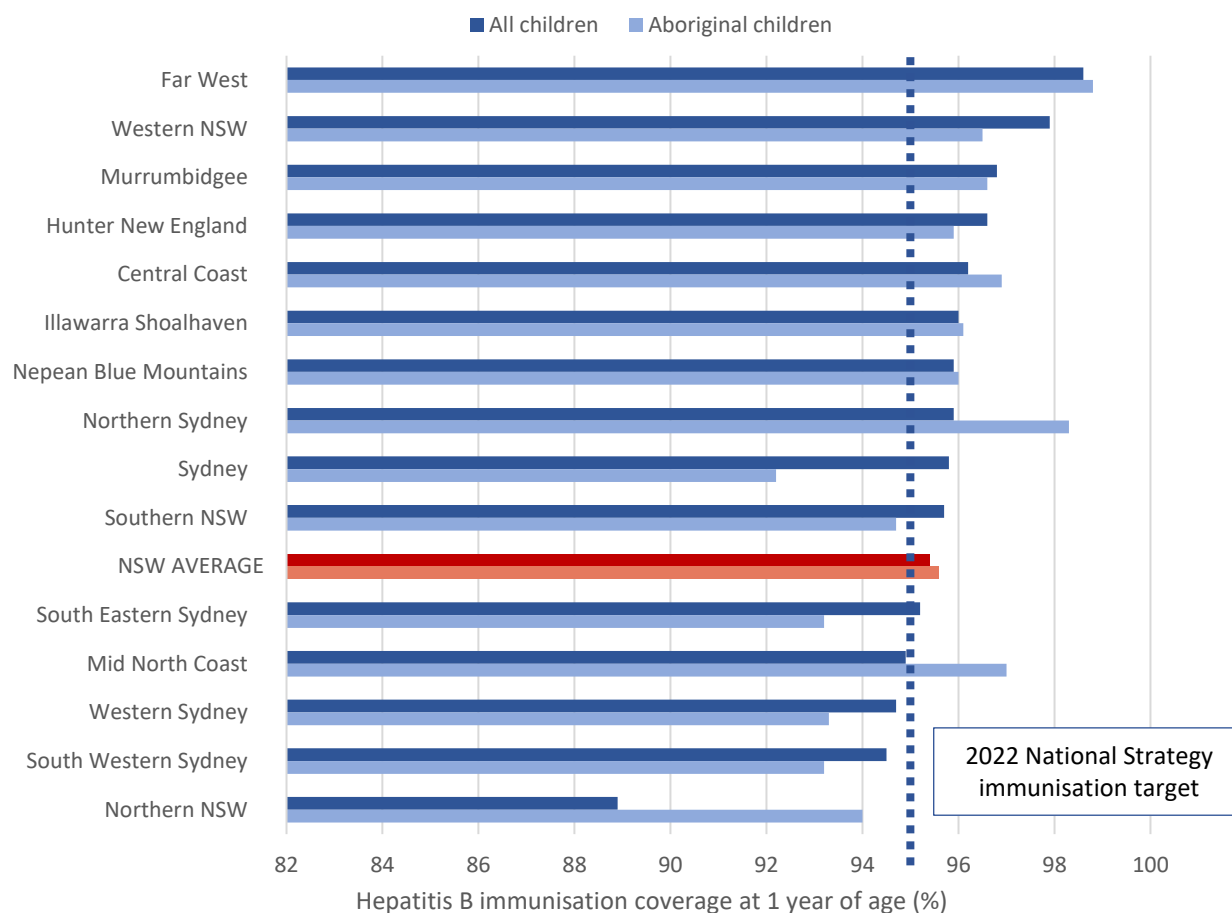
When assessing all children, all LHDs had reached or approximated the 95% National Strategy target for hepatitis B immunisation uptake at 12 months of age, with the exception of **Northern NSW LHD** (88.0% uptake, Table 7). The overall uptake for Aboriginal children (95.6%) in NSW was similar to non-Aboriginal children (95.4%). However, some LHDs were below 95% uptake for Aboriginal children, predominately in metropolitan areas (**Northern NSW LHD**, 94.0%; **South Eastern Sydney LHD**, 93.2%; **South Western Sydney LHD**, 93.2%; **Sydney LHD**, 92.2%; and **Western Sydney LHD**, 93.3%). The majority of these regions were those where the proportion of children who are Aboriginal is below the state average.

**Table 7: Hepatitis B immunisation coverage at 1 year of age in NSW, by LHD and Indigenous status, ordered by CHB prevalence, 2020**

LHD	Aboriginal children		Non-Aboriginal children		All children	
	Number in LHD	Uptake (%)	Number in LHD	Uptake (%)	Number in LHD	Uptake (%)
Sydney	129	92.2%	7,041	95.9%	7170	95.8%
Western Sydney	402	93.3%	13,708	94.7%	14,110	94.7%
South Western Sydney	532	93.2%	14,446	94.6%	14,978	94.5%
Northern Sydney	60	98.3%	9,413	95.9%	9,473	95.9%
South Eastern Sydney	190	93.2%	9,803	95.3%	9,993	95.2%
Far West	85	98.8%	260	98.5%	345	98.6%
Western NSW	866	96.5%	2,637	98.4%	3,503	97.9%
Illawarra Shoalhaven	462	96.1%	4,083	96.0%	4,545	96.0%
Southern NSW	226	94.7%	1,975	95.8%	2,201	95.7%
Nepean Blue Mountains	470	96.0%	4,944	95.9%	5,414	95.9%
Mid North Coast	434	97.0%	1,820	94.3%	2,254	94.9%
Hunter New England	1,725	95.9%	8,913	96.8%	10,638	96.6%
Central Coast	421	96.9%	3,420	96.1%	3,841	96.2%
Northern NSW	385	94.0%	2,636	88.2%	3,021	88.9%
Murrumbidgee	499	96.6%	3,055	96.8%	3,554	96.8%
<b>NSW TOTAL</b>	<b>6886</b>	<b>95.6%</b>	<b>88,154</b>	<b>95.4%</b>	<b>95,040</b>	<b>95.4%</b>

Data source: Australian Immunisation Register via Health Protection NSW.

**Figure 9: Hepatitis B immunisation coverage for 12-month-olds, among all children and among Aboriginal and Torres Strait Islander children, by LHD, ordered by uptake, 2020**



Data source: Australian Immunisation Register via Health Protection NSW.

The uptake of hepatitis B birth dose immunisation in 2020 was 94.4%. There is no specific national target set for this indicator, however according to the NSW Neonatal Hepatitis B Prevention and Vaccination Program, all infants must be given the birth dose of hepatitis B vaccine no later than 7 days of age<sup>7</sup>.

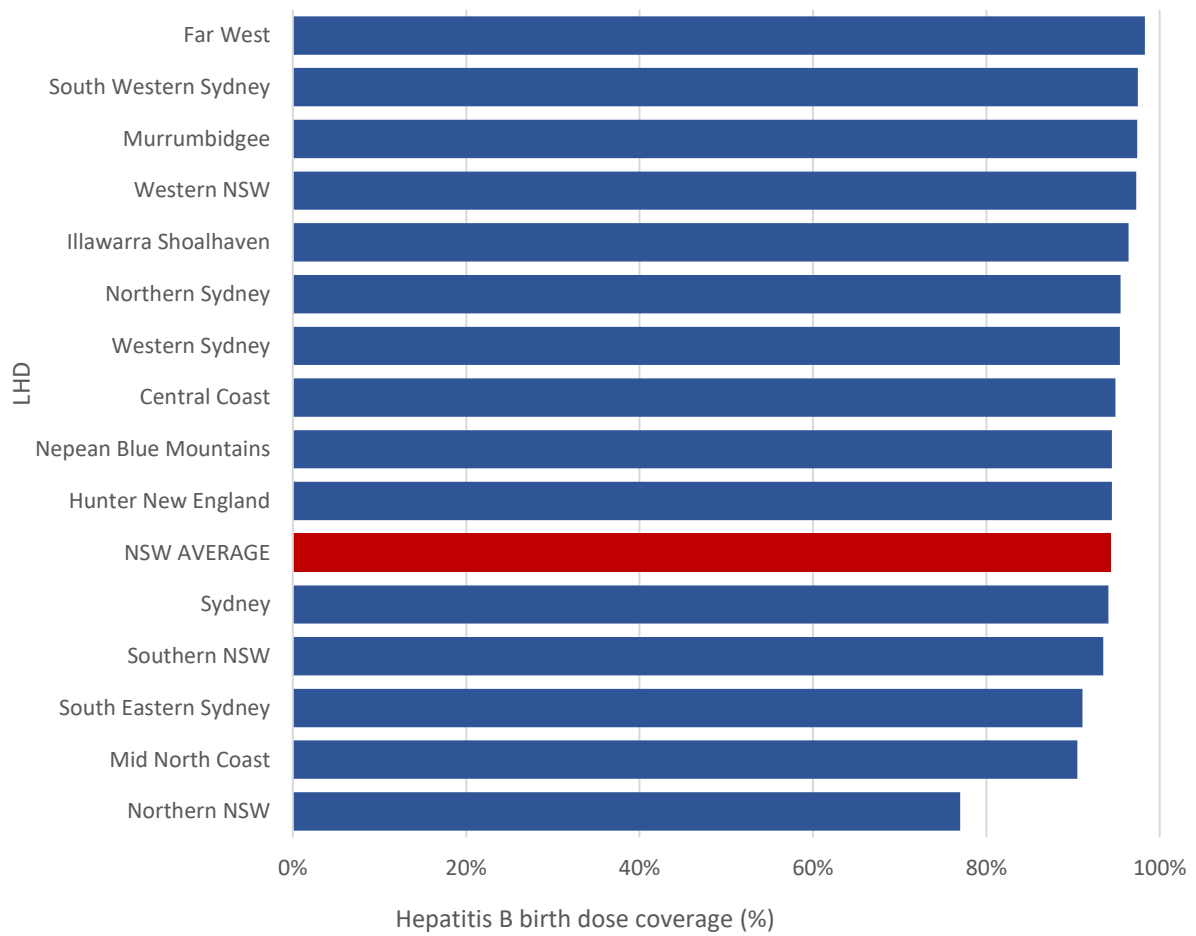
Overall immunisation coverage was lower for birth dose than for the 3-dose infant schedule, both overall and in the majority of LHDs (Table 8). A notable exception was **South Western Sydney LHD**, where birth dose coverage was 97.5%, while infant 3-dose coverage was 94.5%. The largest gap was in **Northern NSW LHD**, where infant 3-dose coverage was 88.2% while birth dose coverage was only 77.0%.

**Table 8: Hepatitis B birth dose immunisation coverage in NSW, by LHD, ordered by CHB prevalence, 2020**

<b>LHD</b>	<b>Number of live births, 2020</b>	<b>Hepatitis B birth dose uptake (%)</b>
Sydney	5,878	94.1%
Western Sydney	14,378	95.4%
South Western Sydney	12,228	97.5%
Northern Sydney	11,476	95.5%
South Eastern Sydney	12,032	91.1%
Far West	176	98.3%
Western NSW	3,262	97.3%
Illawarra Shoalhaven	4289	96.4%
Southern NSW	1,545	93.5%
Nepean Blue Mountains	5,617	94.5%
Mid North Coast	2,019	90.5%
Hunter New England	10,166	94.5%
Central Coast	3,629	94.9%
Northern NSW	2,671	77.0%
Murrumbidgee	2,419	97.4%
<b>NSW AVERAGE</b>	<b>91794</b>	<b>94.4%</b>

Data source: NSW Neonatal Hepatitis B Vaccination Program, Health Protection NSW

**Figure 10: Hepatitis B birth dose immunisation coverage in NSW, by LHD, ordered by uptake, 2020**



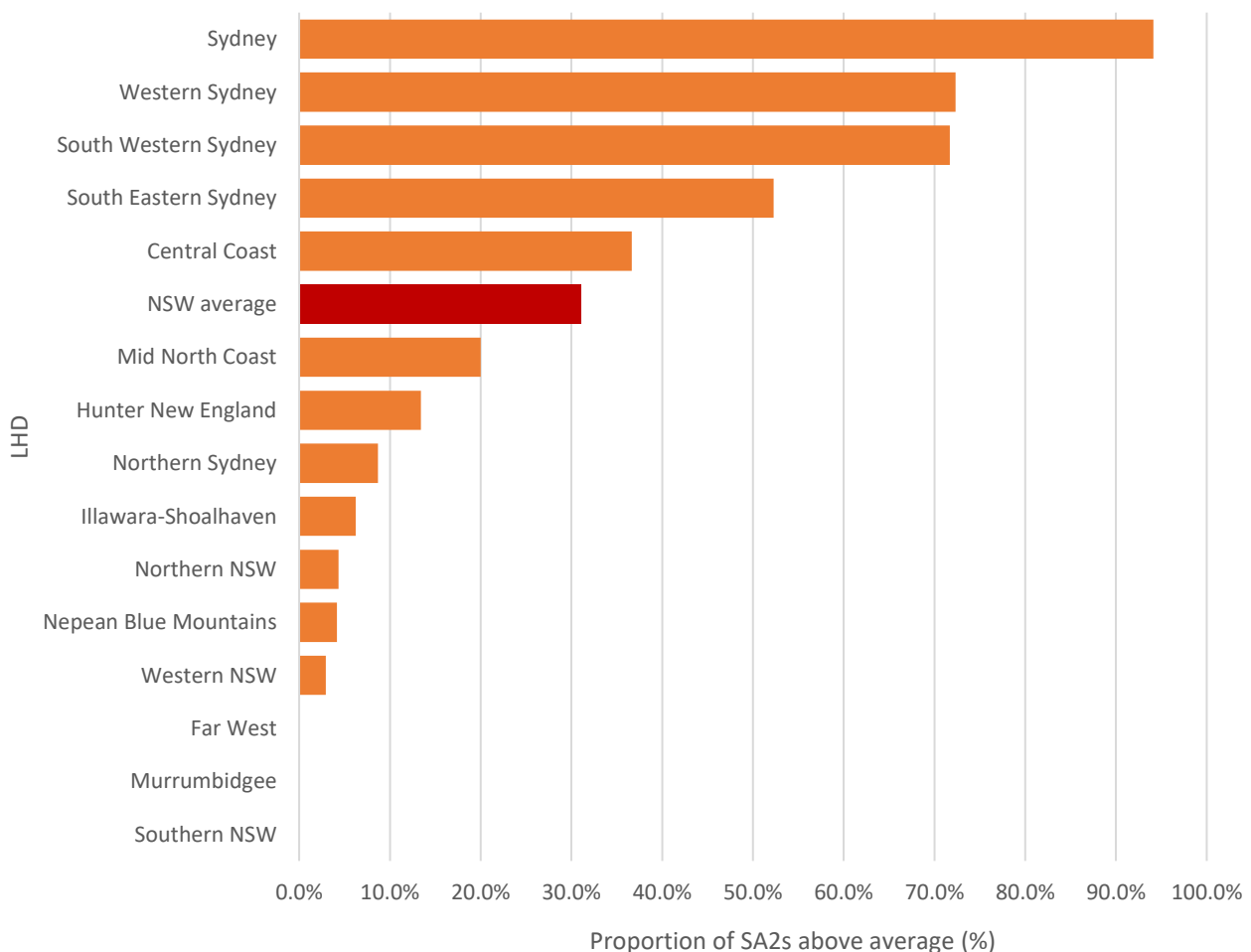
Data source: NSW Neonatal Hepatitis B Vaccination Program, Health Protection NSW

## LIVER CANCER

Data regarding liver cancer in NSW by LHD were derived from the Australian Cancer Atlas, which generates estimates of the variation in cancer rates according to the geographic unit called Statistical Area 2 (SA2). SA2s are areas derived by the Australian Bureau of Statistics, which intend to represent communities that interact together socially and economically. They generally contain about 3,000-25,000 people each, and there are 576 different SA2 regions in NSW. When analysing the SA2s contained within a given LHD, it provides data regarding the relative liver cancer burden across NSW by LHD.

Liver cancer in NSW varied widely according to region, and in some areas reached more than double the average incidence rate. Overall in NSW, 31.0% of SA2 regions are estimated to have had a liver cancer rate that is genuinely above the national average during 2007-2016. As shown in Figure 11, in the **Sydney, Western Sydney, South Western Sydney, and South Eastern Sydney LHDs**, the majority of the SA2s had liver cancer rates above average. All four of these LHDs also have CHB prevalence above average.

**Figure 11: Proportion of SA2 regions (see above) where the rate of liver cancer was above the Australian average, by LHD, ordered by proportion above average, 2007-2016**



Data source: Modelled estimates based on cancer registry data from the Australian Cancer Atlas.



## DATA SOURCES AND METHODS

**Table S.1 Summary of data sources**

<b>Indicator</b>	<b>Method of estimation</b>	<b>Source</b>	<b>Time period covered</b>
CHB prevalence	Calculated using a mathematical model incorporating prevalence data according to population group (e.g. country of birth)	Published seroprevalence surveys and 2016 Census data according to population	2020
CHB treatment	Number of individuals prescribed antiviral medications indicated for hepatitis B	Pharmaceutical Benefits Scheme data provided to NSW Health	2020 (comparison to 2019)
CHB monitoring	Number of individuals who received a viral load test designated for people with CHB who are not on treatment.	Medicare Benefits Schedule data provided to NSW Health	2020 (comparison to 2019)
CHB care (treatment or monitoring)	Number of individuals who <i>either</i> received treatment <i>or</i> were provided monitoring, as defined above	Medicare Benefits Schedule data provided to NSW Health	2020 (comparison to 2019)
Hepatitis B birth dose immunisation	Proportion of children provided the birth dose immunisation for hepatitis B	NSW Neonatal Hepatitis B Vaccination Program reports	2020
Hepatitis B infant immunisation	Proportion of children fully immunised for hepatitis B (birth dose)	Australian Immunisation Register data	2020
Liver cancer above average	In each LHD, the proportion of SA2 regions where the incidence rate of liver cancer was “genuinely” <sup>^</sup> above the national average	Australian Cancer Atlas, a statistical model of cancer incidence based on data from cancer registries	2007-2016

<sup>^</sup> Thresholds for average based on 95% confidence intervals.

## DETAILED STATISTICAL METHODOLOGY

### *Hepatitis B prevalence*

#### DATA SOURCES

- Mathematical model of hepatitis B prevalence
- Census data according to country of birth and Aboriginal and Torres Strait Islander status
- Published estimates of seroprevalence.

#### DETAILS

The overall number of people living with CHB in Australia was estimated using a deterministic compartmental mathematical model of HBV infection in the Australian population from 1951 to 2050, which incorporated existing mathematical models, surveillance notifications, epidemiological research, clinical studies and demographic and mortality data<sup>8</sup>. Estimates according to priority population within this total estimate were derived using the country-of-birth distribution in each region, combined with specific prevalence for each country of birth, and then for the Australian-born population the priority groups of Aboriginal and Torres Strait Islander people, people who inject drugs and men who have sex with men. Most country-of-birth estimates were derived from local antenatal seroprevalence data<sup>9, 10</sup>, which were adjusted upwards to correct for the discrepancy in CHB prevalence by sex, according to the differential between men and women observed in published serosurveys<sup>11</sup>. Prevalence estimates for countries for which data were not available from local source estimates were generated from global systematic review papers<sup>12, 13</sup>. Census data were available by postcode, and were assigned to an LHD using concordances provided by NSW Health.

The proportion of people living with CHB in each LHD was derived using the total population in each LHD, sourced from publicly available NSW Government data<sup>14</sup>.

### *Hepatitis B treatment, testing and care*

#### DATA SOURCE

- Medicare Benefits Scheme (MBS) and Pharmaceutical Benefits Scheme (PBS) records provided to NSW Health.

#### DETAILS

The number of people who received a hepatitis B viral load monitoring tests was derived using MBS data for a viral load test while not receiving treatment. The number of people who received treatment was derived using PBS records of prescriptions dispensed for antiviral treatment indicated for hepatitis B. Monitoring and treatment were combined to generate an aggregate measure of the number in care.

Medicare data were provided via a data package for NSW blood-borne virus data for 2021-22, the June to September 2021 quarter. Analysis was conducted by CPH, Ministry of NSW Health.

Treatment uptake and care uptake were derived as a proportion of the number living with CHB in each LHD and in NSW overall, using the estimated prevalence as defined above.

The provider type used by Medicare is a derived designation, based on a practitioner's service history.

Note that this report uses data provided by LHD as the data source, and therefore treatment and care uptake estimates for NSW overall may vary slightly from the National Viral Hepatitis Mapping Report.

### *Hepatitis B immunisation coverage*

#### DATA SOURCES

- Australian Immunisation Register
- NSW Neonatal Hepatitis B Vaccination Program, Health Protection NSW

#### DETAILS

The immunisation schedule for hepatitis B in NSW includes three doses of vaccine at six weeks, four months, and six months. The AIR records data regarding what proportion of children received complete immunisation by the age of 12 months. The AIR is a national register that includes all children registered with Medicare, and coverage is estimated to be >99% of all Australian children.

Hepatitis B birth dose data is reported in accordance with NSW Health Policy Directive PD2017\_036 Neonatal Hepatitis B Prevention and Vaccination Policy

Birth dose immunisation is measured as a proportion of all live births. All infants must be offered hepatitis B vaccine at birth (within 7 days) and all infants born to women with CHB must also be offered hepatitis B immunoglobulin (HBIG) within 12 hours of birth.

### *Liver cancer*

#### DATA SOURCE

- Australian Cancer Atlas

The Australian Cancer Atlas is a collaborative project, led by Cancer Council Queensland, Queensland University of Technology, and Frontier SI, which aims to provide a national perspective of how the burden of cancer varies by geographical area. It draws source data from each state and territory cancer registry, which collect all cancer diagnoses through

mandatory reporting requirements. It uses spatial models to generate 'smoothed' estimates at the Statistical Area 2 (SA2) level to assess variation from the national average, and quantifies the certainty of these estimates. In this report, we assessed the proportion of SA2s which had an above-average incidence rate of liver cancer in each LHD, using a 60% probability cut-off for inclusion, as this suggests the area is genuinely above the Australian average. LHDs were then ranked according to the proportion of SA2s that had above-average rates.

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