Supported Mothers, Stronger Futures

The relationship between Birth outcomes and indicators of lifelong health and prosperity in Lismore and Richmond Valley

Population health profile

BEACON STRATEGIES

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BACKGROUND

Purpose of this report

In late-2016, Northern Rivers Community Gateway (NRCG) engaged Beacon Strategies to assist with co-designing a service model for community-based prenatal care coordination in the Lismore / Richmond Valley regions. The purpose of this project is to leverage the extensive evidence base available on what works, and position this within the local context to ensure the proposed service model responds to the needs of the Lismore and Richmond Valley communities. Beacon Strategies will deliver a number of pieces of work to develop this service model, including:

- Population health profile
- Service mapping
- Community consultation
- Community briefing and reporting.

This paper reports on Deliverable 1 – Population Health Profile under the scope of work agreed by NRCG and Beacon Strategies.

The journey so far

The emergence of community-based prenatal care coordination as a key priority for generating social impact is based on a compelling argument that the origins of social disadvantage begin in the womb. The critical part of the life course spent developing from embryo, to foetus and as a child largely determines the trajectory of one's health and personal capacities.

This theory arises from the scientific field of study called epigenetics. Epigenetics describes the process of environmental factors determining the physiological make up of newborn babies, where many lifelong traits and capabilities are determined. Environmental factors have the ability to switch genes on and off, affecting how cells and genes interact and ultimately birth outcomes. The most commonly recognised proxy indicators of fetal development are birth weight and gestational age. The World Health Organisation (WHO) rates low birth weight and pre term birth as the biggest indicators of lifelong health. More evidence about the links between adverse birth outcomes (e.g. low birth weight and pre-term birth) and a range of social indicators is available in the population health profile contained later in this report.

Evidence suggests that investing in the prenatal period through a holistic approach can save a lifetime of costs, ranging from postnatal healthcare costs through to better education and employment prospects and a reduced likelihood of illness and incarceration. This means providing the optimal conditions for children to have every opportunity to thrive in life.

Anecdotally, a number of real barriers exist in getting services to women that really need them, such as those facing difficult socioeconomic circumstances or from culturally and linguistically diverse (CALD) backgrounds. These barriers include things like:

- Complexity in navigating the system
- An overly clinical, patient-focused approach
- Financial barriers to accessing services
- Lack of coordination between services
- Bad past experiences with service providers
- Isolation from peer and community support
- Transport, language and literacy issues

Previous evidence indicates that a service model aimed at taking the coordination of prenatal care out of the clinical setting and basing it in community sector can help to alleviate these barriers and promise greater impact. This person-centered approach introduces the role of a prenatal care coordinator as a trusted and ongoing point of contact. The coordinator's role is crucial to the activities of service intake, outreach, individual needs assessment, service referral, client follow-up and performance measurement.

Evidence argues that a service mix should go beyond mere clinical services and take a whole-of-person perspective, incorporating services that can improve the social determinants of health. Existing academic literature has demonstrated that the following service categories can improve birth outcomes:

- Midwifery and clinical care
- Drugs, alcohol and smoking cessation
- Mental health, wellbeing and resilience
- Nutrition and physical wellbeing
- Secure housing
- Financial security
- Relationships and family planning
- Parenting skills and early attachment

Importantly, the community-based model must adopt an 'at-all-costs' approach to service delivery that reflects there is no more critical stage for physiological development, or for plotting the life-course of a person, than the prenatal stage.

METHODOLOGY:
CONSTRUCTING A POPULATION-LEVEL HEALTH PROFILE

Rationale:

The rationale behind examining a broad cross section of population level indicators is to raise awareness around the link between birth outcomes (low birth weight, pre-term birth) and a range of consequential health and social outcomes.

Methodology

How did we access the data?

The Public Health Information Development Unit (PHIDU) is a statistical analysis unit based at Torrens University Australia. PHIDU provides analysis of population level data across a range of health and social indicators and cuts the data to various geographic units to allow targeted analysis. Some of the statistical data used in our analysis may not be the most recent but we have purposefully used PHIDU because it allows consistent and stable comparison across a variety of indicators.

Data are provided by many different geographic categorisations. This specific project however focussed on Local Government Area (for assessing the needs of the local community), Primary Health Network (PHN) regions (comparison to the broad regional data) and State Government and Australia wide data (to compare trends on a larger scale).

Why did we choose the specific indicators?

A broad cross-section of population level data indicators were selected based on wanting to better understand the needs of the local community and research whether there was any association between the data indicator and birth outcome. There was no intent behind choosing indicators to sway the argument in our favour, each of the chosen indicators were analysed and researched based on a genuine will to better understand the community and potential impact of adverse birth outcomes.

21 indicators were analysed across a range of categories. Academic, peer-reviewed evidence exists that links all 21 indicators to having at least some association with adverse birth outcomes (low birth weight or preterm birth). These indicators are inclusive of early childhood development, families, socio-economic disadvantage, employment, housing, mental health and suicide, risky behaviour, education and chronic disease.

Population level data analysis was conducted to highlight the impact of adverse birth outcomes across the life course. For each data indicator presented, academic evidence is also presented in parallel to fully articulate the standpoint that the origins of poor health and social disadvantage are perpetuated in utero and that an undisputable relationship exists between adverse birth outcomes and health and social outcomes in later life.

Data comparison:

To other localities

The below localities are used as a comparator to fully understand how the local Lismore and Richmond Valley communities compare to the broader population. This has been displayed in the vertical bar graphs in the middle of each data visualisation on pages 8 and onward.

- **Lismore and Richmond Valley LGAs:** Local Government Areas were used to analyse data at the local level to fully understand the needs of the community.
- **North Coast PHN**: this geography is made up of a number of LGAs the make up the North Coast PHN area. LGAs in this specific catchment include:
    - Ballina
    - Bellingen
    - Byron
    - Clarance Valley
    - Coffs Harbour
    - Kempsey
    - Kyogle
    - Lismore
    - Nambucca
    - Port Macquarie-Hastings
    - Richmond Valley
    - Tenterfield
- **New South Wales:** Data calculated across the entire New South Wales population
- **Australia**: data calculated across the entire Australian population.

Comparison Across New South Wales

To further investigate the size and scale of each issue. The Lismore/Richmond Valley communities were ranked against all other New South Wales LGAs. Data from each LGA (where available) in New South Wales was ranked from highest to lowest, expressing the ranking of the Lismore/Richmond Valley communities against all other New South Wales LGAs. This data is visualised in the gauges in the middle of each page from page 9 and onward.

Please not that data for some LGAs across some of the data indicators were unavailable. These locations were removed from the overall ranking system.

FINDINGS

Overall

All of the indicators analysed through the population health profiling process were found to show at least an association between adverse birth outcomes (low birth weight and preterm birth) and biological, social and economic prosperity throughout the life course. The evidence for each indicator is briefly summarized on page 8 and beyond and points to the prenatal period as being a key time of influence to break the cycle of disadvantage. Although the rate and prevalence of a multitude of conditions and situations varies in terms of severity, it is clear that disadvantage exists in both Lismore and Richmond Valley and the link between disadvantage and poor birth outcomes continues to perpetuate disadvantage across generations. See the table on page 7 to compare how both Lismore and Richmond Valley compare to the broader North Coast PHN population but also New South Wales and Australian averages.

Lismore

Overall the Lismore LGA experiences social and economic disadvantage consistent with the broader North Coast PHN region, however this is at higher rate than New South Wales and Australian averages. Generally speaking; the social, economic, housing and mental health indicators in relation to Lismore are on par with the North Coast PHN averages, which are typically higher than New South Wales, and Australian population averages. It is fair to assess the overall Lismore LGA community as a community that has a moderate level of disadvantage consistent with the broader North Coast PHN community. There are however some indicators that are substantially higher than the North Coast PHN, New South Wales and Australian averages, including:

- Higher rates of early childhood developmental vulnerability across both 1 and 2 domains
- Higher proportion of low-income, welfare-dependent families
- Higher proportion of the population with respiratory disease
- Higher proportion of premature deaths from circulatory diseases
- Higher rate of premature deaths from cancer

Richmond Valley

Overall, Richmond Valley LGA is the 7th most disadvantaged LGA in New South Wales (out of 153 LGAs). Generally speaking, the Richmond Valley LGA community has poorer comparable rates of population level indicators across the family, social and economic disadvantage, employment, housing, mental health and suicide, risky behaviour, education and chronic disease domains. Unlike the Lismore LGA, Richmond Valley displayed rates that were above the broader North Coast PHN population in addition to surpassing population averages across New South Wales and Australia. Interestingly, the Richmond Valley LGA had lower rates of childhood vulnerability across two domains which was inconsistent with the other population level indicators, which were pointing toward significant disadvantage. Most notably, Richmond Valley had:

- A high burden of chronic disease (comparative rates of respiratory and circulatory diseases)
- the 3rd highest rate of psychological distress when compared to all NSW LGAs
- the 5th highest rate of children in families where the mother has low education levels
- A low rate of full time participation in education at age 16 (72.87%), high unemployment rate (8.41%) and a high proportion of low-income welfare dependent families (16.7%)

Summary of population level indicators. Lismore LGA & Richmond Valley LGA

							Lismore LGA			Richmond Valley LGA		
Category	**Indicator**	**Lismore LGA**	**Richmond Valley LGA**	**North Coast PHN**	**New South Wales**	**Australia**	**Rank**	**No. NSW LGAs**	**Rank %**	**Rank**	**No. NSW LGAs**	**Rank %**
Early Childhood	Early childhood development - vulnerable on one domain (%).	26.42	22.14	21.23	19.93	22.01	29	151	19.21%	57	151	37.75%
	Early childhood development - vulnerable on two domains (%).	13.44	8.86	9.74	9.17	10.81	31	153	20.26%	80	153	52.29%
Families	Children in families where the mother has low educational achievement (%).	34.15	46.93	35.8	27.64	23.55	71	153	46.41%	5	153	3.27%
	Low income, welfare-dependent families (%)	16.5	16.7	14.6	10.49	10.29	18	153	11.76%	16	153	10.46%
Disadvantage	SEIFA Index of Relative Socio-economic Disadvantage (SEIFA Score)	952.71	899.55	948.18	995.74	1000	57	153	37.25%	7	153	4.58%
Employment	Unemployment rate (%)	7.55	8.41	7.24	5.71	5.97	40	153	26.14%	24	153	15.69%
Housing	Households receiving rent assistance (%)	30.21	31.73	30.39	18.89	18.15	9	153	5.88%	6	153	3.92%
	Dwellings rented from the government housing authority (%)	3.26	3.21	3.09	4.4	4.06	72	153	47.06%	73	153	47.71%
Mental health and suicide	Estimated population aged 18 years and over with high or very high psychological distress (%)	11.04	12.77	11.7	10.51	10.76	49	150	32.67%	3	150	2.00%
	Premature death from suicide or self-inflicted injuries (rate per 100,000)	11.68	16.77	11.51	13.18	10.8	28	106	26.42%	9	106	8.49%
Risky Behaviour	Estimated female population who are current smokers (rate per 100)	17.27	21.26	18.82	13.77	15.71	81	150	54.00%	12	150	8.00%
	Estimated population consuming alcohol, high risk to health (rate per 100)	5.22	5.57	5.33	4.8	4.65	74	150	49.33%	16	150	10.67%
Education	Full-time participation in secondary school education at age 16.	81.52	72.87	78.39	80.12	79.1	109	153	71.24%	26	153	16.99%
Chronic Disease	Estimated population, obese (rate per 100)	30.16	32.78	30.23	26.38	27.49	89	151	58.94%	21	151	13.91%
	Estimated population with diabetes (rate per 100)	4.58	5.48	4.89	5.77	5.39	116	150	77.33%	32	150	21.33%
	Estimated population with respiratory disease (rate per 100)	31.79	32.5	29.57	27.36	28.66	27	150	18.00%	12	150	8.00%
	Premature deaths from respiratory diseases (rate per 100,000)	15.47	25.87	16.35	14.9	14.35	75	133	56.39%	19	133	14.29%
	Estimated population with circulatory disease (rate per 100)	17.99	19.05	18.48	17.76	17.29	100	150	66.67%	17	150	11.33%
	Premature deaths from circulatory diseases (rate per 100,000)	57.95	49.05	47.57	47.17	46.52	56	153	36.60%	91	153	59.48%
	Premature deaths from cancer (rate per 100,000)	113.86	103.55	113.41	102.24	101.57	56	153	36.60%	96	153	62.75%
	Estimated population with arthritis (rate per 100)	16.61	19.19	17.47	15.27	14.77	54	150	36.00%	3	150	2.00%

Early Childhood Development

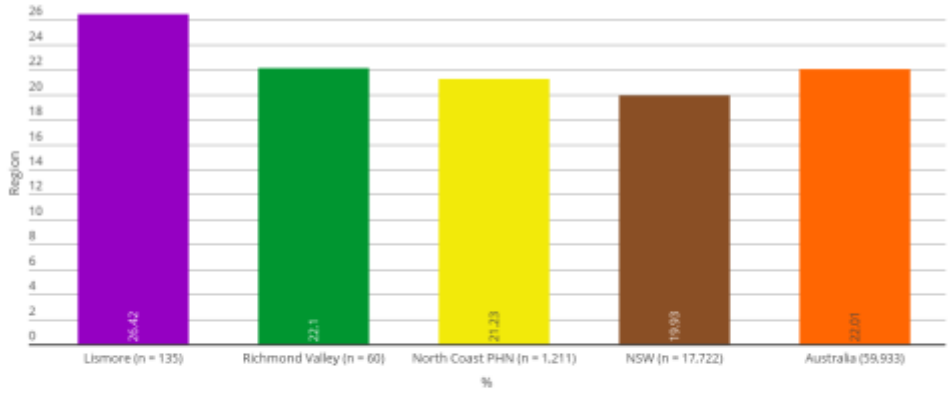
Compiled by PHIDU based on data from the 2012 Australian Early Development Census (an Australian Government Initiative).

Children who are developmentally vulnerable on one or more domain (AEDC, 2012)

What do we know about the local community?

The **Lismore LGA** community has substantially higher rates of developmental vulnerability when compared to the broader North Coast PHN community, New South Wales and Australia. The **Lismore LGA** is ranked 29th in terms of highest rates of developmental vulnerability when compared to 151 New South Wales LGAs.

The **Richmond Valley LGA** experiences rates of developmental vulnerability on par with the broader North Coast PHN community, New South Wales and Australia. The **Richmond Valley LGA** is ranked at number 57 out of 151 New South Wales LGAs.



Why does this matter?

> **Preterm birth has a sizable impact on child neurodevelopment and numerous studies have documented associations between preterm birth, low birth weight and developmental delays.**
> Schieve, L., Tian, L., Rankin, K., Kogan, M., Yeargin-Allsopp, M., Visser, S., & Rosenberg, D. (2016). Population impact of preterm birth and low birth weight on developmental disa

> **Children born prematurely have been shown to have a range of problems that often result in delayed academic achievement. A body of research is developing that suggests very low birth weight children may have specific attention problems.**
> David, D., Burns, B., Snyder, E., Robinson, J. (2007). Attention problems in very low birth weight preschoolers: are new screening measure needed for this special population? Journal of child Adolescent Psyc

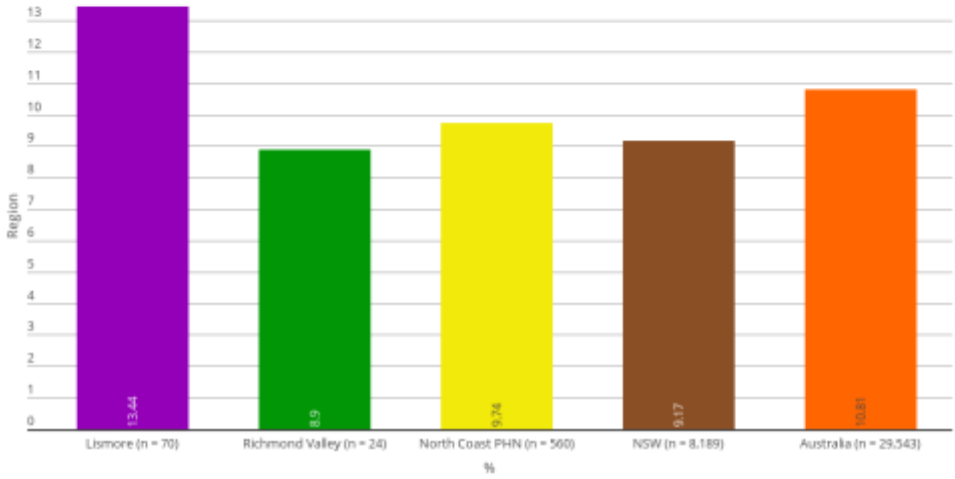
Compiled by PHIDU based on data from the 2012 Australian Early Development Census (an Australian Government initiative).

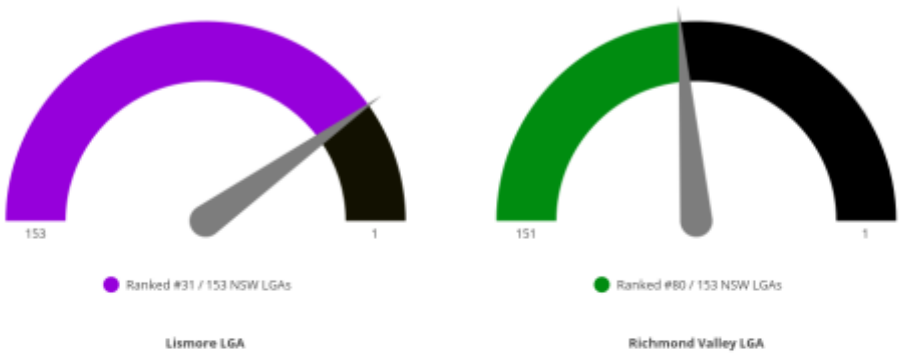
Children who are developmentally vulnerable on two or more domains (AEDC, 2012)

What do we know about the local community?

The Lismore LGA has higher rates of developmental vulnerability across two or more domains when compared to the broader North Coast PHN region, New South Wales and Australia. Out of the available 151 New South Wales LGAs, **Lismore** is ranked highly at number 31 in relation to complex developmental vulnerability.

The **Richmond Valley LGA** community has lower rates of developmental vulnerability across two or more domains when compared to the broader North Coast PHN region, New South Wales and Australia. Out of 151 New South Wales LGAs, **Richmond Valley** is ranked at number 80. This finding is interesting due to other indicators highlighting substantial disadvantage.





Why does this matter?

> **Children born at a healthy weight are at a lower risk of being developmentally delayed. Both birth weight and responsive parenting positively predict children's language skills. Negative parenting can significantly inhibit language development ability, specifically for low birth weight children.**
>
> Sheri Madigan, M.A.D.J. (2015). Birth Weight Variability and Language Development: Risk, Resilience, and Responsive Parenting. Journal of Pediatric Psychology, 40(9),

> **Low birth weight is associated with lower levels of executive function at 3 and 4 years old. Interestingly, low birth weight children who receive sensitive parenting in toddlerhood reach similar standards of executive function. Comparatively, low birth weight children who experience sub-par parenting show lasting deficits in executive function.**
>
> Camerota, M., Willoughby, M., Cox, M., & Greenberg, M. (2015). Executive Function in Low Birth Weight Preschoolers: The Moderating Effect of Parenting. Journal of Abnormal Child Psychology, 43(8), 1551-1

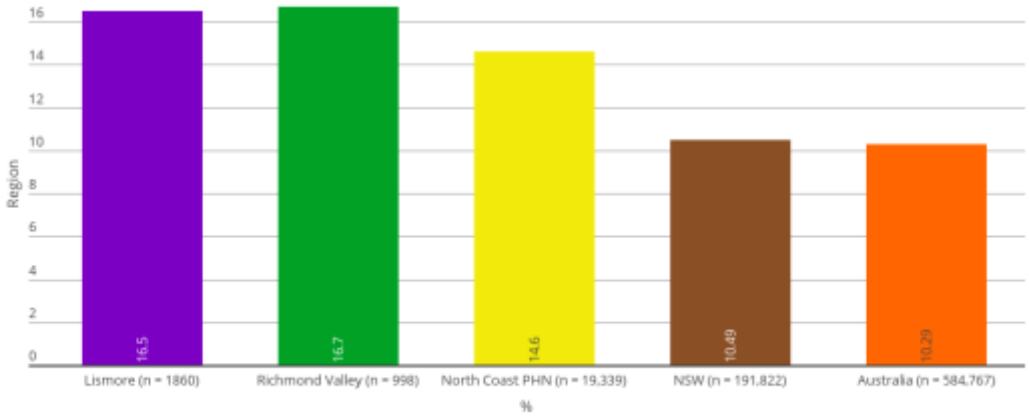
Families

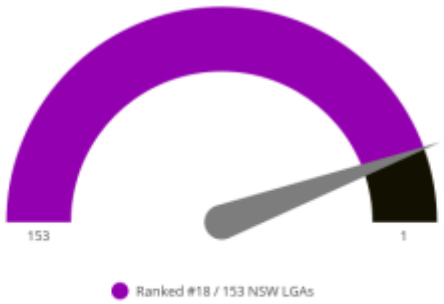
Compiled by PHIDU based on data from the Department of Social Services, June 2014; and the ABS Census 2011.

Low income, welfare-dependent families (2014).

What do we know about the local community?

Both the **Lismore LGA** and **Richmond Valley LGA** communities have higher proportions of low income, welfare dependent families compared to the broader North Coast PHN, New South Wales and Australian population averages. Both communities are ranked at the high end in comparison to other New South Wales LGAs.





Lismore LGA

Richmond Valley LGA

Why does this matter?

> **Inequalities in population health, at least partly, originate in pregnancy and early childhood. There is an extensive body of evidence that shows that social disadvantage affects adult mortality.**
> Raat, H., Wijtzes, A., Jaddoe, V., Moll, H., Hofman, A., & Mackenbach, J. (2011). The health impact of social disadvantage in early childhood; the Generation R study. Early Human Development, 87(11),

> **The health of children is positively associated with the health of their mother during pregnancy. Across the population, the health of children is positively associated with a range of factors, including maternal social structural factors such as economic situation.**
> Cheng, T., & Lo, C. (2016). Racial Disparities in Children's Health: A Longitudinal Analysis of Mothers Based on the Multiple Disadvantage Model. Journal of Community Health, 41(4), 753-760.

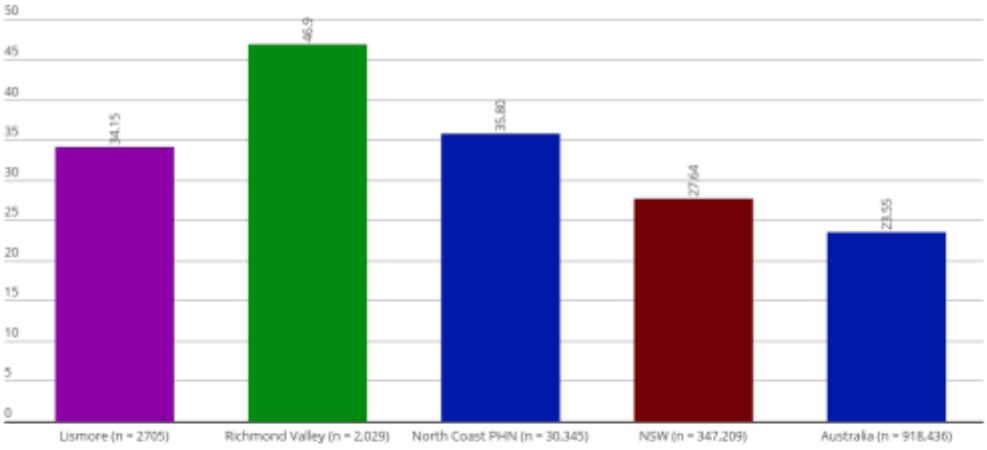
Compiled by PHIDU based on the ABS Census 2011 (unpublished) data.

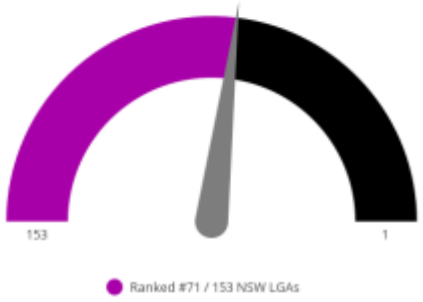
Children in families where the mother has low educational attainment (2011).

What do we know about the community?

The **Lismore LGA** community experiences poor maternal education attainment at rates relatively on par with the broader North Coast PHN community however at a much higher rate when compared to New South Wales and Australia. The **Lismore LGA** is ranked roughly in the middle of all other New South Wales LGAs.

The **Richmond Valley LGA** community experiences poor maternal education attainment at rates much higher than New South Wales and Australian averages but also substantially above the North Cost PHN rate. The **Richmond Valley** LGA is ranked extremely high at number 5 in relation to all New South Wales LGAs.





Why does this matter?

> **The education level of mothers has a large effect on child birth weight. Birth weight is an important predictor of health and success later in life. An increase in maternal education reduces the likelihood of low birth weight.**
> Grytten, J., Skau, I., & Sørensen, R. (2014). Educated mothers, healthy infants. The impact of a school reform on the birth weight of Norwegian infants 1967–2005. Social Science & Medicine, 105, 84-92.

> **Disadvantage is perpetuated intergenerationally. Studies suggest that the prenatal period is a sensitive period for setting a child up for future life. For example, this period has been found to be that sensitive that maternal grandmother's exposure to neighbourhood poverty (inclusive of poor education) during her pregnancy is a risk factor for their grandchildren to be born at a low birth weight.**
> Collins, J., David, R., Rankin, K., & Desireddi, J. (2009). Transgenerational Effect of Neighborhood Poverty on Low Birth Weight Among African Americans in Cook County, Illinois. American Journal of Epidemiology, 169(6),

Socio-Economic Disadvantage

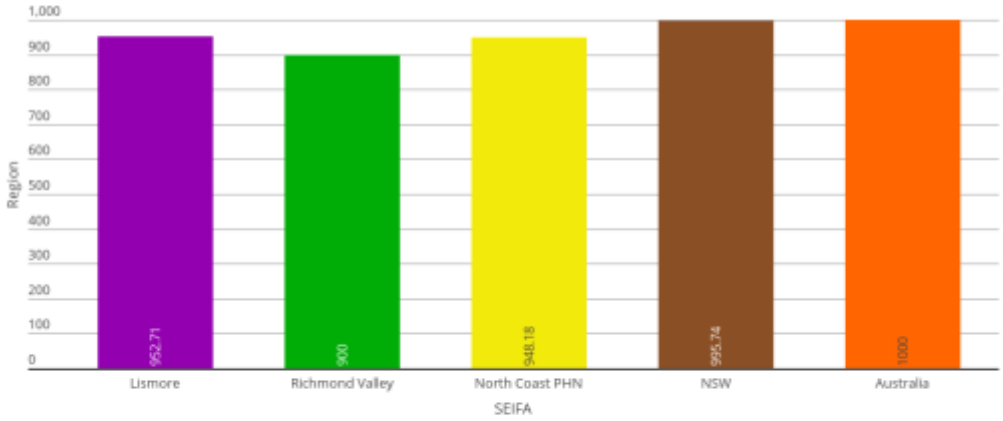
Compiled by PHIDU based on the ABS Socio-Economic Indexes for Areas (SEIFA), 2011 data.

SEIFA Index of Relative Socio-economic Disadvantage (2011).

What do we know about the local community?

The **Lismore LGA** community experiences socio-economic disadvantage at an extent on par with the broader North Coast PHN community but more than New South Wales and Australia. Out of the available 153 New South Wales LGAs, **Lismore LGA** is ranked at number 57 in terms of disadvantage.

The **Richmond Valley LGA** community experiences socio-economic disadvantage at rates much higher than the North Coast PHN community and New South Wales and Australian averages. The **Richmond Valley LGA** is the 7th most disadvantaged of all 153 New South Wales LGAs.



Ranked #57 / 153 NSW LGAs

Lismore LGA

Ranked #7 / 153 NSW LGAs

Richmond Valley LGA

Why does this matter?

> **Maternal social disadvantage is associated with poor health status in pregnancy, which in turn adversely affects birth outcomes. Social disadvantage is a proven indicator for poor birth outcomes.**
> Gavin, A., Nurius, P., & Logan-Greene, P. (2012). Mediators of Adverse Birth Outcomes Among Socially Disadvantaged Women. Journal of Women's Health, 21(6), 634-642

> **Unemployment and lack of social support are associated with higher risk of preterm birth, supporting the hypothesis that poor psychosocial circumstances elevate the risk of poor birth outcome.**
> Snelgrove, J., & Murphy, K. (2015). Preterm birth and social inequality: assessing the effects of material and psychosocial disadvantage in a UK birth cohort. Acta Obstetricia Et Gynecologica Scandinavic

Unemployment

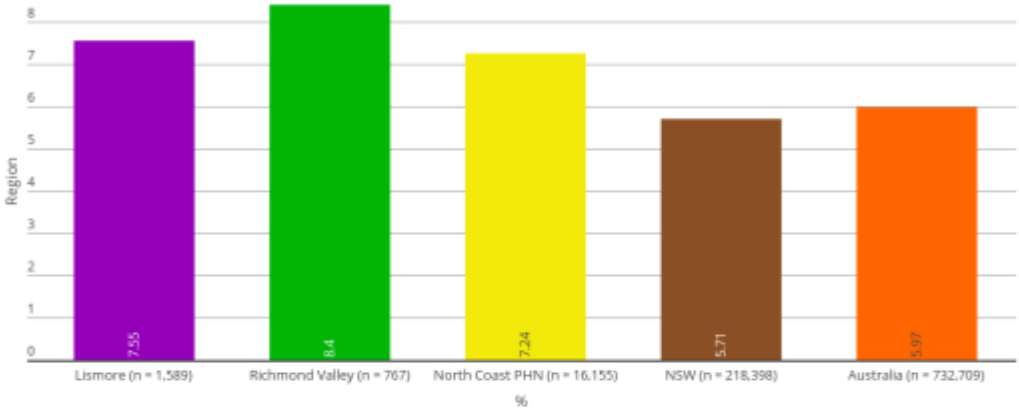
Compiled by PHIDU based on *Small Area Labour Markets - Australia*, Department of Employment, September Quarter 2014.

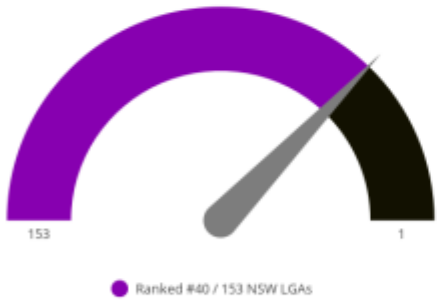
Unemployment rate (September, 2014)

What do we know about the local community?

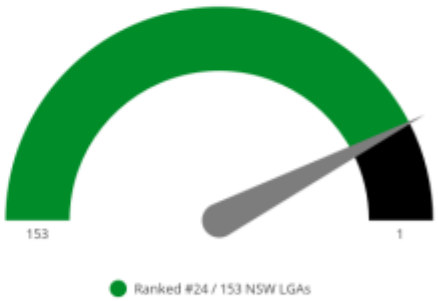
The **Lismore LGA** community experiences unemployment at a rate that is on par with the North Coast PHN community however comparatively higher than both New South Wales and Australian population averages. This ranks the **Lismore LGA** at number 40 out of 153 available New South Wales LGAs.

The **Richmond Valley LGA** community however experience rates of unemployment at higher rates than the North Coast PHN region, New South Wales and Australia. Out of all available 153 New South Wales LGAs, **Richmond Valley LGA** is ranked high at number 24.





Lismore LGA



Richmond Valley LGA

Why does this matter?

> **There is an association between women's lifelong residence in low-income neighbourhoods and delivering low birth weight babies. This is further exacerbated in vulnerable populations.**
> Collins, J., Wambach, J., David, R., & Rankin, K. (2009). Women's Lifelong Exposure to Neighborhood Poverty and Low Birth Weight: A Population-Based Study. Maternal and Child Health Journal, 13(3), 326-333.

> **There is a significant relationship between family poverty and low birth weight. Even after controlling for other sociodemographic factors, poverty is a strong indicator of low birth weight.**
> Lee, B., & Lim, S. (2010). Risk of low birth weight associated with family poverty in Korea. Children and Youth Services Review, 32(12), 1670-1674.

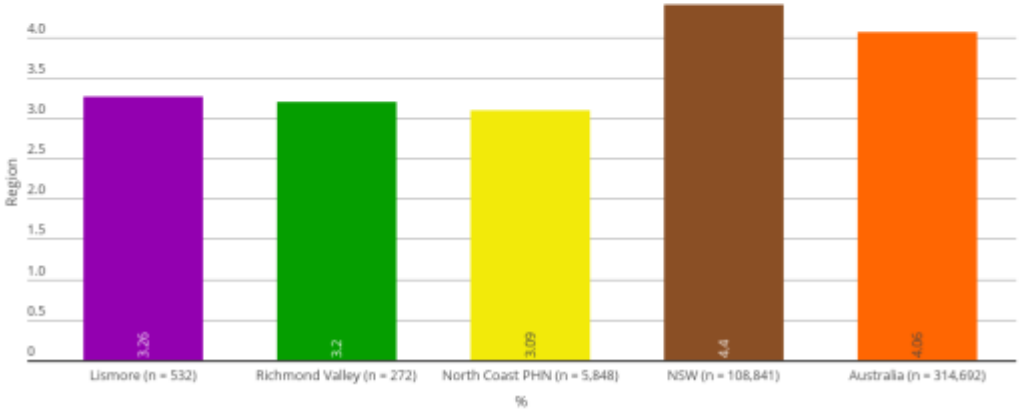
Housing

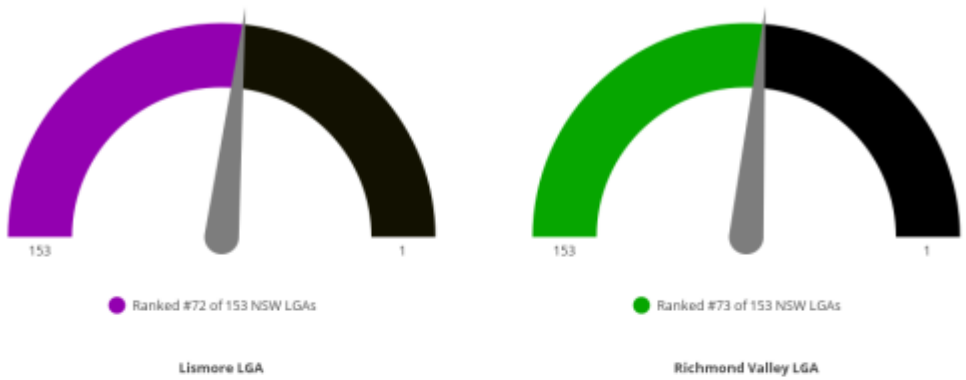
Compiled by PHIDU based on the ABS Census 2011 data.

Dwellings rented from the government housing authority (2011).

What do we know about the local community?

Both the **Lismore LGA** and **Richmond Valley LGA** have slightly higher proportions of public housing compared to the broader North Coast PHN community but less than New South Wales and Australian averages. Both localities are ranked middle of the road (**Lismore LGA** 72, **Richmond Valley LGA** 73) when compared to the available 153 New South Wales LGAs.





Why does this matter?

> **Women residing in public housing generally have higher health burdens and may be exposed to chronic stress, high crime and poverty. Women moving from public to private housing as a result of forced removal were at an elevated risk of poor birth outcomes.**
> Kramer, M., Waller, L., Dunlop, A., & Hogue, C. (2012). Housing Transitions and Low Birth Weight Among Low-Income Women: Longitudinal Study of the Perinatal Consequences of Changing Public Housing Policy

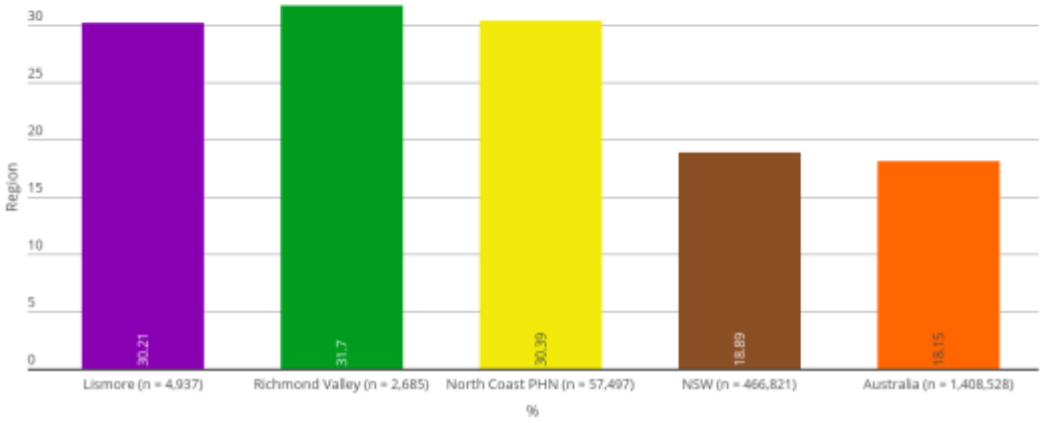
> **Prenatal homelessness is an independent risk factor for low birth weight. Maternal homelessness is related to a decrease in birth weight and homeless women are more likely to encounter violence, substance use and chronic ill-health.**
> Cutts, D., Coleman, S., Black, M., Chilton, M., Cook, J., Cuba, S., Heeren, T., Meyers, A., Sandel, M., Casey, P., & Frank, D. (2015). Homelessness During Pregnancy: A Unique, Time-Dependent Risk Factor

Compiled by PHIDU based on data from the Department of Human Services, June 2014; and ABS Census: Dwellings, 2011.

Households in dwellings receiving rent assistance from the Australian Government (2014).

What do we know about the local community?

Both the **Lismore LGA** and **Richmond Valley LGA** communities have rates of household rent assistance on par with the North Coast PHN community but substantially higher than New South Wales and Australian averages. When ranked against the other available LGA areas, both **Lismore** (9th) and **Richmond Valley** (6th) rank toward the top in terms of highest rates of rent assistance.



Lismore LGA

Richmond Valley LGA

Why does this matter?

> **Poor housing conditions and low household income are associated with adverse birth outcomes such as low birth weight and preterm birth.**
> Vettore, M., Gama, S., Lamarca, G., Schilithz, A., Leal Mdo, C. (2010). Housing conditions as a social determinant of low birth weight and preterm low birth weight. Rev Saude Publica, 44(6), 1021-31.

> **Housing stability is a significant predictor of lower birth weight. The importance of housing stability during pregnancy should be highlighted to enhance infant health.**
> Carrion, B., Earnshaw, V., Kershaw, T., Ickovics, J. (2014). Housing instability and birth weight among young urban mothers. Journal of Urban Health, 92(1).

Mental Health and Suicide

Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

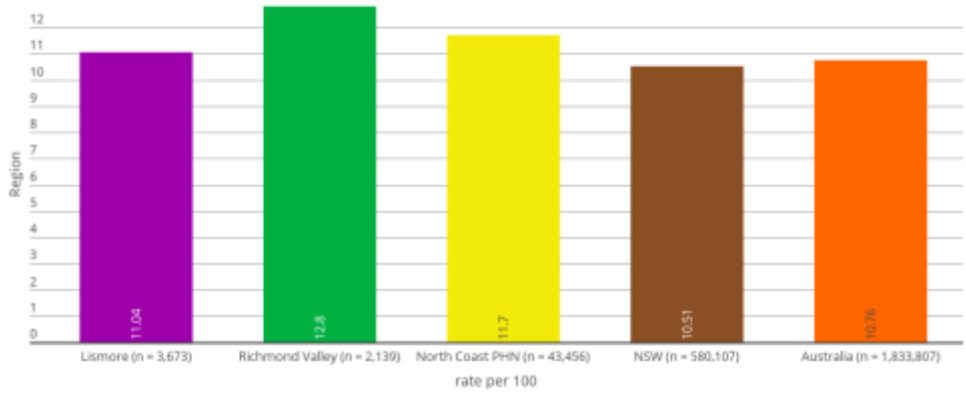
Estimated population, aged 18 years and over, with high or very high psychological distress based on Kessler 10 Scale (2011-13).

What do we know about the local community?

The **Lismore LGA** experiences rates of high and very high psychological distress at rates on par with the broader North Coast PHN community, New South Wales and Australian population averages. **The Lismore LGA** is ranked 49th out of 150 available New South Wales LGAs in terms of highest rates of psychological distress.

Richmond Valley LGA experiences higher rates of high and very high psychological distress when compared to the broader North Coast PHN community, New South Wales and Australia. **The Richmond Valley LGA** is ranked the 3rd highest New South Wales LGA in terms of psychological distress.

%



Why does this matter?

> **Low birth weight is associated with adult psychological distress suggesting a direct effect of early life factors on adult mental health.**
> Rogers, P. (2005). Low birth weight associated with psychological distress at age 45-51 years. Mental Health Practice, 9(1), 37-37.

> **Exposure to preconception stressful life events increases the risk for adverse birth outcomes. This is amplified in racial/ethnic minorities and people with chronic conditions living in disadvantaged communities, putting them most at-risk to give birth to very low birth weight infant/s.**
> Whitney P. Witt, Hyojun Park, Lauren E. Wisk, Erika R. Cheng, Kara Mandell, Debanjana Chatterjee, and Dakota Zarak. Neighborhood Disadvantage, Preconception Stressful Life Events, and Infant Birth Weig

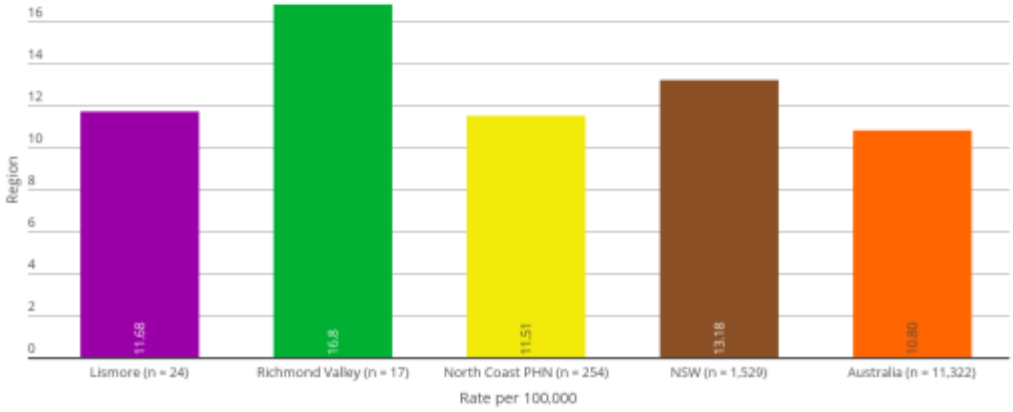
Data compiled by PHIDU from deaths data based on the 2009 to 2013 Cause of Death Unit Record Files supplied by the Australian Coordinating Registry and the Victorian Department of Justice, on behalf of the Registries of Births, Deaths and Marriages and the National Coronial Information System. The population is the ABS Estimated Resident Population (ERP) for Australia, 30 June 2009 to 30 June 2013.

Premature deaths from suicide or self-inflicted injuries, 0 to 74 years (2009 to 2013).

What do we know about the local community?

The **Lismore LGA** community experience premature deaths from suicide or self-inflicted injuries at a rate generally on par with the broader North Coast PHN community and Australian average but less than the New South Wales population average. When ranked against other New South Wales LGAs, **Lismore LGA** ranks 28 out of 106.

The **Richmond Valley LGA** community however experience premature deaths from suicide or self-inflicted injuries at a rate much higher than the broader North Coast PHN, New South Wales and Australia. Out of all available New South Wales LGAs, **Richmond Valley** comes in ranked 9 out of 106.



Ranked #28 / 106 NSW LGAs

Lismore LGA

Ranked #9 / 106 NSW LGAs

Richmond Valley LGA

Why does this matter?

> **Low birth weight has significant effects on outcomes in later life. Studies have documented an association between low birth weight and altered stress responses, reduced cognitive functioning and increased suicide.**
> Levine, S. (2014). Low birth-weight and risk for major depression: A community-based longitudinal study. Psychiatry Research, 215(3), 618-623.

> **Very preterm birth appears to be the first step in a cascade of stressors across lifetime, which affects the risk and the severity of suicidal behaviour.**
> Blasco-Fontecilla, H., Jaussent, I., Emilie, O., Garcia, E., Beziat, S., Malafosse, A., Guillaume, S., & Courtet, P. (2013). Additive effects between prematurity and postnatal risk factors of suicidal behavior. Journal of

Risky Behaviours

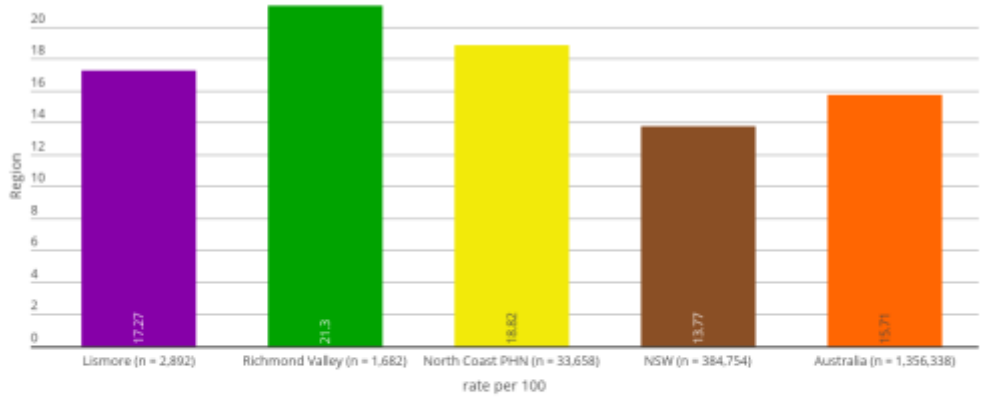
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

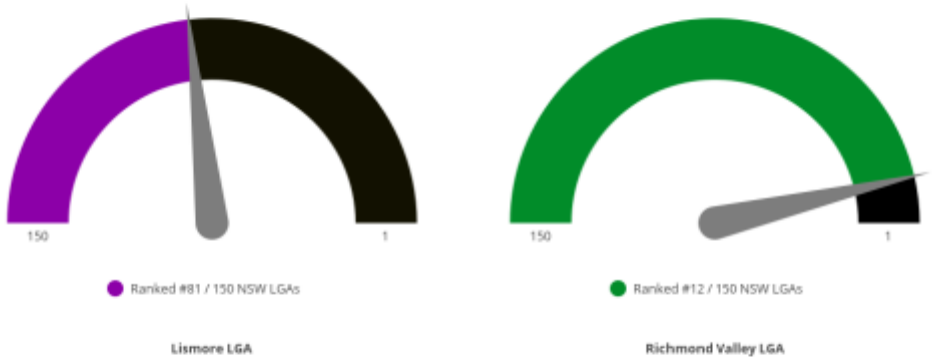
Estimated female population, aged 18 years and over who were current smokers (2011-13).

What do we know about the local community?

The **Lismore LGA** community has slightly less females who are current smokers when compared to the broader North Coast PHN community however this rate is higher than both the New South Wales and Australian population averages. The **Lismore LGA** is ranked in the bottom half of the available 150 New South Wales LGAs, coming in at number 81.

The **Richmond Valley LGA** community has higher rates of females who are current smokers when compared to the broader North Coast PHN community, New South Wales and Australia. The **Richmond Valley LGA** community however has the 12th highest rate of females currently smoking out of the available 150 New South Wales LGAs.





Why does this matter?

> **Maternal smoking during pregnancy is associated with a reduction in birth weight of the child. Maternal smoking during pregnancy is one of the major causes of low birth weight and intrauterine growth restriction.**
> Suzuki, K., Shinohara, R., Sato, M., Otawa, S., & Yamagata, Z. (2016). Association Between Maternal Smoking During Pregnancy and Birth Weight: An Appropriately Adjusted Model From the Japan Environment a

> **Smoking throughout pregnancy is associated with an increased risk of preterm birth. Smoking is one of the most important modifiable risk factors for the reduction of pregnancy complications.**
> Moore, E., Blatt, K., Chen, A., Van Hook, J., & DeFranco, E. (2016). Relationship of trimester-specific smoking patterns and risk of preterm birth. American Journal of Obstetrics and Gynec

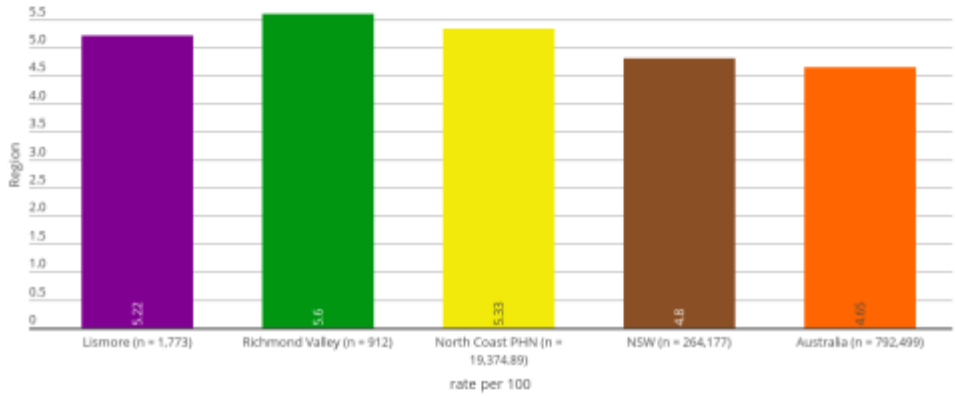
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

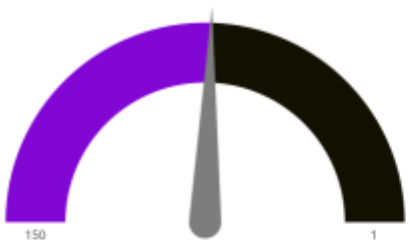
Estimated population, aged 18 years and over, consuming alcohol at levels considered to be a high risk to health (2011-13)

What do we know about the local community?

The **Lismore LGA** has rates of risky alcohol consumption generally on par with the broader North Coast PHN but higher than both the New South Wales and Australia population averages. In comparison to the other available 150 LGAs in NSW, the **Lismore LGA** community is situated approximately in the middle, coming in at number 74.

The **Richmond Valley LGA** area has higher rates of risky alcohol consumption when compared to the broader North Coast PHN community and New South Wales and Australian population averages. The **Richmond Valley LGA** is ranked highly at number 16 (out of 150 available NSW LGAs) in terms of highest rates of risky alcohol consumption.





Why does this matter?

> **It is known that maternal alcohol intake during pregnancy is associated with a broad range of irreversible disorders and serious impairments in the offspring. The adverse effects of prenatal alcohol exposure are amplified in offspring with a low socioeconomic background.**
>
> Pfinder, M. (2014). Anthropometric and Health-Related Behavioral Factors in the Explanation of Social Inequalities in Low Birth Weight in Children with Prenatal Alcohol Exposure. International Journal of Env

> **Prenatal alcohol exposure is associated with longitudinal reductions in weight, height and body mass index, all of which are largely determined at birth yet continue to persist though young adulthood.**
>
> Carter, R., Jacobson, J., Sokol, R., Avison, M., & Jacobson, S. (2013). Fetal Alcohol-Related Growth Restriction from Birth through Young Adulthood and Moderating Effects of Maternal Prepregnancy Weight.

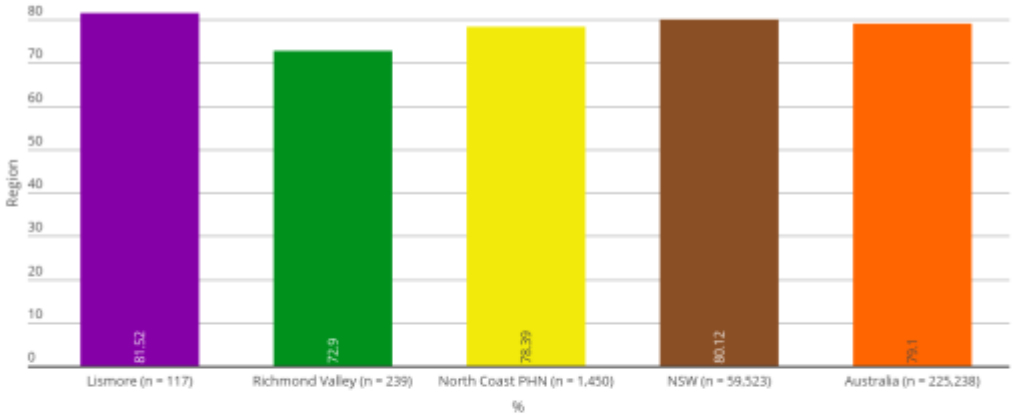
Education

Compiled by PHIDU based on the ABS Census 2011 data.

Full-time participation in secondary school education at age 16 (2011)

What do we know about the local community?

16 year olds in the **Lismore LGA** community participate in secondary school education at rates higher than the broader North Coast PHN community, New South Wales and Australia. **The Richmond Valley LGA** community however attend school at the age of 16 at much lower rates across the same comparison geographies. Overall, the **Lismore LGA** is ranked low amongst other NSW LGAs in terms of poor school attendance while **Richmond Valley LGA** is ranked much higher, coming in at 26th out of 153 NSW LGAs.



Ranked #109 / 153 NSW LGAs

Lismore LGA

Ranked #26 / 153 NSW LGAs

Richmond Valley LGA

Why does this matter?

> **Fewer very-low-birth-weight young adults (compared to healthy-birth-weight young adults) graduate from high school. Very-low-birth-weight men (but not women) were significantly less likely to be enrolled in post-secondary study.**
> Hack, M., Flannery, D., Schluchter, M., Cartar, L., Borawski, E., Klein, N. (2002). Outcomes in Young Adulthood for Very-Low-Birth-Weight Infants. The New England Journal of Medicine, 346, 149-157.

> **Children who are born very preterm may face significant difficulties in learning. At 11 years of age, noticeable difficulties in English and mathematics can become apparent in addition to an increased likelihood of requiring special education support.**
> Huddy, C. (2015). Preterm birth and the school years. Developmental Medicine & Child Neurology, 57(6), 502-503.

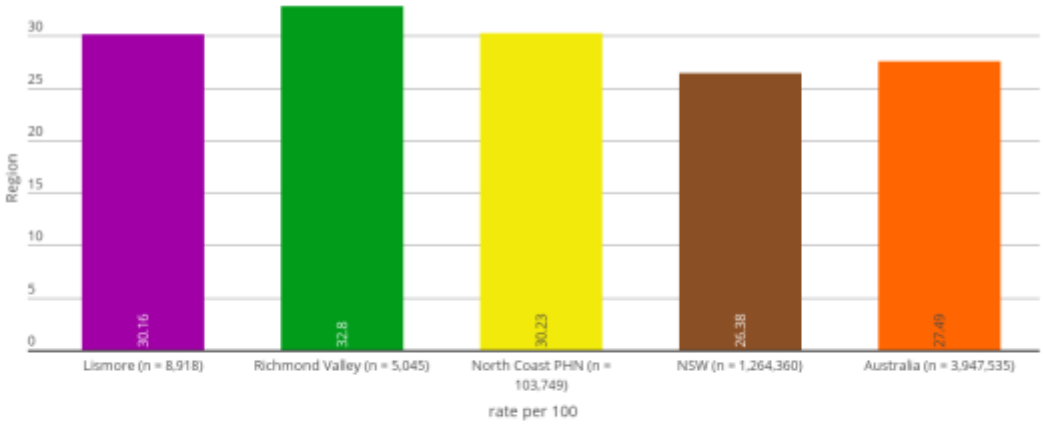
Chronic Disease

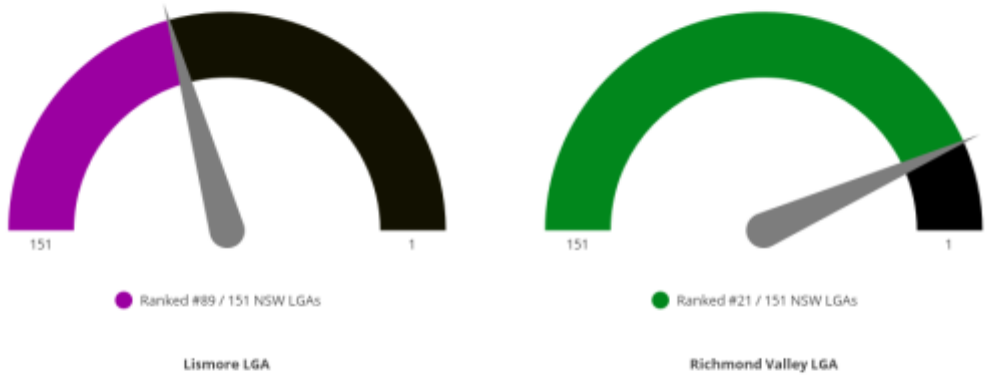
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

Estimated population, aged 18 years and over, who were obese (2011-13).

What do we know about the local community?

The Lismore LGA community has rates of obesity on par with the broader local North Coast PHN but higher then that New South Wales and Australia population averages. **The Richmond Valley LGA** area has higher rates of obesity when compared to the broader North Coast PHN community and New South Wales and Australia population averages. The **Lismore LGA** however has a higher comparative absolute volume of community members who are obese (8,918) compared to **Richmond Valley LGA** (8,918).





Why does this matter?

> **Studies show that in utero conditions that lead to low birth weight contribute to increased risks of adult obesity. Thus, helping patients avoid extremes of nutrition in pregnancy can help optimize long-term health for their offspring.**
> Ross, M., Desai, M. (2013). Fetal programming and adult obesity. Contemporary OB/GYN, May.

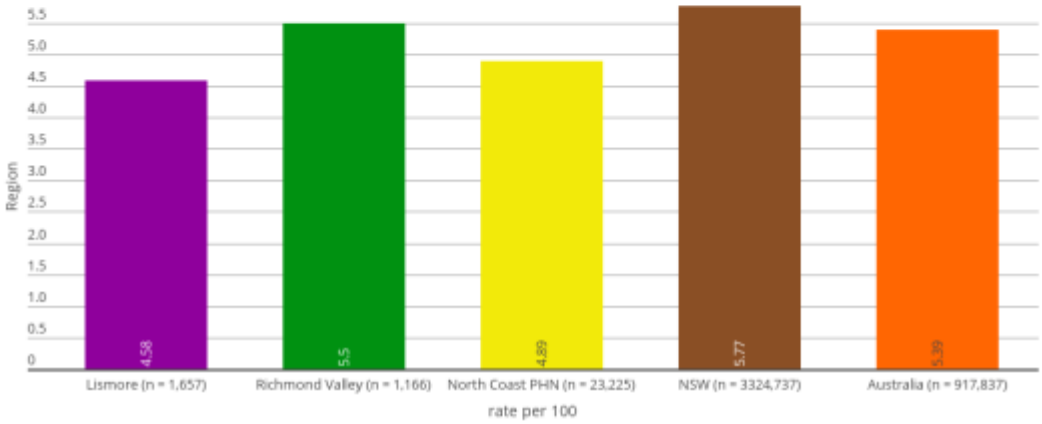
> **Early life events program the occurrence of significant adult diseases, including obesity and insulin resistance. Epidemiologic evidence exists for this concept across the globe.**
> Lane, R. (2014). Fetal programming, epigenetics, and adult onset disease. Clinics in Perinatology, 41(4), 815-831.

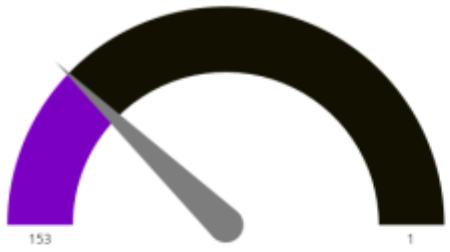
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

Estimated population, aged 18 years and over, with diabetes mellitus (2011-13).

What do we know about the local community?

The **Lismore LGA** has rates of diabetes that are slightly lower than the broader North Coast PHN community, New South Wales and Australia while the **Richmond Valley LGA** has a higher rates of diabetes compared across the same geographies. The **Lismore LGA** is ranked 116 of 150 New South Wales LGAs in terms of highest rates of diabetes. The **Richmond Valley LGA** however is ranked number 32 out of 150 available New South Wales LGAs.





Ranked #116 of 150 NSW LGAs

Lismore LGA

Ranked #32 of 150 NSW LGAs

Richmond LGA

Why does this matter?

> **Low birth weight combined with an unhealthy lifestyle is associated with a significantly higher risk of type 2 diabetes. When these factors are combined, the likelihood of having type 2 diabetes increases exponentially.**
> Li, Y., Ley, S., Tobias, D., Chiuve, S., VanderWeele, T., Rich-Edwards, J., Curhan, G., Willett, W., Manson, J., Hu, F., & Qi, L. (2015). Birth weight and later life adherence to unhealthy lifestyles in

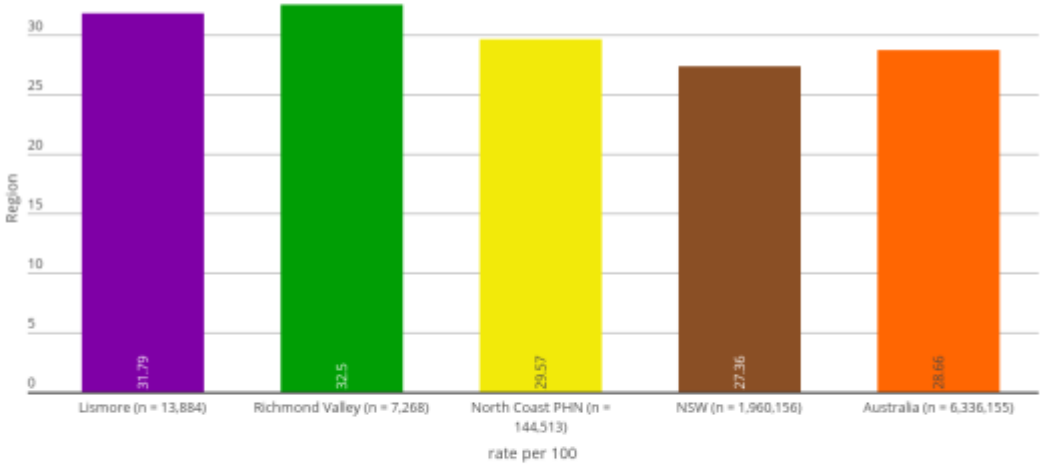
> **The association between low birth weight and adult disease is well known. However, very high birth weight is also proven to increase the risk of type 2 diabetes in young male adults.**
> Johnsson, I., Haglund, B., Ahlsson, F., & Gustafsson, J. (2015). A high birth weight is associated with increased risk of type 2 diabetes and obesity. Pediatric Obesity, 10(2), 77-83.

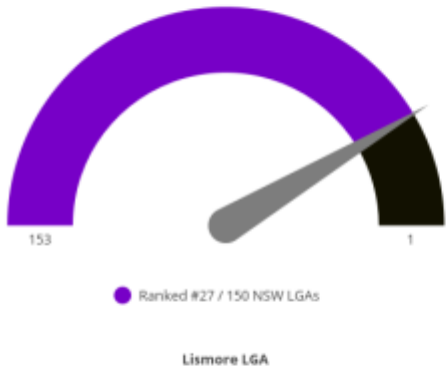
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

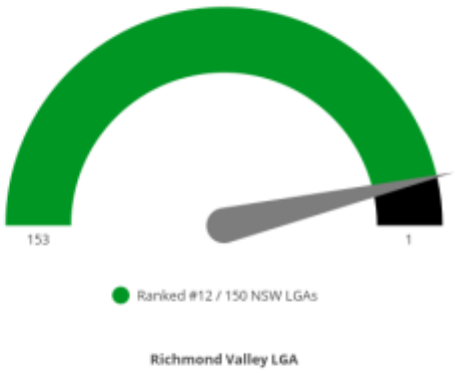
Estimated population with respiratory disease (2011-13).

What do we know about the local community?

Both the **Lismore LGA** and **Richmond Valley LGA** have higher rates of respiratory disease when compared to the broader North Coast PHN community and New South Wales and Australian population averages. The **Lismore LGA** community has a higher absolute volume of respiratory disease in the community (13,884 people) compared to the **Richmond Valley LGA** (7,268 people).







Why does this matter?

> **Low birth weight babies are significantly more likely than other babies to develop asthma, especially for vulnerable and impoverished population cohorts.**
> Potera, C. (2003). Low Birth Weight Linked to Asthma. Environmental Health Perspectives, 111(3),

> **Low birth weight is associated with an increased risk of respiratory hospitalisations in adolescence.**
> Walter, E., Koepsell, T., & Chien, J. (2011). Low birth weight and respiratory hospitalizations in adolescence. Pediatric Pulmonology, 46(5), 473-482.

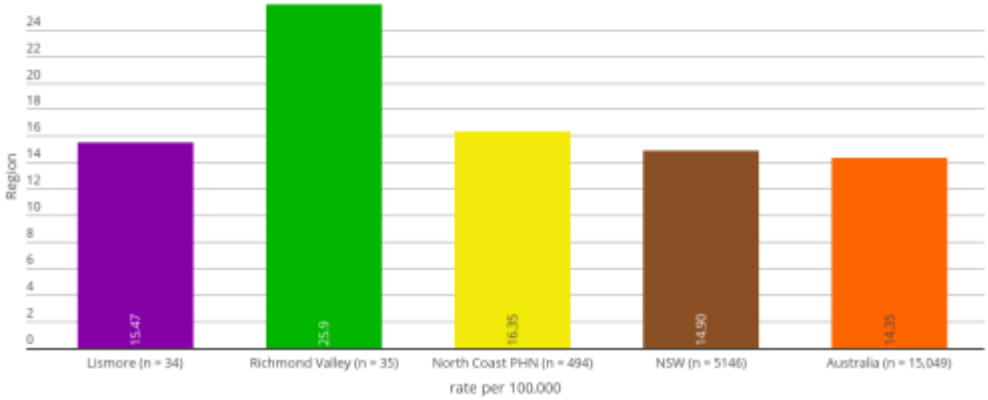
Data compiled by PHIDU from deaths data based on the 2009 to 2013 Cause of Death Unit Record Files supplied by the Australian Coordinating Registry and the Victorian Department of Justice, on behalf of the Registries of Births, Deaths and Marriages and the National Coronial Information System. The population is the ABS Estimated Resident Population (ERP) for Australia, 30 June 2009 to 30 June 2013.

Premature deaths from respiratory diseases, 0 to 74 years (2009 to 2013).

What do we know about the local community?

The **Lismore LGA** community has a premature death rate from respiratory diseases at a slightly lower rate than the broader North Coast PHN community but at a rate higher than New South Wales and Australia. The **Lismore LGA** community falls in the lower half of other New South Wales LGAs, coming in at number 75 out of 133.

The **Richmond Valley LGA** community however has substantially higher rates of premature deaths from respiratory diseases compared to the broader North Coast PHN community and New South Wales and Australian averages. The **Richmond Valley LGA** is rated toward the top end of New South Wales LGAs with high rates of premature deaths relating to respiratory diseases.



Ranked #75 / 133 NSW LGAs

Lismore LGA

Ranked #19 / 133 NSW LGAs

Richmond Valley LGA

Why does this matter?

> **Low birth weight is strongly correlated with an increased risk of adult diseases. It is the consensus of many studies that low birth weight significantly increases the risk of childhood asthma.**
> Xu, X., Li, Y., Sheng, Y., Liu, J., Tang, L., & Chen, Z. (2014). Effect of low birth weight on childhood asthma: a meta-analysis. BMC Pediatrics, 14(1),

> **Low birth weight is significantly associated with lower adult lung function. Prenatal development contributes substantially to COPD and other chronic diseases.**
> Baumann, S., Godtfredsen, N., Lange, P., & Pisinger, C. (2015). The impact of birth weight on the level of lung function and lung function decline in the general adult population. The Inter99 study. Resp

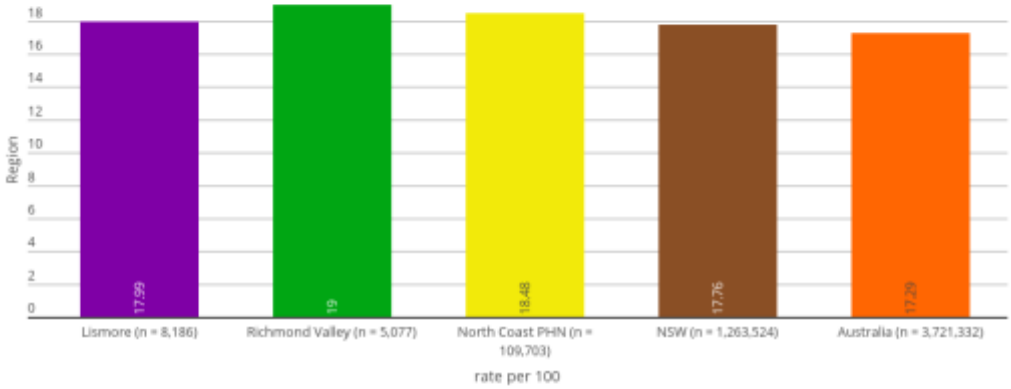
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

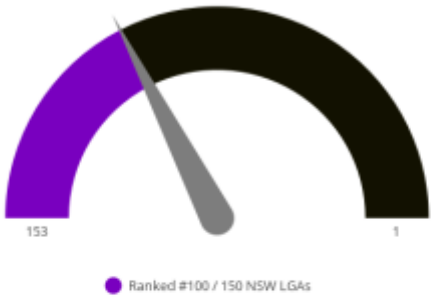
Estimated population, aged 2 years and over, with circulatory disease (2011-13).

What do we know about the local community?

The **Lismore LGA** has slightly lower rates of circulatory disease when compared to the broader North Coast PHN community however these rates are on par with both New South Wales and Australia. **Lismore** has a substantial absolute number of community members with circulatory disease, approximately 8,186 people.

Although the **Richmond Valley LGA** has a smaller absolute population of people experiencing circulatory disease (5,077), the rate of circulatory disease in the community is higher than the neighbouring Lismore community, North Coast PHN community and New South Wales and Australian population averages.





What does this mean?

> **Low birth weight has been associated with an increased risk of hypertension in children. However, both small and large birth weight (for gestational age) is associated with hypertension in children and young adults.**
> Pocobelli, G., Dublin, S., Enquobahrie, D., & Mueller, B. (2016). Birth Weight and Birth Weight for Gestational Age in Relation to Risk of Hospitalization with Primary Hypertension in Children and Young

> **A strong case has been made for an influence of fetal growth on risk of subsequent high blood pressure, insulin resistance, and cardiovascular disease in adulthood.**
> Naess, O., Stoltenberg, C., Hoff, D., Nystad, W., Magnus, P., Tverdal, A., & Davey Smith, G. (2013). Cardiovascular mortality in relation to birth weight of children and grandchildren in 500 0

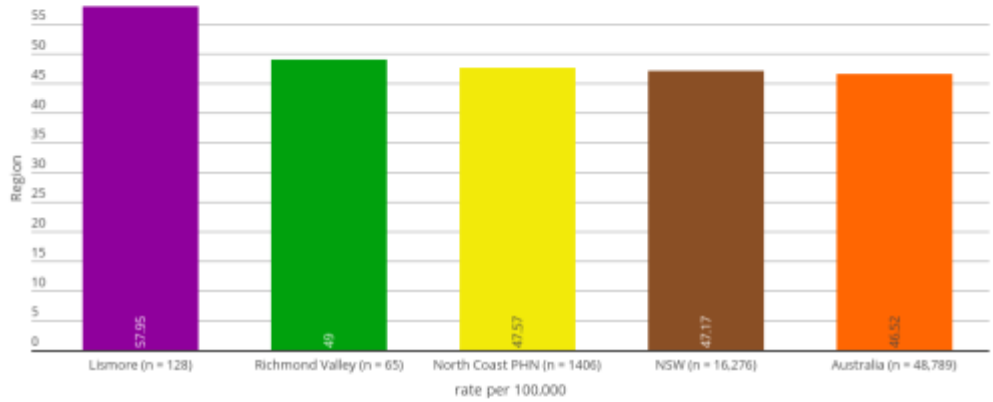
Data compiled by PHIDU from deaths data based on the 2009 to 2013 Cause of Death Unit Record Files supplied by the Australian Coordinating Registry and the Victorian Department of Justice, on behalf of the Registries of Births, Deaths and Marriages and the National Coronial Information System. The population is the ABS Estimated Resident Population (ERP) for Australia, 30 June 2009 to 30 June 2013.

Premature deaths from circulatory diseases, 0 to 74 years (2009 to 2013).

What do we know about the local community?

The **Lismore LGA** community experience substantially higher rates of premature deaths from circulatory diseases when compared to the broader North Coast PHN community and New South Wales and Australian population averages. When compared with other New South Wales LGAs, **Lismore LGA** comes in number 56 out of 153.

The **Richmond Valley LGA** experiences premature deaths from circulatory disease at rates generally on par with the broader North Coast PHN community and New South Wales and Australian population. The **Richmond Valley LGA** is ranked in the lower half of comparative New South Wales LGAs, ranked at number 91 of 153.



Ranked #56 / 153 NSW LGAs

Lismore LGA

Ranked #91 / 153 NSW LGAs

Richmond Valley LGA

Why does this matter?

> **Several epidemiological studies have indicated that low birth weight is associated with a higher incidence of death from cardiovascular disease in later life.**
> Inomata, S., Yoshida, T., Koura, U., Tamura, K., Hatasaki, K., Imamura, H., Mase, D., Kigawa, M., Adachi, Y., & Inadera, H. (2015). Effect of preterm birth on growth and cardiovascular disease risk at sc

> **Cardiovascular disease is among the leading causes of morbidity and mortality worldwide. Low birth weight is independently associated with cardiovascular disease outcomes.**
> Smith, C., Ryckman, K., Barnabei, V., Howard, B., Isasi, C., Sarto, G., Tom, S., Van Horn, L., Wallace, R., & Robinson, J. (2016). The impact of birth weight on cardiovascular disease risk in the Women's

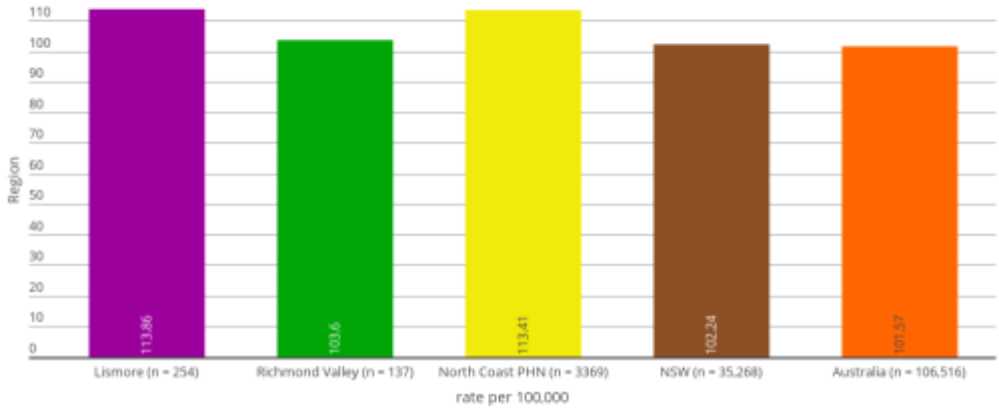
Data compiled by PHIDU from deaths data based on the 2009 to 2013 Cause of Death Unit Record Files supplied by the Australian Coordinating Registry and the Victorian Department of Justice, on behalf of the Registries of Births, Deaths and Marriages and the National Coronial Information System. The population is the ABS Estimated Resident Population (ERP) for Australia, 30 June 2009 to 30 June 2013.

Premature deaths from cancer, 0 to 74 years (2009 to 2013).

What do we know about the local community?

The **Lismore LGA** community experience premature deaths from cancer at a similar rate to the broader North Coast PHN community but higher than both New South Wales and Australia. This ranks the **Lismore LGA** in the top half of other New South Wales LGAs, ranked at 56 out of 153.

The **Richmond Valley LGA** community experiences deaths from cancer at a rate lower than the broader North Coast PHN community however at a rate on par with New South Wales and Australia averages. This ranks the **Richmond Valley LGA** in the bottom half of other New South Wales LGAs, ranked 96 out of 153.



Why does this matter?

> **Birth weight is positively associated with the risk of some cancers, including lung cancer and colon cancer. The strength of association varies for other types of cancer.**
> Spracklen, C., Wallace, R., Sealy-Jefferson, S., Robinson, J., Freudenheim, J., Wellons, M., Saftlas, A., Snetselaar, L., Manson, J., Hou, L., Qi, L., Chlebowski, R., & Ryckman, K. (2014). Birth weight a

> **Birth weight is positively associated with the risk of adult colon cancer, whereas the results for rectal cancer were inverse. Birth weight is associated inconsistently to different cancer types.**
> Smith, N., Jensen, B., Zimmermann, E., Gamborg, M., Sørensen, T., & Baker, J. (2016). Associations between birth weight and colon and rectal cancer risk in adulthood. Cancer Epidemiology, 42, 1-208.

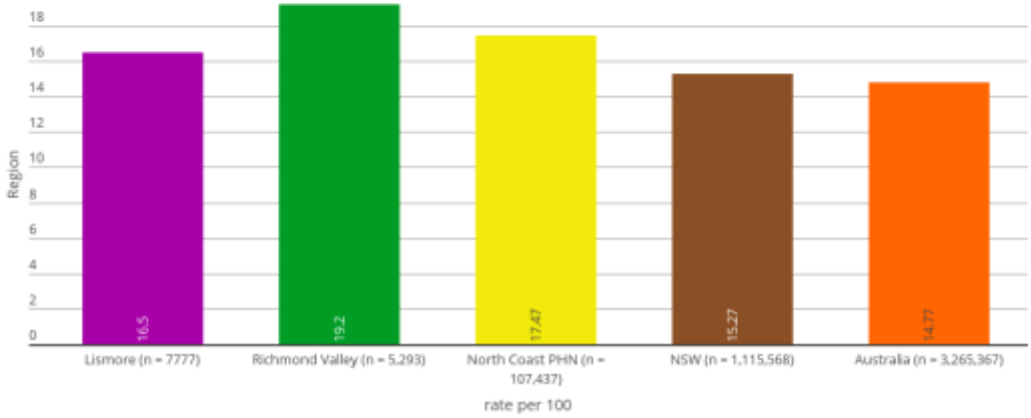
Compiled by PHIDU based on modelled estimates from the 2011-13 Australian Health Survey, ABS (unpublished); and the average of the ABS Estimated Resident Population, 30 June 2011 and 30 June 2012, based on the Australian standard.

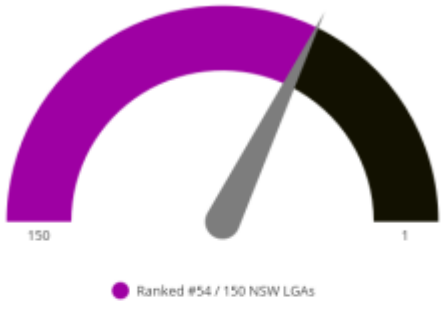
Estimated population with Arthritis (2011-13)

What do we know about the local community?

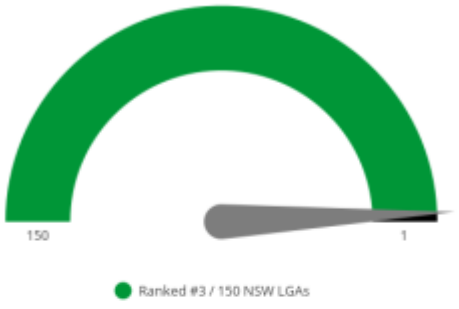
The **Lismore LGA** community experiences rates of Arthritis below the broader North Coast PHN community rate but higher than both New South Wales and Australian averages. This ranks the **Lismore LGA** at number 54 out of the available 150 New South Wales LGAs.

The **Richmond Valley LGA** however experiences rates of Arthritis at much higher levels when compared to the broader North Coast PHN community and New South Wales and Australian averages. The **Richmond Valley LGA** is ranked at number 3 of the available 150 LGAs in terms of highest rates of Arthritis in the population.





Lismore LGA



Richmond Valley LGA

Why does this matter?

> **It is suggested that individuals born at low birth weight or preterm are at increased risk of hip arthroplasty for osteoarthritis in adult life.**
> Hussain, S., Wang, Y., Wluka, A., Shaw, J., Magliano, D., Graves, S., & Cicuttini, F. (2015). Association of Low Birth Weight and Preterm Birth With the Incidence of Knee and Hip Arthroplasty for Osteoar

> **A large cohort study found that children born at a very high birth weight were at increased risk of adult onset rheumatoid arthritis. The 'fetal origins of disease' hypothesis suggests the uterine environment can influence the susceptibility to future disease.**
> Mandl, L., Costenbader, J. F., Karlson, E. W. (2009). Is birthweight associated with risk of rheumatoid arthritis? Data from a large cohort study. Annals of the Rheumatic Diseases, 68

NEXT STEPS

This paper provides a brief snapshot of the evidence that details the links between birth outcomes and lifelong health, social and economic advancement. It also provides a detailed overview of the population health profile for the Lismore and Richmond Valley area. This population profile presents a quite powerful visualization of the challenges facing the local community. Based on this evidence, early intervention could be considered an urgent priority in order to prevent a generation of children from being held back from their full potential.

As this project rolls out, Beacon Strategies will continue to deliver a mixed-methods approach to fully understand an optimal service model based on local needs and informed by a range of perspectives ensures. This will help to ensure that a solid foundation has been built to deliver outcomes in this community when the service model concept becomes a reality.

Subsequent activities that we will undertake to achieve this include:

- **Service mapping** - to fully document the available services and supports located either in or within close proximity to the community. A criteria-based approach will be used to fully understand service accessibility, cost, intake criteria and referral pathways, as well as an opportunity to build strong relationships with the local service delivery sector.
- **Community conversations** - in-depth consultation with a range of mothers to ensure the community are at the centre of the identification of issues. These conversations will consist of focus groups or semi-structured interviews with recent mothers to explore their experiences, perceptions, challenges and suggestions relating to their pregnancy journey.
- **Community briefing and reporting** – following the development of a final report, the results of the service model co-design project will be presented to key stakeholders to guide discussion on future program directions.