Data availability and use in aged care

– moving from information to knowledge

MILES MORGAN AUSTRALIA

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Overview

Purpose

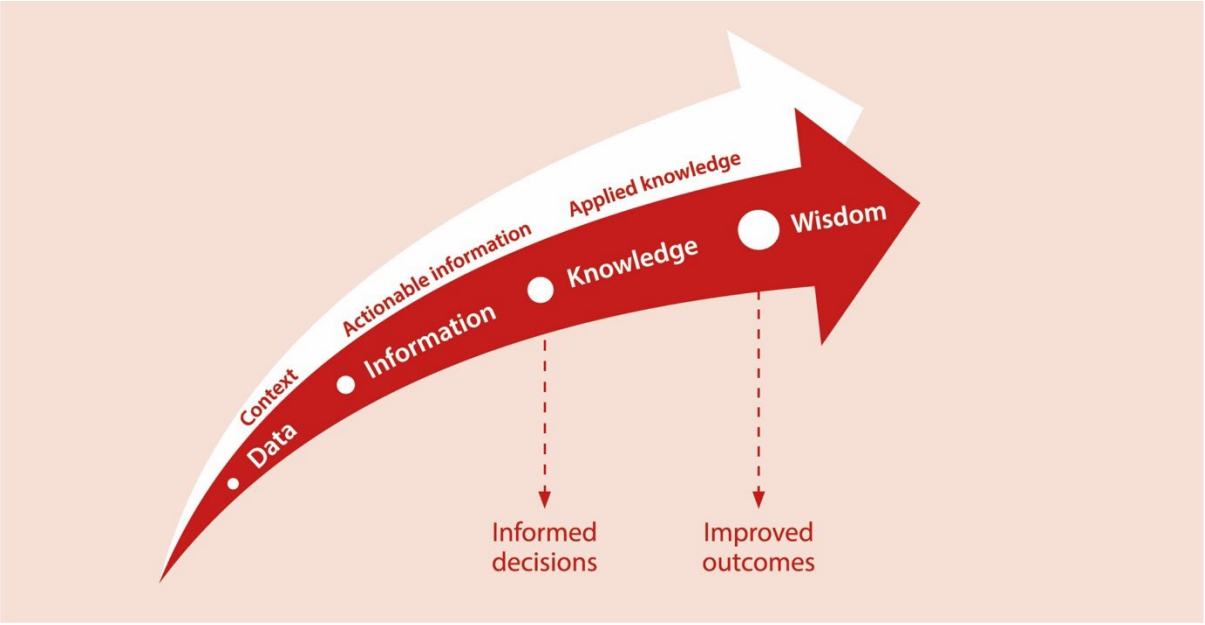
The current aged care data landscape is insufficient for a sector continuing to experience significant change – with decision makers unable to reach beneath the macro to build actionable information.

This report is designed to help decision-makers reach a deeper understanding of the contexts required to successfully implement aged care policies in regional, rural and remote Australia.

The purpose of this report is to provide an overview of the current information state in the aged care sector, in particular, identifying actionable information so that system stewards can move from information to knowledge.

Once a state of 'knowledge' has been achieved, greater confidence can be taken that policy decisions are well informed.

Figure 1: Improving aged care outcomes: a journey[1]



We acknowledge there is a level of effort required to consolidate actionable information – from across a number of interdependent sectors – and apply this collective knowledge to better inform aged care policy.

> To manage wisely implies knowing why to do something; to manage effectively implies knowing what to do; to manage efficiently implies knowing how to do it; and to 'muddle through' implies nothing other than having 'lots of data' around.
>
> **- Milan Zeleny, 1987**

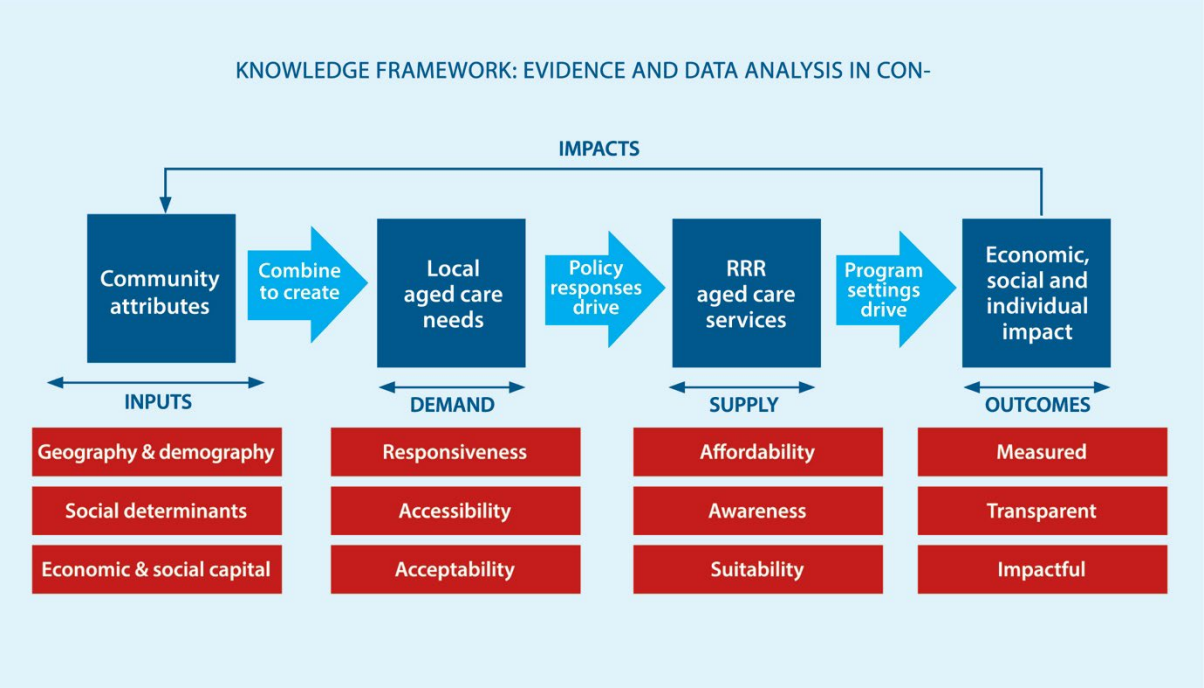
[1] Adapted from Zeleny, 1987

Knowledge framework

Miles Morgan Australia acknowledges the current homogenous approach to aged care policy design and program implementation has resulted in services that do not adequately meet individual, family and community needs outside of metropolitan areas.

Starting with Penchansky and Thomas's seminal work characterising factors influencing entry and use of care systems (later expanded in Saurman, 2016), we have developed a **knowledge framework** of independent yet interconnected dimensions – each important to the achievement of service quality and equity.

Figure 2: Knowledge Framework[2]



The policy dimensions identified in the source literature are grouped under the themes of demand and supply. We then expanded the framework to also address policy issues relating to inputs and outcomes.

Methodology

You can find our methodology in Appendix 1. Appendix 2 contains all reference material.

Navigation

Mirroring the framework outlined in Figure 2, this paper comprises four parts:

- Part 1: Examining the notion of community attributes.
- Part 2: Understanding demand in terms of responsiveness, accessibility and acceptability.
- Part 3: Improving supply in terms of affordability, awareness and suitability.
- Part 4: Public benefit – how to validate the economic, social and personal impact.

[2] Adapted from Saurman, 2016

By framing the relevant evidence and data against each policy dimension, we are hoping this knowledge framework will help to inform the development, implementation, operation and/ or evaluation of aged care services now and into the future.

Our objective, in mapping relevant evidence and data to a purpose-built knowledge framework, is to support policy design so that older Australians receive the right care, from the right provider, at the right time, in the right place, dependent on context – irrespective of where they live.

Scope

What is Regional, Rural and Remote Australia?

The Department of Health defines RRR regions of Australia using the Modified Monash Model (MMM).

The MMM is a classification system that categorises metropolitan, regional, rural and remote areas according to their population size (based on census data) and geographical isolation (determined by the distance from urban centres).

MMM was developed to recognise the challenges in attracting health workers to more remote and smaller communities and is constructed from the ASGS Remoteness Structure.

Alignment between the two indexes only vary across RA2-3 and MMM 2-5, which are exact matches at the higher level, but have granular differences (i.e. MMM 2 is any RA2 and RA3 area that is in or within a 20km drive of a town with over 50,000 residents).

Table 1: Area matching between the ASGS Remoteness Structure and the MMM

ASGS Remoteness Structure	MMM Category
Major Cities (RA1)	Metropolitan (MMM 1)
Inner and Outer Regional (RA2 and RA3)	Regional and Rural (MMM 2-5)[3]
Remote (RA4)	Remote (MMM 6)
Very remote (RA5)	Very remote (MMM 7)

[3] MMM 2 refers to regional centres; MMM 3 refers to large rural towns; MMM 4 refers to medium rural towns; and MMM 5 refers to small rural towns.

Table 2: MMM classifications table

Category	Definition
MMM 1 **Metropolitan**	All areas categorised ASGS-RA1.
MMM 2 **Regional Centre**	Areas categorised ASGS-RA 2 and ASGS-RA 3 that are in, or within 20km road distance, of a town with a population greater than 50,000.
MMM 3 **Large Rural Town**	Areas categorised ASGS-RA 2 and ASGS-RA 3 that are not in MMM 2 and are in, or within 15km road distance, of a town with a population between 15,000 and 50,000.
MMM 4 **Medium Rural Town**	Areas categorised ASGS-RA 2 and ASGS-RA 3 that are not in MMM 2 or MMM 3 and are in, or within 10km road distance of a town with a population between 5,000 and 15,000.
MMM 5 **Small Rural Town**	All other areas in ASGS-RA 2 and 3.
MMM 6 **Remote Community**	All areas categorised ASGS-RA 4 that are not on a populated island that is separated from the mainland in the Australian Bureau of Statistics (ABS) geography and is more than 5km offshore. Islands that have an MMM 5 classification with a population of less than 1,000 (2019 Modified Monash Model classification only).
MMM 7 **Very Remote Community**	All other areas, that being ASGS-RA 5 and areas on a populated island that is separated from the mainland in the ABS geography and is more than 5km offshore.

Due to the inclusion of capital cities such as Darwin and Hobart in MMM 2, the focus of this report is directed to aged care services provided in MMM 3-7.

- MMM 3-7 constitutes over 95% of the nation's land mass and approximately 20% of the population according to the ABS 2016 Census.
- Nearly 5 million people live outside metropolitan areas (MMM 3-7), all of whom will have a direct or indirect interest in the provision of care in their local community.
- The regions comprising MMM 5-7 account for 10% of the nation's total population and about 90% of the geographical area.

Figure 3: Visual representation of MMM regions

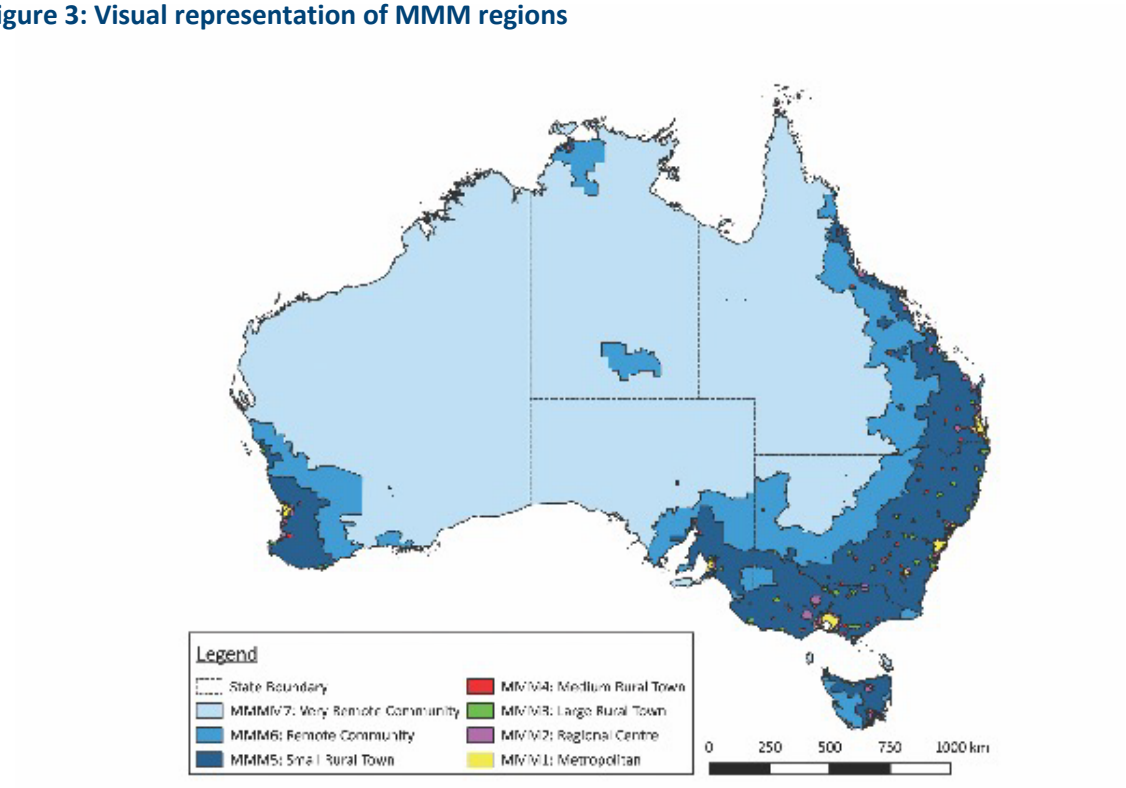
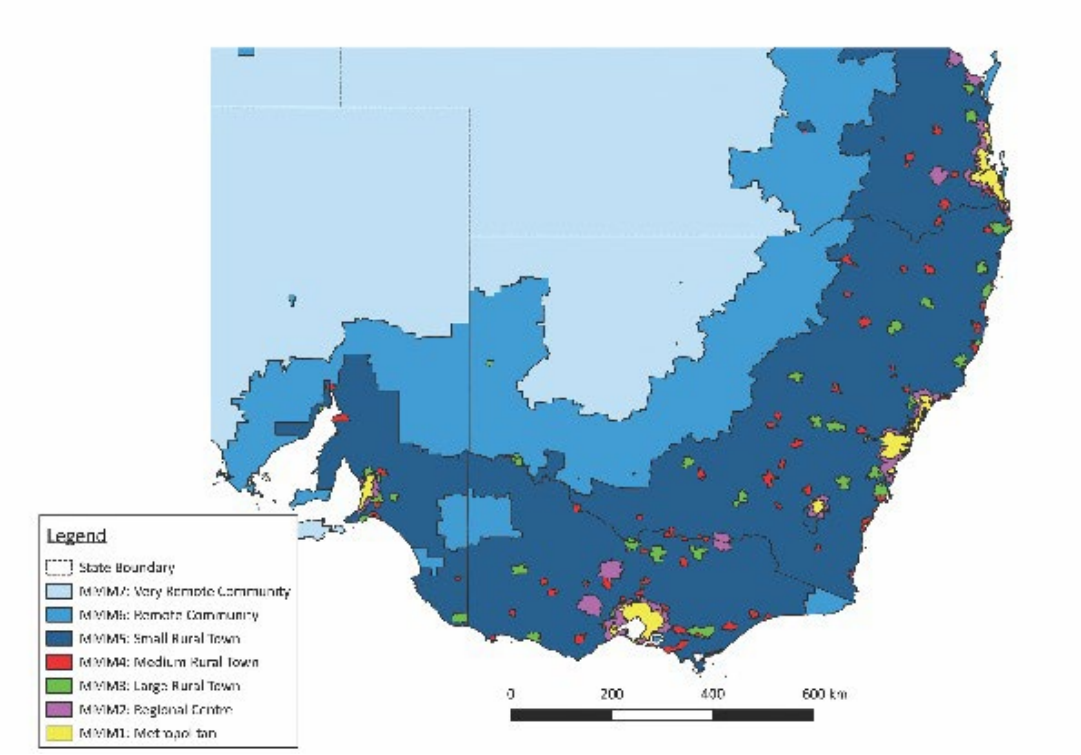


Figure 4: Detailed representation of MMM regions in the South East corner of mainland Australia



Current operating environment

The regional, rural and remote areas of Australia (MMM 3-7) constitute over 95% of the nation's land mass and approximately 20% of the population.

Aged care service delivery in these regions presents unique challenges that are entirely different to those faced in metropolitan areas. For example, there are geography-determined costs of service delivery, necessitating the development of different business models for service providers in regional, rural and remote regions.

The current approach to understanding aged care, especially around evidence-based decision making and predictive analysis, focuses on aggregate views of demand, and fragmented views of service supply.

Our observations are that demand and supply are primarily planned and projected at an aggregated level. This includes projecting aged population nationally, program funding distribution and prioritising access for eligible service recipients.

While there have been supplementary efforts to address anomalies or inequities in the service system (i.e. National Aboriginal and Torres Strait Islander Flexible Aged Care Program), at the macro-level, policies remain homogenous.

Our examination of de-aggregated data provides an opportunity to build actionable intelligence to inform future aged care settings.

Current information state

Providing aggregated information at the national level has been the predominant analysis and forecasting method for aged care. The results include headline numbers such as the Treasury projection that the national aged population (65+) would be 8.1 million by 2050.

Headline numbers like this can inform macro aged care policy settings. However, this kind of aggregation effectively treats regional, rural and remote regions the same as metropolitan. While metropolitan areas (defined in this paper as MMM 1 and 2) contain 80% of the population nationally, they only account for around 5% of the country's land mass.

Data aggregation fails to differentiate regional, rural and remote locations from metropolitan areas, obscuring the distinctive and unique challenges of non-metropolitan locations.

Policy and program settings need a greater level of granularity for successful implementation – information that can be acted on.

An ideal case, as applied in this paper, is to break down the data geographically by an accepted standard, such as the Modified Monash Model, and to closely examine individual MMM regions to identify unique questions to be answered through careful 'munging' and enriching of available data sources.

The advancement of geographical information system (GIS) and data visualisation makes such analysis possible, with the primary limitation being data availability, accuracy and completeness.

Observations on the application of the Modified Monash Model

Although the MMM was developed by the Department of Health in 2015 to better target incentive payments for rural doctors, it is currently used as a proxy measure of access for a number of Commonwealth health and social services.

By applying MMM in this way, it is assumed that only population size and distance from urban centres are relevant to service accessibility. In reality, the concept of access is highly complex and multifaceted, especially in regional, rural and remote locations.

Supplementing the MMM with localised analysis will provide greater insights for policy and planning purposes.

Observations on data

Current data capture (the right information at the right level), data curation and management practices (data architecture, dictionaries, libraries, metadata) are inadequate for the purposes of informing policy or program settings when looking beyond aggregate positions (i.e. at the individual MMM level).

As has been documented in earlier reviews and reports, the current data landscape contributes to a range of perverse outcomes:

- Poor data connectivity limits the opportunity to develop evidence-based care models, to undertake sophisticated service planning or to understand trends and identify emerging risks.
- Current data management practices limit transparency, and consequently, accountability.
- The absence of any known data architecture impacts on system navigation – not only for older Australians and their carers, but also for service providers.

Without the right data infrastructure and architecture, any steps to improve planning, transparency or navigation will incur higher ongoing costs – with limited ability to automate.

While complex, other government departments are successfully managing – or rapidly improving – their data management capabilities. It is important to note the high risk associated with outsourcing data functions, especially when data relates to a complex system[4].

The presumption that engaging multiple data scientists will deliver expedient business transformation, underestimates the knowledge required for outputs to be actionable. When building analytics capability, an equally vital role is that of the 'business translator' (Ransbotham et al., 2015).

In some ways, the success of the business translator will determine whether a data investment pays off, because their objective is to convert analytics into insights and actionable steps. In addition to being data savvy, business translators need to have deep policy and operational knowledge.

[4] For example, the Department of Social Services (DSS) has constructed a modular event-based dataset providing a longitudinal picture of the interaction of individual welfare recipients throughout their interactions with DSS payments. These de-identified data have been designed with a focus on enduring data integration. Having invested the necessary resources and time in developing their data management practices, DSS is now in a position to conduct or commission high-quality, high-impact research on the life-course effect of income supports.

While outsourcing analytics activities can be a practical step, business translators need to have proprietary knowledge covering a multitude of perspectives, reflecting the diversity of data consumers – and are more likely to be 'grown from within'.

In considering ways aged care system stewards could improve their business translation capability, Miles Morgan Australia has developed a Data Blueprint and Analytics Roadmap focused on the aged care sector (see Appendix 4).

The Data Blueprint and Analytics Roadmap provide a baseline from which business translator and analytics capabilities could be built.

Invest in data infrastructure to better collect, analyse, interpret, share and report across data sources (securely); in order to develop shared measurement systems and reporting capability.

PART 1: What do we mean by community attributes?

1.1 Geography and demography

Changing patterns of longevity, fertility and migration in Australia have driven substantial changes in population age structure (also known as demographic structure), and household size and composition.

One key issue for all levels of government will be assessing where particular services will be required in the future.

The spatial implications of population ageing will create unprecedented challenges for the future delivery of government services.

Figure 5: 65+% Population in relation to the total population of MMM regions – trends over time

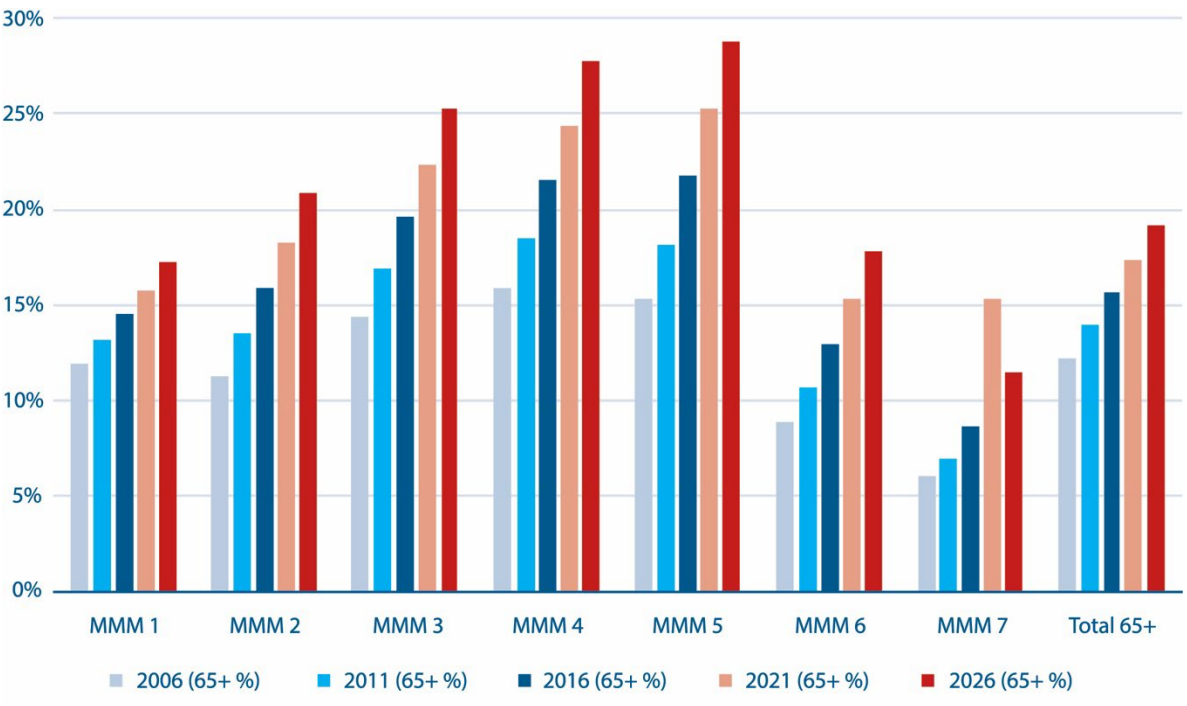


Figure 5 observations

- By 2026, the largest ageing population relative to total population, in any area, will be in MMM 5.
- The second largest proportional ageing population will be MMM 4, followed closely by MMM 3.

Table 3: 65+% Population in relation to the total population of MMM regions – trends over time

MMM	2006 (65+ %)	2011 (65+ %)	2016 (65+ %)	2021 (65+ %)	2026 (65+ %)
MMM 1	11.9%	13.2%	14.5%	15.8%	17.2%
MMM 2	11.2%	13.5%	15.9%	18.2%	20.8%
MMM 3	14.4%	16.9%	19.6%	22.3%	25.2%
MMM 4	15.9%	18.5%	21.5%	24.4%	27.7%
MMM 5	15.3%	18.1%	21.8%	25.2%	28.8%
MMM 6	8.9%	10.7%	12.9%	15.3%	17.8%
MMM 7	6.0%	7.0%	8.6%	10.0%	11.5%
Total 65+	12.3%	14.0%	15.7%	17.4%	19.2%

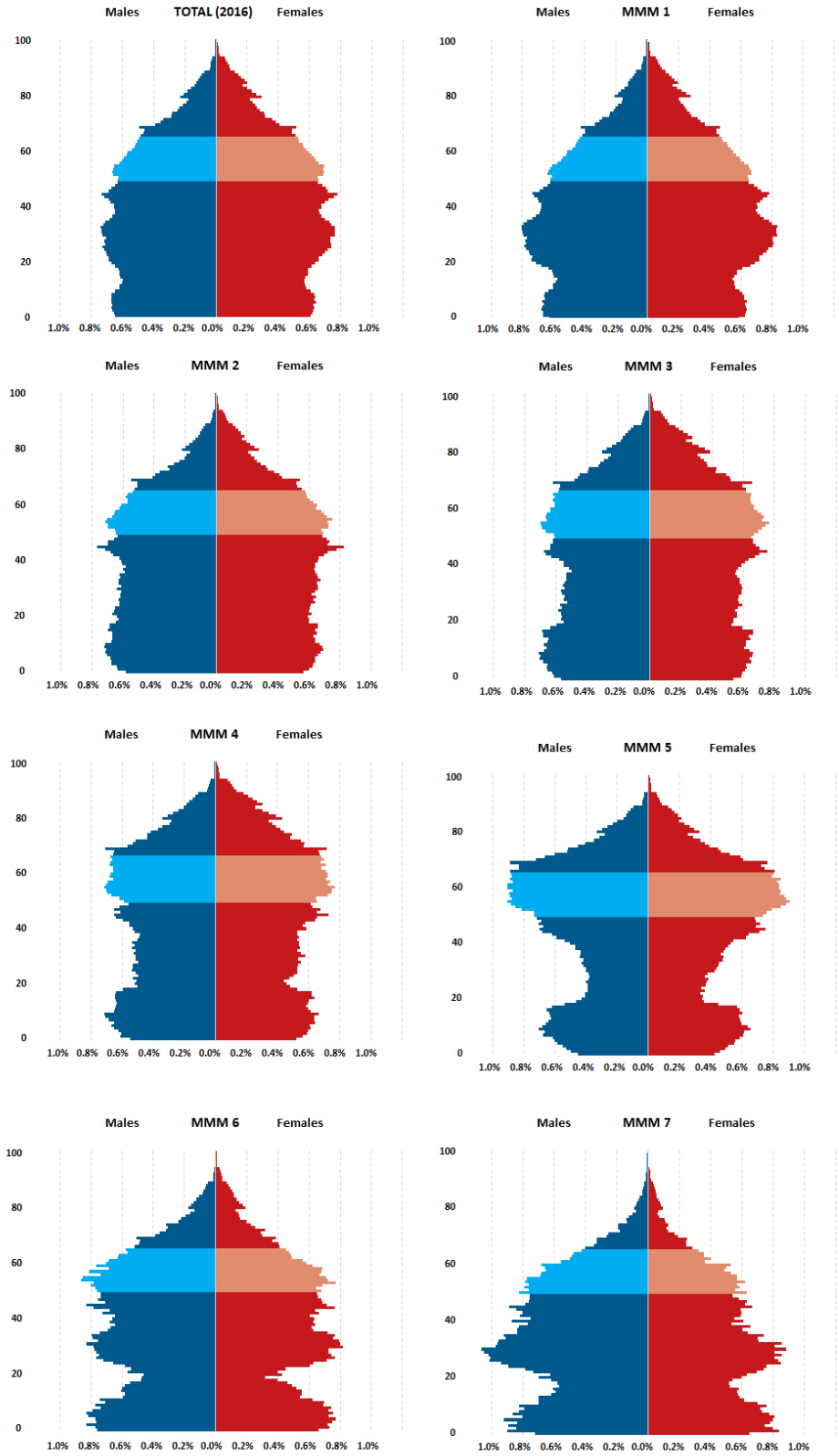
The Royal Commission into Aged Care Quality and Safety conducted research into the national ageing distribution profile (Royal Commission into Aged Care Quality and Safety, 2019). This is a sound indicative measure to highlight possible future systemic issues.

Miles Morgan Australia has taken this ageing distribution analysis one step further, creating population pyramids for each MMM region.

As Figure 6 illustrates expected changes in the number of people likely to require care, and the number of working age people who would potentially be available to provide that care varies greatly by region.

By de-aggregating demand it becomes evident that challenges created by population age structure in many regions will need tailored solutions if they are to be addressed in equal measure. For example, in MMM 5 it appears that a deep investment in workforce attraction is required – at a community level. Whereas, for MMM 6-7 investments in workforce development would appear more relevant.

Figure 6: Aging distribution calculated across MMM region (ABS Census 2016)[5]



[5] ABS census does not publicly provide data above 80 years of age by each single year, hence here the 80+ populations are modelled and shall only be used to compare trends and ratios rather than absolute values.

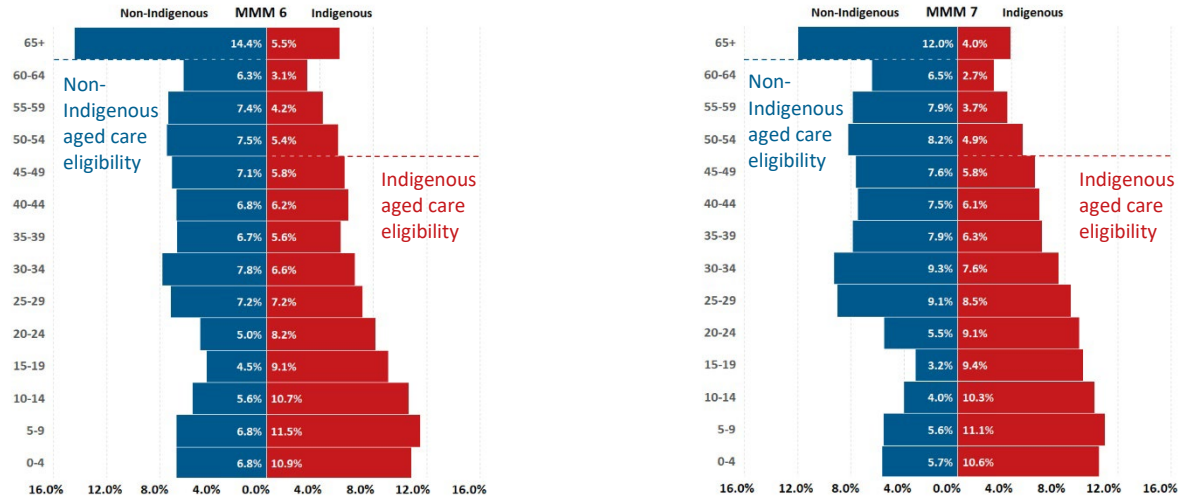
Figure 6 methodology

- The analysis was performed based on the ABS Census 2016 at the Statistical Level 1 (SA1) level.
- MMM to SA1 correspondence published by the Department of Health at data.gov.au for July 2019 was used to map the MMM value for SA1.
- ABS Census does not publicly provide data above 80 years of age by each single year, hence here the 80+ populations are modelled and shall only be used to compare trends and ratios rather than absolute values.

Figure 6 observations

- The transparent bands of each image represent the 50 to 65 demographic (aged care demand pipeline and early eligibility for Aboriginal and Torres Strait Islanders) and 85+ represent the oldest old.
- The population distributions are highly variable across different MMM regions:
  - MMM 2-5 shows a trend of a lower proportion of working age population, compared with the overall population in each region, which becomes most prominent in MMM 5.
  - MMM 5 and 4 have larger portions of key ageing populations - 85+, 65+, and 55-64 (aged care pipeline).
- MMM 5 currently has the most challenging ratio of older Australians to working age population. This ratio is projected to continue into the future (see Figure 9).
- MMM 6 and 7 have relatively less aged population compared to other MMM areas – it also appears that MMM 6 and 7 have an available working age population, sufficient to build a local care workforce.
- The aggregated national picture best reflects the population of MMM 1, due to high number of people that live in MMM 1.

Figure 7: Understanding Aboriginal and Torres Strait Islander population age structures in remote and very remote regions (MMM 6-7)



While the unique service delivery challenges and opportunities in Aboriginal and Torres Strait Islander communities may be most apparent in remote and very remote locations (as illustrated in Figure 7), matters of acceptability (demand-side) and suitability (supply-side) – for example – have no geographical boundaries.

Further work is required to understand the unique situation, experience and perspective of Aboriginal and Torres Strait Islander peoples in relation to ageing and aged care.

Research relating to Aboriginal and Torres Strait Islander peoples and communities is cursorily referenced in this review, due to scope limitations.

All concepts in this report require further investigation from an Aboriginal and Torres Strait Islander standpoint.

Understanding local workforce availability

Small-area population projections suggest that many regional and rural communities are likely to be characterised by strong growth in the number of aged Australians, with a dwindling proportion of children and a shrinking proportion of the population of labour-force age.

In these country towns, fewer workers will be available to help meet the service needs of older Australians, and extensive planning will be required to ensure that government is able to provide the health, aged care and other services needed by these populations.

Rapidly declining ratios have implications not only for the financing of aged care but also for the aged care workforce. In some regions there will be far fewer workers to draw on to meet the rapidly growing demand for health and aged care services (Royal Commission into Aged Care Quality and Safety, 2019).

Based on the approach outlined by the Royal Commission into Aged Care Quality (Royal Commission into Aged Care Quality and Safety, 2019)[6], dependency ratios have been analysed by MMM region.

[6] Two types of dependency ratios were calculated to consider the future of service delivery and related workforce planning issues, using the population datasets created by geographical areas. These were:

- Age-pension dependency ratio: the population ratio between the 65+ population and the 15-64 population
- Age-care dependency ratio: the population ratio between the 85+ population and the 15-64 population.

Figure 8: Age-pension dependency ratios by MMM region

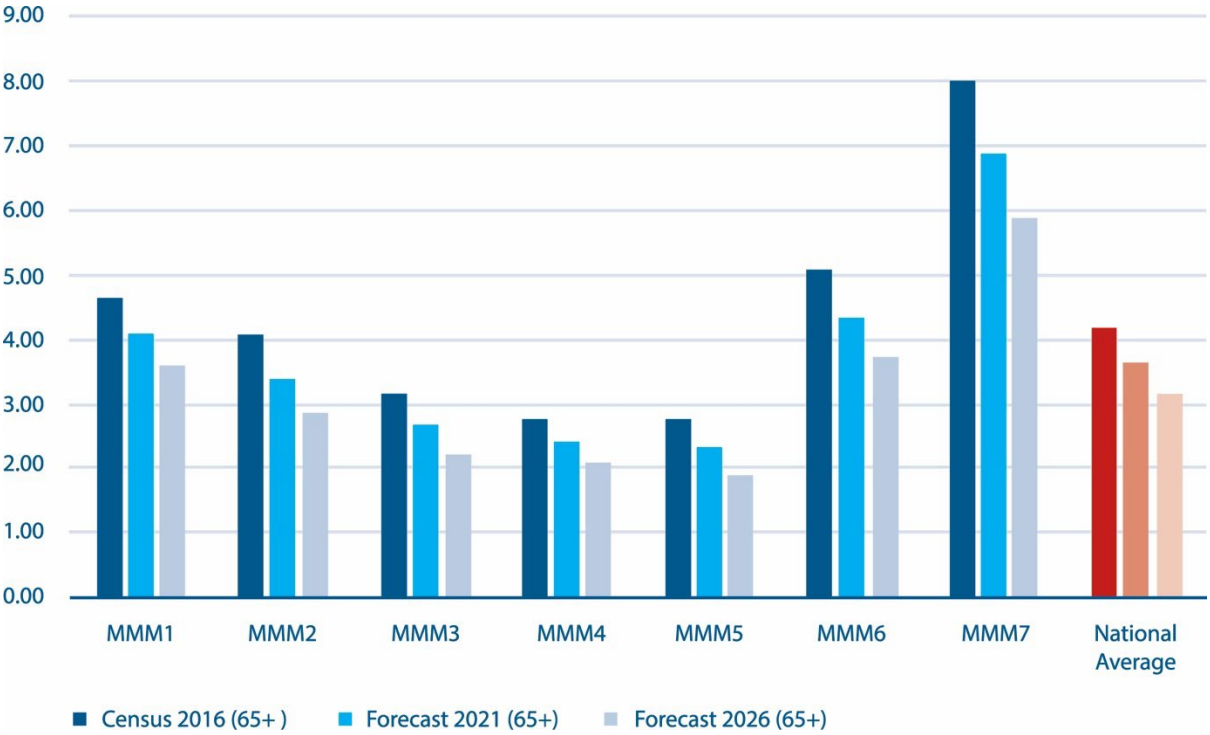


Figure 8 methodology

- The **age-pension dependency ratio** is calculated by dividing the number of people of traditional working age (15-64 years) by the number of people aged 65+.

Figure 8 observations

- The available workforce to support people over 65 is of greatest concern in MMM 5 and 4 – both currently and into the future.
- By 2026 we estimate only 1.9 people in MMM 5 communities will be of working age for each person over 65.

The 15-64 aged group represents the working age population. All ratios were calculated and forecasted into 2021 and 2026.

Figure 8 further commentary

- The Royal Commission into Aged Care Quality and Safety defined the 'Age-Pension Dependency Ratio' to provide some understanding of the issues that governments will face when providing services for older people of eligible pension age (Royal Commission into Aged Care Quality and Safety, 2019).
- Spending on the Age Pension is currently the largest budgetary component of the cost of ageing, this impact is likely to peak in the early-2030s (Parliamentary Budget Office, 2019).
- Once the entire baby boomer cohort has reached the qualifying age for the Age Pension in the early-2030s, the impact of ageing on Aged Pension spending will be moderate.

Figure 9: Age-care dependency ratios by MMM region

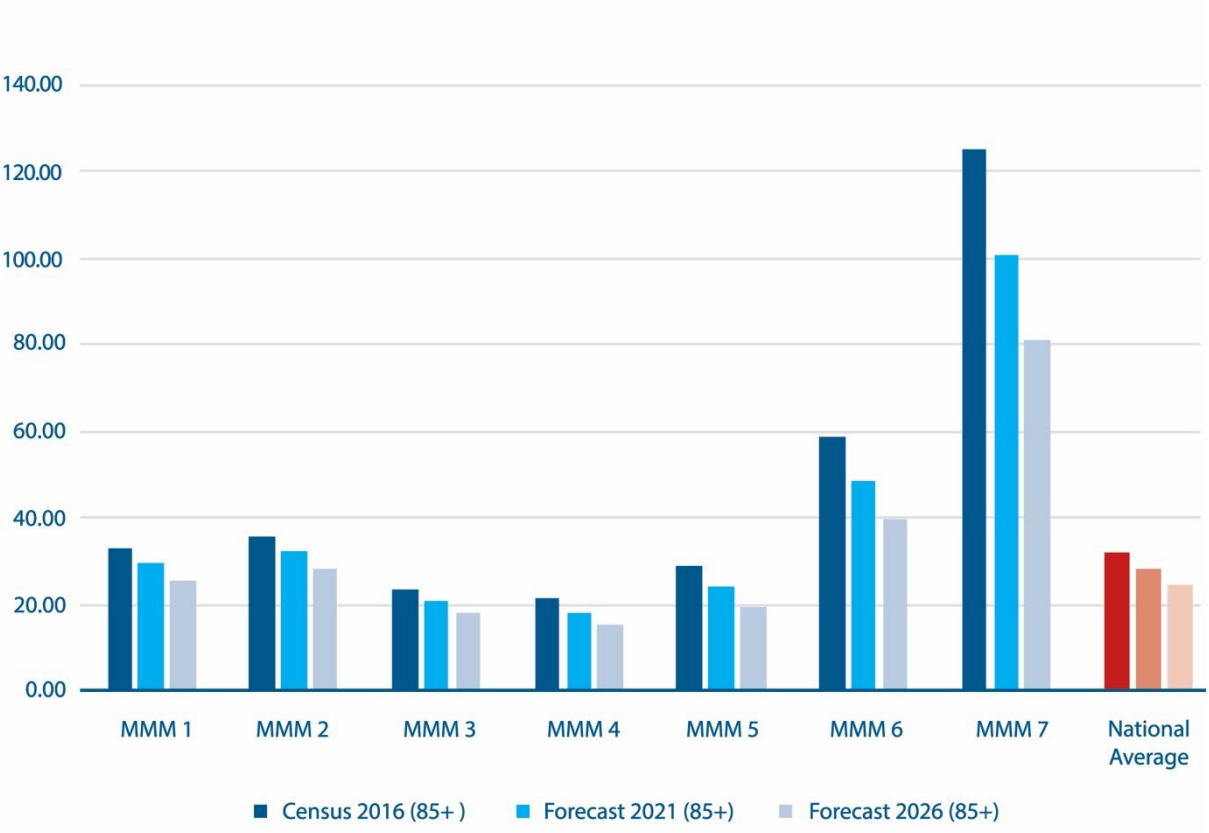


Figure 9 methodology

- The **age-care dependency ratio** is calculated by dividing the number of people of traditional working age (15-64 years) by the number of people aged 85+.

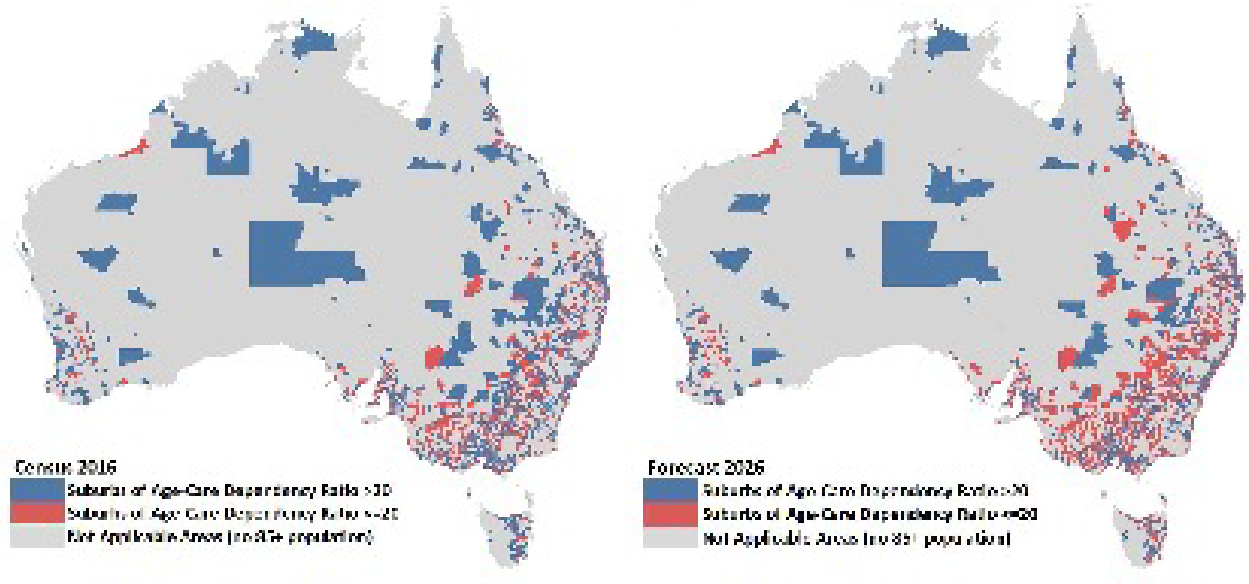
Figure 9 observations in relation to possible impacts on the local workforce:

- The available workforce to support people over 85 is of greatest concern due to increased needs, complexity and cost for the cohort known as the oldest old:
  - The available workforce in MMM 4 regions, closely followed by MMM 3 and MMM5 will require active intervention if the impacts are to be ameliorated.
  - Maximising utilisation of the working age population in these regions will be critical, as will workforce attraction.
- We assume ratios in MMM 7 regions may be impacted by mortality rates in the 65+ population, in particular the poorer life expectancy of Aboriginal and Torres Strait Islander people.
  - Improving life expectancy for all Aboriginal and Torres Strait Islander people is paramount.
  - The age-care dependency ratios in MMM 7, and to a slightly lesser extent MMM 6, presents a strong opportunity for local people to meet local workforce needs into the future, with the necessary supports that can be derived through workforce and community development.

Based on the 2026 census forecast, there are some communities with a population over 4,000 people – but with an age-pension dependency ratio of less than 20 (see Figure 10):

- At the regional level (Statistical Areas level 3[7]) there are 38 areas facing this scenario in 2026.
- 45% of these areas are located in MMM 3 and over 76% are located across MMM 3-7.
- 11 of these areas are located in South Australia, 10 in Queensland, 9 in Victoria and 8 in New South Wales.

Figure 10: Forecasting Age-care dependency ratios in 2016 and 2026



[7] As defined under the Australian Statistical Geography Standard.

System stewards would benefit from a permanent capability that can estimate the spatial effect of a policy, before the policy change is introduced – to help prevent the emergence of unintended small-area consequences and associated population risks.

1.2 Social determinants of health

The number of Australians aged 85+ will more than quadruple by 2050 to 1.8 million (Australian Government Department of the Treasury, 2010).

It is expected that by 2050, over 3.5 million older people will access aged care services each year, with approximately 80% of services delivered in the community (Productivity Commission, 2011a).

It is unclear whether the aged care system is currently meeting demand, particularly in rural and remote areas.

Additionally, rural and remote communities have limited access to specialists, primary care professionals (such as GPs) and other health practitioners, as well as reduced access to acute health care infrastructure (Infrastructure Australia, 2019).

Even when services are available and accessible, the focus is primarily on diagnosing and treating existing conditions, with comparatively little attention directed at prevention and early intervention.

However, the key challenge over coming years will be chronic disease prevention, which is largely dependent on comprehensive and coordinated care that is ongoing, rather than episodic, and that requires additional and often different infrastructure, services and skills from those that have been in place for decades (Calder et al., 2019).

Targeting preventative and early intervention activities at social risk factors can be an effective way of reducing future demand on health and aged care systems, whilst simultaneously improving the quality of life of older Australians (Productivity Commission, 2011a).

Socio-economic factors, described in terms of educational attainment, income level, and occupational status, are important determinants of health. In fact, socio-economic status is the primary non-medical factor affecting health (Daniel et al., 2018).

Mapping the Socio-Economic Index For Areas[8] (SEIFA) against the classification system used by the Department of Health to categorise metropolitan, regional, rural and remote areas according to their population size (based on census data) and geographical isolation (determined by the distance from urban centres)[9], we found:

- The highest proportional exposure to socio-economic disadvantage is in very remote areas (MMM 7), with causes having been extensively documented elsewhere.
- MMM 6 have significantly less exposure to socio-economic disadvantage, with further investigation required to determine what advantages/ disadvantages this might have for future service provision.

[8] An index created by the ABS
[9] Application of the MMM

Table 4: Relative MMM exposure to areas of socio-economic disadvantage (based on the Index of Relative Socio-economic Disadvantage (IRSD) rankings) as a ratio to MMM population

Aged Care Regions	IRSD Decile 1 (Most Disadvantaged)	IRSD Decile 2 (2nd Most Disadvantaged)	IRSD Decile 1 & 2 (20% Most Disadvantaged)
MMM 1	9.2%	7.2%	16.4%
MMM 2	12.3%	10.8%	23.0%
MMM 3	18.2%	19.8%	38.0%
MMM 4	16.0%	30.2%	46.2%
MMM 5	15.1%	23.7%	38.7%
MMM 6	13.5%	10.1%	23.6%
MMM 7	54.8%	10.0%	64.7%

Figure 11: Chart representing the relative MMM exposure to areas of socio-economic disadvantage (based on the Index of Relative Socio-economic Disadvantage (IRSD) rankings) as a ratio to MMM population

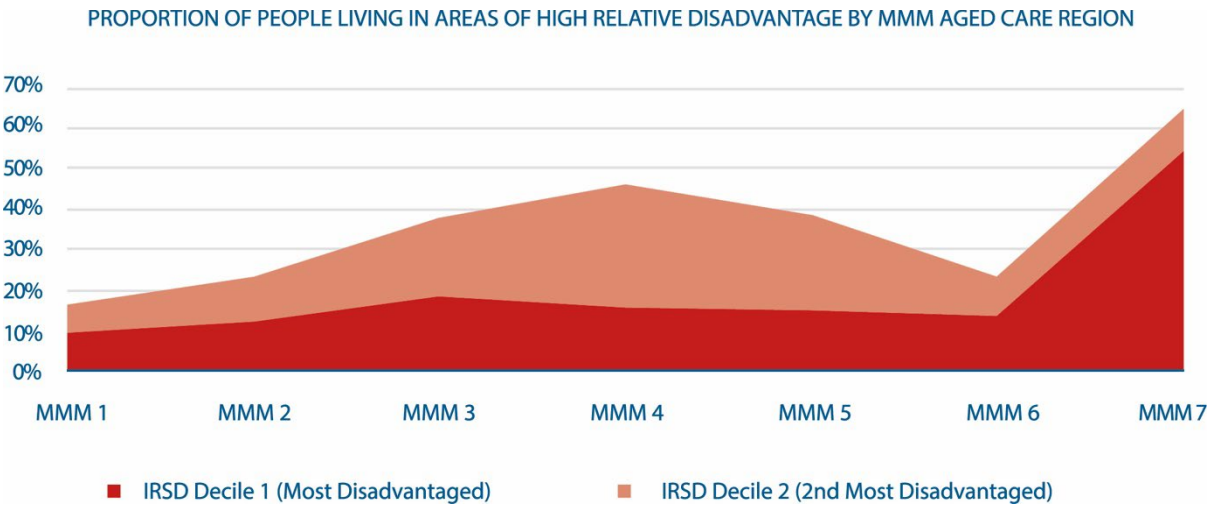
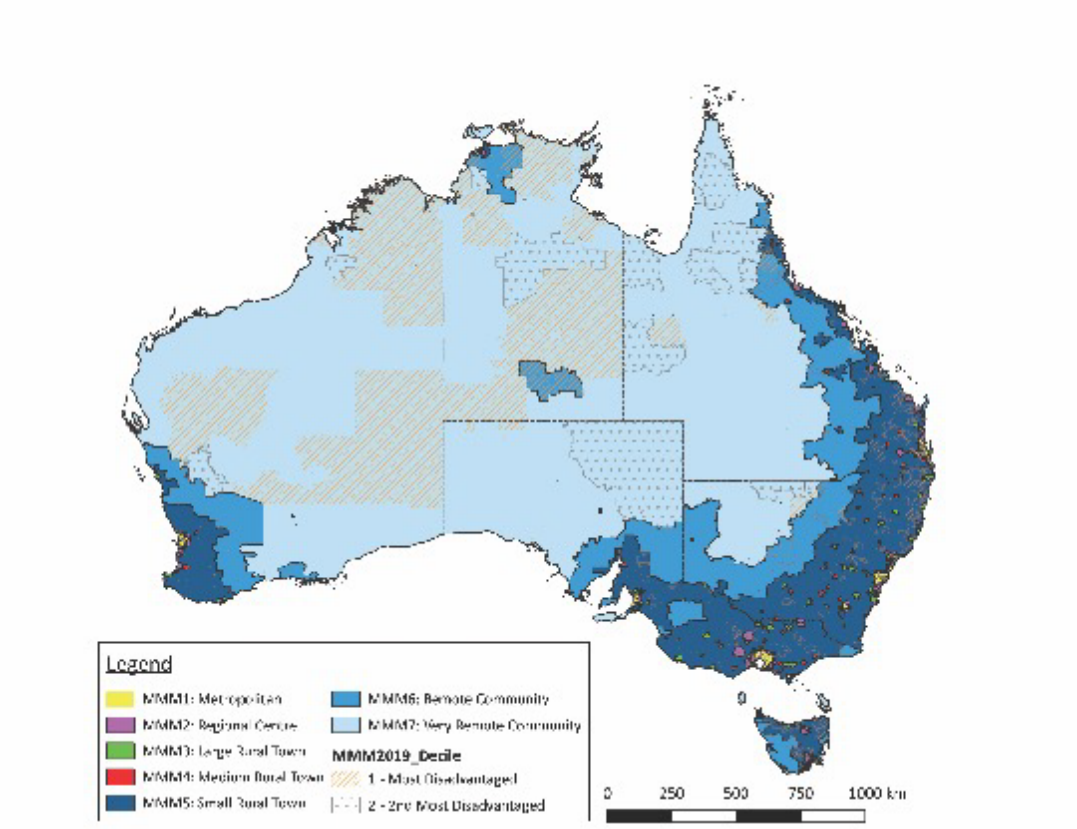


Figure 11 observations

- MMM 3 has the highest relative exposure to the most socio-economically disadvantaged areas outside of MMM 7. While it is assumed this is due to weaker connectivity to strong labour markets, further investigation is required.
- MMM 4 has the highest relative exposure to the second most socio-economically disadvantaged areas in the country.

Figure 12: Visual representation of areas of greatest disadvantage (SEIFA 2016) relative to MMM regions

While this map is provided by way of example, information on socio-economic disadvantage – and analysis on how highly impacted areas interface with program design and service delivery – is simple to generate and should be readily available to decision-makers.



1.3 Economic and social capital

Economic capital

> "The economic value of a rapidly growing healthy older population is so large that healthy ageing should be aggressively pursued, on its own merits, as a societal investment."
>
> **- Beard et al., for the World Economic Forum, 2011, p. 12**

If an objective of aged care policy is to realise the economic value of an active and healthy older population, what are the forms of societal investment that should be pursued? The World Economic Forum argues that first, we need to invest in health throughout the life course (Beard et al., 2011), which would also bring a social and economic benefit to people of all ages living in regional, rural and remote Australia[10].

As the World Health Organization has outlined, there is an urgent need to "develop and implement comprehensive and coordinated primary health care approaches that can prevent, slow or reverse

[10] Refer to Miles Morgan Australia's Report: *An opportunity to transform for further discussion*.

declines in capacity", and help maximise the functional ability of older people (World Health Organization, 2017a).

Internationally, there is a strong and clear recognition that health and aged care systems are inextricably linked.

By redesigning our health and aged care systems, and with a stronger focus on prevention, we can decrease the burden of disease – successfully compressing morbidity to the latest possible point in the life course, lowering costs and amplifying the economic benefits (Beard et al., 2011).

Any future system design should meet needs of the older person rather than the provider, be community- based and effectively coordinated (World Health Organization, 2017a).

Actions to create age-friendly environments can target different contexts (i.e. home or community) or specific environmental factors (i.e. transport, housing, streets and parks, social facilities) and they can be influenced at different levels of government (national, regional or local) (World Health Organization, 2017b). Plouffe and Kalache (2010) describe eight domains to consider in developing an age-friendly neighbourhood, which form the basis for the World Health Organization's Checklist of Essential Features for Age-friendly Cities[11].

Figure 13: Domains to consider in an age-friendly neighbourhood[12]

[11] The four-page checklist is available at https://www.who.int/ageing/publications/Age_friendly_cities_checklist.pdf

[12] Adapted from World Health Organization, 2010

The availability of certain services has become a pre-condition for the viability of a particular place – including infrastructure (i.e. water, roads, electricity), basic human services (i.e. health care, aged care) and economic support structures (i.e. banks, petrol stations, grocery stores).

Healthy ageing in place is most effective in more compact, walkable neighbourhoods, where there is improved public transport and adequate sheltered rest areas for walkers (Atkins, 2018; Van Hoof, Kazak, Perek-Bialas & Peek, 2018).

In Australia these neighbourhoods tend to be clustered around the inner-city suburbs of capital cities, which often don't align with the areas in which older Australian's are living, or where population forecasts predict this cohort will grow in the future (Atkins, 2018).

There is a clear linkage between the provision of public services and activities and the availability of adequate and fit for purpose community infrastructure.

When age-friendly actions are coordinated across multiple sectors and levels, they can enhance quality of life. And when actions also take into consideration issues of social exclusion, these efforts also serve to overcome inequities (World Health Organization, 2017b).

Social capital

The World Health Organization also explicitly recognises the importance of social connections (Holt-Lunstad, 2017).

There is robust evidence that social isolation and loneliness[13] significantly increases the risk for premature mortality, and the magnitude of the risk exceeds that of many leading health indicators (smoking, obesity etc) (Holt-Lunstad et al., 2010).

Recent Canadian research findings indicate that socially isolated individuals are, to some extent, clustered into areas with a high proportion of low-income older adults, whereas personal characteristics place individuals at risk of loneliness (Menec et al., 2019).

For example:

- People over the age of 75 are most likely to experience loneliness (Australian Institute of Health and Welfare, 2019).
- Loneliness and isolation are strongly correlated with living alone (Bond et al., 2000).
- Low socio-economic status is associated with higher levels of loneliness (Pinquart & Sorensen, 2001).
- A direct correlation exists between low income and loneliness and isolation among older people (Davidson & Rossall, 2015).

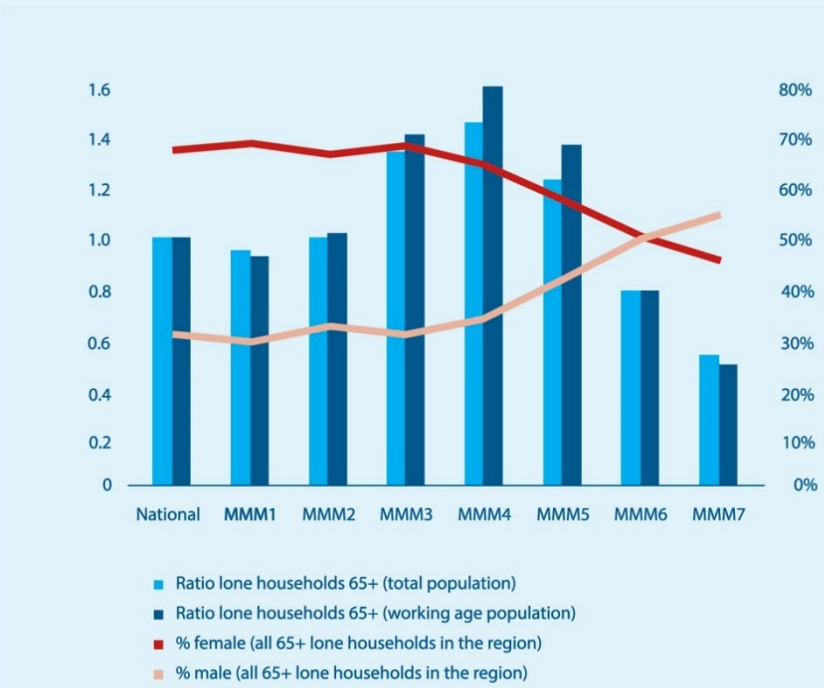
This list is not exhaustive.

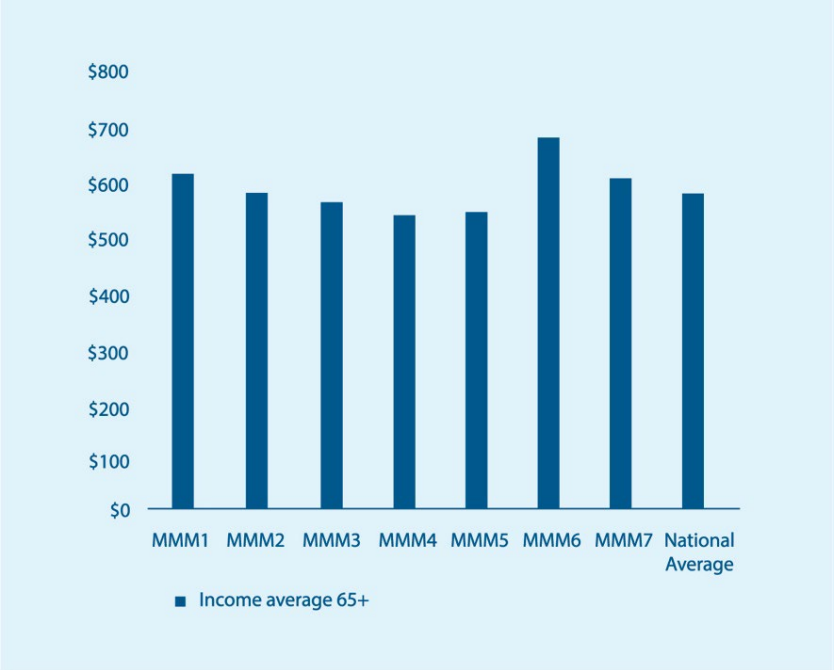
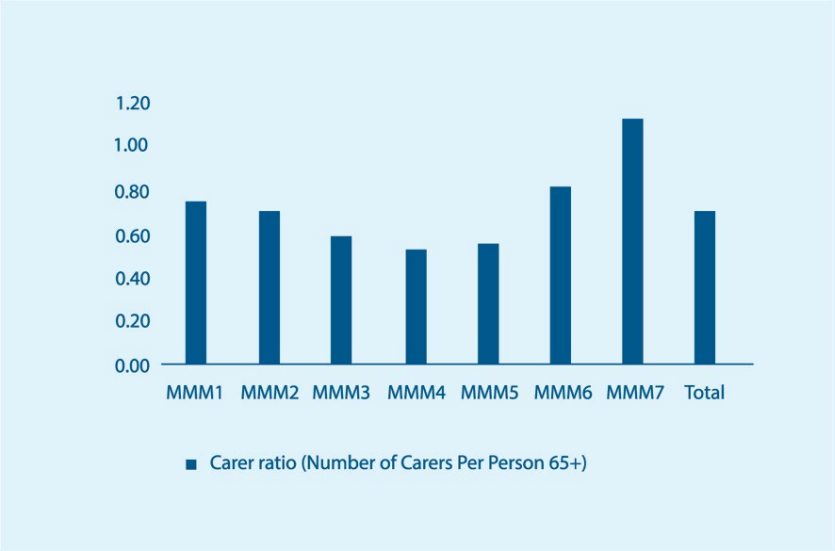
To better inform and target interventions on loneliness, Miles Morgan Australia has undertaken basic analysis of publicly available ABS data[14].

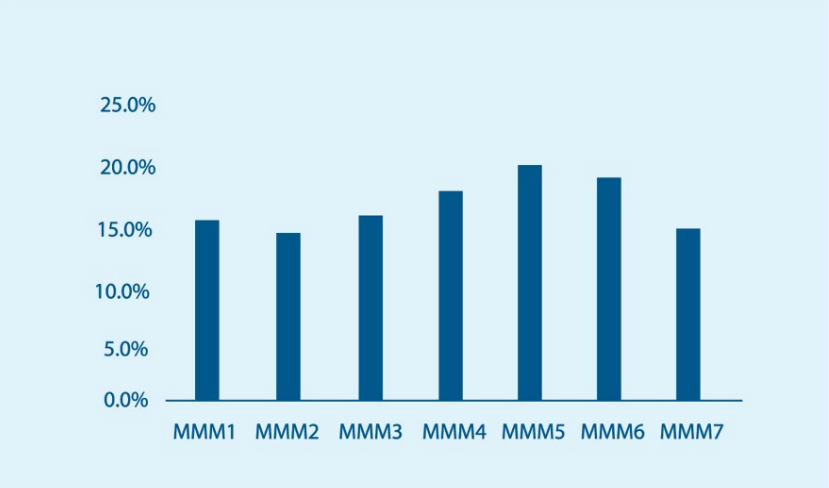
[13] Although distinct concepts, loneliness and social isolation are often used interchangeably and therefore both need to be considered together. People can be socially isolated without feeling lonely, or feel lonely despite having an adequate quantity of social relationships. (Malcolm et al., 2019)
[14] Calculated and grouped by state suburbs (SSC) and MMM.

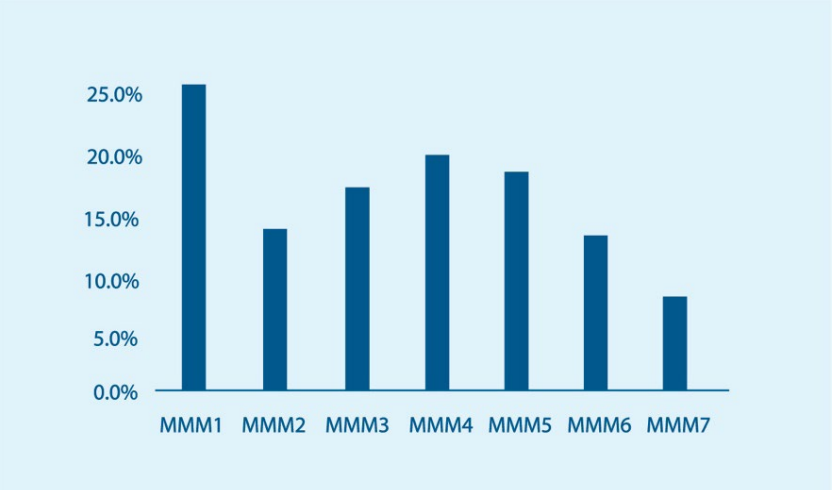
Table 5: Socio-economic impact in regional, rural and remote regions

Demographic data in this table was sourced from the 2016 ABS Census and mapped to MMM regions by Miles Morgan Australia. The carers data presented in row 3 of the table combines this demographic data with data from the 2018 Survey of Disability, Ageing and Carers (SDAC), also conducted by the ABS.

Analysis	Findings
Lone person: single person household was calculated for people who were aged 65+ in the 2016 ABS Census.	MMM 3-5 have severe levels of 65+ lone person households when compared to the overall population and the working age population.  To avoid elevated downstream costs that research shows is associated with social isolation and loneliness – such as early access to and prolonged use of complex health and high-care aged care services – targeted interventions in communities with higher proportions of single 65+ households will be required.

Analysis	Findings
Income average: average income for people aged 65+ was calculated across various geographical blocks.	The 65+ population in MMM 3-5 regions earn less on average when compared with the national average income for those over 65 – impacting affordability of aged care services, both from a client and provider perspective.  Although the ABS publishes a wealth report, it remains aggregated at the national level and would require significant effort to de-aggregate this data in a meaningful way, that aligns with each MMM region.
Carers: the availability of carers was based on a combination of 2016 ABS Census population data and carer profiles derived from the 2018 ABS Survey of Disability, Ageing and Carers – modelled across state suburbs (SSC) and mapped to MMM regions.	Carer availability is limited in MMM 3-5, which may accelerate the transition into residential care in these areas. 

Analysis	Findings
Indigenous: Aboriginal and Torres Strait Islander population aged 50+ were calculated using the 2016 ABS Census.	The proportion of older (50+) Aboriginal and Torres Strait Islander people is relatively consistent across all MMM regions, with the largest proportional representation in MMM 5.  MMM 5 also has the highest proportional representation of all older people when compared with other MMM regions. That is, 22% of the total population in MMM 5 is aged 65+ and 19.7% of the Aboriginal and Torres Strait Islander population in MMM 5 is aged 50+. Understanding Aboriginal and Torres Strait Islander population profiles is a key input into demand planning. It is unclear whether this been factored into existing resource allocation.

Analysis	Findings
Non-English-Speaking Background (NESB): Based on people who have self-reported as not speaking English very well or at all in the 2016 ABS Census, aged 65+.	Outside of most capital cities (MMM 1), the proportion of people identifying as being from a NESB is consistent at an average of 17% (+/- 1%). However, when looking and people aged 65+ there is a greater degree of variability, with significantly higher proportional representation in MMM 4, outside of capital cities.  Understanding where people from a NESB reside is a key input into demand planning and designing the right support to help people navigate complex systems. Given projected increases in the prevalence of dementia, and by association an increasing number of people reverting to first languages, this demographic will become a fundamental consideration of resource planning overtime. The lower proportional representation of self-identified people from a NESB in MMM 6, and significantly less again in MMM 7, requires further investigation given the higher overall number of Indigenous people living in remote and very remote areas, most of whom are proficient speakers of at least one language other than English.

International research has also identified rural-specific issues related to social isolation: transportation; technology; collaboration; health care; access to resources; and culture (Henning-Smith et al., 2018).

With the health burdens of loneliness and consequent impact on health services well identified, it makes sense to put money into interventions which deliver the most benefit.

The context of social isolation can differ across local areas and interventions may need to be adapted according to the local context and needs of local citizens (Public Health England & UCLA Institute of Health Equity, 2015) – moving away from a 'one size fits all' approach, enables flexible service provision that correlates with the regional, rural and remote context (Kelly et al., 2019).

Service providers with strong local networks are well placed to work in partnership and with individuals and communities to identify who is at risk of social isolation, and to engage them in finding solutions – noting the importance of local participation in planning, managing and implementing interventions (Popay et al., 2007).

The economic benefits of addressing isolation and loneliness are derived from a reduced burden on other, more costly, health and human services (Public Health England & UCLA Institute of Health Equity, 2015).

Economic and social policies have health consequences and there is a need for policy makers, providers, and leaders across multiple sectors to apply available evidence to improve the underlying conditions that impact the health of our ageing population (Williams et al., 2008).

We recommend aged care system stewards gather detailed evidence on the level of investment required to support the development of age-friendly communities in regional, rural and remote Australia, taking into account the health, social and economic benefits.

Undertake further examination of the impact of physical and social environments on loneliness in the ageing population – specifically, mapping the predictors of loneliness to better inform community and individually-based interventions.

PART 2: Understanding demand

> "Understanding demand is the key, without it, we are just flying blind."
>
> **- CEO, national aged care provider**

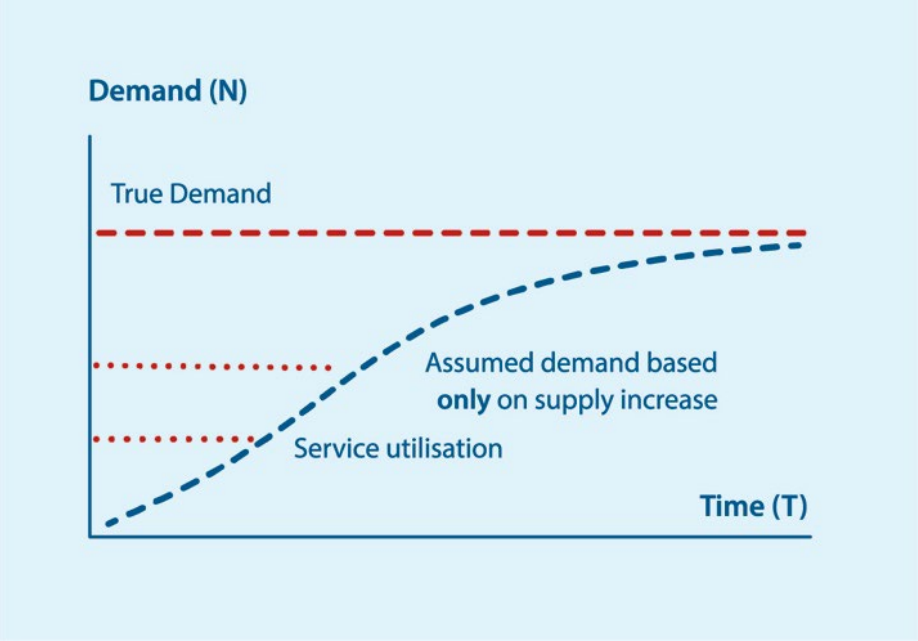
Demand forecasts are most valuable when they provide sufficient warning for timely, remedial action to be taken. Service providers need to make critical decisions and resource allocations to plan for changing demand for their services well in advance of time (Soyiri & Reidpath, 2013).

2.1 Responsiveness

Responsiveness is defined as the interval between the perceived need for service and the actual service provision. This domain focuses on the ability to identify service gaps (current and emerging), and the capacity to provide systemic responses in a timely and sustainable way.

The assumption that service utilisation is an accurate marker of service need does not reflect true demand.

Figure 14: Demand assumptions



Aged care service demand is presumed to be the available supply plus any known consumer needs (i.e. wait lists). The current demand assumptions are based on 'supply driven demand', which is limited by system-wide supply restrictions.

Because the market has been shown to be unsaturated (i.e. there is unmet demand, as indicated by service waitlists), any increased supply will quickly be absorbed.

Consumers who feel they may not be able to access services – either due to service unavailability, cost, or any other reason – are unlikely to participate in the 'market' (referred to as 'spectating consumers') are unobservable in the current demand calculations.

Any incremental increases in supply are diminished by the emergence of 'hidden demand'.

'True demand' is only visible when supply approaches market saturation, reducing 'spectating consumers' to a minimum. The more aged care services become available and affordable, the more likely the true number of consumers seeking services will be known.

Not knowing the true demand for aged care services poses several significant challenges to developing an informed service planning position:

1. Detailed, de-aggregated demographic information should be used to accurately model current and project future demand (as outlined in Part 1).
2. Epidemiological and geographical information should be built into planning models to improve the accuracy of future supply needs.
3. Outcomes specifically relating to spectating consumers are not being collected to identify immediate and downstream impacts, including costs, on the health and aged care systems.
4. Qualitative information is not being collected from high-risk cohorts to understand why services are not currently being accessed or supports fully utilised.

If aged care does not move away from population-based supply-driven demand modelling, systemic improvement will not be possible, with the only plausible outcome being more of the same.

Demand forecasting is an untapped resource that – if utilised well – could provide communities, governments and service providers with enough time to undertake preparatory activities, contributing to improved access, coverage and quality of services (Soyiri & Reidpath, 2013).

Only by understanding true demand will older Australians receive the right care, from the right provider, at the right time, in the right place, dependent on context – irrespective of where they live.

Create a demand forecast model including but not limited to: detailed demographic information; disease prevalence and incidence; early indicators of health decline and disability (i.e. information captured by emergency services or available through MBS, PBS and NDIS); historical trends relating to aged care service access and activity; known service gaps (i.e. wait lists).

We recommend aged care system stewards design a predictive model to test demand and supply scenarios utilising a combination of variables including but not limited to:

- Age bracket (i.e. young old, old, oldest old and/ or frail old)
- Sex
- Ethnicity
- Geography
- Socio-economic status (including variations of contributing factors)
- Epidemiological risk and protective factors
- Health and life course events.

2.2 Accessibility

To measure and evaluate accessibility, three factors are essential: population demand, supply capacity, and geographic impedance (McGrail, 2012).

Geographic impedance indicates to what extent the 'distance' between service location and population demand will affect accessibility (Ma et al., 2018).

While 'distance' in urban areas is increasingly characterised by travel time – outside of metropolitan areas, the key factors are defining catchment areas (communities) and physical distance service (Shah et al., 2016). Transport considerations cuts across all models, especially when overlayed with socio-economic population data (Shah et al., 2016).

Accessibility index

An accurate estimation of existing service accessibility is a crucial aspect of both service and infrastructure planning, so as to guarantee the proper allocation of resources through informed decision making (Ma et al., 2018).

Calculating and quantifying population access to various types of local health services (i.e. hospitals, general practitioners, pharmacists) is common in health and urban planning research – starting with Penchansky & Thomas in 1981.

Given the depth of knowledge in the health sector and the interconnectedness of health and aged care, much of the work undertaken to design accessibility models can be adapted to calculate the geographic impedance for older Australians in regional, rural and remote areas – where services are not evenly available. Unsurprisingly, the literature also tells us that better accessibility persists when a holistic view of health care needs is taken (Siegel et al., 2016).

The creation of an accessibility index – using statistical methods to compare the ageing population with their relative distance from different types of critical health services in any particular location – provides an empirical basis for inter-sectoral and cross-jurisdictional planning and investment discussions.

Model overview

Accessibility indexes can be used to easily quantify, compare and rank the ease or difficulty for population(s) to access services as needed.

Each service contributing to healthy ageing should be listed, starting with relevant health and social services, including aged care. The anticipated effort, or distance, required to access each service is also defined (the equivalent of a minimum service standard).

Multiple indexes are created to map access to each service. For example, the same small town may have a different accessibility score for their ability to access residential care as opposed to a hospital, or home care as opposed to an allied health professional.

Each service type (e.g. General Practice, Residential Care, dementia-specific services etc.) will have an index with its own unique parameters (i.e. it is reasonable to be located 100kms from an ambulance station, but people should reasonably expect to be only 50kms from a pharmacy).

Access to each service will need to be weighted, relative to clearly defined needs and priorities (i.e. access to primary care may be weighted higher than access to a particular allied health professional).

Statistical and spatial methods are then introduced to determine regional multiple deprivation measurements based on access to resources and accounting for the impact of distances.

Statistical outputs may vary depending on the methods used. However, literature suggests quantifying accessibility for a defined geographical area into a single numerical value, or index. One such example is the commonly applicable z-score in statistics, which reveals the typical and atypical cases in any given dataset.

Once accessibility is known, quantified and comparable – this information can be overlayed with key epidemiological or population health data to inform future investments in infrastructure and/ or service coverage.

Further considerations

When accessibility levels for each type of care are combined into a univariate index, the substitutability between care sectors and services needs to be well understood (Siegel et al., 2016), for example, having access to a pharmacist does not equate to hospital access.

Catchment areas need to be set at the right level to reduce methodological inaccuracies. Most models are constructed using the smallest available geographical unit of analysis for which data are consistently available.

Spatial representation is often distorted because the construction of statistical areas does not always accord with 'functional' catchments areas (i.e. the definition of a community is more than a line on a map). Applying an accessibility index to any given area needs to be approached with considerable care. This is particularly true in remote areas of Australia (Mcgrail & Humphreys, 2015) and border-towns.

Data access, currency and uniformity will likely be perceived as the primary barrier to developing an accessibility index. While much of the target data publicly exists – meaning a proof of concept can be developed and tested – the long-term approach will be somewhat reliant on obtaining high quality, current data at the same level from multiple sectors and across jurisdictions.

Building an accessibility index will support national planning and resource allocation for aged care services, to ensure that similar communities and regions receive a relative share of the limited resources available, and that those communities/regions which are most disadvantaged are allocated resources proportionate to their needs (McGrail, 2012).

An accessibility index will provide insights as to the localised challenges accessing health and aged care services, within a broader health service context. While an accessibility index may provide insights for allied service sectors and jurisdictions, there is no assumption that action should or would be taken.

We recommend system stewards further explore the differences between the intra-regional patterns of spatial access, as well as the association between poor accessibility scores with socio-economic status, to better inform future resource allocations.

MMA recommends further examination of the geographical accessibility to health and aged care services, at the lowest possible geographical level, to identify underserviced or poorly served communities for aged care service planning purposes.

Aged care system stewards have an opportunity to develop and validate an accessibility index, based on available data, including where possible, but not limited to:

- Hospitals
- Registered allied health professionals
- Ambulance stations
- Commonwealth Home Support Program service outlets
- General Practitioners
- Pharmacists
- Home Care Package service outlets
- Residential Care facilities

Consideration should be given as to whether to include National Disability Insurance Scheme providers in the accessibility index, noting the need to uphold service relevance so as not to distort accessibility scores.

2.3 Acceptability

Acceptability relates to cultural and social factors determining the possibility for people to accept the aspects of a service. It may be that some service systems are inequitable in the way they are organised, making services and/ or providers unacceptable to some sections of the community that they are intended to serve (World Health Organization, 2003).

The challenge of ensuring that care meets the needs of different cultural, socio-economical and vulnerable populations is elevated in regional, rural and remote communities where service and provider choice is limited.

Understanding and measuring acceptance will rely on qualitative methods – specifically interviews, questionnaires, formal and informal feedback mechanisms

Limited choice

Acceptability relates to concepts of personal autonomy and capacity to choose care options (Levesque et al., 2013), which means levels of acceptability can be exacerbated when provider and/ or service choice is limited.

While service coverage has been difficult to establish, there are signs of disparity in both service availability and provider choice, based on location[15]:

- While small rural towns (MMM 5) constitute 11% of the total 65+ population, only 6% of all Home Care Package provider outlets are located in these areas, well below any other MMM region.
- Service allocation under Home Care Packages never reaches parity with the relative 65+ population in MMM 5 – both in total, and across each of the Home Care package levels. No other MMM region has the same level of disparity.
- 95.3% of residential care providers in MMM 5 locations are non-profit[16] (this is 100% of providers in MMM 6-7).
- There are more people over 65 per residential place in MMM 5 locations (24.5:1), compared with metropolitan areas (16.1:1).

[15] Point 1 data source: ABS Census 2016 and AIHW Aged Care Service List 2018-19; Point 2: Department of Health home care data; Point 3: AIHW Aged Care Service List 2018-19 with additional analysis undertaken by Miles Morgan Australia on not-for-profit status; Point 4: AIHW Aged Care Service List 2018-19.
[16] Includes government and not-for-profit providers.

Services based on a population health management approach identify consumers and their communities as key partners in care. Population health management is an integral part of people-centred care (Groene et al., 2016).

Only by understanding the population you intend to service can you ensure service systems are designed to meet their needs.

The importance of culture

Indigenous people across the world value a holistic, multi-dimensional concept of health including physical, psychological, social health and wellbeing, spirituality and cultural integrity (Australian Indigenous Doctors' Association, 2010).

Indigenous peoples are therefore more likely to experience better health outcomes when care is not compartmentalised. Better outcomes are more likely when a comprehensive model of care addressing all aspects of Indigenous health, including social and emotional health and wellbeing, is used (Fraser et al., 2017).

Cultural factors influence the way in which Indigenous peoples access and engage with health services and non-Indigenous healthcare professionals (Scrimgeour & Scrimgeour, 2007).

For the non-Indigenous workforce, working at the 'cultural interface' requires critical questioning of professional assumptions based on Western knowledge, while simultaneously being open to learning about Indigenous knowledges (Y. Thomas et al., 2011).

The effectiveness of health care services for Indigenous peoples has proved to be greatest when aimed at addressing holistic needs (Commonwealth of Australia, 2013). Similarly, for aged care services, acknowledging, valuing and incorporating the knowledge of communities and individuals into program and process settings is essential when considering how to improve service quality and outcomes.

Specialised information gathering may be required to better infuse service delivery with local culture.

Further considerations

Now and into the future, the care needs of older adults need to be tailored to the individual beliefs, priorities and preferences of older adults. Consideration of factors such as language, background, religion and culture will enhance service acceptability and improve outcomes of care (van Gaans & Dent, 2018).

Only by actively seeking to understand the service expectations of older Australians will health, aged and social care services in regional, rural and remote Australia be well positioned to tackle the challenges of a rapidly ageing population (van Gaans & Dent, 2018).

Given the qualitative nature of 'acceptability', we recommend aged care system stewards explore opportunities to improve their understanding of the expectations of older Australians and their communities – particularly in relation to current or proposed aged care programs and policies. For example, an early opportunity might be to:

- Start analysing complaints data from MyAgedCare, and
- Institute a formal mechanism for regularly receiving and analysing complaints from the Aged Care Quality and Safety Commission[17].

[17] Complaints will need to be de-identified and sanitised to maintain confidence in the process. Well categorised complaints data could help inform structural or systemic issues relating to service acceptability.

PART 3: Improving supply

3.1 Affordability

Cost to the budget

As Australia's baby boomers become frail and infirm, many will have to stay at home because institutional care will become overcrowded (Schofield & Earnest, 2006).

As the Australian Infrastructure Audit 2019 states in relation to the impact of our ageing population:

Without action, our health care system will be unable to meet demand and maintain quality, accessibility and affordability of services for communities (Infrastructure Australia, 2019).

Poorer access to health care remains a key issue for non-metropolitan residents. Regional, rural and remote area populations receive a reduced level of access to health care, with long-term consequences of poorer health outcomes (Mcgrail & Humphreys, 2015).

Australia is regarded as one of the healthiest nations in the world, with one of the best universal health care systems. However, our health infrastructure faces challenges due to its scale, age, complexity and fragmented nature (Australian Institute of Health and Welfare, 2018b). The same can be said of our aged care infrastructure.

In remote areas, the Royal Flying Doctor Service has reported that an absence of aged care facilities correlates with increased transfers of older patients for preventable hospital admissions (Infrastructure Australia, 2019). Where services do exist in regional and remote communities, limited infrastructure in these communities often require facilities to service overlapping needs, meaning that when an older person requires respite or end-of-life care, local facilities are at capacity as they serve a wide section of the community – including younger people (Infrastructure Australia, 2019). Increasingly, across Australia there is a mismatch between the location of aged-care infrastructure and the locations where older populations are forecast to grow in the future (Atkins, 2018).

- As the large baby boomer cohort enter their mid-80s in the early 2030s, they will drive up residential care as a substantial cost component to the budget (Parliamentary Budget Office, 2019).
- The number and proportion of older Australians is expected to generate increasing and more complex demand for health and aged care services (Australian Institute of Health and Welfare, 2018c).
- Projections indicate Australia could have a lack of residential aged care beds to support this demand, in the order of almost 100,000 by 2025 (Price Waterhouse Coopers and Australian Unity, 2018). This would mean that about 1,300 residential aged care facilities would need to be built if the average size of each facility was 77 places (Australian Institute of Health and Welfare, 2018a).
- While the cost of construction differs by region, the base construction costs in 2018-19 were $260,700 per new aged care bed (Aged Care Financing Authority, 2019).
- This cost estimate is likely to be conservative.
- Using the Aged Care Financing Authority's cost estimates and ratios across new residential care beds, rebuilding and refurbishing existing stock, it appears the capital investment required to meet the projected shortfall noted above by 2025 would be $22.7 billion.

As Australia's population grows and ages, and as the prevalence of chronic disease increases, the demand for health infrastructure increases (Infrastructure Australia, 2019).

Per capita Commonwealth public hospital spending on those aged 75 to 84 years and over is five times the median, while pharmaceutical benefits and Medicare spending on the same cohort is closer to three times the median (Parliamentary Budget Office, 2019).

Cost to the community

According to the World Health Organization, chronic diseases are among the foremost health and economic challenges – both for the human impact and the reduced social and economic wellbeing of citizen and communities (Schofield et al., 2016).

Working age people will be supporting the health care costs of an increasing number of older people (Lee & Mason, 2017).

- By 2049-50, there will be twenty people aged 75 and over for every 100 working age people, compared to ten now (Armstrong & Dyson, 2014).
- For the over 85s, where health care costs rise dramatically, there will be seven people aged 85 and over for every 100 compared to just three now (Armstrong & Dyson, 2014).
- The working population may be paying almost double their own health expenditure to subsidise older Australians compared to a current rate of 1.4 (Armstrong & Dyson, 2014).

87% of Australians aged 65 years and over have a health care status that is either defined as chronic health (1–5 chronic conditions) or complex health (5 or more chronic conditions) (AIHW, 2018).

Based on the evidence provided in this paper, Australians living outside of metropolitan areas are more likely to face more severe consequences of an ageing population than those living in metropolitan areas.

In the absence of evidence-based actions, the human, social and economic costs of chronic diseases will continue to grow and overwhelm the capacity of communities to address them (Schofield et al., 2016).

Local and international research studies commonly emphasise the need for better organisation, adequate funding to improve the availability of diagnosis and treatment of chronic diseases, as well as health promotion and early prevention (Schofield et al., 2016).

Cost to providers

Social, economic and environmental conditions in regional, rural and remote areas are different to metropolitan areas.

In regional, rural and remote Australia the complexity of providing health services is magnified by unique community characteristics. Many communities are: geographically dispersed; have an ageing population; have low population density; limited and ageing infrastructure; and higher costs associated with service delivery (Australian Government, 2012).

The dispersed nature of populations, spread across large geographical areas, leads to inconsistent economic conditions, transient workforces and inequitable access to services. Many communities also have higher levels of complex health and aged care needs (S. Thomas et al., 2015).

Traditional models of service provision in regional, rural and remote areas have struggled to address diseconomies of scale, which can result from large distances and small dispersed populations. As the Aged Care Financing Authority has noted (Aged Care Financing Authority, 2016):

- Care management costs are nearly four times higher in rural and remote facilities than in non-rural facilities,
- Registered and enrolled nurse costs are almost double,
- Labour and maintenance costs are more than triple,
- Catering, laundry and cleaning costs are higher, as are utilities and consumables.

With limited ability to deliver services due to a lack or poor consistency of critical inputs (i.e. workforce, infrastructure, transport, communication, eligibility assessments), as well as barriers to operational efficiencies (i.e. poorly targeted administrative and regulatory requirements, poorly constructed funding models) a market-based approaches are not viable in some areas.

'Thin' markets emerge when there are not enough providers in a public or private market for it to function as intended (Girth et al., 2012).

Thin markets have both a low number of buyers and a low number of sellers and may also suffer from price volatility – a combination of characteristics that leads to market inefficiencies or complete market collapse (Carey et al., 2017).

Thin markets and market failure are more likely to occur in regional areas or for those with highly specialized needs. Market failure can include the failure of individual suppliers or organisations, localised market failure or more systemic failures related to unbalanced supply and demand, unbalanced information about support, decrease in participant choice, and decrease in the quality of services (Carey et al., 2017).

When considering the design of the National Disability Insurance Scheme, the Productivity Commission conceded that in some places and at some points in time a market might not be viable, and that government has a stewardship role to address issues such as under-servicing and unmet need, or in local monopolies overcharging consumers (Productivity Commission, 2011b).

> "There are specific areas where traditional approaches, such as block funding or government provision of services, may deliver better outcomes for consumers than market-based solutions."
>
> **- Productivity Commission, 2011**

The nature of individualised funding arrangements mean that choice and control of services is dependent on market robustness. Without a well-functioning market, multiple providers are not available for participants to choose from (Needham, 2010; Productivity Commission, 2011b)[18].

[18] 'Individual funding arrangements' is an umbrella term to cover several closely related concepts, including consumer-directed care, self-managed care, self-directed care, direct payments or funding, personalisation or voucher schemes. While there are economic and program nuances that can be applied to each of these terms, each approach allows individuals to purchase services from a quasi 'service market' using individual funding, budgets or vouchers given to them by governments. Individual funding arrangements have been implemented in disability and aged care across Europe, the UK and Australia.

To ensure markets underpinned by individualised funding arrangements meet their diverse policy goals, a number of principles have been developed to guide market stewards.

For example, a stewardship role is typically described as going beyond ensuring minimum market protections for citizens, to ensure long-term outcomes and public value (Gash et al., 2013).

This would mean actively working to address market gaps where there is insufficient supply in a geographical area (Carey et al., 2018), especially when it is clear that citizens in particular locations do not have access to robust or functioning markets by which to exercise consumer choice and control.

What is a viable aged care market?

There is little known about the viability needs of aged care providers outside of metropolitan areas.

From the literature, it is clear there is an inherent contradiction between providing health services to patients in rural areas, which typically requires public planning as well as flexibility in use of resources and creating competitive markets for care provision.

Based on the experiences of similar sectors operating under individualised funding arrangements, we know:

- A population base of about 5,000 inhabitants for rural regions and 2,000–3,000 people for remote communities is necessary to support a comprehensive and sustainable range of care services (Wakerman et al., 2008).
    - In relation to allied health services operating under the National Disability Insurance Scheme, no service provider for a population fewer than 10,000 people was able to 'break-even' (Victorian Healthcare Association, 2019).
- The provision of services to rural and remote communities smaller than these populations requires a model with characteristics that enable it to capture the necessary population aggregation required to support minimum service threshold requirements and thereby ensure adequate access to care (Wakerman et al., 2008).
    - Aggregated populations of approximately 800 people are considered to be the minimum size for the provision of viable care services (Wakerman et al., 2017), which can be viewed as a notional minimum viable population.
    - Service providers need to be able to aggregate a critical service population mass, whether it is a discrete town population or dispersed across a region (Wakerman et al., 2008).
- The geography of viability changes when service prices cover the real costs of service delivery.
    - Allowing providers to take the higher costs (arising from diseconomies of scale) into account when determining prices and individual entitlements to better reflect the costs of operating in regional, rural and remote locations (Productivity Commission, 2011b).

Market rules honouring principles of fair competition can easily become a strait jacket, as they make it difficult to financially compensate rural providers for their higher costs, which are typically due both to low population density and difficulties in recruiting permanent staff (Kullberg et al., 2018).

MMA recommends aged care system stewards engage actuarial services to determine the true cost of service in regional, rural and remote Australia, taking account of local market conditions.

Use the true cost of service (input costs, productivity implications, throughput considerations) to design flexible pricing arrangements that are responsive to local market conditions.

Utilising actuarial data, decision makers can then Identify areas where individualisation funding arrangements are not viable by determining the minimum population density (over a defined geographic spread) for aged care service provider viability – leading to a reconsideration of how aged care services are administered outside of metropolitan areas.

Table 6: Population density scenarios

	% of population in MMM 3 - 7
Communities with fewer than 2,000 residents - 8,601 communities	**42.8%** (total of 1.98 million people)
Communities with fewer than 5,000 residents - 8,940 communities	**65.4%** (total of 3.02 million people)
Communities with fewer than 10,000 residents - 9,056 communities	**81.9%** (total of 3.88 million people)

Of the 8,940 communities with populations less than 5,000 people only 969 communities have populations over 800 people.

3.2 Awareness

"If there is a market for system navigators – people who help people access the services they are entitled to – then we are doing it all wrong."

- Regional Manager, Home Care Program provider

The aged care system can be difficult to navigate for older people, their families and carers, and planning for aged care services usually occurs in a time of crisis due to rapid deterioration in health (Aged Care Financing Authority, 2018).

Personalisation schemes put an unprecedented emphasis on individuals to navigate care systems and advocate for their own needs and rights (Malbon et al., 2019).

Navigation challenges essentially stem from poorly functioning systems, a lack of compassion among system gatekeepers and inappropriate or unnecessary bureaucratic processes (Funk et al., 2019).

Navigating aged care in regional, rural and remote Australia presents an additional set of challenges, for example:

- Internet accessibility to be able to navigate MyAgedCare is limited (Park, 2017).
- Culturally and linguistically diverse groups, including Aboriginal and Torres Strait Islander peoples, require additional support to overcome the barriers they face when interacting with MyAgedCare contact centres (Aged Care Financing Authority, 2018).

Much of the recent research on navigating complex systems comes from Canada, and while the care systems may differ – consumer and caregiver needs do not.

Older people and their caregivers often need to learn as they go, relying on their resourcefulness to navigate and access health and social services. The following are common examples of the tasks involved (Funk et al., 2019):

- Searching for information about services and how to access them.
- Pushing through and working around barriers to accessing services.
- Coordinating the receipt of formal help and resources (including administrative work).
- Ongoing monitoring and advocacy to ensure that the services provided are adequate.

In Australia, concerns have been publicly raised by consumers about accessing information through the MyAgedCare national call centres and website.

Placing the onus on patients and their families to navigate systems and access care themselves can give rise to inequities due to disparities in income, education and other characteristics that affect their capacity to succeed in these tasks (Productivity Commission, 2016).

Low-income families are less able to access private forms of navigation support, such as paid consultants and advocates. Ailing older adults without family or friends who can provide support can be seriously disadvantaged (Funk, 2019).

Regional, rural and remote communities often rely on local people with health knowledge or caring experience to play an important bridging role to fill the knowledge gaps, providing information and support to community members. These people can be defined as health intermediaries; they act as mediators, providing information and support in ways that best suit the individual and his or her specific context (Simpson et al., 2009).

Communication in most care settings assumes that information provision is both necessary and sufficient to improve outcomes. However, approaches that only allow for one-way information transfer are insufficient (Lee & Garvin, 2003).

In fact, additional information may actually increase the burden on consumers and caregivers due to the work required to sift and process new information, especially in the absence of other assistance (Dalmer, 2018).

Broad community awareness of MyAgedCare and the aged care system is low, and when consumers or caregivers interact with the system, useability is poor (Tune, 2017).

Consumers – including families or carers – as well as providers, can only navigate the complex aged care system if they have information that is timely, accurate and in a format that is easy to understand and use.

Disseminating information on its own is insufficient. Navigational challenges extend far beyond obtaining information (Hibbard & Peters, 2003), such as providing information online, over the phone

and in person multiple times (Tune, 2017), advocating for particular levels or types of service and dealing with adverse care circumstances.

Older people living in remote areas have difficulties accessing an assessment in a reasonable timeframe (Aged Care Financing Authority, 2018). Further, once eligibility has been determined, certain services may not be locally available. These issues may delay or prevent access to appropriate interventions. While the time lapse between registration and assessment is unknown, and the time between assessment and initial access to service is unavailable by region, what is clear is that hard-to-reach populations, those with complex needs, and those with limited access to technology, are not gaining as effective access as they should (Tune, 2017).

When people are unable to navigate the system effectively, including knowing what services and supports can be accessed and how, they can become dissatisfied, overwhelmed, and confused (Hibbard & Peters, 2003).

Poor awareness undoubtably impacts on access and, ultimately, on health outcomes.

There are immediate opportunities for aged care system stewards to better construct consumer records to monitor the nature and frequency of contacts with MyAgedCare, coupled with administrative data to track service provision.

System stewards should also explore the opportunity to monitor overall experience through regular consumer and caregiver satisfaction surveys, which can include broad measures of navigational experiences.

3.3 Suitability

> "The boundaries of health systems should encompass all actions whose primary intent is to improve health."
>
> **- World Health Organization, 2000**

Today's health services and systems are still structured to meet the health care needs of the past – acute illness, infectious disease and trauma. However, today's health needs require coordinated and sustained health care for individuals that includes multiple disciplines and care settings (Calder et al., 2019).

Multiple forces are transforming the pattern of disease and health.

As the population ages and the disease burden becomes more complex there is an increased need for coordination of health and social care. This is particularly important for those with multiple chronic and complex conditions, where they require frequent contact with a number of care providers (Primary Health Care Advisory Group, 2015).

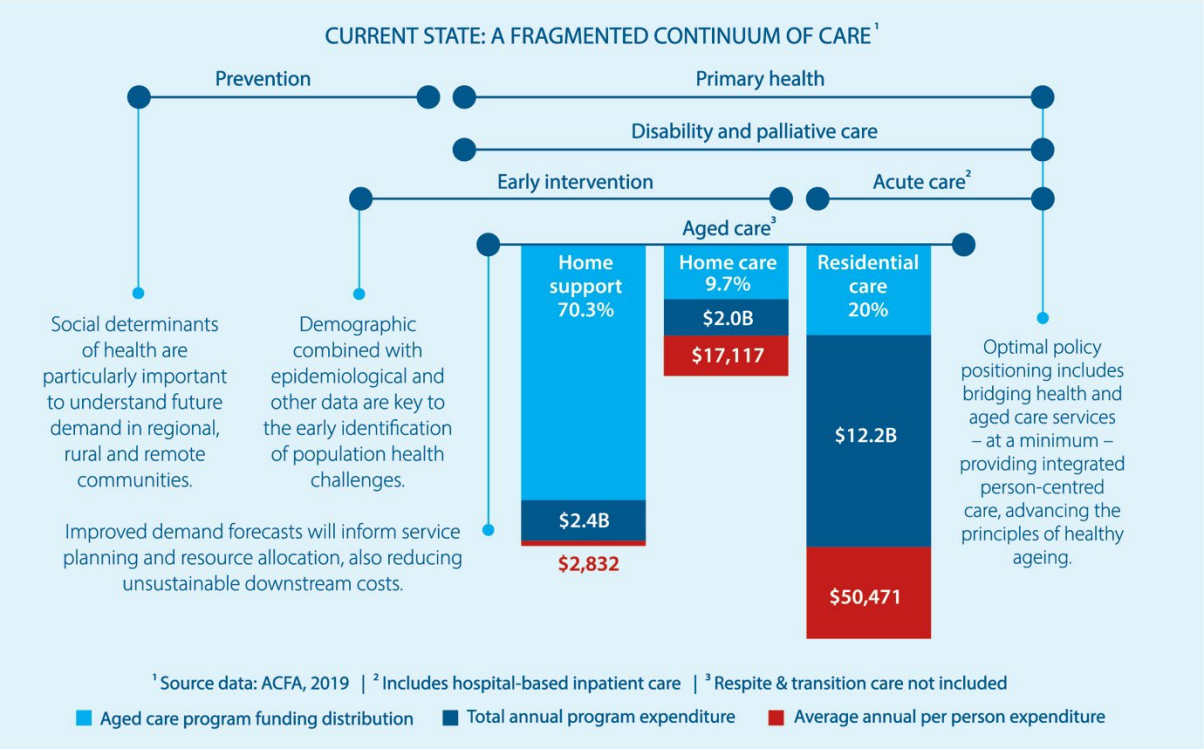
The main issue for the hospital system in responding to the ageing of the population is the avoidance of unnecessary admissions and unnecessarily long lengths of stay. Both issues are related to coordination of hospital services with the primary care system and other community support structures (McPake & Mahal, 2017).

In the current operating environment, the burden of ensuring holistic care often falls to the service provider or community. As the responsibility for navigating multiple, increasingly complex systems falls on individuals and their families – addressing 'care linkage deficiencies' will become a point of contention for the community.

Aged care programs appear to be initiated without due consideration as to how they fit into the existing pattern of health, disability and palliative care, or other closely aligned services that are already available – creating or contributing to service fragmentation (see Figure 15).

Fragmentation adversely impacts quality, cost, and outcomes.

Figure 15: Aged care within a health system context



Contextualising aged care within health and care systems highlights opportunities for better integration. Even within the aged care system, funding and service levels appear fragmented. As with *all* efficient service models, the optimal setting would see improvements in triage such that – at a minimum – there is an increased intake for home care, resulting in a reduced demand (volume and/or duration) for residential care.

Improving population and individual health outcomes – at times of increasing demand and contracting resources – is possible through system integration.

When a system is able to achieve high levels of integration there is an ability to realise improved health outcomes for patients as well as better utilisation of constrained resources (Goodwin et al., 2011).

Benefits to consumers of integrated service systems include improved access, service quality and continuity of services, especially for people with complex needs (Trankle et al., 2019).

Australia's commitment to the Global strategy and action plan on ageing and health (World Health Organization, 2017b) provides a clear mandate for integration across health and social care sectors.

That is, to seamlessly link health and social services and care; ensuring good quality and tailored services are delivered at the right time, in the best place, for people with different levels of capacity and different personal circumstances and aspirations.

The global strategy and action plan on ageing and health calls for every country to develop a sustainable and equitable system of long-term care, emphasising the importance of enabling older people to age in a place that is right for them (World Health Organization, 2017b).

This will require significant reorientation, since the historic focus of most health systems has been to meet acute care needs, for example through centralised hospital services (Pot et al., 2017).

Current health systems are not well aligned with the needs of the increasing population of older people who tend to experience more chronic conditions and multi-morbidities (World Health Organization, 2017b).

International studies and specific local-level Australian studies have demonstrated significant growth in emergency department presentations due to the ageing population. Older people are a vulnerable population in the emergency department environment, having substantially inferior clinical outcomes after discharge, with higher rates of missed diagnoses and medication errors (Burkett et al., 2017).

Growth in emergency department presentations exceeding population growth suggests that current models of acute health care delivery require review to ensure that optimal care is delivered in the most fiscally efficient manner. Trends in presentation of older people emphasise the imperative to incentivise emergency department avoidance and to invest in substitutive care models targeting older people (Burkett et al., 2017).

A transformation is needed in the way that health systems are designed, to ensure affordable access to integrated services centred on the needs and rights of older people.

System integration will require an agile, sustainable, culturally appropriate and connected health and aged care system that will deliver quality, consumer-centred services (Queensland Health, 2017).

Any systemic level integration will face significant governance challenges as responsibility for policy development, funding and service delivery are shared across governments (Department of the Prime Minister and Cabinet, 2014).

International literature highlights the relative low proportion of system (meso) level and community or program (macro) level integration interventions, compared with individual or service instance (micro) level interventions (Briggs et al., 2018).

Local research also suggests current integrated care efforts are unevenly weighted towards micro-level strategies and that increased attention to macro-level strategies are warranted in order to accelerate progress and sustain integrated care in Australia (Angus & Valentijn, 2017).

This disproportionate micro-level emphasis most likely reflects the complexity in tackling systemic issues (i.e. data linkages, payment reform), both in terms of implementation and measurement complexity, resulting in a one-dimensional focus to integrated care interventions (Angus & Valentijn, 2017; Briggs et al., 2018).

System integration requires targeted interventions at multiple levels – micro, meso and macro. While a disproportionate focus at one level may lead to change and efficiency at that level, it will most likely not be sustained in a broader system (Briggs et al., 2018).

Given the disproportionate focus on micro-level strategies to date, there is a need for a greater focus on meso-level and macro-level strategies to achieve implementation of integrated care at scale.

Integrated care in regional, rural and remote Australia

Traditional care models of provision have struggled to address diseconomies of scale which can result from large distances and small dispersed populations.

A systematic review of health care in rural and remote Australia (Wakerman et al., 2008) found a number of interrelated elements for sustainable service delivery in small communities.

Table 7: Environmental enablers and essential service requirements for successful service delivery in rural and remote areas

Environmental enablers	• A supportive policy which ensures sustained service funding. • Coordination of policy and funding across national and state governments. • Appropriate level of community readiness for involvement in planning, implementation and monitoring of service activity.
Essential service requirements	• Workforce – numbers and mix of staff. • Adequate funding (true cost of service). • Governance, management and leadership. • Linkages – including integration of services within an organisation and external linkages with other key organisations to ensure continuity of care. • Infrastructure – physical infrastructure as well as adequate

Care integration is generally best managed locally, reflecting local knowledge and relationships, variations in the characteristics of local populations, an efficient scale for managing health service delivery, and integration with other parties that address local population health (Productivity Commission, 2017b).

Aboriginal Community Controlled Health Services have adopted an integrated care approach over the past 30 years and provide some of the best examples of this model.

There is now a broad range of primary health care data that provides a sound evidence base for comparing the health outcomes for Indigenous people in Aboriginal Community Controlled Health Services with the outcomes achieved through mainstream services, and the findings are positive (Panaretto et al., 2014).

Aboriginal Community Controlled Health Services aim to improve health outcomes through better access to services and by addressing underlying social determinants of health. Services include primary clinical care, preventive and health promotion activity, as well as education and development in relation to workforce training and governance/community capacity building.

The key drivers behind this innovative service arrangement are:

- Poor service access and availability.
- Inadequate funding of services.
- Low acceptance of mainstream services by Aboriginal patients; the poor health status of the
- Aboriginal population.
- A desire for community control of these services (Wakerman et al., 2008).

We recommend system stewards review the health outcomes for older Indigenous people receiving services through Aboriginal Community Controlled Health Services, with a view to considering whether to incorporate aged care service into this model.

MMA would argue there is also a case for considering whether a community-controlled service model should be applied systemically; delivering integrated care to all older people in communities with populations less than 5,000 (communities across MMM 4-7).

Additionally, the World Health Organization recommendation to improve the (safe) collection, recording and linkage of health and service information to improve care outcomes. Including the safe storage and access of this information for research purposes, building an evidence base to inform policy settings, performance management and funding levels (World Health Organization, 2012).

We also recommend aged care system stewards review information sharing arrangements between aged and health care providers with a view to improving system interoperability.

Integration and coordination of health and social care services will be important if optimal health and economic outcomes are to be achieved.

When a system is able to achieve high levels of integration, there is an ability to realise improved health outcomes for patients as well as better utilisation of constrained resources (Goodwin et al., 2012).

PART 4: Public benefit

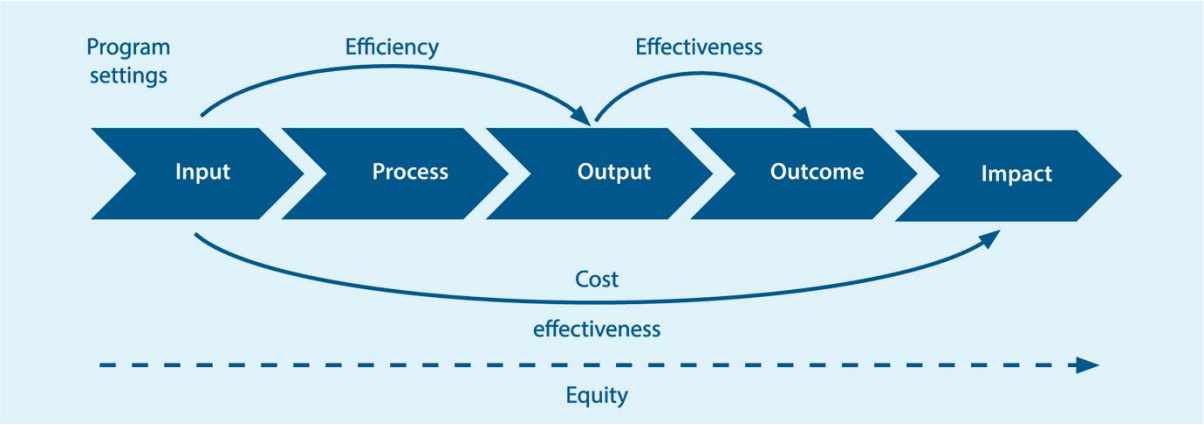
Validating the economic, social and personal impact

There is no single solution or methodology for dealing with the complexity of the new and emerging issues confronting governments; similarly, no one accountability or performance management approach could accommodate all new modes of public policy implementation (Australian Public Service Commission, 2009).

Different types of economic metrics are routinely applied in relation to public expenditure, such as cost-effectiveness, cost-utility and cost-benefit analyses, return on investment, and more recently social return on investment (SROI).

Before exploring the terrain of outcomes measurement, it is important to specify the underlining assumptions being relied on to achieve impact.

Figure 16: Understanding the operational landscape[19]



Program settings: Are services being purchased at the right price to deliver quality and equity? Costs will vary based on different operational environments. The hardest to reach places and people with the most complex needs are more expensive to deliver results to. It is important to understand cost drivers and to make sure inputs are set to deliver the desired levels of quality and equity.

Process: An exercise in control through active and responsive management to make sure programs stay on track, achieve the intended results, and are delivered on time and within budget. Before exploring the terrain of outcomes measurement, it is important to specify the underlying assumptions being relied on to achieve impact.

Efficiency: How successfully are service providers converting inputs into quality outputs?

Outputs: The direct products or services resulting from program interventions or activities.

Outcomes: Changes in conditions that occur between a baseline and subsequent points of measurement. These changes can be immediate, intermediate or long-term – at the macro, meso or micro levels.

Effectiveness: How well are the outputs contributing to the desired outcome?

Impact: Long-term outcomes that are achieved from the activities, outputs and outcomes of an intervention, program or sector – be they 'positive or negative', 'direct or indirect', or even 'intended or unintended'.

[19] Adapted from UK Department for International Development, 2011

Cost-effectiveness: How much impact does an intervention achieve relative to the inputs invested? Due to the nature of government by network[20], establishing 'value for money' is often the first step in validating any government program. Outsourced service provision requires government to demonstrate the best possible allocation of resources.

4.1 Measured

Any measurement framework needs to reflect the complexity of the aged care system and its environment.

For decades, there have been three categories of quality measurement and monitoring: structure, process and outcome (Donabedian, 1980).

In aged care, structural measures assess inputs, including funding and the effectiveness of information and pathways to secure services. Process measures examine actual services or activities provided to consumers. Outcome measures are focused on identifying the impacts of these services on the health, wellbeing and quality of life of consumers (Cardona, 2018).

For each category, it is important to undertake different levels of measurement[21] to build a comprehensive picture:

- Macro: system.
- Meso: community / program.
- Micro: individuals / families / service instance.

Table 8: Example of measurement categories applied at different system levels

Measurement categories/levels	Macro level examples	Meso level examples	Micro level examples
Structure: Assessment of the basic conditions or system levers needed to facilitate transformation and/or continuous improvement.	Degree to which financial and administrative frameworks enable or hinder effective and efficient service delivery.	Infrastructure measures, such as service coverage, information and communication technology (ICT), workforce etc.	Program efficiency and effectiveness measures.
Process: Monitoring areas where service users are most at risk of lack of quality, equity and availability of services.	Systematic responses to emerging and forecast population health issues.	Compatibility and interconnectedness of programs, across relevant providers and service sectors.	Ensure the services and care delivered reflects the processes in place

[20] When government funds other organisations to do the work it wants done (Australian Public Service Commission, 2009).
[21] Adapted from Nolte, 2017

Measurement categories/levels	Macro level examples	Meso level examples	Micro level examples
Outcome: Ensure that structures and processes attain citizen and system goals.	Health and wellbeing of the ageing population.	Level of innovation to improve care outcomes.	Individual service experience and outcomes.

Measures should be developed through a process including an assessment of the scientific strength of the evidence found in peer-reviewed literature, evaluating the validity and reliability of the measures and sources of data, and actually testing the measure (Hughes, 2008).

Measurements need to be comprehensive, not just the easiest things to measure – any framework should evolve through a continual and collaborative discipline.

4.2 Transparent

Program results depend on whether the program logic was correct from the outset. This depends on the strength of the evidence behind the program settings and whether policy assumptions were correct (Centre for Epidemiology and Evidence, 2017).

If either the evidence or the assumptions are wrong, outcomes will be impacted – and contrary to the intention that government funds be targeted at interventions which make the most impact.

In areas where there is limited evidence about what works, policy owners need to ensure there are strong monitoring and evaluation plans in place (Centre for Epidemiology and Evidence, 2017).

The suitability of each measurement will be relative to the view of each stakeholder and should be acknowledged as such (Brinker & O'Connor, 2013; Garland et al., 2004).

Table 9: Example of stakeholder information needs in aged care

Stakeholder	Examples of needs	Data requirements
Governments	• Monitoring ageing population health and wellbeing. • Setting policy goals and priorities. • Assurance that government finances are used as intended. • Ensuring appropriate information and research functions are undertaken. • Monitoring regulatory effectiveness and efficiency.	• Information on system performance at national and international levels. • Information on availability, access and equity of care. • Information on quality and risk. • Ageing population health data.

Stakeholder	Examples of needs	Data requirements
Providers	• Market parity. • Awareness of cost-drivers. • Assurance that regulatory procedures are working properly. • Flexibility in service delivery innovation.	• Information on unmet, as well as projected service and health needs. • Information on care experiences and customer satisfaction. • Information on comparative performance. • Information on the cost effectiveness of interventions.
Citizens	• Assurance that appropriate services will be available when needed. • Performance and benchmark information on individual service providers, to improve transparency and informed consumer choice. • Transparency of outcomes for government investments.	• Broad trends in, and comparisons of, system performance at national and local level across multiple domains of performance: - access - effectiveness - safety and - quality

A culture of transparency starts with building a strong monitoring and reporting capability – using data to create information and knowledge assets not only for internal use, but also externally so that providers, citizens and others might benefit from useful and reliable information on the value and impact of aged care programs.

It is generally accepted that there are unresolved issues associated with the collection and management of measurement data – across all domains: structure, process and outcomes – the resolution of which will be essential to ensure the integrity and validity of measurements and associated findings.

4.3 Impactful

Outcome evaluation tools and findings need to be meaningful, and valid appraisals of the impact services have on the health, wellbeing and quality of life (Cardona, 2018).

The Productivity Commission developed a framework for measuring impacts (Productivity Commission, 2017a) titled the 'quadruple aim', which expands on work first published by the Institute for Healthcare Improvement on the 'triple aim' (Berwick et al., 2008).

For over a decade, Germany has demonstrated how the triple aim delivers significant gains in population health, improved experience of care and reduced per capita costs (Groene et al., 2016).

In Australia, the Productivity Commission included a fourth aim; improving the wellbeing of people providing care.

From an impact measurement perspective, the Productivity Commission provided guidance on what each of the four aims might cover, for example:

- Improving population health, estimated broadly in terms of a percentage improvement in the health of those who would otherwise be in poor or fair health.
- Enhancing the experience of consumers could be represented, in part, by estimating the value of the reduction in the time spent waiting for services – especially early intervention services.
- Lowering care costs (without compromising quality) could be estimated in terms of the impacts on total health and care expenditure for particular demographic groups.
- Providing a supportive environment to improve the wellbeing of people providing care (Productivity Commission, 2017, adapted).

However, to understand impact, important methodological and governance arrangements need to be in place, including agreement on the most suitable measurements and instruments, as well as data collection, collation and access points (Cardona, 2018).

Collection of robust, valid data to measure and monitor the full spectrum of performance.

APPENDIX 1: Evidence and data methodology

Our approach to research

This report is presented in similar terms to an integrative review – that is, based on non-experimental research (such as case studies), observational studies, and meta-analyses. Where relevant, we also referenced practice applications, guidelines, grey literature and other reputable resources.

Peer reviewed journals were sourced through journal databases using a combination of search terms based on the concept outlined in Figure 2: Knowledge framework.

Online sources were searched, and in particular, the following electronic sources were accessed: Pubmed; Elsevier ScienceDirect; BMJ Journals Online; SAGE Journals online; ProQuest; The Cochrane Library; Blackwell-Wiley; ASSIA; Oxford Journals; JSTOR; PLOS One; PMC; and Cambridge Journals Online.

The project team also considered grey literature and other reports, guides and resources provided by providers, peak organisations and departmental staff during Miles Morgan Australia's consultation in regional, rural and remote areas.

An iterative process involving the project team was used to unpack each policy dimension specified in the knowledge framework. Once a text was selected, the project team synthesised the content of each paper employed thematic analysis. While the full text of selected papers was read – text segments, in the form of phrases or paragraphs relevant to the objectives of the knowledge framework, were extracted.

The meaning of each of these text segments was classified by theme. Latent level analysis was conducted according to which text segments were allocated to themes on the basis of the dominant meaningful concept within them. Text directly relating to the provision of aged care in regional, rural and/ or remote regions was prioritised. Text relating to health systems and services, as an interconnected sector was prioritised (second only to text directly relating to aged care).

Following a first pass of the available literature, the knowledge framework was revised, to better reflect the language and intent of the research.

Data analysis was then undertaken on both publicly available information and data provided by the Department of Health. By incorporating data analysis, which expands on the traditional integrative review approach, our intention was to validate the knowledge framework through de-aggregated information – allowing for a nuanced discussion of the reality outside of metropolitan areas.

All sources considered by the project team are listed in Appendix 2: Reference Material of this paper. Sources were limited to those in English.

Our approach to data

Data sources

The public datasets include:

- Australian Bureau of Statistics (ABS) Censuses 2006, 2011 and 2016.
- Australian Statistical Geography Standard (ASGS) related geographical structures and non-ABS structures such as state suburbs (SSC) and postal areas (POAs), plus all relevant digital shapefiles used for Geographical Information System (GIS) analysis.

- Socio-economic Indexes for Areas (SEIFA) 2016, specifically the Index for Relative Socio-economic Disadvantage (IRSD) developed by the ABS using 2016 Census data.
- Department of Health published 'Modified Monash Model Suburb and Locality Classification – Home Care Subsidy' was the main source used to assign MMM classifications to Australian suburbs. Where needed, the Modified Monash Model (MMM) 2019 at Statistical Level 1 (SA1) published by the Department of Health through data.gov.au was also examined.
- Australian Institute of Health and Welfare published Aged Care Service List 2017-18 and 2018-19. This includes some information related to service providers for Residential and Home Care, and funding received by providers' outlets. This data source does not include any data on consumers or services delivered.

Administrative datasets supplied by the Department of Health include:

- CHSP program data for 2017-18 and 2018-19.
- Home Care Package program data for 2017-18.

All datasets were cleaned by MMA and mapped into SSC wherever possible, to ensure consistency across the analysis of MMM classifications.

Some datasets are less usable. Some of the CHSP program data is geographically classified at the ACPR level. ACPR are too large to be accurately mapped to smaller MMM regions, meaning analysis for the purpose of this project was limited. Though these may be potentially modelled through more dedicated exercises, the available project resources did not permit this level of analysis. Such datasets were not mapped but only used for reference purposes.

It is important to note that the administrative datasets provided for this project were incomplete. There is no single source of truth for aged care services – either from a consumer, provider or funding perspective, with key data being held across multiple agencies. In some instances, data on the same program was unable to be linked to provide a full-service picture – for example CHSP outlet information is not linked to customer information, meaning program coverage could not be determined.

Data munging[22]

Population modelling requires maintaining a minimum population size within each geo-block; larger populations result in smaller systematic errors across each dataset in subsequent mapping exercise. For example, while mesh blocks[23] may be good from the perspective of having a strong correlation with MMM, the population sizes within mesh blocks are very small and vulnerable to fluctuation across different censuses, resulting in a risk of any errors in the model compounding significantly.

Geo-blocks used in population modelling and mapping must align with the structure of available datasets. State suburbs (SSC 2016) have been chosen for the geographical building blocks of the analysed datasets, which all datasets mapped into, for several reasons:

- SSC 2016 has 15,304 geo-blocks, which is small enough for MMM classifications analysis and has a matchable Locality Classification published by the Department of Health.
- The 2016 ABS Census published correspondences to the SSC 2016 structure.
- Department of Health datasets use postcodes and suburbs as geographical separators.

[22] The process of changing data into another format (or arrangement) so that it can be used or processed
[23] The smallest geographical area defined by the ABS

- Suburbs can be used as location identifiers and mapped across all datasets where the geolocation data are available.

There are also several issues across the geographical structures:

- State suburbs 2011 is different from state suburbs 2016, hence the two censuses are mapped into SSC 2016 using ABS published correspondences.
- Census 2006 only contains ABS structures in the public domain; hence it is mapped from SA2 into SSC 2016.

Data analysis

Population projection (demand model)

The usual convention in age care demand analysis was followed, that is to use population groupings aligned to certain thresholds: 50 and older for Aboriginal and Torres Strait Islander people, 65 and over for traditional aged-pension eligibility, or 85 and over for typical aged-care dependency. These classifications are used to estimate proportions of the population likely to have particular aged care service needs. Detailed analysis using this these population groupings include:

- Medium- and Long-Term Pressures on The System, Background Paper 2 (2019), published by the Royal Commission into Aged Care Quality and Safety (the Royal Commission Background Paper) and
- Seventh Report on the Funding and Financing of the Aged Care Industry (2019), published by the Aged Care Financing Authority (the ACFA Report).

In both the Royal Commission Background Paper and the ACFA Report, demand analysis was performed at the national level. This approach may be accurate at an aggregate level – a larger sample base will likely reduce errors from various aspects. However, due to the significant differences in the operational environments between RRR and metropolitan locations, it is less appropriate for RRR aged care service planning and delivery.

For example, the ACFA Report indicates that there may "be pockets or regions of the country where people are waiting to access residential care." Such issues may not be very serious at a national scale and may represent a small percentage of total Residential Care, but it is exactly the issue for RRR aged care.

This report has de-aggregated the population projection for demand analysis at the state and suburb level for the potential aged population. One must beware of the errors that de-aggregation may cause.

Though de-aggregation provides highly relevant intelligence for RRR aged care, there are certain systematic errors that must be considered. When comparing aggregated projections – such as those from the ABS and Treasury – there can be a projection error of up to 10%.

Some of the possible issues that will lead to systematic errors are:

- The ABS publish state suburb level population data for Census 2011 and 2016. There is no open access data available for 2006 or earlier or future projection at the suburb level.
- The geographical structure used was the State Suburb 2016, which contained 15,304 geo-blocks, whereas the Census 2011 suburbs contained 8,529 geo-blocks. The ABS published 2011-2016 State

- Suburb Correspondence was used to map the two structures, but errors will still occur for the 2011 populations distribution into the 2016 structure, as the populations may not be evenly distributed within a suburb.
- The 2006 suburb population was back casted from 2011 and 2016 census populations, as only statistical level 2 (SA2) population distribution for 2006 was found to be publicly available. Errors may occur due to the estimating nature of population change ratio and un-matched geo-structures.
- The 2021 and 2026 numbers are forecasted using the same estimated population change ratio as the back-casted 2006. The same errors may occur. One must be aware that once systematic errors appear, they are likely to be compounded. Hence with the current model it is not recommended to forecast beyond 2026.
- Out of the 15,304 SSC, there are two categories for each state plus overseas territories that are not MMM specified, i.e. the "no usual address" and "migratory offshore shipping" categories do not have MMM values attached. In the raw data provided, they are classified as MMM 0, which is not a valid value for MMM, but rather indicates they are not counted in the segmented MMM groups. Hence, the total population adding together across MMM can be less than the actual total population published in the censuses.

Population growth ratios

A key part of the de-aggregated population projection is to create de-aggregated growth ratios across different MMM areas of Australia. However, there are a number of challenges that need to be mitigated to create a reasonable method of generating such ratios:

- The publicly available ABS census data are not consistent on geographical structures:
  - MMM de-aggregation uses SSC as its core structure, but only 2011 and 2016 have available data at SSC, with geographical blocks of 8,529 and 15,304 correspondingly, which must be mapped with published ABS correspondences.
  - ABS published time series data which include 2006 census records can only go as detailed as statistical level 2 (SA2) records. SA2 and SSC, which is a non-ABS structure are not exact matches and may create increased errors.
- Averages across different SSC cannot be taken easily, as SSC is a relatively small geographical structure that may only have very limited population in the area, e.g. less than 10. Migration or other reasons may cause population growth in an SSC that creates an abnormally large growth rate, e.g. an SSC may have 3 people in 2011, but 5 people in 2016, which can cause the calculation to recognise a 60% increase in population. The report recognises the ABS also randomises data to protect confidentiality and as such advise that small cells in extracted data cannot necessarily be relied upon in isolation as they may well be randomised numbers[24].

As explained previously, excessive de-aggregation will expose the model to greater errors as it loses the ability to incorporate and mitigate abnormal changes by sizes. There needs to be a balanced approach to represent corresponding changes in different MMM areas but also maintain certain levels of robustness.

As a result, the following steps have been taken to generate the growth ratios used for population projection:

[24] https://www.abs.gov.au/ausstats/abs@.nsf/Lookup/2901.0Chapter38202016

- Due to the availability of data, the statistical level 2 (SA2) time series data for 2006, 2011 and 2016 were used as the basis of historical records for population projection. This is the smallest geographical structure available publicly. Notice that SA2 actually changes across different censuses, hence it is critical to use a consistent record set, e.g. the ABS published time series, to ensure the consistency of population in the corresponding geospatial blocks.
- The projected growth rate of each SA2 (i) is calculated by taken the average change of the last two censuses, shown as the following:

  Equation (1)

$$\bar{R}_i = \left(\frac{P_{i\,2016} - P_{i\,2011}}{P_{i\,2011}} + \frac{P_{i\,2011} - P_{i\,2006}}{P_{i\,2006}} \right) \Big/ 2$$

  $P_{i\,2016}$ is the population for the corresponding SA2 in the 2016 Census, the same as other corresponding population parameters.

- Once the average growth ratio of each SA2 is calculated, the rate is then mapped into Postcode using ABS's SA2 and Postcode correspondence, to create $\bar{R}_j$ where j is the corresponding Postcode.
- ABS data allows mapping between Postcode and SSC, hence $\bar{R}_k$ can be calculated where k is the corresponding SSC, and each SSC will have its own growth rate calculated based on their corresponding Postcode growth rate.
- During the process, some SA2 growth rates also had issues due to relatively small population sizes. These SA2 growth rates were treated as outliners and replaced by the average national growth rate.
- All SSC were then treated separately with their corresponding growth rates and assumed constant growth from 2016 to 2021, and to 2026, hence the future populations in each SSC were projected.
- This would not be the only method that can achieve the results but was used due to limitations and availability in datasets. More appropriate methods may be adapted and improve the accuracy of the results if additional data become available in the future.
- All errors discussed in the previous section are also applicable in this case.

Data application

Data analysis was then undertaken on both publicly available information and proprietary administrative data provided by the Department of Health.

Outputs from analysis of publicly available data:

- Information derived from ABS censuses such as demand analysis, population forecasts, population examination including 2016 lone persons, indigenous populations, incomes, languages spoken, etc.
- Geographical blocks from ABS published shapefiles on Statistical Levels, State Suburbs, Postcodes, etc.
- Aged care information related to service providers, outlets and funding for residential care and home care, using the AIHW published Service List 2017-18 and 2018-19.

APPENDIX 2: Reference Material

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APPENDIX 3: Opportunity to act

Miles Morgan Australia has summarised those key areas where there is an opportunity for aged care system stewards to act (or further investigate) to improve the level of actionable information in aged care. Care should be taken not to duplicate similar efforts to improve data capture, access and use across government.

Domain	Opportunities to investigate and act
Challenges	• Supplement the MMM with localised analysis to provide greater insights for aged care policy and planning purposes. • Access or invest in data infrastructure to better collect, analyse, interpret, share and report across data sources (securely), in order to develop shared measurement systems and reporting capability. • Validate and evolve the Data Blueprint and Analytics Roadmap.
Part 1: Community attributes	• Build capability that can estimate the spatial effect of a policy, before the policy change is introduced. This will help prevent the emergence of unintended small-area consequences and associated population risks. • Target individual communities with the highest dependency ratios for stable and sustained economic investment sufficient to improve the attraction and retention of a working age population. • Work with data stewards across all levels of government to identify areas of highest disadvantage, to a granular level, allowing for better targeting of early intervention/ healthy ageing initiatives. • Build capability that can monitor results of early intervention programs and evaluate impact. • Access and use the Multi-Agency Data Integration Project (MADIP) to develop microdata products to study how socioeconomic characteristics predict government service usage and changes over time. - MADIP datasets also allow for analysis of changes in social, health and economic outcomes for sub-populations such as Aboriginal and Torres Strait Islander peoples, older Australians, welfare recipients, and regional communities • Undertake further examination of the impact of physical and social environments on loneliness in the ageing population – specifically, mapping the predictors of loneliness to better inform community and individually-based interventions. • Gather evidence on what level of investment is required to support the development of age-friendly communities in regional, rural and remote Australia, taking into account the health, social and economic benefits.

Domain	Opportunities to investigate and act
Part 2: Under-Standing demand	• Create a de-aggregated demand forecast model including but not limited to: detailed demographic information; disease prevalence and incidence; early indicators of health decline and disability (i.e. information captured by emergency services or available through MBS, PBS and NDIS); historical trends relating to aged care service access and activity; known service gaps (i.e. wait lists). • Design a predictive model to test demand and supply scenarios utilising a combination of variables including but not limited to: - Age bracket (i.e. young old, old, oldest old and/ or frail old) - Sex - Ethnicity - Geography - Socio-economic status (including variations of contributing factors) - Epidemiological risk and protective factors - Health and life course events • Investigate how data infrastructure might support secure data provisioning from multiple sources in a way that improves demand forecasting, adheres to data protection requirements, and encourages predictive modelling techniques. • Develop and validate an accessibility index, based on available data, including where possible, but not limited to: - Hospitals - General Practitioners - Registered allied health professionals - Pharmacists - Ambulance stations - Commonwealth Home Support Program service outlets - Home Care Program outlets - Residential Care facilities Consider whether to include NDIS providers in the accessibility index, noting the need to uphold service relevance so as not to distort accessibility scores. • Examine the geographical accessibility to health and aged care services, at the lowest possible geographical level, to identify underserviced or poorly served communities for aged care service planning purposes. • Explore the differences between the intra-regional patterns of spatial access, as well as the association between poor accessibility scores with socio-economic status, to better inform future resource allocations.

Domain	Opportunities to investigate and act
	• Understanding and measuring acceptance will rely on qualitative methods - specifically interviews, questionnaires, formal and informal feedback mechanisms - as such the most pressing opportunity is to: - Start analysing complaints data from MyAgedCare, and - Institute a formal mechanism for regularly receiving and analysing complaints from the Aged Care Quality and Safety Commission[25]. Given the qualitative nature of 'acceptability', explore opportunities to improve the flow of information on the expectations of older Australians and their communities towards the aged care system.
Part 3: Improving supply	• Engage actuarial services to determine the true cost of service in regional, rural and remote Australia, taking account of local market conditions[26]. • Use the true cost of service (input costs, productivity implications, through put considerations) to design flexible pricing arrangements that are responsive to local market conditions. • In relation to residential care, undertake further investigation into MMM population forecasts, and mobility patterns of older Australians, to ensure infrastructure investments are appropriately directed across regional, rural and remote locations. An infrastructure cost estimate based on the population needs within each MMM region, down to the individual community level, should be produced. • Identify areas where individualisation funding arrangements are not viable by determining the minimum population density (over a defined geographic spread) for aged care service provider viability – leading to a reconsideration of how aged care services are administered outside of metropolitan areas. • Better construction of consumer records to monitor the nature and frequency of contacts with MyAgedCare, coupled with administrative data to track service provision. • Explore the opportunity to monitor overall experience through regular consumer and caregiver satisfaction surveys, which can include broad measures of navigational experiences.

[25] We acknowledge that complaints made to the Commission will need to be de-identified and sanitised to a satisfactory degree to maintain confidence in the process. However, rather than underlying information being lost, well categorised complaints data could help inform structural or systemic issues relating to service acceptability

[26] MMA was advised in August 2020 that actuarial services have been engaged (scope and period of the engagement was not specified). We recommend the publication of all actuarial outputs for transparency and to promote informed policy and program discussions.

Domain	Opportunities to investigate and act
	• Review the health outcomes for older Indigenous people receiving services through Aboriginal Community Controlled Health Services, with a view to considering whether to incorporate aged care service into this model. • Review information sharing arrangements between aged and health care providers with a view to improving system interoperability. • Forecast the budgetary impact on the health system under current arrangements with a view to informing a business case for adjustments to policy, funding instruments and models of care to consider the specific care and resource needs of older people, as outlined above. • Explore the World Health Organization recommendation to improve the (safe) collection, recording and linkage of health and service information to improve care outcomes. Including the safe storage and access of this information for research purposes, building an evidence base to inform policy settings, performance management and funding levels (World Health Organization, 2012).
Part 4: Public benefit	• Collection of robust, valid data to measure and monitor the full spectrum of performance. • Establish systems to collect, analyse and report on said data – such systems would require investment in human capital and technological structures capable of storing, exporting and protecting sensitive data.

APPENDIX 4: Data blueprint and analytics roadmap

Arising from the knowledge framework developed by Miles Morgan Australia two key research outputs have also been created to support transition from information to knowledge:

- The **Data Blueprint** maps the data needed to perform sophisticated policy and program analysis. While not an exhaustive list, known data sources have been listed, accessibility categorised, and mapped to the 12 policy domains in the knowledge framework
- The **Analytics Roadmap** articulates how best to build actionable information, recognising data availability and constraints. Policy analysis topics are based on the knowledge framework.

The Data Blueprint and Analytics Roadmap are not intended to be definitive – in either data availability and access, nor in the nature and prioritisation of analytics tasks. However, these products provide a solid foundation from which data and analytics decisions can be made. The first of which should be validation.

We recommend printing the Data Blueprint and Analytics Roadmap in A3.