Northern Australia Health Service Delivery Situational Analysis Summary report

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Disclaimer

Executive Summary

The *Northern Australia Health Service Delivery Situational Analysis* ("Situational Analysis") is an initiative of the Cooperative Research Centre for Developing Northern Australia (CRCNA). The CRCNA is investing in industry-led research collaborations to develop new technologies, products and services which address industry issues in northern Australia. The aim of the Situational Analysis is to identify strategic long-term development and growth opportunities for the health sector in northern Australia, towards a goal of improving the health and prosperity of northern Australian communities. It was comprised of a series of outputs, namely: a literature review, export and demand analysis, SWOT analysis, research investment analysis, costing study and socialisation activities. This report provides a 20-page summary of the full report.

The health sector across northern Australia is complex, with multiple health care providers across government, community controlled, non-government and private providers, and with complex training, educational and regulatory frameworks. An experienced team of health systems researchers with deep knowledge of the sector and extensive contacts conducted this work and the complex stakeholder engagement that was necessary to document the issues.

Literature review

The Situational Analysis includes a synthesis of 324 papers predominantly from the last 10 years representing a diverse range of grey literature (including strategic plans, policy and annual reports) and peer-reviewed literature. Overall, the literature highlights the benefits of comprehensive primary healthcare and emphasises the need for community preferences, control or participation in health care decision-making. However, a mismatch was identified between stated commitments to act on social, cultural and environmental determinants of health at a strategic planning level, and translation of this strategic intent into operational capacity and funded action.

Other key challenges identified in the literature, which were also reflected in stakeholder consultations, included:

- Health workforce recruitment and retention in regional, rural and remote areas;
- Funding models rewarding occasions of service rather than quality of care or prevention;
- Gaps in culturally responsive care; and
- Often-limited inclusion of community preferences in the planning of health service models.

A key governance challenge related to fragmentation of health-related policy and planning in the north, leading in some cases to detrimental policy changes being made without adequate consultation or evidence – a finding supported in consultation workshops. Despite an apparent need for policy-focussed evaluative research, however, few quality systems-level evaluations of health-related policy were identified in the literature. Further, despite the many shared challenges and opportunities apparent across the north, opportunities for cross-jurisdictional and international collaboration in health service and workforce governance, planning and information-sharing also received little attention.

Export and demand analysis

An analysis of Asia Pacific region demand and northern Australian health services-related export capability/export income generation considered opportunities for export in four categories:

- Knowledge transfer and exchange;
- Education and training;
- Services (including health systems advisory, research and medical tourism); and
- Health products (including new therapeutics, diagnostics, vaccines and technologies).

The analysis identified opportunities to grow and develop partnerships with neighbouring countries to Australia's north, focussed on health systems strengthening and workforce development, as well as areas where targeted investment and support could help to realise the potential for export income generation.

Stakeholder consultations indicated broad support for further developing regional partnerships, focussed on two-way sharing of health-related expertise and educational opportunities. However, concerns were raised both in reviewed literature and during consultation workshops about the risk that export efforts, particularly health service exports, might divert already-stretched health service and workforce resources away from communities in northern Australia.

Research investment

High quality research currently being undertaken in the north is addressing many of the key issues identified in this project, but more resourcing is needed for locally led research focussed on the key health systems challenges and priorities, including strengthening health workforce, improving accessibility of needed services and re-orienting financing models towards prevention and outcomes. Only two percent of national disbursements from Australia's largest government funding bodies for health and medical research are being administered by northern-based institutions, despite the north representing five percent of Australia's population, its strategic proximity to the Asia Pacific region and higher disease burden.

An analysis of the types of studies funded by these bodies that were administered by northern institutions found that the smallest proportion of funding (11 percent) was for projects in the category of Health Services Research, which includes studies focussed on efficiency and effectiveness of the healthcare system, potentially highlighting underinvestment in policy-focussed evaluative research on health system functioning in the north.

The findings of this analysis and the consultations strongly suggest that more research capacity and activity is needed in the north to address the systems challenges that contribute to the higher disease burden, particularly targeting rural and remote populations. This investment must be northern led to ensure that the contexts and realities of the north are properly understood and to facilitate rapid implementation of findings into practice and policy. Findings from consultations also indicated a degree of fatigue associated with southern-led research which is often undertaken from a deficit point of view. When northern researchers and organisations are engaged (if at all) as associate investigators, they are often not properly resourced to interrogate, manage or oversee the research, strengthening the case for research to be driven and led by northern institutions

Costing study – Potentially Preventable Hospitalisations (PPH)

A costing study undertaken in the project identified that in the 2016-17 financial year, there were 45,702 hospital separations documented as PPH across northern Australia. National PPH costs for 2016-17 were estimated at $3.7 billion. Across the north, these separations costed an estimated $241.8 million, representing 6.6 percent of national PPH expenditure. At greater than five percent, this is higher than the national average per person. Significant cost-savings are possible through investment in comprehensive primary health care to reduce these hospitalisations.

SWOT (strengths, weaknesses, opportunities, threats) analysis

The SWOT analysis drew from the desktop study and consultation findings, and highlights the strengths, weakness, opportunities and threats facing the health system in northern Australia:

- **Strengths** largely reflect the health service delivery and education and training expertise unique to northern Australia (including a wide range of quality services in regional centres), developed in the region out of necessity based on geographic and population factors. Strengths also include national attributes such as commitments to universal health coverage and reasonably well-developed infrastructure, including health service facilities and equipment. Policymakers across the north are also increasingly adopting e-health technologies to facilitate and enhance planning, information-sharing and patients' access to services regardless of service context.
- **Weaknesses** include siloed systems of governance, finance and planning that impact on services and ultimately health outcomes, which are reflected in fragmentation of efforts and funding both within and across jurisdictions. Health workforce shortages and high turnover are also apparent, particularly in the Aboriginal, and Torres Strait Islander, health workforce. Key service weaknesses include the failure of many health services in the north to provide integrated and optimal care across stages of the patient journey, including coordination of quality health services from hospital settings to community-based chronic and rehabilitative care, or to involve communities in co-design. Additional weaknesses include under-resourcing, particularly of critical prevention services, and an inadequate focus within the health sector on addressing the social, cultural and environmental determinants of health.
- **Opportunities** include improving the stability and cultural responsiveness of health workforce in the north and supporting locally led needs-based planning and research. Sustainable staffing in comprehensive primary health care would substantially improve quality of care at minimal or no overall cost. Attention is also warranted to review financing mechanisms, and financing distribution, to ensure greater resourcing of prevention.
- **Threats** include challenging financing models, including those in areas without block-grant funding that reward occasions of service rather than prevention or quality of care and outcomes. Threats also include those stemming from the higher disease burden, which represent risks to health service organisations and policymakers in terms of rising costs of health care and lost productivity, and ultimately to the development of northern Australia. More existential threats in terms of vulnerability to emerging infectious diseases, natural disasters and climate change are also cogent.

Priority actions

Eight priority actions were identified in the project, which drew from the findings of the desktop-based analysis and stakeholder consultations across the jurisdictions:

1. Support and enhance formal education and training of a fit-for-purpose, culturally competent health workforce across all health disciplines and elements of rural health training pipelines;
2. Enhance professional support, career development and career pathways for rural health and Aboriginal and Torres Strait Islander health workforce across all health disciplines;
3. Establish a cross-jurisdictional northern Australian health system network as an independent body;
4. Determine need and mechanisms to finance appropriate health service delivery models for rural and remote health service delivery;
5. Improve local amenities and infrastructure across sectors to reduce effects of adverse social determinants on health outcomes;
6. Undertake trials to develop and scale up place-based planning models;
7. Strengthen and grow northern-led research capacity and funding; and
8. Explore potential areas of export opportunity that deliver value for northern Australia.

Implementing these actions will: improve the health and productivity of northern Australian populations; reduce health system costs associated with high PPH, duplication of services and workforce turnover; empower local communities to develop solutions and have more control of their health and wellbeing; and strengthen northern Australia's strategic role and capacity within the broader Asia Pacific region.

1. Introduction

Project background and aim

Northern Australia is a vast region of three million square kilometres which incorporates the Northern Territory and the northern parts of Queensland and Western Australia above the Tropic of Capricorn (Commonwealth of Australia, 2018). Within the region, healthcare and social assistance is the largest employing industry, representing 13 percent of total employment (Commonwealth of Australia, 2018), and generally provides high-quality service.

Health care delivery within the northern Australian context is challenged by long distances between population centres, persistent health workforce shortages and high turnover rates across all health workforce categories. The region's tropical climate (including both wet and dry tropics), exposure to extreme weather events and proximity to Pacific Island nations and Asia shape a healthcare and health workforce development context that also involves managing tropical infectious disease risks and relationships with neighbouring countries. The effects of changing climate in terms of drought and extreme weather events are also felt acutely in the north (NESP, 2019).

Despite commonalities between the three northern jurisdictions in experiences of health care delivery and workforce planning, these functions are often siloed. The ad hoc relationships and ways of working between service providers and other health system stakeholders across the north sometimes hamper opportunities to jointly and systematically identify cross-jurisdictional health systems issues and areas of development potential.

In the 2015 White Paper on Developing Northern Australia, the Australian Government recognised the importance of a northern Australian approach to health sector development by including "healthcare" as one of the five industry pillars underpinning development in the north (Commonwealth of Australia, 2015). The industry pillars represent areas of endeavour seen as fundamental to both the wellbeing of people living in the north and broader economic prosperity (Commonwealth of Australia, 2015).

The Northern Australia Health Service Delivery Situational Analysis ("Situational Analysis") is an initiative of the Cooperative Research Centre for Developing Northern Australia (CRCNA), which was established by the Australian Government in 2017. With a budget of $75 million over ten years, the CRCNA brings together industry, research organisations and the three northern jurisdictions to identify and conduct research on developmental opportunities in key industry areas including food, agriculture and health (CRCNA, 2019).

The Situational Analysis involves the production of a health-sector-focussed report that identifies the key challenges and opportunities facing the northern Australian health service delivery sector and health workforce and puts forward strategic development priorities for future investment. The aim of the project is to improve the health and prosperity of northern Australian communities by identifying strategic long-term development and growth opportunities for the health sector.

The production of this report involved a desktop review, synthesis and stakeholder consultation over six months from August 2019. The project consisted of two stages:

> **Stage 1**: Production of a draft report, incorporating: a literature review; an analysis of health sector export and demand opportunities; an analysis of strengths, weaknesses, opportunities and threats; an analysis of government-partnered research projects; and a costing study.
>
> **Stage 2**: Circulation of the draft report and engagement with stakeholders across northern Australia to identify the key challenges and opportunities facing the northern Australian health system, refine the draft report and inform the development of a policy action plan.

Across both stages, analysis, consultation and reporting were informed by the World Health Organization (WHO) health system "building blocks".[1] The WHO building blocks are health system components that contribute to the functioning of health systems in different ways – some are cross-cutting (Leadership and Governance; Health Information Systems), while others represent key inputs (Financing; Health Workforce) or outputs (Essential Medicines and Technologies; Service Delivery). Both stages were informed and reviewed by the jurisdictional advisory groups (including a broad range of public, private, community-controlled and academic health sector partners) and the report was thoroughly stakeholder-tested (more detail in the full report). These reviewers: evaluated the report's originality, methodology, rigour, compliance with ethical guidelines, conclusions against results, and conformity with the principles of the Australian Code for the Responsible Conduct of Research; and provided constructive feedback which was considered and addressed by the authors.

This Situational Analysis is intended to provide a foundation for health sector collaboration, advocacy, funding and policy development to improve health systems in northern Australia.

[1] The WHO describes health systems in terms of six core components or "building blocks": Service Delivery; Health Workforce; Health Information Systems; Access to Essential Medicines and Technologies; Financing; and Leadership and Governance. A seventh category – Community Engagement – is sometimes added to highlight community perspectives and priorities.

2. Literature review

Aim and methods

This section provides a condensed summary of the literature review which synthesised the evidence on the current issues characterising the northern Australian health service delivery sector and identified key gaps (see full report). A scoping review design was adopted, involving systematic methods to comprehensively identify and map the literature relating to health service delivery and workforce in northern Australia.

Both peer-reviewed and grey literature were sourced for the review, with searches for both types undertaken in parallel by two members of the project team during August 2019. A combination of electronic database and website searching was used to find papers, supplemented by snowballing and expert and peer recommendations. Additional sources were added following the consultation phase of the project (October-December 2019) to incorporate papers suggested by participants and peers.

Following searching and selection, key information was extracted from included papers into a template and findings were analysed and reported against the World Health Organization (WHO) health system "building blocks" (WHO, 2010).[2] The initial review findings informed the consultation phase of the project, with final review findings then used in subsequent analyses such as the SWOT analysis.

Description of dataset

A total of 324 papers were included in the review following screening and eligibility assessment, of which 197 were peer-reviewed journal articles and 127 were policy papers ("grey literature").

Key findings

Literature in the **Service Delivery** building block highlighted the growing pressures on health care systems in the north to manage the high non-communicable disease burden and respond to demographic changes resulting in increasing health service use.

This building block also encompasses the largest body of peer-reviewed literature in the review, with many papers focussed on improving health care access for specific population groups. Reflecting the vast geographical distances between population centres and specialist services in the north, a specific focus was on making health services more accessible closer to home for rural and remote patients, minimising the need for travel.

For Aboriginal peoples and Torres Strait Islanders, connection to country was highlighted as an additional and critical factor driving a need for models of care to facilitate remaining on country while accessing needed services.

The literature in this building block highlights the benefits of comprehensive primary healthcare (PHC) and emphasised the need for community preferences, control and participation in health care decision-making. The policy literature also indicated a mismatch between stated commitments to act on social determinants of health at a strategic planning level, and translation of strategic intent into operational capacity and funded action.

The **Health Workforce** literature highlighted the significant and ongoing health workforce recruitment and retention challenges experienced across northern Australia, which affect rural and remote locations more acutely.

High workforce training needs across multiple professions were documented. Multiple studies highlighted the benefits of rurally based health professional recruitment and education models to train and retain local health workforce, particularly in medical (and increasingly other health professional) "generalist" roles. The importance of health professionals in rural areas being able to work to their full scope of practice in team-based models using tele-health was also highlighted, along with high health system costs related to turnover.

Cultural competence, safety and responsiveness were emphasised in multiple studies as workforce attributes that are critical for health services to be able to improve Aboriginal, and Torres Strait Islander, health care and access. An urgent need was also identified to grow, strengthen and support the Aboriginal, and Torres Strait Islander, health workforce.

The **Planning and Health Information Systems** literature profiles some important approaches and methods that incorporate local needs and community participation or co-design in planning processes as well as the role of information and communication technology.

Multiple economic studies in the review demonstrate the benefits of economic evaluations in providing accurate assessments of the true costs of specific service models, which can assist in health service planning.

Multiple studies in the **Essential Medicines and Technologies** building block examined tele-health models of service delivery, overwhelmingly highlighting their value as models that meet patients' preferences in terms of

[2] The WHO building blocks are: Service Delivery; Health Workforce; Health Information Systems; Access to Essential Medicines and Technologies; Financing; Leadership and Governance; and the often-added Community Engagement.

minimising travel, while at the same time providing equivalent care at reduced cost. An added benefit of telehealth models was demonstrated in rural workforce development through tele-supervision.

However, the literature also described some limitations to the use of telehealth for some conditions and in some contexts, suggesting that telehealth should be utilised as a component of (rather than replace) community-led comprehensive health service models.

Studies about essential medicines and related medical products focussed on access issues, including multiple barriers to accessing treatment in different settings across the north.

Literature in the **Financing** building block highlighted the significant cost pressures facing the northern Australian health system relating to vast distances, chronic disease burden, ageing population, new technologies and ageing infrastructure.

The literature, overall, highlighted that strengthening comprehensive PHC is one of the most effective strategies for both improving health outcomes and containing health care costs.

Some studies offered critiques of current funding schema that reward volume over value (activity throughput rather than high quality care, which disadvantages smaller population centres with higher health needs) and highlighted a need for financing models to reflect not only disease burden and cost but also the notion of a "minimum equitable viable service". This is particularly relevant in small rural and remote communities where Medicare funding is inadequate to sustain services.

Papers in the **Leadership and Governance** building block emphasised the strengths of the Aboriginal Community Controlled Health Service (ACCHS) model of community governance. However, very few of the included papers offered an analysis of the benefits or disadvantages of different governance structures or approaches outside of the ACCHS sector.

Some studies profiled initiatives, such as Academic Health Centres, that aim to create governance infrastructure to bring together different health system components within distinct geographic areas. These emerging initiatives are reported as approaches to facilitating networked health service and workforce planning to improve population health.

A key governance challenge related to fragmentation of health-related policy and planning, leading in some cases to detrimental policy changes being made without adequate consultation or evidence. Despite an apparent need for policy-focussed evaluative research, however, few quality systems-level evaluations of health-related policy were identified in the literature.

Further, despite the shared challenges and opportunities apparent across the north, opportunities for cross-jurisdictional and international collaboration in health service and workforce governance, planning and information-sharing received little attention.

The addition in this report of **Community Engagement** to the six WHO building blocks resulted from identification of many papers that highlight the importance of community participation or co-design in planning and decision-making.

Many of the papers mapped to this additional category address cultural preferences and approaches to health and wellbeing among Aboriginal peoples and Torres Strait Islanders, which in many instances are not being reflected in dominant, biomedical models of health care.

Community engagement issues are also addressed throughout the other categories; in Leadership and Governance, for example, degree of community engagement is identifiable on a continuum from passive feedback platforms to active community control of governance structures.

<u>Opportunities for further work/investigation</u>

- Supporting/developing comprehensive models of primary health care.
- Strengthening the translation of strategic intent to act on social and cultural determinants of health into operational capacity and funded action.
- Meeting the training needs of health professionals including cultural responsiveness capabilities across all health professions.
- Development of cross-jurisdictional networks, including investigation of opportunities for data sharing and data linkages across the northern region.
- Evaluation of the limitations to current financing systems and identification of options to improve them.
- Evaluation of health-related policy at a systems level to provide evidence to policymakers on the best use of resources for improving health outcomes and reducing health system costs.

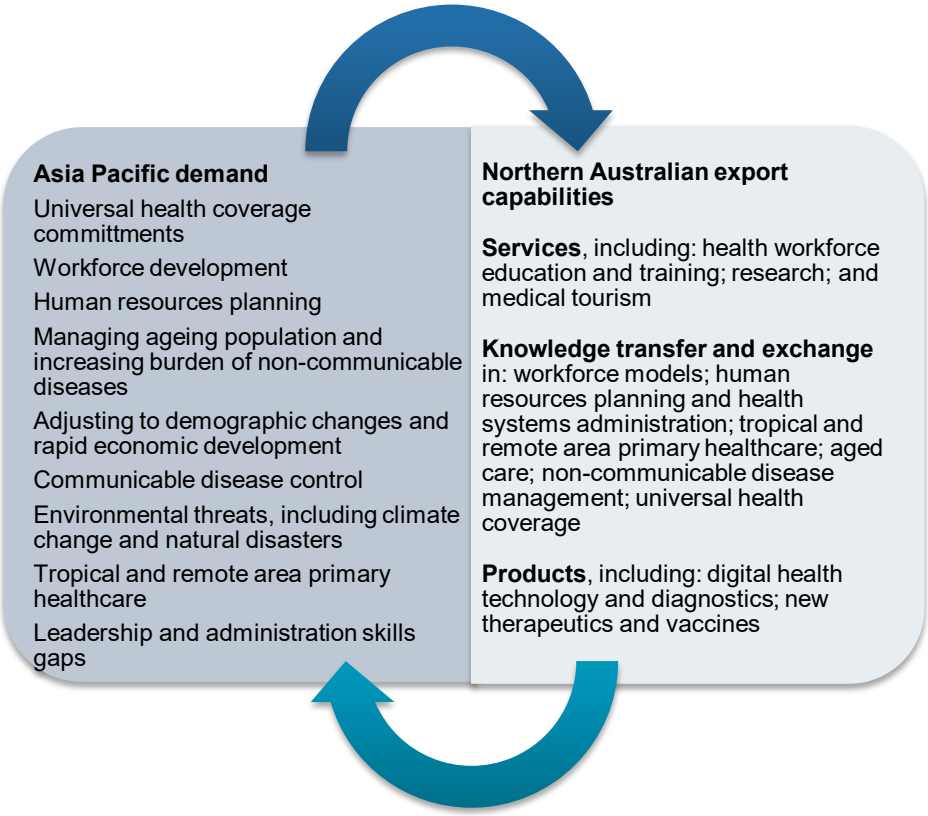
3. Export and demand analysis

This analysis explored potential export investment and income generating opportunities for the health sector in northern Australia, drawing from a literature search on Australian government websites and analysis of a body of work developed by James Cook University.

Based on an analysis of demand from the Asia Pacific region and northern Australian capability, there is potential for cross-institutional partnerships to be fostered between northern Australia and neighbouring countries focussed on improving health and biosecurity. However, widespread concerns were expressed in the consultation phase of this project that a discussion about export income generation opportunities involving health may be premature given the extent of unmet need in northern Australia. The risks of investing in medical tourism were also highlighted in published analyses and were noted to likely outweigh any potential perceived benefits.

Overall, health education, research and knowledge sharing partnerships across the region were broadly supported if approached from an ethical perspective. There is considerable untapped potential (economic, promoting and supporting regional cooperation, and in terms of health security) in investing in two-way learning between northern Australia and neighbouring countries. Northern Australia and neighbouring countries have experiences and expertise that could be shared to benefit both populations, and as such investing in development and support of the northern Australian health workforce and joint research on priority issues could potentially bring broader benefits to the region.

Figure 1: Factors influencing Asia Pacific demand for health systems outputs, and export capabilities in northern Australia



Opportunities for further work/investigation

- Active investigation of opportunities in health workforce education, training and professional development and knowledge transfer and exchange, developed through both new and existing partnerships with institutions in neighbouring countries and through global partnership fora.
- Investigation of opportunities to support northern Australian universities and Academic Health Centres to grow Research and Development (R&D) partnerships with regional economies in the life sciences sector.
- Development of an ethical framework for bi-directional health system strengthening and health-related export involving northern Australia and regional neighbours.
- Investigation of current and potential exports, and delivery of medical tourism, cognisant of the ethical implications of developing opportunities to export health services or products, in view of the unmet health needs of the northern population and already overstretched resources.

4. Research investment

Investment snapshot

This section of the report provides a snapshot of some of the government-funded research activity and projects currently underway across northern Australia. Within the last five years, the major government research funding bodies for health in Australia (ARC 2019, NHMRC, 2019, MRFF, 2019)[3] spent $4.2 billion on health and medical research grants, of which just over $76 million was received by northern Australian institutions, representing less than two percent of national disbursements (**Table 1**). The expected outcomes of these research investments are new or improved medical products, services or technologies, public health interventions, and health system or service improvements.

Apart from the project-specific impacts of this research spending on northern populations, investments in health and medical research deliver more general health and economic returns. For every $1 spent on research, an estimated return of $3.90 is delivered back to the population. Australia-wide, this translates to net present gains of $78 billion from 1990 to 2004: $52 billion in health gains and a further $26 billion in wider economic gains (KPMG, 2018). An analysis and modelling of the research work of the NT-based Menzies School of Health Research between 2002 and 2033 found that the work of the School generated $1.1 billion of total benefit and $698 million net benefit across the NT, Australia and the Asia-Pacific, with every dollar invested returning $2.70 to the economy (Deloitte Access Economics, 2015).

Table 1: Health and medical research funding received by northern Australian administering institutions*, 2015-2019

	NHMRC** 2015-2019	ARC** 2015-2019	MRFF current grants**	Total
Health research funding received by northern institutions	70,350,773	1,419,484	4,597,340	76,367,597
National health research funding	3,535,467,324	102,008,185	574,475,970	4,211,951,479
% funding received by northern institutions	2.0%	1.4%	0.8%	1.8%

NHMRC = National Health and Medical Research Council; ARC = Australian Research Council; MRFF = Medical Research Future Fund

*Northern-based administering institutions used in this analysis: Charles Darwin University, James Cook University, Central Queensland University and Menzies School of Health Research. Southern-based institutions that undertake research in the north were not included.

**NHMRC data were obtained from the NHMRC website, from the following spreadsheets accessed on 11 February 2020: "All Grants 2009 to 2018 updated May 2019" and "Summary of the results of the NHMRC 2019 Grant Application Round - Updated 07/12/2019". ARC data were obtained from the ARC Data Portal for grants commencing 2015-2019 within Field of Research Code 11. MRFF "current grants" refer to grants announced and under contract since 2016-17, as updated on 30 September 2019.

Although the figures in Table 1 do not include research administered by institutions based outside northern Australia, the proportion of funding received by northern institutions is well below what would be expected given northern Australia's population size (around five percent of the Australian population), its higher disease burden and proximity to the Asia Pacific region. Notably, the north has received less than one percent of MRFF disbursements since the first MRFF funding round in 2016/17.

As a result of the *Our North Our Future: White Paper on Developing Northern Australia*, there are two funding sources that target research in northern Australia. These are the Cooperative Research Centre for Developing Northern Australia (CRCNA), funded by the Department of Industry, Science, Energy and Resources (current health investments totalling $949,534)[4] and the NHMRC-funded Hot North Collaborative. Coordinated from Darwin, Hot North (grants totalling $5,997,915[5]) is an excellent example of cross-jurisdictional health research capacity and network building, and to date has 89 health research projects, fellowships and scholarships totalling (Hot North,

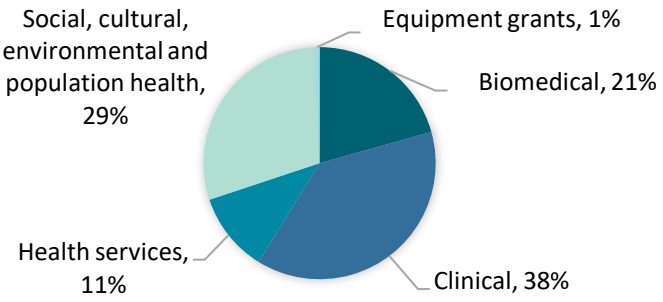
[3] ARC: Australian Research Council; NHMRC: National Health and Medical Research Council; MRFF: Medical Research Future Fund.
[4] The health-related CRCNA grants refer to two projects: this Situational Analysis ($149,534) and a project to implement retinal screening in remote communities using a telehealth platform ($800,000): https://crcna.com.au/research/current-projects
[5] The NHMRC Hot North grant is included in the NHMRC data column in Table 1.

2019). These initiatives represent important research capacity-building efforts in northern Australia and are further profiled in the full report.

The Lowitja Institute Aboriginal and Torres Strait Islander Health Cooperative Research Centre also has most, but not all, of its partners in northern Australia. Other important research capacity-building initiatives include the establishment of academic health centres[6] in northern Queensland, central Australia and the Top End, which represent efforts to bring health service delivery organisations, universities and research institutes together to integrate and enhance service provision, education and research within specific geographic regions. Two of these (the Central Australia Academic Health Science Network in Central Australia and the Tropical Australian Academic Health Centre in northern Queensland) have been formally recognised by the NHMRC as Centres for Innovation in Regional Health. The Kimberley also demonstrates strong leadership in community-led research capacity building, with the Kimberley Aboriginal Health Research Alliance due to be launched in the coming months.

A total of 86 research grants and fellowships from the ARC and NHMRC (including 11 equipment grants) were administered by northern-based institutions between 2015 and 2019, representing a total investment of $71,770,257. **Figure 2** classifies this funding into four research categories: Biomedical Research; Clinical Research; Health Services Research; and Social, Cultural, Environmental and Population Health Research.[7] A fifth category shows the proportion of funding for equipment grants.

Figure 2: NHMRC and ARC grant funding proportions received by northern Australian institutions by research type, 2015-2019



Around 60 percent of funding was for projects classified by the research team as being either Biomedical or Clinical Research, which includes pre-clinical studies and research on, or for the treatment of, patients. Around 30 percent of funding was for projects in the category of Social, Cultural, Environmental and Population Health Research, which were largely focussed on addressing risk factors for disease among northern population groups and studies describing epidemiological trends.

The smallest proportion of funding (11 percent) was for projects in the category of Health Services Research, which includes studies focussed on efficiency and effectiveness of the healthcare system, potentially highlighting underinvestment in policy-focussed evaluative research on health system functioning in the north. More research investment is needed to address the persisting systems challenges that contribute to the higher disease burden in the north, particularly targeting rural and remote populations. This investment must be northern led to ensure that the contexts and realities of the north are properly understood and to facilitate rapid implementation of findings into practice and policy. Findings from consultations also indicated a degree of fatigue associated with southern-led research which is often undertaken from a deficit point of view. When northern researchers and organisations are engaged (if at all) as associate investigators, they are often not properly resourced to interrogate, manage or oversee the research, strengthening the case for research to be driven and led by northern institutions.

Opportunities for further work/investigation

- Investigate opportunities to grow funding and support for northern Australian led research and research capacity building initiatives focussed on priority health systems issues across the north.
- Investigate opportunities for increasing whole-of-system research, and research-focussed policy analysis and evaluation, such as in how to design policy in the context of resource, culture, geographic, demographic and epidemiologic needs unique to the north.

[6] Academic Health Centres are relatively new initiatives in Australia that are built around a "tripartite mission" of service delivery, education and training, and research. Academic Health Centres in the north of Australia include the Central Australian Academic Health Sciences Network, Top End Academic Health Partners, and the Tropical Australian Academic Health Centre.
[7] These classifications are used by the Canadian Institutes of Health Research http://www.cihr-irsc.gc.ca/e/48801.html

5. SWOT analysis

Analysis of strengths, weakness, opportunities and threats (SWOT) utilises a model developed for the health care sector that builds analysis around three pillars: stakeholder expectations, resources, and contextual developments (van Wijngaarden et al, 2012). In this model, SWOT are identified from the "confrontation" between these pillars. **Table 2** presents the results of this analysis, which builds from the desktop-based study and consultation findings.

To differentiate between different community expectations relating to service delivery, the Modified Monash Model (MMM) classifications were used to identify regions by level of remoteness. Six MMM categories are applicable in northern Australia:[8]

- MM2-Regional Centres (areas that are in, or within a 20km drive of a town with over 50,000 residents);
- MM3-Large Rural Towns (areas that are not MM2 and are in, or within a 15km drive of a town between 15,000 to 50,000 residents);
- MM4-Medium Rural Towns (areas that are not MM2 or MM3, and are in, or within a 10km drive of a town with between 5,000 to 15,000 residents);
- MM5-Small Rural Towns (areas corresponding to the Australian Statistical Geographic Standard Remoteness Area categories 2 or 3, with fewer than 5,000 residents);
- MM6-Remote Communities (remote mainland areas and remote islands less than 5kms offshore); and
- MM7-Very Remote Communities (very remote areas and all other remote island areas more than 5kms offshore).

Notably, northern Western Australia is MM6-MM7 only, with only Darwin and proximate townships classified as MM2-5 in the Northern Territory. While the bulk of MM2-5 regions are located in northern Queensland, large areas are also MM6-7.

Although all land areas in the north are represented in the MMM categories, two additional categories were added in this analysis to take into account the different contexts of discrete Aboriginal, and Torres Strait Islander, communities and "fly-in/fly out or drive-in/drive-out populations" (FIFO/DIDO) in mining towns. As shown in **Table 2**, these contexts have different types and quanta of health service resources, which influence community expectations about service availability and access. Health service and policy-maker expectations are similar across the various contexts and include a focus on health service efficiency and population productivity.

Strengths largely reflect the health service delivery and education and training expertise unique to northern Australia, developed in the region out of necessity based on geographic and population factors. Strengths also include national attributes such as commitments to universal health coverage and reasonably well-developed infrastructure, including health service facilities and equipment. Policymakers across the north are also increasingly adopting e-health technologies to facilitate and enhance planning, information-sharing and patients' access to services regardless of service context.

Weaknesses include siloed systems of governance, finance and planning that impact on services and ultimately health outcomes, which are reflected in fragmentation of efforts and funding both within and across jurisdictions. Health workforce shortages and high turnover are also apparent, particularly in the Aboriginal, and Torres Strait Islander, health workforce. Key service weaknesses include the failure of many health services in the north to provide integrated and optimal care across stages of the patient journey, including coordination of quality health services from hospital settings to community-based chronic and rehabilitative care, or to involve communities in co-design. Additional weaknesses include under-resourcing, particularly of critical prevention services, and an inadequate focus within the health sector on addressing the social, cultural and environmental determinants of health.

Opportunities include improving the stability and cultural responsiveness of health workforce in the north and supporting locally led needs-based planning and research. Sustainable staffing in comprehensive primary health care would substantially improve quality of care at minimal or no overall cost. Attention is also warranted to review financing mechanisms, and financing distribution, to ensure greater resourcing of prevention.

Threats include financing inadequacies, such as models that reward occasions of service in some service settings rather than prevention or quality of care and outcomes. Threats also include those stemming from the higher disease burden, which represent risks to health service organisations and policymakers in terms of rising costs of health care and lost productivity, and ultimately to the development of northern Australia. More existential threats in terms of vulnerability to emerging infectious diseases, natural disasters and climate change are also cogent.

[8] There are seven Modified Monash Model Categories but MM1 "Metropolitan Areas" is not applicable in northern Australia.

Table 2: Strengths, weaknesses, opportunities and threats (SWOT) analysis of health service delivery and workforce across northern Australia

HEALTH SERVICE DELIVERY AND WORKFORCE CONTEXTS:

MM2. Regional Centres (Cairns, Darwin, Mackay and Townsville). Current resources: public referral hospitals; private general practice and allied health/pathology/Xray services; private hospitals; Community Controlled Health Services; aged care; some shared staff between public and private systems.

MM3-5. Small, Medium and Large Rural Towns (e.g. Ayr, Airlie Beach, Atherton, Bowen, Cardwell, Charters Towers, Emerald, Ingham, Innisfail, Mareeba, Vernon Islands, Yeppoon). Current resources: Public referral hospitals; private general practice and allied health/path/X-ray services; private hospital in the larger towns; Community Controlled Health Services.

MM6. Remote Communities (e.g. Alice Springs, Broome, Cloncurry, Cooktown, Karratha, Katherine, Mt Isa, Port Hedland). Current resources: Public referral hospitals; private general practice and allied health/path/X-ray services; Community Controlled Health Services.

MM7. Very Remote Communities (e.g. Derby, Halls Creek, Fitzroy Crossing, Kununurra, Longreach, Nhulunbuy, Palm Island, Tennant Creek, Thursday Island, Weipa). Current resources: Visiting or on-site general practice services; general practitioner or nurse-led primary care clinic; Community Controlled Health Services; variable allied health service provision; Royal Flying Doctor Service.

Discrete Aboriginal, and Torres Strait Islander, communities. Current resources: Usually remote nurse-led clinic, with Aboriginal, and Torres Strait Islander, Health Workers and Health Practitioners and visiting or onsite general practitioners; multiple visiting services including specialist medical, allied health, Royal Flying Doctor Service and Community Controlled Health Services.

Fly-in/fly out; drive-in/drive-out (FIFO/DIDO) populations (e.g. Karratha, Mackay, Port Hedland) Current resources: mixed, with mining context influencing lifestyle as well as availability of, and access to, services.

STAKEHOLDER EXPECTATIONS AND SWOT:

Stakeholder expectations		**Strengths**	**Weaknesses**	**Opportunities**	**Threats**
Health services and policymakers	**Community**				
All contexts: Meeting quality and service efficiency targets, including expected volume of services within activity-based funding models; Business viability (private services); Coordination between services; Services meet expectations of constituents; Cost containment – efficient care; workforce productivity.	**MM2**: Full range of primary health care, secondary and most tertiary services; high quality, efficient services close to home. **MM3-5**: Full range of primary health care services (essential "basket of services"); access to referral services in major centres with some visiting services. **MM6**: Same as MM3-5 but with access to specialists usually through visiting services; birthing services in communities. **MM7**: Range of primary health care services and access to specialty services as needed. **Discrete Aboriginal, and Torres Strait Islander, communities**: Range of primary health care services; some visiting health promotion and specialist services. **FIFO/DIDO**: Full primary health care services including occupational health and health promotion through employment; links to usual source of health care at home.	**Service delivery:** • Expertise in rural and remote service delivery. • Expertise in disaster management and communicable disease surveillance and control. • Increasingly rigorous processes for managing occupational health checks and managing exposures and safety risks. **Health workforce:** • Expertise in training and supporting a fit-for-purpose health workforce. • Strong health workforce attraction in regional centres– good educational options and high liveability indexes. • Involvement of local community members as Aboriginal, and Torres Strait Islander, Health Workers/Practitioners in local health teams. **Financing:** • Commitments to universal coverage - Medicare and Pharmaceutical Benefits Scheme and patient travel assistance, underpinned by reasonably well-developed facilities and equipment. **Medicines and technologies:** • Increasing experience and commitments among services to use digital and other technologies to support access to care closer to home. **Leadership and governance; community:** • Community-controlled governance mechanisms and use of models of cultural responsiveness that strengthen community participation and health care access.	**Service delivery:** • Comparatively high rates of preventable hospitalisations across the north. • Systems failure in capacity to provide integrated and optimal care across various stages of patient journey. • Limited accessibility of allied health services outside of public hospitals in regional centres. • Limited health promotion activities in context of high modifiable risk factor prevalence. • Limited availability of comprehensive primary health care. • Insufficient mental health, oral health and community rehabilitation services in remote areas. **Health workforce:** • High staff turnover and shortages in some health disciplines (especially allied health) and health-related roles, especially in rural/remote communities. • Insufficient Aboriginal, and Torres Strait Islander, health workforce. • Limited occupational health and safety training systems and coordination. **Information systems and planning:** • Limited utility and inter-operability of e-records systems. **Financing; Leadership and governance:** • Fragmentation of resourcing, programming and planning due to multiple sources of financing and multiple jurisdictions leading to duplication and inefficiency. • Health services most under-resourced in locations with highest health needs (rural and remote areas). • Not addressing multiple complex social, environmental and economic factors contributing to poor health outcomes. **Community:** • Limited health and social research on perceptions of community of health and illness, and limited inclusion of community perspectives and preferences in strategic and operational planning.	**Service delivery:** • Establishing coherent integrated models of care for remote communities including seamless integration of comprehensive primary health care services and hospital services. • Strengthening mental health, oral health, community rehabilitation and sub-acute services in remote areas. • Improving communicable and non-communicable disease risk factor surveillance and response capacities. • Expanding public health capacity at all levels of government, including a focus on prevention and health literacy. • Improving accessibility of allied health services in regional centres. **Health workforce:** • Redesigning recruitment, training and support for Aboriginal, and Torres Strait Islander, health workforce. • Enhancing rural retention strategies for health workforce outside of regional centres. • Trialling and scale up of innovative health workforce models for rural and remote contexts. • Leveraging training and health systems expertise as an export opportunity with neighbouring countries. **Information systems and planning:** • Increasing data linkage and sharing across jurisdictions to study patient flows. • Developing and implementing coordinated, cross-sectoral population-based local area planning systems, including collective place-based approaches to preventive health. **Financing:** • Exploring new funding models for packages of services for integrated primary healthcare. **Medicines and technologies:** • Expansion of telehealth models to expand access to services in rural/remote locations and provide remote supervision. **Leadership and governance:** • Shared governance across health service providers. • Developing cross-jurisdictional linkages, strategies and research programs. • Expanding research capacity-building initiatives to develop clusters of service, teaching and research excellence across the north. • Supporting research that meets locally identified needs.	**Service delivery:** • Failure to deal with risk factors for chronic disease. • Vulnerability to biosecurity threats, emerging infectious diseases and extreme weather events. • Lack of integration of not-for-profit sector services with government and community-controlled services in remote areas. **Health workforce:** • Inability to attract, retain and locally recruit professional health workforce in rural and remote areas. • "Poaching" of work-ready graduates by southern institutions. • Not enough health-related posts in remote areas (e.g. social work, disability services). **Information systems and planning:** • Multiple funding sources, jurisdictions, programs present a threat to efficient and equitable coordinated planning. • Inflexibility of planning systems to respond and adapt to demographic and other contextual changes, including increasing frailty and ageing. **Financing:** • Lack of resourcing/consideration of social and cultural determinants of health across sectors. • Small fraction of resources allocated to prevention. • Increased costs due to increasing rates of preventable hospital admissions. • Unsustainable financing trajectory due to growing demand for health services. • Perverse incentives rewarding occasions of service rather than effective quality care and prevention of poor health. • Increasing out-of-pocket expenditure with impacts on equity of health care access. • Funding models do not support a viable business base for allied health services outside of regional centres. **Leadership and governance:** • Competition between health system stakeholder across the north inhibiting collaboration to address shared challenges. • Imposition of guidelines, benchmarks and policies from the south which are poorly suited to remote regions in the north. • Success/failure of programs defined by expectations for urban, densely population contexts.

6. Costing analysis: costing Potentially Preventable Hospitalisations in northern Australia

Potentially Preventable Hospitalisations (PPH)[9] are a health system performance indicator measuring accessibility and effectiveness in the Australian National Healthcare Agreement (AIHW 2016; COAG 2008). As a component of the National Health Performance Framework, PPH are used to monitor the quality and effectiveness of health care services in Australia. PPH rates are higher among Aboriginal and Torres Strait Islander populations and across the north.

The aim of this analysis was to quantify the PPH in northern Australia and to assign costs to them. This is likely to help in identifying the key health conditions that drive health expenditure across the north, thus providing quantitative information to contribute to priority setting in the next phase of the broader project. The analysis was conducted for 2016-2017 with PPH data drawn from the AIHW website (AIHW, 2019) and associated costs estimated from the literature. The PPH are broadly referred to in three categories: vaccine preventable; acute; and chronic conditions (Box 1). Stratifying PPH by condition, population and geographic location can allow for the development of targeted policies.

In the 2016-17 financial year, there were 45,702 hospital separations documented as PPH across northern Australia (crude rate of 4,073 per 100,000 population). Across the north, these separations cost an estimated $241.8 million, or 6.6 percent of national PPH expenditure[10]. Most PPHs were for acute (50.7 percent) and chronic (39.2 percent) conditions, with acute and chronic conditions together accounting for 41,709 (89.9 percent) of PPH separations. Qld reported the majority of PPH cases (57.7 percent) in northern Australia. The crude rate of PPH was the highest in the NT (5,049 per 100,000 population), followed by 4,282 per 100,000 in WA.

Table 3 classifies the PPH cases by state or territory. Cellulitis (n= 6,839; 15.0 percent) was the most commonly reported condition followed by chronic obstructive pulmonary disease (COPD) (n=4,726; 10.3 percent) and urinary tract infections (UTI) (n=4,346; 386; 9.5 percent). The top five conditions account for 22 825 (50 percent) cases in northern Australia. Cellulitis features prominently across all jurisdictions and comprises 29.9 percent of the PPH disease burden in northern Australia. The same five conditions top the list of most commonly occurring diseases across all jurisdictions (apart from 'other VPD' replacing 'dental conditions' in the NT).

Across northern Australia, acute conditions were the greatest cost driver accounting for 46.1 percent ($111.6 million) of the total expenditure on PPH. Acute conditions are also major contributors to antimicrobial use, and potentially avoidable contributors to the growing global problem of antimicrobial resistance. Chronic conditions were the second greatest cost driver at $92.7 million (38.3 percent of PPH expenditure). Several factors could be considered pertinent in reducing PPH including adequate numbers of doctors, ensuring continuity of care, appropriate management plans and subsidised community health services (Zhao 2014; Katterl 2012).

Reducing hospitalisations for the conditions responsible for PPH requires vaccination, early diagnosis and treatment, and good ongoing management of risk factors and conditions in community settings (AIHW, 2019). The findings of this costing study therefore suggest a need to strengthen community-led comprehensive primary healthcare across the north to address the higher burden of both acute and chronic conditions. Successful interventions will reduce unnecessary hospitalisations, reflecting better health outcomes and substantial cost savings in the health system. This and other costing studies on PPH show that even small percentage reductions in PPH can translate to millions of dollars in cost savings (CEHSEU, 2009). Furthermore, each $1 invested in remote Indigenous primary health care is likely deliver a return of $4-$12 in saved public hospital expenses (Zhao et. al, 2014).

Opportunities for further work/investigation

- Continuous costing and tracking of PPH in the north to inform investment priorities.
- Exploration of the limitations of PPH as a planning tool in the context of prevention goals.
- Strengthen community-led comprehensive primary healthcare across the north to reduce unnecessary hospitalisations.

[9] The Australian Commission on Safety and Quality in Health Care defines PPH as: "an admission to hospital for a condition where the hospitalisation could potentially have been prevented through the provision of appropriate individualised preventative health interventions and early disease management, usually delivered in primary care and community-based care settings (including by general practitioners, medical specialists, dentists, nurses and allied health professionals)" (Falster et al., 2017).
[10] At greater than five percent, this is higher than the national average per person.

Table 3: Summary of Potentially Preventable Hospitalisations in northern Australia

	QUEENSLAND							NORTHERN TERRITORY							WESTERN AUSTRALIA						
	SEPARATIONS			COSTS (AU$)				SEPARATIONS			COSTS (AU$)				SEPARATIONS			COSTS (AU$)			
	n	%	Crude rate*	Median cost	Median LOS	Total cost†	%	*n*	%	Crude rate*	Median cost	Median LOS	Total cost†	%	*n*	%	Crude rate*	Median cost	Median LOS	Total cost†	%
Total PPH	**26358**	**100.0**	**3643**	**5068**	**3.5**	**133.6**	**100.0**	**12 794**	**100.0**	**5049**	**5535**	**4.0**	**73.2**	**100.0**	**6 550**	**100.0**	**4282**	**5351**	**3.2**	**35.1**	**99.9**
Total vaccine-preventable	**1686**	**6.4**	**233**	**7930**	**6.9**	**13.4**	**10.0**	**2 314**	**18.1**	**942**	**8148**	**5.8**	**19.0**	**26.0**	**623**	9.5	**407**	**8149**	**5.2**	**5.1**	**14.5**
Pneumonia and influenza	1096	4.2	151	7832	**6.6**	8.6	6.4	719	5.6	293	7832	**5.4**	5.6	7.6	238	3.6	156	7832	**4.1**	1.9	5.3
Other vaccine preventable	578	3.4	80	8280	**7.7**	4.8	3.6	1 623	12.7	660	8280	**6.1**	13.4	18.3	388	5.9	254	8280	**4.9**	3.2	9.2
Total acute	**13448**	**51.0**	**1860**	**4653**	**2.9**	**62.6**	**46.8**	**6 094**	**47.6**	**2480**	**5028**	**3.3**	**30.9**	**42.2**	**3 625**	55.3	**2370**	**5005**	**2.7**	**18.1**	**51.7**
Cellulitis	4066	15.4	562	4663	**3.1**	19.0	14.2	1 663	13.0	677	4663	**2.9**	7.8	10.7	1 110	16.9	726	4663	**2.5**	5.2	14.7
Convulsions and epilepsy	1578	6.0	218	3730	**2.3**	5.9	4.4	909	7.1	370	3730	**2.6**	3.4	4.7	334	5.1	218	3730	**1.9**	1.2	3.5
Dental conditions	2169	8.2	300	3490	**1.2**	7.6	5.7	794	6.2	323	3490	**1.6**	2.7	3.7	615	9.4	402	3490	**1.1**	2.1	6.1
ENT infections	1806	6.8	250	3425	**1.4**	6.2	4.6	980	7.7	399	3425	**1.4**	3.5	4.7	560	8.5	366	3425	**1.2**	1.9	5.5
Gangrene	605	2.3	84	17183	**12.8**	10.4	7.8	484	3.8	197	17183	**12.3**	8.3	11.3	314	4.8	205	17183	**6.7**	5.4	15.4
PID	223	0.8	31	3980	**2.8**	0.9	0.7	240	1.9	98	3980	**3.0**	1.0	1.3	87	1.3	57	3980	**0.0**	0.0	0.0
Perforated/bleeding ulcer	151	0.6	21	7174	**6.2**	1.1	0.8	39	0.3	16	7174	**0.0**	0.0	0.0	33	0.5	22	7174	**0.0**	0.0	0.0
Pneumonia	59	0.2	8	7832	**0.0**	0.0	0.0	24	0.2	10	7832	**7.1**	0.2	0.3	39	0.6	25	7832	**0.0**	0.0	0.0
UTI‡	2812	10.7	389	4129	**3.0**	11.6	8.7	986	7.7	401	4129	**3.5**	4.0	5.5	548	8.4	358	4129	**3.0**	2.3	6.4
Total chronic	**11224**	**42.6**	**1551**	**5134**	**3.8**	**57.6**	**43.1**	**4 386**	**34.3**	**1785**	**5246**	**4.3**	**23.3**	**31.8**	**2 302**	35.1	**1505**	**5139**	**3.4**	**11.8**	**33.7**
Angina	1301	4.9	180	3307	**1.8**	4.3	3.2	525	4.1	214	3307	**1.9**	1.7	2.3	225	3.4	147	3307	**1.6**	0.7	2.1
Asthma	941	3.6	130	3060	**1.6**	2.9	2.2	379	3.0	154	3060	**1.8**	1.1	1.6	281	4.3	184	3060	**2.1**	0.9	2.4
Bronchiectasis	323	1.2	45	6559	**6.6**	2.1	1.6	227	1.8	92	6559	**4.9**	1.5	2.0	47	0.7	31	6559	**0.0**	0.0	0.0
CCF	1785	6.8	247	6718	**6.1**	12.0	9.0	566	4.4	230	6718	**6.0**	3.8	5.2	378	5.8	247	6718	**1.5**	2.5	7.2
COPD	2796	10.6	386	6559	**4.2**	18.3	13.7	1 323	10.3	538	6559	**4.0**	8.7	11.9	607	9.3	397	6559	**3.8**	4.0	11.3
Diabetes complications	1741	6.6	241	7381	**4.9**	12.9	9.6	592	4.6	241	7381	**7.9**	4.4	6.0	382	5.8	250	7381	**3.5**	2.8	8.0
Hypertension	400	1.5	55	3611	**2.0**	1.4	1.1	93	0.7	38	3611	**1.6**	0.3	0.5	51	0.8	33	3611	**1.3**	0.2	0.5
Iron deficiency anaemia	1662	6.3	230	1776	**1.3**	3.0	2.2	305	2.4	124	1776	**1.4**	0.5	0.7	221	3.4	144	1776	**1.1**	0.4	1.1
Nutritional deficiencies	43	0.2	6	17535	**0.0**	0.0	0.0	20	0.2	8	17535	**0.0**	0.0	0.0	0	0.0	0	17535	**0.0**	0.0	0.0
Rheumatic heart disease	230	0.9	32	3252	**8.6**	0.7	0.6	356	2.8	145	3252	**5.9**	1.2	1.6	95	1.4	62	3252	**4.4**	0.3	0.9

*per 100 000, **† in millions, ‡** includes pyelonephritis, LOS length of stay, median costs = per episode

UTI = urinary tract infection, PID = pelvic inflammatory disease, COPD = chronic obstructive pulmonary disease, CCF = congestive cardiac failure, ENT = ears, nose and throat

7. Priority action areas

Eight priority actions (**Table 4**) were identified in the project, which drew from the findings of the desktop-based analysis and stakeholder consultations across the jurisdictions.

Table 4: Health Service Delivery Situational Analysis Priority Actions

Key priority actions for sector development	Action owner and key partners	Pathways to implementation and timeline	Intended industry impacts
1. Support and enhance formal education and training of a fit-for-purpose health workforce across all health disciplines and elements of rural health training pipelines *WHO building blocks: Health Workforce* Key areas of focus: • Addressing all elements of the training pathway, including targeted selection, primary health care-focussed and regionally based curricula and clinical placements, exposure to inspirational role models, and rural and remote post-graduate training pathways; • Entry-level skills-based training, with a specific focus on provision of training for Aboriginal, and Torres Strait Islander, staff from non-clinical roles into highly skilled Aboriginal and Torres Strait Islander Health Worker and Health Practitioner roles; • Medical, nursing and allied health rural generalist training pathways; • Fostering multidisciplinary teams with all members operating at maximum scope of practice; • Including health research, biomedical, disability and support workforce.	Action owner: **Professor Ian Wronski**, with planned transition to ownership within new cross-northern body once established **Key consortium partners:** • Registered training organisations (RTOs); • Universities (especially the Innovative Research Universities based in the north); • Vocational education and training sector; • Accreditation bodies; • Specialist colleges; • Peak Aboriginal, and Torres Strait Islander, health workforce groups; • Jurisdictional workforce departments.	• With start-up funding support from the commonwealth, state and NT governments (and with research analysis investment from CRCNA), establish a consortium with clear terms of reference and project capability (consortium operational by October 2020), to: - Conduct research to map current health workforce and gaps and capacity in health workforce education and training across the north, including professional and vocational sectors, on-site and online delivery systems (January 2021-December 2021); - Develop an implementation plan (by April 2021); - Present plan to cross northern body/rural health commission for funding (by June 2021); - Advocate for and implement a program of work to meet identified training and workforce gaps, designed to be implemented by training providers and funders (commence January 2022); and - Conduct fully resourced, regular and independent research evaluations of progress, involving monitoring and mapping of health workforce (recruitment/ retention/vacancy rates) across north (June 2022-ongoing).	Implementing this recommendation will: • Provide a cross-northern approach to developing fit-for-purpose health workforce; • Address a need for data on health workforce gaps across the north; • Maximise the availability of suitably trained health workforce to address chronic workforce gaps – students who are recruited from and train in areas of workforce need are more likely to remain in those areas post-graduation; • Ensure a culturally responsive health workforce; • Increase the number and proportion of Aboriginal, and Torres Strait Islander, members of the health workforce; • Improve population access to suitably trained health professionals; • Increase efficiencies in service provision across north through reduced locum costs.

2. Enhance professional support, career development and career pathways for rural and regional health workforce across all health disciplines *WHO building blocks: Health Workforce* Key areas of focus: • Opportunities to enhance context-based recruitment and retention investments across all health disciplines; • Opportunities to support career pathways of Aboriginal, and Torres Strait Islander, health workforce (both Indigenous and non-Indigenous), such as by improving recognition of qualifications and skills of Aboriginal and Torres Strait Islander Health Workers and Health Practitioners, ensuring availability of posts in areas of need, and broader role development; • Improving retention incentives such as through regular fly-out/flexible rosters, eased mobility across the north and discounted registration/training fees; • Addressing capability gaps in health workforce such as in cultural responsiveness and clinical and corporate governance. Key guiding principles: • Availability of continuing professional development opportunities regardless of location; • Equitable access to essential supporting infrastructure (e.g. housing, internet) for all health workforce; • Innovation in health service delivery to make use of available workforce; • Innovation in health workforce models that involve ancillary health workforce roles (e.g. social work, disability, aged care, early childhood education, health interpreters and cultural brokers).	Action owner: **Professor Sabina Knight** **Key consortium partners:** • Aboriginal, and Torres Strait Islander, peak bodies – Aboriginal Health Council of Western Australia, Kimberley Aboriginal Medical Service Ltd, Aboriginal Medical Services Alliance Northern Territory, Queensland Aboriginal and Islander Health Council; • Australian College of Rural and Remote Medicine (ACRRM); • CRANAPlus; • Services for Australian Rural and Remote Allied Health (SARRAH); • Rural Doctors Association of Australia; • National Aboriginal and Torres Strait Islander Health Worker Association (NATSIHWA); • Jurisdictional heads of health workforce units in government departments and health services; • Chief Aboriginal and Torres Strait Islander health officers or equivalent at jurisdictional level;	• With start-up funding support from the commonwealth, state and NT governments (and with research analysis investment from CRCNA), establish consortium with clear terms of reference and project capability (consortium operational by October 2020), to drive forward two workstreams: 1) Career development and support: - Undertake research analysis that explores key opportunities, including a costed sustainable mechanism to identify and share best practice approaches in cultural responsiveness training and capability development of health workforce (by June 2021); - Develop business case and funding model and present to cross jurisdictional body (by December 2021); - Advocacy by consortium and cross jurisdictional body for investment from mixed jurisdictional resourcing and implementation by key health workforce units and health employers (December 2021-March 2022). 2) Workforce mobility: - Conduct research to investigate key barriers to workforce mobility across service providers and jurisdictions and develop program of work to address (by June 2021); - CRCNA to transition the costed program of work to the cross-jurisdictional body by 2021; - Mechanisms and financing arrangements established to facilitate implementation of findings within health services across the north (commencing December 2021).	Implementing this recommendation will produce: • A stronger, more sustainable, health workforce; • Lower staff turnover rates, resulting in lower costs for locums, on-boarding and recruitment – reducing staff turnover could save northern Australian health services millions of dollars (Zhao et al, 2018; Wakerman et al, 2019); • Increased recruitment and stability of the health workforce, enabling better continuity of care; • Strengthened cultural responsiveness of all health services resulting in better primary care attendance and reduced potentially preventable hospitalisations – cultural capability of healthcare services and professionals is associated with increased likelihood that Aboriginal people will access those services (Nguyen and Gardiner, 2008); • Support for greater numbers of Aboriginal, and Torres Strait Islander, staff (clinical and non-clinical) across the health sector; • Increased attractiveness of the region for employees and new businesses and improved retention of productive workforce in northern Australia.

	• Jurisdictional representative bodies for Aboriginal, and Torres Strait Islander, health; • Health Workforce Queensland; • Rural Health Workforce Australia.		
3. Establish a cross-jurisdictional northern Australian health system network as an independent body *WHO building blocks: Leadership and Governance; Health Information Systems and Planning; Essential Medicines and Technologies* Key areas of focus: • Mechanisms to share and create knowledge across the north; • Data linkage and data interoperability/seamless integration; • Health information and management systems; • Joined up credentialing/registration processes to support effective health workforce mobility; • Cross-border service provision to account for population movements across jurisdictional borders; • Uniform/shared clinical practice guidelines; • Advocacy around effective financing models and northern-focussed health policy.	Action owner: **Commonwealth, state and NT governments with CRCNA initially as action owner to support building a business case** **Key consortium partners:** • Rural health commissioners, • Office for Northern Australia; • Key jurisdictional government and educational partners; • Council of Australian Governments (COAG).	• Through a co-design process call a tender to build a business case and develop a sustainable resourcing model for this body to ensure its longevity and utility (July 2020-December 2020), involving: - Research to investigate effective governance/operational models drawing from experience of past initiatives; and - Drawing on best available research evidence on effective governance models and networks. • CRCNA present to COAG meeting (first meeting 2021); • Assuming model accepted by COAG and jurisdictions, oversee the establishment and commencement of operations (by July 2021 to 2026 and ongoing).	Implementing this recommendation will: • Facilitate a “coalition of the willing” to harmonise processes between jurisdictions (focus will be on joint priorities and easier wins initially); • Provide accountability for equitable health service delivery and improvements in population health outcomes; • Reduce duplication and streamline service and workforce planning across the north; • Facilitate uniformity of clinical care, quality and safety and smoothed patient journey; • Facilitate mobility of health workforce and patient records across the north for continuity of care; • Support health services in the translation of their strategic intent to implement comprehensive primary health care into concrete planning actions, including lobbying for financing reform at Federal level; • Better coordination of health workforce training and support.

4. Determine need and mechanisms to finance appropriate health service delivery models for rural and remote health service delivery *WHO building blocks: Financing; Information Systems and Planning* Key guiding principles: • Equal care and outcomes based on need; • Allocation of funding close to point of care; • Continuity of funding pipelines; • Joined up planning incorporating co-design with communities; • Inclusion of financing of disability, aged care, early childhood development and other support services in funding models.	Action owner: **senior public service employee with COAG as the key implementation partner** **Key consultation partners:** • Northern Australian Senior Officer Networking Group (NASONG); • Northern Australian Health Ministers; • Health service delivery organisations across the northern jurisdictions.	• Action lead to convene working group funded by COAG to articulate clear principles that should underpin financing of health care in rural and remote northern Australia informed by Situational Analysis and consultations (by December 2020); • Building on the articulated principles, the working group develop an investment and implementation plan, retaining funding models where effective and redesigning where failing, involving stakeholder consultation and engagement (by December 2021); • The working group (or COAG) monitor and evaluate outcomes in terms of actual health outcomes, satisfaction and efficiency as part of an ongoing evaluation and reporting strategy.	Implementing this recommendation will: • Offer a more equitable and efficient funding model for health service delivery in rural and remote northern Australia, leading to better health outcomes and reduced costs; • Address waste related to duplication of funding streams and inefficiencies in service provision; • Strengthen access to preventive, primary and rehabilitative care involving improved access to essential services like private general practice, pharmacist and allied health services.
5. Improve local amenities and infrastructure across sectors to reduce effects of adverse social determinants on health outcomes *WHO building blocks: Community* Key areas of focus: 'health hardware' (e.g. water, sanitation), public transport networks, telecommunications/ICT, school-level education, housing, tax incentives, land ownership, and food security. Key guiding principles: • Equity in access to the social and cultural determinants of health; • Intersectoral action and coordination to address determinants; • Planning and action informed by local communities including through formal partnerships with community organisations to empower communities in decision-making processes.	Action owner: **CRCNA** **Key consortium partners:** • Health service organisations; • Local councils; • Community organisations.	• CRCNA provide funding/tender to develop a cross-sectoral consortium to conduct research to identify key infrastructure development concerns and opportunities (commencing July 2020); • Through consultations with key consortium partners and stakeholders, develop a five-year costed development plan and undertake annual mapping of achievements, needs and changes. This plan would identify appropriate funding and implementation agencies (e.g. local, state/territory, federal governments) and provide plans through budget cycles (by June 2021); • Evaluation of progress, outcomes, facilitators and barriers undertaken every 3 years.	Implementing this recommendation will: • Empower Aboriginal peoples and Torres Strait Islanders through better health and more control over their health and wellbeing; • Improve attractiveness of rural centres to workers and families; • Improve recruitment/retention of health workforce; • Prevent poor health leading to greater productivity and cost savings to the health system – a one year increase in life expectancy corresponds to a four percent increase in labour productivity (Bloom et al, 2004).

6. Undertake trials to develop and scale up place-based planning models *WHO building blocks: Community; Service Delivery; Health Information Systems and Planning; Financing* Key areas of focus: • Local comprehensive primary health care – including preventive, acute, subacute and rehabilitative/ disability services and aged care; supplemented by additional service delivery methods as best suited, e.g. telehealth services (following local referral pathways), fly-out and outreach models; • Exploration and trialling of financing models to follow people and clinical need rather than activity; and • Reporting based on actual health outcomes rather than number of services delivered. Key guiding principles: • Strong community co-design, ownership and engagement; • Focus on addressing social and cultural determinants of health across multiple sectors (not just health care delivery); • Focus on improving the patient journey and creating healthcare neighbourhoods and corridors of care.	Action owner: **CRCNA (TBC)**, whose role would be to commission place-based planning work across the north **Key consortium partners:** • Academic Health Centres; • University Departments of Rural Health and Rural Clinical Schools; • Local Health Networks and Hospital and Health Services; • Aboriginal, and Torres Strait Islander, peak bodies and health services; • Primary Health Networks; • Local governments.	• Terms of reference for the commissioned work developed (by December 2020): - Objectives to explore optimal models and principles for place-based planning, involving a review of present models of place-based health services/workforce planning for lessons learnt (this includes contexts in which they are being trialled) • Commissioning work commences (January 2021) • Consultation across the various health service delivery and workforce contexts as to scalability (by June 2021); • Call for expressions of interest to trial recommended approaches (January 2022); • Implement trials with strong monitoring and evaluation frameworks involving an expert advisory group with key stakeholder representation (2022-2025); • Regular feedback of lessons learnt and progress through the cross jurisdictional body (6-monthly).	Implementing this recommendation will: • Improve health equity; • Reduce service duplication and inefficiencies in remote services; • Strengthen delivery of comprehensive primary health care, which will provide social and economic benefits: investing $1 in PHC in remote Aboriginal communities could realise a saving of between $3.95 and $11.75 in public hospital expenses, over and above the health and social benefits for patients (Zhao et al, 2014). • Enable competency-based health workforce planning; • Deliver more acceptable and needs-based services; • Improve quality and safety and the patient journey through strengthened communication between providers along “corridors of care”; • Reduce costs through a reduction in Potentially Preventable Hospitalisations.
7. Strengthen and grow northern-led research capacity and funding *WHO building blocks: Leadership and Governance; Health Information Systems and Planning* Key guiding principles: • Focus on addressing local issues and contextually informed implementation of evidence;	Action owner: **Professor John Wakerman,** to activate CRCNA process **Key consortium partners:** • Academic Health Centres; • Research institutes, • Universities (including medical schools, University Departments of	• With start-up investment from CRCNA, establish consortium with clear terms of reference and project capability (by December 2020), to: - Commission/undertake research (conducted between January 2021-June 2021) to: ○ Investigate options to develop and support local hubs of service, research and training activity, and to grow support for research capacity	Implementing this recommendation will: • Generate a return of investment of $3.90 per $1.00 invested (KPMG, 2018); • Build long-term, sustainable research capacity and capability of the north; • Improve national distribution of research funding to meet needs of the north, including research

• Led by northern-based researchers, including clinician-researchers (across health disciplines and involving both public and private health workforce); • Provision of adequate funding to account for higher costs of research and skills development in rural and remote settings; • Provision of support for research capacity strengthening at multiple levels.	Rural Health and Rural Clinical Schools); • Aboriginal, and Torres Strait Islander, peak bodies and health services; • Health service research departments.	and capability building for northern-based clinicians and researchers; ○ Explore the potential to increase the current integrative investment in health services research; - Present findings to cross jurisdictional body with business case (July 2021); - Implement findings and guidelines/assessment criteria for funding schemes, including identification of appropriate funding body (commencing July 2021). • Funding body to support first call for funding bids for support of local research hubs under scheme/s (October 2021); • Support for funded hubs commences Feb 2022; • Six-monthly progress reports from funded hubs.	focussing on Indigenous-determined priorities for improving the health of Aboriginal and Torres Strait Islander Australians.
8. Explore potential areas of export opportunity that deliver value for northern Australia *WHO building blocks: Leadership and Governance* Key focus areas: • Export of workforce development strengths (e.g. remote generalist training; surveillance and response; implementation research and research training); • Health service models; and • Placement/interchange of health service workers with near neighbours. Key guiding principles: • Enhance two-way health system strengthening with regional neighbours; • Does not detract from meeting local needs; • Provides financial return to providers to complement other funding sources.	Action owner: **AusTrade (TBC)** **Key consortium partners:** • Jurisdictional trade representatives at government and health department levels; • Health services; • Universities.	• CRCNA commission research to collect details on existing health exports and potential from jurisdictional authorities, Austrade and university/TAFE/health sector/hospitals (public and private); • Document activities, opportunities, gaps and develop prioritised plan for market engagement (end Dec 2020); • CRCNA work with DFAT and others to comprehensively analyse demand and then market capability and skills to neighbouring countries (by June 2021 and ongoing).	Implementing this recommendation will: • Build health system capacity of regional neighbours and strengthen regional linkages; • Support regional neighbours to achieve WHO Sustainable Development Goals; • Strengthen health security for northern Australia; • Strengthen Australia's position as a leading influence in the Western Pacific region; • Direct financial return for exported services.

For further detail and references, please refer to the full report.