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The Health Outcomes and Health Service Needs of the Martu and Nyiyaparli People of Northwest Western Australia: A Grey Literature Review

Abstract

Introduction: Health outcomes for Australian Aboriginal and Torres Strait peoples are very poor. This is considerably worse in remote regions. The East Pilbara, where the Aboriginal and Torres Strait Islander communities of the Martu and Nyiyaparli people reside, is one such remote region.

Methods: This review explored the grey literature relating to the health services and health outcomes of the Martu and Nyiyaparli people. Search strategies included specific search terms as well as the systematic search of specific websites likely to inform this review. To ensure relevance of the data, the review incorporated documents published in the last five years and obtained statistical data at two different population levels (SA3 and Indigenous Area). Both SA3s and IAREs are geographical areas utilised by the Australian Bureau of Statistics for the attainment of statistical data; however, IAREs were created for more specific data related to Aboriginal and Torres Strait Islander people.

Results: The main findings from this review were that health outcomes for the Aboriginal and Torres Strait Islander peoples of the East Pilbara were poor, with health indicator trends that were worse than nationwide averages. Additionally, the review found that the healthcare workforce shortages common to very remote areas across Australia were particularly problematic in the East Pilbara.

Conclusion: In addition to seeking improved health outcomes, this project responds to calls from this community to move from the 'repair shop' model of healthcare to an upstream preventative model by providing a context of the current health issues in this East Pilbara region.

Keywords

Aboriginal and Torres Strait Islander health, East Pilbara, Pilbara, health outcomes, healthcare workforce, remote health, rural health

Health outcomes for Australian Aboriginal and Torres Strait Island peoples are very poor (Australian Indigenous Health*InfoNet*, 2021). This is considerably worse in remote regions (Australian Institute of Health and Welfare [AIHW], 2022a). In 2008, the Australian Federal Government stated its intent to close the gap in health outcomes between Aboriginal and Torres Strait Island peoples and non-Indigenous people (Australian Human Rights Commission, 2008). Australia's healthcare budget has had a 100% increase from 2009 to 2019 (Office for Economic Cooperation and Development, n.d.). However, Aboriginal and Torres Strait peoples in remote communities have not benefitted from this financial increase in healthcare budgeting.

The East Pilbara is one such remote region; a location where the Indigenous communities of the Martu and Nyiyaparli people reside (Karlka Nyiyaparli Aboriginal Corporation, 2022). In addition to the lack of health benefits from the current funding policy, there is also a call from this community to move from the 'repair shop' model of healthcare addressing disease to an upstream preventive model concentrating on the wider determinants of health.

Therefore, to provide a context of the current health issues in this East Pilbara region, a review of the grey literature was performed. Data were obtained at a whole population level (inclusive of Aboriginal and Torres Strait Islander peoples and non-Indigenous people) and separately for Aboriginal and Torres Strait Islander peoples within the East Pilbara region. Annual data were obtained enabling trend calculations to further assess progress on health outcomes for these Aboriginal and Torres Strait peoples. Recent data were also obtained on the health workforce servicing the Martu and Nyiyaparli lands to establish what level of healthcare needs were attained.

Objectives

The Puntukurnu Aboriginal Medical Service (PAMS) is an Aboriginal Medical Service providing healthcare services to the Aboriginal and Torres Strait Islander peoples (primarily Martu and Nyiyaparli people) living in communities within Newman, Jigalong, Parnngurr, Punmu and Kunawarritji (hereafter called the Five Localities). PAMS has expressed an

intention to pursue the development of an ‘upstream’ model of healthcare delivery to address the underlying causes of illness (Williams et al., 2008), in order to alter the trajectory of poor health outcomes for the Martu and Nyiyaparli. This review was requested by PAMS as Phase One of the development of the new model.

Subsequent phases of the project will involve in-depth community consultation undertaken by permanent members of the project team. As such, this review was limited by its role as an initial enquiry and did not include consultations or interviews. Though the review was requested by PAMS, the work was conducted independently, and no funding was received from PAMS, to ensure no conflict of interest.

This project reviewed grey literature available in the public sphere to identify and collate information regarding the health outcomes of, and health workforce serving the Martu and Nyiyaparli people.

Acronyms and Abbreviations

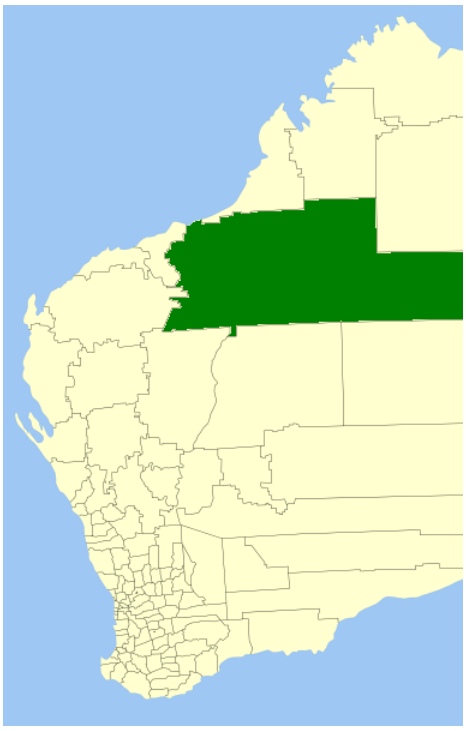
ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
ASR	Age Standardised Rate
ED	Emergency Department
GPs	General Practitioners
IARE	Indigenous Area
ILOC	Indigenous Locations
LGA	Local Government Area
MM	Modified Monash category
MMM	Modified Monash Model
NDIS	National Disability Insurance Scheme
NRHA	National Rural Health Alliance
PAD	Potentially Avoidable Deaths
PAMS	Puntukurnu Aboriginal Medical Service
PD	Premature Death
PPH	Potentially Preventable Hospitalisations
PYLL	Potential Years of Life Lost
RAN	Remote Area Nurse
SA	Statistical Area Level
SEIFA	Socio-Economic Indexes for Areas
WA	Western Australia
WACHS	Western Australia Country Health Service

Background

The Martu are the traditional owners of the lands occupied by the four remote communities of Jigalong, Parnngurr, Punmu and Kunawarritji (Kanyirninpa Jukurrpa, n.d.), and the Nyiyaparli are the traditional owners of the lands occupied by Newman (Karlka Nyiyaparli Aboriginal Corporation, 2022). Recent excavations of Newman rock shelters indicate that Aboriginal and Torres Strait Islander peoples have resided in the East Pilbara shire for approximately 45,000 years (Slack et al., 2020). The Five Localities are in the Local Government Area (LGA) of East Pilbara, a very remote region of northwest Western Australia (WA) (See Figure 1). The East Pilbara is the largest LGA in Australia, covering 379,571 square kilometres (Australia Local Government Association, 2022). In 2021, the main sources of employment were mining (48.9% of total employment), construction (8.9%) and education and training (4.8%) (Australian Bureau of Statistics [ABS], 2022a). The climate is characterised by long, hot and dry summers with temperatures commonly exceeding 45°C. Winters are moderately cool, often with very cold nights typical of a desert environment. Rainfall is highly variable seasonally and spatially, and averages 300-350 millimetres in the north-east of the region (Department of Primary Industries and Regional Development, 2021).

Figure 1

Location of the East Pilbara Local Government Area within Western Australia



("Location of the Local Government Area in Western Australia: East Pilbara," *2007).*

The region has been designated a Distribution Priority Area for general practitioners (GPs) and an Area of Need (Department of Health and Aged Care [DoHAC], 2021a).

Regional remoteness is scaled by the Modified Monash Model (MMM), which measures a location's access to services and defines locations from Modified Monash category (MM) 1 (a major city) to MM 7 (a very remote location). The MMM is used by the Department of Health and Aged Care in health workforce distribution planning (DoHAC, 2021d.). The Five Localities of the East Pilbara have an MM 7 (very remote) classification.

The East Pilbara is characterised by low population density and small inland communities with larger population centres along the coast. The distances between the inland communities and larger population centres are considerable (Figure 2 and Table 1). As health services in the inland communities (including the regional hub of Newman) are limited, residents of these communities spend considerable time travelling long distances of up to 2000 kilometres to access services not available locally. Therefore, it is critical for these health services to be accessible and adequately resourced.

Figure 2

The communities of the Martu and Nyiyaparli peoples in relation to the larger population centres

("WA location map," 2005). Note: text added.

Socio-Economic Indexes for Australia Scores and Ranking

The Australian Bureau of Statistics publishes the Socio-Economic Indexes for Areas (SEIFA) scores from each census. The SEIFA scores indicate relative socio-economic

disadvantage at the Statistical Area Level (SA)1 (most granular) level and are ranked in order from lowest to highest score, with the lower scores equating to greater disadvantage. The scores for the 16 SA1 areas of Newman ranged from 955 to 100, ranking in the 27th to 55th percentile compared to other SA1 areas Australia-wide. Such scores indicate a relative advantage for the predominantly non-Indigenous Newman population. However, the SEIFA scores for Jigalong, Parnngurr and Punmu were 529, 505 and 414 respectively, with all three communities ranked in the 1 percentile for Australia. These rankings highlight that the residents of these communities experience some of the worst social and economic disadvantages in Australia (ABS, 2018). The SEIFA score for Kunawarritji could not be located.

Table 1

Driving Distance and Time Required to Travel Between the Five Localities and Major Population Centres (Google Maps, n.d).

	Newman	Jigalong	Parnngurr	Punmu	Kunawarritji
Perth					
km	1178	1332	1536	1827	2002
(hr)	(12.21)	(15.6)	(18.38)	(22.21)	(25.0)
Newman					
km	--	165	369	660	835
(hr)		(2.43)	(6.15)	(9.58)	(12.51)
Karratha					
km	611	773	900	804	980
(hr)	(6.36)	(9.11)	(12.58)	(10.57)	(13.50)
Port Hedland					
km	452	613	675	579	755
(hr)	(5.0)	(7.31)	(10.30)	(8.28)	(11.22)

Population

In 2021, a total of 1,109 people in the Five Localities (Newman, Jigalong, Parnngurr, Punmu and Kunawarritji) identified as Aboriginal and Torres Strait Islander (ABS, 2022b) (Table 2). It is thought that the majority are Martu and Nyiyaparli peoples (Department of Planning, Lands and Heritage [DPLH], 2006; DPLH, 2007a; DPLH, 2007b; DPLH, 2019), and they will be referred to as Martu and Nyiyaparli people for the remainder of this paper.

Table 2

Aboriginal and Torres Strait Islander Population Profile by Indigenous Location, 2021 Census (ABS, 2022b).

	Newman	Jigalong	Parnngurr	Punmu	Kunawarritji
Population	556	269	99	110	75
Median age (years)	20	20	26	28	24
Median weekly household income ($) *	2821	759	966	880	933
Employed in the labour force (%) **	70	21	21	20	25
Average number of persons per bedroom	1.0	1.5	1.8	1.7	1.7

**Excludes households where at least one household member aged 15 years and over did not state their income.*
********As a percentage of persons aged 15 years and over.*

Method

Grey literature is defined as information that is not the product of commercial publication and is produced by business, industry, academics, and all levels of government (Paez, 2017). Different types of media can be included in a grey literature search, with current definitions including the traditional grey literature documents, such as reports, as well as websites, conference proceedings, position statements, social media, and video and audio mediums (Pappas & Williams, 2011). This methodology was chosen for this project as it seemed more probable that the information being sought would appear in the grey literature rather than in the peer-reviewed scientific literature.

Data Sources

Several search strategies were used to identify grey literature to answer the research questions.

1. Specific websites likely to yield information on health workforce and health service delivery in the East Pilbara region were systematically searched. If additional websites were located during the search strategy, they were added to the search list and systematically searched for relevant documents.
2. A search was conducted of search engines including Google, Yahoo, DuckDuckGo & Bing using the identified search terms. Precise terms included in the search were

combinations of East Pilbara, Martu, Nyiyaparli, Western Australia, Newman, Jigalong, Parnngurr, Punmu, Kunawarritji, Aboriginal and Torres Strait Islander, rural, remote, health workforce, health workforce shortage, and health service needs. Each search strategy was documented and the number of hits per search engine was recorded. The first 25 pages of results from each strategy were scanned for relevant websites or documents.

3. Specific information about the East Pilbara population, the Martu and Nyiyaparli people, health workforce, and health issues was sought through a targeted search of data websites such as the Australian Bureau of Statistics, Australian Institute of Health and Welfare (AIHW), West Australian Country Health Service (WACHS), and WA Primary Health Network (WAPHN).
4. Publicly available datasets provided by government bodies were also searched for information.

The selection of documents was restricted to those that provided quantitative data on the health outcomes of, and health workforce serving the Martu and Nyiyaparli people, the broader Aboriginal and Torres Strait Islander population of the East Pilbara region and, where data enabled relevant comparison, the wider population (i.e., inclusive of Aboriginal and Torres Strait Islander peoples and non-Indigenous people) of the East Pilbara. To ensure the selected data reflected to current health workforce and health outcomes in the East Pilbara, the review incorporated documents published in the years 2018-2023. If updates of older documents were located, the latest update was utilised. The selection of articles and data extraction were cross checked for accuracy. Discussion of the data incorporated a narrative synthesis.

The search obtained statistical data at two different population levels (Statistical Area 3 [SA3] and Indigenous Area [IAREs]). Both SA3s and IAREs are geographical areas utilised by the ABS for the attainment of statistical data; however, IAREs provided more specific data related to Aboriginal and Torres Strait Islander people. These population levels were utilised

as they provided the most definitive data on the Martu and Nyiyaparli people of the East Pilbara.

There are 34 SA3 and 69 IAREs areas in WA. Consecutive years of SA3 data were available, enabling the calculation of trends and the identification of improvements or deteriorations in the health indicators. The project also tabulated population-level data for the East Pilbara and selected SA3 or IAREs areas, based on remoteness, to enable comparisons between the areas. SA3 location remoteness was represented by major city (Perth City), regional (Goldfields), and very remote (Wheatbelt - North). IAREs are represented by major city (Perth City), regional (Kalgoorlie – Dundas - Goldfields) and very remote (Narrogin – Wagin - Katanning).

A total of 62 local and national websites were searched for data pertaining to the Martu and Nyiyaparli people. Websites included Aboriginal and Torres Strait Islander health organisations, health professional organisations, local health organisations, health departments, local government authorities, other local and national entities, and news sites. This search yielded a total of 395 documents for further review.

Findings

Defining the Martu and Nyiyaparli People

Health data rarely distinguish between the language groups that constitute Australia's diverse Aboriginal and Torres Strait Islander populations. Thus, there was no means by which the distinct cultural, social, health and environmental needs of a specific language group, such as the Martu and Nyiyaparli people, could be identified using currently available data. The data available in the public domain about the Martu and Nyiyaparli people were sparse.

Data Availability

In the 2021 census, the Martu and Nyiyaparli peoples represented only 34% of the population of the Five Localities and 4.3% of the population of the East Pilbara (SA3) (ABS, 2022b). As data on this small minority group were sparse, whole population data were used

in this review. Therefore, care should be taken when interpreting these findings and used only as a guide in providing healthcare insight into the Martu and Nyiyaparli peoples.

Health Indicators

Summary

Health indicators provide important insights into the health of a population. The only health data specific to the populations of the Five Localities located by this review were long-term health conditions. This data showed that the Martu and Nyiyaparli people were more likely to suffer from diabetes, heart disease and kidney disease than the non-Indigenous population of the Five Localities (ABS, 2022d).

There was adequate data on the whole population of East Pilbara to identify poor health outcomes for the wider population in general. However, this data was sparse for the Aboriginal and Torres Strait Islander populations. The median age of death (43.5 years) in the Aboriginal and Torres Strait Islander peoples within East Pilbara was the lowest in Western Australia (Public Health Information Development Unit [PHIDU], 2022). In addition, when data enabled a comparison of the health indicator rate ratios between Aboriginal and Torres Strait Islander peoples and non-Indigenous peoples, the ratios in the East Pilbara were among the worst in Western Australia (PHIDU, 2022).

Downward trends were demonstrated in three of four health indicators available: Potentially Avoidable Deaths (PADs) (AIHW, 2022d), Potential Years of Life Lost (PYLL) (2022b) and mental health-related Emergency Department (ED) presentations (2022e). Also, when comparing trends between East Pilbara and Perth City, the gap in health outcomes increased in all four indicators, further highlighting the disparity in health outcomes between very remote and major city locations.

There was an increase of 1,695% in ED presentations in the East Pilbara for mental health-related issues from the 2014-15 to the 2021-20 period (AIHW, 2022e). This significant increase in ED mental health presentations emphasised a growing demand for mental health services in East Pilbara, which current service provision has been unable to meet.

Long-Term Health Conditions

Overall, the Aboriginal and Torres Strait Islander people of the Five Localities had a higher prevalence of heart disease, diabetes and kidney disease compared to the non-Indigenous population (Table 3) (ABS, 2022c; ABS, 2022d).

Table 3

Prevalence of Main Long-Term Health Conditions as a Proportion (%) of the Population, by Indigenous Location (ABS, 2022c; ABS, 2022d).

	Newman		Jigalong		Parnngurr		Punmu		Kunawarritj	
Type of long-term health condition:	Aboriginal and Torres Strait Islander peoples	Non-Indigenous	Aboriginal and Torres Strait Islander peoples	Non-Indigenous	Aboriginal and Torres Strait Islander peoples	Non-Indigenous	Aboriginal and Torres Strait Islander peoples	Non-Indigenous	Aboriginal and Torres Strait Islander peoples	Non-Indigenous
Arthritis	2.3	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Asthma	6.5	7.6	3.3	0.0	0.0	0.0	3.6	0.0	0.0	0.0
Cancer	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dementia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Diabetes[a]	4.3	2.3	9.3	0.0	4.0	0.0	7.3	0.0	10.7	0.0
Heart disease[b]	2.2	1.1	3.3	0.0	0.0	0.0	0.0	0.0	5.3	0.0
Kidney disease	0.0	0.1	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Lung condition[c]	0.7	0.3	0.0	0.0	0.0	0.0	3.6	0.0	0.0	0.0
Mental health condition[d]	2.7	6.5	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stroke	0.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Any other long-term health condition	4.0	4.4	3.3	0.0	4.0	0.0	7.3	0.0	5.3	0.0

[a] excluding gestational diabetes; [b] including heart attack or angina; [c] including COPD or emphysema; [d] including depression or anxiety.

Leading Cause of Death

The three leading causes of death in the East Pilbara region were coronary heart disease, suicide and diabetes (Table 4) (AIHW, 2022b).

Table 4

The 10 Leading Causes of Death in the East Pilbara (*Whole Population, Persons*) (2016-2020) (AIHW, 2022b).

Rank	Percent of all causes	Crude rate (per 100,000)	Age-standardised rate (per 100,000)
Coronary heart disease	36.3	96.5	50.8
Suicide	21.6	18.4	23.5
Diabetes	16.2	52.2	-
Cerebrovascular disease	10.8	-	-
Land transport accidents	10.8	-	-
Other ill-defined causes	10.0	-	-
Lung cancer	9.3	-	-
Influenza and pneumonia	7.7	-	-
Chronic obstructive pulmonary disease (COPD)	7.7	-	-
Liver disease	6.9	-	-

- Not reported

The Median Age of Death

Aboriginal and Torres Strait Islander peoples had a considerably lower median age of death than the non-Indigenous population in selected IARE areas (very remote, regional and major city) in Western Australia (Table 5) (PHIDU, 2022). Furthermore, of the 69 IARE areas in WA, the Aboriginal and Torres Strait Islander peoples living in East Pilbara had the lowest mean age of death (PHIDU, 2022). The ratio of Aboriginal and Torres Strait Islander deaths to non-Indigenous deaths for East Pilbara was the 5th worst of all IARE areas in WA.

Table 5

Comparison of the Median Age at Death for Aboriginal and Torres Strait Islander and Non-Indigenous Australians for Select Indigenous Areas (IARES) By Remoteness (2016-2020) (PHIDU, 2022).

IARE	Aboriginal and Torres Strait Islander peoples, Age, years: median	Non-Indigenous, Age, years: median	Rate ratio
East Pilbara	43.5	66.5	0.65
Kalgoorlie - Dundas - Goldfields	49.0	68.0	0.72
Narrogin - Wagin - Katanning	62.0	81.0	0.76
Perth	53.5	83.0	0.64

Whole population mortality figures for the SA3 area during 2016-20 highlighted the increasing gap in age of death (Table 6) (AIHW, 2022b). In the East Pilbara, the median age of death decreased by 3.06% during this period. However, for the same period, the median age of death in Perth City increased by 4.90%. This underscores the increasing gap in the median age of death between the major city and regional areas. Specifically, the gap in age of death between the East Pilbara and Perth City areas increased from 22.7 years in 2016 to 32.5 years in 2020. Furthermore, of the 34 SA3 areas in WA, the East Pilbara had the second highest deterioration in the median age of death (AIHW, 2022b).

Table 6

The Change in Median Age at Death (Years) for Select SA3 Regions by Remoteness (2016-2020) (AIHW, 2022b)

SA3 Area	2016	2017	2018	2019	2020	Average*	% Change**
East Pilbara	60.5	61.3	59.5	59.0	53.0	58.6	-3.06
Goldfields	67.1	70.4	64.5	66.8	67.8	67.3	0.35
Wheatbelt - - North	77.9	77.7	75.7	76.9	76.4	76.9	-1.20
Perth City	83.2	82.7	83.6	83.1	85.5	83.6	4.90

*Average for the period
** Percentage of change between the start of the period and the average for the period

Premature Death

From 2017 to 2020, very remote and regional SA3 areas had high average Premature Death (PD) rates compared to Perth City (Table 7). The Goldfields and Wheatbelt – North areas had the worst decline in the average PD rate. While the average PD rate for the East Pilbara improved by 0.69% (306.9 to 304.8 ASR), the gap in the PD rate between East Pilbara and Perth City increased from 104 (ASR per 100,000) in 2017 to 127.3 in 2020 (AIHW, 2022b). Furthermore, of the 34 SA3 areas in WA, 16 areas had a greater improvement in the PD rate compared to the East Pilbara (AIHW, 2022b).

Table 7

*The Change in Premature Deaths (PDs) (ASR Per 100,000) Selected SA3 Regions by Remoteness (2017-2020) (*AIHW, 2022b).

SA3 Area	2017	2018	2019	2020	Average*	% Change**
East Pilbara	306.9	322.6	317.1	272.5	304.8	-0.69
Goldfields	352.8	374.4	363.8	340.3	357.8	1.41
Wheatbelt - North	235.3	274.0	252.6	239.5	250.4	6.39
Perth City	202.9	175.3	180.0	145.2	175.8	-13.00

* Average for the period
** Percentage change between the start of the period and the average for the period

Potentially Avoidable Deaths

It is well known that Potentially Avoidable Death (PAD) rates increase with remoteness as well as with Aboriginal and Torres Strait Islander status, and this was reflected in the selected IAREs listed in Table 8. Aboriginal and Torres Strait Islander peoples from the IARE locations of East Pilbara, Goldfields, Wheatbelt and Perth City had higher rates of death from potentially avoidable causes compared with the non-Indigenous population in these locations (PHIDU, 2022). Within the East Pilbara, Aboriginal and Torres Strait Islander peoples were 15.8 times more likely to die from avoidable causes compared with the non-Indigenous population (Table 8) (PHIDU, 2022). Additionally, the IARE of the East Pilbara had the worst rate ratio out of 51 IAREs for which data were available (PHIDU, 2022).

Table 8

Potentially Avoidable Deaths (PADs) Persons Aged 0 To 74 Years (ASR Per 100,000), for Selected Indigenous Areas (IARES) (2016-2020) (PHIDU, 2022).

IARE	Aboriginal and Torres Strait Islander	Non-Indigenous	Rate Ratio
East Pilbara	514.7	32.5	15.8
Kalgoorlie - Dundas - Goldfields	557.3	206.5	0.9
Narrogin - Wagin - Katanning	695.8	119.5	5.8
Perth	444.6	90.4	4.9

At the SA3 level, the East Pilbara had an average rate increase in PADs of 13.10% (165 to 186.6 ASR) during the period 2017-2020 (Table 9) (AIHW, 2022b). This compared poorly to Perth City where the average PAD rate declined by 16.02% over the same period (AIHW, 2022b). Table 9 highlights the increasing gap in premature death rate between East Pilbara (very remote) and Perth City (major city) from 54 ASR per 100,000 in 2017 to 103.6 ASR per 100,000 in 2020 (AIHW, 2022b). Only one WA SA3 area, Wheatbelt – South, had a more detrimental decline in PAD rate than the East Pilbara (AIHW, 2022b).

Table 9

Potentially Avoidable Deaths (PADs) ASR (Per 100,000) Selected SA3 Regions (2017-2020) (AIHW, 2022b).

SA3 Area	2017	2018	2019	2020	Average*	% Change**
East Pilbara	165.0	200.4	200.0	180.8	186.6	13.10
Goldfields	198.5	203.8	207.6	183.8	198.4	-0.06
Wheatbelt - North	152.2	174.8	154.0	134.3	153.8	1.09
Perth City	111.0	97.6	87.0	77.2	93.2	-16.02

* Average for the period
** Percentage change between the start of the period and the average for the period

Potential Years of Life Lost

In the East Pilbara, the Potential Years of Life Lost (PYLL) rate for the Aboriginal and Torres Strait Islander peoples was 13.3 times higher than the rate for the non-Indigenous population (Table 10) (PHIDU, 2022). Of all the WA IAREs, the East Pilbara had the worst rate

ratio between Aboriginal and Torres Strait Islander peoples and the non-Indigenous population (PHIDU, 2022).

Table 10

The Potential Years of Life Lost (PYLL), Persons Aged 0-74, by Aboriginal and Torres Strait Islander Status and Non-Indigenous People (Age-Standardised Rate per 100,000) for Selected Indigenous Areas (2015-2019) (IARES) (PHIDU, 2022).

IARE	Aboriginal and Torres Strait Islander	Non-Indigenous	Rate Ratio
East Pilbara	153.7	11.5	13.3
Kalgoorlie - Dundas - Goldfields	170.0	58.8	2.9
Narrogin - Wagin - Katanning	193.3	40.1	4.8
Perth	201.6	18.8	10.7

At the SA3 level, the East Pilbara had an increase in average PYLL rate of 17.6% for the period 2016-2020 (Table 11). Furthermore, the gap in the PYLL rate between East Pilbara and Perth City increased from 15.7 ASR 1000 in 2017 to 23.3 in 2020 (AIHW, 2022b). The average PYLL increase in East Pilbara was the worst of the selected SA3 areas. Among 34 of the WA SA3 areas, only one area, Wheatbelt – South, had a greater deterioration in PYLL rate compared with the East Pilbara (AIHW, 2022b).

Table 11

Potential Years of Life Lost (PYLL) (Under 75 Years of Age, ASR Per 1000), for Selected SA3 Areas (2016-2020) (AIHW, 2022b).

SA3 Area	2016	2017	2018	2019	2020	Average*	% Change**
East Pilbara	45.7	46.8	47.4	64.1	64.8	53.8	17.6
Goldfields	80.7	65.0	73.0	77.2	68.0	72.8	-9.8
Wheatbelt - North	59.0	52.5	69.1	58.3	55.1	58.8	-0.3
Perth City	32.0	36.1	31.2	30.0	23.1	30.5	-4.7

* Average for the period
** Percentage change between the start of the period and the average for the period

Potentially Preventable Hospitalisations

Overall, Aboriginal and Torres Strait Islander peoples had considerably higher Potentially Preventable Hospitalisations (PPH) rate ratios compared with non-Indigenous people (Table 12) (PHIDU, 2022). Of the 69 IAREs in Western Australia, the East Pilbara was in the bottom quarter. The majority of the IAREs in this quarter were in remote or very remote locations (PHIDU, 2022).

Table 12

Admissions for Potentially Preventable Conditions (ASR Per 100,000) by Indigenous Area (IARE) (*2017/18 To 2018/19)* (PHIDU, 2022).

IARE	Aboriginal and Torres Strait Islander	Non-Indigenous	Rate Ratio
East Pilbara	10449.4	2316.8	4.5
Kalgoorlie - Dundas – Goldfields	16208.5	2912.8	5.6
Narrogin - Wagin – Katanning	11793.4	3109.4	3.8
Perth	8728.3	2307.0	3.8

Mental Health Services Provided in Emergency Departments (Eds)

Mental health-related Emergency Department (ED) presentations in public hospitals are not commonly listed as a health indicator. However, these presentations are suggestive of a system failure in providing access to early intervention services, as well as access to late intervention alternatives (Duggan et al., 2020). As such, the data was considered relevant to this scoping review.

The mental health-related ED presentations in East Pilbara increased dramatically over the period 2015 to 2021 (Table 13). This increase was in stark contrast to the decreasing trend seen in the urban SA3 area of Perth City. Of all the WA SA3 areas, the East Pilbara had the greatest increase in ED presentations for mental health-related issues over the seven-year period leading to 2020-21 (AIHW, 2022e).

Table 13

Mental Health-Related Emergency Department (ED) Presentations in Public Hospitals, of Patients (Rate Per 10,000 Population) by Selected SA3 Area (2014–15 To 2020–21) (AIHW, 2022e).

SA3 Area	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Average*	% Change**
East Pilbara	11.3	99.5	175.1	269.6	287.0	281.5	295.7	202.8	1694.8
Goldfields	20.4	19.6	173.4	204.1	227.1	234.2	276.7	165.1	709.2
Wheatbelt - North	62.3	68.5	65.7	67.8	120.5	113.7	114.9	87.6	40.7
Perth City	169.9	176.7	167.8	169.5	176.1	163.5	152.4	168.0	-1.1

* Average for the period
** Percentage change between the start of the period and the average for the period

Specific data for mental health among the Aboriginal and Torres Strait Islander peoples of the East Pilbara were unavailable. However, inference may be drawn from data showing the national rate of mental health-related ED presentations for Aboriginal and Torres Strait Islander peoples was 4.5 times that of non-Indigenous Australians (478.3 and 106.4 per 10,000 population respectively) (AIHW, 2022e).

Health Workforce

As noted, data availability on the Martu and Nyiyaparli peoples were sparse, and the data on the health workforce servicing these people was similarly sparse.

The health needs of the Martu and Nyiyaparli peoples are primarily serviced by PAMS with clinics in each of the Five Localities. Aboriginal medical services are funded chiefly to provide continuous doctor-patient relationships and holistic, comprehensive, and culturally appropriate care for Aboriginal and Torres Strait Island peoples (Aboriginal and Torres Strait Islander Health Performance Framework, 2021).

The PAMS 2019-20 annual report identified that the four clinics located in Jigalong, Parnngurr, Punmu, Kunawarritji were fully staffed for this reporting period and that all PAMS clinics were serviced by several mobile staff including two GPs (Puntukurnu Aboriginal Medical Service [PAMS], 2020). The PAMS 2021 annual report identified that staffing was

more challenging for that reporting period due to a variety of reasons, including the effects of COVID-19 (PAMS, 2021). The 2022 annual report identified that the number of GPs serving the Five Localities had expanded from two to four (PAMS, 2022).

In addition to permanent primary healthcare staff, the PAMS Newman and remote clinics host a wide range of visiting medical and allied health specialists: a paediatrician, a renal physician, ear and hearing health services, optometry, podiatry and physiotherapy services, a dietician, diabetes education services, mental health services and women's health obstetrics (PAMS, n.d.a). Other agencies stated that they provide visiting services to the Pilbara on a regular basis and this is discussed below.

General Practitioners

In 2021, there was a reduced availability of GP staff due to personal circumstances for two of PAMS GPs (PAMS, 2021). In 2022, two additional GPs were added to the PAMS team with funding from the Broken Hill Proprietary Company Limited (BHP), owner of Mt Whaleback Mine and primary corporate investor in Newman (PAMS, 2022). Furthermore, the Royal Flying Doctor Service provided a fortnightly visiting GP service at Punmu and Parnngurr, and an additional Female GP program in Jigalong, Parnngurr and Punmu (Western Australia Primary Health Alliance, 2022).

Nurses and Midwives

There was no data available on nurse staffing levels in the PAMS Newman Clinic. However, in the PAMS 2020 annual report, workforce information indicated that four remote clinics were fully staffed for the reporting period (PAMS, 2020). There were two Remote Area Nurses (RANs) and one Team Leader at the Jigalong clinic, and one RAN at each of the Parnngurr, Punmu and Kunawarritji clinics (PAMS, 2020). In addition, all PAMS clinics were serviced by several mobile staff including a Child Health Nurse and a Sexual Health Nurse (PAMS, 2020). In the PAMS remote clinics, the majority of day-to-day care was provided by RANs, who were also responsible for providing after-hours emergency care (PAMS, 2021). Funding assistance in the 2022 reporting period enabled immediate and

short-term increases in the nursing staff to assist with delivering COVID-19 vaccinations (PAMS, 2022).

Specialists

In 2022, the visiting specialists included: renal physician support, women's health GP visits, COVID-19 clinic, a podiatrist, a diabetic educator, a physiotherapist, ear health services, eye health services, dental services, paediatric services, hospital physiotherapist, an occupational therapist and palliative care (PAMS, 2022).

A database of Western Australia rural and remote resident specialists, whose primary work location is in a rural or remote area MM 2 to MM 7, stated that, as of September 2020, seven resident specialists worked in the Pilbara region. However, it is worth noting that none were located in an MM 7 area, suggesting their work location address must be one of the MM 6 areas on the coast (the towns of Karratha, Port Hedland or Point Samson) (Rural Health West, 2020). The report for the 2021 resident specialists did not distinguish between MM 4 and MM 7 areas (Rural Health West, 2021a). Thus, while a number of agencies stated that they provided visiting services to the Pilbara on a regular basis, it is important to ascertain what these agencies define as 'the Pilbara'. Specialists servicing the Pilbara often visit only the major centres of Port Hedland or Karratha (Western Australia Country Health Service, 2021). While some Pilbara specialists service smaller communities on a rotating schedule, urgent or semi-urgent access to specialists by residents of the MM 7 area located inland can only be achieved through patient relocation or a long car journey. For the Martu and Nyiyaparli peoples, this can involve up to 11 hours of driving one way, or plane transfer.

In 2022, the first assisted dialysis service in the Pilbara was opened by PAMS. Operating six days a week, the service provides long- and short-term (respite) dialysis (PAMS, 2022).

Dental Practitioners

The PAMS 2021 annual report indicated that visiting dental services provided on-site emergency, preventive, and basic dental care on a weekly basis (PAMS, 2021). This was

supplemented by a Royal Flying Doctor Service Dentist and Dental Nurse, who attend the Newman Clinic for two weeks on average every two months (PAMS, 2021).

Mental Health Workforce

Mental health services in the Pilbara are mainly based in Newman but also provide outreach services. headspace Pilbara has a youth worker based in Newman with outreach services for young people aged 12-25 years (headspace, 2023). A multi-disciplinary mental health team, based in the Newman Hospital, provides clinical services to residents of Newman and outreach services to the surrounding communities (Healthdirect, n.d.). Aboriginal Mental Health Workers from the Pilbara Mental Health and Drug Service offices, based in Karratha and Port Hedland, provide outreach services across the region (Healthdirect, n.d.). Finally, Telehealth mental health professionals were available to patients attending one of the four remote PAMS clinics at Kunawarritji, Jigalong, Parnngurr or Punmu (PAMS, 2021).

Allied Health Professionals

In 2020, PAMS reported that it had increased its allied health service provision (PAMS, 2020). PAMS and Panaceum deliver allied health services to the communities of the Western Desert through the Integrated Chronic Disease Care program (PAMS, 2022). In addition, there were reports of visiting services provided in the sectors of podiatry, physiotherapy, eye health, dental, ear health, occupational therapy and palliative care (PAMS, 2021). In PAMS' Newman clinic, there was a pharmacy onsite (PAMS, 2021). The review located one report about a speech pathology program in the South Newman Primary school (Newman Futures, 2019). Similar to GPs and nurses staffing, recruitment and retention of the allied health workforce in rural and regional areas was reported to be a common challenge (NRHA, 2019).

Aboriginal Health Workers

Each of the four remote PAMS clinics was staffed by one or more Aboriginal Health Workers (Aboriginal Health Council of Western Australia [AHCWA], 2021a; PAMS, 2022).

Disability Services Workers

In 2020, PAMS became a National Disability Insurance Scheme (NDIS) provider and provided clients with coordination support to assess NDIS eligibility, navigate the NDIS access process, and develop a NDIS plan (PAMS, 2020). The number of people provided with NDIS coordination support by PAMS more than trebled in 2021 to 100 clients (PAMS, 2021).

Hospital Workforce

The local hospital for the Five Localities is located in Newman and is designated as an Integrated District Health Service run by the Western Australia Country Health Service (DoHAC, 2022). Data on nursing hours per patient suggests that the Newman Hospital staffing levels reflect the same workforce shortages experienced across rural Western Australia (DoHAC, 2022). Further data on the hospital workforce could not be located.

Aged Care Workforce

The review located a respite care facility in Newman as the only residential aged care facility in the East Pilbara. The Pilbara offered permanent residential aged care in Port Hedland, Roebourne and Karratha (Healthdirect, n.d.). However, in 2020 there was a reported shortage of GPs providing services in aged care facilities in the Pilbara, resulting in a cap on the number of beds in use and the aged care facilities operating at less than 100% capacity (WA Primary Health Alliance [WAPHA], 2022).

Full Time Equivalents, Benchmarks and MM 7 Workforce Averages

An accurate Full Time Equivalent (FTE) for the health workforce serving the Martu and Nyiyaparli peoples was unable to be determined. However, the whole Pilbara region has been designated as an Area of Need (Western Australia Local Government Association, 2018). This is defined as an area where the workforce availability is failing to meet the health needs of the population (DoHAC, 2021a). The East Pilbara was also classified as a Distribution Priority area, defined as an area experiencing lower levels of GP services compared with the benchmark (DoHAC, 2022).

The benchmark for health workforce distribution is set by the National Rural Health Alliance (NRHA). Comparison of FTE and health workforce expenditure by LGA against the benchmark and the average for FTE MM 7 across Australia, highlights disparities in the health workforce distribution (Table 14) (National Rural Health Alliance [NRHA], n.d.).

Table 14

Comparison of the Health Workforce FTE (2020) of the East Pilbara to the NRHA Benchmark and the Average FTE For MM 7 Areas Australia-Wide (FTE Per 100,000)

(NRHA, n.d.).

	East Pilbara	Benchmark	MM 7 Areas
Aboriginal and Torres Strait Islander Health Practitioners	8.9	4.3	63.2
Chiropractors	11.1	14.7	6.8
Dental Practitioners	18.3	70.5	26.5
Medical Radiation Practitioners	28.5	60.2	13.3
Enrolled Nurses	67.0	210.4	129.1
Midwifery	7.2	60.1	62.1
Registered Nurses	797.60	1,084.3	1,086.6
Occupational Therapists	69.9	80.2	34.3
Optometrists	0.0	18.2	5.0
Osteopaths	0.0	7.7	0.6
Pharmacists	53.0	93.3	48.3
Physiotherapists	119.0	95.3	52.1
Podiatrists	0.0	19.1	8.7
Paramedicine Practitioners	624.6	103.3	153.3
Psychologists	34.7	88.3	30.8
General Practitioners	66.8	122.4	175.9
Hospital Non-Specialists	0.0	74.8	22.0
Non-Clinicians	0.0	3.5	1.6
Other Clinicians	0.0	8.6	3.4
Specialists	14.2	154.8	26.3
Specialists in Training	0.0	83.1	18.9

Of the 21 health workforce categories identified in Table 14, the 2020 FTE in the East Pilbara LGA fell below the benchmark in 19 categories, and below the average of the MM 7

areas in 15 categories. In very remote communities, access to some services would not be expected *in situ*. For example, osteopathic or dental services would typically be provided by visiting practitioners or accessed by patient transfer to a larger community location. However, the data demonstrated a shortfall against both the benchmark and the MM 7 average in two workforce categories which are the backbone of the remote health workforce: enrolled/registered nurses and GPs. In addition, the East Pilbara FTE for Aboriginal and Torres Strait Islander Health Practitioners was only 14% of the average FTE for MM 7 communities (AIHW, 2022f). As there is an increased proportion of Aboriginal and Torres Strait Islander peoples in these very remote populations, there is also a greater need for a higher proportion of Aboriginal and Torres Strait Islander health professionals.

Recruitment and Retention

The recruitment of clinical staff was more challenging in 2021 due to a number of factors. COVID-19 made recruitment of RANs difficult, reducing the availability of nursing staff in all remote clinics (PAMS, 2021). There was a marked reduction in the availability of RANs in the Jigalong clinic (PAMS, 2021). While PAMS reported some vacancies in their medical workforce in 2022, their positions for GPs were fully staffed with a total of four GPs serving the Five Localities (PAMS, 2022).

This is consistent with reports of significant issues with staff retention across the Pilbara, which experienced WA's highest proportional movement of staff out of the region in 2020-21 - 29.2% of the workforce (Rural Health West, 2022). To address this issue, PAMS introduced a Retention Allowance in 2017 which has helped to reduce staff turnover in their organisation. In spite of this initiative, it was reported that over half of PAMS' total staff in 2021 had been employed for less than 12 months (PAMS, 2020).

There were challenges associated with recruiting midwives in the Pilbara and the issue was the subject of a State Parliamentary question. In response to this question, it was reported that, as of November 2021, 2.6 FTE midwifery positions were vacant, 7.8 FTE were filled by contract or temporary arrangements, and 15.7 FTE were filled on a permanent basis (Aldridge, 2021).

Workforce Stressors

GPs in the Pilbara reported the highest average hours worked in 2020 (43.4 hours per week) in Western Australia (Rural Health West, 2021b). It was also reported that primary care nurses in the East Pilbara SA3 worked longer hours than the state average (37 hours per week compared to 30 hours) (WAPHA, 2022).

In 2018, GPs in the Pilbara had the third highest rate of solo practice in the state (11.7%) (Rural Health West, 2019). Housing affordability impacted the ability to attract and retain healthcare staff in the Pilbara (Gorman, 2021) and the extreme heat of the Pilbara was reported as a stressor for health professionals providing services to the desert regions of remote Australia (AHCWA, 2019). Issues with fatigue management, health and safety associated with single-nurse postings in remote clinics were also reported (PAMS, 2021).

Discussion

Australia's healthcare budget doubled in the decade to 2019 (Office for Economic Co-operation and Development, n.d.), yet health outcomes in very remote communities have not made similar gains. For the Martu and Nyiyaparli people, many indicators suggest that health outcomes are in decline (Tables 9, 11 and 13). This review sought to identify and collate publicly available information on the health needs of and for the Martu and Nyiyaparli people to aid future planning and resource allocation.

The main finding from this review was that health outcomes for the Aboriginal and Torres Strait Islander peoples of the East Pilbara were poor (PHIDU, 2022). Furthermore, health indicators, such as PADs, PYLL and mental health-related ED presentations, for the East Pilbara were trending negatively (AIHW, 2022b). In addition, the health indicator trends for the Aboriginal and Torres Strait Islander peoples of the East Pilbara were worse than nationwide averages (AIHW, 2022b). These findings suggest that, while national Aboriginal and Torres Strait Islander people have experienced some improvement in health outcomes, these improvements were not reflected in the East Pilbara Aboriginal and Torres Strait Islander populations.

The second finding was that the maldistribution of healthcare professionals in common to very remote areas across Australia was particularly problematic in the East Pilbara (NRHA, n.d.). Workforce shortages were especially concerning in the three professions that form the backbone of rural healthcare (NRHA, n.d.): Aboriginal and Torres Strait Islander Health Practitioners, nurses and GPs. In addition, the East Pilbara had persistently high rates of healthcare staff turnover, particularly in regard to GPs (Rural Health West, 2022).

These findings demonstrate that the current healthcare system has not met the needs of the Martu and Nyiyaparli people. These problems are not unique to the Martu and Nyiyaparli people but to all Aboriginal and Torres Strait Islander people. It has been formally recognised that there was a failure of Australia's healthcare system to meet the needs of Aboriginal and Torres Strait Islander people for over 25 years (Bourke et al., 2022), yet Australia's healthcare system has continued in its failure to respond to the available evidence and to the calls for change from a 'repair shop' healthcare model (Jeffries & Snowball, 2019).

With the announcement of the new federal policy direction on preventive health in late December (DoHAC, 2021b), it became evident that true healthcare reform is now formally an issue of funding rather than of knowledge or recognition of need. The National Preventive Health Strategy 2021-2030 (DoHAC, 2021b) clearly defined objectives for improving the system's performance in preventive health. However, failure to include sufficient public health funding in the 2022-23 federal budget has ultimately stalled in addressing the objectives of this Strategy paper (Public Health Association Australia [PHAA], 2022). Importantly, evidence continues to mount that the preventive health approach is less expensive and produces better outcomes (Masters et al., 2017); yet the healthcare funding for the 2022-23 budget continued to focus on the treatment of disease (PHAA, 2022).

A significant feature of the existing 'repair shop' model was its failure to address the wider determinants of health (Schlesinger & Phillips, 2023), estimated to account for approximately one-third of the gap in health outcomes between Aboriginal and Torres Strait

Islander people and non-Indigenous Australians (AIHW, 2022g). Aboriginal Community Controlled Health Organisations (ACCHOs), the agencies primarily tasked with providing healthcare to very remote Aboriginal and Torres Strait Islander communities, have long identified the primacy of addressing the wider determinants of health (AHCWA, n.d). However, funding restrictions limits their capacity (National Aboriginal Community Controlled Health Organisation, 2021) and hinders innovations that might address community needs (Productivity Commission, 2021). The communities of the Martu and Nyiyaparli people were ranked in Australia's lowest one percentile in SEIFA scores (ABS, 2018). Therefore, these restrictions are particularly detrimental in already disadvantaged communities where the impact of the wider determinants of health are the greatest (Neadley et al., 2021), such as the communities of the Martu and Nyiyaparli people.

A final note on this review is that the publicly available health data for the Martu and Nyiyaparli people were sparse, and this may limit the overall understanding of the entire health needs or outcomes for this population. Sufficient data were available regarding the health outcomes for the wider Aboriginal and Torres Strait Islander peoples in the East Pilbara; however, it is acknowledged that diversity within Aboriginal and Torres Strait Island peoples influences the health needs of the different language groups (Bourke et al., 2022). Thus, care should be taken when interpreting whole population data within the context of the Martu and Nyiyaparli people.

While the publication of the National Preventive Health Strategy 2021-2030 (DoHAC, 2021b) acknowledges, at the Australian Federal Government level, the primacy of preventive medicine, specific action is required to translate that understanding into outcomes. Though defining these actions lies outside the scope of this project, the review did locate literature identifying the need for an improved funding model to address the wider determinants of health (Schlesinger & Phillips, 2023), and a shift in locus of expenditure control to enable local problems to be addressed through place-based solutions and person-centred care (Productivity Commission, 2021).

Conclusion

Australia's healthcare expenditure continues to grow, yet health outcomes in very remote communities fail to benefit from this investment. The poor health outcomes, negative trends in health indicators and persistent health workforce issues identified in this review clearly show that the current model of healthcare has failed to meet the health needs of the Martu and Nyiyaparli people. The findings of this review support calls for a new model of healthcare that focuses on preventive health measures, with comprehensive reform occurring across all levels of government, particularly in healthcare funding allocation.

References

Aboriginal and Torres Strait Islander Health Performance Framework. (2021). *Regular general practitioner or health service.* https://www.indigenoushpf.gov.au/measures/3-17-regular-gp-health-service

Aboriginal Health Council of Western Australia. (n.d). A*bout us.* https://www.ahcwa.org.au/about-us/

Aboriginal Health Council of Western Australia. (2019). *WA Climate Health Inquiry.* https://ww2.health.wa.gov.au/~/media/Files/Corporate/general-documents/Climate-Health-WA-Inquiry/public-submissions/Organisations/AboriginalHealthCouncilWA.pdf

Aboriginal Health Council of Western Australia. (2021a). *AHCWA Submission – Inquiry into the Delivery of Ambulance Services in Western Australia – July 2021.* Parliament of WA. https://www.parliament.wa.gov.au/Parliament/commit.nsf/luInquiryPublicSubmissions/C3A8EC208D2377AE482587720027379B/$file/096%20Aboriginal%20Health%20Council%20of%20WA.pdf

Aldridge, Martin. (2021). *Question On Notice No. 36 asked in the Legislative Council on 4 May 2021 by Hon Martin Aldridge*. Parliament of Western Australia. https://www.parliament.wa.gov.au/parliament/pquest.nsf/viewLCPQuestByDate/8E2BADC9D6DE462F482586CB00212F42?opendocument

Australia Local Government Association. (2022). *Facts and Figures*. https://alga.com.au/facts-and-figures/

Gorman, V. (2021). *Housing affordability crisis in WA's north impacting some of its most vulnerable residents***.** Australian Broadcasting Corporation. https://www.abc.net.au/news/2021-06-22/housing-affordability-impacting-vulnerable-pilbara-residents/100162850

Australian Bureau of Statistics. (2018). *Census of population and housing: socio-economic indexes for areas (SEIFA), Australia, 2016.*

https://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/2033.0.55.0012016?OpenDocument

Australian Bureau of Statistics. (2022a). 2021 *Census of Population and Housing: General Community Profile. Local Government Areas.* https://www.abs.gov.au/census/find-census-data/community-profiles/2021/AUS

Australian Bureau of Statistics. (2022b*). 2021 Census Community Profiles: Aboriginal and/or Torres Strait Islander Peoples Profiles. Indigenous locations.* https://www.abs.gov.au/census/find-census-data/search-by-area

Australian Bureau of Statistics. (2022c). *Community profile by Indigenous Area (IARE).* https://abs.gov.au/census/find-census-data/community-profiles/2021/IA506001

Australian Bureau of Statistics. (2022d). *Community Profile by Indigenous Location (ILOC). https://abs.gov.au/census/find-census-data/community-profiles/2021/IARE506001*

Australian Bureau of Statistics. (2023a). *Indigenous Areas, Australian Statistical Geography Standard (ASGS) Edition 3.* https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/indigenous-structure/indigenous-areas

Australian Bureau of Statistics. (2023b). *Statistical Area Level 3, Australian Statistical Geography Standard (ASGS) Edition 3.* https://www.abs.gov.au/statistics/standards/australian-statistical-geography-standard-asgs-edition-3/jul2021-jun2026/main-structure-and-greater-capital-city-statistical-areas/statistical-area-level-3

Australian Human Rights Commission. (2008). *Close the gap; Indigenous Health Equality Summit.* https://humanrights.gov.au/sites/default/files/content/social_justice/health/statement_intent.pdf

Australian Indigenous Health*InfoNet*. (2021). *Overview of Aboriginal and Torres Strait Islander health status, 2020.* https://healthinfonet.ecu.edu.au/key-

resources/publications/42435/?title=Overview+of+Aboriginal+and+Torres+Strait+Islander+health+status+2020&contentid=42435_1

Australian Institute of Health and Welfare. (2018). *Health expenditure Australia 2016-17.* https://www.aihw.gov.au/getmedia/e8d37b7d-2b52-4662-a85f-01eb176f6844/aihw-hwe-74.pdf

Australian Institute of Health and Welfare. (2022a). *Indigenous health and wellbeing.* https://www.aihw.gov.au/reports/australias-health/indigenous-health-and-wellbeing

Australian Institute of Health and Welfare. (2022b). *Mortality Over Regions and Time (MORT) books.* https://www.aihw.gov.au/reports/life-expectancy-death/mort-books/contents/mort-books

Australian Institute of Health and Welfare. (2022c). *Suicide self-harm monitoring.* https://www.aihw.gov.au/getmedia/fef61104-dbe5-4f91-bdb2-fc50f7c55177/Suicide-self-harm-monitoring-Data.pdf.aspx?inline=true

Australian Institute of Health and Welfare. (2022d). *Aboriginal and Torres Strait Islander Health Performance Framework. Data tables: Measure 1.24 Avoidable and preventable deaths.* https://www.indigenoushpf.gov.au/measures/1-24-avoidable-preventable-deaths/data

Australian Institute of Health and Welfare. (2022e). *Mental health services provided in emergency departments*. https://www.aihw.gov.au/reports/mental-health-services/mental-health-services-in-australia/report-contents/hospital-emergency-services

Australian Institute of Health and Welfare. (2022f). *Rural and remote health.* https://www.aihw.gov.au/reports/rural-remote-australians/rural-and-remote-health

Australian Institute of Health and Welfare. (2022g). *Determinants of health for Indigenous Australians*. https://www.aihw.gov.au/reports/australias-health/social-determinants-and-indigenous-health

Bourke, S. C., Chapman, J., Jones, R., Brinckley, M-M., Thurber, K. A., Calabria, B., Doery K., Olsen, A., & Lovett, R. (2022). Developing Aboriginal and Torres Strait Islander cultural indicators: An overview from Mayi Kuwayu, the National Study of Aboriginal and Torres Strait Islander Wellbeing. *International Journal for Equity in Health, 21*(1), 109. https://doi.org/10.1186/s12939-022-01710-8.

Department of Health and Aged Care. (2021a). *Area of Need.* Department of Health and Aged Care. https://www.health.gov.au/topics/rural-health-workforce/classifications/aon

Department of Health and Aged Care. (2021b). *National Preventive Health Strategy 2021-2030.* https://www.health.gov.au/resources/publications/national-preventive-health-strategy-2021-2030.

Department of Health and Aged Care. (2021c). *Modified Monash Model.* https://www.health.gov.au/health-topics/rural-health-workforce/classifications/mmm

Department of Health and Aged Care. (2022). *Nursing hours per patient day annual report.* https://www.health.wa.gov.au/~/media/Corp/Documents/Health-for/Nursing-and-midwifery/PDF/NHPPD-Annual-Report-JUL20-JUN21.pdf

Department of Health and Aged Care. (2022). *Health Workforce locator.* https://www.health.gov.au/resources/apps-and-tools/health-workforce-locator/health-workforce-locator

Department of Primary Industries and Regional Development. (2021). *Climate in the Pilbara region of Western Australia.* Department of Primary Industries and Regional Development. https://www.agric.wa.gov.au/climate-change/climate-pilbara-region-western-australia

Department of Planning, Lands and Heritage. (2006). *Jigalong Layout Plan 2 Background Report.* https://www.wa.gov.au/system/files/2021-09/Jigalong-LP2-Amendment-16-Report.pdf

Department of Planning, Lands and Heritage. (2007a). *Parnngurr Layout Plan 2 Background Report.* https://www.wa.gov.au/system/files/2023-07/parnngurr-lp-2-amendment-7-report.pdf

Department of Planning, Lands and Heritage. (2007b). *Punmu Layout Plan 2 Background Report.* https://www.wa.gov.au/system/files/2021-07/LOP-Punmu-LP2-Amendment-4-Report.pdf

Department of Planning, Lands and Heritage. (2019). *Kunawarritji Layout Plan 2 Background Report.* https://www.wa.gov.au/system/files/2023-07/kunawarritji-lp1-amendment-10-report.pdf

Duggan, M., Harris, B., Chislett, W. K. and Calder, R. (2020). *Nowhere else to go: Why Australia's health system results in people with mental illness getting 'stuck' in emergency departments.* https://vuir.vu.edu.au/41956/1/nowhere-else-to-go-people-mental-illness-stuck-emergency-departments-report-mitchell-institute.pdf

Google Maps. (n.d). [Driving distance and time required to travel between city centres and rural/remote communities]. Retrieved September 26, 2022, from https://www.google.com/maps

headspace. (2023). *headspace Pilbara.* https://headspace.org.au/headspace-centres/pilbara/

healthdirect. (n.d). *Service finder.* https://www.healthdirect.gov.au/australian-health-services

Jeffries, F., & Snowball, K. (2019). *Towards a medical workforce strategy in WA.* https://www.wagpet.com.au/media/io4pfevc/wa-rural-medical-workforce-strategy.pdf

Kanyirninpa Jukurrpa. (n.d). *Meet the Martu.* https://www.kj.org.au/meet-the-martu

Karlka Nyiyaparli Aboriginal Corporation. (2022). *About Us.* https://www.karlka.com.au/about/#:~:text=The%20Nyiyaparli%20People%20are%20the,township%20of%20Newman%2C%20Western%20Australia

Masters, R., Anwar E., Collins B., Cookson R, and Capewell S. (2017). Return on investment of public health interventions: A systematic review. *Journal of Epidemiology Community Health, 71*(8), 827–834. doi:10.1136/jech-2016-208141.

National Aboriginal Community Controlled Health Organisation. (2021). *Pre-budget submission January 2021.* https://treasury.gov.au/sites/default/files/2021-05/171663_national_aboriginal_community_controlled_health_organisation.pdf

National Rural Health Alliance. (n.d). *Rural Health Workforce Mapping Tool.* https://www.ruralhealth.org.au/mapping-tool

National Rural Health Alliance. (2019). *Allied health workforce in rural, regional & remote Australia.* https://www.ruralhealth.org.au/sites/default/files/publications/fact-sheet-allied-health.pdf

Neadley, K. E., McMichael G., Freeman T., Browne-Yung K., Baum F., Pretorius E., Taylor K., & Boyd M. A. (2021). Capturing the social determinants of health at the individual level: A pilot study. *Public Health Research & Practice, 31*(2). https://doi.org/10.17061/phrp30232008.

Newman Futures. (2019). *Edition 5, Community Newsletter.* https://newmanfutures.com.au/wp-content/uploads/2019/12/001366_BHP-CTP_Newsletter_ED5_DEC_vFA-2-WEB.pdf

Office for Economic Co-operation and Development. (n.d). *Health Expenditure and Financing.* https://stats.oecd.org/Index.aspx?DataSetCode=SHA

Paez, A. (2017). Grey literature: An important resource in systematic reviews. *Journal of Evidence-Based Medicine*. https://doi.org/10.1111/jebm.12265

Pappas, C., & Williams, I. (2011). Grey Literature: Its emerging importance. *Journal of Hospital Librarianship, 11*(3), 228-234. https://doi.org/10.1080/15323269.2011.587100.

Productivity Commission. (2020). *Mental Health, Report no. 95.* https://www.pc.gov.au/inquiries/completed/mental-health/report

Productivity Commission 2021, *Innovations in Care for Chronic Health Conditions, Productivity Reform Case Study.* https://www.pc.gov.au/research/completed/chronic-care-innovations

Public Health Association Australia. (2022). *2022 Budget deserves a F-.*

https://www.phaa.net.au/news/2022-budget-deserves-a-f

Public Health Information Development Unit. (2022). *Indigenous Status Comparison: Social Health Atlas of Australia Data by Indigenous Area*. https://phidu.torrens.edu.au/social-health-atlases/data

Puntukurnu Aboriginal Medical Service. (n.d.a). *Visiting Specialists.* https://www.puntukurnu.com.au/clinical-services/visiting-specialists.aspx

Puntukurnu Aboriginal Medical Service. (n.d.b). *Primary Health Care.* https://www.puntukurnu.com.au/clinical-services/primary-health-care.aspx

Puntukurnu Aboriginal Medical Service. (2020). *Annual Report 2020.* https://www.puntukurnu.com.au/Profiles/pams/Assets/ClientData/IJ29_-_PAMS_-_Annual_Report__WEB_.pdf

Puntukurnu Aboriginal Medical Service. (2021). *Annual Report 2021.* https://www.puntukurnu.com.au/Profiles/pams/Assets/ClientData/Annual-Report-2021.pdf

Puntukurnu Aboriginal Medical Service. (2022). *Annual Report 2022.* https://www.puntukurnu.com.au/documents/4/annual-report-2122

Rural Health West. (2019). *Rural general practice in Western Australia - Annual workforce update 2018.* https://ruralhealthwest01.blob.core.windows.net/www-production/docs/default-source/marketing/publications/annual-workforce-update-november-30-2019-final_21072020_complete_lr.pdf?sfvrsn=2

Rural Health West. (2020). *Profile of the rural resident specialist workforce 2020.* https://ruralhealthwest01.blob.core.windows.net/www-production/docs/default-source/rural-resident-specialists-fact-sheets/profile-of-the-rural-resident-specialist-workforce-2020_ihp.pdf?sfvrsn=2

Rural Health West. (2021a). *Profile of the rural resident specialist workforce 2021.* https://ruralhealthwest01.blob.core.windows.net/www-production/docs/default-source/corporate/profile-of-the-rural-resident-specialist-workforce-2021_f_ihp.pdf?sfvrsn=2

Rural Health West. (2021b). *Rural general practice in Western Australia - Annual workforce update.* https://ruralhealthwest01.blob.core.windows.net/www-production/docs/default-source/marketing/publications/annual-workforce-update-november-30-2020_final-web.pdf?sfvrsn=2

Rural Health West. (2022). *Rural general practice in Western Australia - Annual workforce update 2021*. https://ruralhealthwest01.blob.core.windows.net/www-production/docs/default-source/corporate/annual-workforce-update-november-30-2021_published-june-2022_final-complete.pdf?sfvrsn=2

Schlesinger, N., & Phillips, S. (2023). *Bold action needed on social determinants to improve health outcomes.* https://www.pwc.com.au/health/health-matters/social-determinants-in-health-australia.html

Slack, M. J., Law, W. B., & Gliganic, L. A. (2020). The early occupation of the Eastern Pilbara revisited: New radiometric chronologies and archaeological results from Newman Rockshelter and Newman Orebody XXIX. *Quaternary Science Review*, 236, 106240. https://www.sciencedirect.com/science/article/abs/pii/S027737911930753X?via%3Dihub

Tallentire, C. & Goiran, N. (2020). *Palliative care in Western Australia - progress report: Final report of the joint select committee on palliative care in Western Australia.* Parliament of Western Australia. https://www.parliament.wa.gov.au/Parliament/commit.nsf/(Report+Lookup+by+Com+ID)/18B9480C632DACFC48258625000B1E29/$file/pv.plc.201111.rpf.001.xx.pdf

Western Australia Country Health Service. (2021). *Specialist Medical Outpatient Services.* https://www.wacountry.health.wa.gov.au/~/media/WACHS/Documents/Pilbara/PILBARA_VISITING_MEDICAL_SERVICES_2021.pdf

Western Australia Local Government Association. (2018). *Regional Health Services in Western Australia Survey of Local Governments.*

https://walga.asn.au/getattachment/Policy-Advice-and-Advocacy/People-and-Place/Health-and-Wellbeing/WALGA-Regional-Health-Services-in-Western-Australia-Survey-of-Local-Governments-FINAL.pdf?lang=en-AU

Western Australia Primary Health Alliance. (2022). *Pilbara needs assessment 2022-24.* https://www.wapha.org.au/wp-content/uploads/2022/04/Needs-Assessment_Country-WA_Pilbara.pdf

WA location map. (2005, October 11). In *Wikipedia*. https://en.m.wikipedia.org/wiki/File:Western_Australia_location_map.png

Location of the Local Government Area in Western Australia: East Pilbara. (2007, April 19). In *Wikipedia*. https://commons.wikimedia.org/wiki/File:East_pilbara_LGA_WA.png

Williams, D., Costa, M., Odunlami, A., & Mohammed, S. (2008). Moving upstream: How interventions that address the social determinants of health can improve health and reduce disparities. *Journal of public health management and practice*, *14 Suppl*(Suppl), S8–S17. https://doi.org/10.1097/01.PHH.0000338382.36695.42