

AusEnHealth

An Australian environmental health digital twin



AusEnHealth Project Deliverable 1

Data Audit Report

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AusEnHealth Data Audit Report

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Executive Summary

Environmental health encompasses physical, chemical, and biological factors in the environment that potentially or currently have an impact on the health of individuals and populations, as well as the communities in which people live. The importance of environmental health has been on the rise since the call for national coordination in the field by the Australian **Environmental Health Standing Committee** (enHealth) in 2000. Since then, there have been a number of achievements towards the enHealth Strategic Plan, leading up to the commencement of the **Australian Environmental Health Project** (AusEnHealth). AusEnHealth aims to build a national, spatially enabled, ongoing infrastructure resource that will enable users to access, visualise and analyse environmental health data, reports, and models.

As part of the first steps of the AusEnHealth Project, both international and national resources were reviewed to identify a preliminary list of environmental health indicators and parameters. Following on from that review, this report contains findings from a data audit to identify the most valuable data to underpin the AusEnHealth infrastructure. As part of this audit, the metadata have been recorded, where available, including timescale, update frequency, spatial resolution, data file format, geographical extent, and access restrictions.

In the first phase, a focus has been placed on the identification of data with a national coverage, while also building a collection of state-based data sources for future consideration. This data audit focused on data pertaining to 5 key use cases:

1. Climate and Health Outcomes Related to Heat
2. Built Environment and Health Outcomes Related to Heat
3. Water Quality and Water Borne Disease
4. Air Quality and Asthma
5. Climate and Mosquito Borne Disease

National Data

The quality and access of national data in Australia is a reflection of the quality and accessibility of state-based data and represents a large portion of the data pursued as part of the data audit. While many national sources of air quality, built environment and climate data have been discovered, it is clear that there are no national data custodians which hold water quality data. Communication with existing data custodians has revealed that this is the responsibility of either a state or local government area in Australia.

Health data have also been pursued as part of this data audit activity. While incidences of notifiable disease are recorded, there have been difficulties locating data relating directly to other health outcomes including asthma and heatstroke. Data custodians suggest the use of excess deaths in modelling, as well as emergency department presentations, classified by **International Statistical Classification of Diseases and Related Health Problems** (ICD) codes. These parameters offer some insight into specific environmental health risks and reflect the current system of health statistics in Australia.

The processes undertaken to determine the use cases are provided in the document, as well as the approach used in the data audit and the data catalogue itself which, at the time of writing, contains over 100 parameters from over 20 sources. Following this data audit activity, priority use cases will be selected for implementation into the AusEnHealth demonstrator. A portion of the data mentioned in

this report will then be accessed and assessed ahead of modelling and integration into the planned infrastructure resource.

Data Quality, Accessibility, and Recommendations

Following an analysis of gaps and opportunities from the data audit, a series of recommendations have been made regarding environmental health data.

1. Health Outcomes

In an ideal environment, the pursuit of health outcome data would involve a searchable catalogue which shares the data custodians and related metadata both nationally and by jurisdiction and allows for open access to various temporal and spatial resolution data. Health outcome data access in its current state is heavily restricted by privacy concerns and governance. In the AusEnHealth Project, this has led to limited insight into the metadata recorded at state level, with understanding gained through either project partners, such as WA Health, or through national data custodians, such as AIHW, NNDSS, and ABS. While information for some Australian health outcome data are available through each of these sources, the development of an Australian health data catalogue would greatly improve the flow of information to decision makers, as well as improving the visibility of the state of Australian health outcome data.

Recommendation 1.1: National coordination for the development of a health data catalogue, including both national and jurisdiction specific data.

Recommendation 1.2: Efforts to enable easier access to health data through ongoing discussion on privacy in line with open data initiatives.

2. Climate

As a broad finding, climate data is the most straightforward and complete data identified in this audit. While features such as extreme temperature and extreme rainfall are listed as paid options, the temperature and rainfall parameters themselves can be used to derive such features. However, it is acknowledged that climate includes a much larger range of variables than the parameters included in this audit.

3. Air Quality

The air quality data recorded are the modelled results from the Centre for Air pollution, energy, and health Research (CAR). This modelled data is produced through research funding and is not ongoing. Using this data source in the short term is acceptable, however, if CAR stops producing modelled data, it is recommended that replacement modelled data be sourced. For this reason, the effort to pursue further data sources will continue past the release of this document and will be stored in a live data catalogue, maintained at <https://frontiersi.com.au/ausenhealth-digital-twin>.

While the modelling aspect of the air quality data can be repeated, there are potential issues with fine temporal modelling. Air quality data is recorded by many states using rolling averages, which protects from equipment malfunction but inhibits real-time analysis. If this data were released without smoothing, more complex models could be achieved and at a more sensitive time scale.

Recommendation 3.1: Data released from air quality monitoring stations should be provided without smoothing to enable complex modelling.

Recommendation 3.2: Seek to increase the density of air quality monitoring stations to improve the granularity of air quality data for modelling and analysis.

Recommendation 3.3: Ensure continued support for CAR’s modelled air quality data or ensure support for an alternative in the event CAR’s work is discontinued.

4. Water Quality

While the parameters identified in this audit are at a fine scale and are accessible, there are many absent parameters which, if accessible, would enable modelling of water borne disease. Some examples of desirable parameters for modelling include pH, dissolved oxygen levels and chemical compound amounts such as copper, lead, zinc, or iron. We recommend future work to bring water quality monitoring to the same standards as climate data in preparation of potential spikes in water borne disease incidence.

Recommendation 4.1: Future efforts should be undertaken to ensure that water quality monitoring data suitable for analysis of water borne disease developments is made available both nationally and by jurisdiction.

5. Built Environment

There are a range of built environment parameters which exist on a national scale. These parameters share a number of limitations: a large number of the national parameters have only been recently developed and consist of data from 2020 onwards, the parameters are mostly one point in time compared to the time series data recorded in other exposure domains, and the update frequency for many parameters is yearly. It is clear that built environment indicator development is ongoing. Recording time series data could allow for more complex analysis to be performed and is the main recommendation relating to built environment data.

Recommendation 5.1: Continue development of time series data relating to built environment.

6. All Data

When considering national data in Australia, a common issue communicated by national data custodians is differences in formatting and collection across states. If each state adapted to a single agreed framework for the collection or recording of state-based data, repeated data collation and cleaning efforts would no longer be a strain on analysis groups and a comparison of data between states would become more straightforward. On a similar note, metadata collected for various environmental health categories (down to indicators and their parameters) differs by state, which makes preparing national data infeasible for some parameters.

Recommendation 6.1: Work towards adherence to national data standards.

Recommendation 6.2: Agreement of nationally consistent environmental health indicators and metadata standards for priority use cases in Australia.

Introduction

Humans depend on the environment for energy and the materials necessary to sustain life [1]. In 2016, the **World Health Organisation** (WHO) stated that *"13.7 million deaths per year in 2016, amounting to 24% of the global deaths, are due to modifiable environmental risks"* [2]. The ongoing consideration of environmental factors is crucial for maintaining and improving the lives of humans [3]. The consideration of public health with specific respect to the environment is referred to as *environmental health*.

The United States of America's **National Environmental Health Association** (NEHA) defines environmental health as *"the science and practice of preventing human injury and illness and promoting well-being by identifying and evaluating environmental sources and hazardous agents and limiting exposures to hazardous physical, chemical, and biological agents in air, water, soil, food, and other environmental media or settings that may adversely affect human health"* [4]. Similarly, the **Australian Government Department of Health** (DOH) states that environmental health *"involves those aspects of public health concerned with the factors, circumstances, and conditions in the environment or surroundings of humans that can exert an influence on health and well-being"* [5].

Enabling an understanding of Australian environmental factors in different regions across Australia can save lives through improved intervention targeting, prevention initiatives, and community awareness. While there is decades-long nation-wide interest in improving environmental health [6], understanding in Australia, existing approaches have either been limited in success or scope. This is largely due to differences in state-based policies for recording and sharing environmental health data, as well as a lack of long-term funding opportunities for projects working to produce improved infrastructure.

The **Australian Environmental Health** (AusEnHealth) **Project** aims to build a national, spatially enabled, ongoing infrastructure resource that will enable users to access, visualise and analyse environmental health data, reports, and models. Such a resource will allow the general public, media, policy analysts, decision-makers, researchers, and scientists to engage with environmental health in ways not previously possible in Australia. This is a staged project, the first phase of which is to build an interactive demonstrator.

This report is the first deliverable of the AusEnHealth Project and begins with a *Current Focus* section, which details the scope of the data audit following the AusEnHealth Project's *Use Case Workshop* activity. The *Data Catalogue* section details key parameters recorded throughout the data audit activity, as well as key data collections held by various organisations. A *Methods* section follows, which details the motivation behind the choice of certain parameters and data custodians. A *Related Projects* section is then included, noting resources that provide similar capabilities to those of the proposed AusEnHealth demonstrator, as well as environmental health projects which may be included.

Information attained throughout this data audit will be used in the data access portion of the AusEnHealth Project ahead of modelling and integration into the demonstrator.

Focus of the Data Audit

Environmental health is a broad topic which encompasses many different aspects of both environment and health. To ensure that the AusEnHealth Project produces a high-quality resource in the first phase, the demonstrator is to be built using data focused on a select number of use cases. The data audit covered by this report relates only to data required to support each of these use cases, rather than a complete data audit of all environmental health data. To better understand what is meant by “*use case*”, we provide some terminology below which is referred to within the AusEnHealth Project.

Terminology

It is important to begin this subsection by defining *environmental health indicators*, as they are of high interest to policy analysts, decision-makers, scientists, and researchers working in the field and play an important role in environmental health monitoring and modelling. Environmental health indicators “*describe the link between the environment and health*” [1] and usually describe one aspect of the environment-health relationship. Environmental health indicators are classified into:

- *Exposure indicators*: Possible environmental determinants of health, and
- *Health indicators*: Health effects from environmental hazards and risks.

Environmental health indicators are often grouped into *exposure domains*; categories which contain a number of related environmental determinants of health. Such domains include:

- Air quality,
- Climate, and
- Built environment.

A simple breakdown of the air quality exposure domain is given in Table 1, listing only a few of the many indicators and parameters in the full exposure domain.

The AusEnHealth Project defines a *use case* as an exposure domain and at least one of its associated health outcomes, described by health indicators. Some examples of use cases include:

- Air quality and asthma,
- Air quality and respiratory health outcomes,
- Water quality and gastrointestinal disease, and
- Land contamination and health outcomes related to lead exposure.

The grouping of exposure and health indicators is used in the AusEnHealth project to split the broad topic of environmental health into tangible sections, which can be prioritised for implementation into the demonstrator. The use cases mentioned in this report have been determined through the review of similar projects and research papers in environmental health both in Australia and internationally. More detail on the indicators and parameters which make up these use cases in the literature is given in the *Methods* section of this report.

Exposure Domain	Environmental Indicators	Parameters Measured	Environmental Indices
Air Quality	Wood and Coal Fires	<ul style="list-style-type: none"> - Number of households using wood fires for home heating. - Number of households using coal fires for home heating. 	<p>Box ATM10 Air quality index</p> <p>An air quality index (AQI) is calculated based on the relevant Air National Environment Protection Measure (NEPM) standard, or advisory standard, for that pollutant as follows:</p> <p>AQI = pollutant concentration/pollutant standard × 100</p> <p>For example, at an index value of 100, the pollutant is currently at a concentration equal to an environmental standard level. The lower the index, the better the air quality.</p>
	Motor Vehicles	<ul style="list-style-type: none"> - Number of motor vehicles in Australia by type (including diesel). - Number of light vehicles per 1000 population. - Average age of vehicle fleet. 	
	Particulate Matter	<ul style="list-style-type: none"> - Annual average PM10 levels at monitoring sites. - Exceedances of the daily national standard for PM10 levels, including maximum PM10 levels. 	
	Other Air Pollutants	<ul style="list-style-type: none"> - Annual average NO2 concentration at monitoring sites. - NO2 1-hour maximum levels at monitoring sites. - Monitoring sites exceeding the WHO daily guideline for SO2. - SO2 1-hour maximum levels at monitored sites. - CO 8-hour maximum levels at monitored sites. 	

Table 1: Exposure domain breakdown example for air quality. Indicators sourced from Environmental Health Indicators New Zealand [1], air quality index sources from the 2016 State of the Environment Report [7].

Use Case Workshop

The AusEnHealth Project's *Use Case Workshop* was held on the 4th of December 2020 and was the first use case prioritisation task. For this workshop, the AusEnHealth Project's Advisory Group, Delivery Team, and other contacted experts in environmental health met to decide on 5 key use cases. Initially, the workshop attendees were asked to rank exposure domains for further consideration. The results of which are displayed below:

Exposure Domain	Rank
Air Quality	2
Climate, Weather & Extreme Weather	1
Water Quality & Quantity	3
Food Safety & Supply	6
Vector Distribution & Ecology	4
Built Environment	5
Land & Land Contamination	7

From this ranking activity, Food Safety & Supply and Land & Land Contamination were excluded for this phase of the AusEnHealth Project. The remaining exposure domains were then expanded to potential use cases: a combination of exposure domain and selected health outcome(s) based on environmental health literature (with some added through discussion during the workshop). The use cases were then discussed based on discovered data sources at the time of the workshop and were further considered using the following criterion:

- Can data related to the use case be collected on a national scale?

- *Availability*: Is data available and accessible?
- *Reach*: Can data be attained from multiple jurisdictions?
- How important is the use case?
 - *Clarity*: Are there clear links between environmental indicators and health indicators?
 - *Urgency*: Does the use case address a significant or emerging health hazard?
- How feasible is the use case?
 - *Timeliness*: Is this use case feasible to explore in this project period (12 months)?
 - *New Knowledge*: Would including this use case enable the ability to discover new knowledge that might otherwise go unchecked?

This criterion is the result of consideration of the literature [8], [9] and how it applies to the AusEnHealth Project. Each attendee was then asked whether each use case should be considered further, with *yes*, *maybe* and *no* response options. To summarise these responses, a *score* was attributed to each response, with a *yes* response given a score of 2, a *maybe* response a 1 and a *no* response a 0. The results were used to create three ranking methods (a sum of the *maybe* and *yes* responses, a sum of the *yes* responses and an average score), which were used to arrive at the following 5 key use cases:

1. Climate and Health Outcomes Related to Heat
2. Built Environment and Health Outcomes Related to Heat
3. Water Quality and Water Borne Disease
4. Air Quality and Asthma
5. Climate and Mosquito Borne Disease

All considered use cases are listed in Appendix A: Use Case Ranking: Table 3, as well as their rankings using the various ranking methods. The national data audit activity began directly following this workshop, with a focus on the above 5 key use cases. Information presented in the following *Data Catalogue* section is the primary result of the work carried out as part of the data audit activity.

Methods

This section of the report outlines the current international efforts in data access and visualisation, notes international data sources which were used as a starting point for the AusEnHealth Project's data audit, and outlines the data audit approach.

Related Projects

There are two important objectives of the AusEnHealth Project. The first objective is to enable improved access to national data relating to environmental health. The second objective is to provide models and visualisations, which enable the interpretation of data for decision making. Data platform development, in a general sense, is by no means a new concept. In fact, there have been many successful national and international projects which focus on both data provision and visualisation [10, 11, 12], including project with an environmental health scope [13, 14, 15, 16].

The AusEnHealth Project is not the first Australian effort to provide a resource aiming at improving access to environmental health information on a national scale. In 2010, a report titled *Investigation, Scoping and Planning of a National Environmental Health Tracking System* was produced by the WA Department of Health **Environmental Health Directorate** (commissioned by enHealth) [8]. This scoping project shares a large number of goals with the AusEnHealth Project and provided insight into the difficulties that would be faced in the pursuit of a national environmental health platform, including data custodian and stakeholder perception, as well as data access and interpretation. The report recommended the development of a tool which focuses on the collection, analysis and reporting of “*core information relative to the practice of environmental health in Australia*”. To ensure the success of projects in the future, the report notes that “*negotiation with data custodians will have to occur around specific datasets and will have to be negotiated around individual topics and end uses*”. The findings and recommendations from the work in [8] have been and will continue to be carefully considered throughout the course of this project to ensure that the resulting demonstrator has the potential to be maintained and expanded in the future.

Indicator Development Frameworks

The aforementioned enHealth report [8] also identifies the need for consistent standards for the recording and reporting of information on a national scale. To help achieve this, the creation of nationally recognised environmental health indicators is also recommended. Indicator development literature has been considered in the AusEnHealth Project, which referred to several frameworks. These include:

- Environmental public health conceptual framework (EPHCF) [17],
- Driving force-pressure-state exposure-effect-action (DPSEEA) [18],
- Driving force-pressure-state-impact-response (DPSIR) [19],
- Pressure-state-response (PSR) [20], and
- Driver-pressure-environmental condition-health impact-action (DPEHA) [21].

Indicators and Parameters in the Literature

As the development of indicators is a large task, the AusEnHealth Project instead relied on existing literature to determine indicators and parameters of interest. A number of these sources relied on the above indicator development frameworks [1, 22, 23, 10, 24], while other sources include research literature [25, 26] and government-backed reports [27, 28], which state indicators and parameters without reference to existing development frameworks.

Information has been taken from the above sources to produce an indicator summary document, which can be found online at <https://frontiersi.com.au/ausenhealth-digital-twin>. This document lists the exposure domains, indicators, and parameters noted in each of the sources discovered prior to the AusEnHealth Project's use case workshop activity.

Approach to Data Audit

The goal of this data audit is to identify valuable data sources, as well as to better understand the landscape of Australian environmental health data collection at both state and national levels. The indicators and parameters from the literature have been used as a starting point in the identification of Australian sources of environmental health data in this project. The process undertaken involved (a) searching for terms similar to those identified in the indicator summary document, (b) auditing the results based on data quality and accessibility, and (c) consultation with data custodians to discuss potential data gaps.

This process of identification and recording of environmental health metadata is limited by the online nature of the approach. Attempts have been made to contact a number of data custodians to discuss relevant data that may not be noted online. Resulting discussions have revealed that some custodians sell data services which include temporal and spatial resolutions and time series data not otherwise available. Over time, these additional options will be noted in the live data catalogue as knowledge of existing data continues to develop.

Data Search

Each of the known parameters and indicators were sought via four main data repositories for Australian environmental health data:

1. **Data.gov.au:** A national aggregation of data sources used by governmental organisations. For each data source shown on the platform, the source location of that data was searched until the access point could be found. Many of the Australian national data repositories were identified through this method, including BOM, ABS, and Geoscience Australia.
2. **Google:** A standard google search was undertaken for each indicator to locate sources outside the Australian data repositories. International organisations with global datasets were found through this method, including LANCE-MODIS, CRU.TS, and TerraClim.
3. **National Map:** National Map is an aggregator of publicly available data repositories and is especially useful for identifying potential sources of built environment data.
4. **Research Articles:** A short search using Google Scholar for data repositories was undertaken to discover recently developed datasets for any of the parameters in the Indicator document.

Each of these searches are aimed at determining the access point for the dataset specific to each parameter. Each of the sources identified in this step were then audited.

Data Source Auditing

The following criteria were used to determine the quality of the data source:

1. **National Coverage:** The data sets must cover at least the Australian mainland (including Tasmania), or be able to be merged from state level datasets.
2. **Current:** The data must fall within the year range of 2000-Present. Additionally, there must be sufficient data in each year.
3. **Spatially Precise:** Preference was given to point data or rasters with high resolution (0.07° or better).

4. Accessible: The data must be freely accessible (except in the case of BOM derived variables) and publicly available (or available through agreement).

Of over 100 sources identified, roughly 50 have been listed as suitable sources for the AusEnHealth Project. Once a source was identified for a parameter, a listing was then created in the data catalogue with a range of attributes, including data custodian, access website link, timescale, update frequency, spatial resolution, data file format, among others.

Data Catalogue

Throughout the data audit activity, information relating to data and custodians were recorded. This section displays this information, separated into data custodian information, key data identified by the AusEnHealth Project team and other data which may be relevant to the 5 key use cases discussed in the Use Case Workshop section of this report.

As it is possible that data sources may change in the future, a live version of the data catalogue has been created and can be found at <https://frontiersi.com.au/ausenhealth-digital-twin>. The live catalogue is to be updated on a regular basis and also accepts contributions (see the Ongoing Data Collection and Collaboration section of this report).

Data Custodian Information

There are a large number of environmental health data custodians in Australia, each with different practices and goals. Throughout the search process, our understanding of key data and data sources for visualisation and modelling increased. As a result, a set of key data custodians were established which provide a significant portion of environmental health data at a national level. These are presented alongside their motivation for use in Table 2.

Data Custodian	Motivation for Use
Australian Bureau of Statistics (ABS)	High resolution point data for demographics.
Bureau of Meteorology (BOM)	High resolution temporally and spatially.
Geoscience Australia (GA)	Provides high quality, built environment data and analysis-ready satellite data through their Digital Earth Australia platform.
Centre for Air Pollution, Energy and Health Research (CAR)	Combines data from various air quality measuring platforms to provide modelled results that minimises the weaknesses of individual platforms.
Australian Urban Research Infrastructure Network (AURIN)	Provides high quality, built environment data.
Australian Institute of Health and Welfare (AIHW)	Provides useable data at SA3 resolution for health outcomes.
National Notifiable Diseases Surveillance System (NNDSS)	Provides useable data at postcode resolution for health outcomes.
NASA Earth Observations (NEO)	Provides medium resolution global rasters that can be used as a backup for modelling.

Table 2: Key data custodians.

A number of other sources which contains similar data have been considered and are included in this report's data catalogue in the Secondary Data Sources section. These sources either provide data at a lower spatial or temporal resolution or provide less data overall than those listed in Table 2.

Key Data Properties

The data catalogue is split into three sections. The first section contains specific parameters from the key data custodians listed in the previous section, which are displayed both online and in Appendix B: : Table 4. Included in the list of key data are health outcomes, some of which are separated by International Statistical Classification of Diseases and Related Health Problems, Tenth Revision, Australian Modification (ICD-10-AM). Of these classifications, the following are related to environmental health:

- Intestinal infectious diseases (A00–A09)
- Tuberculosis (A15–A19)
- Bacterial disease (A20–A49)
- Diphtheria (A36)
- Whooping cough (A37)
- Meningococcal infection (A39)
- Trachoma (A71)
- Acute hepatitis A (B15)
- Acute hepatitis B (B16)
- Scabies (B86)
- Acute rheumatic fever (I00–I02)
- Chronic rheumatic heart diseases (I05–I09)
- Acute upper respiratory infections (J00–J06)
- Influenza and pneumonia (J10–J18)
- Asthma (J45)
- Lung disease due to external agents (J60–J70)
- Pneumonitis due to solids and liquids (J69)
- Toxic effects of metals (T56)

These codes are valuable for use in modelling health outcomes for particular use cases and should be utilised where possible.

Secondary Data Sources

The second section of the data catalogue is a list of secondary data sources and the data they provide. In the event that a key data source is no longer able to provide access to certain parameters, it is important to have secondary sources on record. Some of these sources provide additional parameters relevant to environmental health, all of which are recorded and provided both online and in Appendix B: Data Catalogue Tables: Table 5.

Other Data Collections

A number of additional data collections have been identified through the data audit, which contain environmental health datasets. Some of these datasets may be useful for other projects relating to environmental health, as well as future phases of the AusEnHealth Project. Information on these data collections is also provided both online and in Appendix B: Data Catalogue Tables: Table 6.

Ongoing Data Collection and Collaboration

It should be stated again that the collection of data and resources within the AusEnHealth Project team does not end with this report. As previously mentioned, the data catalogue will continue to be updated online, and contains names of data providers, data categories and lists of parameters. This resource (screen capture displayed in Figure 1) also displays website link where available, functioning in essence as an environmental health focused data repository.

Category	Parameter	Access	Metadata Link	Source	Curator	Timescale
Climate	Temperature	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	1910 -
Climate	Rainfall	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	1900 -
Climate	Extreme Temperature	Upon Request	LINK	ACORN-SAT	Bureau of Meteorology	2000-
Climate	Extreme Rainfall	Upon Request	LINK	ACORN-SAT	Bureau of Meteorology	2000-
Climate	Solar Exposure	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	1990 -
Climate	UV Index	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	2000-
Climate	Humidity	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	1971 -
Climate	Southern Oscillation Index	WEBSITE	LINK	BOM Climate Maps	Bureau of Meteorology	1870 -
Climate	Temperature	WEBSITE	LINK	Air Temperature from 21 Weather Stations	UNSW CFRC	2016-2019
Climate	Floods	WEBSITE	LINK	Landsat (Water Observations from Space)	Geoscience Australia	1986 -

Figure 1: Online data catalogue example layout.

In addition to ongoing maintenance of the online resource by the AusEnHealth Project team, readers are invited to contribute environmental health data sources, reports, research papers, etc. A contribution can be made using an online form (see Figure 2) available through the above website.

AusEnHealth Platform Data Suggestion

Please fill out this form if you know of or would like to suggest a data source to be included in the AusEnHealth project.

* Required

Your Name *

Your answer

Your Institution *

Your answer

Figure 2: Public contribution Google Form.

Submissions made using this form will be checked regularly and utilised by the AusEnHealth Project team once the contributions themselves are audited for quality. Any contributions made in this way are greatly appreciated, as new information will help to keep the project up to date in the future.

Appendix A: Use Case Ranking

Use Case	Ranking Options			Final Rank
	Avg. Score	Maybe + Yes	Yes Count	
Climate, Weather & Extreme Weather and Health Outcomes Related to Heat	1	1	1	1
Climate, Weather & Extreme Weather and Health Outcomes Related to Extreme Weather	7	2	3	6
Climate, Weather & Extreme Weather and Coronary Heart Disease (CHD) Issues / Mortality	6	2	4	7
Climate, Weather & Extreme Weather and Gastroenteritis	11	4	7	8+
Air Quality and Asthma	4	2	3	4
Air Quality and Chronic Obstructive Pulmonary Disease (COPD)	6	2	4	7
Air Quality and Cardiovascular Disease (CVD)	8	4	4	8+
Water Quality & Quantity and Water Borne Disease	5	1	3	3
Vector Distribution and Ecology and Mosquito Borne Disease	2	3	3	5
Vector Distribution and Ecology and Arbovirus	10	4	7	8+
Built Environment and Carbon Monoxide Poisoning	12	5	6	8+
Built Environment and Health Outcomes Related to Noise Pollution	9	4	5	8+
Built Environment and Health Outcomes Related to Heat	3	1	2	2

Table 3: Use case rankings with different methods applied alongside final ranks.

Appendix B: Data Catalogue Tables

Parameters from Key Data Sources

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Climate	Temperature	Website	BOM	2000-	Daily	0.05° Raster	grid
Climate	Rainfall	Website	BOM	2000-	Daily	0.05° Raster	grid
Climate	Extreme Temperature	Request	BOM	2000-	Daily	0.05° Raster	grid
Climate	Extreme Rainfall	Request	BOM	2000-	Daily	0.05° Raster	grid
Climate	Humidity	Website	BOM	2000-	Daily	0.25° Raster	grid
Water Quality	Water Use	Website	BOM	2000-	Daily	0.25° Raster	grid
Water Quality	Groundwater Levels	Website	BOM	2000-	Daily	0.25° Raster	grid
Water Quality	Streamflow Levels	Website	BOM	2000-	Daily	Riverway Shapefile	
Water Quality	Streamflow Salinity	Website	BOM	2000-	Daily	Riverway Shapefile	
Water Quality	Groundwater Salinity	Website	BOM	2000-	Daily	0.05° Raster	grid
Water Quality	Soil Moisture	Website	BOM	2000-	Daily	0.05° Raster	grid
Water Quality	Runoff	Website	BOM	2000-	Daily	0.05° Raster	grid
Climate	Solar Exposure	Website	BOM	2000-	Daily	0.05° Raster	grid
Climate	UV Index	Website	BOM	2000-	Daily	0.05° Raster	grid
Climate	Southern Oscillation Index	Website	BOM	1870-	Monthly	1 value globally	Data frame
Air Quality	Nitrogen Dioxide	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Sulfur Dioxide	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Ozone	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Lead	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Carbon Monoxide	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Particulates: PM 10	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Particulates: PM 2.5	Website	CARDAT	2000-	Daily	Shapefile	
Air Quality	Particulates: PM 1	Website	CARDAT	2000-	Daily	Shapefile	
Built Environment	Energy Use	Website , Website	AEMO, AURIN	2019-	5-minute	Electricity Region and Station	csv
Built Environment	Energy Use	Website , Website	CER, AURIN	2001-	Monthly	Postcode	Vector Polygon

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Built Environment	Energy Use	Website	ABS	2009	1 Point in time	Labour-Force Region	Vector Polygon
Built Environment	Urban Green Space	Website , Website	Geoscape, AURIN	2016-	Yearly	2m (urban), 10m (rural)	Vector Polygon, Point and Line
Built Environment	Urban Green Space	Website	AURIN, OSM	2020-	Daily	Point	Vector Point
Built Environment	Residential Density	Website , Website	Geoscape, AURIN	2020-	Yearly	2.5m (urban), 11m (rural)	Vector Polygon
Built Environment	Residential Density	Website , Website	AURIN, DataVIC	2017-	Yearly	0.5m to 25.0m	Vector Polygon
Built Environment	Residential Density (land use)	Website	AURIN	2017-	Yearly	N/A	Vector Polygon
Built Environment	Residential Density (land use)	Website	AURIN	2018-	Yearly	N/A	Vector Polygon
Built Environment	Population Distribution	Website	AURIN				
Built Environment	Public Transport Use	Website	ABS	2009	1 Point in time	Transport Zone	Vector Polygon
Built Environment	Public Transport Use	Website	Transport for NSW	2018-2019	Yearly	SA3 & LGA	
Built Environment	Solid waste generation	Website	Sustainability VIC	2001-	Yearly	LGA	XLSX
Built Environment	Solid waste generation	Website	QLD Gov.	2016-	Yearly	LGA	PDF
Built Environment	Solid waste generation	Website	EPA NSW	2018-2019	Yearly	LGA	XLSX
Extreme Weather	Floods	Website	GA	1986-2017	Daily	25-m grid cell	
Extreme Weather	Bushfires	Website	NEO-MODIS	2000-	Monthly	500-m grid cell	
Demographics	Population	Website	ABS	2016	1 Point in time	SA2	
Demographics	Age	Website	ABS	2016	1 Point in time	SA2	
Demographics	Gender	Website	ABS	2016	1 Point in time	SA2	
Demographics	Indigenous	Website	ABS	2016	1 Point in time	SA2	
Demographics	Education	Website	ABS	2016	1 Point in time	SA2	
Demographics	Income	Website	ABS	2016	1 Point in time	SA2	
Health Outcomes	Cryptosporidiosis	Website	NNDSS	2001-	Monthly	State	
Health Outcomes	Giardia	Website	NNDSS	2001-	Monthly	State	
Health Outcomes	E. Coli (STEC)	Website	NNDSS	2001-	Monthly	State	

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Health Outcomes	Influenza	Website	NNDSS	2001-	Monthly	State	
Health Outcomes	Asthma	Website	ABS, AIHW	2006, 2016	1 Point in time	SA3	
Health Outcomes	COPD	Website	ABS, AIHW	2006, 2016	1 Point in time	SA3	
Health Outcomes	Ross River Virus	Website	NNDSS	2001-	Monthly	State	
Health Outcomes	Integrated data set	Website	ABS	2006, 2011, 2016	1 Point in time	Point Data	
Health Outcomes	Dengue Fever	Website	QUT	2005-2019	Daily	SA2	
Health Outcomes	Principal Diagnosis (ICD-10-AM)	Website	AIHW	2008-2020		SA3	
Health Outcomes	Giardia	Website	AIHW	2008-2020		SA3	
Health Outcomes	Asthma	Website	ABS	2001-2018	1 Point in time	State	
Health Outcomes	Emergency Department Presentations (ICD-10-AM)	Website	AIHW	2018-2019	1 Point in time	State	
Health Outcomes	Causes of Death	Website	ABS	2010-2019	1 Point in time	State	
Health Outcomes	Mortality Over Regions and Time (MORT) books	Website	AIHW	2014-2018	1 Point in time	SA3	
Health Outcomes	Burden of Disease	Website	AIHW	2011, 2015	1 Point in time	State	

Table 4: Parameters from key data sources.

Parameters from Secondary Data Sources

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Air Quality	Nitrogen Dioxide	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Sulfur Dioxide	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Ozone	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Lead	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Carbon Monoxide	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Particulates: PM 10	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Particulates: PM 2.5	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Air Quality	Particulates: PM 1	Website	NASA (LANCE-MODIS)	2016-	Daily	0.05° Raster	
Built Environment	Vegetation	Website	BOM	1992-	Monthly	0.05° Raster	
Built Environment	Land Use	Website	Dept. of Ag., Water and the Env.	1992-2011	Yearly	National	
Air Quality	Nitrogen Dioxide	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Sulfur Dioxide	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Ozone	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Lead	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Carbon Monoxide	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Particulates: PM 10	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Particulates: PM 2.5	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality	Particulates: PM 1	Website	Copernicus	2003-2020	3-hourly	0.75° Raster	
Air Quality		Website	CSIRO	1967-	Monthly	1 Point Nationally	
Air Quality	Greenhouse Gas	Website	OWID			1 Point Nationally	

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Air Quality	Ozone	Website	NASA Ozone Watch	1980-	Daily	Global Raster	
Built Environment	Vegetation	Website	BOM	2000-	Daily	0.05° Raster Data	.grid
Built Environment	Land Use	Website	ABARES	2003-2018	Yearly	50m Raster	
Built Environment	Species outbreaks	Website					
Built Environment	Marine and estuarine protected areas	Website					
Built Environment	Recovery plans R 38	Website					
Built Environment	Aquatic habitat destruction	Website	Ocean Health Index	2003-2018	Yearly	Raster	
Extreme Weather	Fire Emissions	Website	Global Fire Emissions Database	2016-	Monthly	0.25° Raster	
Built Environment	Vegetation	Website	ABARES	2018	One Point in Time	100m x 100m	.grid
Built Environment	Solid waste generation	Website	GA				
Water Quality	Bathymetry Derivatives	Website	GA	2009	One Point in Time	250m x 250m	
Built Environment	Exposure	Website	GA				
Water Quality	Groundwater	Website	BOM	1880-2018			
Built Environment	Percent of land covered by forest	Website	GA	2001-2015	Monthly	250m x 250m	
Extreme Weather	Fire regimes	Website	ABARES	2011-2016	Monthly		
Built Environment	Catchment Scale Land Use of Australia	Website	ABARES	2017-	Yearly		
Built Environment	Botanical Database	Website	Australian National Herbarium				
Built Environment	Threatened Species	Website	Dept. of Ag., Water and the Env.			Point Data	
Air Quality	Greenhouse Gas	Website	Dept. Industry, Science, Energy and Resources	1990-2018	Yearly	State	

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Built Environment	Protected Areas	Website	Dept. of Ag., Water and the Env.	2018	One Point in Time	Point Data	
Built Environment	Wetlands	Website	Dept. of Ag., Water and the Env.				
Water Quality	Algae	Website	Australian National Herbarium	Present			
Built Environment	Fisheries Data	Website	ABARES	1967-			
Water Quality	Marine Pests	Website	NIMPIS	2009-			
Built Environment	Fisheries Data	Website	FRDC	2018			
Water Quality	Pollution Events	Website	IMO	1998-			
Climate	Extreme Temperature	Website	Met Office Hadley Centre	1901-2018	Annual	1.875°×1.25° Raster	
Climate	Extreme Rainfall	Website	Met Office Hadley Centre	1901-2018	Annual	1.875°×1.25° Raster	
Extreme Weather	Fire Regimes	Website	Dept. of Ag., Water and the Env.	2020	One Point in Time	Polygons	
Air Quality	Aerosol Optical Thickness	Website	NEO-MODIS	2000-	Monthly	0.4° Raster	GeoTIFF
Air Quality	Carbon Monoxide	Website	NEO-MODIS	2000-	Monthly	0.4° Raster	GeoTIFF
Air Quality	Nitrogen Dioxide	Website	NEO-AURA	2000-	Monthly	0.4° Raster	GeoTIFF
Air Quality	Ozone	Website	NEO-AURA	2000-	Monthly	0.4° Raster	GeoTIFF
Climate	Radiation	Website	NEO-FLASHFlux	2000-	Monthly	0.4° Raster	GeoTIFF
Built Environment	Land Use	Website	NEO-AVHRR	2001-2011	Annual	0.4° Raster	GeoTIFF
Built Environment	Vegetation	Website	NEO-MODIS	2000-	Monthly	0.4° Raster	GeoTIFF
Demographics	Population	Website	SEDAC	2000-2020	5-Year Blocks	0.01° Raster	GeoTIFF
Water Quality	Chlorophyll Concentration	Website	NEO-MODIS	2002-	Monthly	4km	NetCDF
Climate	Temperature	Website	CRU	1901-2019	Monthly	0.5° Raster	NetCDF
Climate	Rainfall	Website	CRU	1901-2019	Monthly	0.5° Raster	NetCDF
Climate	Temperature	Website	TerraClim	1958-2020	Monthly	0.4° Raster	

Category	Parameter	Access	Source	Time Scale	Update Freq.	Spatial Res.	Format
Climate	Rainfall	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Humidity	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Drought	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Radiation	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Wind Speed	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Vapor Pressure	Website	TerraClim	1958-2020	Monthly	0.4° Raster	
Climate	Temperature	Website	NOAA	1979-	Daily	0.5° Raster	
Climate	Rainfall	Website	NOAA	1979-	Daily	0.5° Raster	
Climate	Solar Exposure	Website	NEO-CERES	2006-2020	Monthly	0.4° Raster	GeoTIFF

Table 5: Parameters from secondary sources.

Additional Data Collections

The websites listed in this table direct a print reader to the homepage of the data source. Electronic versions of this paper contain an extended link leading directly to the data collections page.

Source	Link to Data Collections Homepage
AIHW	https://www.aihw.gov.au/
ABS Data Packs	https://datapacks.censusdata.abs.gov.au/
WA Notifiable Diseases Register	https://www.wslhd.health.nsw.gov.au/
AURIN Data Repository	https://data.aurin.org.au/
National Map	https://www.nationalmap.gov.au/
Data.gov.au	https://www.data.gov.au/search
National Vegetation Information System	https://www.environment.gov.au/
Geoscience Australia Web Services	http://services.ga.gov.au/
Digital Earth Australia	http://www.ga.gov.au/
AIMS Data Catalogue	https://www.aims.gov.au/
Geoscience Australia Data Catalogue	https://ecat.ga.gov.au/
Atlas of Living Australia	https://collections.ala.org.au/
NCI Geonetwork	https://geonetwork.nci.org.au/
Marine Biodiversity Hub	https://www.nespmarine.edu.au/
FSDf-LINK Platform	https://link.fsd.f.org.au/
SEDAC	https://sedac.ciesin.columbia.edu/
CMIP6 Environmental Projections	https://esgf-node.llnl.gov/
NOAA	https://psl.noaa.gov/

Table 6: Additional data collections.

Appendix D: Project Advisory Board

Team Member	Role	Organisation
Helen Spencer	Program Director, Land and Spatial Information	Queensland Department of Natural Resources, Mines and Energy
Adam Mowlam	Digital Twin Lead	Department of Environment, Land, Water and Planning, Victoria
Wayne Patterson	Direction, Spatial Operations	New South Wales Spatial Services
Ivana Ivanova	Research Fellow	Curtin University
Irina Bastrakova	Director – Spatial Data Architecture – National Location Information, Place, Space and Communities Division	Geoscience Australia
Matt Beaty	Geographer and Health Analyst	Australian Department of Health
James Spath	Geospatial Analyst	City of Swan – Local Government Representative, Western Australia
Grace Yun	Geospatial Lead	Western Australia Department of Health
Paul Merchant	Health Data Analyst	Western Australia Department of Health
Alex Xiao	Epidemiologist	Western Australia Department of Health
Peter Franklin	Air Quality Expert	Western Australia Department of Health
Nimmi Carlose	Environmental Surveillance Data Manager	Western Australia Department of Health
Angie Bone	Deputy chief Health Officer, Environment	Department of Health and human Services, Victoria
Ivan Hannigan	Data Scientist, Epidemiology	University of Sydney
Geoffrey Morgan	Associate Professor, Public Health	University of Sydney
Claire Sparke	Unit Head, Population Health	Australian Institute of Health and Welfare

Table 7: AusEnHealth Project Advisory Group.

Appendix E: Data Quality and Accessibility Heatmap

The following tables are note the key parameters for each environmental exposure domain with properties coloured red (undesirable) through to green (desirable) as a measure of quality. Also included, using the same colour scaling, are health outcome parameters.

Air Quality

Parameter	Time Scale	Temporal Resolution	Spatial Resolution	Update Frequency	Geographical Extent	Access Restrictions
Nitrogen Dioxide	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Sulfur Dioxide	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Ozone	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Lead	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Carbon Monoxide	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Particulates: PM 10	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Particulates: PM 2.5	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)
Particulates: PM 1	2000-	Daily	SA2 (polygons)	Upon Request	National	Upon Request (Time to Access)

Climate

Parameter	Time Scale	Temporal Resolution	Spatial Resolution	Update Frequency	Geographical Extent	Access Restrictions
Temperature	2000-	Daily	0.05° Raster	Daily	National	Open Access
Rainfall	2000-	Daily	0.05° Raster	Daily	National	Open Access
Extreme Temperature	2000-	Daily	0.05° Raster	Upon Request	National	Upon Request (Paid)
Extreme Rainfall	2000-	Daily	0.05° Raster	Upon Request	National	Upon Request (Paid)
Humidity	2000-	Daily	0.05° Raster	Daily	National	Open Access
Temperature	2000-	Daily	0.05° Raster	Daily	National	Open Access
Solar Exposure	2000-	Daily	0.05° Raster	Daily	National	Open Access
UV Index	2000-	Daily	0.05° Raster	Daily	National	Open Access
Southern Oscillation Index	2000-	Monthly	1 Point	Monthly	National	Open Access

Water Quality

Parameter	Time Scale	Temporal Resolution	Spatial Resolution	Update Frequency	Geographical Extent	Access Restrictions
Water Use	2000-	Daily	0.25° Raster	Daily	National	Open Access
Ground-water Levels	2000-	Daily	0.25° Raster	Daily	National	Open Access
Streamflow Levels	2000-	Monthly	Riverway Shapefile	Monthly	National	Open Access
Streamflow Salinity	2000-				National	Open Access
Ground-water Salinity	2000-	Daily	0.25° Raster	Daily	National	Open Access
Soil Moisture	2000-	Daily	0.25° Raster	Daily	National	Open Access
Runoff	2000-	Daily	0.25° Raster	Daily	National	Open Access

Built Environment

Note that the parameters and associated spatial and temporal scales listed below are based on online searches for available data. Further historic data may be accessible via discussion with data custodians, and other data may be available from less well publicised sources.

Parameter	Time Scale	Temporal Resolution	Spatial Resolution	Update Frequency	Geographical Extent	Access Restrictions
Building Exposure	2020-	1 Point in time	LGA	Yearly	National	CC BY 3.0 Australia
Energy Use – Dispatch Data	2019-	5-minute	Electricity Infrastructure	5-minute	SA/NSW/QLD/VIC/TAS/ACT	Open (AEMO Licence)
Energy Use – Small-scale Installations	2001-	Monthly	Postcode	Monthly	National	CC BY 3.0 Australia
Land Parcels	2021-	1 Point in time	2m (urban), 10m (rural), Up to 20-200m in areas	Yearly	National	Upon Request (Paid)
Population Distribution	2001-	Yearly	SA2/SA3/SA4/LGA	Yearly	National	CC BY 2.5 Australia
Residential Density	2011, 2016	1 Point in time	SA2	5-yearly	National	CC BY 4.0 International
Residential Density – Microsoft Building Footprints	2018	1 Point in time	Unknown	Unknown	National	ODbl
Residential Density – Geoscape Building Footprints	2020-	1 Point in time	2.5m (urban), 11m (rural)	Yearly	National	Upon Request (Paid)
Urban Greenspace – Satellite Imagery	2021-	16 days	30m Raster	16 days	National	Open Access (USGS License)
Urban Greenspace – Points of Interest	2020-	1 Point in time	Point	Daily	National	ODbl
Urban Greenspace – Transport and Topography	2016-	1 Point in time	2m (urban), 10m (rural)	Yearly	National	Upon Request (Paid)

Health Outcomes

Parameter	Time Scale	Temporal Resolution	Spatial Resolution	Update Frequency	Geographical Extent	Access Restrictions
Mortality related to heat		Monthly			National	Open Access
Hospitalisations due to heatstroke		Monthly			National	Open Access
Cryptosporidiosis	2001-	Monthly	State	Yearly	National	Upon Request (Paid?)
Giardia	2001-	Monthly	State	Yearly	National	Upon Request (Paid?)
E. Coli (STEC)	2001-	4 Years Aggregate	State	Yearly	National	Upon Request (Paid?)
Influenza	2001-	4 Years Aggregate	State	Yearly	National	Upon Request (Paid?)
Asthma	2006, 2016	Monthly	SA3	Yearly	National	Open Access
COPD	2006, 2016	4 Years Aggregate	SA3	Yearly	National	Open Access
Ross River Virus	2001-	Daily	State	Yearly	National	Upon Request (Paid?)
Integrated Data Set (MADIP)	2006, 2011, 2016		Point Data	Yearly	National	Upon Request (Paid?)
Dengue Fever	2005-2019		SA2	Upon Request	National	Upon Request (Paid?)
Principal Diagnosis (ICD-10-AM)	2008-2020	4 Years Aggregate	SA3	Yearly	National	Upon Request (Time to Access)
Giardia	2008-2020	Monthly	SA3	Yearly	National	Upon Request (Paid?)
Asthma	2001-2018	Monthly	State	Yearly	National	Open Access
Emergency Department Presentations (ICD-10-AM)	2008-2019	Monthly	State	Yearly	National	Upon Request (Time to Access)
Causes of Death	2010-2019	Monthly	State	Yearly	National	Upon Request (Time to Access)
Mortality Over Regions and Time (MORT) books	2014-2018	Monthly	SA3	Yearly	National	Open Access
Burden of Disease	2011, 2015	Monthly	State	Yearly	National	Open Access

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