COS30045 Data Visualisation

COVID-19 Health Impacts in Australia

Assignment 3A: Project standup 3 submission point

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List of What We Have Done Since the Last Stand-up (Stand-up 2)

Since Project Stand-up 2, I have completed the following:

1. Finalised. The OECD health expenditure database has been prepared and validated by checking the unit of measurement, determining the year of record (base year for registration, i.e., current price), and documenting any assumptions made during the validation process.
2. Cleaned. The dataset has been organised for direct use with web-based visual functionality.
3. Implemented working drafts of the main visualisations, including time-based and comparative charts.
4. Refined: The visual characteristics of the charts have been optimised for visual communication purposes (e.g. scaling, axes, colour schemes, and layout).
5. Integrated the visualisations into the website structure and ensured consistent styling across pages.
6. The process book has been expanded with new sections, such as:
    - Visualisation design rationale
    - Early design iterations
    - Challenges encountered during implementation
7. Additional JavaScript code has been created and tested to add basic interactivity and functionality to the visualisations.
8. Repair issues with data loading and visual alignment have been resolved

Contribution So Far:

Area	Estimated Time	% of Team Work Completed So far
Finding and working with the dataset	~3 Hours	~60%
Designing the visualisation	~4 Hours	~50%
Contributing to the process book (Assignment 3B)	~3 Hours	~45%
Coding	~7 Hours	~55%

Work has remained collaborative, and we have taken in dataset validation, visualisation refinement, and documenting design decisions.

Summary of Tasks to Be Completed Before the Next Meeting:

Before the next meeting, I plan to:

- Complete the interaction and annotation of the visualisation
- Improve accessibility and similar characteristics within all charts
- Complete full integration of all visualisations into the website.
- Finalise the other sections of the process book, including screenshots of work being completed/decisions made
- Conduct Bug fixing and ensure final tests

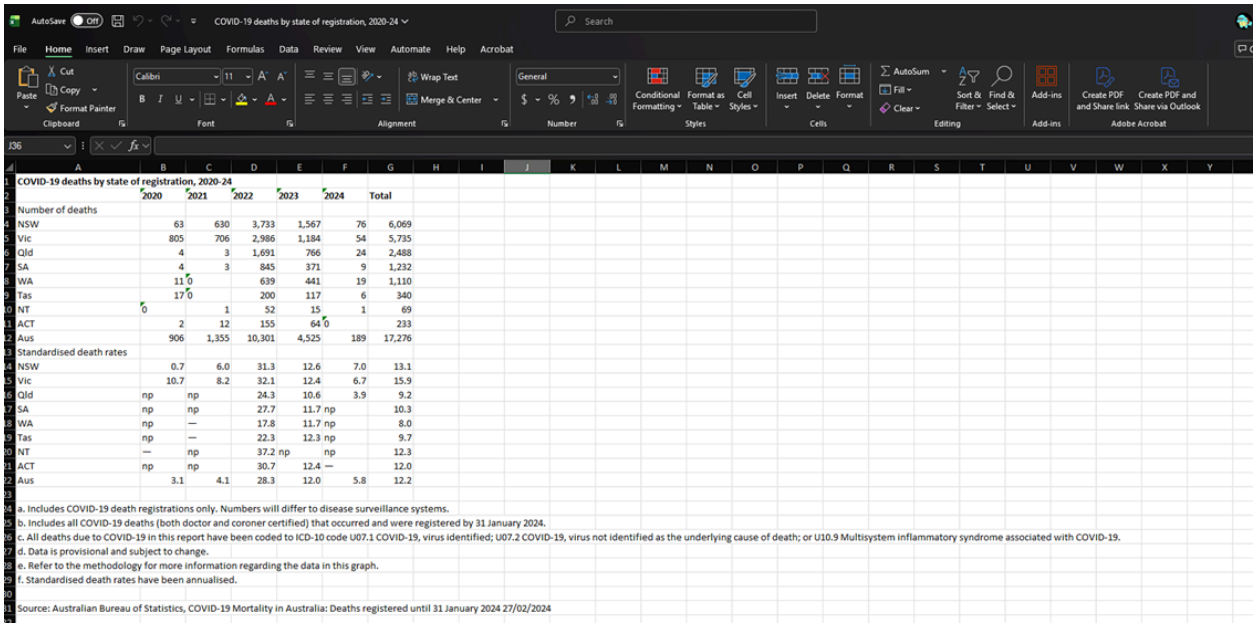
Issues With Teamwork:

At this time, there are no difficulties with cooperation as everyone is communicating well, has clear roles with defined priorities and is collaborating to keep track of progress.

Progress on Assignment 3C: Website and Visualisation:

- Core visualisations are implemented and functional.
- Website layout and styling are largely complete.
- Final refinement and testing are in progress.

Data Collection (Processing & Cleaning):



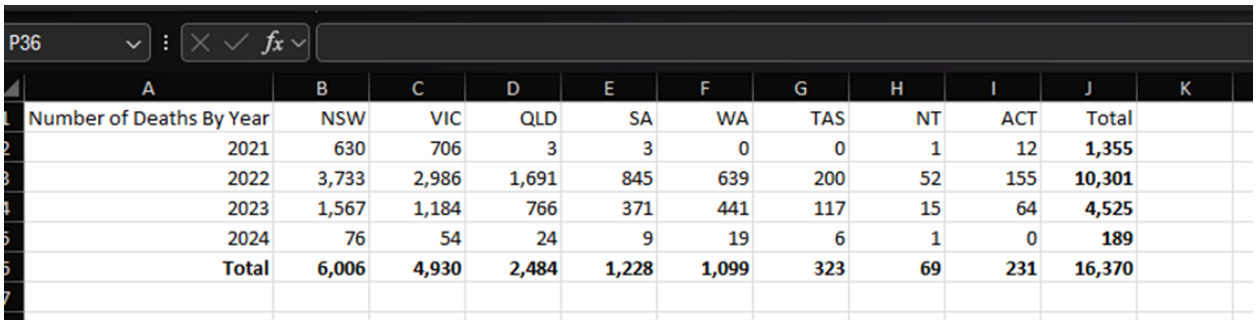
COVID-19 deaths by state of registration, 2020-24

	2020	2021	2022	2023	2024	Total
Number of deaths						
NSW	63	630	3,733	1,567	76	6,069
Vic	805	706	2,986	1,184	54	5,735
Qld	4	3	1,691	766	24	2,488
SA	4	3	845	371	9	1,232
WA	11	0	639	441	19	1,110
Tas	17	0	200	117	6	340
NT	0	1	52	15	1	69
ACT	2	12	155	64	0	233
Aus	906	1,355	10,301	4,525	189	17,276
Standardised death rates						
NSW	0.7	6.0	31.3	12.6	7.0	13.1
Vic	10.7	8.2	32.1	12.4	6.7	15.9
Qld	np	np	24.3	10.6	3.9	9.2
SA	np	np	27.7	11.7	np	10.3
WA	np	—	17.8	11.7	np	8.0
Tas	np	—	22.3	12.3	np	9.7
NT	—	np	37.2	np	np	12.3
ACT	np	np	30.7	12.4	—	12.0
Aus	3.1	4.1	28.3	12.0	5.8	12.2

a. Includes COVID-19 death registrations only. Numbers will differ to disease surveillance systems.
b. Includes all COVID-19 deaths (both doctor and coroner certified) that occurred and were registered by 31 January 2024.
c. All deaths due to COVID-19 in this report have been coded to ICD-10 code U07.1 COVID-19, virus identified; U07.2 COVID-19, virus not identified as the underlying cause of death; or U10.9 Multisystem inflammatory syndrome associated with COVID-19.
d. Data is provisional and subject to change.
e. Refer to the methodology for more information regarding the data in this graph.
f. Standardised death rates have been annualised.

Source: Australian Bureau of Statistics, COVID-19 Mortality in Australia: Deaths registered until 31 January 2024 27/02/2024

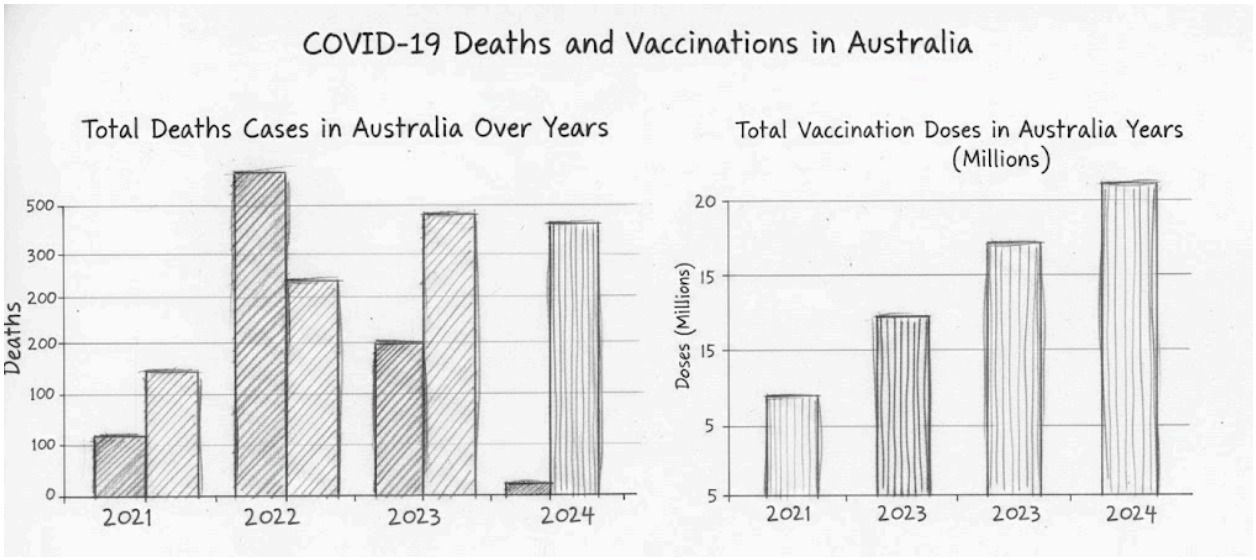
Final Processed Dataset for Deaths of COVID-19 by state:



Number of Deaths By Year	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
2021	630	706	3	3	0	0	1	12	**1,355**
2022	3,733	2,986	1,691	845	639	200	52	155	**10,301**
2023	1,567	1,184	766	371	441	117	15	64	**4,525**
2024	76	54	24	9	19	6	1	0	**189**
Total	**6,006**	**4,930**	**2,484**	**1,228**	**1,099**	**323**	**69**	**231**	**16,370**

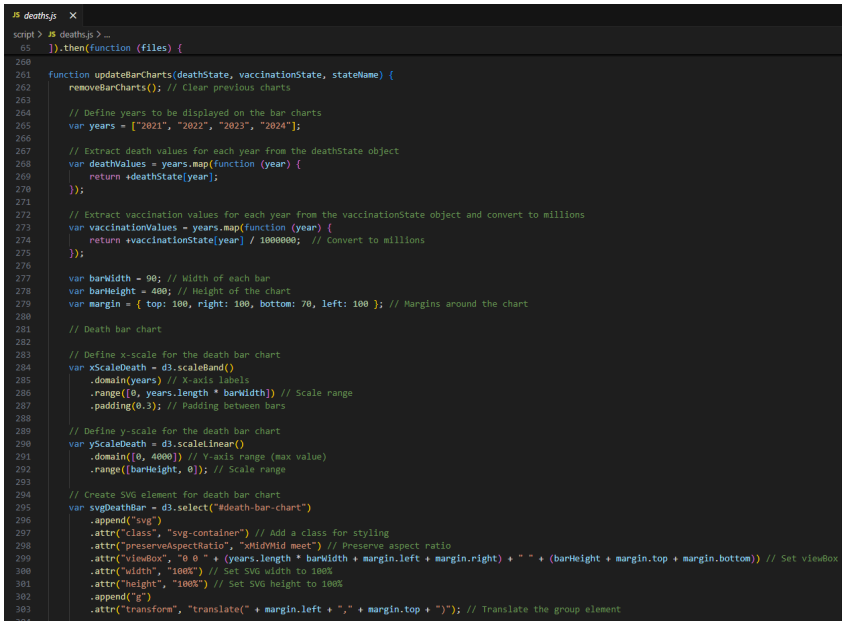
We have completed the data cleaning process, where we have removed unnecessary data and made the data clean and accurate. The data that we have used in the final process includes the deaths due to COVID-19 in Australia, covering the data from 2021 to 2024. The data helps in a better comparison of the deaths due to COVID-19 in Australia.

Designing of Visualisation:

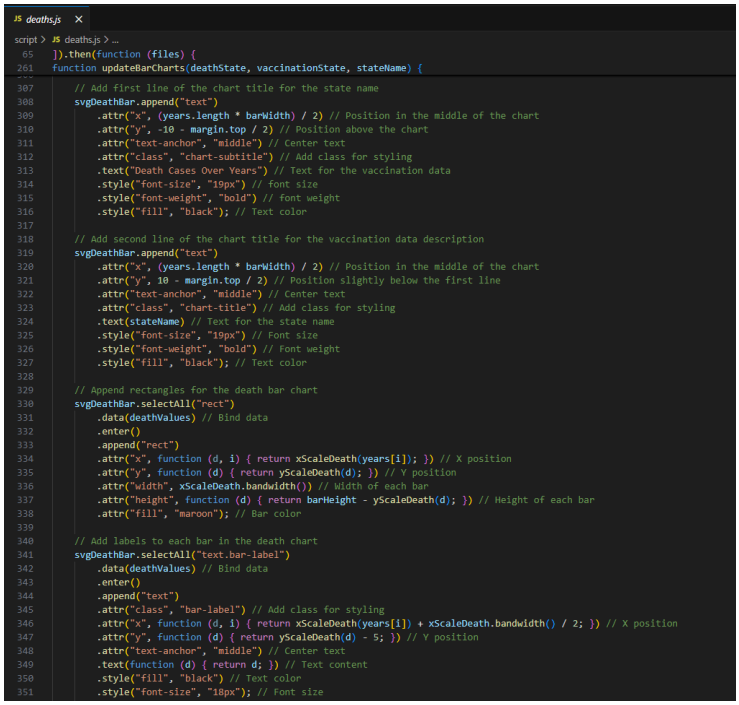


The following is a depiction of how the relationship between the number of deaths due to COVID-19 and the number of vaccinations in Australia between 2021 and 2024 is represented visually. The use of this type of graph allows for a clearer understanding of the trends that are present, as the variables are represented side by side.

Writing/Research of Our Code:



```
]).then(function (files) {

function updateBarCharts(deathState, vaccinationState, stateName) {
    removeBarCharts(); // Clear previous charts

    // Define years to be displayed on the bar charts
    var years = ["2021", "2022", "2023", "2024"];

    // Extract death values for each year from the deathState object
    var deathValues = years.map(function (year) {
        return +deathState[year];
    });

    // Extract vaccination values for each year from the vaccinationState object and convert to millions
    var vaccinationValues = years.map(function (year) {
        return +vaccinationState[year] / 1000000;  // Convert to millions
    });

    var barWidth = 90; // Width of each bar
    var barHeight = 400; // Height of the chart
    var margin = { top: 100, right: 100, bottom: 70, left: 100 }; // Margins around the chart

    // Death bar chart

    // Define x-scale for the death bar chart
    var xScaleDeath = d3.scaleBand()
        .domain(years) // X-axis labels
        .range([0, years.length * barWidth]) // Scale range
        .padding(0.3); // Padding between bars

    // Define y-scale for the death bar chart
    var yScaleDeath = d3.scaleLinear()
        .domain([0, 4000]) // Y-axis range (max value)
        .range([barHeight, 0]); // Scale range

    // Create SVG element for death bar chart
    var svgDeathBar = d3.select("#death-bar-chart")
        .append("svg")
        .attr("class", "svg-container") // Add a class for styling
        .attr("preserveAspectRatio", "xMidYMid meet") // Preserve aspect ratio
        .attr("viewBox", "0 0 " + (years.length * barWidth + margin.left + margin.right) + " " + (barHeight + margin.top + margin.bottom)) // Set viewBox
        .attr("width", "100%") // Set SVG width to 100%
        .attr("height", "100%") // Set SVG height to 100%
        .append("g")
        .attr("transform", "translate(" + margin.left + "," + margin.top + ")"); // Translate the group element
```



```
]).then(function (files) {
function updateBarCharts(deathState, vaccinationState, stateName) {
    // Add first line of the chart title for the state name
    svgDeathBar.append("text")
        .attr("x", (years.length * barWidth) / 2) // Position in the middle of the chart
        .attr("y", -10 - margin.top / 2) // Position above the chart
        .attr("text-anchor", "middle") // Center text
        .attr("class", "chart-subtitle") // Add class for styling
        .text("Death Cases Over Years") // Text for the vaccination data
        .style("font-size", "19px") // font size
        .style("font-weight", "bold") // font weight
        .style("fill", "black"); // Text color

    // Add second line of the chart title for the vaccination data description
    svgDeathBar.append("text")
        .attr("x", (years.length * barWidth) / 2) // Position in the middle of the chart
        .attr("y", 10 - margin.top / 2) // Position slightly below the first line
        .attr("text-anchor", "middle") // Center text
        .attr("class", "chart-title") // Add class for styling
        .text(stateName) // Text for the state name
        .style("font-size", "19px") // Font size
        .style("font-weight", "bold") // Font weight
        .style("fill", "black"); // Text color

    // Append rectangles for the death bar chart
    svgDeathBar.selectAll("rect")
        .data(deathValues) // Bind data
        .enter()
        .append("rect")
        .attr("x", function (d, i) { return xScaleDeath(years[i]); }) // X position
        .attr("y", function (d) { return yScaleDeath(d); }) // Y position
        .attr("width", xScaleDeath.bandwidth()) // Width of each bar
        .attr("height", function (d) { return barHeight - yScaleDeath(d); }) // Height of each bar
        .attr("fill", "maroon"); // Bar color

    // Add labels to each bar in the death chart
    svgDeathBar.selectAll("text.bar-label")
        .data(deathValues) // Bind data
        .enter()
        .append("text")
        .attr("class", "bar-label") // Add class for styling
        .attr("x", function (d, i) { return xScaleDeath(years[i]) + xScaleDeath.bandwidth() / 2; }) // X position
        .attr("y", function (d) { return yScaleDeath(d) - 5; }) // Y position
        .attr("text-anchor", "middle") // Center text
        .text(function (d) { return d; }) // Text content
        .style("fill", "black") // Text color
        .style("font-size", "18px"); // Font size
```

The code still remains a work in progress as we continue to enhance it to create an interactive bar chart that effectively visualises COVID-19 deaths across different states in Australia from 2021 to 2024. It currently reads yearly data for deaths, uses appropriate scales, and plots the data as labelled bars using D3.js.

Process Book Update:

2. Data

2.1. Health spending

2.1.1 Data Source

- Data source link: Health expenditure and financing
  - Data provider: OECD (the Organisation for Economic Cooperation and Development) hosts an online library, which provides a rich repository of statistics across numerous domains of both member and non-member countries. The data is retrieved from OECD Health Statistics. 'Health expenditure and financing' statistical data demonstrates how different countries finance their healthcare systems.

2.1.2 Data Processing

Data download

The initial data format is downloaded in the .xls file. Using sorting functions in Microsoft Excel, the data is filtered to include only data from OCED member countries from 2019 to 2022. As the analysis focuses on how health spending is influenced by COVID-19, the period for visualisation only spans from 2019 until 2022. The given timeline is sufficient to define how health expenditure of countries, especially Australia changes as a response before, during and after the pandemic.

Health expenditure and financing
Frequency of observation: Annual
Measure: Expenditure

Time period			2019	2020	2021	2022
Reference area	Combined unit of measure					
Australia	Millions, Current prices		203,204.0	223,250.6	245,060.2	253,985.1
Austria	Millions, Current prices		42,045.0	43,405.4	49,500.2	50,289.7
Belgium	Millions, Current prices		52,059.6	53,157.6	57,123.9	60,541.2
Canada	Millions, Current prices		255,607.9	D 289,053.3	D 313,961.3	D 315,918.3
Chile	Millions, Current prices		18,203,386.0	19,516,658.9	23,282,226.0	26,320,506.2
Colombia	Millions, Current prices		83,046,238.5	86,842,140.2	109,024,700.6	111,660,378.9
Costa Rica	Millions, Current prices		2,731,953.0	2,855,920.0	3,063,382.3	3,219,010.2
Czechia	Millions, Current prices		440,931.6	522,797.7	577,424.9	597,168.6
Denmark	Millions, Current prices		234,618.2	248,768.0	273,588.7	269,465.4
Estonia	Millions, Current prices		1,892.7	2,081.6	2,351.6	2,527.0
Finland	Millions, Current prices					

Figure 1. OECD Health Expenditure Source Data

2.3. COVID-19 Death Cases

2.3.1 Data Source

The primary source of information for our project comes from the Australian Bureau of Statistics (ABS). The ABS is Australia's national statistical authority. Since 1905, it has been providing statistics and information that can be used for informed decisions by various stakeholders in Australia. The ABS provides high-quality and reliable statistics on various topics and domains, such as health statistics, population statistics, and economic conditions.

The relevant information for our project comes from the "COVID-19 Mortality in Australia: Deaths Registered until 31 January 2024" dataset. This dataset provides information about deaths that have been recorded in Australia due to COVID-19 from 2021 to 2024. This information is useful for our project as it allows us to visualize trends related to deaths due to COVID-19.

The information in our dataset is arranged in a tabular format and consists of various pieces of information. Some of these pieces of information include the state or territory where deaths have been recorded due to COVID-19, the year for which deaths have been recorded (i.e., 2021-2024), and the number of deaths recorded in each year and overall.

The visualization for our project is related to how deaths due to COVID-19 change from state to state over time. Therefore, we have included only the relevant information from our dataset for our visualization. All other information that is not relevant for our visualization has been left out. For example, information about age-standardized death rates is not included in our visualization.

2.3.2 Data Processing:

Here is the initial dataset before cleaning up and processing:

Deaths due to COVID-19: State of registration

- As of 31 January 2024, the most registered deaths due to COVID-19 had occurred in New South Wales (6,069) and Victoria (5,735). These states also have the highest age standardised death rates (SDRs) since the pandemic began, at 13.1 and 15.9 deaths per 100,000 population (rate for total pandemic period) respectively.
- In 2023, the highest SDR was in NSW (12.6). Queensland (10.6) recorded the lowest SDR.

COVID-19 deaths by state of registration, 2020-24 Download

	2020	2021	2022	2023	2024	Total
Number of deaths						
NSW	63	630	3,733	1,567	76	6,069
Vic	805	706	2,986	1,184	54	5,735
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WA	11	0	639	441	19	1,110
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Aus	906	1,355	10,301	4,525	189	17,276
Standardised death rates						
NSW	0.7	6.0	31.3	12.6	7.0	13.1
Vic	10.7	8.2	32.1	12.4	6.7	15.9
Qld	np	np	24.3	10.6	3.9	9.2
SA	np	np	27.7	11.7	np	10.3
WA	np	—	17.8	11.7	np	8.0
Tas	np	—	22.3	12.3	np	9.7
NT	—	np	37.2	np	np	12.3
ACT	np	np	30.7	12.4	—	12.0
Aus	3.1	4.1	28.3	12.0	5.8	12.2

Figure 6. Australia's Raw Mortality Dataset

Data Cleanup and Processing Steps

1. Data Collection:

- To access the Australian Bureau of Statistics website and find the "COVID-19 Mortality in Australia: Deaths Registered until 31 January 2024" dataset.
- First download the dataset as a CSV file.

2. Initial Data Format:

- The dataset is initially presented as shown in the image:

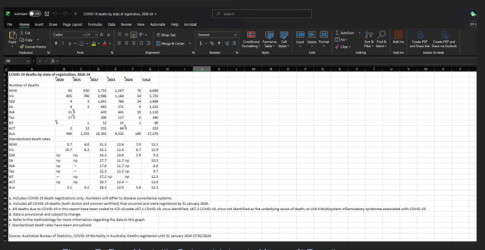
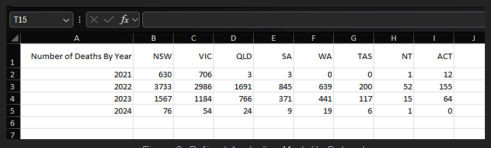


Figure 7. Raw Mortality Dataset (view in Microsoft Excel)

3. Removing Unnecessary Data:

- Data from 2020 is excluded since the data is based on the 2021-2024 period, and columns related to standardized death rates are excluded since they are not required for this visualization.



Number of Deaths By Year	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
2021	630	706	3	3	0	0	1	12
2022	3733	2986	1691	845	639	200	52	155
2023	1567	1184	766	371	441	117	15	64
2024	76	54	24	9	19	6	1	0

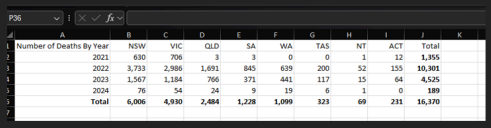
Figure 8. Refined Australian Mortality Dataset

4. Calculating Totals for Australia:

- We used the SUM formula to determine the total deaths in Australia for the years 2021 to 2024. The same formula was used to determine the total deaths in Australia for each state, and this was achieved using the fill tool to complete the remaining cells in the column.

Final Processed Dataset

After processing, the final dataset is displayed as follows:



Number of Deaths By Year	NSW	VIC	QLD	SA	WA	TAS	NT	ACT	Total
2021	630	706	3	3	0	0	1	12	**1,355**
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2024	76	54	24	9	19	6	1	0	**189**
Total	**6,006**	**4,930**	**2,484**	**1,228**	**1,099**	**323**	**69**	**231**	**16,370**

Figure 11. Final Mortality Dataset

We have completed the introduction and data part of our process book, which includes our dataset for OECD health expenditure and the ABS COVID-19 mortality dataset. We are now working on adding the visualisation design and iteration parts of our process book. We are including figures for the process of cleaning and transforming the data and are now working on adding the visualisation design and iteration parts.