Communication Portfolio

By Group 7: Ethan Ericson, Jaxon Ham, Andrew Mendez, Medhansh Sankaran, Ethan Styles

Infographic

Press Release

FOR IMMEDIATE RELEASE

Australian Department of Health and Aged Care Highlights Critical Need for Improved Public Toilets

Canberra, ACT – December 6, 2024

The Australian Department of Health and Aged Care has released a comprehensive report revealing significant gaps in the availability and quality of public toilets across the nation. The report, titled "Toilets in Australia," underscores the urgent need for enhanced public hygiene facilities to support the health and well-being of all Australians.

Key Findings:

- Central Australia Needs More Toilets: The report identifies a critical shortage of public toilets in central Australia, particularly those equipped with essential amenities such as showers, parking, and dump points.

- Accessibility Issues: There is a notable deficiency in accessible toilets for disabled individuals, both in central and some coastal areas. The report recommends prioritizing upgrades in urban areas before expanding inward.

- Health and Hygiene: While no direct correlation was found between the number of toilets and the spread of diseases, the report calls for further research to understand this dynamic better.

- Environmental Concerns: The presence of toilets is linked to increased air and land pollution, necessitating stringent waste disposal inspections.

- Inclusivity: The report highlights a lack of unisex toilets in central Australia, advocating for their inclusion to enhance accessibility for all gender identities.

Recommendations:

The report suggests several measures to address these issues, including the construction of new toilets in underserved areas, upgrading existing facilities to include necessary amenities, and implementing rigorous pollution control measures.

About the Study:

The study utilized data from the National Public Toilet Map of Australia and various health and environmental datasets to perform a comprehensive analysis of the current state of public toilets in the country.

Contact:

For more information, please contact:

Australian Department of Health and Aged Care

Phone: 02 6289 1555

Memo

To: Australian Government Department of Health and Aged Care
From: G7 Data Science Professionals
Date: December 10th, 2024
Subject: Analysis of Public Toilet Facilities and Infrastructure Recommendations

Our comprehensive analysis of Australia's public toilet facilities, leveraging the National Public Toilet Map dataset, focused on five critical metrics: traveler access, disabled access, gender inclusivity, public health impact, and environmental considerations. These findings will inform strategies for optimizing the placement, maintenance, and construction of facilities to enhance public health outcomes and sustainability.

1. **Traveler Access**
    - Inland regions, including the Outback, lack sufficient public toilets with essential amenities like showers, parking, and dump points. Coastal areas are adequately served.
2. **Accessibility for Disabled Persons**
    - Significant gaps exist in facilities accommodating disabled individuals, particularly in central and some coastal urban areas.
3. **Gender Inclusivity**
    - Unisex toilets are underrepresented, especially in rural and central areas. Urban areas have higher adoption rates.
4. **Public Health Impact**
    - No significant correlation was found between toilet density and public health metrics such as kidney and heart disease prevalence. Coastal population density may skew results.
5. **Environmental Impact**
    - Air and land pollution correlate with toilet locations, likely influenced by population density. Water pollution showed minimal correlation due to effective wastewater management.

Recommendations

To improve overall health and wellbeing in the Australian toilet ecosystem, we recommend:

- Facility construction along major inland roads with showers, parking, and dump points.
- Accessibility prioritization in major cities and coastal regions.
- Unisex facility construction with community education initiatives about their benefits.
- Further study on the relationship between public health and toilet infrastructure.
- More robust air and land emission mitigation in toilet construction and maintenance.

By implementing these recommendations, we strongly believe in the overall improvement of public health and wellbeing as related to the Australian ecosystem.

Abstract

Access to hygiene facilities is critical to public health, yet gaps in coverage can impact population well-being. This study, conducted by the Australian Department of Health and Aged Care, evaluated the availability and effectiveness of public toilets across Australia. The research addressed traveler access, disabled accessibility, gender inclusivity, the spread of disease, and environmental pollution.

Using data from the National Public Toilet Map and additional national datasets, the study employed geographic mapping, statistical correlations, and filterable parameters to analyze facility distribution and impact. Findings revealed a lack of facilities in central Australia, particularly for travelers, disabled individuals, and inclusive gender access. Air and land pollution correlated with toilet locations, raising environmental concerns, while no significant relationship was observed between toilet counts and public health metrics.

These findings emphasize the need for new facilities in underserved areas, improved accessibility features, and stringent pollution controls. The results provide actionable insights for policymakers to enhance public health infrastructure and environmental stewardship while supporting future research into the relationship between hygiene facilities and health outcomes.

Executive Summary

Problem Statement

The Australian Department of Health and Aged Care has identified significant gaps in the availability and quality of public toilets across Australia. These deficiencies impact traveler access, accessibility for disabled individuals, inclusivity for all gender identities, public health, and environmental sustainability.

Purpose of the Communication

This report, titled "Toilets in Australia," aims to inform policy decisions and infrastructure improvements to enhance public hygiene facilities nationwide. It provides a comprehensive analysis of the current state of public toilets and offers actionable recommendations to address identified issues.

Summary of Results

1. Central Australia Needs More Toilets: There is a critical shortage of public toilets in central Australia, particularly those equipped with essential amenities such as showers, parking, and dump points.

2. Accessibility Issues: A notable deficiency in accessible toilets for disabled individuals exists, both in central and some coastal areas.

3. Health and Hygiene: No direct correlation was found between the number of toilets and the spread of diseases, but further research is needed.

4. Environmental Concerns: The presence of toilets is linked to increased air and land pollution, necessitating stringent waste disposal inspections.

5. Inclusivity: There is a lack of unisex toilets in central Australia, limiting accessibility for all gender identities.

Conclusions

The findings underscore the importance of accessible and well-maintained public toilets in promoting public health and hygiene. Addressing the identified gaps will significantly improve the quality of life for all Australians.

Recommendations

- Construct new toilets in underserved areas, particularly in central Australia.

- Upgrade existing facilities to include essential amenities such as showers, parking, and dump points.

- Implement rigorous pollution control measures and regular inspections to minimize environmental impact.

- Prioritize the addition of accessible toilets in urban areas and expand efforts inward to cover central regions.

- Design new facilities as unisex to enhance inclusivity and meet the needs of diverse populations.

Technical Report (begins on next page)

Toilets in Australia – Technical Report

Group 7: Ethan Ericson, Jaxon Ham, Andrew Mendez, Medhansh Sankaran, Ethan Styles

University of Arkansas

DASC 22103 – Data Visualization and Communication

Dr. Davis

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Introduction

Hygiene is immensely important to personal health, and as members of the Australian Department of Health and Aged Care, we should take all possible measures to ensure universal access to basic hygiene facilities that will maintain and improve our population's health.

The most effective way to provide these facilities to the nation is through the construction and management of public toilets, which our department has spearheaded for decades. As part of this initiative, we performed the following analysis on Australia's toilets with the goal of determining if our department should relocate, repair, or create new toilets on the basis of traveler access, gender access, disabled access, the spread of disease, and the spread of pollution.

These five areas were determined to be the most important metrics in assessing the effectiveness of our toilet initiative because of their relevance to nearly all of the nation's health, regardless of demographic identity. Each of the following segments of this paper will be organized by our five areas of analysis: results & recommendations, technical descriptions, and conclusions.

Summary

This report uses data from the National Public Toilet Map of Australia to evaluate the need, or lack thereof, of toilets in the nation based on their availability to travelers, their availability to disabled persons, their availability to gender identities, their impact on the spread of disease in nearby towns, and their impact on the environment through potential pollutants. We found that central Australia has a large need for more toilets with improved accessibility to travelers, disabled persons, and varied gender identities, while the coastal areas are generally well covered by existing facilities.

Furthermore, our analysis showed that the number of toilets is not directly correlated with disease but stipulated that this finding is likely skewed by the high population density of coastal areas, so further research is needed. Finally, the addition of toilets comes with the potential risk of increased air and land pollution, which were shown to be related to the presence of toilets; thus, careful consideration should be given to the location and maintenance of these facilities.

Results & Recommendations

Toilets for Traveling

Through our analysis, we found that public toilets necessary to cross country travelers are absent or lack many important hygiene amenities such as showers, parking, and dump points within inland Australia. This area of the nation requires more toilets and many upgrades to those facilities' features to provide basic hygiene to the travelers that use the roads in the region.

Accessible Toilets

Toilets and other hygiene amenities at facilities accessible to people with disabilities are lacking in central Australia and sometimes in coastal areas. This is an important area of focus, as if even the coastal areas, where resources for accessibility improvements are plentiful, are struggling to provide accessible bathrooms, then there is a true nationwide deficiency in facilities that are available to all types of people. To remedy this problem, attention should be put towards upgrading or adding facilities in urban areas with higher population density first, then expanding focus inward towards the central region of the nation.

Toilets and Public Health

Our study found that the number of toilets and the presence of certain diseases in nearby towns are not strongly related, but we believe that the large population density of the coastal areas confounds this relationship and overshadows a potential relationship between toilets and health metrics within less dense areas, such as Central Australia. As such, further research is required into this dynamic, and no change to toilets should be made on this metric along before an adequate conclusion has been reached.

Toilets and Pollution

While water pollution was not found to be strongly connected to the presence of toilets, air and land pollution levels were observed to be tied to toilets. Land pollution was especially affected by toilets, and therefore raises environmental concerns with the addition of toilets to fulfill requirements in the other areas of this study. When toilets are constructed or upgraded, a thorough inspection of waste disposal methods should be performed on site, and then on a continuous basis thereafter to minimize the escape of potential pollutants.

Gendered Toilets

Unisex toilets are also lacking in the center of the nation, which represents a missed opportunity for more efficient design as well as a failing to meet inclusivity goals. Toilets added in this region should be designed as unisex rather than gendered to increase universal access to hygiene for all gender identities.

Technical Descriptions

Toilets for Traveling

Background/Context:

This section delves into the availability of public toilets with showers, parking, and dump points along the major roads of Australian. These features of public toilets were chosen because they are necessary to maintain the hygiene of travelers; showers provide this hygiene benefit directly through increased cleanliness, parking ensures that travelers attempting to fulfill their hygiene needs have easy access to the facilities, and dump points enable travelers with toilets in their vehicles to empty their septic tanks regularly to avoid potential contamination from the waste.

Methodology:

To conduct this analysis, we performed the following actions:

1. Plotted every public toilet on a map of Australia using the Australian toilets dataset
2. Overlayed the major roads of Australia on these points using the Australian major roads dataset.
3. Added a parameter to filter the toilets by the selected amenity (shower, parking, dump point)
4. Calculated the proportion of toilets with the selected amenity, and then investigated where those toilets were distributed within the nation.

Findings/Results:

We found that the majority of the 24131 toilets in Australia were situated on the coasts, where major urban centers contain high population densities. The Outback, located in the center of Australia, did not have good coverage of its roads with existing public toilets (Figure A1).

Facilities with the amenities of showers and dump points followed a similar pattern of sparseness in inland Australia, making up 7.86% and 5.44% of toilets respectively and being distributed primarily on the coast, leaving large swatches of major roads in the Outback uncovered by basic hygiene facilities (Figure A2 and Figure A4).

Parking, however, is present at 63.94% of toilets, and these toilets, while still less frequent in central Australia than the coasts, do consistently cover the major roads in the area (Figure A3)

Discussion:

To ensure that travelers have consistent access to basic hygiene, we need to increase the number of toilets near roads in central Australia, and we need to add the amenities of showers and dump points to these new facilities as well as old ones in the areas. Performing these actions will increase the availability of sites where people on the road can clean themselves and dispel their waste, both activities that contribute to better hygiene and thereby reduce the risk of negative health consequences. This initiative fits with our mission as the Department of Health and Aged Care to maintain and improve the health of our nation's peoples; therefore, we should make these changes.

Accessible Toilets

Background/Context:

This section examines the availability of accessibility features in public toilet facilities across Australia. These features are vital to ensuring that all individuals, regardless of physical abilities or needs, can use public restroom facilities comfortably and safely. By calculating a metric called 'features per capita', this analysis highlights regions with the greatest need for such facilities, emphasizing the states where a lack of accessibility features may hinder public hygiene and comfort. Through this comparison, the goal is to identify specific areas in Australia where more accessible restroom features are required to improve inclusivity and meet the needs of diverse populations.

Methodology:

To conduct analysis on the distribution of different accessibility features amongst the country, we did the following.

1. Geographic Analysis:
    a. A map was created, showing each instance of a facility denoted by a dot on the continent.
    b. A parameter, 'Accessibility Feature Selection' was used to filter out data points that don't have the selected accessibility feature at that facility.
    c. The dots were colored according to state to allow for ease of reading.
2. Facility Access/Population Distribution Analysis
    a. A bar chart is created to visualize the distribution by state for the number of facilities with the selected accessibility feature.

b. A calculated field is created ‘People per Facility’, which divides the population of the state by the number of facilities in the state.
c. This bar chart allows for disparities of accessibility feature access to be highlighted.

Findings/Results:

The analysis reveals significant gaps in the availability of accessibility features across Australian toilet facilities. Only 58% of facilities offer accessible toilets, with a particularly pressing need in the Australian Capital Region (ACR), which lacks sufficient parking to support the population size (Figure B1) Additionally, only 43% of accessible restrooms are paired with accessible parking, exacerbating access challenges in the region (Figure B2).

A critical shortfall in ambulant toilets is also evident, especially in the ACR, where the need for these facilities is urgent. These toilets, designed for individuals with limited mobility but not requiring a wheelchair, can be implemented with minimal modifications to existing facilities, offering an opportunity to improve accessibility efficiently (Figure B3).

The availability of sling devices for paraplegic individuals is extremely limited, particularly in central Australia, where access is almost non-existent. This highlights an urgent need for these devices to ensure better restroom access for individuals with severe mobility challenges (Figure B4).

Adult Changing Rooms, essential for caregivers to assist individuals with disabilities, are scarce, especially in rural areas. Expanding the number of these facilities and ensuring they meet "Changing Places Certification" standards is crucial to support caregivers and enhance accessibility in both rural and populated areas (Figure B5 and Figure B6).

Finally, there is a significant gap in the availability of left-handed (7.8%) and right-handed (8.7%) handrails in Australian restrooms. Increasing the presence of these safety features is necessary to ensure that facilities are fully inclusive and meet the diverse needs of users with mobility challenges. (Figure B7 and Figure B8)

Discussion:

To ensure that all individuals, regardless of mobility challenges, have equitable access to public toilet facilities, it is essential to prioritize the expansion and improvement of accessibility features across Australia. The current gaps, especially in the Australian Capital Region and central Australia, highlight the need for more accessible toilets, ambulant facilities, sling devices, and adult changing rooms. Addressing these deficiencies will not only improve independence and safety for people with disabilities but also foster a more inclusive environment for all users. Enhancing accessibility in public restrooms aligns with the broader goals of promoting public health and well-being, ensuring that everyone, regardless of their physical abilities, has access to necessary hygiene facilities. Expanding and upgrading these facilities should be a priority for governments and communities to ensure equal access and enhance the quality of life for individuals with diverse needs.

Toilets and Public Health

Background/Context:

This analysis investigated the relationship between public facility counts (e.g., public toilets) and public health metrics across towns in Australia. The health metrics examined included the prevalence of kidney disease, heart/vascular disease, and mortality rates. The study aimed to

understand whether the availability of facilities is associated with better health outcomes, providing insight into public health infrastructure and its effectiveness.

Methodology:

Data was collected from public facility databases and public health reports across towns in Australia.

- **Geographic Visualization:** A map was created to visualize the spatial distribution of public facilities, with larger circles indicating a higher facility count. The prevalence of selected health metrics was represented using color intensity (dark green) via a Metric Selector parameter, which consisted of Kidney Disease, Heart/Vascular Disease and Mortality rates. Refer to Figure C1, Figure C2, and Figure C3 for Visualizations.
- **Scatter Plot Analysis:** Three scatter plots were generated to compare the number of facilities against the percentage of the population affected by kidney disease, heart/vascular disease, and mortality. LOESS (locally estimated scatterplot smoothing) was applied to the scatter plots to identify subtle patterns. Refer to Figure C4 for Visualization.

Findings/Results:

The analysis revealed the following outcomes:

1. **Geographic Visualization:** The map displayed no apparent correlation between the number of facilities and public health metrics.
2. **Scatter Plot Analysis:**
    a. The scatter plots showed very weak or no correlation between facility counts and the health metrics.
    b. $R\text{^}2$ values were consistently below 0.1, indicating a negligible statistical relationship.
    c. LOESS smoothing trends were inconsistent, reinforcing the conclusion of no significant correlation.
3. **Key Conclusion:** The data indicates no meaningful link between the number of facilities and the prevalence of kidney disease, heart/vascular disease, or mortality rates.

Discussion:

The findings suggest that the availability of public facilities alone does not have a measurable impact on public health outcomes. Possible reasons for this lack of correlation include:

- **Quality vs. Quantity of Facilities:** Merely counting facilities does not account for their quality, maintenance, or accessibility, which could influence their effectiveness in promoting health.
- **Unequal Access to Facilities:** Geographic or socioeconomic barriers may restrict facility usage, limiting their potential impact on health outcomes.
- **Confounding Variables:** Other factors such as healthcare infrastructure, individual lifestyle choices, and environmental conditions likely play a more critical role in determining health metrics than facility availability.

These findings highlight the complexity of public health and the limitations of simplistic metrics like facility counts in assessing health impacts.

Toilets and Pollution

Background/Context:

This analysis focused on examining relationships between pollution metrics such as air, land, and water pollution and toilet locations. The aim was to see whether locations with higher concentrations of toilets tended to have higher pollutant measures. The metrics measured included total air emissions, total water emissions, and total land pollution, all measured in total kg over the year. The dataset had location data which allowed for easy geographic analysis alongside the base dataset.

Methodology:

Data was collected from the Australian Government Department of Climate Change's National Pollutant Inventory dataset. In addition, the base dataset regarding locational toilet data was analyzed.

- **Geographic Analysis:** Two sets of maps were created to compare distributions of toilets across Australia with distributions of pollution across the same area. Parameters were used to allow the audience to select the specific type of pollution to analyze and filter for specific states in the region. Refer to Figures D1, D2, D3, and D4 for the full visualizations.
- **Bar Chart Analysis:** Two sets of bar charts were created to compare state wise distributions of toilets across Australia with pollution distributions. The previously mentioned parameters and filters were also applied to this set of visualizations to allow for more precise viewing. Refer to Figures D5, D6, D7, and D8 for the full visualizations.
- **Statistical Analysis:** An additional correlation calculation was placed to demonstrate statistically how much pollution correlated to toilet location. The parameters were applied here again to compare different pollutant types. Refer to Figure D9 for an example visualization.

Findings/Results:

The results of this analysis suggest that pollution and toilet location are well correlated; however, this interaction may be more due to population concentration than a true relationship.

- **Geographic Analysis:** Areas of high pollution and high toilet concentration seemed to line up well. However, this can be a side effect of high population in these areas; cities such as Sydney and Melbourne have higher pollution and more toilets simply due to their high population as compared to deserted sections of Western Australia. Interestingly, water pollution was especially high in Tasmania, likely due to its status as an island and proximity to the ocean.
- **Bar Chart Analysis:** Again, pollution and toilet location were relatively well correlated, but the states with the highest numbers in both metrics were most commonly the most populated states: New South Wales, Queensland, Victoria, and Western Australia. Water pollution seemed to buck this trend, concentrating in areas closer to the ocean such as Tasmania.
- **Statistical Analysis:** While air and land pollution seemed to be well correlated to toilet location, water pollution was not as well associated. The correlation between air/land

pollution and toilet location was higher (0.6922 and 0.7152 respectively), but the correlation between water pollution and toilet location was significantly lower (0.5822).

There may not be a direct link between pollution and toilets, but their high correlation provides reason to investigate better pollution mitigation measures around toilet heavy areas, especially for airborne and land-transmitted substances.

Discussion:

The findings suggest that there is a relationship between toilet locations and pollution. This is likely due to both metrics being a factor of population density/concentration. However, there are some implications worth considering.

- **Pollution Mitigation:** Air and land pollution have high correlations with toilet locations; whether this be due to population concentration or a direct relationship, there is a gap in controlling this type of pollution in toilet heavy areas. Improvements to toilet infrastructure in these areas could help decrease pollution in these areas.
- **Water Pollution:** Water pollution is not well correlated with toilet locations; it seems that the current toilet infrastructure is advanced enough to prevent excessive water pollution in sewage and wastewater. Pursuing this issue should be secondary to other pollution concerns.

Gendered Toilets

Background/Context:

This analysis examines the distribution of gendered lavatory facilities in Australia, focusing on male, female, and unisex. Typically, where there is a male restroom, there should be a corresponding female restroom, and vice versa. Additionally, we explored how unisex bathrooms contribute to the total proportion of bathroom facilities.

Unisex bathrooms are generally more cost-effective than gendered facilities, as they only require the construction and maintenance of a single room. However, the adoption rate varies due to social acceptance and differing norms, particularly in more traditional or conservative areas. This analysis seeks to identify patterns in the prevalence of these facilities and their distribution across Australia.

Methodology:

The data for this study was sourced from a comprehensive dataset detailing Australian toilet facilities and their attributes. The analysis was structured around two key visualizations

1. Heatmap by State (Figure E1 & Figure E2)
    - A heatmap of Australia was created to visualize the distribution of male, female, gendered (Male + Female), and unisex toilets across the country.
    - To simplify interpretation, the data was aggregated at the state level.
    - A parameter was implemented to allow users to toggle between each type of facility for a clearer comparison.
2. Bar Charts (Figure E3 & Figure E4)
    - A bar graph was generated to look at the counts of toilet types by state. This bar graph used the same parameter as the map to switch between views of male, female, gendered, and unisex toilet counts.

- These visualizations highlight the proportional differences between gendered and unisex bathrooms on both a state and national scale.

Findings/Results:

The analysis yielded several key insights

- Male and female restrooms are equal in number nationwide, supporting the expectation that both are provided in tandem.
- Unisex bathrooms, however, represent a much smaller proportion of total facilities compared to gendered bathrooms.
- Urbanized states, such as Victoria and New South Wales, have the highest prevalence of unisex bathrooms. In contrast, rural areas exhibit significantly lower adoption rates for unisex facilities.

Discussion:

The observed trends suggest that the higher prevalence of unisex bathrooms in urban areas may be influenced by cultural and political factors. Urban regions, which are often more progressive, may be more open to adopting unisex facilities due to their inclusivity and cost-effectiveness.

Conversely, rural areas tend to hold more traditional values and may prefer to adhere to the long-standing practice of providing separate male and female restrooms. Despite the potential cost savings, the slower adoption of unisex bathrooms in these areas reflects broader societal attitudes and resistance to change.

Conclusion

By conducting this report, we aimed to highlight areas of our nation that would benefit from the relocation, repair, and creation of public toilets on the basis of traveler access, gender access, disabled access, the spread of disease, and the spread of pollution.

We found that Central Australia was the most in need of new or upgraded toilets to provide access to amenities necessary for the basic hygiene of travelers, people of varied genders, and disabled people. We also discovered that public toilets could be contributing to air and land pollution, and should be monitored more closely to prevent the escape of contaminants into the environment.

As we move forward from this study, we will continue to investigate the association between the number of toilets and the presence of disease in nearby towns, as our analysis indicated a lack of correlation between these variables, which we believe is skewed due to the high population density of coastal areas.

All of these findings illustrate that access to hygiene may not be as universal as we thought, so we should take strides towards improving the availability of necessary hygiene facilities in order to preserve and improve the health of our nation’s people.

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Visualizations

Toilets for Traveling

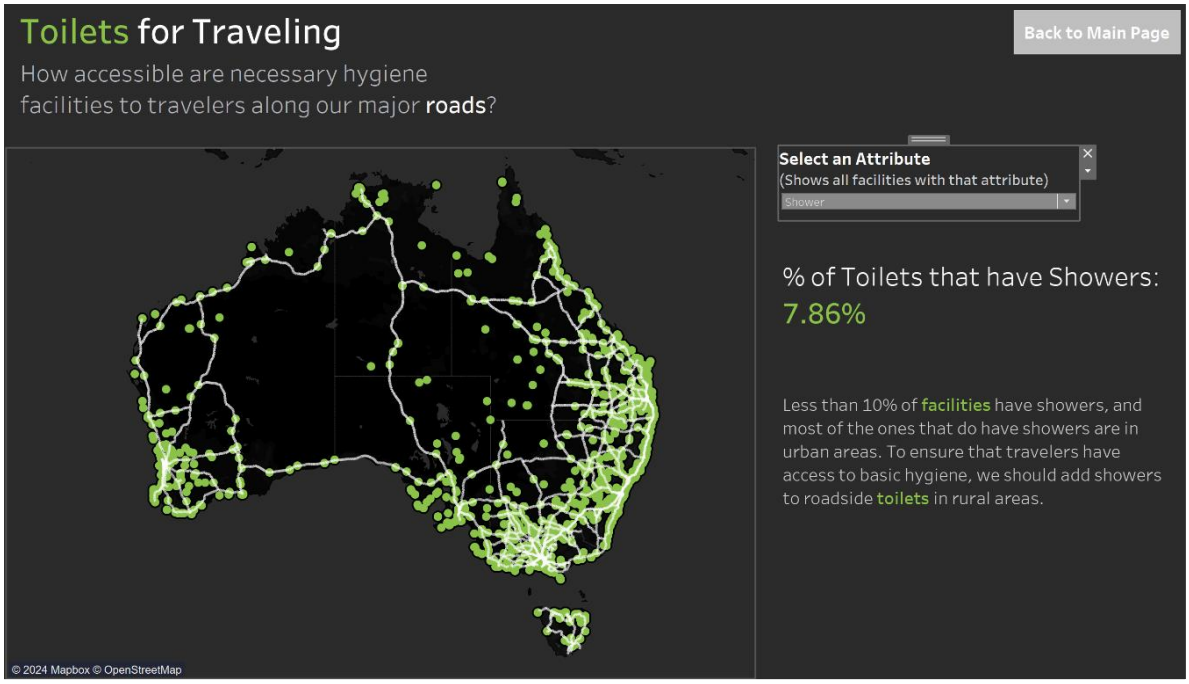
Figure A1

All Toilets

Note. This figure depicts all the locations of toilets in Australia layered on the national roads.

Figure A2

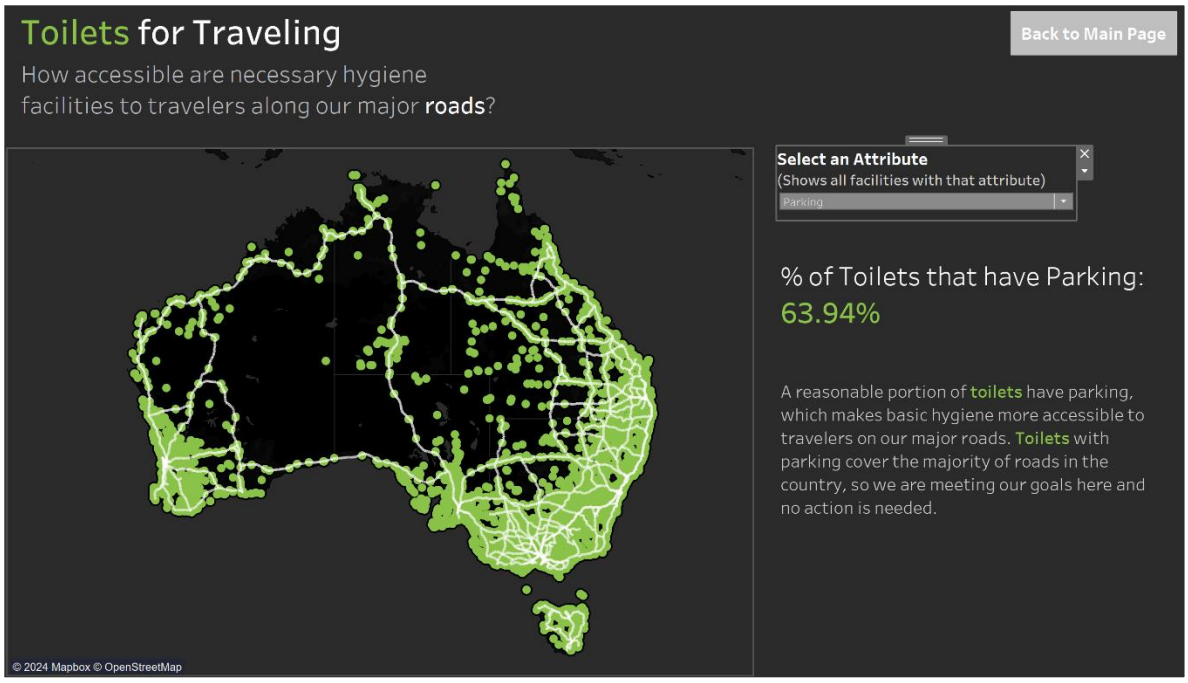
Toilets with Showers



Note. This figure depicts the locations of toilets with showers

Figure A3

Toilets with Parking



Note. This figure depicts the location of toilets with parking

Figure A4

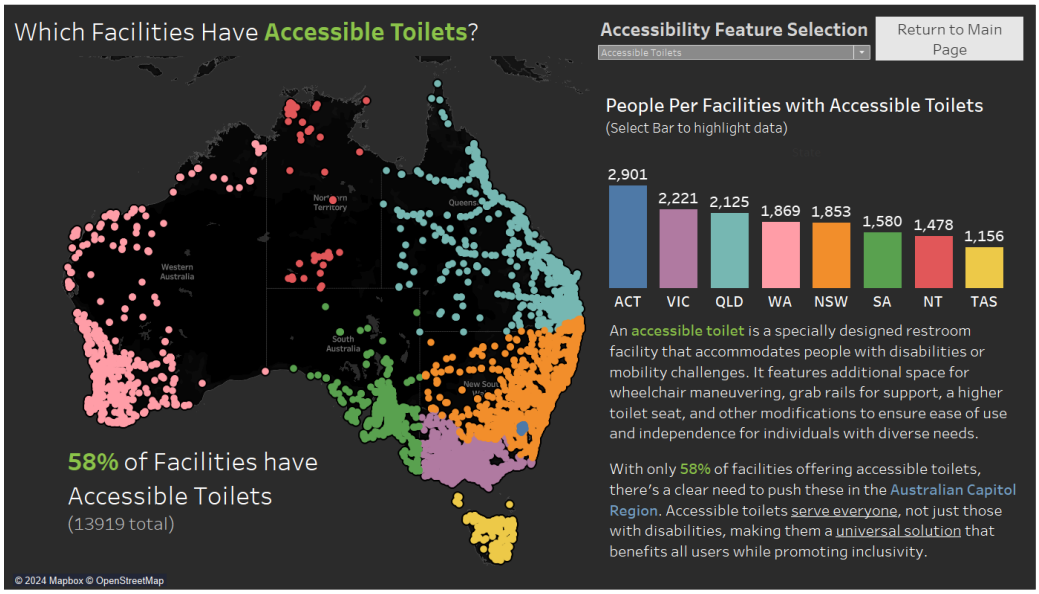
Toilets with Dump Points

Note. This figure depicts the location of toilets with dump points

Accessible Toilets

Figure B1

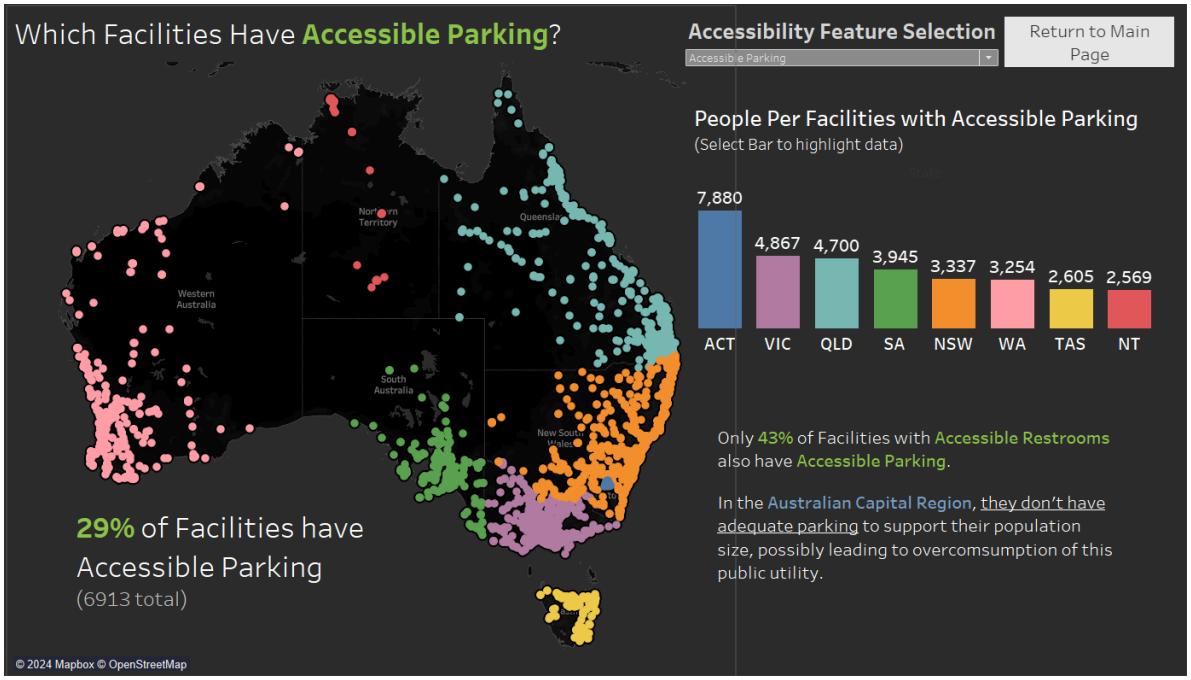
Which Facilities Have Accessible Toilets?



Note. This figure demonstrates facilities which have Accessible Toilets

Figure B2

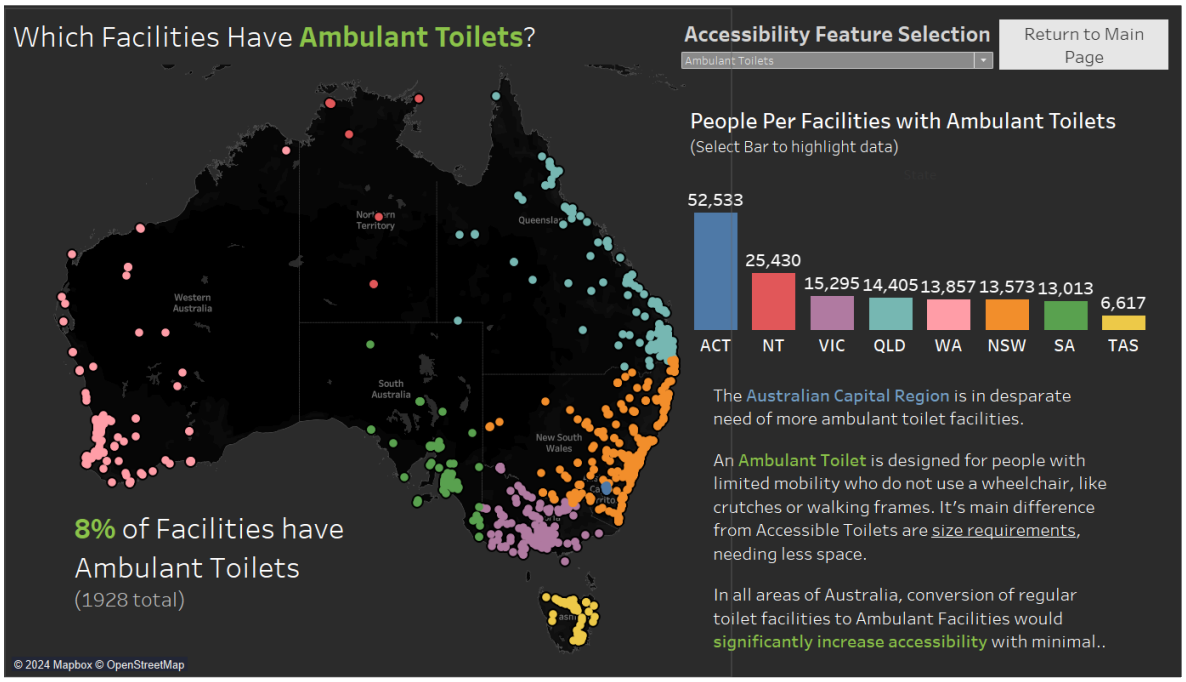
Which Facilities Have Accessible Parking?



Note. This figure demonstrates facilities which have Accessible Parking

Figure B3

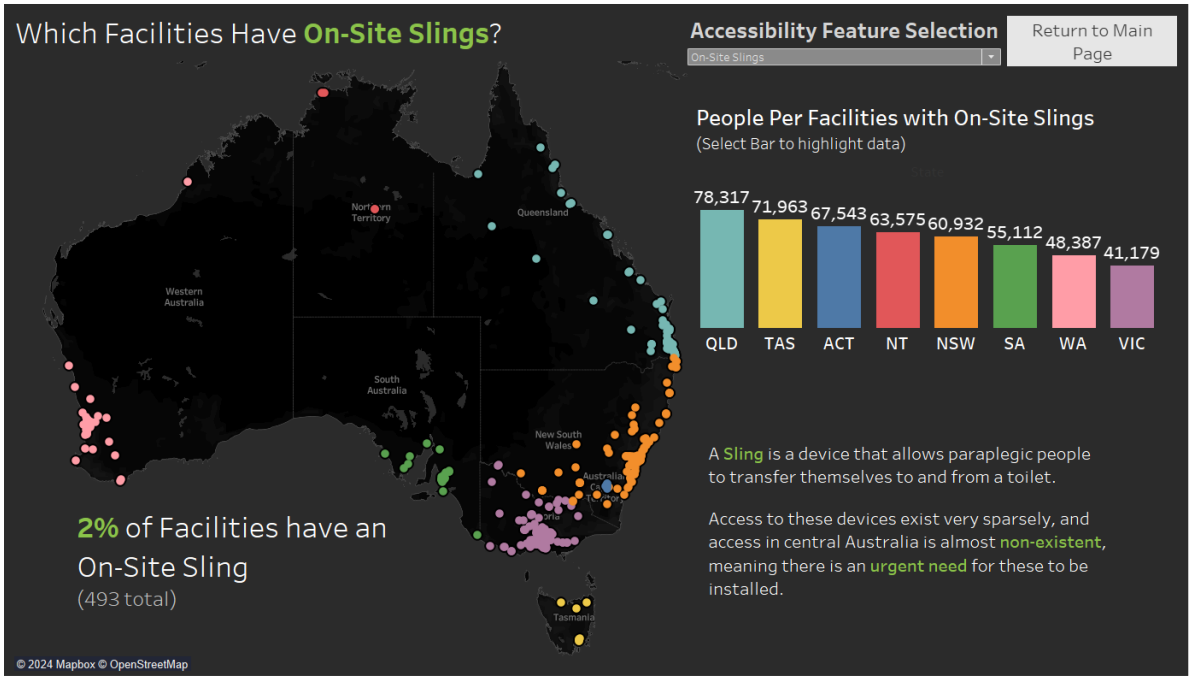
Which Facilities Have Ambulant Toilets?



Note. This figure demonstrates facilities which have Ambulant Toilets

Figure B4

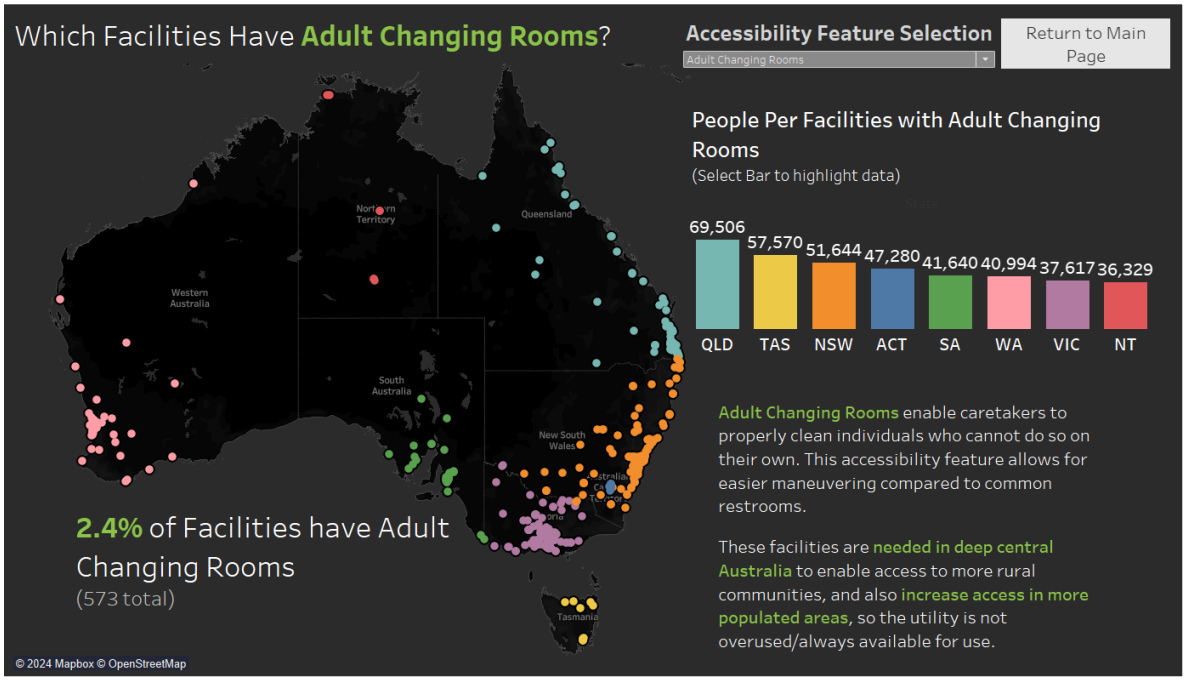
Which Facilities Have On-Site Slings?



Note. This figure demonstrates facilities which have On-Site Slings

Figure B5

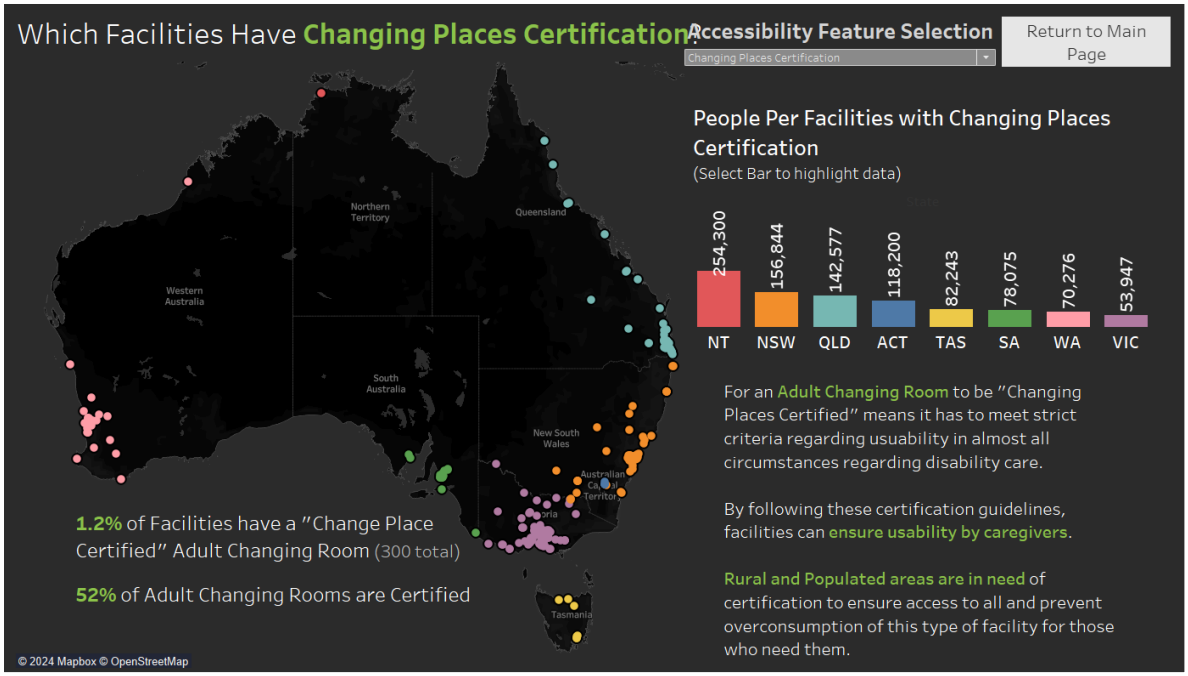
Which Facilities Have Adult Changing Rooms?



Note. This figure demonstrates facilities which have Adult Changing Rooms

Figure B6

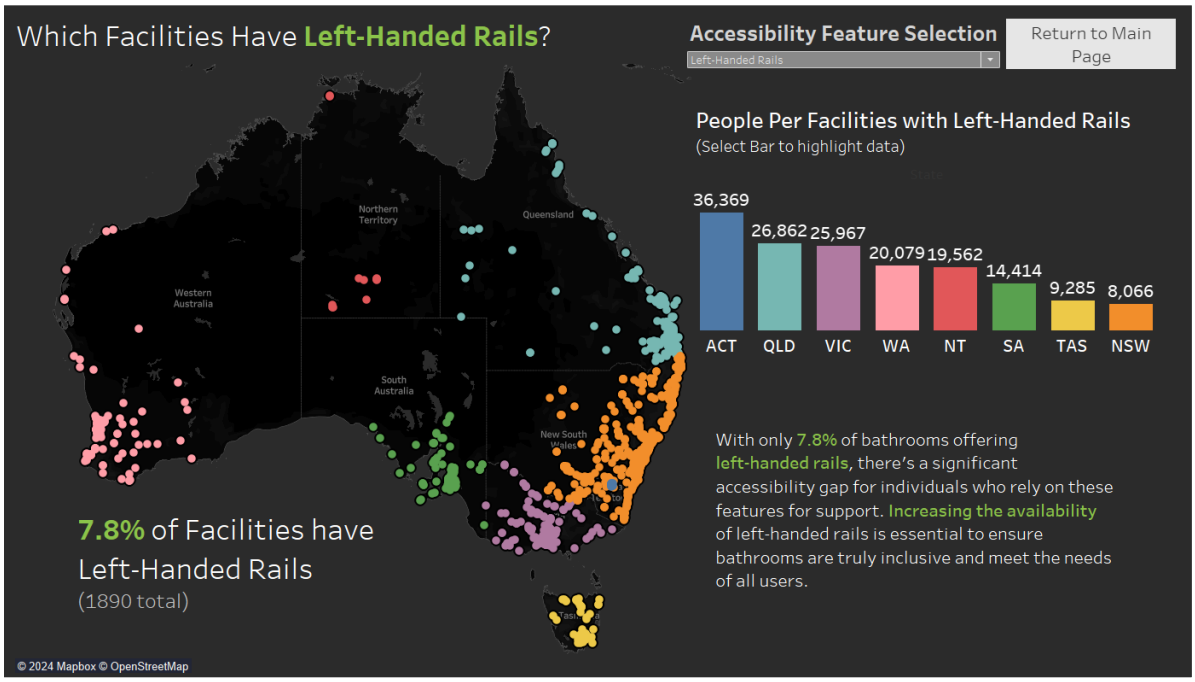
Which Facilities Have Changing Places Certification?



Note. This figure demonstrates facilities which have Changing Places Certification

Figure B7

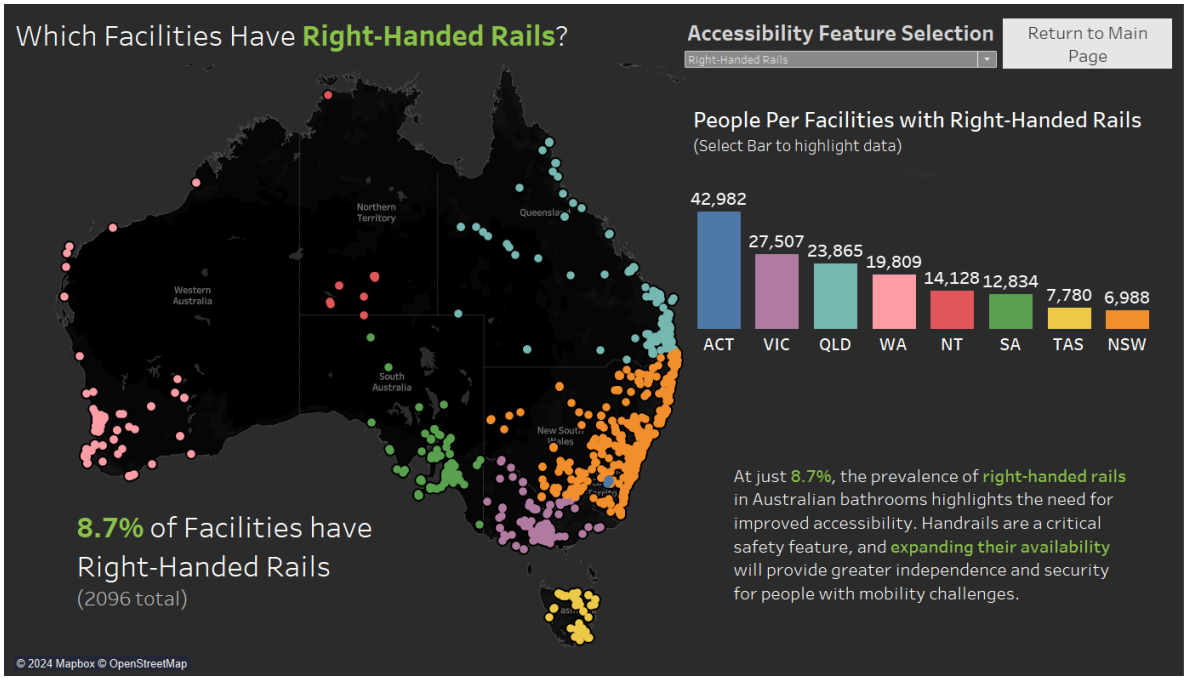
Which Facilities Have Left-Handed Rails?



Note. This figure demonstrates facilities which have Left-Handed Rails

Figure B8

Which Facilities Have Right-Handed Rails?

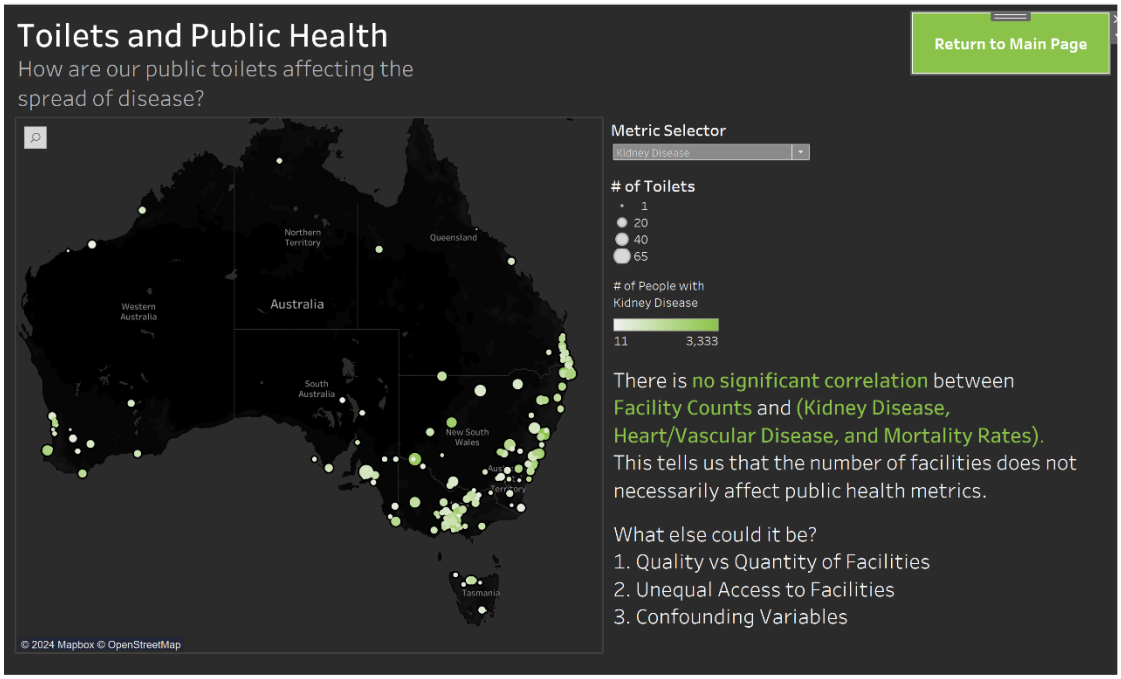


Note. This figure demonstrates facilities which have Right-Handed Rails

Toilets and Public Health

Figure C1

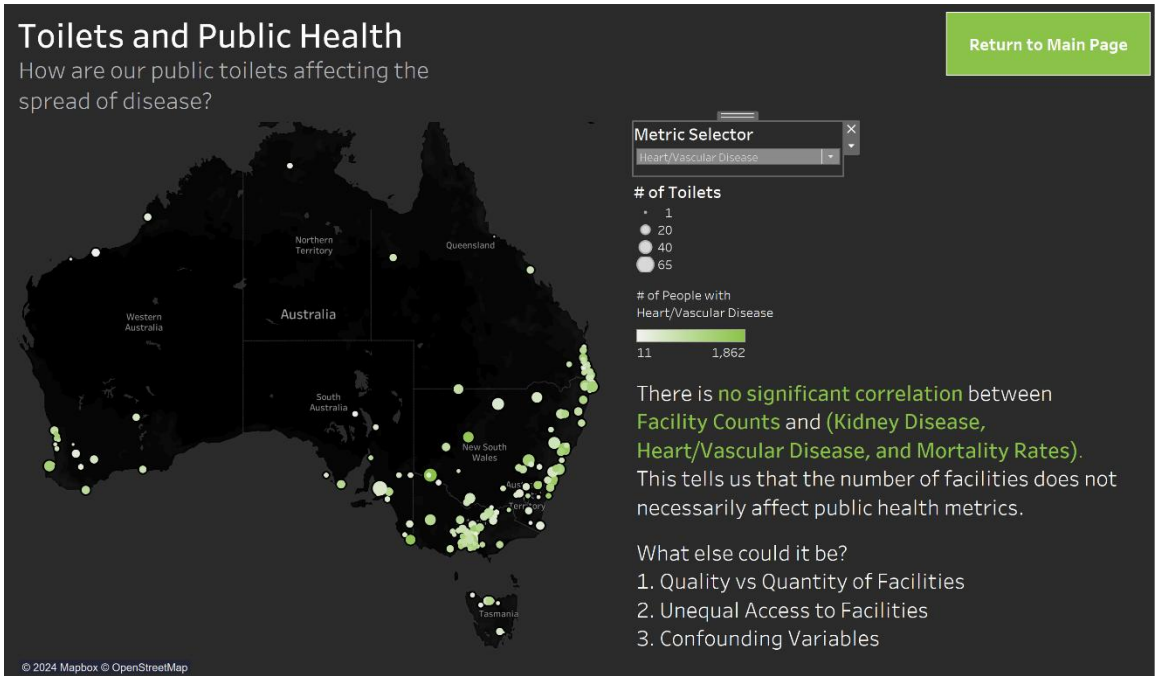
Toilets vs Kidney Disease by Town



Note. This figure demonstrates the number of Toilets (Size of Dot) and number of people with Kidney Disease (Shade of Green of Dot). Each Dot is a Town.

Figure C2

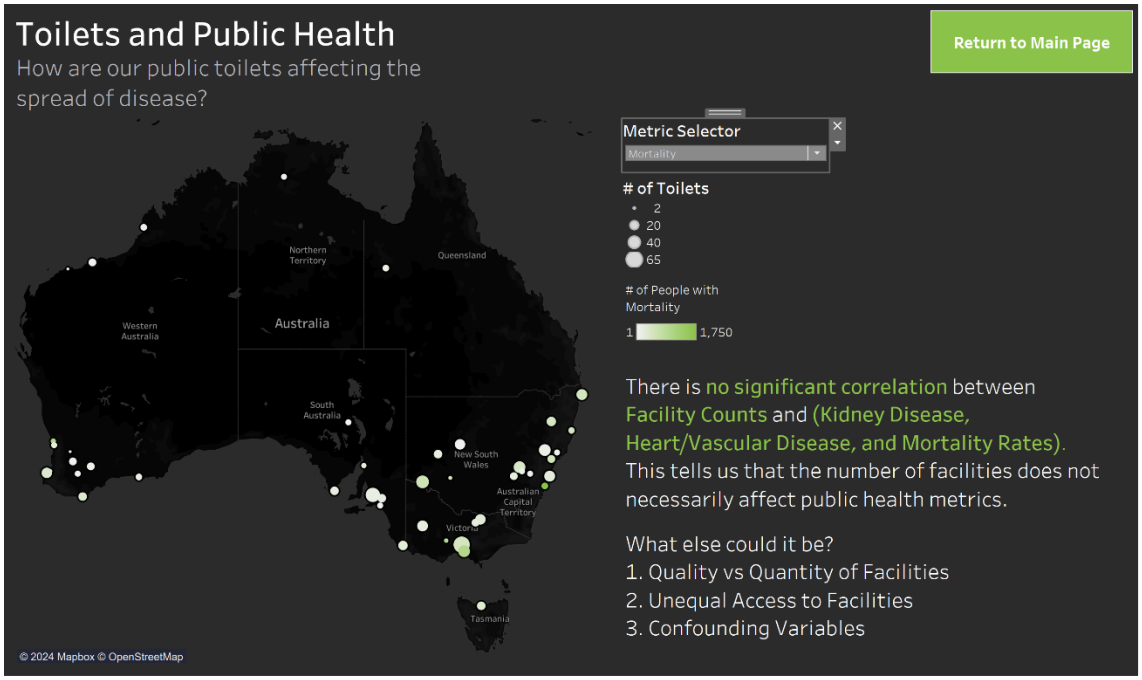
Toilets vs Heart/Vascular Disease by Town



Note. This figure demonstrates the number of Toilets (Size of Dot) and number of people with Heart/Vascular Disease (Shade of Green of Dot). Each Dot is a Town.

Figure C3

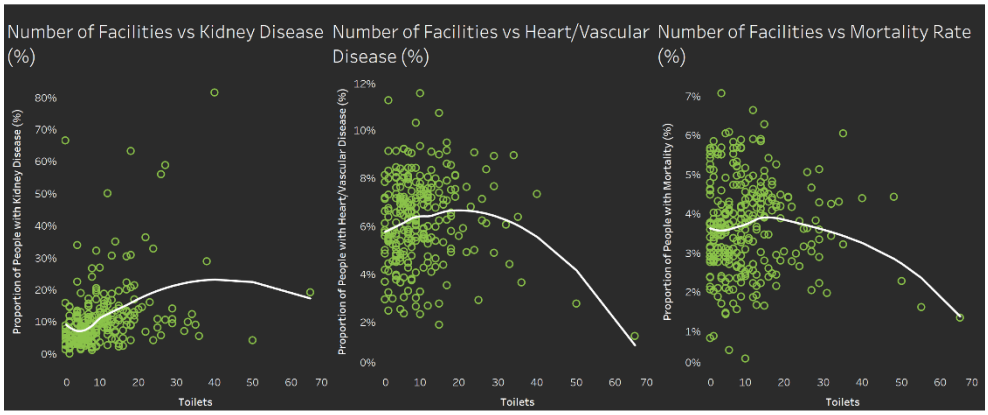
Toilets vs Number of Mortalities by Town



Note. This figure demonstrates the number of Toilets (Size of Dot) and number of Mortalities (Shade of Green of Dot). Each Dot is a Town.

Figure C4

Toilets vs all Public Health Metrics



Note. This figure demonstrates the number of Toilets vs Public Health Metrics. Trend line used is a LOESS Model

Toilets and Pollution

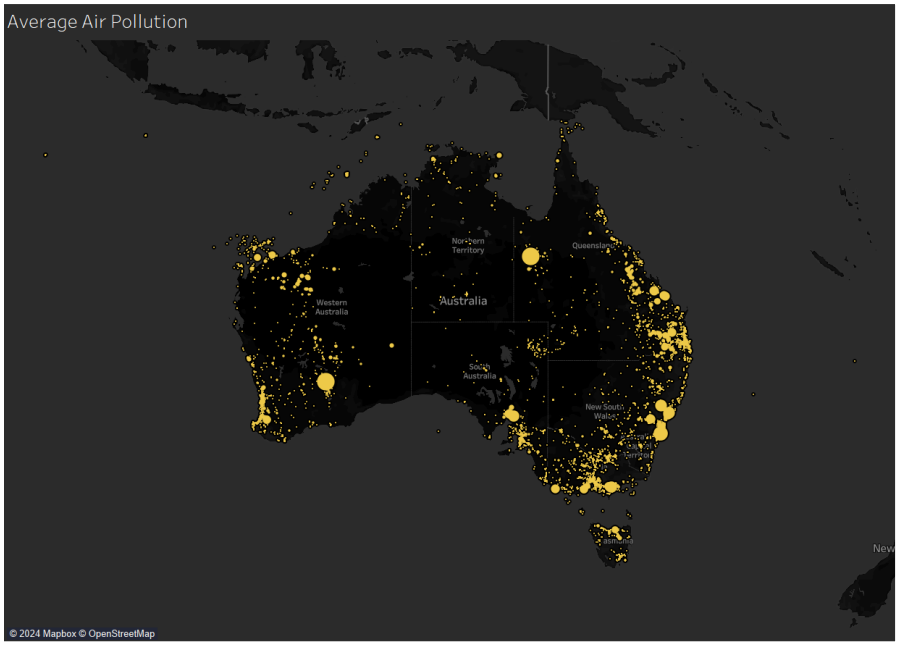
Figure D1

Toilets Across Australia

Note. This figure demonstrates the locations of toilets across Australia by latitude and longitude.

Figure D2

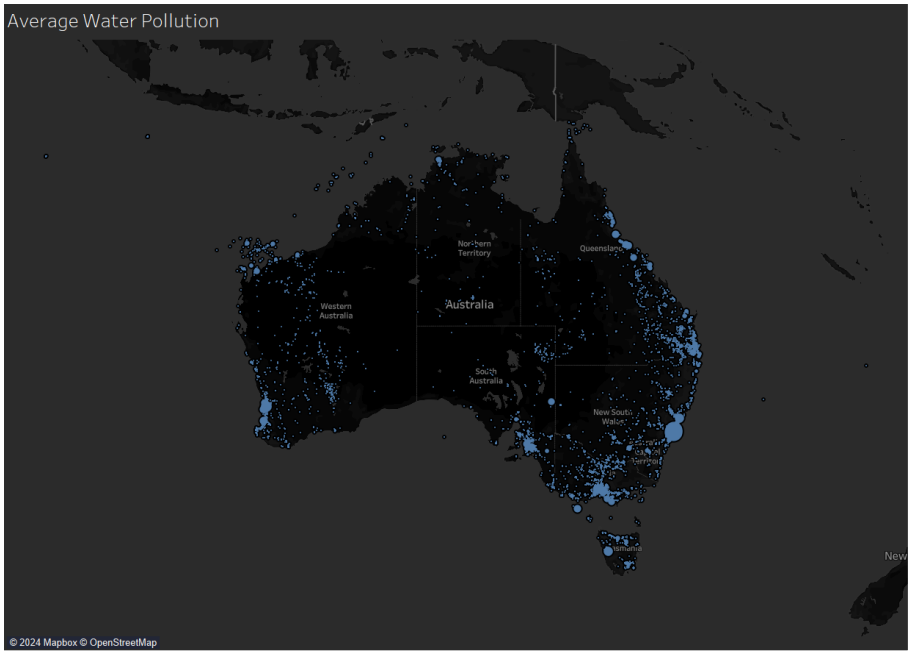
Air Pollution Across Australia



Note. This figure demonstrates air emissions across Australia, with larger circles indicating higher emissions.

Figure D3

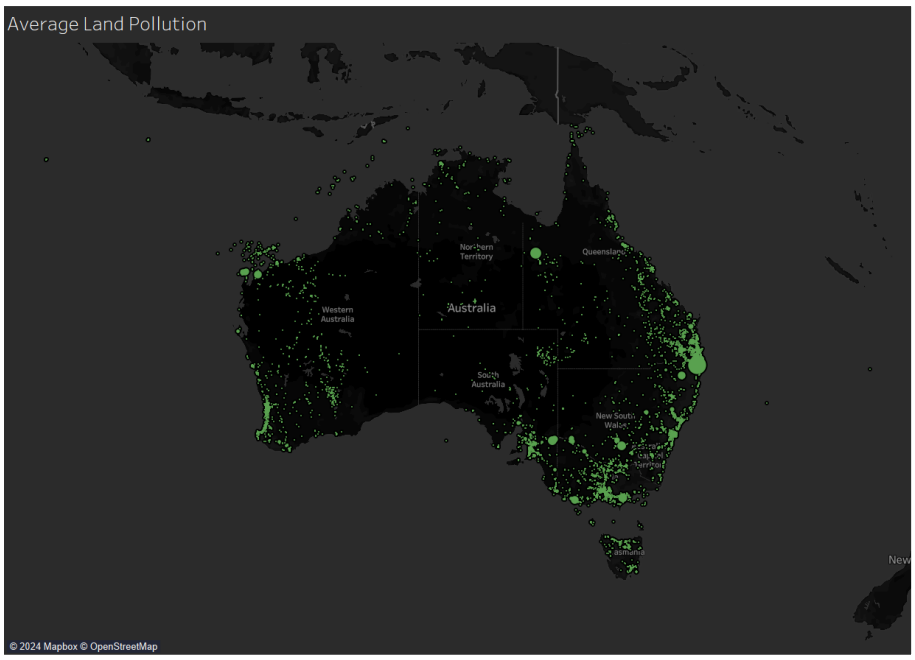
Water Pollution Across Australia



Note. This figure demonstrates water pollution across Australia, with larger circles indicating higher pollution.

Figure D4

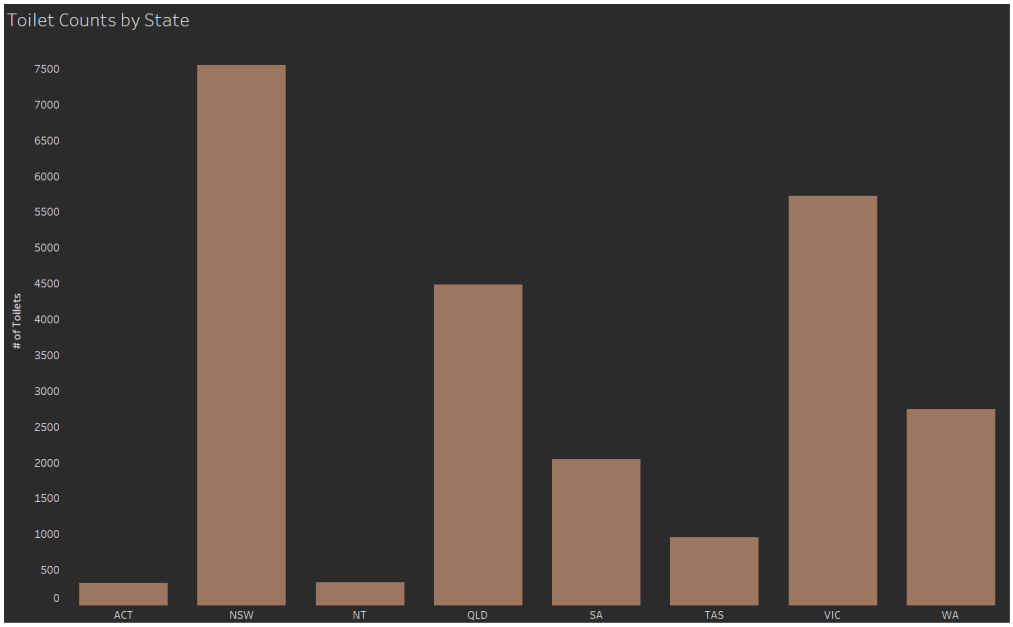
Land Pollution Across Australia



Note. This figure demonstrates land emissions across Australia, with larger circles indicating higher emissions.

Figure D5

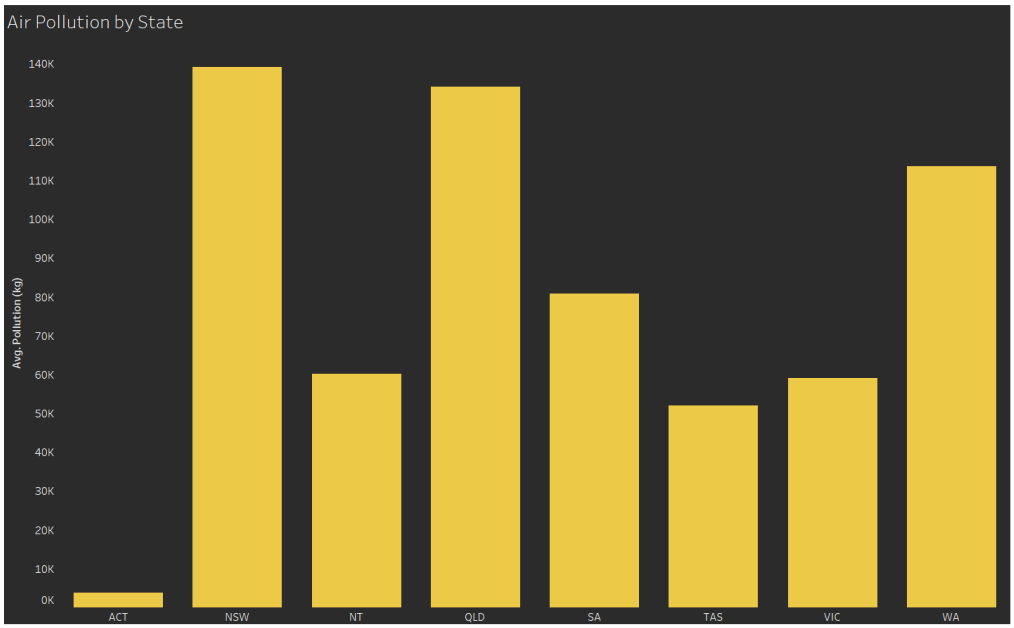
Australian Toilet Locations by State



Note. This figure demonstrates toilet locations by state across Australia, with higher bars showing more toilets.

Figure D6

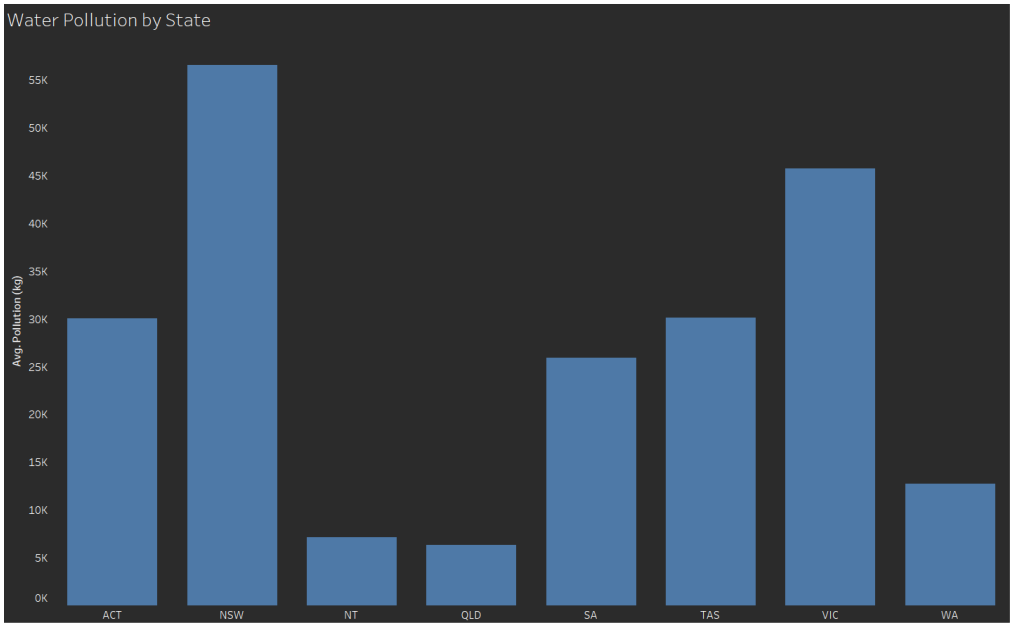
Air Pollution by State across Australia



Note. This figure demonstrates air emissions across Australia, with higher bars indicating more emissions.

Figure D7

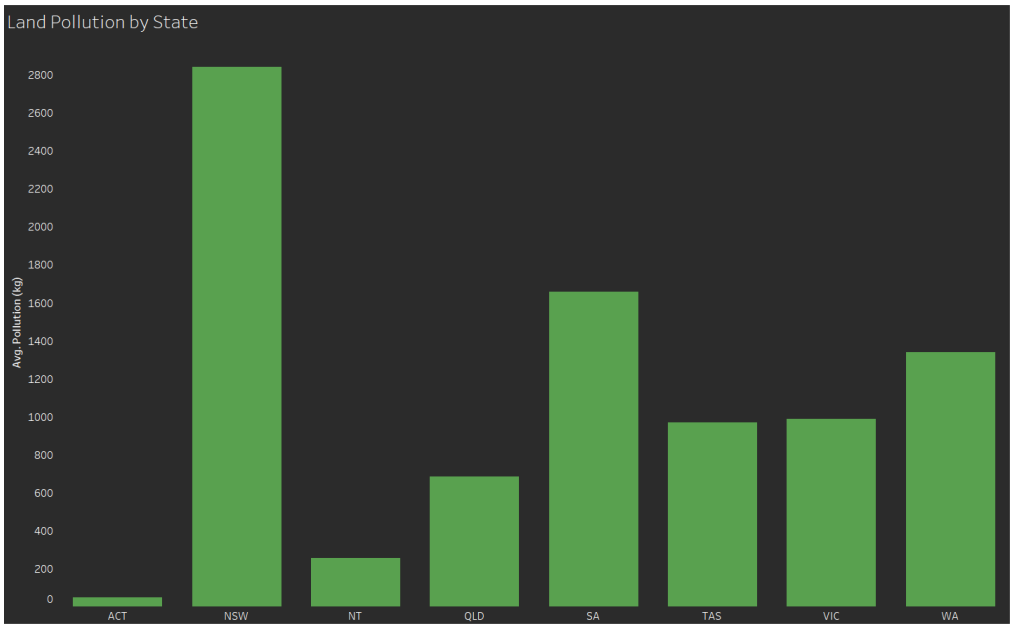
Water Pollution by State Across Australia



Note. This figure demonstrates water emissions across Australia, with higher bars indicating more emissions.

Figure D8

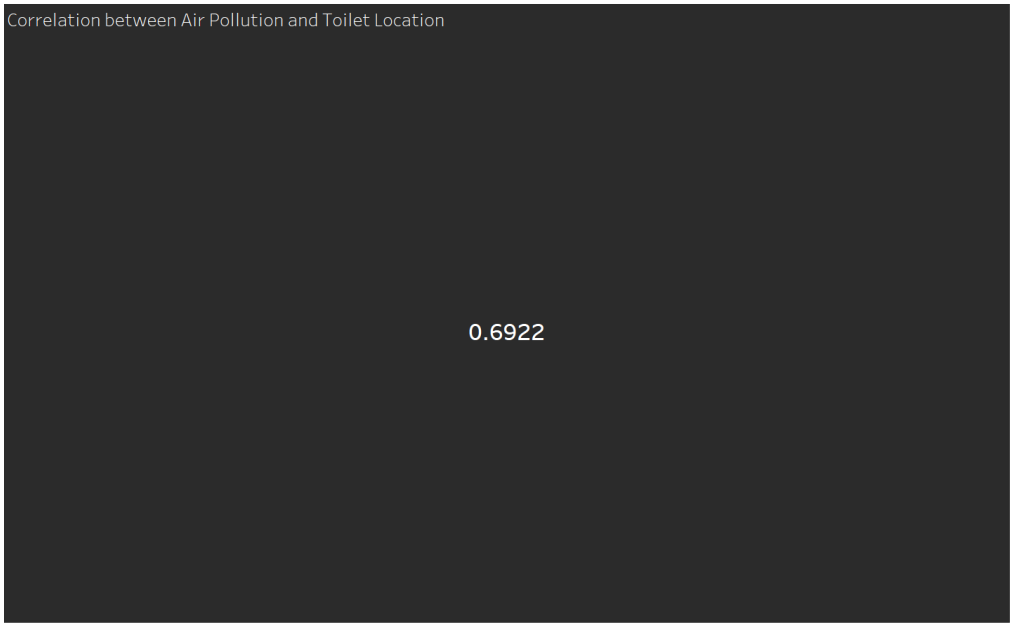
Land Pollution by State Across Australia



Note. This figure demonstrates land emissions across Australia, with higher bars indicating more emissions.

Figure D9

Correlation Coefficient Calculation

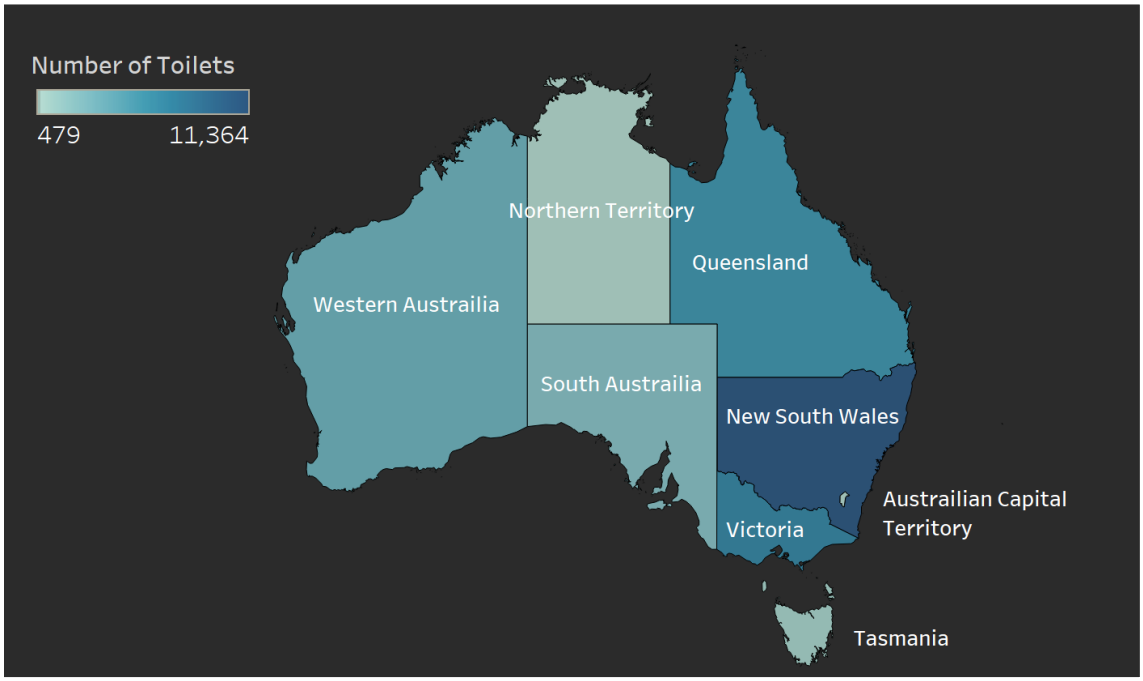


Note. This figure calculates correlation based on the type of pollution and the number of toilets in the location.

Gendered Toilets

Figure E1

Gendered Toilet Counts by State



Note. This figure demonstrates the counts of gendered toilet types (Male and Female combined) by state and is changed using a parameter.

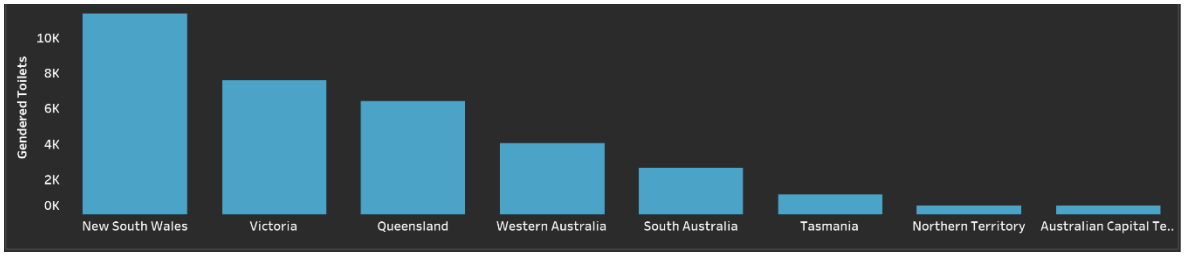
Figure E2

Unisex Toilet Counts by State

Note. This figure demonstrates the counts of unisex toilet types (No gender discrimination) by state and is changed using a parameter.

Figure E3

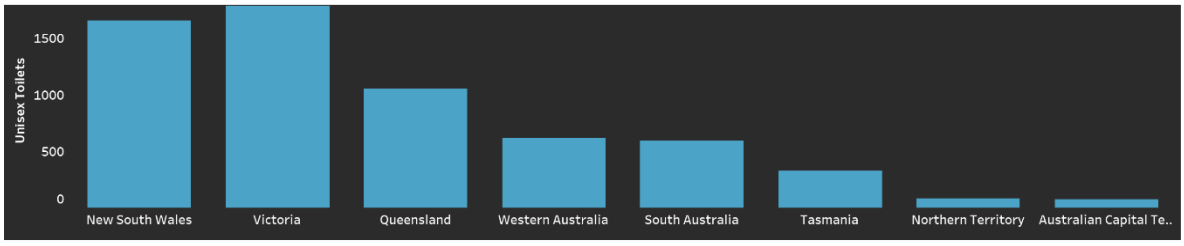
Gendered Toilets by State (Bar)



Note. This figure demonstrates the difference in the amounts of gendered toilets across states. This bar can be changed by a parameter

Figure E4

Unisex Toilets by State (Bar)



Note. This figure demonstrates the difference in the amounts of unisex toilets across states. This bar can be changed by a parameter.

Documentation

Division of Visualization Responsibility

- ***Ethan Ericson*** was responsible for the landing page and the Toilets for Traveling redirect.
- ***Jaxon Ham*** was responsible for the Accessible Toilets redirect.
- ***Andrew Mendez*** was responsible for the R integration and the Toilets and Public Health redirect.
- ***Medhansh Sankaran*** was responsible for the Toilets and Pollution redirect.
- ***Ethan Styles*** was responsible for the Gendered Toilets redirect.

Toilets for Traveling Redirect Documentation

Parameter 1

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
Select Attribute	List of String	Toilets by Highways (Ericson)	Select what travel – related attribute the graph will be filtered based on

Calculated Field 1

Name of Field	Formula	Where it is used	Purpose of the field
Attribute Filter	CASE [Select Attribute] WHEN "Show All Toilets" THEN True WHEN "Parking" THEN [Parking] = True WHEN "Shower" THEN [Shower] = TRUE WHEN "Dump Point" THEN [Dump Point] = TRUE END	Toilets by Highways (Ericson)	Filter toilets by the selected travel – related attribute.

Calculated Field 2

Name of Field	Formula	Where it is used	Purpose of the field
Toilet Proportion Text	CASE [Select Attribute] WHEN "Show All Toilets" THEN "# of Toilets: " WHEN "Parking" THEN "% of Toilets that have Parking:"	Attribute Proportion Text(Ericson)	Set up dynamic text for proportion of toilets with selected attributes out of total toilets

	WHEN "Shower" THEN "% of Toilets that have Showers:" WHEN "Dump Point" THEN "% of Toilets that have a Dump Point:" END		

Calculated Field 3

Name of Field	**Formula**	**Where it is used**	**Purpose of the field**
Toilet Proportion Sign	CASE [Select Attribute] WHEN "Show All Toilets" THEN "" WHEN "Parking" THEN "%" WHEN "Shower" THEN "%" WHEN "Dump Point" THEN "%" END	Attribute Proportion Text(Ericson)	Set up dynamic sign that accompanies proportion text

Calculated Field 4

Name of Field	**Formula**	**Where it is used**	**Purpose of the field**
Toilet Proportions	CASE [Select Attribute] WHEN "Show All Toilets" THEN SUM({ FIXED : COUNT([Facility ID]) }) WHEN "Parking" THEN ROUND(SUM(IF [Parking] THEN 1 ELSE 0 END) / SUM({ FIXED : COUNT([Facility ID]) }) * 100, 2) WHEN "Shower" THEN ROUND(SUM(IF [Shower] THEN 1 ELSE 0 END) / SUM({ FIXED : COUNT([Facility ID]) }) * 100, 2) WHEN "Dump Point"	Attribute Proportion Text(Ericson)	Calculate the dynamic proportions that accompany the proportion text

	THEN ROUND(SUM(IF [Dump Point] THEN 1 ELSE 0 END) / SUM({ FIXED : COUNT([Facility ID]) }) * 100, 2) END		

Calculated Field 5 (Grouped)

Name of Field	**Formula**	**Where it is used**	**Purpose of the field**
Explanation [1st-7th] Part	CASE [Select Attribute] WHEN "Show All Toilets" THEN "[Text between keywords for all toilets explanation]" WHEN "Parking" THEN "[Text between keywords for parking explanation]" WHEN "Shower" THEN "[Text between keywords for shower explanation]" WHEN "Dump Point" THEN "[Text between keywords for dump point explanation]" END	Text Explanation (Ericson)	Generate the unhighlighted explanation text that changes dynamically based on the selected parameter

Calculated Field 6 (Grouped)

Name of Field	**Formula**	**Where it is used**	**Purpose of the field**
Key words [1st-6th] Part	CASE [Select Attribute] WHEN "Show All Toilets" THEN "[keyword]" WHEN "Parking" THEN "[keyword]" WHEN "Shower" THEN "[keyword]" WHEN "Dump Point" THEN "[keyword]"	Text Explanation (Ericson)	Highlight important parts of the dynamic text explanation.

	END		

Accessible Toilets Redirect Documentation

Parameters

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
Accessibility Feature Selection	String	Feature Filter	To specify the Accessibility feature the user wants to investigate, also causes filter to change on maps and bar.
State	String	Map	To hide the null values of the Facilities, specifically where 'State' is null.

Calculated Fields

Name of Field	Formula	Where it is used	Purpose of the field
Feature Filter	[Accessibility Feature Selection] = "Accessible Parking" and [Parking Accessible] = TRUE OR [Accessibility Feature Selection] = "Adult Changing Room" and [Adult Change] = TRUE OR [Accessibility Feature Selection] = "Changing Places Certification" and [Changing Places] = TRUE OR [Accessibility Feature Selection] = "Ambulant Toilets" and [Ambulant] = TRUE OR [Accessibility Feature Selection] = "Accessible Toilets" and [Accessible] = TRUE OR [Accessibility Feature Selection] = "Left-Handed Rails" and [LH Transfer] = TRUE OR [Accessibility Feature Selection] = "Right-Handed Rails" and [RH Transfer] = TRUE OR [Accessibility Feature Selection] = "On-Site Sling" and [BYO Sling] = TRUE	Map and Bar Chart For Accessibility	To filter out Facilities that do not have the Accessibility feature specified in the Parameter

Toilets and Public Health Redirect Documentation

Calculated field 1/R integration 1

Name of Field	Code	Where it is used	Purpose of integration
KD LOESS	SCRIPT_REAL(" df <- data.frame(ft=.arg1, ht=.arg2);	Number of Toilets vs Kidney Scatter plot	To show a better trend line of scatter plot

	predict(loess(ft ~ ht, data=df)) ", SUM([KD Proportion %]), COUNT([Facility ID]))		

Calculated field 2/R integration 2

Name of Field	Code	Where it is used	Purpose of integration
HVD LOESS	SCRIPT_REAL(" df <- data.frame(ft=.arg1, ht=.arg2); predict(loess(ft ~ ht, data=df)) ", SUM([HVD Proportion %]), COUNT([Facility ID]))	Number of Toilets vs Heart/Vascular Disease Scatter plot	To show a better trend line of scatter plot

Calculated field 3/R integration 3

Name of Field	Code	Where it is used	Purpose of integration
Mort LOESS	SCRIPT_REAL(" df <- data.frame(ft=.arg1, ht=.arg2); predict(loess(ft ~ ht, data=df)) ", SUM([Mort Proportion %]), COUNT([Facility ID]))	Number of Toilets vs Mortality Rate scatter plot	To show a better trend line of scatter plot

Calculated field 4

Name of Field	Formula	Where it is used	Purpose of the field
KD Proportion %	100*([Number (Kidney	Number of Toilets vs Kidney Disease	All the prop % columns had

	Disease)]/[Population (Kidney Disease)])	scatter plot and R integrations	invalid numerical data so I had to recalculate it to make it valid numerical data

Calculated field 5

Name of Field	Formula	Where it is used	Purpose of the field
HVD Proportion %	100*([Number (HVD)]/[Population (HeartVVascular Disease)])	Number of Toilets vs Heart/Vascular disease scatter plot and R integrations	All the prop % columns had invalid numerical data so I had to recalculate it to make it valid numerical data

Calculated field 6

Name of Field	Formula	Where it is used	Purpose of the field
Mort Proportion %	100*([Total deaths]/[Population (Mortality Rates)])	Number of Toilets vs Mortality scatter plot and R integrations	All the prop % columns had invalid numerical data so I had to recalculate it to make it valid numerical data

Calculated field 7

Name of Field	Formula	Where it is used	Purpose of the field
Chosen Metric	CASE [Metric Selector] WHEN "Kidney Disease" THEN SUM([Number (Kidney Disease)]) WHEN "Heart/Vascular Disease" THEN SUM([Number (HVD)]) WHEN "Mortality" THEN SUM([Total deaths]) ELSE 0	On the Map for all public health metrics, Facilities counts, and towns	Based of the Metric Selector parameter you can change what public health metric your observing

	END		

Calculated field 8

Name of Field	Formula	Where it is used	Purpose of the field
Territory Filter	IF [By Territory] = "All" THEN TRUE ELSE [State] = [By Territory] END	Not used, ended up breaking the LOESS	Based of the By Territory parameter you can change what territory your looking at

Calculated field 9

Name of Field	Formula	Where it is used	Purpose of the field
Filter Mortality	IF [Metric Selector] = "Mortality" THEN [Year] = 2021 ELSE TRUE END	On the Map for all public health metrics, Facilities counts, and towns	If mortality metric is selected. It gets rid of redundant towns that have no mortality data

Parameter 1

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
Metric Selector	String	On the Map for all public health metrics, Facilities counts, and towns	To switch between what public health metric is being observed on the map

Parameter 2

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
By Territory	String		To switch between what data/postion on the map your looking at by territory

Toilets and Pollution Redirect Documentation

Calculated field 1

Name of Field	Code	Where it is used	Purpose of integration
Chosen Pollution	CASE [Choose Pollution Type] WHEN 'Air Pollution' THEN [Air Total Emission Kg] WHEN 'Water Pollution' THEN [Water Emission Kg] WHEN 'Land Pollution' THEN [Land Emission Kg] END	On the Parameter Choose Pollution Type	To integrate the pollution options between graphs.

Calculated field 2

Name of Field	Code	Where it is used	Purpose of integration
Correlation Calc	WINDOW_CORR(AVG([Chosen Pollution]), COUNT([Facility ID]))	Chosen Pollution type and Facility ID (unique toilets)	Calculates correlation between pollution and toilets

Calculated field 3

Name of Field	Code	Where it is used	Purpose of integration
Chosen Color	CASE [Choose Pollution Type] WHEN 'Air Pollution' THEN 'Yellow' WHEN 'Water Pollution' THEN 'Blue' WHEN 'Land Pollution' THEN 'Green' END	On the parameter Choose Pollution Type	To color code pollution types automatically without manual changing.

Calculated field 4

Name of Field	Formula	Where it is used	Purpose of the field
TextChooserAir	IF [Choose Pollution Type] = 'Air Pollution' THEN TRUE ELSE FALSE END	On the parameter Choose Pollution Type	Allows text to dynamically change on a dashboard when parameter options are selected

Calculated field 5

Name of Field	Formula	Where it is used	Purpose of the field
Merged State	IF ISNULL([State]) THEN [State1] ELSE [State] END	On the State identification field in both datasets	Merge both states together in order to perform easy filtering on both data

Parameter 1

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
Choose Pollution Type	String	On the map for pollution and the bar chart for pollution	To switch between the pollution type (Air, Water, Land) viewed on the dashboard

Gendered Toilets Documentation

Calculated Field 1

Name of Field	Formula	Where it is used	Purpose of the field
Male Toilets	SUM(IF [Male] THEN 1 ELSE 0 END)	The Map and the bar charts	Converts the true false into integer values for counts

Calculated Field 2

Name of Field	Formula	Where it is used	Purpose of the field
Female Toilets	SUM(IF [Female] THEN 1 ELSE 0 END)	The Map and the bar charts	Converts the true false into integer values for counts

Calculated Field 3

Name of Field	Formula	Where it is used	Purpose of the field
Gendered Toilets	[Male Toilets] + [Female Toilets]	The Map and the bar charts	Adds up male and female toilets

Calculated Field 4

Name of Field	Formula	Where it is used	Purpose of the field
Unisex Toilets	SUM(IF [Unisex] THEN 1 ELSE 0 END)	The Map and the bar charts	Converts the true false into integer values for counts

Calculated Field 5

Name of Field	Formula	Where it is used	Purpose of the field
Toilet Totals	[Male Toilets] + [Female Toilets] + [Unisex Toilets]	Wasn't used	Totals up all the previous calculated fields to get an overall total

Calculated Field 6

Name of Field	Formula	Where it is used	Purpose of the field
Toilet Types	IF [Male] THEN "Male" ELSEIF [Female] THEN "Female" ELSEIF [Unisex] THEN "Unisex" END	Wasn't used	Was intended to separate toilet totals but failed

Calculated Field 7

Name of Field	Formula	Where it is used	Purpose of the field
Toilet Type Count	IF [Toilet Type Filter] = "Male Toilets" THEN [Male Toilets] ELSEIF [Toilet Type Filter] = "Female Toilets" THEN [Female Toilets] ELSEIF [Toilet Type Filter] = "Unisex	Map	Allows the parameter to change the way the map is colored

	Toilets" THEN [Unisex Toilets] ELSEIF [Toilet Type Filter] = "Gendered Toilets" THEN [Gendered Toilets] END		

Calculated Field 8 – Added by Ericson to get map to work after importing

Name of Field	Formula	Where it is used	Purpose of the field
State (full)	CASE [State] WHEN "NSW" THEN "New South Wales" WHEN "VIC" THEN "Victoria" WHEN "QLD" THEN "Queensland" WHEN "SA" THEN "South Australia" WHEN "WA" THEN "Western Australia" WHEN "TAS" THEN "Tasmania" WHEN "NT" THEN "Northern Territory" WHEN "ACT" THEN "Australian Capital Territory" ELSE [State] END	Map	Shows the full name of the states

Parameter 1

Parameter Name	Input Type	Where it is used	Purpose of the Parameter
Toilet Type Filter	List of String	Map (Styles)	Select whether you want the map to display counts of Male, Female (those are actually the same), Gendered, or Unisex.