

Process Book

Health Situations in Australia and around the world

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Team 6

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# Summary

The objective of this report is to highlight the background of the visualization, the data findings and cleaning, the requirements of the visualization, the design, and the validation of a comprehensive data visualisation project. This project served as an illustration of health situations in Australia and throughout the world through many aspects (physicians, tobacco, alcohol consumption and life expectancy). The main purpose of this project is to create a user-centered website with the demonstration of data visualizations and interactive features.

The primary features of the project include interactive effects to read the information of each data point, a concise and straightforward design, accurate data representation, and a range slider or a dropdown to show data fluctuation and various data aspects.

The topic of this project is mainly healthcare, such as the number of physicians in each state in Australia, life expectancy and tobacco consumption in both OECD and non-OECD countries. The initial design used screenshots from charts made Excels or simple drafts using D3. The final design ultilized some types of graph such as donut and bubble graphs, designed for a clear and accurate demonstration of the data.

The need of validating data is to check for the sources of data, the application of methods to properly process data, and the representation of data in the visualization. Standard design guidelines were followed, and interactive features were added for better understanding of data and illustrated effects.

In conclusion, this project has contributed to a better understanding many parts of the health situation in Australia and in other countries, providing valuable insights for the readers and the policymakers. The project emphasizes on the importance of informed discussions and decisions in health-related law.

This is the link to our website:

<https://mercury.swin.edu.au/cos30045/s103995439/assignment2/source-countries/>

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# INTRODUCTION

Health and its contributing factors have been an important aspect of the couuntries, and it reflects the countries’ economy status and the living of standard of the civilians. Hence, there is an increase in demand for visualization of health data to better show the features of health aspects in many countries around the world.

## **1.1** **BACKGROUND AND MOTIVATION**

Health is an essential field of a country, and it has great impact on economy, demographics and even policies. However, understanding this trend by reading articles or searching for data requires massive effort and time to process all the information.

This is why we decided to make this project, to easily understand the data no matter what your education background or what your occupation is. Our visualisation presents health data in the consumption of alcohol and tobacco, life expectancy and the number of physicians in Australia.

Beyond being a tool for educational purposes, our visualisation aims to raise awareness of people about the health situation in Australia and around the world and broaden their points of view by presenting different aspects of health.

## **1.2 VISUALISATION PURPOSE**

The project will help the authorities have a great point of view about health to identify potential challenges of well-being so that they could modify the policies based on real-time situations in many countries. Furthermore, some tools will be added for users to interact with the data for better illustration. For instance, users can use visualized charts to identify the consumption of alcohol and tobacco. Donut charts are useful for people to analyze the percentage of physicians in Australia through a long period. Moreover, the project provide reasons why the health system has great impacts on people’s lives, in terms of well-being and immunization. This point is the important key for the government to make important decisions about the allocation of resources, the development of healthcare infrastructure as well as the modification of the health policies.

# DATA

## **2.1 DATA SOURCE**

The project mainly uses the OECD database as the data source. The OECD database contains data that is related to many aspects of the health system, including the number of physicians in Australia, life expectancy, tobacco and alcohol consumption. These datasets allow us to have a broad view on health systems in Australia and in other countries. Our goal is to help the readers understand this multifaceted situation through a thorough collection of essential datasets and the analysis of the data to give different insights and informed discussions on the topic of health.

We analyze many data files, focusing on different aspects of health:

* Physicians in Australia (physicians.csv): The dataset contains these fields:

|  |  |
| --- | --- |
| **Field Name** | **Types of Data** |
| Regions (New South Wales, Victoria, etc.) | Nominal |
| Time period (2011, 2012, 2013, etc.) | Ratio |
| Time period in percent (2011, 2012, 2013, etc.) | Ratio |

The ‘Regions’ field presents data for each regions in Australia, relating to the period from 2010 to 2021. The data statistics in each year represents the number and proportion of physicians of each regions in Australia in this period.

* Alcohol consumption (alcohol.csv): The dataset contains these fields:

|  |  |
| --- | --- |
| **Field Name** | **Types of Data** |
| Countries | Nominal |
| Alcohol | Ratio |

The ‘Countries’ field represents the countries that are in the dataset. The ‘Alcohol’ field represents the amount of tobacco consumption of people over 15 years old using litres as the unit of measurement.

* Tobacco consumption (tobacco.csv): The dataset contains these fields:

|  |  |
| --- | --- |
| **Field Name** | **Types of Data** |
| Countries | Nominal |
| Tobacco | Ratio |

The ‘Countries’ field represents the countries that are in the dataset. The ‘Tobacco’ field represents the amount of tobacco consumption of people over 15 years old using grammes as the unit of measurement.

## **2.2 DATA PROCESSING**

Ảnh có chứa văn bản, ảnh chụp màn hình, Phông chữ

Mô tả được tạo tự động

Figure 1: Physicians in Australia

Ảnh có chứa văn bản, Phần mềm đa phương tiện, phần mềm, ảnh chụp màn hình

Mô tả được tạo tự động

Figure 2: Cleaned Physicians in Australia

**Figure 1** and **Figure 2** present the process of cleaning the dataset, which is essential for data analysis. This process is focused on many steps: removing unnecessary elements such as the tile of the table or the unit of measurement, which often contribute little for the need of the visualization. By removing these elements, the usability and the integrity of the datasets will be increased, which help create more concise and suitable representation for the subsequent process.

Ảnh có chứa văn bản, ảnh chụp màn hình, Phông chữ

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Figure 3: Cleaned Tobacco Consumption

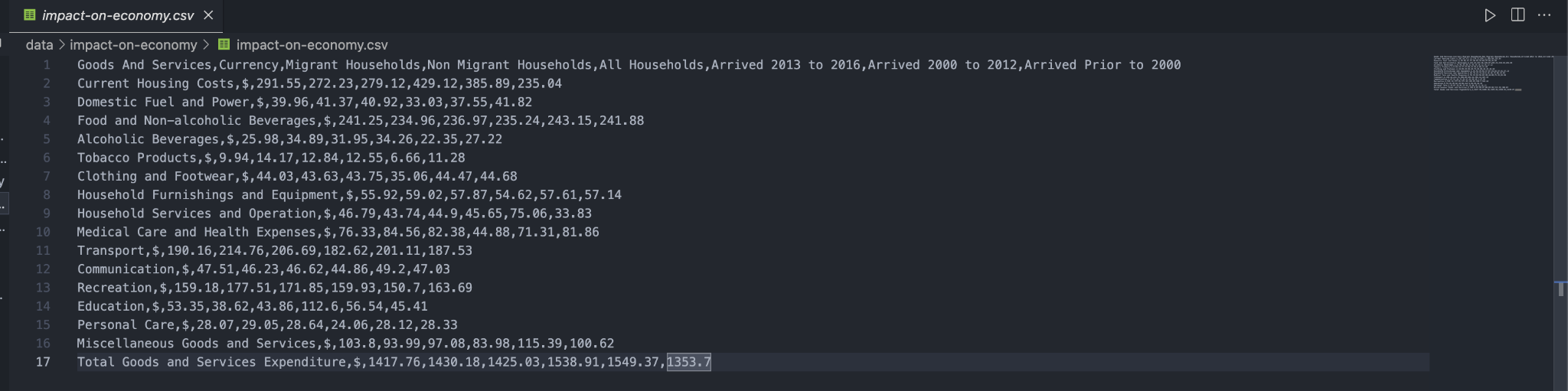


Figure 4: Cleaned Alcohol Consumption

**Figure 3** and **Figure 4** presented the cleaned data and the key characteristics of Physicians in Australia, Tobacco Consumption and Alcohol Consumption. Each figure demonstrates some aspects of the datasets and their correlations, which offers an overview of the aspects of health. The visualizations help enlightens readers on the correlations and the patterns within these different characteristics. Hence, the visualizations play an important role in the analysis and visualization of these aspects of health.

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# REQUIREMENTS

The requirements are the critical features needed for an effective project.

**Must-have Features:**

* To encourage the engagement of users, we create interactive visualisations with mouse hovering to show the statistics.
* To provide information for various health factors, we plan to design three distinct charts with three datasets of three different factors.
* The aim of the visualization is to adopt a concise and user-friendly design.
* It is important to demonstrate a concise and up-to-date data representation to gurantee valid points of view.
* Interactive tools are ultilized to encourage the interaction between the users and the visualizations.

**Optional Features:**

* The integration of smooth animations for the website is proposed to encourage the data exploration and comprehension with intrigue and fascination.
* Legends provide information about colors and the descriptions of chart, hence help the users understand what the chart is about. A legend and interactive effects for the chart to show data statistics are made for clarification.
* Sliders for period of years are made to provide context for the data and compare the data in each year.

# VISUALISATION DESIGN

## **4.1 Initial Visualisation Design**

Question1: How the number of physicians in Australia changed over time?

Figure 5: Initial Physicians in Australia

In Figure 5, a screenshot from a chart made with Excel is taken. This preliminary chart outlines the percentage of the physicians in each region in 2010. The dataset's design and chosen year provide a brief overview of the number of physicians in Australia.

Question 2: What is the consumption of tobacco of children over 15 years old?

**Ảnh có chứa văn bản, vòng tròn, ảnh chụp màn hình, Phông chữ

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Figure 6: Initial Tobacco Consumption

A simple visualization for Figure 6 is made with D3 to present primary characteristics of tobacco consumption. This chart presents a draft of the amount of tobacco consumed by children in 2018.

Question 3: What is the consumption of alcohol of children over 15 years old?

Ảnh có chứa văn bản, vòng tròn, ảnh chụp màn hình, Phông chữ

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Figure 7: Initial Alcohol Consumption

A simple visualisation for Figure 7 is made with D3 to present primary characteristics of alcohol consumption. This chart presents a draft of the amount of alcohol consumed by children in 2017.

## **4.2 Final Visualisation Design**

Question1: How the number of physicians in Australia changed over time?

Figure 8: Final Physicians in Australia

In Figure 8 utilizes a Heat Map to provide a vibrant and insightful visualisation of migration patterns to Australia in the years 2011 and 2021. By representing the source countries of migrants with varying degrees of color intensity, the map vividly illustrates the primary contributors to Australia's migrant population. The careful design and color-coding facilitate an instant grasp of the migration dynamics, significantly enhancing the understanding of how these patterns have changed over the decade. This innovative visual tool effectively answers the question about the main source countries contributing to Australia's migrant population.

Question 2: What is the consumption of tobacco of children over 15 years old?

Figure 9: Final Tobacco Consumption

In Figure 9 employs a line chart to track the fluctuations in migrant numbers over time, showcasing annual data points. A striking observation from this graph is the pronounced dip in migration to Australia during the Covid 19 period. The chart distinctly presents New South Wales (NSW) and Victoria (VIC) as the two most preferred destinations for migrants. However, as the pandemic unfolded, VIC, being one of the strictest states in terms of lockdown measures, witnessed a substantial drop in migration. Despite this downturn, the graph also reflects VIC's remarkable recovery pace, quickly catching up with the migration rates of NSW. Thus, the line chart successfully elucidates the influence of global events like Covid 19 on migration trends over time.

Question 3: What is the consumption of alcohol of children over 15 years old?

Figure 10: Final Alcohol Consumption

In Figure 10 integrates multiple line charts to exhibit key demographic characteristics of migrants, specifically gender and age distribution, from 2018 to 2022. By representing male and female migrants in separate lines, the chart effectively illustrates the gender dynamics of migration over time. Additionally, it incorporates a Population Distribution by Age chart, providing a more granular insight into the age brackets of the migrating population. The chart's design and time span enable a comprehensive understanding of the evolving demographic profile of migrants to Australia. Consequently, it offers valuable insights into age and gender trends among migrants, thus answering the question effectively.

# VALIDATION

The data validation involves the data verification of reliable sources, the application of proper methods to process data, and the proper representation of data through the visualizations.

The sources of the datasets are verified since all the datasets was taken from the OECD database, a trusted intergovernmental organization in the world.

The process of cleaning data were performed to make sure the datasets we use is appropriate for analyzing and visualizing . The process comprised of removing unnecessary features such as unused columns and rows, title, unit of measurement. Furthermore, the normalization of data was used if needed to maintain the data format and data comparability.

We complied with design guidelines so that the visualisations concisely demonstrated the datasets. These comprised of suitable use of data visualization types that the demonstration of the dataset, and proper use of titles, legends and references. We also added interactive effects to encourage the interaction of users for the data and make the charts more intrigue.

# CONCLUSION

Healthcare has an important impact on the demographics and economic status of the world. The questions arised in the project highlight the various aspects of health situations not only in Australia but also in many other countries, both in good and bad terms.

This report offers a broad view of health patterns in Australia and other countries, simplifies the large volumn of data for clearer understanding of health systems and some health factors that has impact on the well-being. The tools used in this project helps demonstrate consumption of alcohol and tobacco, the number of physicians in Australia and life expectancy.

In conclusion, the visualization emphasizes on the importance of health systems throughout the world and contribute to a better understanding of this unfamiliar situations. Hence, understanding the status of health is vital for everyone, especially for the policymakers to modify the policies to better suit with the current situations in their countries.