

# Power BI Project : Global Health Expenditure Analysis

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## Abstract :

In this Power BI project, we will analyse global health expenditure data to gain insights into different aspects of health spending across countries and regions. The dataset used in this project will contain information on health expenditure, GDP, population, and other relevant metrics.

The objective of this Power BI project is to analyse global health expenditure data to gain valuable insights into various aspects of health spending across countries and regions. The primary goal is to provide a comprehensive and data-driven view of health expenditure trends, its relationships, and identify key patterns. The analysis aims to answer critical questions and support decision-making in the field of global healthcare

## Data Source :

We will use a dataset that includes the following key columns:

- ❖ **CountryID** : It contains unique identifiers to different countries
- ❖ **CountryName** : Name of the country.
- ❖ **YearID**: It contains unique identifiers to different years
- ❖ **Year** : Year of the data record.
- ❖ **ExpenditureAmount** : Total health expenditure in US dollars.
- ❖ **GDPAmount** : Gross Domestic Product in US dollars.
- ❖ **PopulationCount** : Total population of the country.

This columns are from five different tables and each table have CountryID and YearID columns which acts as Primary Keys (or) Foreign Keys.

## Data Loading and Data Modelling :

**Step – 1 :** Imported the data from excel workbook using **Get data** option in Power BI

**Step – 2 :** After importing the data performed data cleaning process like handling errors, missing values, outliers, or inconsistencies. Cleaned the data by handling missing values, removing duplicates just by using filtering options in **Transform data Pane**.

**Step – 3 :** In **Transform data Pane** changed columns data types to appropriate data types like Year data type was “Whole number”, I have changed it to “Date” Data type in Power Query editor.

**Step – 4 :** Then after created a data model with appropriate relationships between tables by using primary and foreign keys in **model view** option in Power BI .

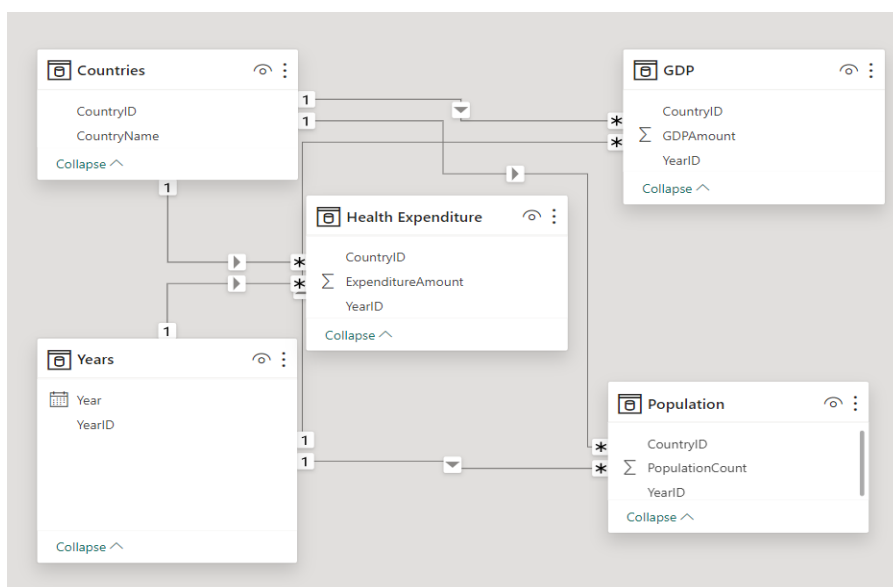
Here are the some snapshots of realtionships which created in Model view

### Manage relationships

Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	GDP (CountryID)	Countries (CountryID)
<input checked="" type="checkbox"/>	GDP (YearID)	Years (YearID)
<input checked="" type="checkbox"/>	Health Expenditure (CountryID)	Countries (CountryID)
<input checked="" type="checkbox"/>	Health Expenditure (YearID)	Years (YearID)
<input checked="" type="checkbox"/>	Population (CountryID)	Countries (CountryID)
<input checked="" type="checkbox"/>	Population (YearID)	Years (YearID)

New...Autodetect...Edit...Delete

Close



## Data Analysis using DAX Functions :

Solved the following using DAX :

(i) Primary KPI's for Data Analysis :

**Total Expenditure :**

```
TotalExpenditurem = SUM(ConsolidatedTable[TotalExpenditure])
```

**Total GDP :**

```
TotalGDPm = SUM(GDP[GDPAmount])
```

**Total Population :**

```
TotalPopulationm = SUM(ConsolidatedTable[TotalPopulation])
```

**Highest Expenditure :**

```
Highest Expenditure = MAX(ConsolidatedTable[TotalExpenditure])
```

**Lowest Expenditure :**

```
Lowest Expenditure = MIN('ConsolidatedTable'[TotalExpenditure])
```

(ii) Create a new table that consolidates information from multiple tables using DAX.

```
ConsolidatedTable =  
SUMMARIZE(  
    'Health  
Expenditure', Countries[CountryID], 'Years'[YearID], "CountryName", MAX(Countries[CountryName])  
, "Year", MAX('Years'[Year].[Year]),  
    "TotalExpenditure", SUM('Health Expenditure'[ExpenditureAmount]),  
    "TotalGDP", SUM(GDP[GDPAmount]),  
    "TotalPopulation", SUM(Population[PopulationCount])  
)
```

(iii) Find the countries/regions with the highest and lowest health expenditure for all years.

Achieved this by using

Bar Chart -> Top 5 Countries -> Highest Expenditure

Bar Chart -> Bottom 5 Countries by Health Expenditure

**(iv) Determine the percentage of health expenditure as a share of GDP for each country.**

% of expenditure as share of GDP = `[TotalExpenditurem]/[TotalGDPm]`

**(v) Calculate the average health expenditure per capita for each country/region.**

**Average Health Expenditure Per Capita :**

Average\_Health\_Expenditure\_Per\_Capita = `DIVIDE([TotalExpenditurem],[TotalPopulationm])`

**(vi) Calculate the average annual growth rate of health expenditure over a selected period**

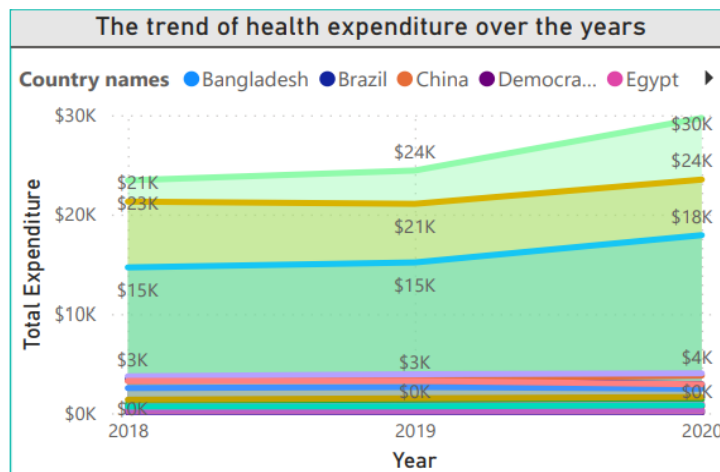
```
AnnualGrowthRate =  
IF(  
    ISBLANK(SUM('Health Expenditure'[ExpenditureAmount])) ||  
    ISBLANK(CALCULATE(SUM('Health Expenditure'[ExpenditureAmount]), DATEADD('Years'[Year],  
-1, YEAR))),  
    BLANK(),  
    (SUM('Health Expenditure'[ExpenditureAmount]) - CALCULATE(SUM('Health  
Expenditure'[ExpenditureAmount]), DATEADD('Years'[Year], -1, YEAR))) /  
    CALCULATE(SUM('Health Expenditure'[ExpenditureAmount]), DATEADD('Years'[Year], -1, YEAR))  
)
```

**(vii) Calculate the year-to-year percentage change in health expenditure**

```
Year_to_Year_Percentage_Change =  
VAR CurrentYearExpenditure = ConsolidatedTable[TotalExpenditure]  
VAR PreviousYearExpenditure =  
    CALCULATE(  
        VALUES(ConsolidatedTable[TotalExpenditure]),  
        FILTER(  
            ALL(ConsolidatedTable),  
            ConsolidatedTable[CountryName] = EARLIER(ConsolidatedTable[CountryName]) &&  
            ConsolidatedTable[Year] = EARLIER(ConsolidatedTable[Year]) - 1  
        )  
    )  
RETURN  
    IF(  
        NOT(ISBLANK(PreviousYearExpenditure)),  
        DIVIDE(CurrentYearExpenditure - PreviousYearExpenditure, PreviousYearExpenditure),  
        BLANK()  
    )
```

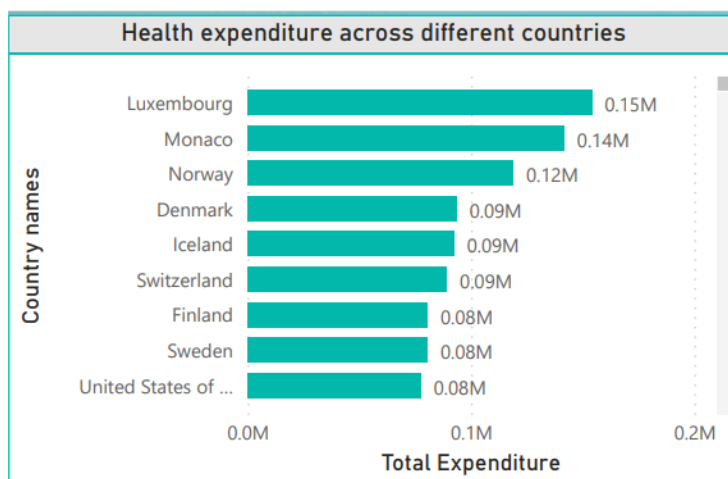
## Visualisations:

- ❖ Created a Area chart to visualise the trend of health expenditure over the years for selected countries



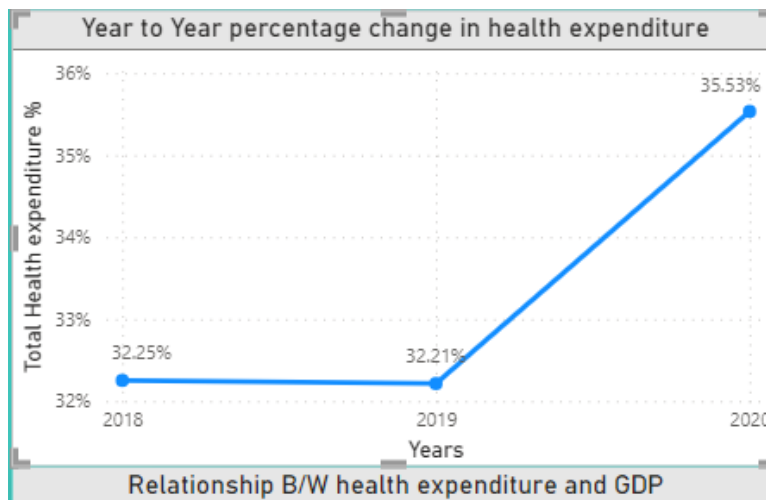
**Reason :** Area charts have their advantages, it's essential to consider the specific characteristics of your data and the insights you want to convey. Depending on the nature of our analysis, other chart types like line charts or stacked bar charts may also be appropriate for visualizing trends in health expenditure over the years for selected countries.

- ❖ Created a bar chart to compare health expenditure across different countries for a 2020 year.



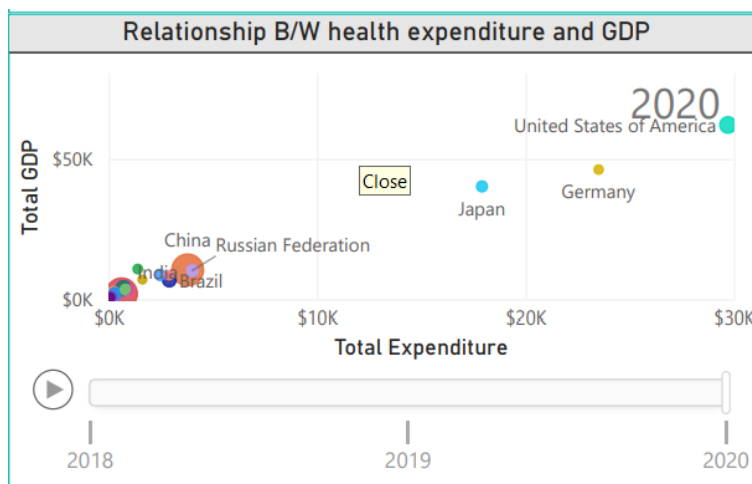
**Reason :** A bar chart is a suitable choice when the goal is to compare health expenditure across different countries for a specific year, as it effectively communicates the relative values, facilitates ranking, and highlights disparities among the countries.

- ❖ Created a line chart for Year to Year health expenditure % change



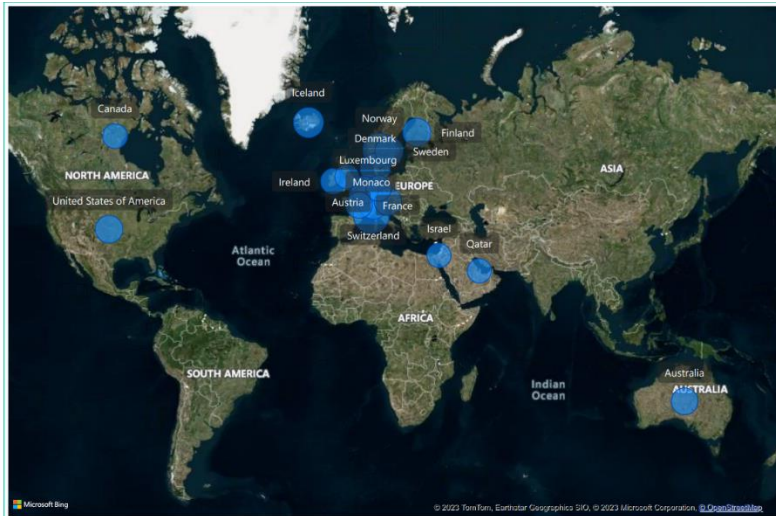
**Reason :** A line chart is commonly used to visualize trends over time, making it a suitable choice for displaying Year-to-Year health expenditure percentage changes. Here are several reasons why a line chart is often considered effective for this type of data.

- ❖ Created a scatter plot to explore the relationship between health expenditure and GDP.



**Reason :** A scatter plot is a valuable visualization tool when exploring the relationship between health expenditure and GDP. It provides a clear and intuitive way to identify patterns, outliers, and the nature of the correlation between these two important variables.

- ❖ Created a map visualisation to show health expenditure distribution geographically.



**Reason :** Using a map visualization for health expenditure distribution provides a spatial context that enhances understanding, facilitates regional comparisons, and enables the identification of patterns and trends across different geographical areas. This makes it a valuable tool for stakeholders involved in healthcare planning, policymaking, and analysis.

## Insights and Conclusions :

⇒ Total health expenditure is \$3.35M and Total GDP is \$8.62M and Total population is 23M

⇒ Average Annual Growth Rate is 55.12%

⇒ Percentage of health expenditure has share of GDP is 38.93%

⇒ The countries with the highest health expenditure in all years are Luxembourg, Monaco, Norway, Denmark, and Switzerland, with expenditure ranging from \$154K to \$89K per country.

⇒ The countries with the lowest health expenditure in all years are Democratic Republic of the Congo, Burundi, Madagascar, Central African Republic, Chad with expenditure ranging from \$186 to \$315 per country.

⇒ At \$154,152.00, Luxembourg had the highest Total Expenditure and was 72.67% higher than Switzerland, which had the lowest Total Expenditure at \$89,275.00.

⇒ Total Expenditure and total Total Population are negatively correlated with each other.

⇒ Luxembourg accounted for 25.79% of Total Expenditure.

⇒ Total Expenditure and Total Population diverged the most when the CountryName was Luxembourg, when Total Expenditure were \$152,310.00 higher than Total Population.

⇒ The year to year percentage change in health expenditure shows an increasing trend from 2018 to 2020, indicating that the health spending is growing faster than the previous year.

⇒ The percentage change in health expenditure in 2020 is 35.53%, which is the highest among the three years, and also much higher than the global average of 11%.

⇒ The percentage change in health expenditure in 2019 is 32.21%, which is slightly lower than the percentage change in health expenditure in 2018 (32.25%), suggesting that the health spending growth slowed down slightly in 2019.

⇒ The percentage change in health expenditure in 2018 is 32.25%, which is the lowest among the three years, but still higher than the global average of 9.8%.

⇒ 2020 in Country names United States of America made up 11.36% of Total Expenditure.

⇒ 2020 had the highest Total Expenditure (\$95,180.00) and 2019 had the highest Total GDP (\$239,388).

## Recommendations :

### 1. Policy Focus on High Expenditure Countries:

- **Luxembourg and Monaco:** Analyze the effectiveness of health spending in these countries to identify best practices and efficient allocation of resources that could be adopted by others.
- **Norway and Denmark:** Further investigate how these countries maintain high health expenditure and whether it correlates with better health outcomes.

### 2. Support for Low Expenditure Countries:

- **Chad, Madagascar, Niger:** Increase international aid and focus on health sector reforms to boost health expenditure and improve healthcare services.
- Implement health programs that target critical needs and improve access to basic healthcare facilities.

### 3. Growth Rate Analysis:

- Sustain the high growth rate in health expenditure by ensuring continuous investment in healthcare infrastructure and services.
- Encourage private sector involvement and public-private partnerships to further boost health sector funding.

### 4. Monitor Health Expenditure Efficiency:

- Ensure that increased health expenditure translates to improved health outcomes by implementing stringent monitoring and evaluation frameworks.
- Regular audits and assessments of health programs to identify and eliminate wastage and ensure funds are used effectively.



**5. Leverage Data for Policy Making:**

- Utilize the data from countries with varied health expenditures to develop tailored health policies that cater to specific needs and contexts.
- Implement data-driven strategies to optimize health expenditure and maximize the impact on population health.

**6. Encourage Preventive Health Measures:**

- Invest in preventive health programs to reduce long-term healthcare costs.
- Promote awareness campaigns, vaccination drives, and regular health check-ups to prevent diseases and reduce the burden on healthcare systems.

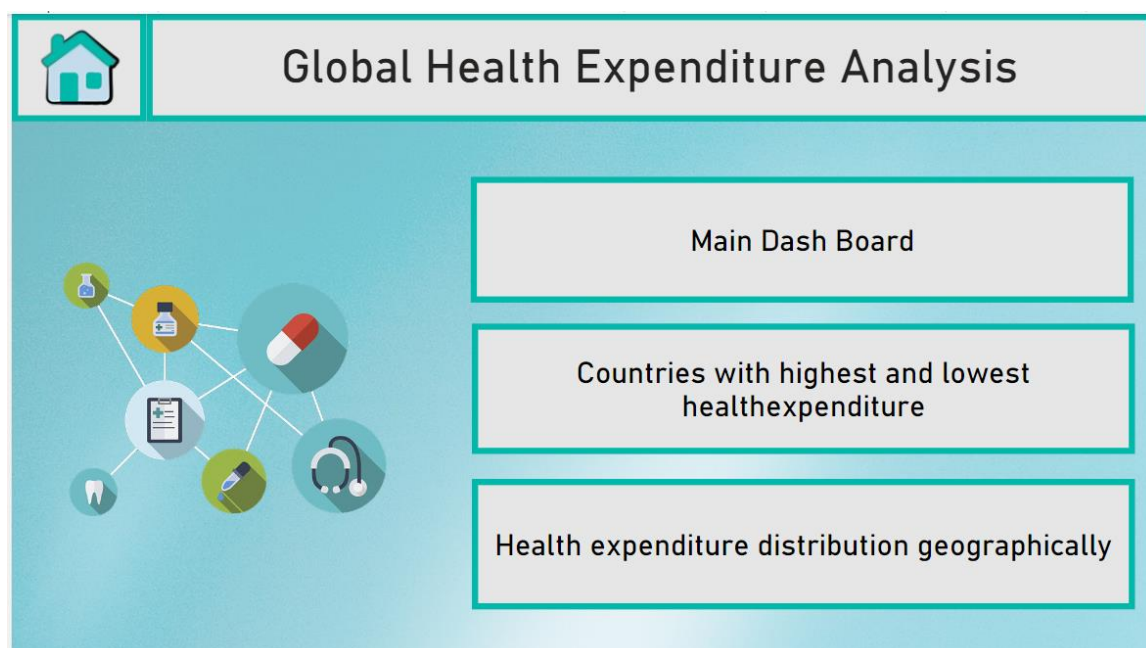
By focusing on these areas, policymakers can ensure that health expenditures are not only increased but also utilized efficiently to improve overall health outcomes across different countries.

## **Final Dashboard & Features :**

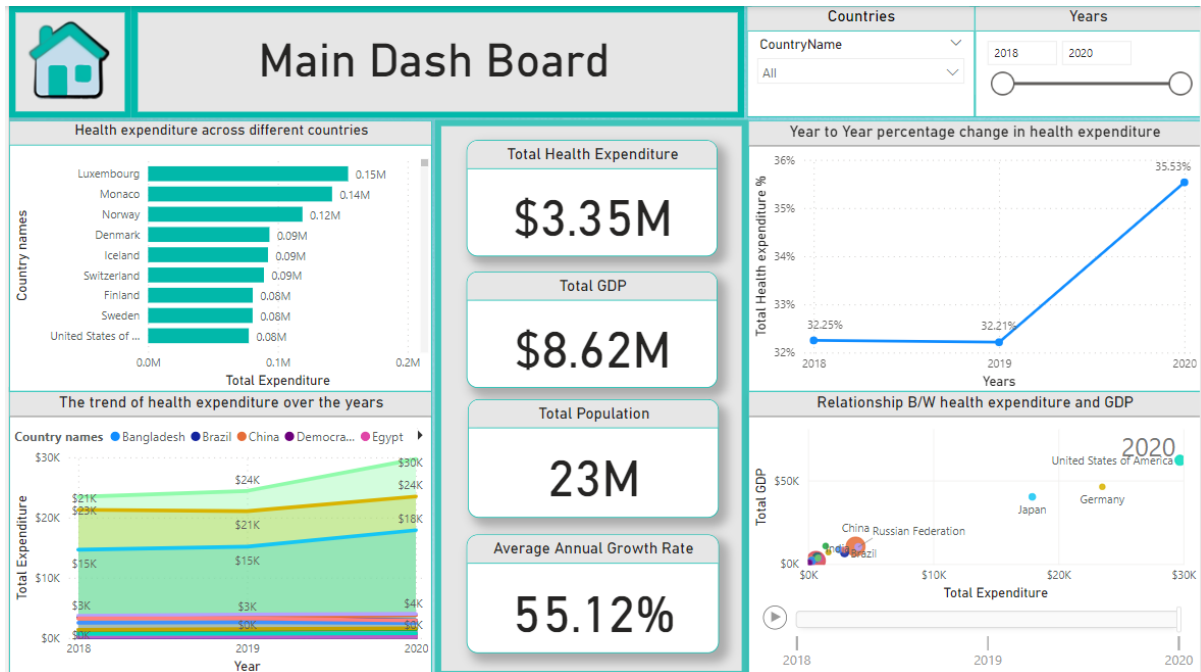
**Main Page :**

We have three buttons in main page, by pressing CTRL + ENTER in power BI desktop them we will get navigated to those pages .

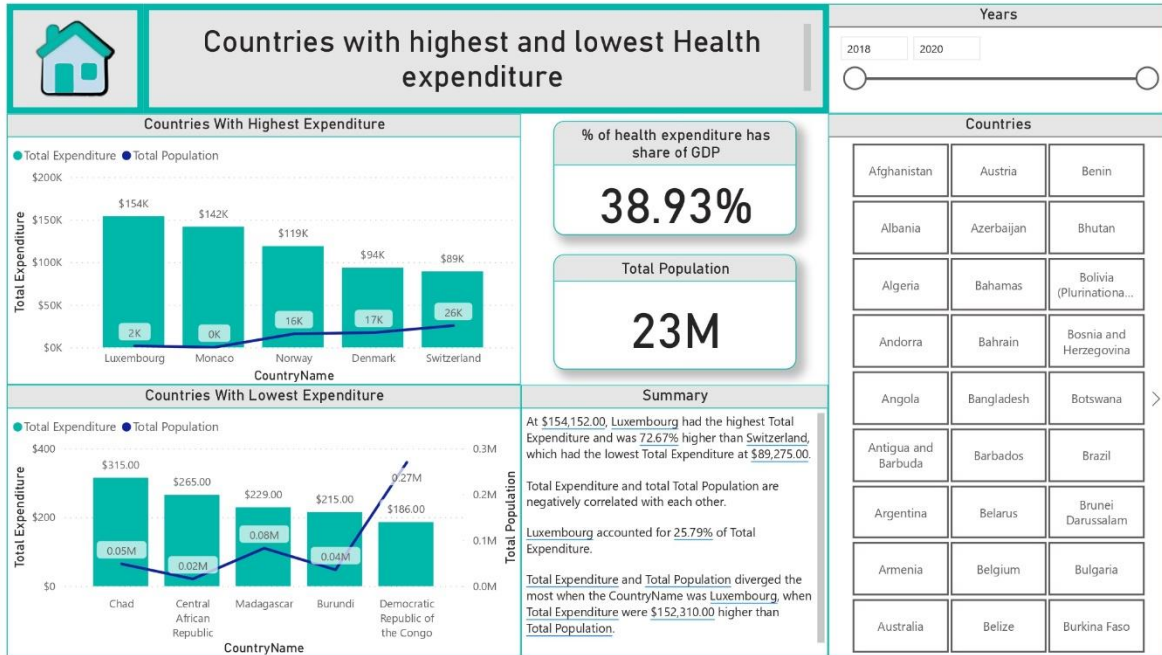
Every page have countries and years slicers & every slicer of each page is synced.



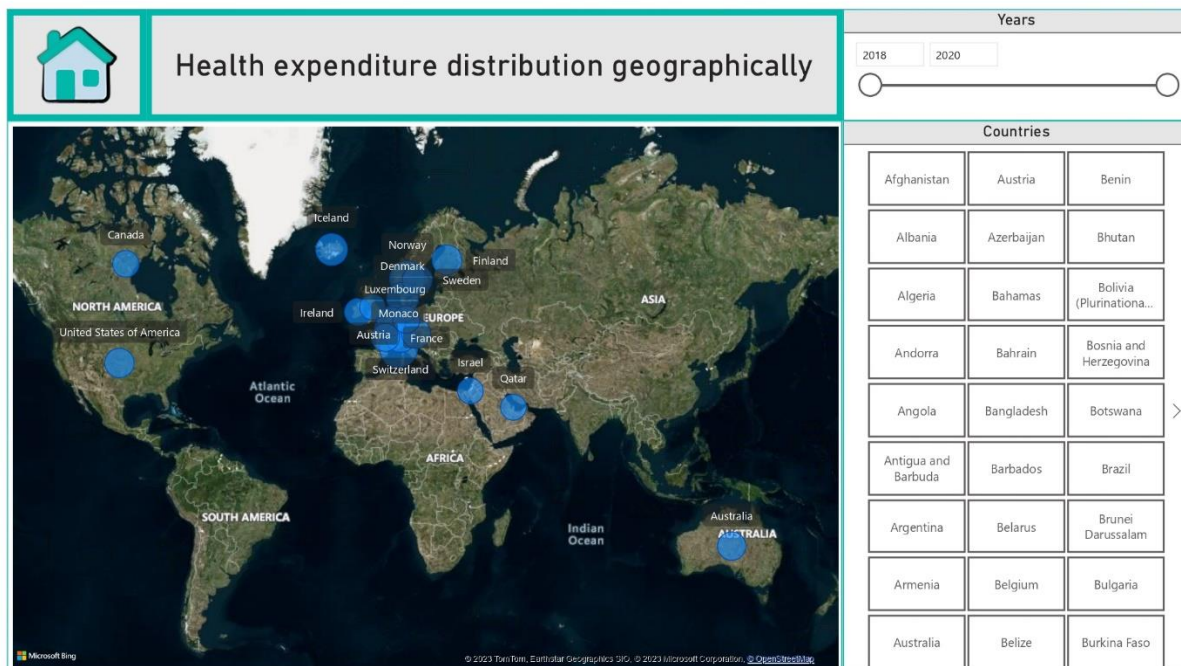
Page - 1 :



Page - 2 :



Page – 3 :



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