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 :

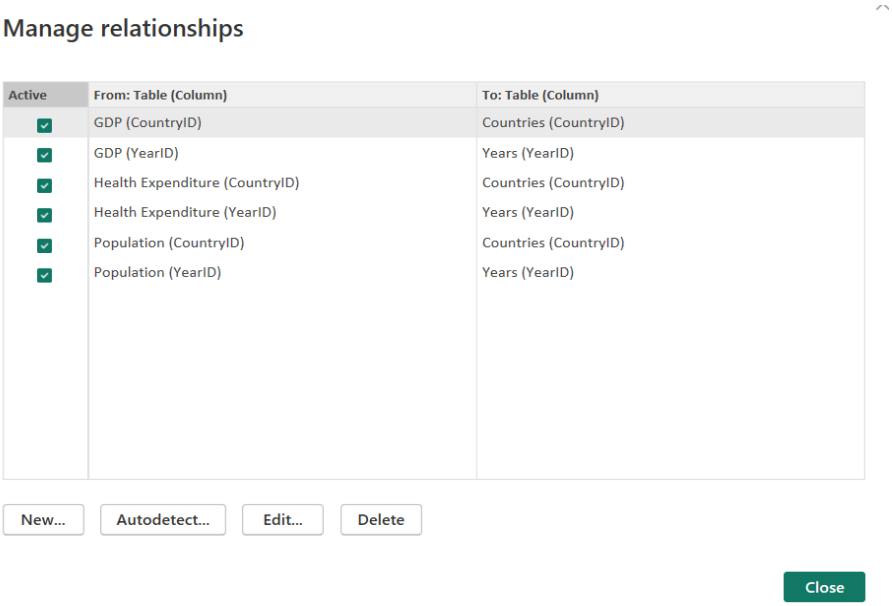
Step – 1 : Imported the data from excel workbook using **Get data** option in Power BI

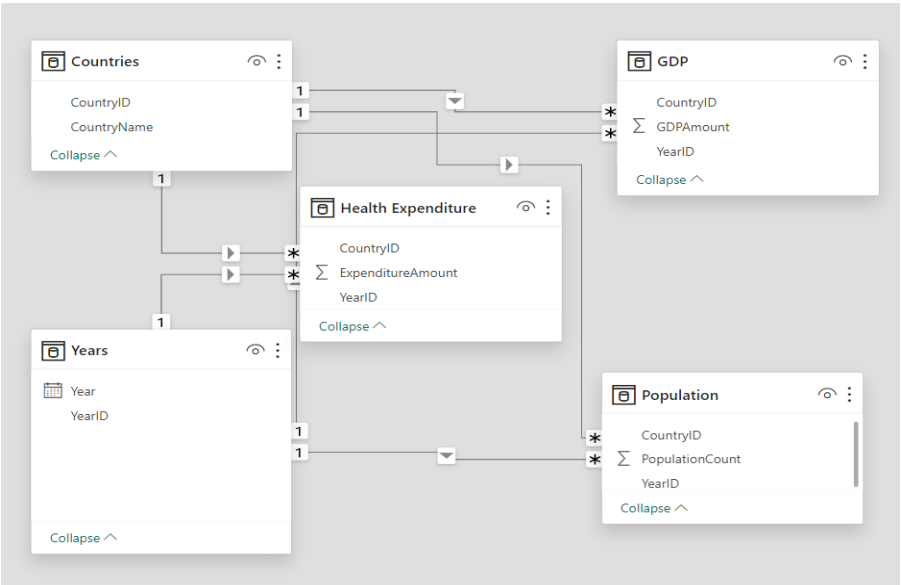
Step – 2 : After importing the data performed data cleaning process like handling errors, missing values, outliers, or inconsistencies. Cleaned the data by handling missing values, removing duplicates just by using filtering options in **Transform data Pane.**

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





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

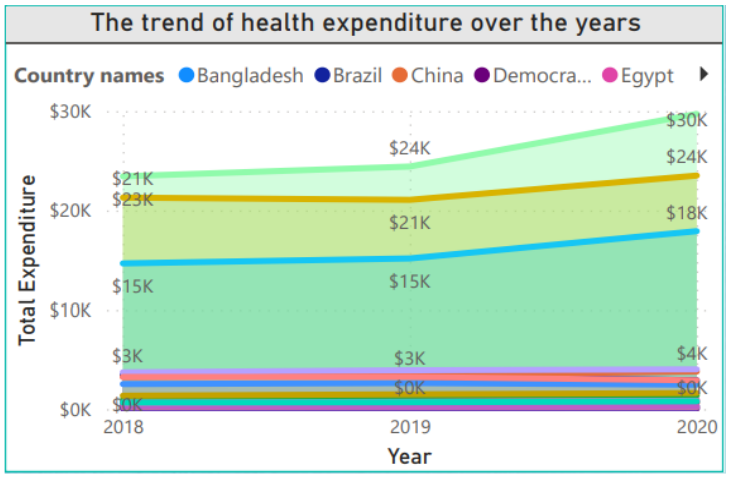
```
AnnualGrowthRate =
IF(
    ISBLANK(SUM('Health Expenditure'[ExpenditureAmount])) ||
    ISBLANK(CALCULATE(SUM('Health Expenditure'[ExpenditureAmount]), DATEADD('Years'[Year],
-1, YEAR))),
    BLANK(),
    (SUM('Health Expenditure'[ExpenditureAmount]) - CALCULATE(SUM('Health
Expenditure'[ExpenditureAmount]),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

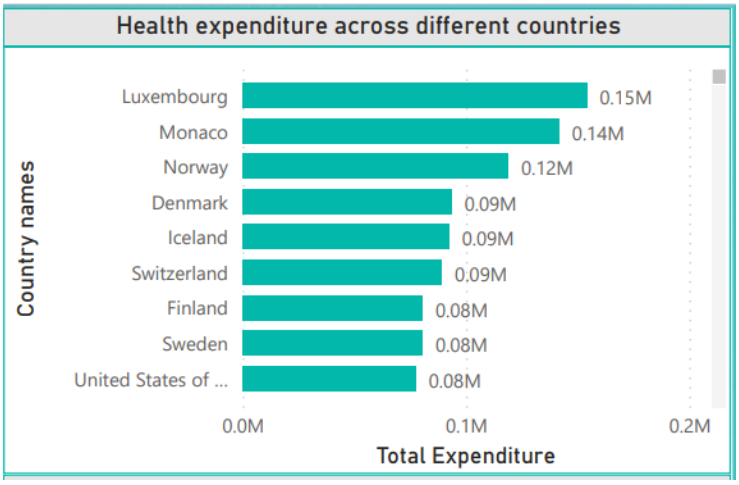
Visualisations :

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



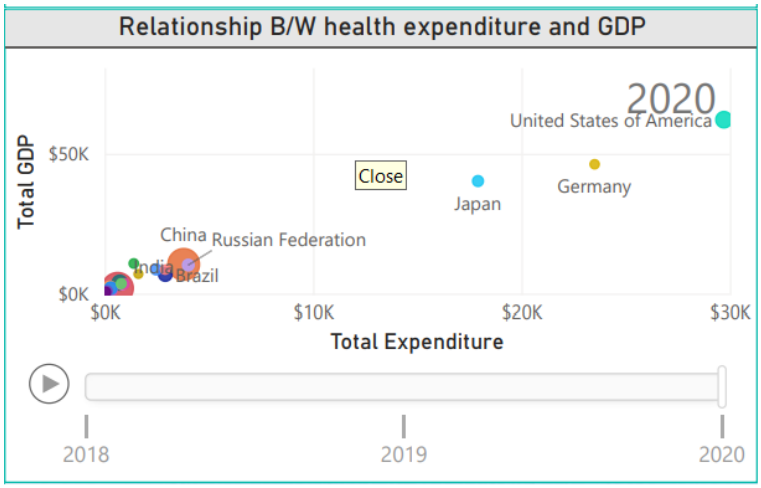
Reason : Area charts have their advantages, it's essential to consider the specific characteristics of your data and the insights you want to convey. Depending on the nature of our analysis, other chart types like line charts or stacked bar charts may also be appropriate for visualizing trends in health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

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



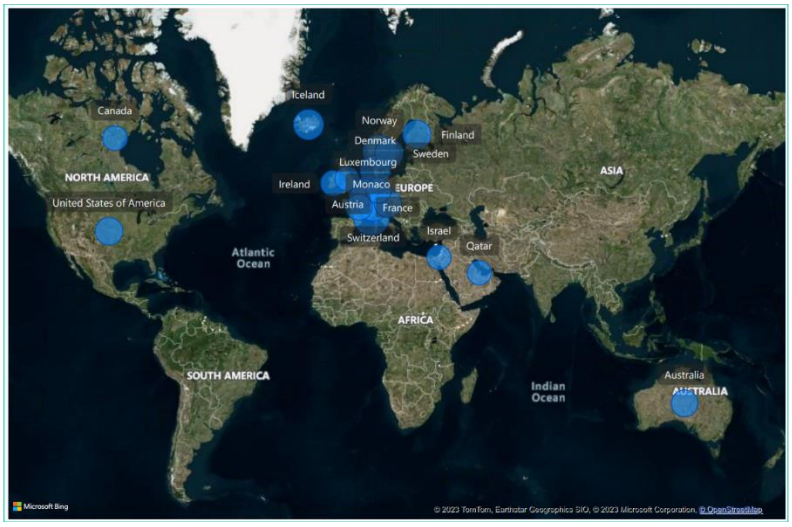
Reason : A bar chart is a suitable choice when the goal is to compare health expenditure across different countries for a specific year, as it effectively communicates the relative values, facilitates ranking, and highlights disparities among the countries.

❖ Created a 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.

⇒Year_to_Year_Percentage_Change for 2020 (11.98) was higher than 2019 (1.70).

⇒2020 accounted for 87.60% of Year_to_Year_Percentage_Change.

⇒2019 had 1.70 Year_to_Year_Percentage_Change and 2020 had 11.98.

⇒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).

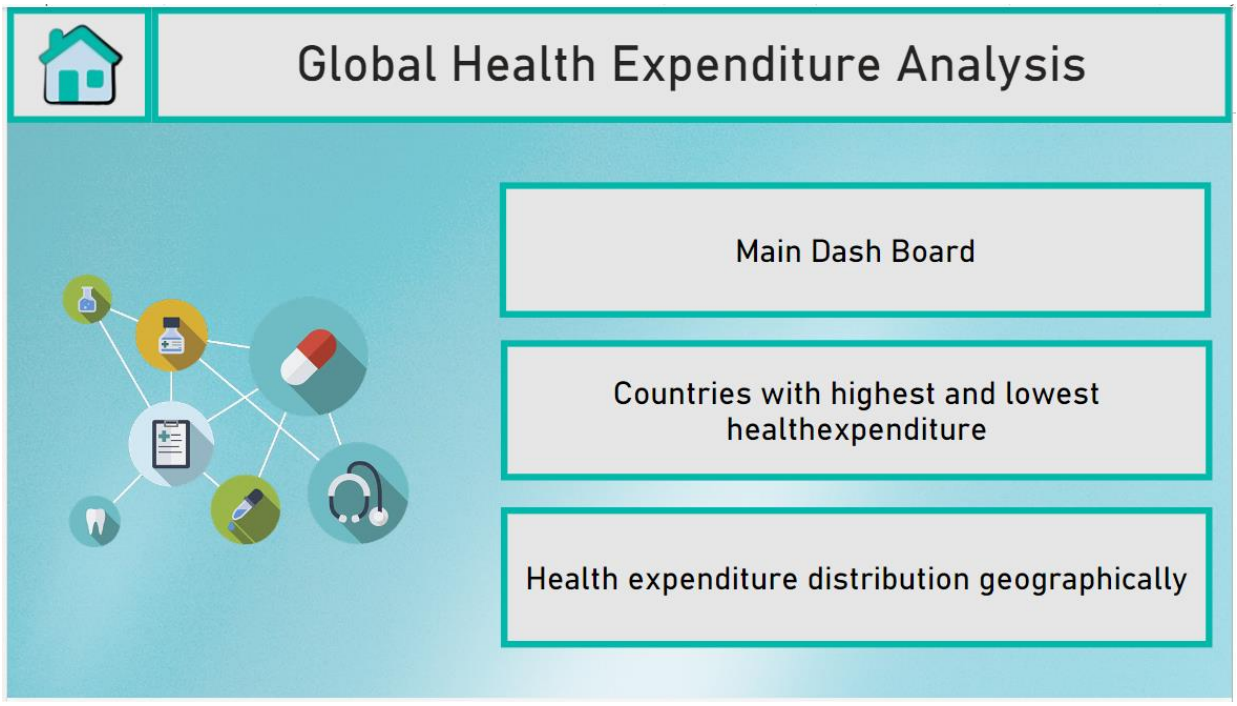
⇒The map shows that the health expenditure distribution is uneven across the world.

Final Dashboard & Features :

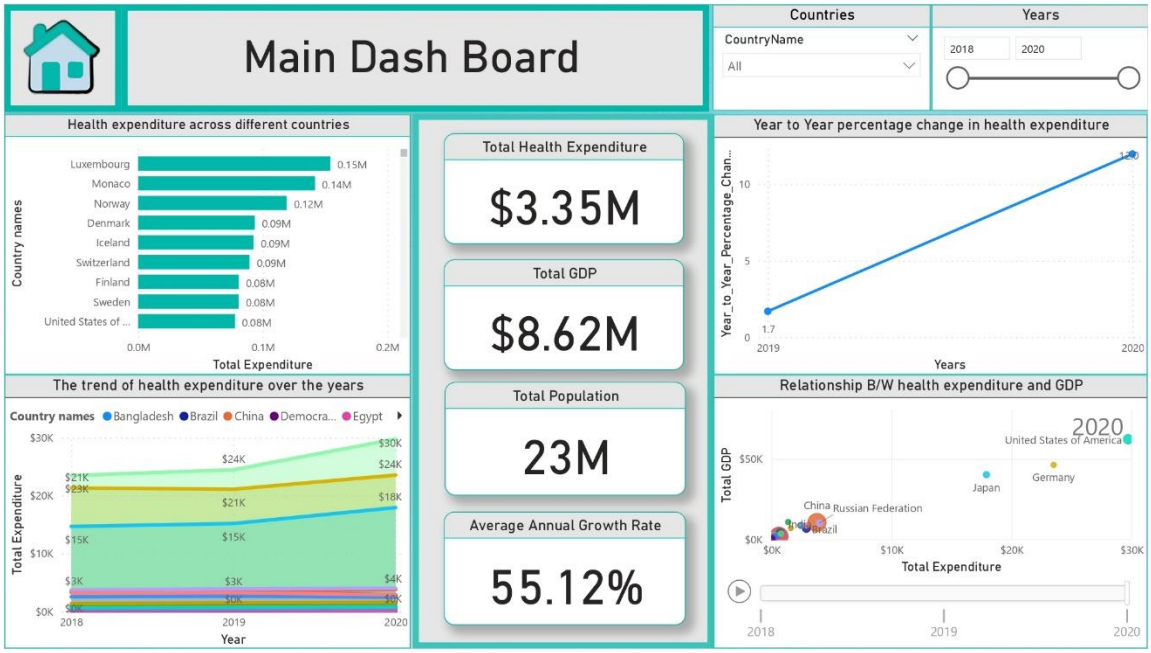
Main Page :

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

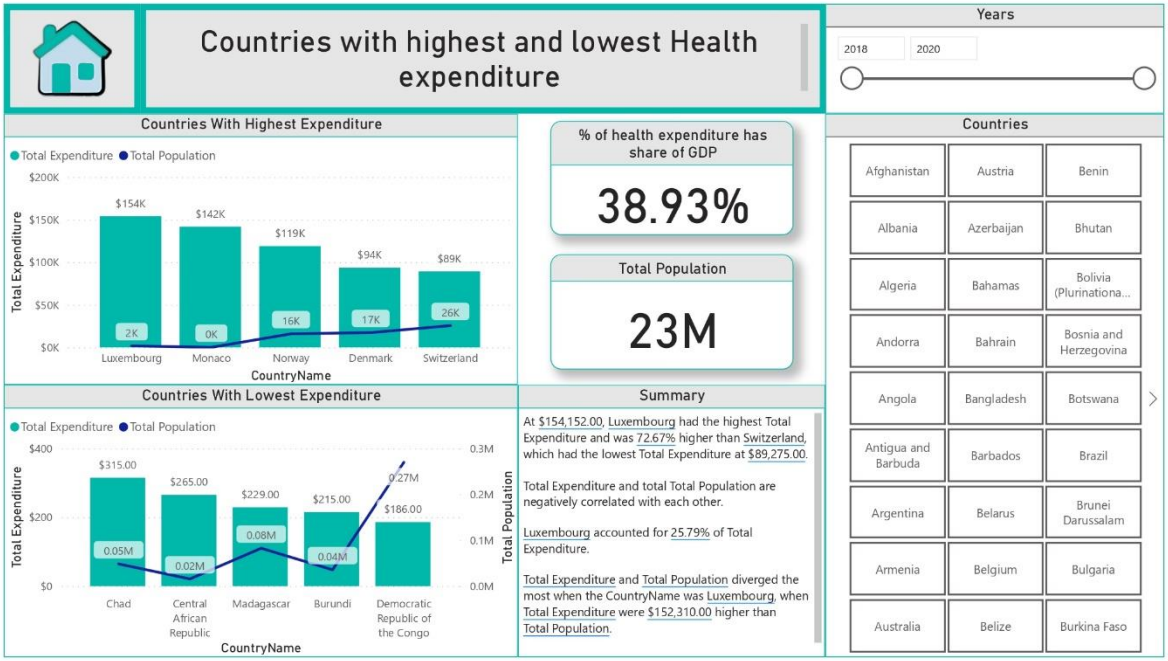
Every page have countries and years slicers & every slicer of each page is synced.


Global Health Expenditure Analysis
Main Dash Board
Countries with highest and lowest healthexpenditure
Health expenditure distribution geographically

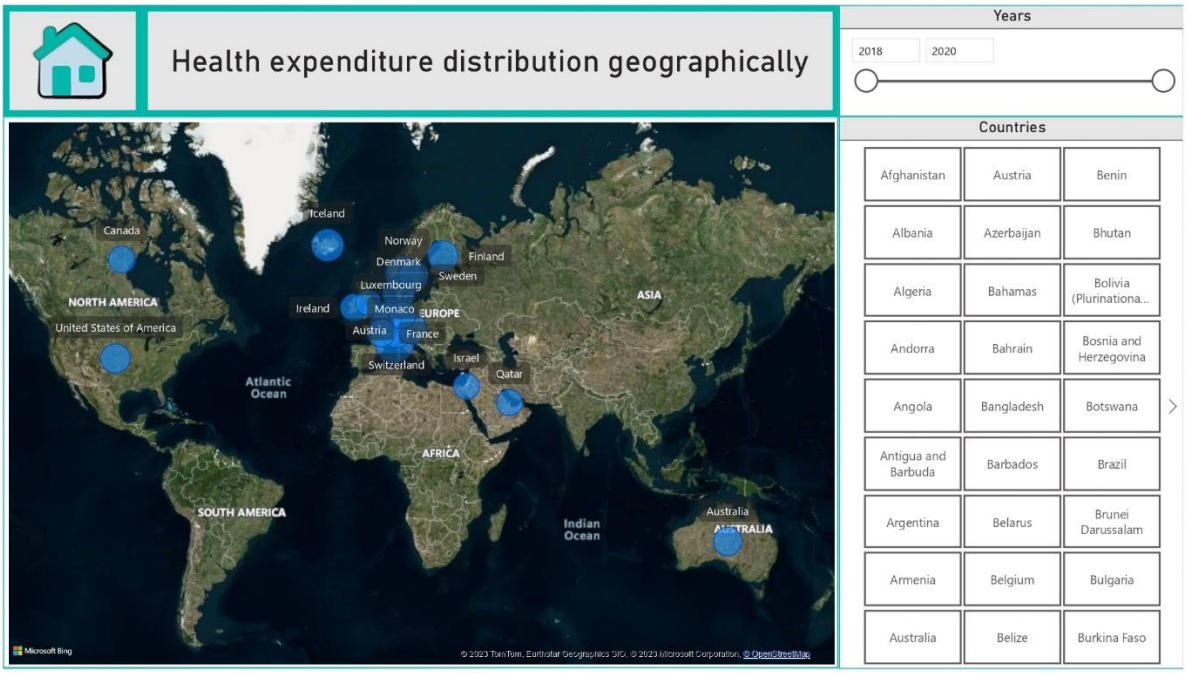
Page – 1 :


Main Dash Board
Countries
CountryName
All
Years
2018
2020
Health expenditure across different countries
Luxembourg 0.15M
Monaco 0.14M
Norway 0.12M
Denmark 0.09M
Iceland 0.09M
Switzerland 0.09M
Finland 0.08M
Sweden 0.08M
United States of ... 0.08M
Country names
0.0M
0.1M
0.2M
Total Expenditure
Total Health Expenditure
$3.35M
Total GDP
$8.62M
Total Population
23M
Average Annual Growth Rate
55.12%
Year to Year percentage change in health expenditure
Year_to_Year_Percentage_Chan...
10
5
0
1.7
2019
2020
Years
The trend of health expenditure over the years
Country names Bangladesh Brazil China Democra... Egypt
$30K
$20K
$10K
$0K
Total Expenditure
2018
2019
2020
Year
Relationship B/W health expenditure and GDP
2020
United States of America
Germany
Japan
China
Russian Federation
Brazil
$50K
$0K
Total GDP
$10K
$20K
$30K
Total Expenditure

Page – 2 :



Page – 3 :



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