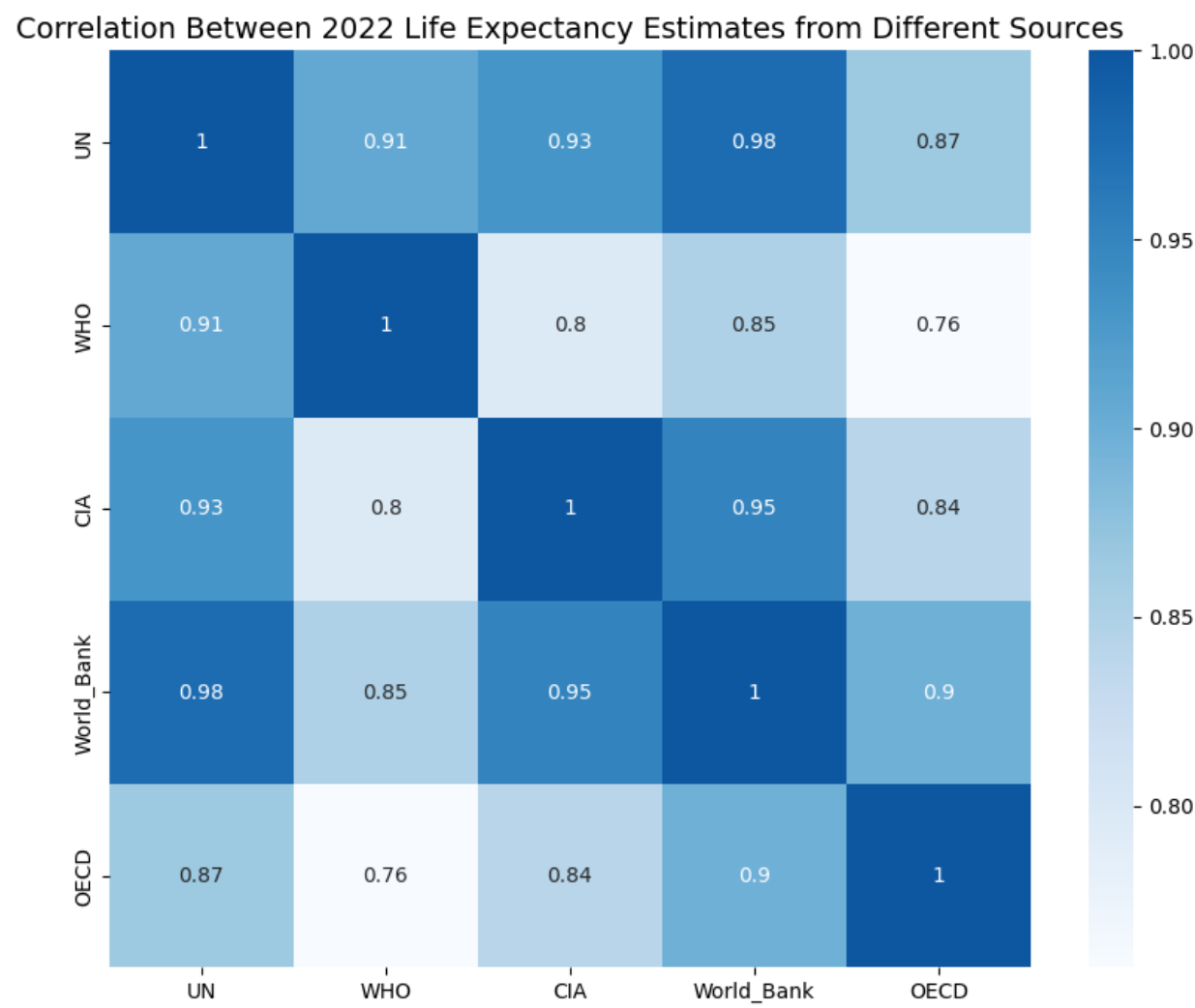


# The comparesions and relationships between all sources :

**The heatmap** visually represents the degree of consistency among sources of life expectancy estimates for 2022 by examining their correlation coefficients

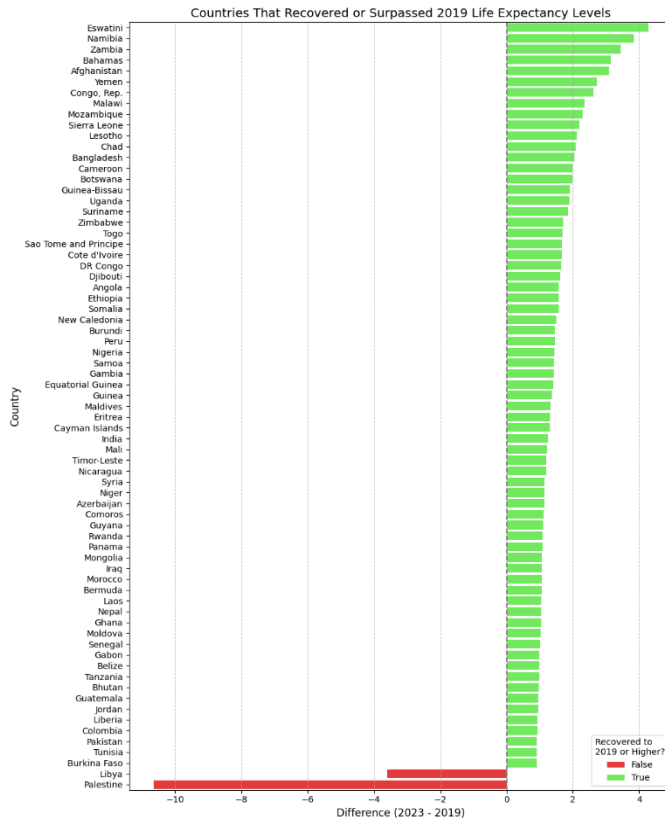
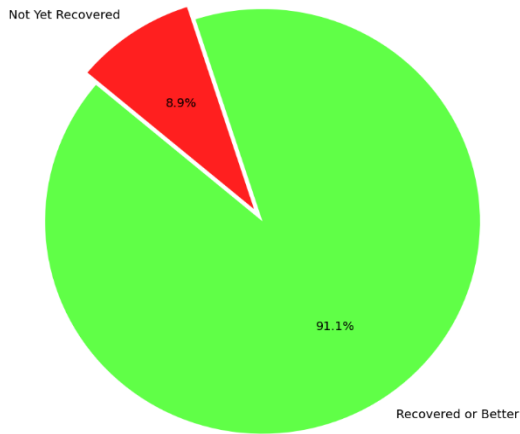


**The pie chart** illustrates the percentage of countries that have recovered or surpassed their pre-pandemic life expectancy compared to those that have not yet recovered.

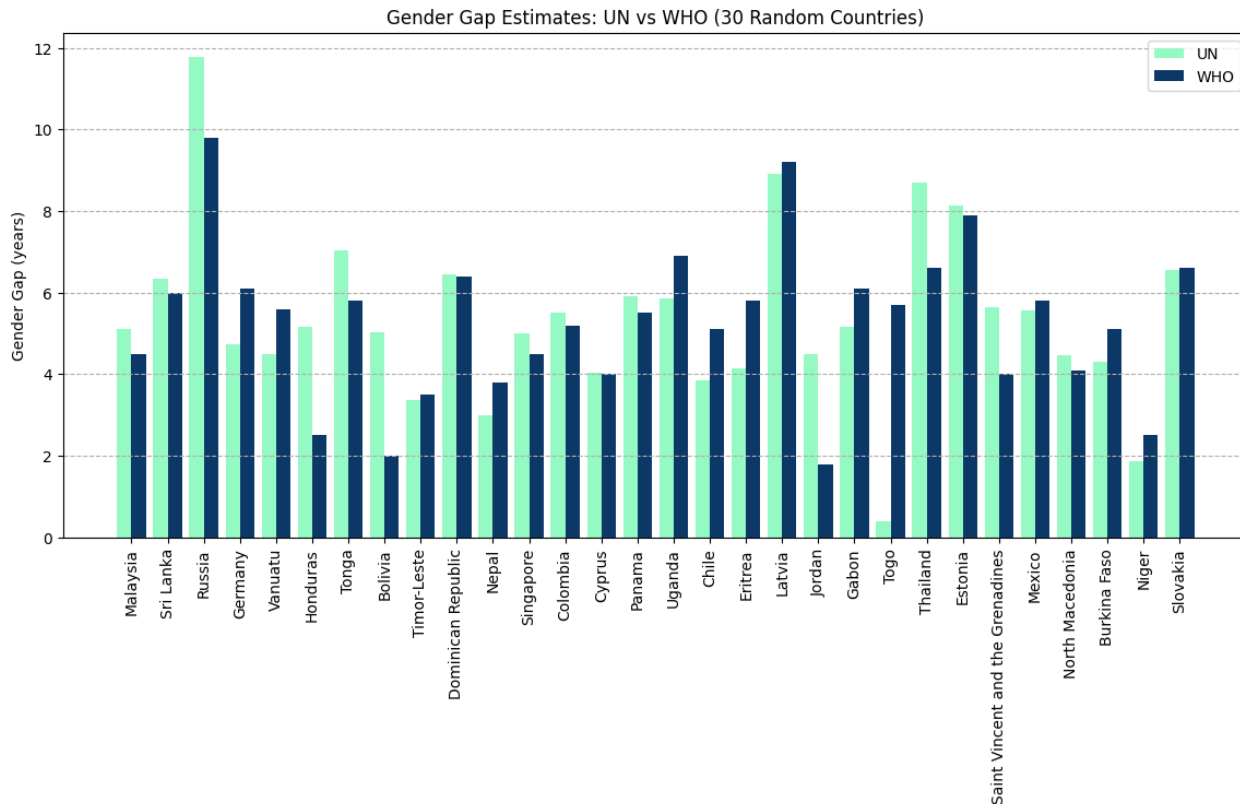
**The bar chart** highlights the change in life expectancy for each country between 2019 and 2023, distinguishing between countries that have recovered and those that have not.

## Global Life Expectancy Recovery After COVID-19

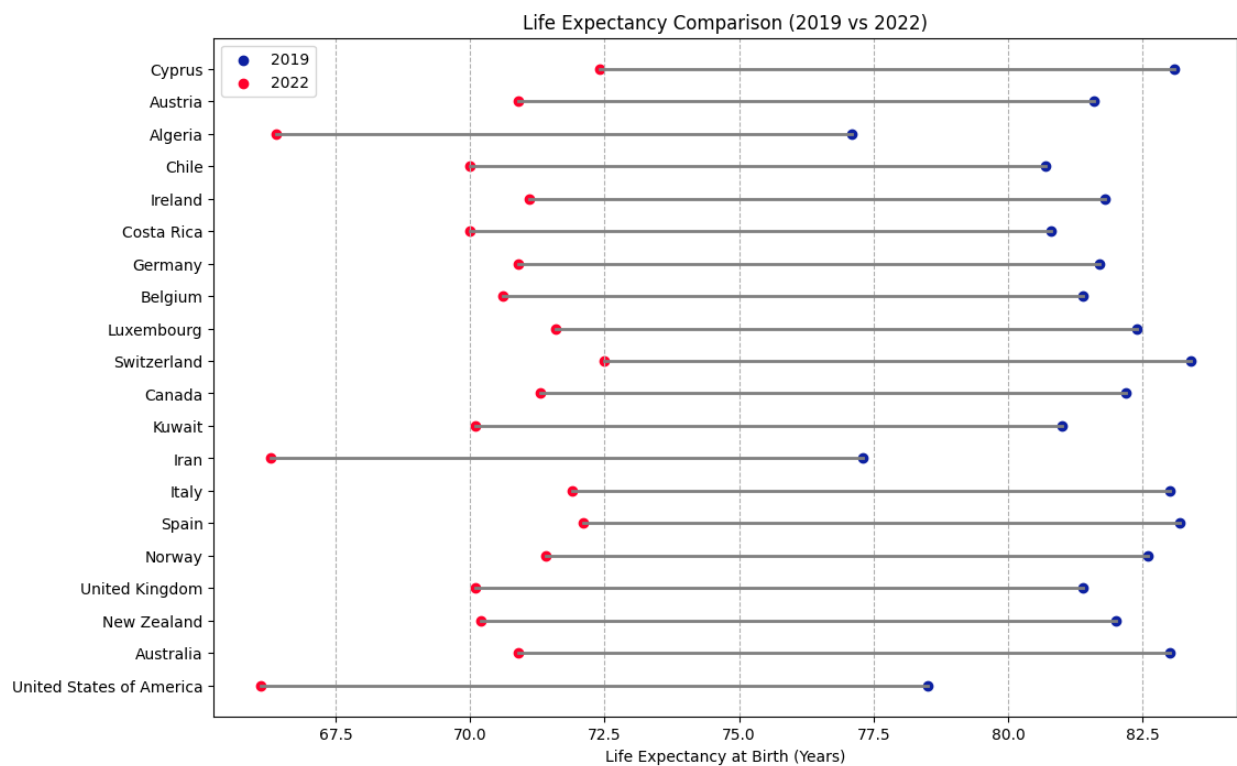
Global Life Expectancy Recovery After COVID-19 (2023 vs 2019)



**the bar chart** compares gender gap estimates in life expectancy between United Nations and World Health Organization data for 30 randomly selected countries.

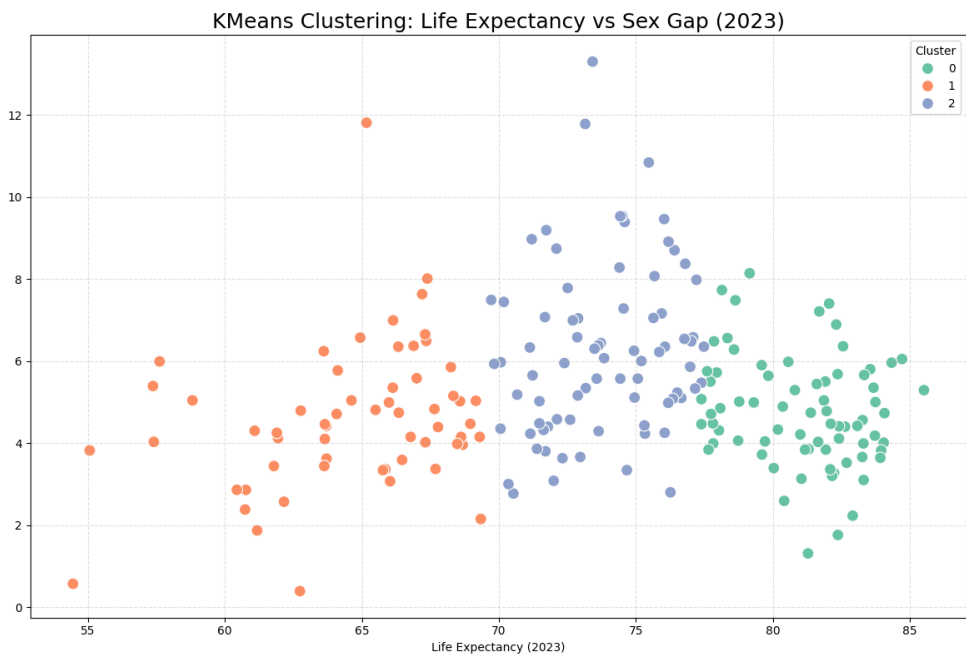


**This chart** displays the top 20 countries most affected by the COVID-19 pandemic in terms of decline in life expectancy at birth, based on a comparison between 2019 and 2022 data .



**The chart** is used to classify countries into three groups based on their 2023 life expectancy, recovery from COVID-19, and gender gap, understanding the relationship between life expectancy, the gender gap, and COVID-19 recovery levels.

	Cluster 0	Cluster 1	Cluster 2
0	Antigua and Barbuda	Libya	Hong Kong, China
1	Sri Lanka	Yemen	Japan
2	Argentina	Botswana	South Korea
3	Ecuador	Laos	French Polynesia
4	Guam	Senegal	Andorra
...	...	...	...
75	Guyana	NaN	NaN
76	Turkmenistan	NaN	NaN
77	Greenland	NaN	NaN
78	Philippines	NaN	NaN
79	Sao Tome and Principe	NaN	NaN



# The store the result into MongoDB part :

We store from various sources about life expectancy information in a MongoDB database for easier access and analysis.

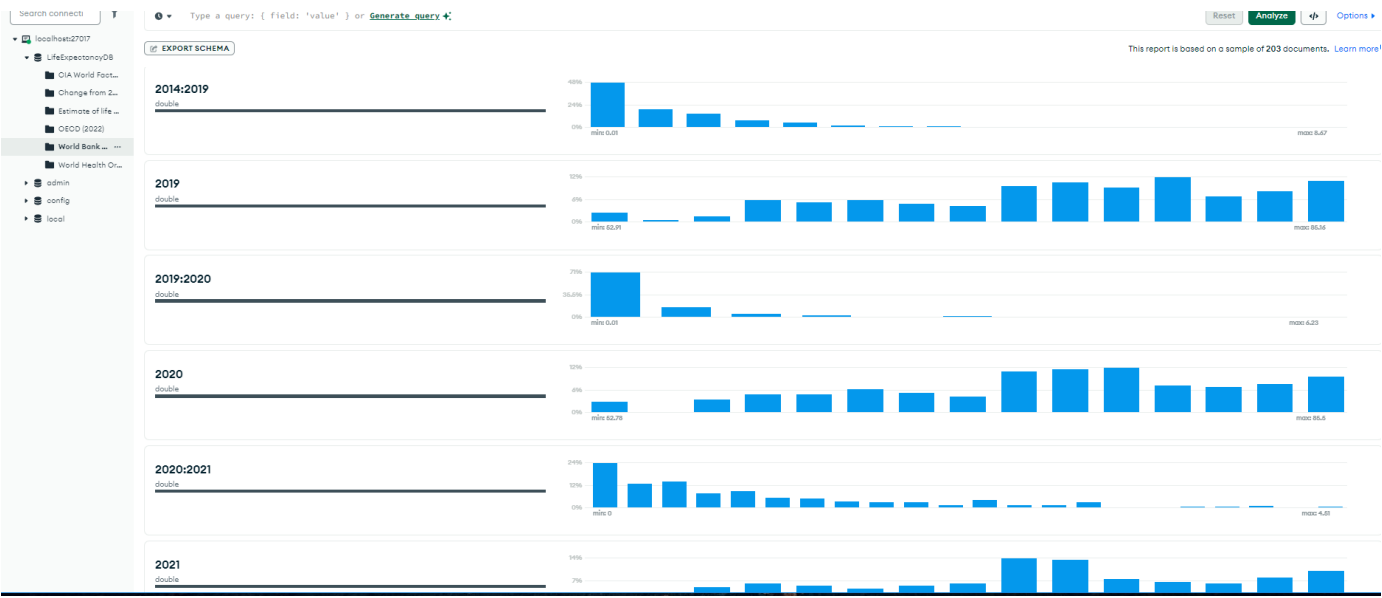
The screenshot shows the MongoDB Compass interface. On the left, the 'CONNECTIONS' panel lists the local host 'localhost:27017' and the selected database 'LifeExpectancyDB'. The main area displays six collections with their respective statistics:

- Change from 2019 to 2...**: Storage size: 40.96 kB, Documents: 211, Avg. document size: 311.00 B, Indexes: 1, Total index size: 20.48 kB.
- CIA World Factbook (2...**: Storage size: 28.67 kB, Documents: 228, Avg. document size: 103.00 B, Indexes: 1, Total index size: 20.48 kB.
- Estimate of life expect...**: Storage size: 49.15 kB, Documents: 211, Avg. document size: 384.00 B, Indexes: 1, Total index size: 20.48 kB.
- OECD (2022)**: Storage size: 24.58 kB, Documents: 49, Avg. document size: 260.00 B, Indexes: 1, Total index size: 20.48 kB.
- World Bank Group (2022)**: Storage size: 40.96 kB, Documents: 203, Avg. document size: 311.00 B, Indexes: 1, Total index size: 20.48 kB.
- World Health Organiza...**: Storage size: 40.96 kB, Documents: 184, Avg. document size: 336.00 B, Indexes: 1, Total index size: 20.48 kB.

The screenshot shows the MongoDB Compass interface with the 'World Health Organization (2019)' collection selected. The 'Documents' tab is active, showing a table of 184 documents. The table has the following columns: **\_id** (ObjectId), **Countries** (String), **All** (Double), **M** (Double), and **F** (Double). The data is sorted by **All** in descending order.

	_id ObjectId	Countries String	All Double	M Double	F Double
1	ObjectId('680d2feb9e4c863...')	"Japan"	84.3	81.5	86.9
2	ObjectId('680d2feb9e4c863...')	"Switzerland"	83.4	81.8	85.1
3	ObjectId('680d2feb9e4c863...')	"South Korea"	83.3	80.3	86.1
4	ObjectId('680d2feb9e4c863...')	"Singapore"	83.2	81	85.5
5	ObjectId('680d2feb9e4c863...')	"Spain"	83.2	80.7	85.7
6	ObjectId('680d2feb9e4c863...')	"Cyprus"	83.1	81.1	85.1
7	ObjectId('680d2feb9e4c863...')	"Italy"	83	80.9	84.9
8	ObjectId('680d2feb9e4c863...')	"Australia"	83	81.3	84.8
9	ObjectId('680d2feb9e4c863...')	"Israel"	82.6	80.8	84.4
10	ObjectId('680d2feb9e4c863...')	"Norway"	82.6	81.1	84.1
11	ObjectId('680d2feb9e4c863...')	"France"	82.5	79.8	85.1

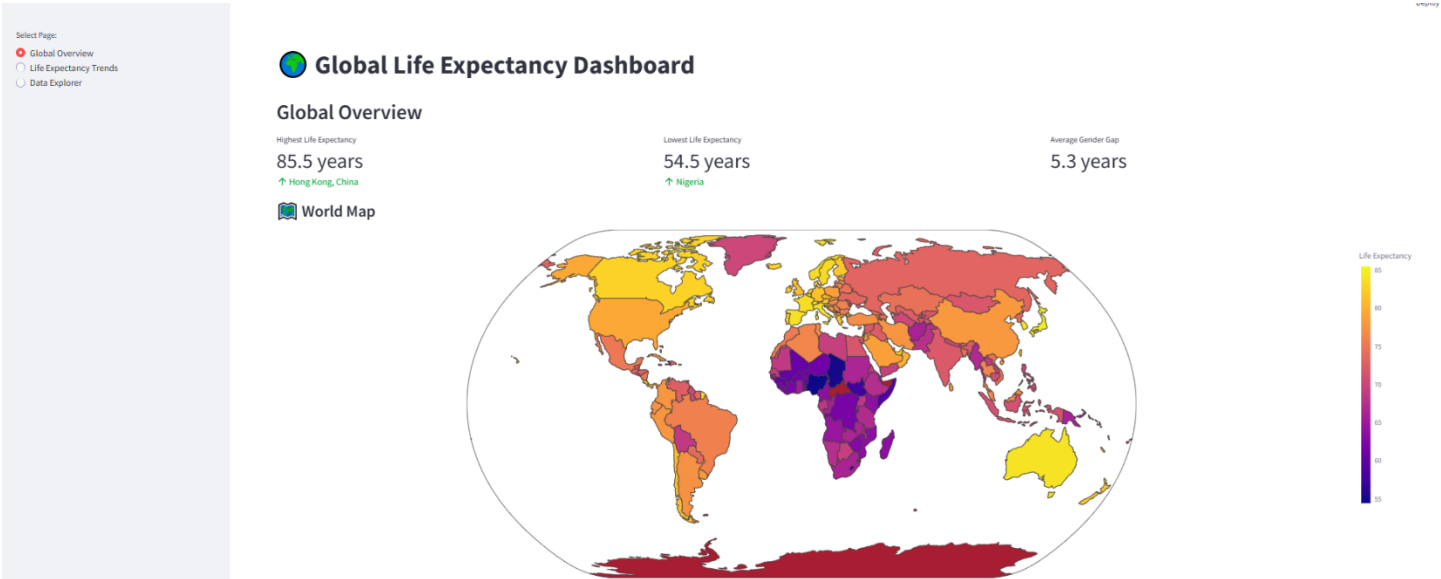
This schema provides an overview of how life expectancy data is distributed for each year or period. It reveals any irregularities or missing values across the dataset.



The streamlit part :

The dashboard contains three interfaces:Global Overview,Gender Analysis, and Data Explorer. Each interface offers a unique perspective on life expectancy.

- 1- **Global Overview** It displays :
  - a) Summary Statistics about life expectancy and gender gap.
  - b) Interactive world map showing life expectancy by country.



c) The tables present the top 50 and bottom 50 countries ranked by life expectancy in 2023, along with the gender gap in these countries .

#### Top & Bottom 50 Countries

☒ Top 50 ☐ Bottom 50

	Country	2023	Male	Female	Sex gap
0	Hong Kong, China	85.5	82.8	88.1	5.3
1	Japan	84.7	81.7	87.7	6.0
2	South Korea	84.3	81.2	87.2	6.0
3	French Polynesia	84.1	81.8	86.5	4.7
4	Andorra	84.0	82.1	86.1	4.0
5	Switzerland	84.0	82.0	85.8	3.8
6	Australia	83.9	82.1	85.7	3.6
7	Singapore	83.7	81.2	86.2	5.0
8	Italy	83.7	81.6	85.8	4.2
9	Spain	83.7	81.0	86.3	5.3
10	Réunion	83.5	80.5	86.3	5.8
11	France	83.3	80.4	86.1	5.7
12	Norway	83.3	81.8	84.8	3.1
13	Malta	83.3	81.3	85.3	4.0
14	Guernsey	83.3	81.0	85.6	4.6
15	Sweden	83.3	81.4	85.1	3.7
16	Macao, China	83.1	80.8	85.2	4.4
17	United Arab Emirates	82.9	82.0	84.2	2.2
18	Iceland	82.7	81.0	84.5	3.5

#### Top & Bottom 50 Countries

☐ Top 50 ☒ Bottom 50

	Country	2023	Male	Female	Sex gap
0	Nigeria	54.5	54.2	54.7	0.6
1	Chad	55.1	53.2	57.0	3.8
2	Lesotho	57.4	54.6	60.0	5.4
3	CAR	57.4	55.3	59.3	4.0
4	South Sudan	57.6	54.6	60.6	6.0
5	Somalia	58.8	56.4	61.4	5.0
6	Mali	60.4	59.0	61.9	2.9
7	Guinea	60.7	59.5	61.9	2.4
8	Benin	60.8	59.4	62.2	2.9
9	Burkina Faso	61.1	58.9	63.2	4.3
10	Niger	61.2	60.3	62.1	1.9
11	Sierra Leone	61.8	60.1	63.5	3.4
12	DR Congo	61.9	59.8	64.0	4.2
13	Cote d'Ivoire	61.9	60.0	64.1	4.1
14	Liberia	62.2	60.9	63.4	2.6
15	Togo	62.7	62.5	62.9	0.4
16	Zimbabwe	62.8	60.2	65.0	4.8
17	Mozambique	63.6	60.3	66.5	6.2
18	Madagascar	63.6	61.9	65.4	3.4

d) This part applies KMeans clustering to group countries based on life expectancy in 2023 and the gender gap and display it in split tables.

## KMeans Clustering: Life Expectancy vs Sex Gap

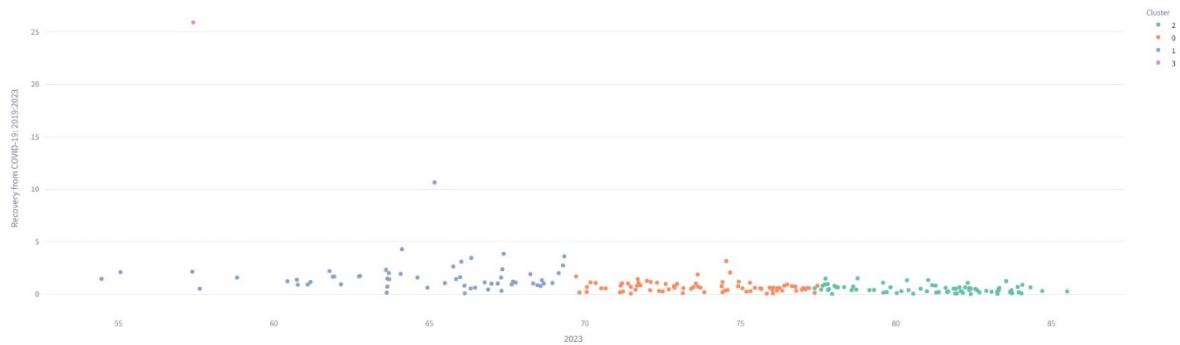
Select columns for clustering:

2023 x Recovery from COVID-19: 2019-2023 x Sex gap x

Number of clusters:



KMeans Clustering: 2023 vs Recovery from COVID-19: 2019-2023



Cluster 0	Cluster 1	Cluster 2	Cluster 3
0 Sri Lanka	Libya	Hong Kong, China	CAR
1 Ecuador	Yemen	Japan	
2 Guam	Botswana	South Korea	
3 Turkey	Laos	French Polynesia	
4 Montenegro	Senegal	Andorra	
5 Hungary	Eritrea	Switzerland	
6 French Guiana	Bolivia	Australia	
7 Curaçao	Mauritania	Singapore	
8 Serbia	Gabon	Italy	
9 Malaysia	Uganda	Spain	

## 2- Life Expectancy Trends It displays :

- Scatter plot: displays the relationship between life expectancy in 2023 and the gender gap , highlighting specific countries and a trendline to show the general pattern of the relationship between life expectancy and the gender gap.

Select Page:

- ☐ Global Overview
- ☒ Life Expectancy Trends
- ☐ Data Explorer

### Global Life Expectancy Dashboard

#### Gender Gap Analysis

Select countries to highlight:

Andorra x Argentina x Aruba x Australia x Palestine x Myanmar x Turkmenistan x



b) The tables display the top 30 countries with the largest gender gaps in life expectancy, and the 30 countries with the smallest gender gaps.

Top 30 Gender Gaps

Country	Sex gap	2023
117 Ukraine	13.3	73.42
183 Palestine	11.81	65.17
119 Russia	11.78	73.15
97 US Virgin Islands	10.84	75.47
107 Georgia	9.54	74.5
108 Belarus	9.53	74.43
92 Lithuania	9.46	76.03
105 Vietnam	9.39	74.59
133 Mongolia	9.19	71.73
141 Moldova	8.97	71.2

Smallest 30 Gaps

Country	Sex gap	2023
195 Togo	0.39	62.74
210 Nigeria	0.57	54.46
40 Bahrain	1.31	81.28
23 Qatar	1.76	82.37
200 Niger	1.87	61.18
152 Libya	2.15	69.34
17 United Arab Emirates	2.23	82.91
203 Guinea	2.38	60.74
196 Liberia	2.57	62.16
46 Kuwait	2.59	80.41

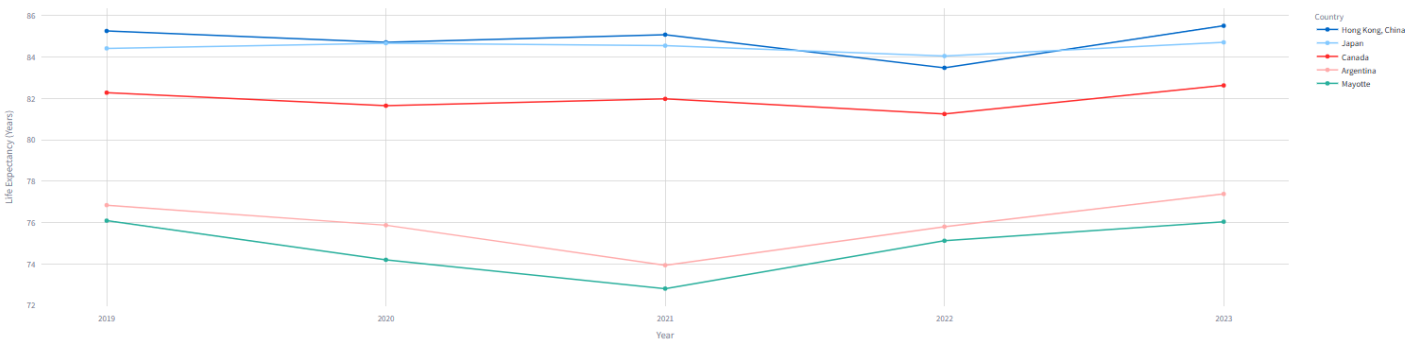
c) This plot displays the trend of life expectancy for selected countries over the years 2019 to 2023.

Life Expectancy Trends by Country

Select one or more countries:

Hong Kong, China Japan Canada Argentina Mayotte

Life Expectancy Trend (2019–2023)



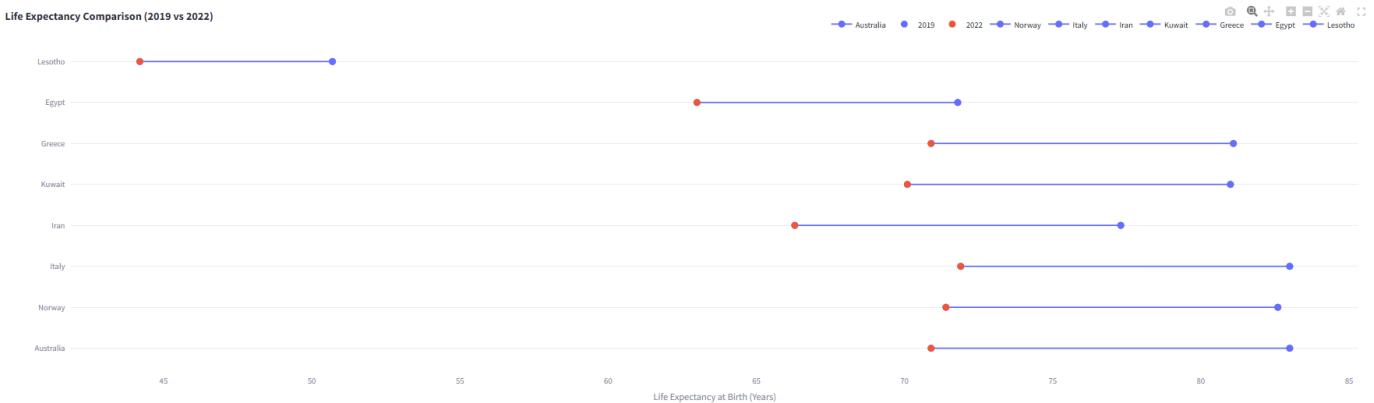
d) This chart compares the changes in life expectancy at birth between 2019 and 2022 for different countries, showing how COVID-19 may have impacted life expectancy.

Life Expectancy Changes: 2019 vs 2022

Select countries to compare:

Australia Greece Lesotho Egypt Norway Italy Iran Kuwait

Life Expectancy Comparison (2019 vs 2022)





### 3- Data Explorer : it explore raw datasets from various sources.

It display :

- A selection menu to choose a dataset.
- Basic information like number of rows & columns , column names and some statistics .
- Finally , represent full data with interactive way.

Select Page:

Global Overview

Life Expectancy Trends

Data Explorer

Global Life Expectancy Dashboard

Data Explorer

Select a table to display:

Estimate of life expectancy for various ages in 2023

Displaying

Estimate of life expectancy for various ages in 2023 :

Basic Info

Number of rows: 211

Number of columns: 20

Column Names:

[

0 : "Locations"

1 : "at birth"

2 : "bonus0+15"

3 : "at 15"

4 : "bonus15+65"

5 : "at 65"

6 : "bonus65+80"

7 : "at 80"

8 : "at birth.1"

9 : "at 15.1"

10 : "at 65.1"

11 : "80.1"

12 : "at birth.2"

13 : "at 15.2"

14 : "at 65.2"

15 : "at 80.2"

16 : "at birth.3"

17 : "at 15.3"

18 : "at 65.3"

19 : "at 80.3"

]

Data overview:

	Locations	at birth	bonus0+15	at 15	bonus15+65	at 65	bonus65+80	at 80	at birth.1	at 15.1	at 65.1	80.1	at birth.2	at 15.2	at 65.2	at 80.2	at birth.3	at 15.3	at 65.3	at 80.3
count	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211	211
unique	211	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
top	Hong Kong																			
freq	1	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None	None
mean	None	73.8053	2.0113	60.8116	5.9171	16.7292	5.8606	7.59	71.1893	58.2982	15.2661	6.8059	76.4473	63.3428	18.0196	8.1397	5.2587	5.044		
std	None	7.0545	1.9878	5.3386	2.7833	2.8534	1.3927	1.6062	7.0329	5.3615	2.6175	1.3643	7.1835	5.4868	3.1728	1.8306	1.9158	1.9605		
min	None	54.46	0.16	47.4	1.57	12.13	3.05	4.71	53.2	44.77	10.79	4.53	54.74	48.74	12.28	4.76	0.39	0.23		
25%	None	68.6	0.57	56.745	3.63	14.285	4.615	6.225	66.37	54.105	13.07	5.68	71.13	59.105	15.325	6.62	4.035	3.8		
50%	None	74.59	1.21	61.17	5.67	16.4	5.94	7.32	71.31	57.75	14.73	6.41	78.18	64.22	17.91	7.8	5.02	4.75		
75%	None	79.595	3.1	65.3	7.67	18.87	7.035	8.975	77.05	62.925	17.635	7.995	81.9	67.645	20.38	9.595	6.29	6.005		

	Locations	at birth	bonus0+15	at 15	bonus15+65	at 65	bonus65+80	at 80	at birth.1	at 15.1	at 65.1	80.1	at birth.2	at 15.2	at 65.2	at 80.2	at birth.3	at 15.3	at 65.3	at 80.3
0	Hong Kong	85.51	0.21	70.72	2.47	23.19	3.27	11.45	82.84	68.06	21.21	10.26	88.13	73.33	25.21	12.54	5.29	5.27	4	
1	Japan	84.71	0.24	69.96	2.54	22.49	3.45	10.95	81.69	66.93	19.98	9.27	87.74	72.98	24.85	12.2	6.05	6.05	4.87	
2	South Korea	84.33	0.3	69.63	1.69	21.32	4.14	10.45	81.19	66.51	18.63	8.4	87.16	72.44	23.55	11.68	5.96	5.93	4.92	
3	French Polynesia	84.07	0.58	69.65	1.85	21.5	3.72	10.23	81.78	67.37	19.58	8.88	86.5	72.07	23.48	11.37	4.73	4.7	3.9	
4	Andorra	84.04	0.58	69.62	1.85	21.47	3.72	10.19	82.1	67.68	19.81	9.03	86.11	71.7	23.18	11.16	4.01	4.02	3.36	
5	Switzerland	83.95	0.36	69.31	2.2	21.51	3.46	9.97	82.01	67.38	20.05	9.08	85.63	71.17	22.83	10.63	3.82	3.8	2.78	
6	Australia	83.92	0.35	69.27	2.38	21.65	3.35	10	82.1	67.45	20.32	9.14	85.74	71.08	22.93	10.74	3.64	3.62	2.62	
7	Singapore	83.74	0.27	69	2.87	21.87	3.87	10.74	81.24	66.51	20.03	9.66	86.24	71.5	23.53	11.5	5	4.99	3.5	
8	Italy	83.72	0.26	68.98	2.33	21.31	3.46	9.77	81.57	66.84	19.67	8.77	85.75	70.99	22.76	10.5	4.18	4.15	3.09	
9	Spain	83.67	0.29	68.96	2.58	21.54	3.57	10.11	80.96	66.26	19.48	8.96	86.31	71.58	23.4	10.94	5.35	5.32	3.92	
10	Réunion	83.55	0.6	69.14	3.1	22.24	3.67	10.91	80.53	66.16	20.37	9.88	86.33	71.89	23.83	11.6	5.8	5.73	3.46	
11	France	83.33	0.39	68.72	3.31	22.03	3.58	10.61	80.43	65.85	20	9.41	86.09	71.44	23.78	11.45	5.66	5.59	3.78	
12	Norway	83.31	0.25	68.56	2.19	20.75	3.53	9.28	81.75	67.02	19.58	8.37	84.85	70.07	21.84	10.02	3.1	3.05	2.27	
13	Malta	83.3	0.78	69.08	2.35	21.42	3.98	10.41	81.27	66.86	19.36	8.83	85.26	71.26	23.35	11.61	3.99	4.4	3.98	
14	Guernsey	83.27	0.64	68.91	2	20.91	3.91	9.82	81.01	66.65	19.03	8.55	85.58	71.2	22.77	10.88	4.56	4.55	3.75	
15	Sweden	83.26	0.24	68.5	2.42	20.92	3.71	9.63	81.44	66.69	19.55	8.69	85.1	70.33	22.23	10.4	3.66	3.64	2.69	