

Data Visualization Lab

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Planning and Statistics Authority (PSA)

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Agenda



01. Introduction

- What is Data Visualization Lab?
- Data Ecosystem & Lifecycle

03. Data Visualization Framework

02. What is Data Visualization?

- Why is data visualization important?
- Stages for producing data visualization

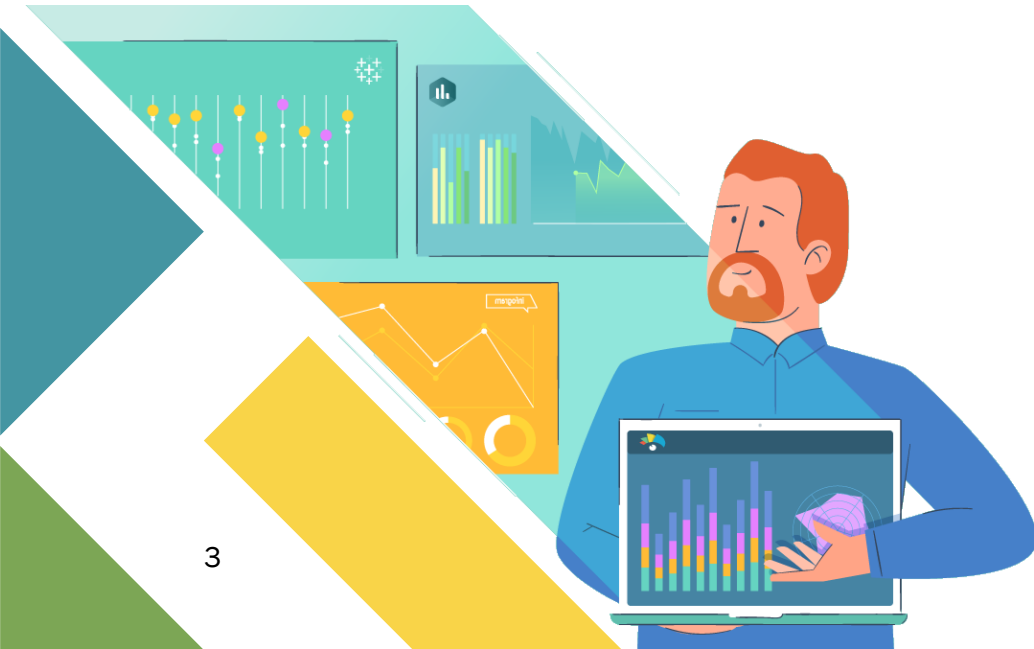
04. Call for Action

05. Closing

Introduction

What is Data Visualization Lab?

- Data Visualization Lab serves as a **dedicated environment** to influence the power of data visualization and unlock insights to effectively communicate complex information through visually engaging representations.
- These visualizations may be used in various domains such as business intelligence, scientific research, healthcare, finance, trade, and more.



Importance of Developing a Data Visualization Lab?

1. Continuous Learning and Improvement

Promotes continuous learning, and updates on advancements, and fosters experimentation, innovation, and knowledge sharing among members

2. Showcase and Dissemination

Encourage sharing, publishing, collaboration, and staying updated with the data visualization community.

3. Collaboration and Project Support

Encourage collaboration, support projects, facilitate knowledge sharing, networking, and feedback within lab.

4. Training and Workshops

Provide training, workshops, and hands-on exercises on data visualization techniques, tools, and best practices. Partner with experts for specialized training.

5. Create a Collaborative Space

Create collaborative space, offer tools, encourage interdisciplinary teamwork for data visualization projects.

6. Support Data Warehouse and Open Data Portal

Providing the central statistical data warehouse and the open data portal with multiple visual products



Today!

Workshop on Data Visualization for Better Decision-Making

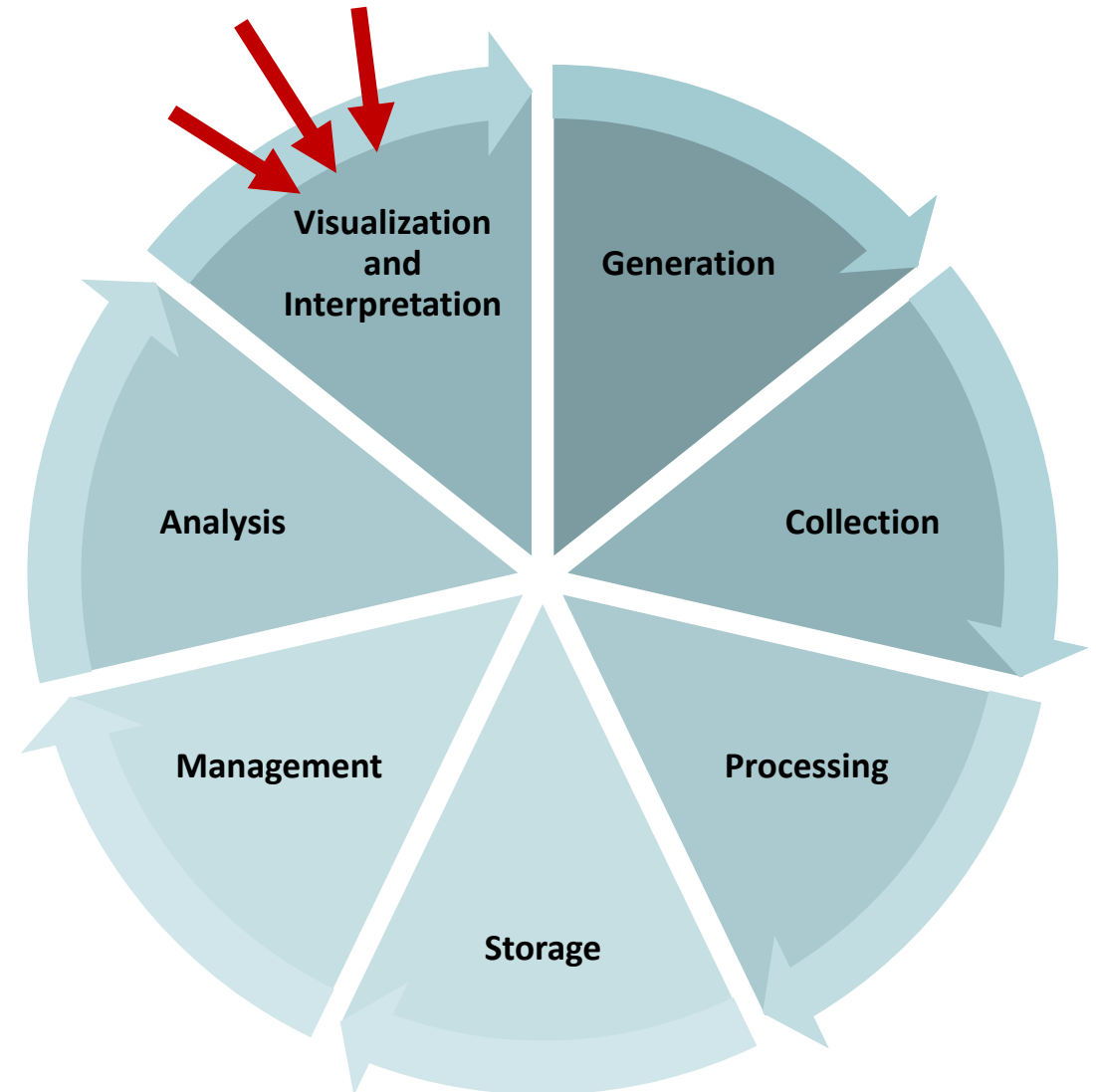
Expected Outcome:

- Understand the advantages of data visualization for decision-making.
- Know various types of visualization.
- Acquire some skills to produce various types of visualization.
- Know some commercial data visualization packages with functionality.

Data Ecosystem & Lifecycle

- The data ecosystem encompasses everything that handles, organizes, and processes data.
- It is the path data takes from generation to dissemination (actionable insights).
- This life cycle can be split into eight steps:

**Generation, Collection, Processing,
Storage, Management, Analysis,
Visualization, and Interpretation**



What is Data Visualization?

- Data visualization uses graphical representations to illustrate information, uncover patterns, and aid decision-making. It combines science and design to communicate complex data effectively, empowering users to understand and present information in impactful ways.
- Data visualization utilizes graphs, charts, and other visual representations to convey information and insights from data effectively.



Importance of Data Visualization



Data comprehension

- Visualizing data allows us to **see complex information quickly and intuitively.**
- By presenting data in visual formats such as graphs, charts, and maps, patterns, trends, and outliers become more apparent, making it easier to derive insights and understand the underlying story within the data.

Decision-making

- Visualizing data enables better decision-making by **providing a clear and concise representation of information.**
- Supporting evidence-based decision-making and facilitating the communication of findings to stakeholders.

Importance of Data Visualization (continued)

Communication and storytelling

- Visual representations engage and captivate audiences, enabling effective communication of insights, recommendations, and narratives derived from data.

Exploration and discovery

- Interactive data visualizations allow users to explore and interact with data dynamically.
- **When** users can drill down, filter, and manipulate visualizations, uncovering deeper insights and discovering previously unnoticed patterns or trends.
- This exploratory aspect fosters a deeper understanding of data and promotes data-driven discovery.

Importance of Data Visualization (continued)



Data-driven insights

- Insights can drive informed decision-making, identify opportunities, detect anomalies, and improve overall performance.
- Empowers users to derive meaningful insights and make informed decisions based on data.

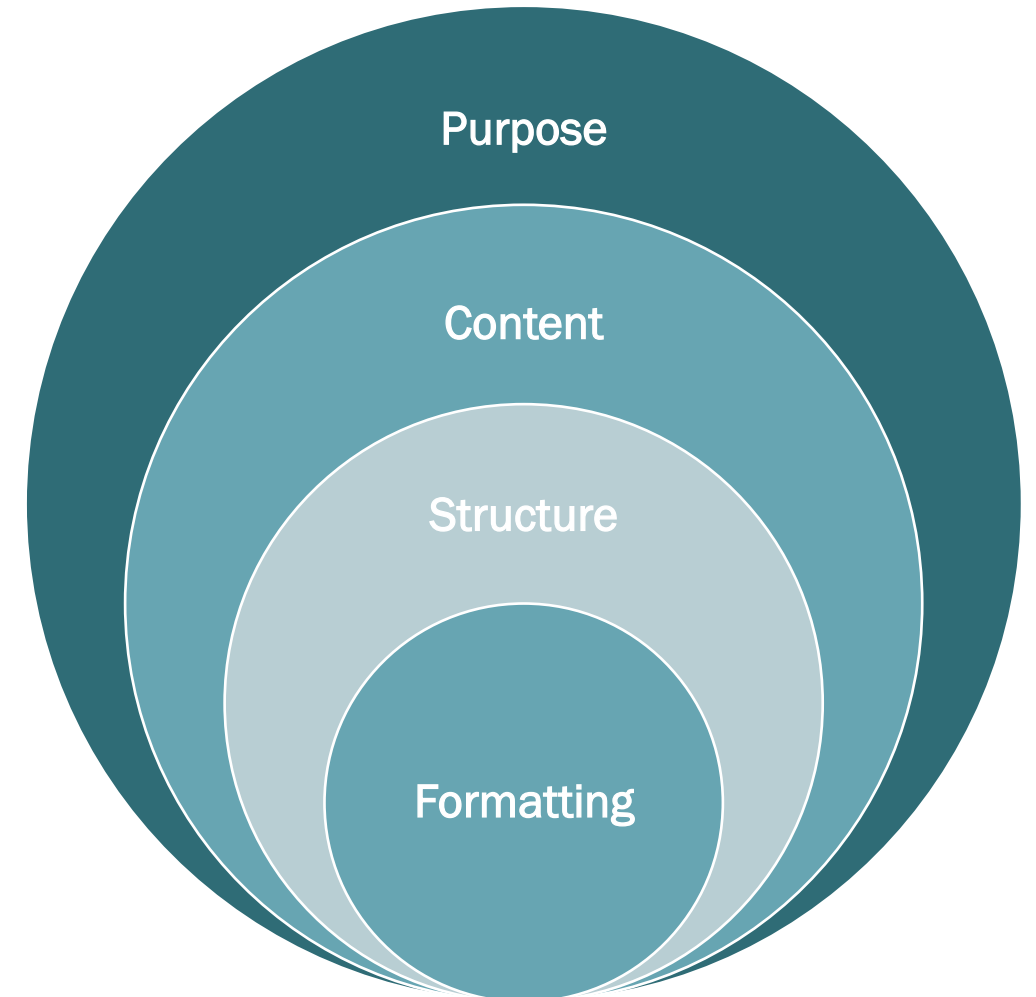
Audience engagement

- Visuals have a higher impact on audience engagement compared to raw data or textual information.
- Well-designed visualizations capture attention, evoke emotions, and enable better understanding and retention of information.
- **Harvard Business Review** demonstrate human beings are naturally wired to respond better to storytelling than most other forms of content sharing

[Why Your Brain Loves Good Storytelling \(hbr.org\)](https://hbr.org/2015/01/why-your-brain-loves-good-storytelling/)

Stages for Producing Effective Data Visualization Products

1. **Purpose** - determine the purpose of the visualization
2. **Content** - create or obtain the data that has the potential to aid the purpose
3. **Structure** - map your data and select geometrical shape that are most likely to reveal underlying patterns and insights.
4. **Formatting** - polish and format the best visual(s) from stage 3 for a more informative and/or persuasive for our intended audience.



A Proposed Data Visualization Framework

Graphical Presentation

Geographical Presentation

Infographics

Social Media

Dashboard

Podcast

Interactive Publications

Press Release

Data Storytelling

Data Journalism

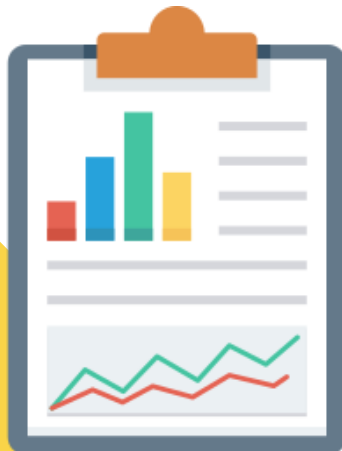
(1)

Infographics

Infographics

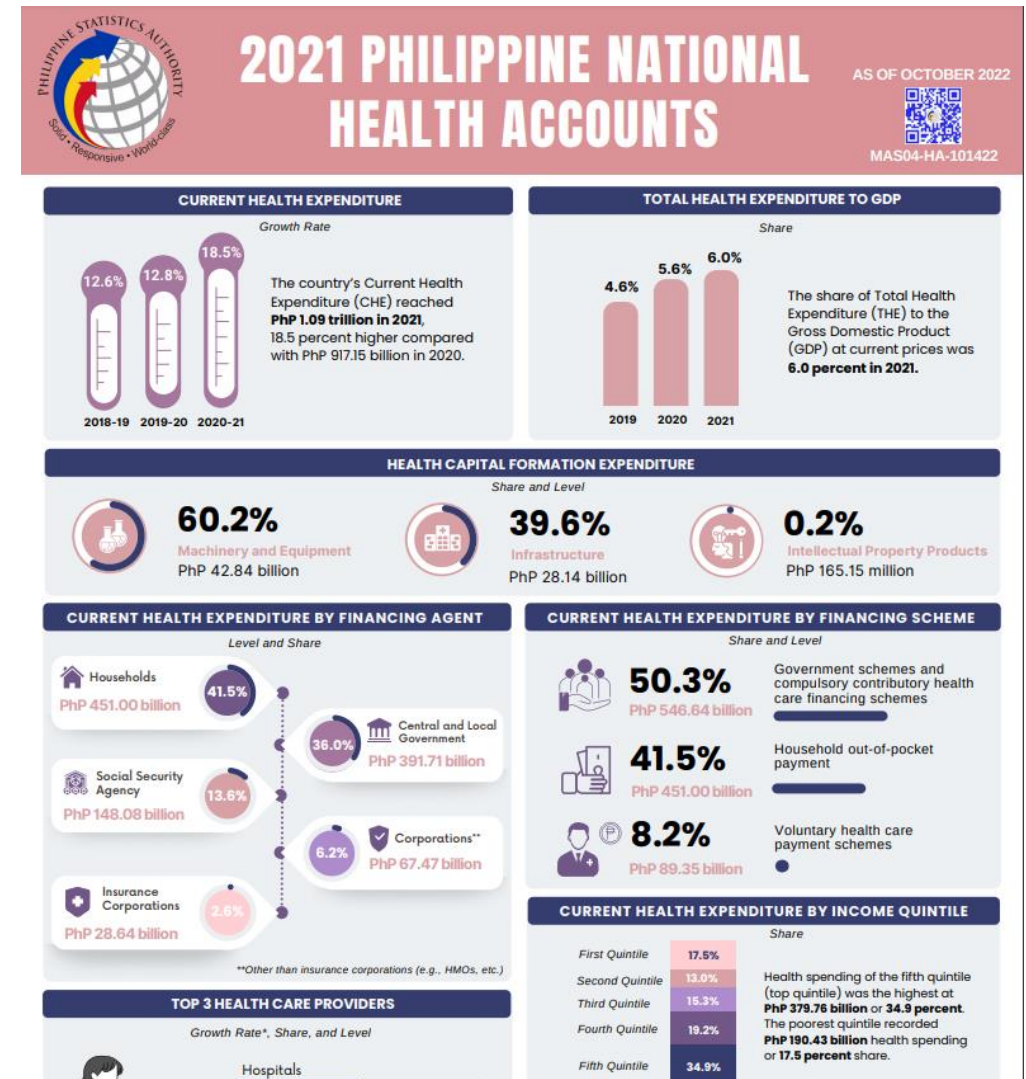
What is Infographics?

- Infographics allow us to walk away with the information we can use to make better decisions without having to deep dive into the data.
- They help drill data down so audiences can get a view of the research problem – the big picture that we’re all trying to see – as well as answer deeper questions about the results of that research .



Example from Philippine Statistics Authority (PSA)

[Philippine Statistics Authority | Republic of the Philippines \(psa.gov.ph\)](http://Philippine Statistics Authority | Republic of the Philippines (psa.gov.ph))



Example from Planning and Statistics Authority (Qatar Monthly Statistics)

Planning and Statistics Authority Home Page (psa.gov.qa)



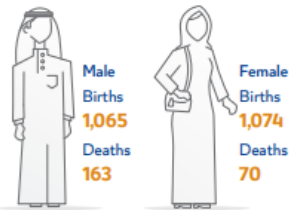
Glance QATAR MONTHLY STATISTICS

Statistics of March 2023

Published by the Planning and Statistics Authority, giving a monthly statistical image on some economic, demographic and social aspects.

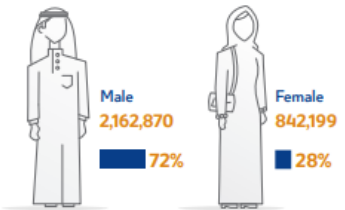
psa.qatar psa.qatar www.psa.gov.qa

Births & Deaths

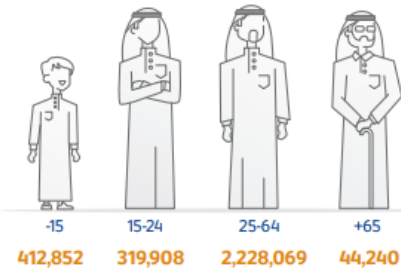


Population by Gender

These data represents the number of individuals in all age groups (Qatari and Non-Qatari) within the boundaries of the State of Qatar.



Population by Age Group



Marriages & Divorces



Social Security

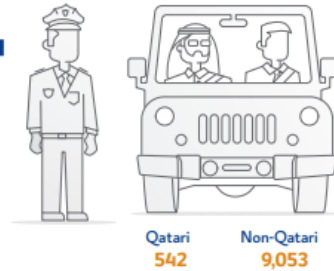
Beneficiaries of Social Security
14,323 individuals

Value of Total Social Security
77,295 Thousand QR

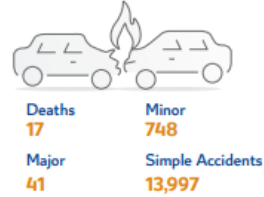
Traffic Violations



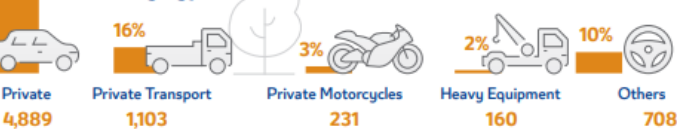
Driving Licenses Issued



Traffic Accidents Cases



Vehicles by Type



Electricity & Water

Electricity Utilization
2,520 GWh

Water Consumption
28,293 Thousand m³

Vessels Movement

No. of Vessels
362

Net Tonnage
7,273 Thousand Ton

Foreign Trade Directions



E-Government

February 2023

Renewal of the Health Cards
67,868

E-Contract
37,689

Online Registration for the Medical Commission
22,576

Criminal Cases Requests
6,747

Real Estate

No. of Sold Properties
340

Sold Properties Value
1,236 Million QR

Visitor Arrivals by Region*

* A visitor is a non-resident staying in the state destination outside his/her usual environment, for less than a year, for any purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited. A visitor is classified as a tourist, if his/her trip includes an overnight stay, or as a same-day visitor otherwise.

Gulf Cooperation Council (GCC)
164,410 38.0%

Europe
114,681 26.5%

Other Asia inc. Oceania
85,234 19.7%

Other Arab
35,020 8.1%

Americas
26,567 6.1%

Other African Countries
7,202 1.7%

Building Permits

Building Permits
666

Example from Singapore Department of Statistics

DOS | SingStat Website - Singapore Population



POPULATION



TOTAL POPULATION¹ in 2022
(as at end-June)

5.64 Mil
3.4% growth over previous year



RESIDENT POPULATION² in 2022
(as at end-June)

4.07 Mil
2.2% growth over previous year

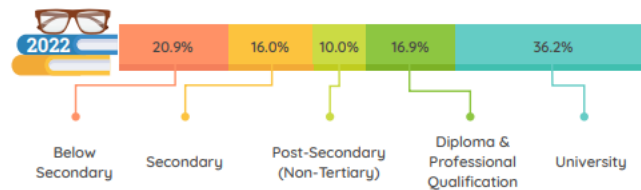


OLD-AGE SUPPORT RATIO
(residents aged 20-64 years per resident aged 65 years and over)

3.8 in 2022
4.0 in 2021

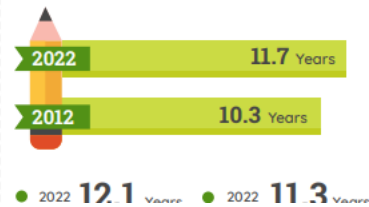
HIGHEST QUALIFICATION ATTAINED

(among Residents aged 25 years and over)

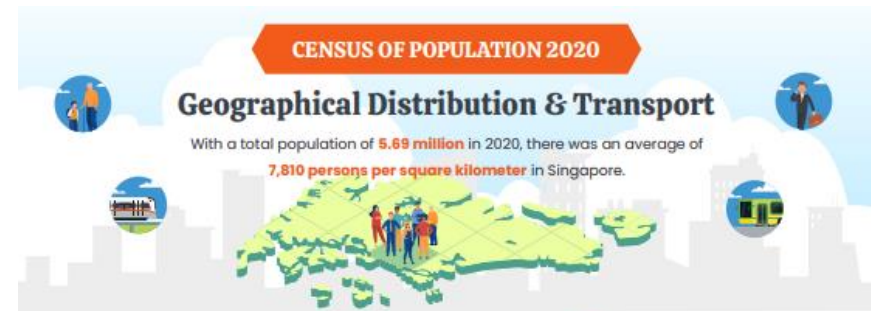


MEAN YEARS OF SCHOOLING

(among Residents aged 25 years and over)



DOS | SingStat Website - Search by Theme



Outram had the highest proportion of residents aged 65 years and over.

Punggol had the highest proportion of residents aged below 5 years.



Top 3 Areas Where Residents Work

Among all employed residents aged 15 years and over with a fixed location for work, Downtown Core, Queenstown and Geylang were the top 3 areas where employed residents travelled to for work.

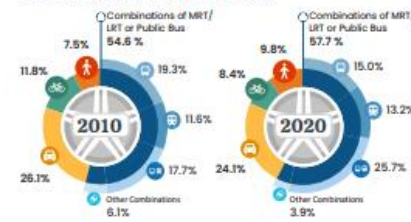


Main Mode of Transport for Students

	2010	2020
Primary and Below: No Transport Required	46.2%	43.0%
Secondary: Public Bus Only	42.1%	36.9%
Post-Secondary (Non-Tertiary): MRT/LRT & Public Bus Only	29.4%	44.2%
Polytechnic Diploma: MRT/LRT & Public Bus Only	34.6%	49.7%
Professional Qualification and Other Diploma: MRT/LRT & Public Bus Only	38.3%	48.9%
University: MRT/LRT & Public Bus Only	43.7%	51.1%

Mode of Transport & Median Travelling Time for Employed Residents

The use of combinations of MRT/LRT or public bus to work increased to **57.7%** in 2020.

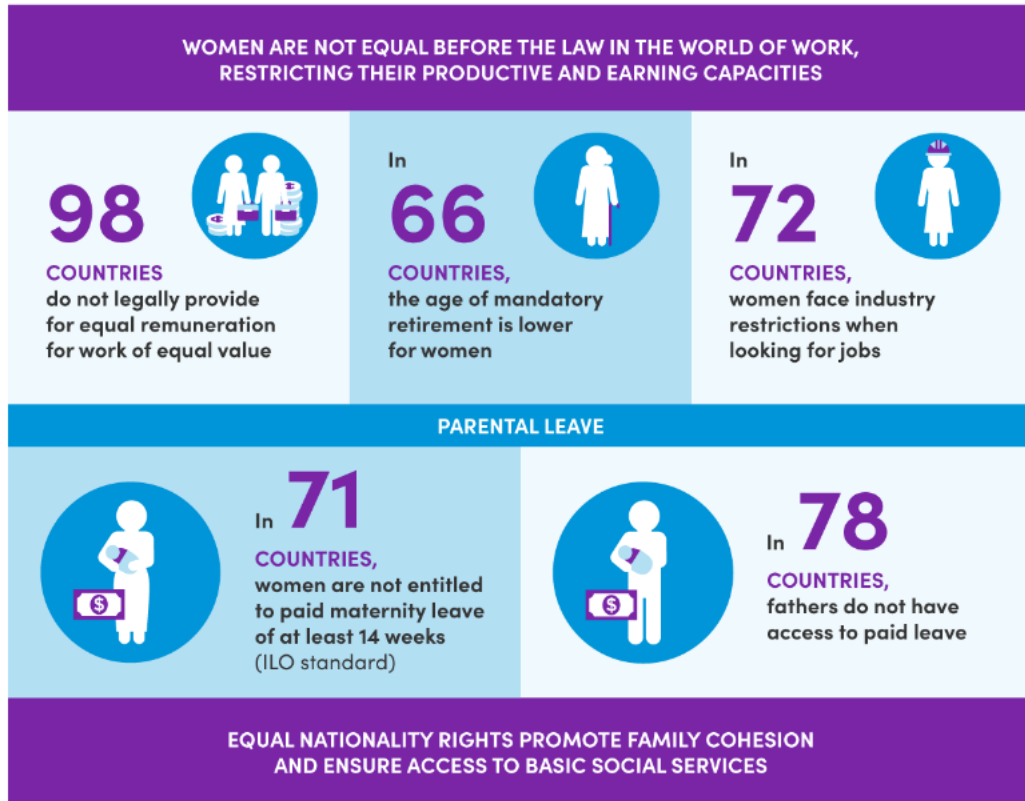


Median Travelling Time

Mode	2010	2020
Combinations of MRT/LRT or Public Bus	45 min	45 min
Public Bus Only	30 min	37 min
MRT/LRT Only	40 min	45 min
MRT/LRT & Public Bus Only	50 min	60 min
Other Combinations	45 min	60 min
Car/Taxi/Private Hire Car Only	30 min	30 min
Other Modes	30 min	30 min
No Transport Required	10 min	8 min

Example from UN Women

Infographic: Women's rights and the law | UN Women – Headquarters

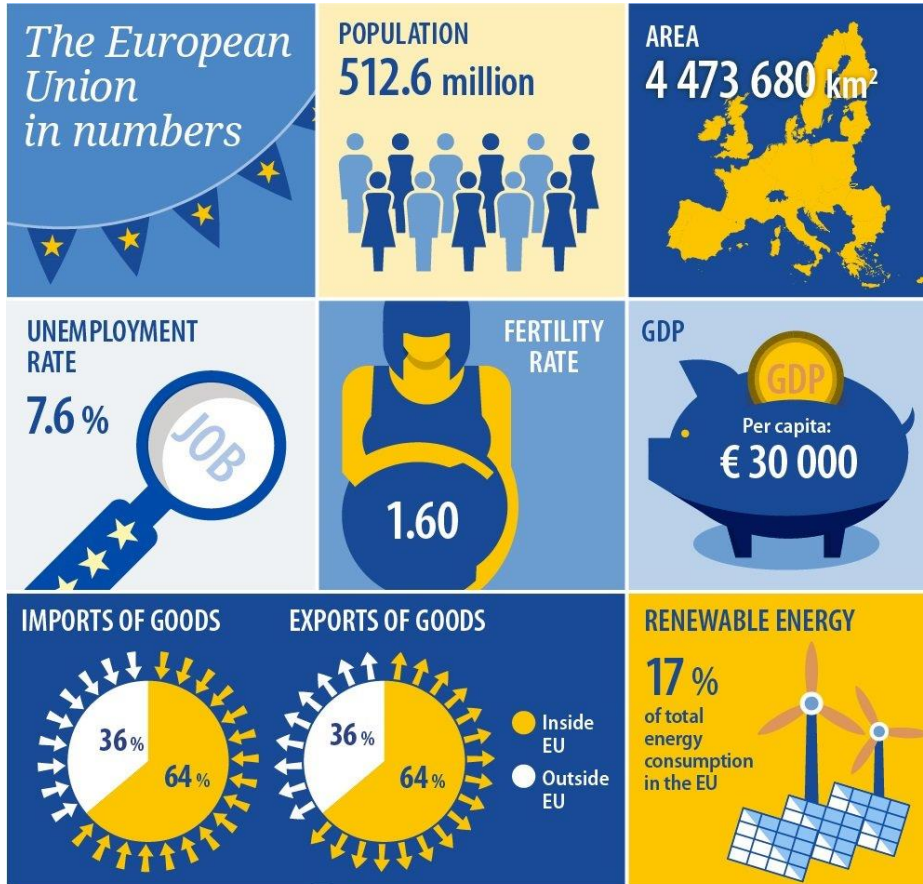


Infographic: Human Rights of Women | UN Women – Headquarters

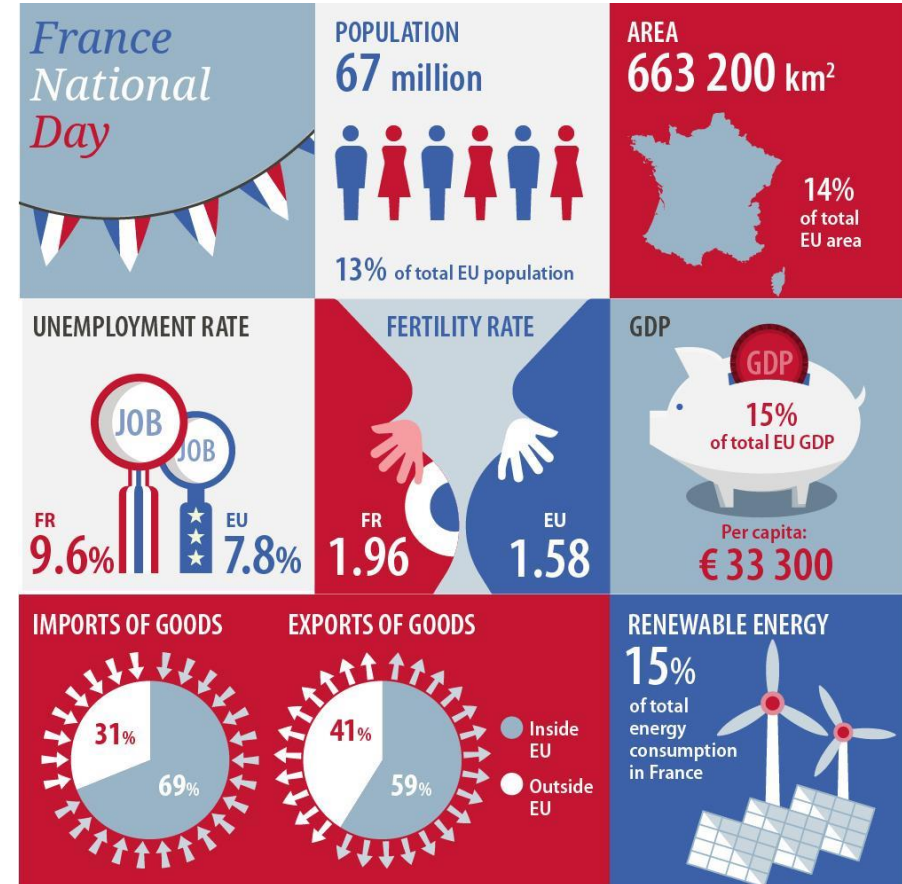


Example from eurostat

[eurostat infographic - Google Search](#)



ec.europa.eu/eurostat



ec.europa.eu/eurostat

Example from Center of Disease Control (CDC)

Global Health Infographics | CDC

QUITLINES CAN HELP ADULTS AROUND THE WORLD QUIT SMOKING TOBACCO

WORLD NO TOBACCO DAY

Nearly **177 million** adults in 31 countries who smoked **tried to quit** in the past year

About **7 in 10** adults who attempted to quit smoking **tried without help**

Less than 1% of adults who tried to quit used a quitline

LESS THAN 1%

Quitlines can improve the likelihood that someone will quit smoking

MAKING QUITLINES MORE AVAILABLE around the world can help more people quit smoking

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

All proportions presented represent median values across 31 countries

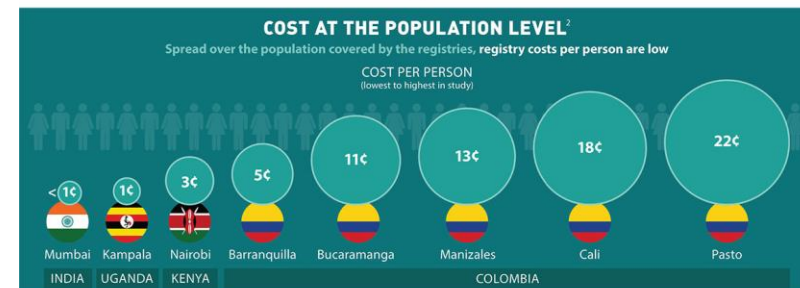
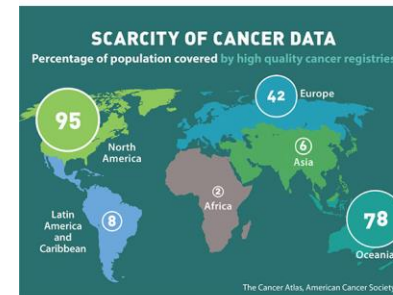
Learn more: bit.ly/GATSquit21

Source: Global Adult Tobacco Survey from 31 countries, 2008 – 2018

CANCER REGISTRIES

TRACK AND MONITOR CANCER TRENDS OVER TIME AND PROVIDE VITAL INFORMATION

FOR ALLOCATING RESOURCES, IMPLEMENTING PREVENTION, SCREENING AND TREATMENT PROGRAMS, AND EVALUATING THE IMPACT AND EFFECTIVENESS OF CANCER PROGRAMS AND POLICIES



Subramanian, Sujha et al. Developing and testing a cost data collection instrument for noncommunicable disease registry planning. *Cancer Epidemiology*, 2016.

² Tangka, Florence et al. Resource requirements for cancer registration in areas with limited resources: Analysis of cost data from four low- and middle-income countries. *Cancer Epidemiology*, 2016.

To learn more, visit www.cancerepidemiology.net
U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

(2)
Dashboard

Dashboard

What is Dashboards?

- A dashboard is a tool that visualizes data, enabling users to track, analyze, and understand key metrics for informed decision-making.
- It features charts, tables, and gauges to monitor performance against goals and benchmarks, engaging both technical and non-technical users in the analytics process.



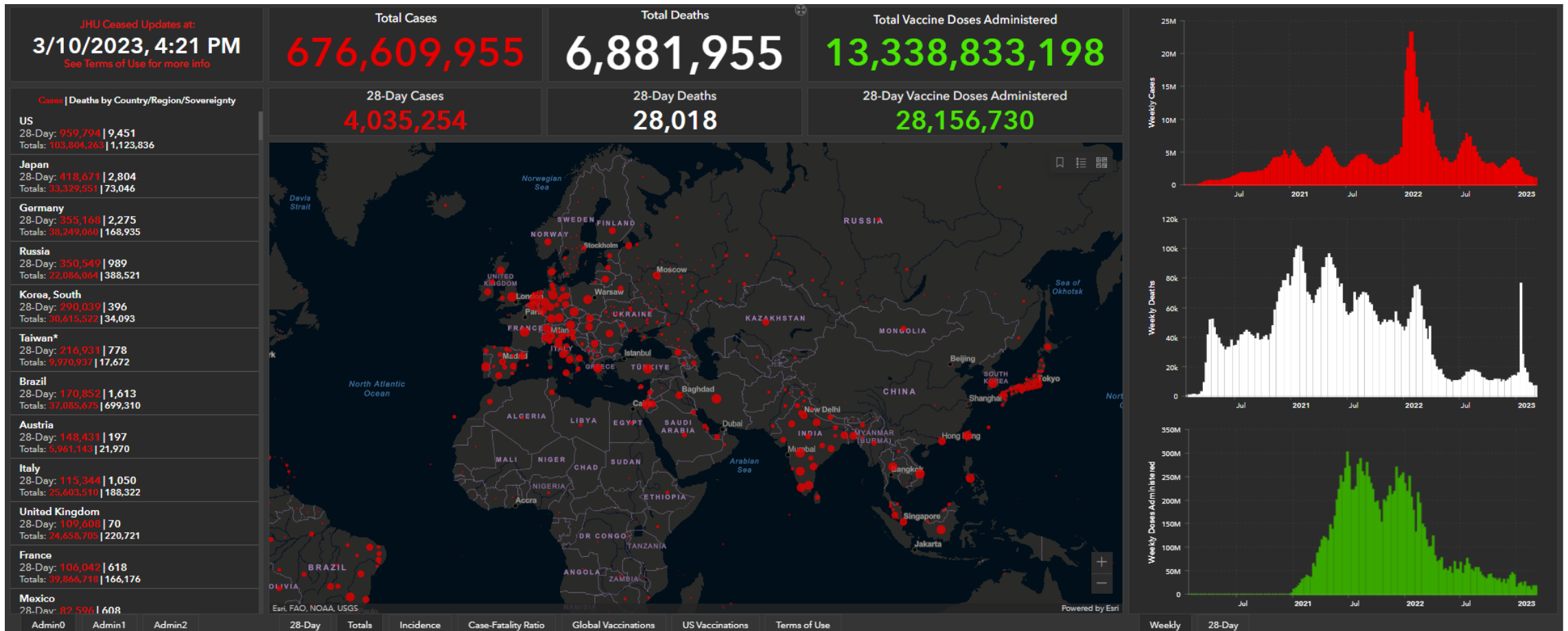
Main Types of Dashboards

- **Real-time dashboards:** that provide up-to-the-minute data and insights, displaying information as it happens, while historical dashboards present past data and trends.
 - are useful for monitoring live events, tracking real-time metrics, and making immediate decisions,
- **Historical dashboards** help analyze trends, patterns, and historical performance over a specific period

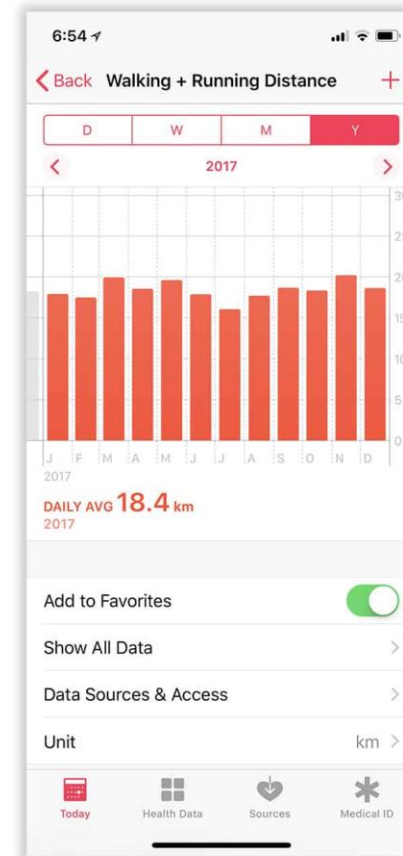
Real-time Dashboard

Example COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU)

[COVID-19 Map - Johns Hopkins Coronavirus Resource Center \(jhu.edu\)](https://www.jhu.edu/coronavirus)



Real-time Dashboard



Historical Dashboard

Example PSA Qatar's Censuses Dashboard (Total Population Example)

[Qatar Census 2020 Detailed Results \(psa.gov.qa\)](https://psa.gov.qa)

The screenshot shows the Qatar Census 2020 dashboard. At the top, there is a navigation bar with a home icon, menu items for Population, Family, Education, Economic, Disability, Housing Units, and Establishments, and a 'Main Results' button. The main content area features a central illustration of a diverse group of people, including a person in a wheelchair, a child, and a doctor. Below the illustration is the word 'POPULATION' and a 'more insight' button. Two data cards are displayed: one for April 2010 and one for December 2020. Each card shows the total population and a breakdown by gender.

Logo: جهاز التخطيط والإحصاء | تعداد قطر ٢٠٢٠ | Planning and Statistics Authority | QATAR CENSUS 2020

Navigation: Downloads, عربي, Aa, +, -

Menu: Population, Family, Education, Economic, Disability, Housing Units, Establishments, Main Results

POPULATION

more insight →

Period	Total Population	Females	Males
as on end of April 2010	1,699,435	414,696	1,284,739
as on end of December 2020	2,846,118	811,600	2,034,518

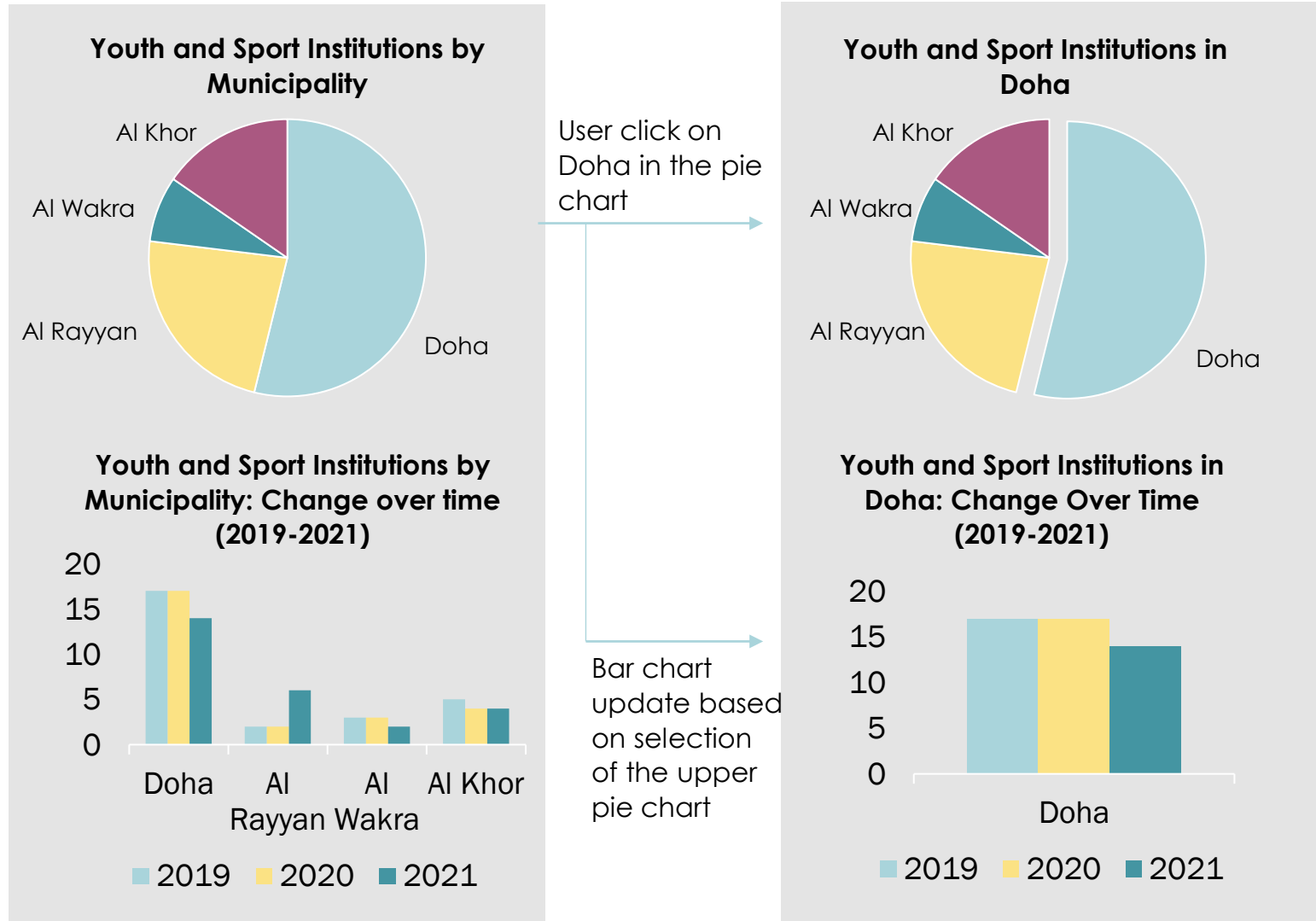
(3)

**Interactive
Publications**

Interactive Publications

- Unlike PDFs, interactive publications are fully functioning web pages allowing data-users to choose which data they want to see and select graphs to visualize the numbers
 - It is type of dashboard known as interactive dashboard

Illustration:



Example Eurostat

[Shedding light on energy - 2023 edition - Interactive publications - Eurostat \(europa.eu\)](#)



Shedding light on energy in the EU - 2023 interactive edition

Energy is essential for our day-to-day life. Turning on our computers or starting our cars are actions that we take for granted, yet they represent the final stage of a complex process, from extraction to final consumption. Where does our energy come from? How dependent are we on energy imports? Which kind of energy do we consume in the EU and how much does it cost? Are we efficient in the consumption of energy? How much greenhouse gas do we emit in the EU?

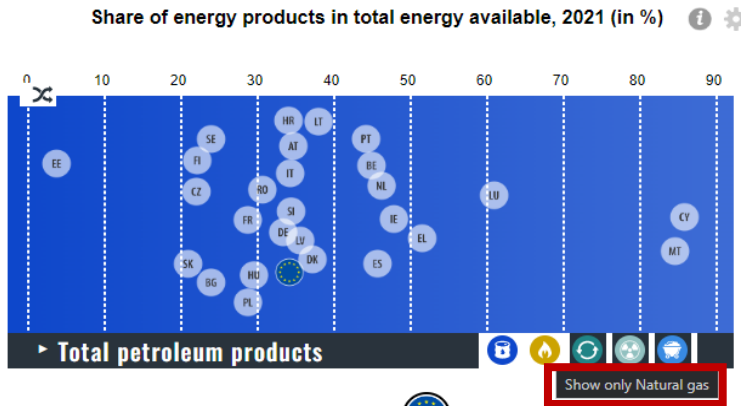
The 2023 edition of the interactive publication 'Shedding light on energy in the EU' provides answers to these questions and many more. The different visualisation tools allow you to explore selected indicators on energy and environment. The publication replies to the needs of those who are not familiar with the energy sector as well as more experienced users.

[Open the publication](#)

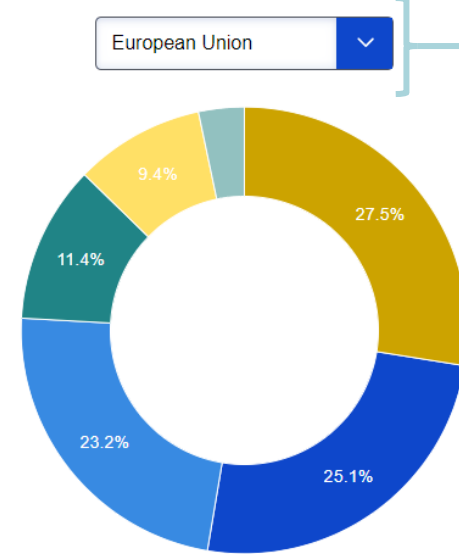


Example Eurostat

Shedding light on energy - 2023 edition - Interactive publications - Eurostat (europa.eu)

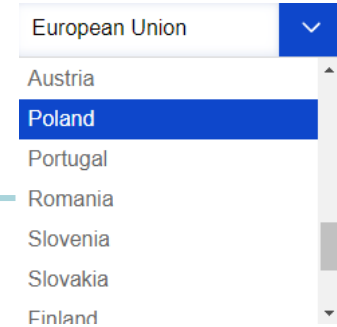


Share of greenhouse gas emissions by source, 2020 (in %)

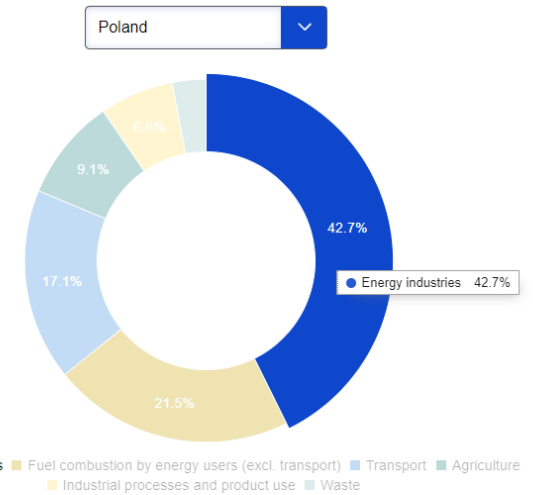


Data including international aviation, excluding indirect CO₂ emissions, excluding land use, land use change and forestry. Due to rounding data might not add up to 100%.

Source: European Environment Agency - [access to dataset](#)



Share of greenhouse gas emissions by source, 2020 (in %)




Data including international aviation, excluding indirect CO₂ emissions, excluding land use, land use change and forestry. Due to rounding data might not add up to 100%.

Source: European Environment Agency - [access to dataset](#)


Example ONS (Office for National Statistics)

[How many people do my job? - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)



How many people do my job?

Select a job type

Select an occupation... 

- Civil engineers
- Chemical and related process operatives
- Chemical scientists
- Chief executives and senior officials
- Child and early years officers
- Childminders
- Civil engineers

A red arrow points from the "Civil engineers" option in the dropdown menu to the "Civil engineers" option in the list.

59,930 people

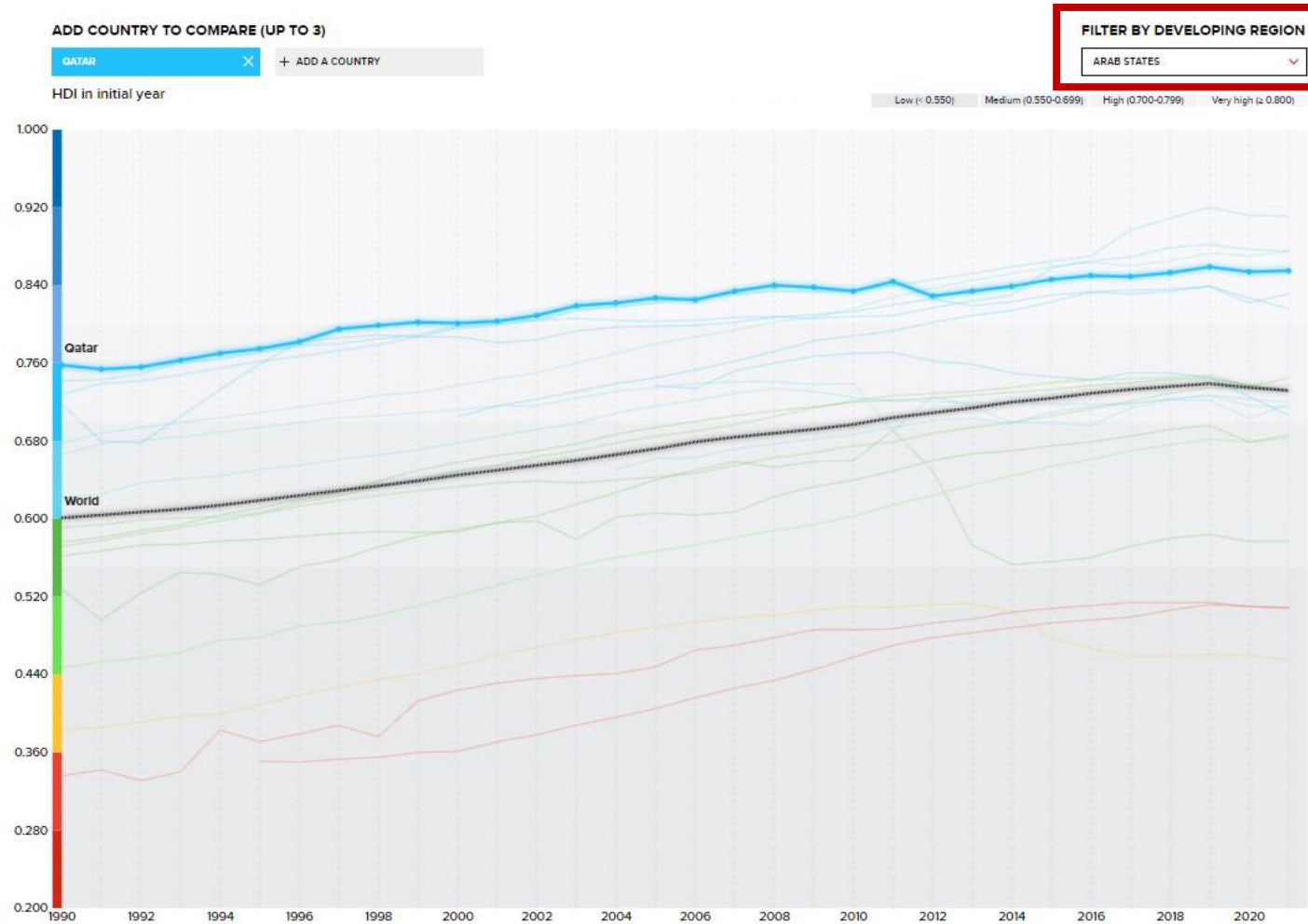
were counted on the census as "**civil engineers**" in England and Wales in March 2021.



Civil engineers undertake research and design, direct construction and manage the operation and maintenance of civil and mining engineering structures.

Example UNDP (Human Development Index)

[Human Development Index | Human Development Reports \(undp.org\)](https://undp.org)













Example UNDP (Human Development Index)










[Country Insights | Human Development Reports \(undp.org\)](https://undp.org)

SORT LIST
RANK ▾

FIND A COUNTRY IN THE LIST
QATAR ▾

FILTER BY DEVELOPING REGION
ARAB STATES ▾

Rank	Country	HDI Value	Change from 2020	
26	 United Arab Emirates	0.911	▾ -0.001	>
35	 Saudi Arabia	0.875	▲ 0.005	>
50	 Kuwait	0.831	▲ 0.009	>
91	 Algeria	0.745	▲ 0.009	>
97	 Tunisia	0.731	▾ -0.006	>
104	 Libya	0.718	▲ 0.015	>
112	 Lebanon	0.706	▾ -0.020	>
123	 Morocco	0.683	▲ 0.004	>
171	 Djibouti	0.509	▾ -0.001	>
183	 Yemen	0.455	▾ -0.005	>

Rank	Country	HDI Value	Change from 2020	
35	 Bahrain	0.875	▾ -0.002	>
42	 Qatar	0.855	▲ 0.001	>
54	 Oman	0.816	▾ -0.011	>
97	 Egypt	0.731	▾ -0.003	>
102	 Jordan	0.720	▾ -0.003	>
106	 Palestine, State of	0.715	▾ -0.001	>
121	 Iraq	0.686	▲ 0.007	>
150	 Syrian Arab Republic	0.577	▲ 0.000	>
172	 Sudan	0.508	▾ -0.002	>

Example UNDP (Human Development Index)

[Human Development Report 2021-22 | Human Development Reports \(undp.org\)](#)

Replacing the standard PDF report



(4)
Data
Storytelling

Data Storytelling

Data storytelling turns data into actionable insights, it is defined as the ability to effectively communicate insights from data using three important elements: **data, visuals, and narrative** to create engaging and easily understood actionable outcomes.

Example from SDG Today

[Storytelling \(sdgstoday.org\)](http://sdgstoday.org)

ArcGIS StoryMaps

- Data-driven narratives about the SDGs and use StoryMaps to highlight data initiatives, research projects, and apps and technologies that utilize new data sources and innovative methods for sustainable development.

Explore stories by SDG



Example from SDG Today SDG 4: Quality Education (cont.)

[Storytelling \(sdgstoday.org\)](https://sdgstoday.org)



Collection

SDG 4: Quality Education

This collection of stories relating to Sustainable Development Goal #4 is featured as part of SDSN SDGs Today's data-driven storytelling initiative. Please visit www.sdgstoday.org for more stories and timely geospatial data on the SDGs.



1 MY SCHOOL TODAY!



2 Mapping Critical Race Theory, Book Bans, and Abortion...



3 Is Education a Necessity for Daerah Pantu Community?



4 An Education That Ends Poverty



5 Sexuality Education Legislation and Policy



6 Public Education in the United States of America

Example from SDG Today SDG 3: Good Health and Well-being (cont.)

[Storytelling \(sdgstoday.org\)](http://sdgstoday.org)

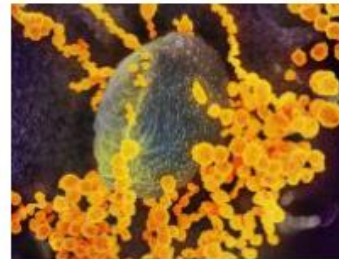


Collection

SDG 3: Good Health and Well-being

This collection of stories relating to Sustainable Development Goal #3 is featured as part of SDSN SDGs Today's data-driven storytelling initiative. Please visit www.sdgstoday.org for more stories and timely geospatial data on the SDGs.

Get started



1 Mapping the spread of COVID-19



2 Sexuality Education Legislation and Policy



3 Working with a blindfold



4 Space, shelter and scarce resources - coping with...



5 Richmond Community Advocates: Heartbeat of Our...



6 Transforming lives: Ascend West and Central Africa



7 Call to Action: End environmental racism now



8 Women's Access to Health Services in Ghana

(5)

**Geographical
Presentation**

Geographical Presentation

Map visualization

- Geographical presentation visualizes data on a map, showing spatial patterns and trends. It utilizes geographic references to convey information effectively, aiding analysis and decision-making based on location-specific data

Guide on Geospatial Data Integration in Official Statistics

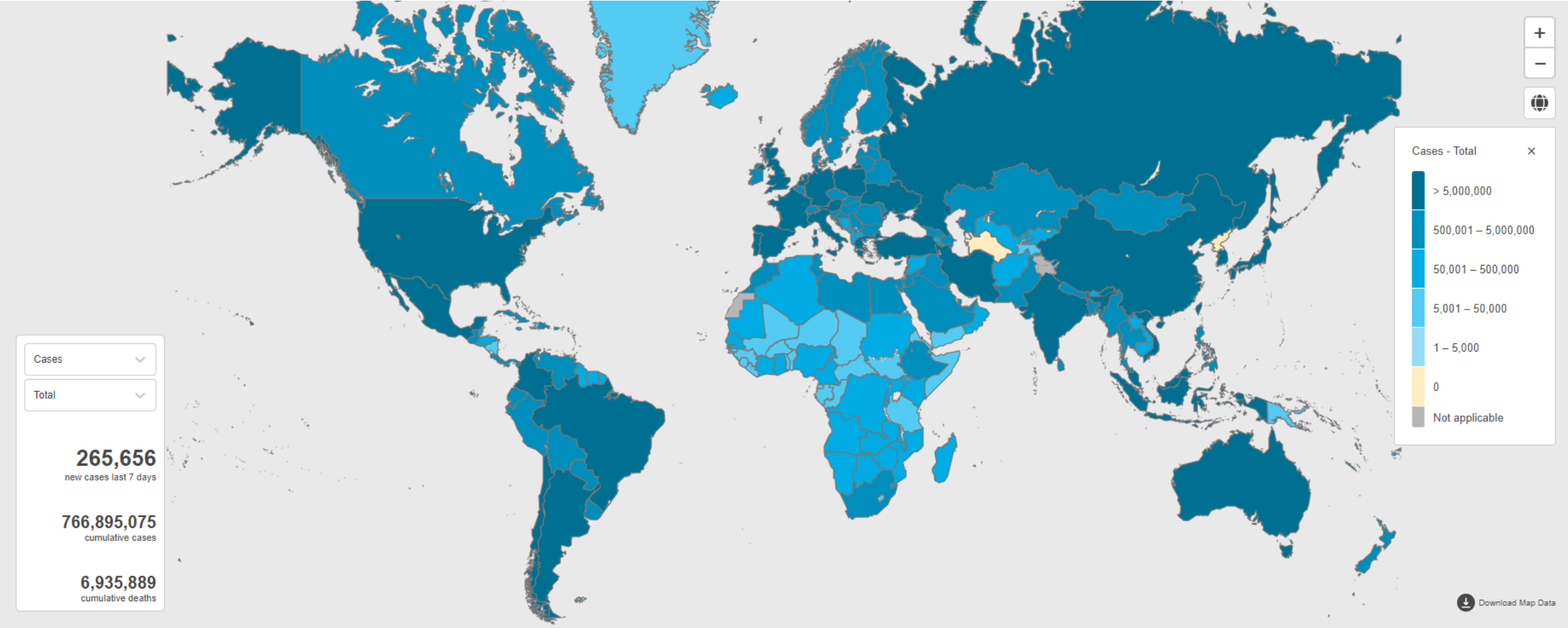
- PARIS21 publication provides a practical guide, based on five principles for national statistics offices to form stronger partnerships with national geospatial integration agencies

[Geospatial Data Integration in Official Statistics 0.pdf \(paris21.org\)](https://www.paris21.org/publications/geospatial-data-integration-in-official-statistics-0.pdf)



Example from World Health Organization (WHO)

[WHO Coronavirus \(COVID-19\) Dashboard](#) | [WHO Coronavirus \(COVID-19\) Dashboard With Vaccination Data](#)



Example from PSA (Qatar Atlas)

Qatar Atlas - Planning and Statistics Authority (psa.gov.qa)

The screenshot displays the Qatar Atlas web application. The top navigation bar includes 'Introduction', 'Statistical Maps', 'My Map', and a search bar. The left sidebar contains menu items: 'About', 'Select Data', 'Layers', 'Add Symbols', 'Add Text', 'Distance', 'BaseMap Gallery', 'Refresh', 'Download', and 'Print'. The main map area shows an aerial view of Doha with several building footprints highlighted in cyan. A data popup window is open over one of these buildings, displaying the following information:

- Municipality: 54115
- Completed and Under Maintenance Building 2015: 54115
- Establishment Buildings 2015: 7095
- Residential and Establishment - Combine: 744
- Residential Building: 46276

Below the popup is a small bar chart with two bars, one taller than the other, and a 'Zoom to' button. On the right side of the map, a legend titled 'Completed and Under Maintenance Building 2015' shows five color-coded categories with their corresponding numerical ranges: 54116 - 61959, 16950 - 54115, 9214 - 16949, 6742 - 9213, and 1840 - 6741. At the bottom of the interface, a table titled 'Building Types' provides a summary of the data for Doha Municipality.

Municipality	Completed and Under Maintenance Building 2015	Establishment Buildings 2015	Residential and Establishment - Combine	Residential Building
Doha Municipality	54,115	7,095	744	46,276

(6)
Podcast

Podcast

- A podcast is a type of **digital media, usually audio**, that is available in a series of episodes or parts and is streamed or downloaded by the end user over the Internet.
- **Storytelling in podcasting** is an essential skill that allows us to capture attention and engage with listeners

ONS Podcast



ESCWA Podcast



Al Jazeera Podcast



Qatar University Podcast
(Research Wednesday Series)



SDG & COVID-19 Data Visualization Toolkit

The SDG & COVID-19 Data Visualization Toolkit, developed as part of the UNSD-FCDO Project on SDG Monitoring, aims to support countries in data storytelling through infographics, reports, online platforms, presentations, promotion materials and social media.

[SDG & COVID-19 DATA VISUALIZATION TOOLKIT \(un.org\)](https://un.org)



SDG & COVID-19 Data Visualization Toolkit



COVID -19 ICONS

&



ICONS

Call for Action

Implementing data visualization in various domains of the above-mentioned framework will enable Planning and Statistics Authority (PSA) and various line ministries and concerned institutions to better:



Workshop Partners



Recourses

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Thank you

We look forward to working together.

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