Economic and Social Analysis

1. The following bar graph shows the gender wage gap in 26 countries based on data collected by the **OECD**. The gender wage gap is calculated by finding the difference between male and female median wages and dividing it by male median wages. It is represented as a percentage in this graph.

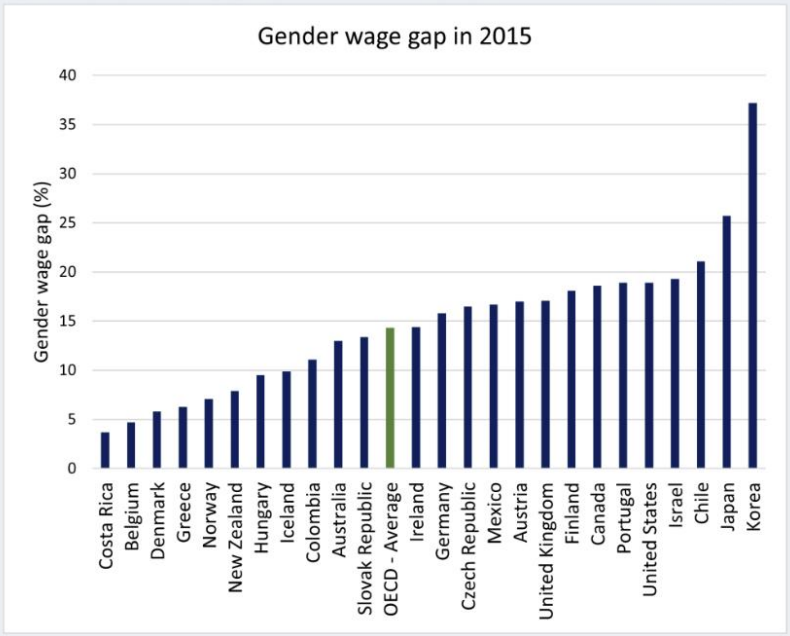


Figure 1: Gender wage gap in 2015 (**Source**)

1.1 Which three countries have the lowest gender wage gap?

Costa Rica, Belgium and Denmark

1.2 Which three countries have the highest gender wage gap?

Chile, Japa and Korea

1.3 Do some research on the country with the lowest gender wage gap and comment on why you think it succeeded in achieving a low gender wage gap in 2015 (max 150 words)

Costa Rica's success in achieving the lowest gender wage gap in 2015 can be attributed to several factors. Strong labor laws and policies promoting gender equality play a significant role. The country has implemented measures such as equal pay legislation and proactive government policies supporting women's workforce participation (OECD, 2017). Additionally, robust social programs providing childcare and parental leave enable women to balance work and family responsibilities effectively (ILO, 2016). Costa Rica’s emphasis on education and vocational training for women ensures they are well-prepared for diverse occupations, contributing to wage equality (UNDP, 2015). Cultural attitudes favoring gender equality and the active involvement of civil society in advocating for women's rights further support a more equitable work environment (ECLAC, 2018).

References:

- OECD (2017) *The Pursuit of Gender Equality: An Uphill Battle*. Paris: OECD Publishing.
- International Labour Organization (ILO) (2016) *Women at Work: Trends 2016*. Geneva: ILO.
- United Nations Development Programme (UNDP) (2015) *Human Development Report 2015: Work for Human Development*. New York: UNDP.
- Economic Commission for Latin America and the Caribbean (ECLAC) (2018) *Gender Equality Observatory for Latin America and the Caribbean*. Santiago: ECLAC.

2. The following line graph shows the sale of isopropanol from May 2019 to March 2020 in the United States of America. The sales are measured using US cents per weight (lb) of the product (US CTS/lb). Focus on the general trend of the three lines on the graph rather than what each of the lines refers to specifically when answering the questions.

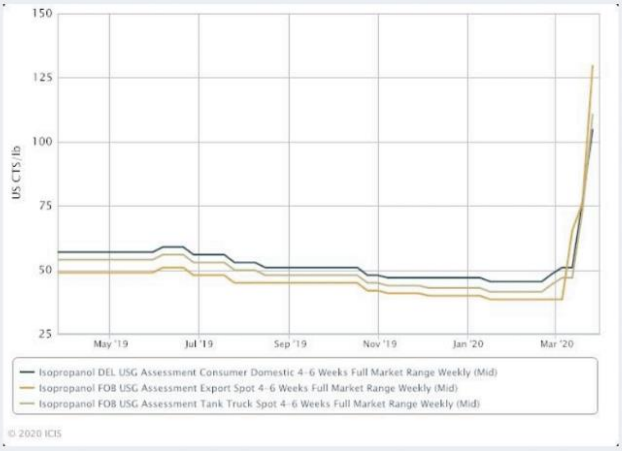


Figure 2: Isopropanol sales from May 2019 to March 2020 (**Source**)

2.1 Explanation of March 2020 Sales Trend:

In March 2020, the graph shows a sharp increase in the price of isopropanol across all three categories (domestic consumer, export spot, and tank truck spot). This significant rise indicates a sudden spike in demand for isopropanol.

2.2 Possible Reason for the Sales Trend:

The spike in isopropanol prices in March 2020 can be attributed to the COVID-19 pandemic. Isopropanol is a key ingredient in hand sanitizers, which caused a high demand as people and organizations enhanced focus on hygiene practices to prevent the spread of the virus. This surge in demand led to increased prices due to the sudden need for large quantities of hand sanitizer.

3. Below, the bubble plot (a scatter plot with variable dot size) shows carbon dioxide (CO_2) emissions per person in tonnes vs the gross domestic product (GDP) per capita (average per person). No unit is given for the GDP per capita; however, the US dollar is typically used when comparing different countries (Callen, n.d.). Each dot represents a country. The colours of the dots refer to the continent to which the country belongs. The size of the dot refers to the size of the population in the country. The larger the dot, the larger the population.

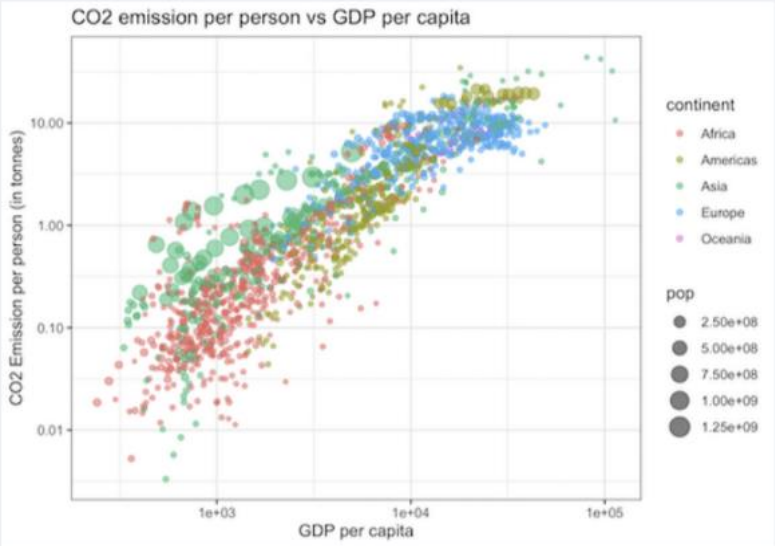


Figure 3: CO_2 emissions per person vs GDP per capita

3. Discuss the relationship between CO2 emissions per person and GDP per capita for each continent listed in the figure legend (max 350 words)

1. **Africa:**
    - Countries in Africa (represented by green dots) generally have lower GDP per capita and lower CO_2 emissions per person. The dots are concentrated in the lower-left part of the plot, indicating that these countries are less industrialized and have smaller economies.
    - There is a noticeable spread in emissions, but most African countries have CO_2 emissions per person below 2 tonnes.
2. **Americas:**
    - Countries in the Americas (represented by red dots) show a wider range of GDP per capita and CO_2 emissions.
    - The United States and Canada are outliers with high GDP per capita and high CO_2 emissions per person.

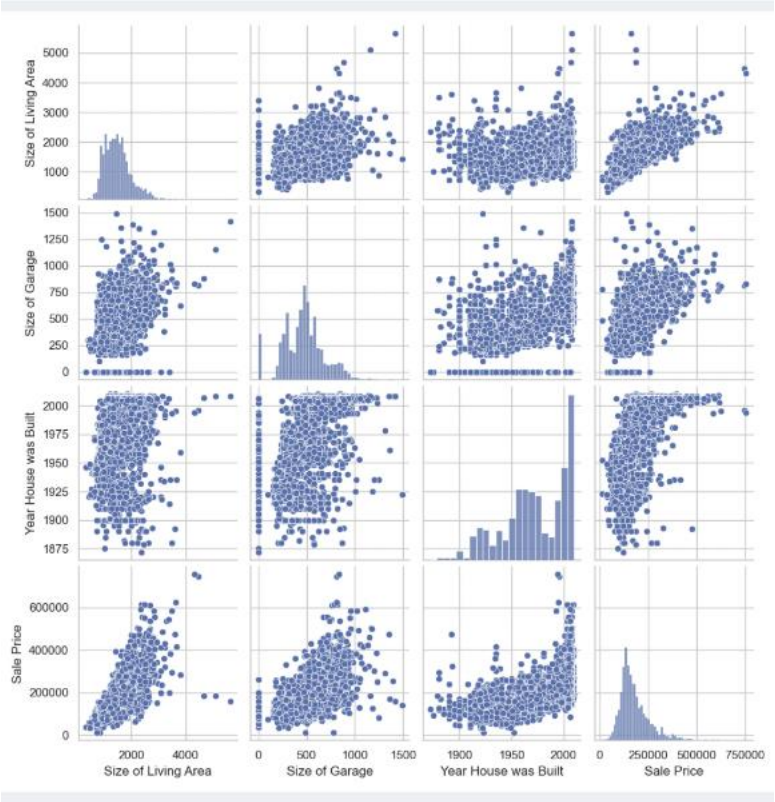
- Other countries in the Americas tend to have moderate GDP per capita and CO_2 emissions, with a few countries having higher emissions despite lower GDP per capita.

3. **Asia:**
    - Asian countries (represented by blue dots) exhibit a wide range of GDP per capita and CO_2 emissions per person.
    - The spread indicates significant economic diversity in Asia, with some countries having low GDP per capita and emissions, while others have high values for both metrics.
4. **Europe:**
    - European countries (represented by yellow dots) generally have higher GDP per capita and moderate to high CO_2 emissions per person.
    - Western European countries tend to have higher GDP per capita and CO_2 emissions, whereas Eastern European countries have lower values for both metrics.
    - The correlation between GDP per capita and CO_2 emissions is quite strong in Europe, with wealthier countries emitting more CO_2 per person.
5. **Oceania:**
    - Oceania (represented by purple dots) includes countries like Australia and New Zealand.
    - These countries have high GDP per capita and high CO_2 emissions per person, similar to trends seen in Western Europe and North America.
    - The smaller number of countries in this region makes it less varied, but the data points show a clear trend of high economic output and emissions.

Conclusion

In general, there is a positive correlation between GDP per capita and CO_2 emissions per person across all continents. Wealthier countries tend to have higher CO_2 emissions per person due to greater industrial activity, energy consumption, and higher living standards. The size of the dots indicates that larger populations do not necessarily correlate with higher emissions or GDP per capita, as seen in densely populated but lower-emission countries in Asia and Africa.

The following scatterplot matrix is from the Ames Housing dataset. It contains data collected by the Ames City Assessor's Office describing 2930 property sales which occurred in Ames, Iowa between 2006 and 2010. The data includes the sale price ($), year the house was built, size of the garage (ft^2) and size of the living area (ft^2).



Practical task 2

1. What do the graphs along the diagonal represent?

- The graphs along the diagonal represent the distribution of each individual variable. These are histograms that show the frequency distribution of the variables: Size of Living Area (ft^2), Size of Garage (ft^2), Year House was Built, and Sale Price ($).

2. Are most garages in Ames larger or smaller than 1000 ft^2?

- Most garages in Ames are smaller than 1000 ft^2. This is shown on the histogram along the diagonal for Size of Garage, where the majority of the data points are concentrated below 1000 ft^2.

3. Are the most expensive houses in Ames built before or after 1950?

- The most expensive houses in Ames are primarily built after 1950. This can be observed from the scatter plot between Year House was Built and Sale Price, where higher sale prices are more frequent for houses built after 1950.

4. Describe the relationship between 'Size of Living Area' and 'Sale Price'.

- There is a positive correlation between Size of Living Area and Sale Price. As the size of the living area increases, the sale price also tends to increase. This relationship is indicated by the upward trend in the scatter plot between these two variables.