Methods:

Our main goal is to determine whether there is a relationship between the prevalence of obesity and the number of MPX-infected cases and fatalities worldwide. If there is, we will examine modeling the relationship between the MPX cases and deaths (dependent variables) and the prevalence of obesity (independent variable). The most popular method for determining the statistical link between two variables, which effectively gauges the strength of (linear) association, is to compute the correlation coefficient.

To model the association between the cases/deaths and obesity, we will also consider linear regression analysis. The cases/deaths are the dependent variable in the current study, while the obesity rate is the independent variable. The amount of variation in the dependent variable that the model can account for is measured by the coefficient of determination (R2). The value of R2 always rises as the number of regressors does. Instead of considering the number of explanatory variables in the model, adjusted R2 is utilized as a relevant indicator of how well the model fits the data. All data analysis has been computed using the R programming language.

Table 1: Top 10 total MPX cases and obesity rate of that countries.

|  |  |  |
| --- | --- | --- |
| Location of highest MPX cases (Top 10) | Total cases (27 Jan 2023) | Obesity rate (%) |
| United States (US) | 29887 | 36.20 |
| Brazil | 10715 | 22.10 |
| Spain | 7518 | 23.80 |
| France | 4128 | 21.60 |
| Colombia | 4066 | 22.30 |
| Mexico | 3768 | 28.90 |
| United Kingdom | 3735 | 27.80 |
| Peru | 3723 | 19.47 |
| Germany | 3692 | 22.30 |
| Canada | 1460 | 29.40 |

Among top 10 highest MPX cases countries, US had the highest (29887) cases in the world and the lowest among top 10 countries are in Canada (1460). By obesity rate, US also has the highest (36.20%) cases among top cases countries where lowest (29.40%) in Canada (table 1).

Table 2: Relation between top 10 MPX cases countries and world with obesity rate

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Top 10 | | | World (86 countries) | | |
|  | Estimate | 95% CI | P-value | Estimate | 95% CI | P-value |
| Total cases | 0.04% | 0.01% to 0.07% | 0.049 | 0.05% | 0.01% to 0.08% | 0.013 |
|  | Correlation Coefficient, r = 0.634 | | R-squared = 40.24% | Correlation Coefficient, r = 0.289 | | R-squared = 8.33% |

From Table 2, if obesity rate increases by 1%, the average total MPX cases increases in Top 10 and world by 0.04% and 0.05%, respectively. The model explained 40.24% and 8.33% of total variation respectively in top 20 countries and world. The Pearson’s correlation coefficient and scatter plot showed perfect positive linear relationship (r=0.634 and r=0.289) between total cases and obesity rate of top 10 and world MPX cases (table 2 and figure 1).

Table 3: Top 10 total MPX deaths and obesity rate of that countries.

|  |  |  |
| --- | --- | --- |
| Location of highest MPX deaths (Top 20) | Total cases (27 Jan 2023) | Obesity rate (%) |
| United States (US) | 26 | 36.20 |
| Brazil | 15 | 22.10 |
| Spain | 15 | 23.80 |
| France | 7 | 21.60 |
| Colombia | 4 | 22.30 |
| Mexico | 4 | 28.90 |
| United Kingdom | 3 | 27.80 |
| Peru | 3 | 19.47 |
| Germany | 2 | 22.30 |
| Canada | 2 | 29.40 |

The United States has the highest MPX deaths (21) and has 36.20% of the population obese. Argentina, Chile, and Ecuador have the lowest MPX deaths, two deaths each and has 28.30%, 28.00% and 19.90% of the population obese, respectively among top 10 highest deaths countries (table 3).

Table 4: Relation between top 10 MPX deaths countries and obesity rate of that countries

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Top 10 | | | | World (14 countries) | | | |
|  | Estimate | | 95% CI | P-value | Estimate | 95% CI | | P-value |
| Total cases | 0.41 | | -0.32 to 1.15 | 0.299 | 0.43 | -0.18 to 1.04 | | 0.191 |
|  | | Correlation Coefficient, r = 0.365 | | R-squared = 13.34% | Correlation Coefficient, r = 0.371 | | R-squared = 13.79% | |

From Table 4, if obesity rate increases by 1%, the average total MPX deaths increases by 0.365 times. The model explained 13.34% of total variation. The Pearson’s correlation coefficient and scatter plot showed perfect positive linear relationship (r=0.365) between total deaths and obesity rate of top 10 MPX deaths countries (table 4 and figure 1).

Figure 1: Scatter plot with regression line between total cases and deaths of MPX with obesity rate.

Graphical user interface, chart, scatter chart

Description automatically generated