Analyzing Mpox: Understanding Epidemiology, Public Health Impact, and Mitigation Strategies
Name: Christian Ramirez-Flores

Dataset name:

2022-24 Mpox(Monkeypox) Outbreak: Global Trends by WHO
https://worldhealthorg.shinyapps.io/mpx_global/#1_Overview

Data Profile: Steps used to clean and organize your data
Duplicate and multipile values under"total_confirmed_cases"
Country and "who_region"
- Geographical areas, but who_region is grouped by WHO.
"iso3" ISO 3166-1 Country Code published by the International Organization for
Standardization (ISO)

Data Wrangling: Steps used to clean and organize your data
This data is already usable except "Column E"
I'll just be using the max number in "total_confirmed_cases" for each ISO3

Size: 734KB

Source: WHO(World Health Organization)

Data Table Schema:

Field	Type	Description
country	String	Country of case entry
iso3	String	ISO 3166-1 Country Code
who_region	String	"Who Regions" A total of six regions; while they are based on geographical terms, are not synonymous with geographical areas.
date	Date/Time	Date of entry
total_confirmed_cases	Integer	Summed amount of total confirmed cases

total_probable_cases	Integer	Summed amount of total probable cases
new_confirmed_cases	Integer	Count of new confirmed cases
new_probable_cases	Integer	Count of new probable cases
total_deaths	Integer	Summed amount of total deaths
new_deaths	Integer	Count of new death entry

Exporatory Data Analysis

Analyzing Mpox: Understanding Epidemiology, Public Health Impact, and Mitigation Strategies

Name: Christian Ramirez-Flores

General Dataset Information:

File Name: mpox cases by country as of 31 august 2024.csv

Description: Information on mpox cases, test result, iso3, and test date entry.

Size: 734KB

Source: World Health Organization (WHO) - Link to source

Problem Statement:

Monkeypox, which was previously rare and mostly confined to specific regions, has recently seen an increase in cases and spread to new areas. This emergence presents a challenge for public health systems that are not fully prepared for a disease that was once considered uncommon. I will evaluate confirmed cases from 2022 and compare them to confirmed cases from 2024 because there was a mild epidemic in that year.

Understanding the Problem and the Data
- *What is the primary health objective in controlling the spread of monkeypox?*

The main objective is to reduce transmission, prevent outbreaks, and limit the severity of illness throughout vaccination, public education, and improved healthcare responses.

- *What specific variable (e.g., age, symptoms, vaccnination status, geographic region) are critical in understanding monkeypox transmission and outcomes?*

   Key variable include age, geographic region, vaccination status, symptoms, exposure history, and comorbidities. These help identify at-risk populations and progression of the disease.

- *What types of data (numerical, categorical, textual) are most important for tracking and analyzing monkeypox cases?*

   The critical data types are numerical data (case counts, mortality rates), categorical data (symptoms, vaccination status), and geographic data (outbreak regions, travel history).

- *What are the key data quality issues, such as underreporting or misdiagnosis, that may affect the accuracy of monkeypox statistics?*

   Common issues include underreporting due to mis diagnosis or lack of access to healthcare, delayed diagnosis, and inconsistent reporting across regions or health systems.

- *How do socioeconomic and demographic factors influence the transmission, treatment, and prevention of monkeypox in affected populations?*

   Socioeconomic factors such as access to healthcare, income levels, and urban vs. rural settings can affect both the spread and treatment of monkeypox. Demogrpahic facotrs like age, gender, and social behaviors also influence vulnerability and outcomes.

Training and Testing data

Data that I've been able to collect is directly from WHO which makes it more reliable and a trusting source. As far as testing the data all of the data is accurate up to August 31st of 2024. The [WHO website](#) is updated my month which will give you more results if you're extracting after September 2024.

Wrangle, prepare, cleanse the data

This data is very organized but there are duplicate values under "total_confirmed_cases". Just by wrangling the max from each "iso3" you're able to view the total number of cases. Specifically by making a pivot table and getting the max count for all countries.

Analyze, identify patterns, and explore the data.

Under "total_confirmed_cases" the value is added from the "new_confirmed_cases" and carried until the end count for that country.

Model, predict and solve the problem.

<u>*Modeling:*</u> There is a section in my dashboard explaining the two strains and their history.
<u>*Solving the problem:*</u>

Vaccination Campaigns

  Considering that West Africa and Central Africa are the two countries known to be the endemic source for both strains of mpox it'd be a wise investment for nations or the government to enable "Vaccination Campaigns" for these two areas specifically as it'll reduce the outgoing transmission.

- Explain the vaccine and who is recommended to get the dose.
- Here is the vaccine website off the [WHO site](#) there is a visual

  Administer vaccines to high-risk groups (healthcare workers, individuals exposed to confirmed cases, LGBTQ+ communities, or those in affected areas). Vaccination is particularly effective when administered post-exposure to limit the spread.

Surveillance and Early Detection

  Focus on high-risk populations and regions, including places where mpox outbreaks have previously occurred. Along with this strengthen surveillance systems to quickly identify new cases. Use case reportin, contact tracing, and genomic sequencing to track the spread of the virus

International Cooperation

  Strengthen partnerships between countries to share data, resources, and research on mpox. Rapid sharing of information can prevent cross-border transmission. Ensure international availability of vaccines, treatments, and diagnostics, particularly in resource-limited settings.

Contact Tracing and Quarantine

  Identify and monitor individuals who have been in contact with infected patients to prevent firther spread. Digital tools can help track exposure and notify contacts in real-time. Provide resources for individuals under quarantine, such as housing, food, and mental health services, to ensure compliance.

There are more possible ways to prevent and/ or control an outbreak or a virus but these four are the most crucial to contain and treat a virus, more specifically *Mpox.*

Visualize, report, and present the problem solving steps and final solution.
  There are numerous dashboards that I've constructed to present the cases and other relevant data to my analysis. Constructed a data folio along with the numerous dashboards present my case to solve this ongoing issue.

Supply or submit the results.
  Will be constructing a whole page formatted like this but better revised to present

Conclusion:

Based on current records from WHO it'd be best to control the outbreak from the source and then follow through with countries that followup. Since the start of this outbreak in 2022 to August 2024 there have been a total of 106,310 confirmed cases throughout the whole world with the US, Brazil, and Spain being the top three countries with Democratic Republic of the Congo being fourth. It's safe to say that by using vaccination campaigns and other methods we are able to confine the number of cases and prevent further outbreaks. There have been measures put in place but increasing public awareness will additionally enhance the defense line towards this virus.