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Visualization Documantation

MALARIA DEATHS IN AFRICA

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Abstract

This project explores the impact of Malaria-carrying mosquitoes on people in African countries from 1990 to 2019. Focusing on Africa due to severe malaria issues, we examine how human activities, such as urbanization and agriculture, influence mosquito species. The goal is to gain insights into death rates, visually represent mortality in African countries, and raise awareness about malaria's dangers. The research informs governments, health professionals, and society about the environmental impact of our actions, aiming to enhance understanding of malaria risks and behavioral impacts.

Introduction

Malaria is a major health issue in Africa causing illness and death. Our visualizations clearly show this serious problem. As we explore the details in our data between 1990 and 2019 in Africa, it becomes clear that understanding how malaria affects people is not just important for dealing with the problem now but is also crucial for creating effective plans to reduce its harmful effects in the future.

Research question

What is the geographical distribution of malaria-related deaths in various regions of Africa? How have the trends in malaria-related deaths evolved over time in Africa?

Target

1. Public Health Professionals:

   Public health professionals are directly concerned with understanding the evolution of malaria-related deaths in Africa. Insights from this research can help them develop effective strategies to address the specific challenges posed by malaria.

2. Researchers and Academia:

   Researchers and academia can leverage the geographical patterns of malaria-related deaths in Africa to enhance their understanding of the disease's dynamics. The data can contribute to the body of knowledge in the fields of epidemiology.

3. Non-Governmental Organizations (NGOs):

   NGOs working on health-related issues, particularly malaria prevention, can benefit from understanding the relationship between human activities and the prevalence of mosquitoes in Africa.

Desired outcome

- Increased Awareness and informed Decision-Making:

  - To raise awareness about malaria's severity in African countries, emphasizing risks and promoting a deeper understanding of its impact. This information aids in making informed decisions for creating effective plans to combat malaria.

- Environmental Consciousness:

  - To make people more aware of how our actions impact the environment. Knowing this is important to encourage everyone to act responsibly and think about how we can keep nature in balance.

By reaching these goals, the project hopes to play a valuable part in the joint efforts to lessen the effects of malaria in Africa and encourage a lasting harmony between people and the environment.

Data Handling

Data Sources

Our project relies on detailed datasets from Kaggle. We picked four specific datasets, each giving us a close look at data specific to different countries. We also included data about how human actions impact different types of mosquitoes and the factors that affect their survival.

In our exploration of the dataset titled ‘Impacts of anthropization on mosquitoes’ from Kaggle, we went deep into the specifics of human influence on mosquito populations. Instead of relying on visualizations, we chose to work on a detailed table to transmit the information of this professional dataset.

Examine the project protocol for each visualization to gain a deeper understanding of metadata and data properties. Refer to the "References" section for the respective dataset URLs.

Data Pre-processing

Using the adaptability of Python, we utilized its capabilities to precisely shape the data for each visualization. This step was essential to make sure the data not only matched our project's focus on Africa but also allowed for a clear and meaningful presentation of our findings.

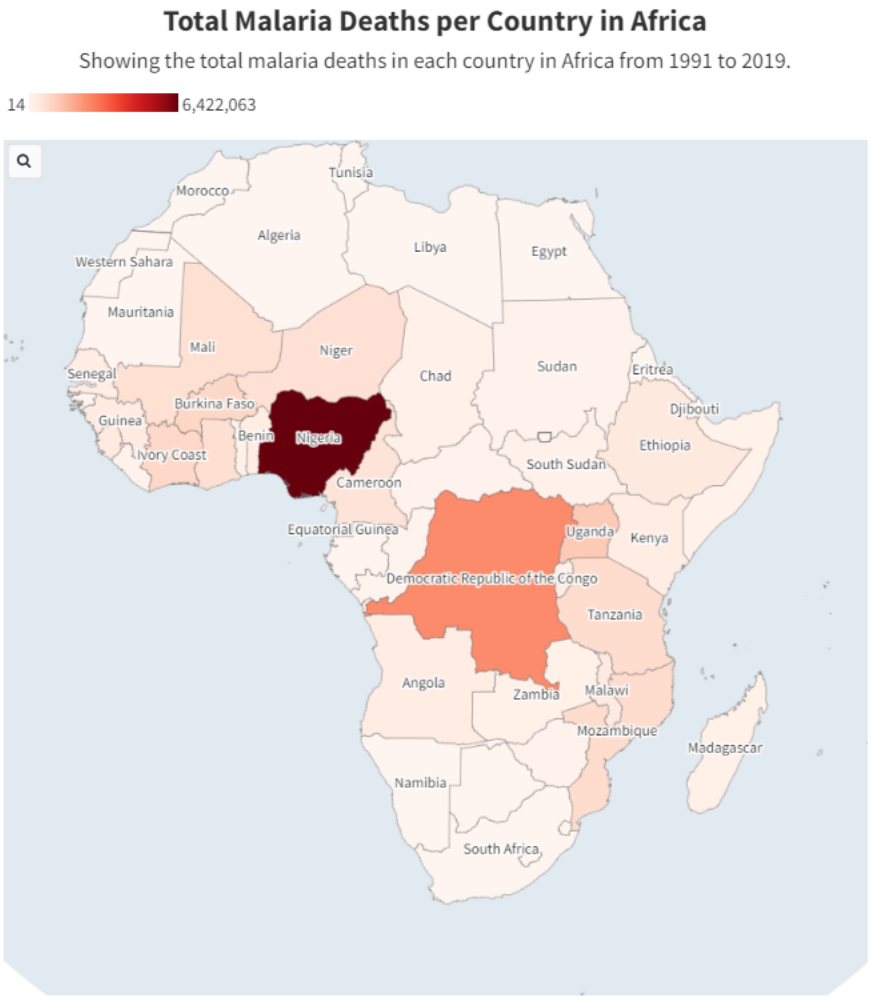
- **Country Selection:** Manually filter out non-African countries, as there is no dedicated continent column available in most of the datasets.
- **Ensuring Data Quality:** Ensuring the excellence of our data was a top priority for us. We started a detailed cleaning process to handle any weird or missing values in the data.
- **Strategic Data Grouping:** We arranged the information in specific ways that made it easier to see patterns and trends. This way of grouping helped us learn important things from the data and make the visualizations more informative.
- **Data Transformation for Visualization:** To make our data work well for visualizing, we made some changes as required. This even involved transposing the data when it made sense for our visualizations.

Data visualizations

Reviewing the visualizations gathered in this project:

First category:

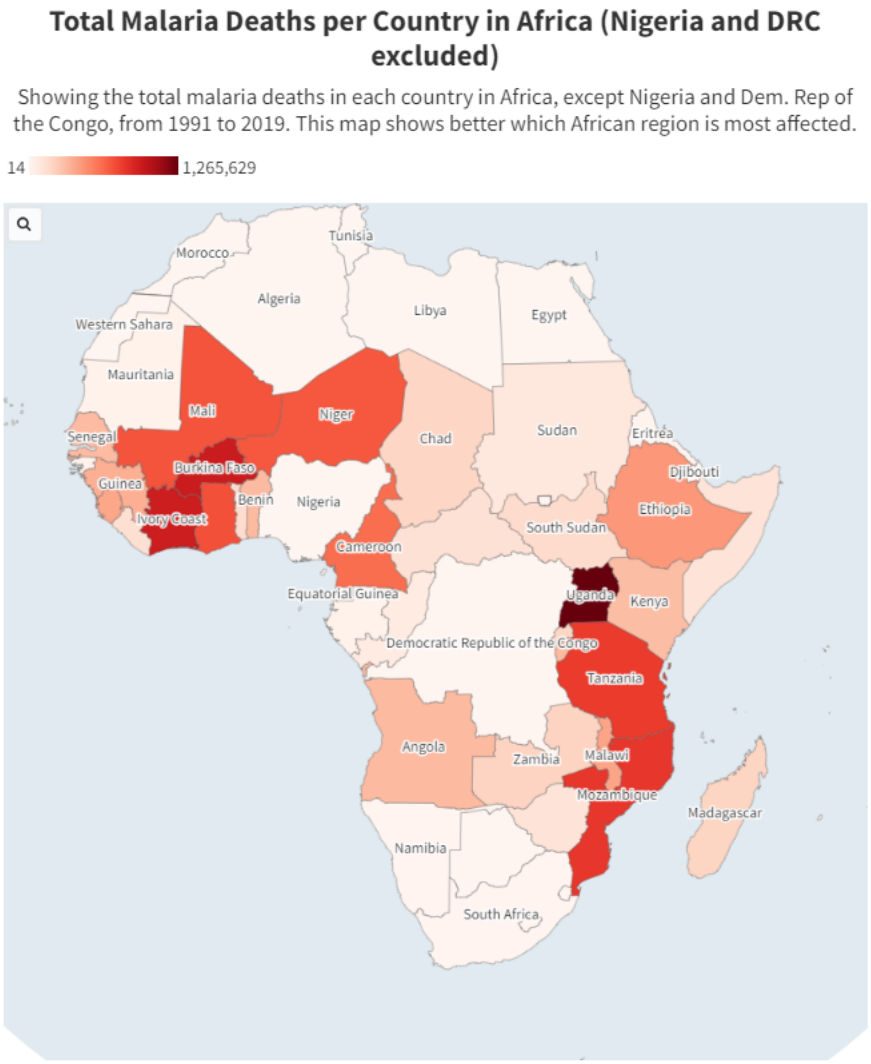
- Map of the total Malaria Deaths per Country in Africa:



Source: Malaria Dataset

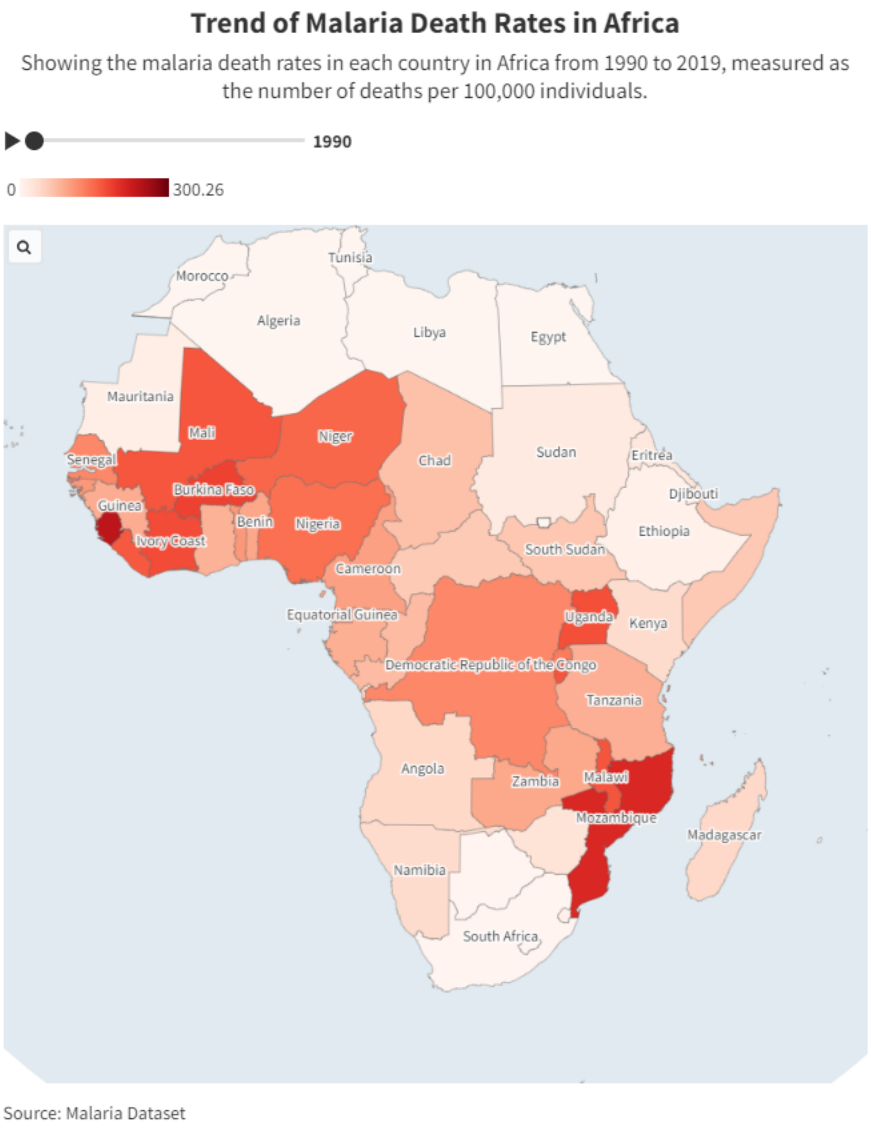
This map shows the total number of deaths from malaria in each African countries. The darkest spots, like Nigeria and the Democratic Republic of The Congo (DRC), show the places where the most deaths happened. As you can see, there aren't many deaths in other countries compared to Nigeria and the Democratic Republic of The Congo.

- Map of the total Malaria Deaths per Country in Africa (Nigeria and Democratic Republic of The Congo excluded):



By excluding Nigeria and the Democratic Republic of The Congo (DRC), this map provides a clearer picture of the malaria impact on other African countries. It allows for an easier comparison among countries that have fewer deaths than the two excluded nations. In this case, after Nigeria and the DRC, Uganda takes the lead, followed by Ivory Coast, Burkina Faso, Niger, Mali, Tanzania, and Mozambique.

- Trend of Malaria Death Rates in Africa:

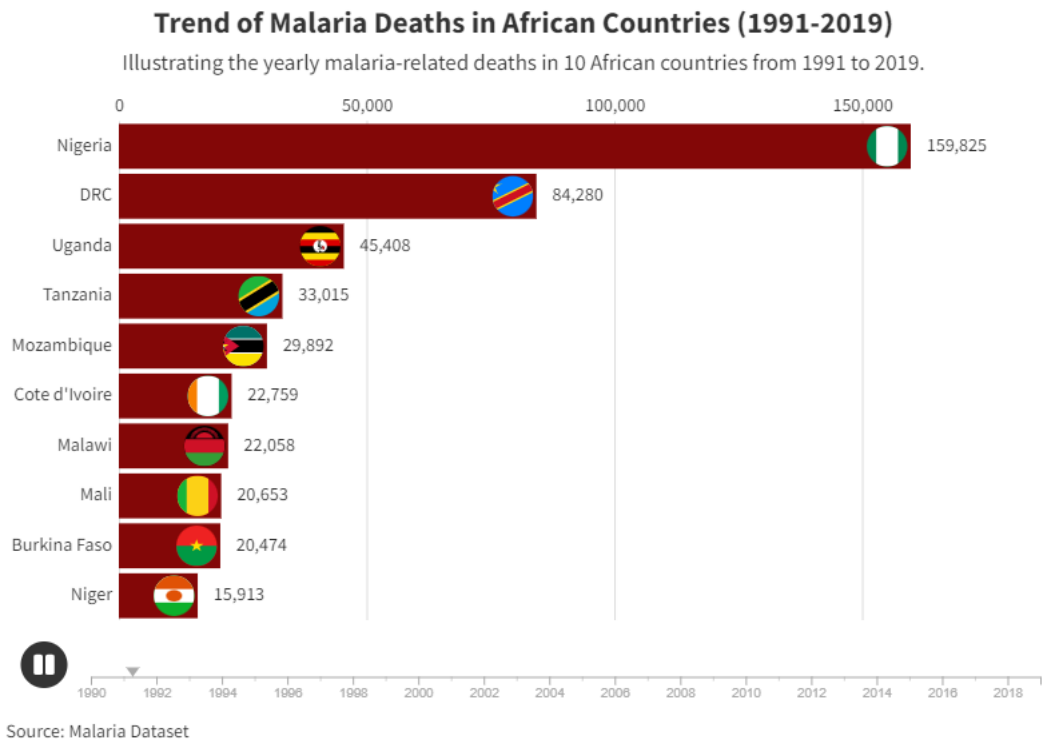


Source: Malaria Dataset

This map illustrates the death rate (deaths per 100,000 people) across African countries from 1990 to 2019. It provides a snapshot of the impact of malaria on each country's population during these years. Analyzing the timeline, Senegal experienced an increase in death rates from 1993 to 2000, followed by a decline due to subsequent efforts. Overall, death rates showed a decreasing trend from 2015 to 2019.

Second category:

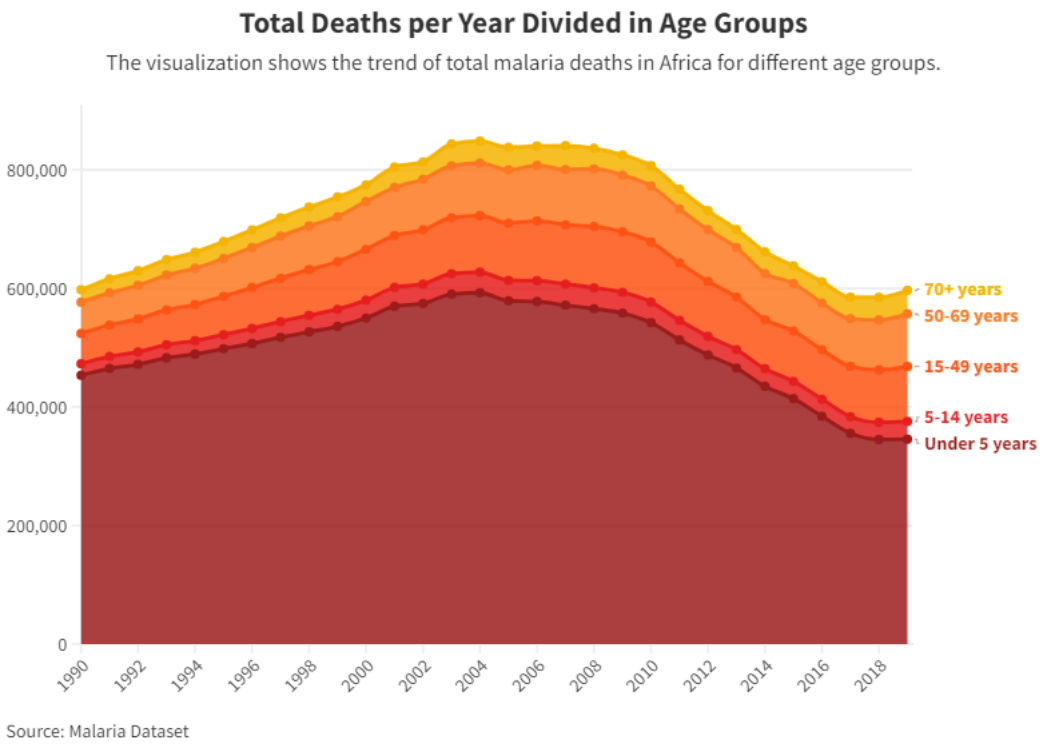
- Race chart of the trend of Malaria Deaths in African Countries (1991-2019):



This race chart shows yearly malaria-related deaths in the top 10 African countries from 1991 to 2019. Nigeria consistently held the highest position, with the Democratic Republic of the Congo following. Burkina Faso experienced a notable increase from 1997 to 2015, rising to the third position. The graph spans from 1990 to 2019, providing a snapshot of the evolving trends. Explore the dynamic graph for a comprehensive understanding beyond this momentary snapshot.

Third category:

- Area chart of the trend of Total Deaths per Year divided in Age Groups:



This area graph illustrates the changing total number of malaria deaths in Africa from 1990 to 2019, categorized by age groups. Notably, the 'Under 5 years' age group had the highest deaths, emphasizing the vulnerability of young children to malaria. While there was a peak in the early 2000s followed by a decline, the 'Under 5 years' category still experiences higher mortality. The age groups '5-14 years' and '50-69 years' follow in death rates, while '70+ years' and '5-14 years' exhibit similar, comparatively lower trends.

Interface design

The website uses a straightforward and user-friendly design. We decided to do a basic web layout without adding distracting colors or complex designs that might divert the reader's attention from the visualizations. The priority is simplicity, readability, and easy navigation. The first section of the website shows the title, subtitle, and authors, providing a clear introduction to the topic. The structure has an introductory section that gives insight into the project, followed by individual visualizations, each having a title, a brief description, the corresponding graph, and an explanation.

At the end, there is a concluding section that summarizes our findings. It is possible to download the datasets and protocols for each visualization if needed. The interface design emphasizes simplicity and readability. Shades of red are used to convey the severity and urgency of malaria deaths in Africa. Interactive buttons help organize visualizations within the same category and avoid lengthy pages.

The website is designed to be responsive and can effortlessly adjust to different screen sizes. To improve readability, we used simple and easily recognizable fonts. The overall goal of the interface design is to create a clear, accessible, and efficient platform for presenting the project's work while maintaining a user-centric approach.

Next steps

As we wrap up our study, our main goal is to share important information about this serious disease with as many people as possible.

- Solving Malaria in Africa:

  Our first aim is to start conversations and collaborations to find specific solutions for dealing with malaria in African countries.

- Going Global:

  Looking at our data, we also noticed that India is facing significant challenges with malaria. So, our next step is to broaden our research to look at the global picture.

- Sharing the Message:

  We're not just stopping at research. we want to actively share what we've found. This involves not only putting our results in well-read places but also, spreading awareness in simple ways, and participating in events where we can talk about our discoveries.

References

- **https://www.kaggle.com/datasets/programmerrdai/malaria**
- **Https://www.kaggle.com/datasets/mpwolke/cusersmarildownloadsgcbcsv**