# Evaluation of malaria incidence in Burundi and Senegal from 2017 to 2020

Groupe 4

African Institute for Mathematical Sciences, AIMS-Senegal

Supervised by Dr Rockfeller
from South Africa

October 31, 2024

# List of Students in Project

- Rokhaya Diop(took care of the design of the Beamer)
- Bankole Adédogni Arikè Rihanatou( interpretation of the graphs and comparisons of the results for the two datasets)
- Thiemokho Fall(Download the Senegal dataset and interpretation of Senegal graphs)
- Mbuyi Bidiku Chance Victor(preparation and analysis of the data)
- Kabura Fabrice ( Download the Burundi dataset and interpretation of Burundi graphs)

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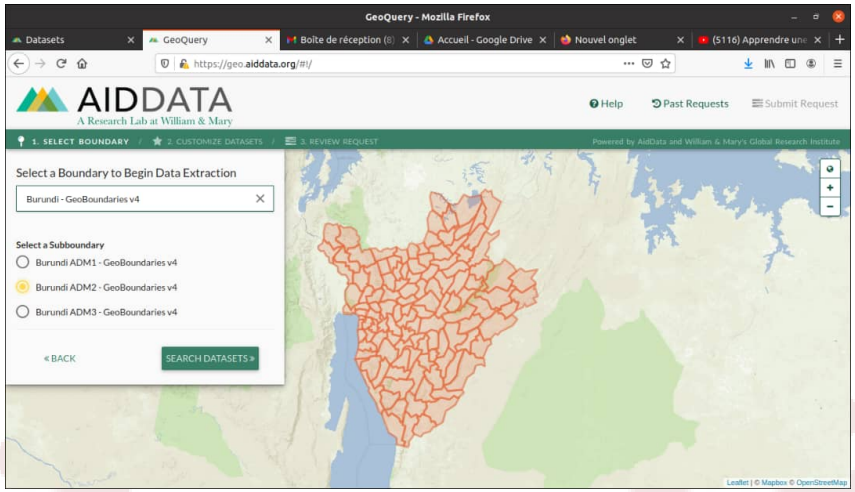
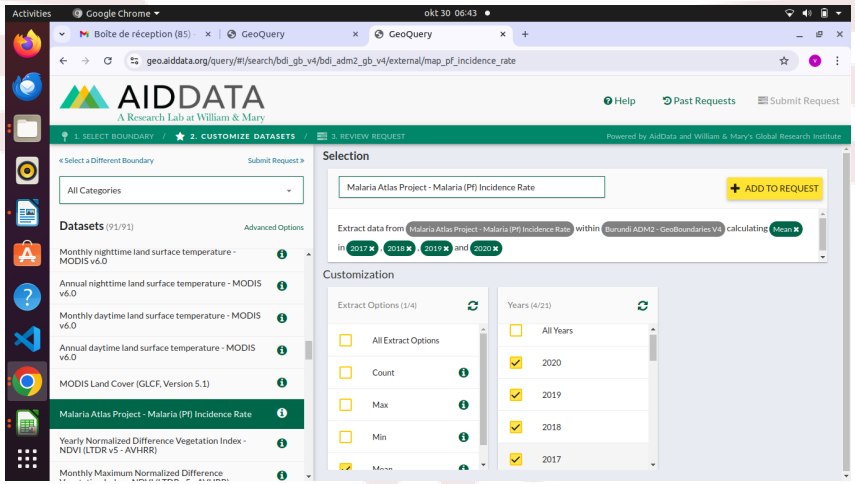
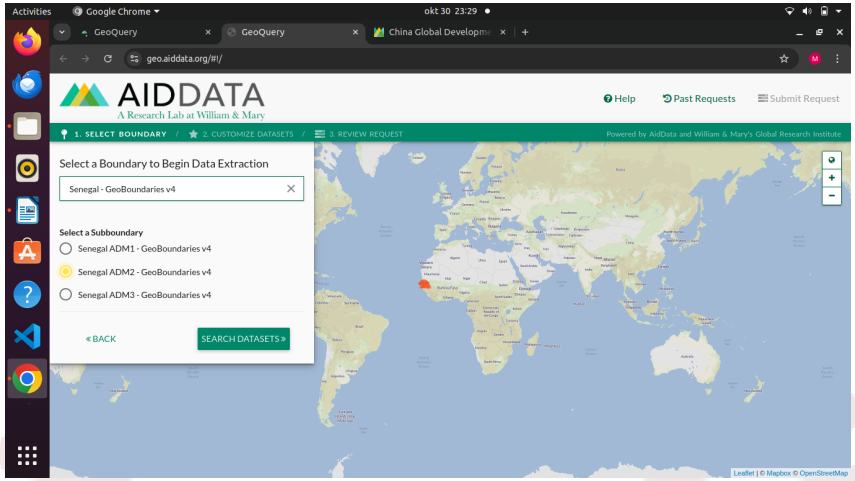
Malaria is a major cause of illness and death in sub-Saharan Africa, especially in low-income countries. Our data preprocessing project, focused on data from Senegal and Burundi. We aims to analyze malaria trends and disparities in order to make good decisions.

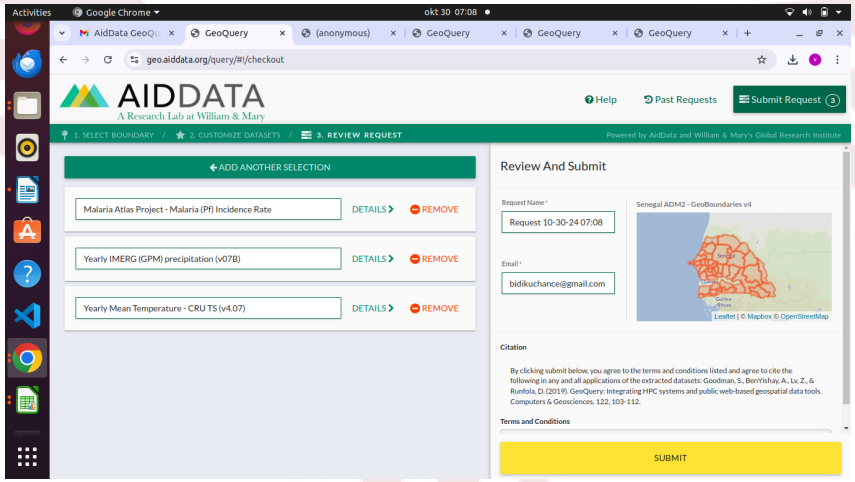
# Vector of Malaria

Figure: Mosquito


GeoQuery - Mozilla Firefox
AIDDATA
A Research Lab at William & Mary
Help
Past Requests
Submit Request
1. SELECT BOUNDARY
2. CUSTOMIZE DATASETS
3. REVIEW REQUEST
Select a Boundary to Begin Data Extraction
Burundi - GeoBoundaries v4
Select a Subboundary
Burundi ADM1 - GeoBoundaries v4
Burundi ADM2 - GeoBoundaries v4
Burundi ADM3 - GeoBoundaries v4
« BACK
SEARCH DATASETS »


AIDDATA
A Research Lab at William & Mary
Help
Past Requests
Submit Request
1. SELECT BOUNDARY
2. CUSTOMIZE DATASETS
3. REVIEW REQUEST
« Select a Different Boundary
Submit Request »
All Categories
Datasets (91/91)
Advanced Options
Monthly nighttime land surface temperature - MODIS v6.0
Annual nighttime land surface temperature - MODIS v6.0
Monthly daytime land surface temperature - MODIS v6.0
Annual daytime land surface temperature - MODIS v6.0
MODIS Land Cover (GLCF, Version 5.1)
Malaria Atlas Project - Malaria (Pf) Incidence Rate
Yearly Normalized Difference Vegetation Index - NDVI (LTDR v5 - AVHRR)
Selection
Malaria Atlas Project - Malaria (Pf) Incidence Rate
ADD TO REQUEST
Extract data from Malaria Atlas Project - Malaria (Pf) Incidence Rate within Burundi ADM2 - GeoBoundaries V4 calculating Mean
in 2017 2018 2019 and 2020
Customization
Extract Options (1/4)
All Extract Options
Count
Max
Min
Years (4/21)
All Years
2020
2019
2018
2017

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# Precipitations in Burundi

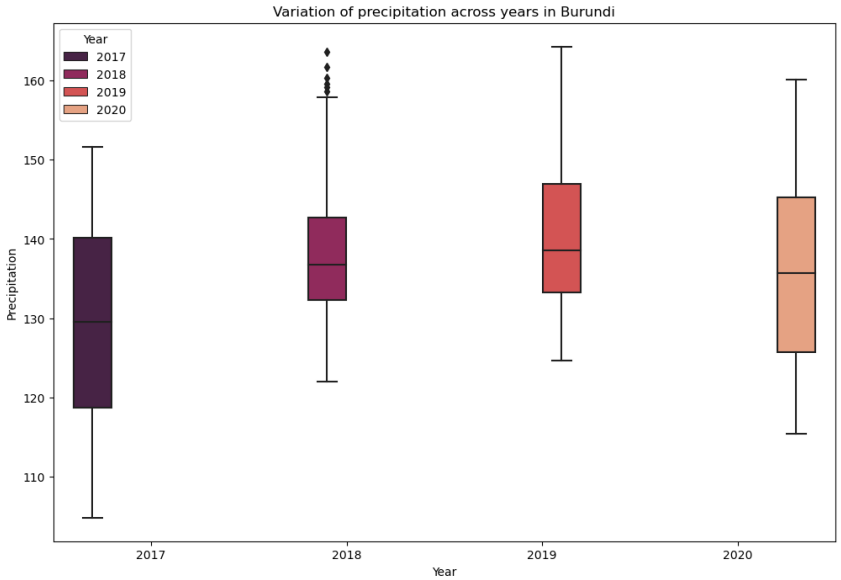


Figure: 1

This boxplot show the variation of precipitations across the years From this boxplot one can see that the mediane of precipitation is increasing as years are passing. In 2018 , we can see that we have some values that are out of the range of the remmain data points(outliers). It means that in 2018 the precipitation increase too much.So the higher the precipitation is the higher the malaria incidence will be in Burundi.

# Malaria incidence in Burundi

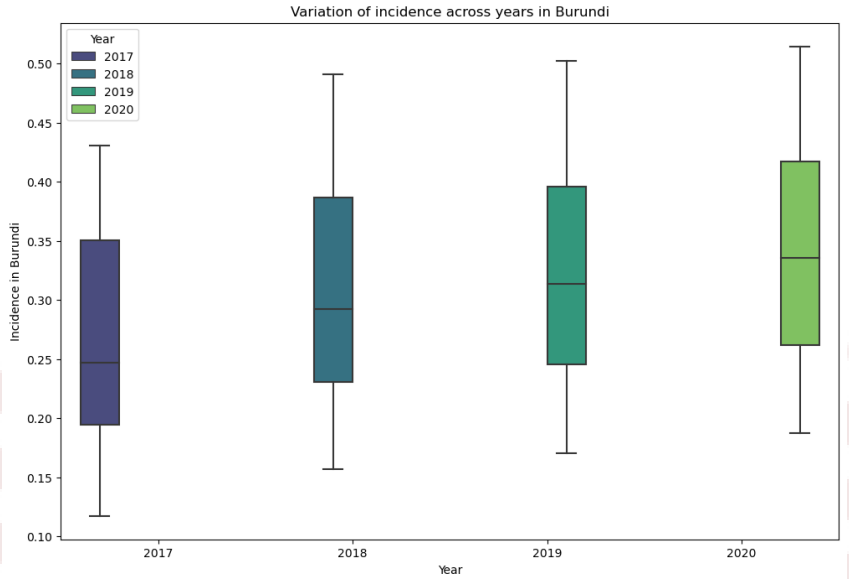


Figure: 2

This boxplot shows the distribution of incidence across years, From this plot one can notice that the median of malaria incidence go up as the years are passing So from 2017 to 2020 the incidence of malaria increase

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# Malaria incidence in Burundi

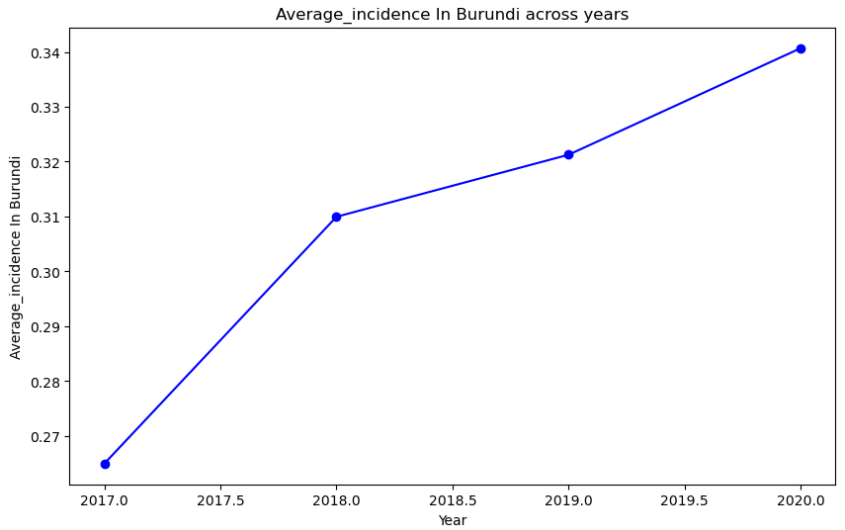


Figure: 3

This lineplot show the variation of malaria incidence across years, from this lineplot one can notice that as years are passing the incidence of malaria increase in Burundi.

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# Relationship between malaria incidence and precipitations in Burundi

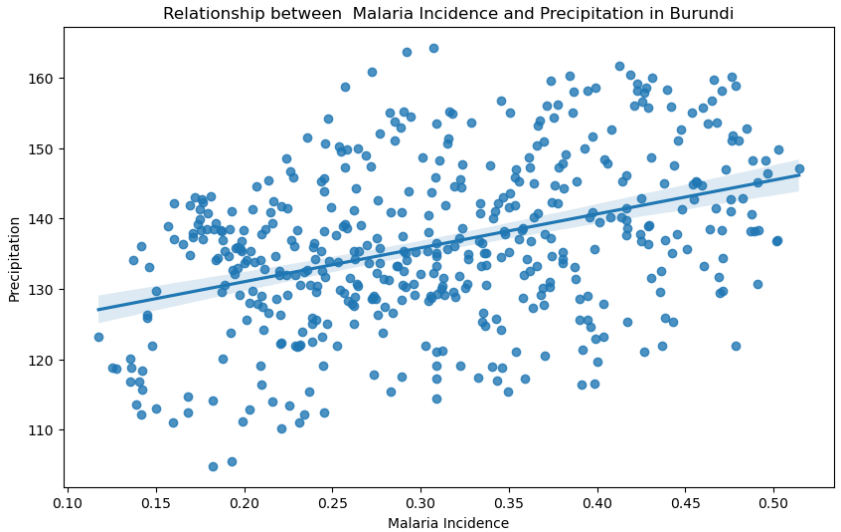


Figure: 4

This scatterplot shows us there is a linear relationship between malaria incidence and precipitation. As the precipitation increases the malaria incidence increase also. So one can advice to decisions makers to consider the precipitation among factors that can allow them to mitigate the increasing of malaria incidence rate for next years.

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# Relationship between malaria incidence and temperature in Burundi

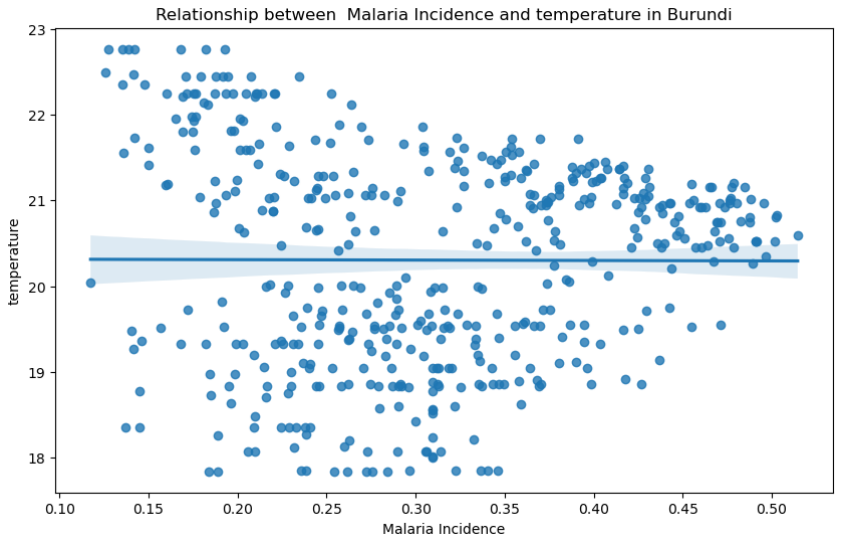


Figure: 5

This scatterplot shows the relationship between precipitation and malaria incidence in Burundi. From this plot , one can notice that there is a weak linear relationship between Malaria incidence.It means that we cannot use temperature as parameters to evaluate the malaria incidence rate in Burundi.

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# Precipitations in Senegal

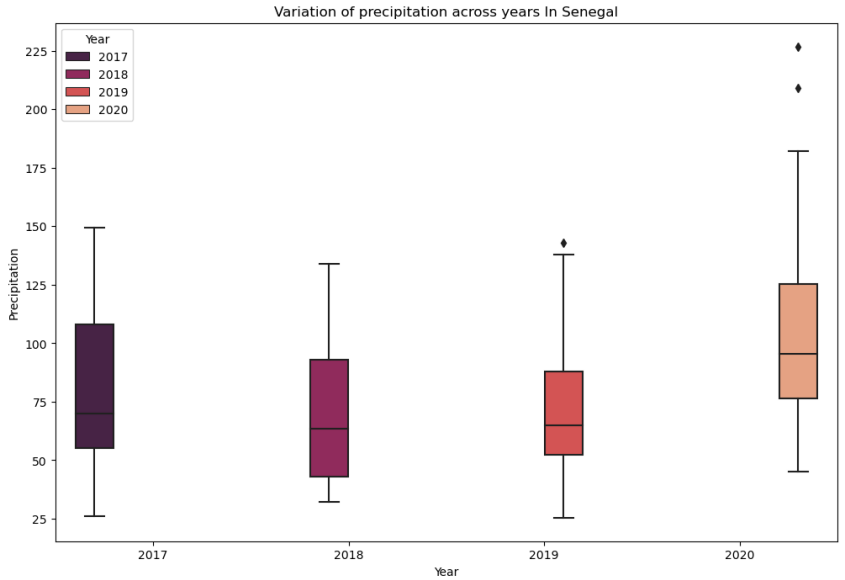


Figure: 6

This boxplot shows the distribution of precipiation from 2017 to 2020. From this boxplot, one can notice a decrease of the median of precipitation 2018 and 2019 while in 2020 it increase even more.

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# Malaria incidence in Senegal

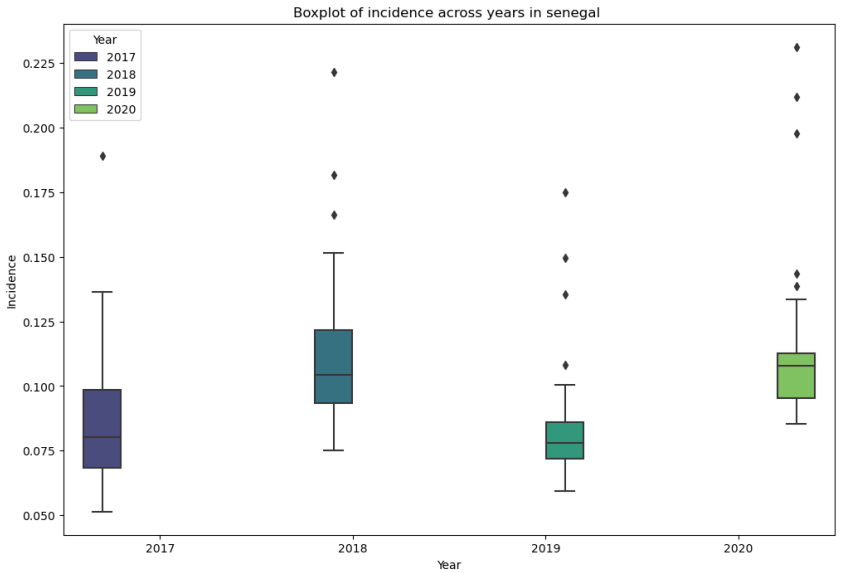


Figure: 7

This boxplot shows the distribution of malaria incidence from 2017 to 2020 in Senegal. One can notice that the median are not the same as years are passing. In 2018 the median increase, so the malaria incidence also increase, while in 2019 it decrease with, and increase again in 2020, from 2018 to 2020 we can notice some outliers after the maximum value of malaria incidence. These outliers indicates that in these years we have some extreme values of malaria incidence.This can also be due to precipitations variations during these years.

# Malaria incidence in Senegal

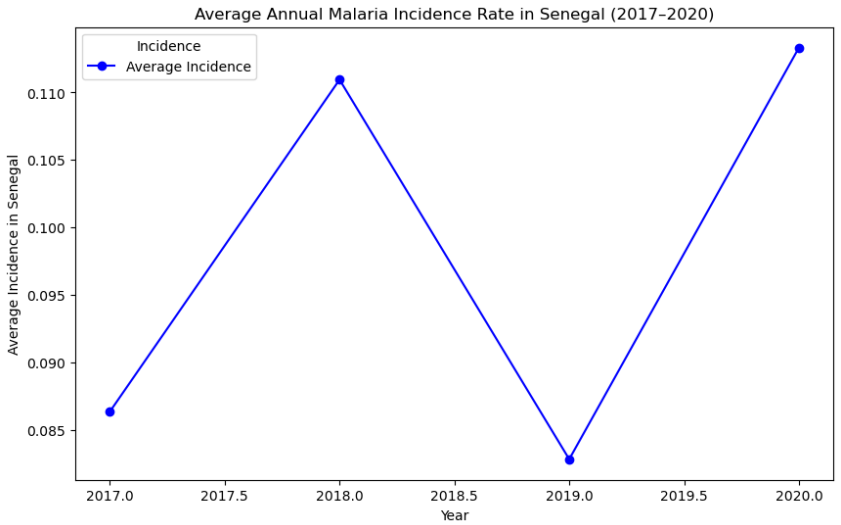


Figure: 8

This lineplot shows us the variation malaria incidence in Senegal. From this plot one can see that in 2017 the incidence of malaria increases,and it decreases in 2019 while it increase in 2020. So this draw attention to the fact that the actions put into place the malaria from 2017 to 2019 is not consistent efficient.

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# Relationship between malaria incidence and Precipitations in Senegal

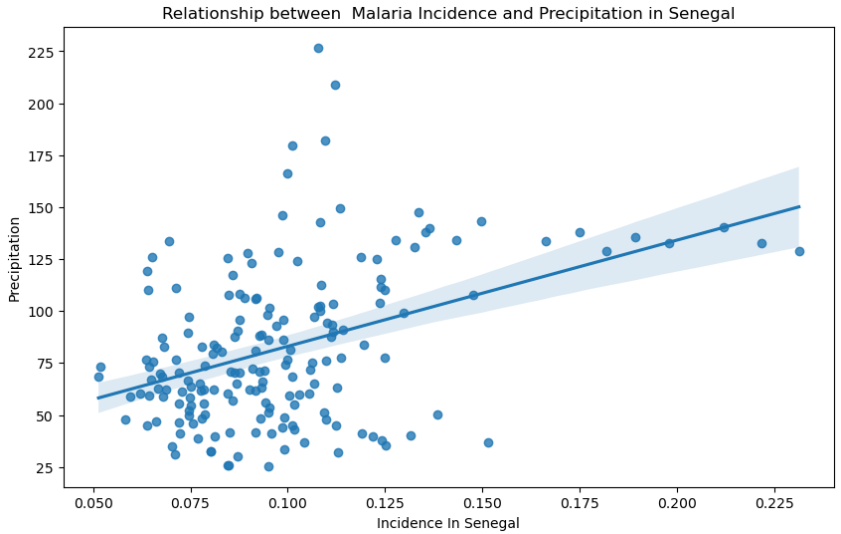


Figure: 9

This scatterplot shows the relationship between the precipitation and malaria Incidence in df Senegal.
From this scatterplot one can notice that there is positive linear relationship between precipitation and malaria incidence in Senegal. It means that as the precipitation is increasing the malaria incidence also increase.

# Relationship between malaria incidence and Temperature in Senegal

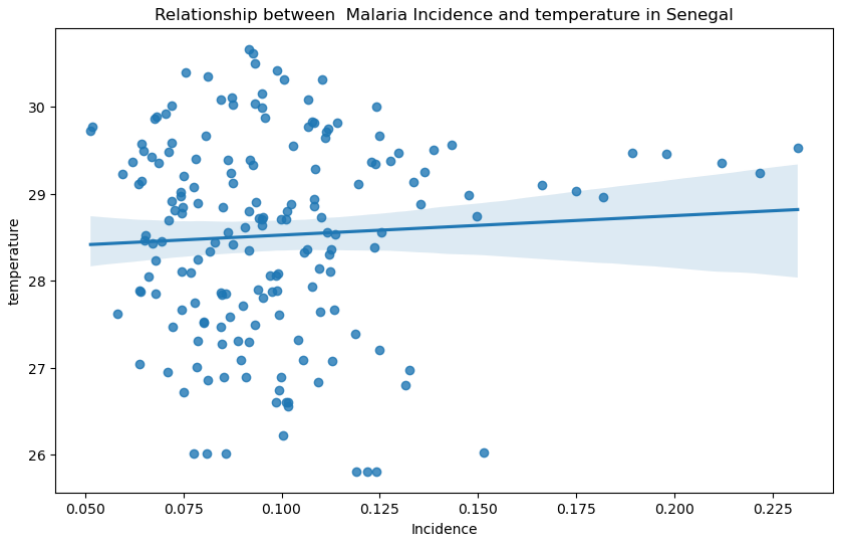


Figure: 10

This scatterplot shows the relationship between the temperature and malaria incidence in senegal. From this scatterplot one can notice that there is weak linear relationship between the temperature and malaria incidence.

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# Malaria incidence in Burundi and Senegal

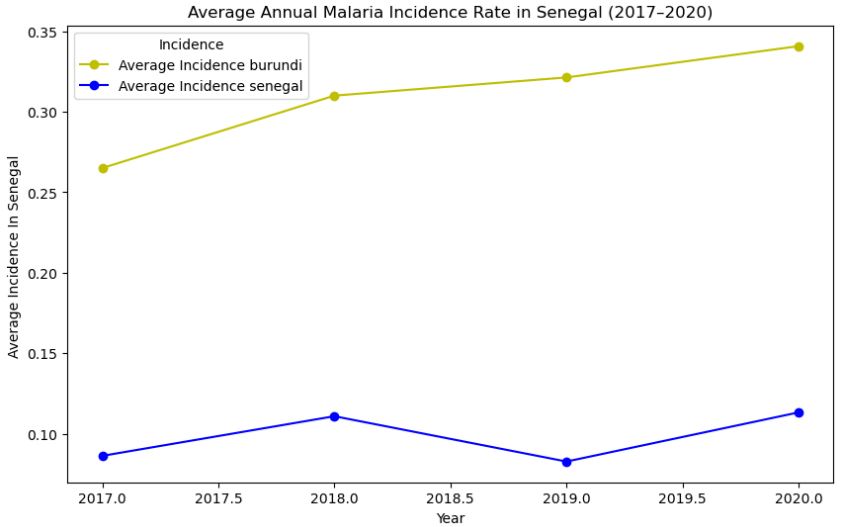


Figure: 11

This graphic shows the variation of Malaria incidence from 2017 to 2020 in Burundi and Senegal. From this graphic one can notice that the malaria incidence increase from 2017 to 2020 in Burundi while In senegal the malaria increase mostly in 2017 and 2020. One can notice that for both countries the malaria incidence rate increases in 2017 and 2020. This confirm that malaria is a public health and it urge that the decisions to mitigate this disease.

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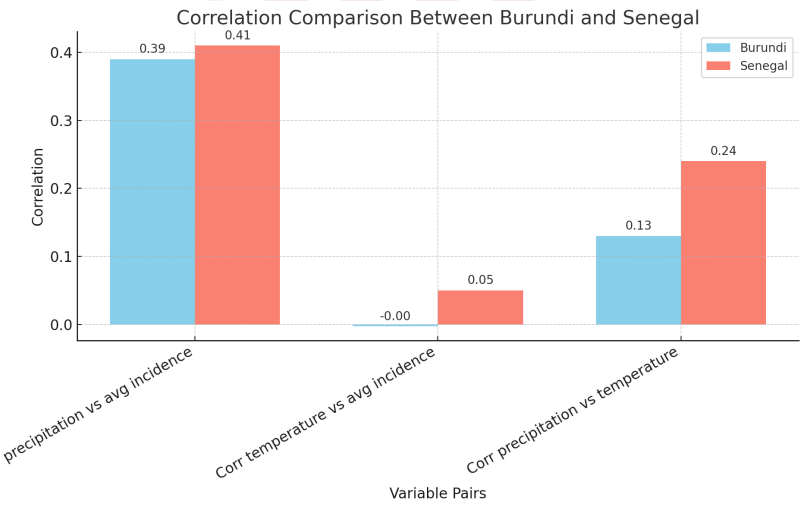
Correlation Comparison Between Burundi and Senegal
Burundi
Senegal
Correlation
0.0
0.1
0.2
0.3
0.4
0.39
0.41
-0.00
0.05
0.13
0.24
Corr precipitation vs avg incidence
Corr temperature vs avg incidence
Corr precipitation vs temperature
Variable Pairs

Figure: 1

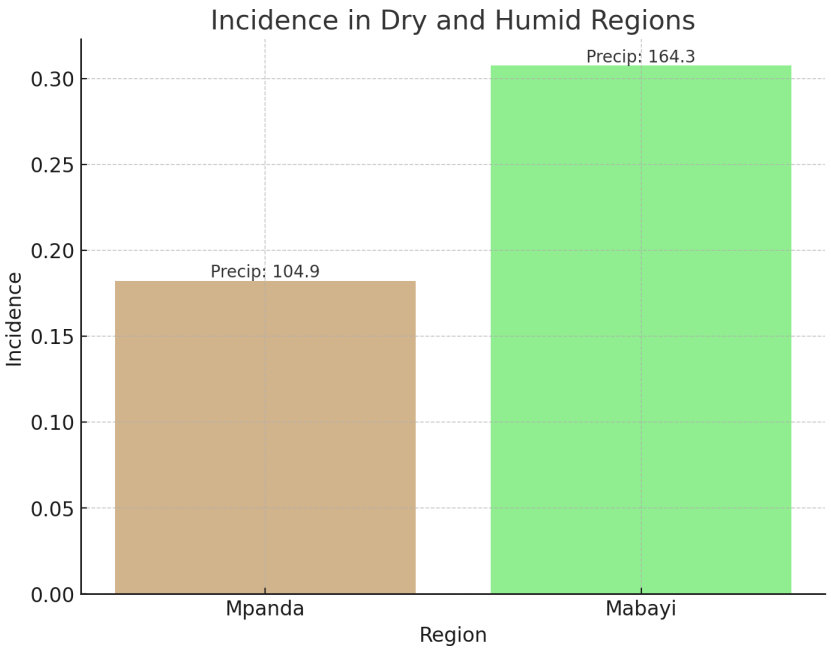
Incidence in Dry and Humid Regions
Precip: 164.3
Precip: 104.9
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Incidence
Mpanda
Mabayi
Region

Figure: 2

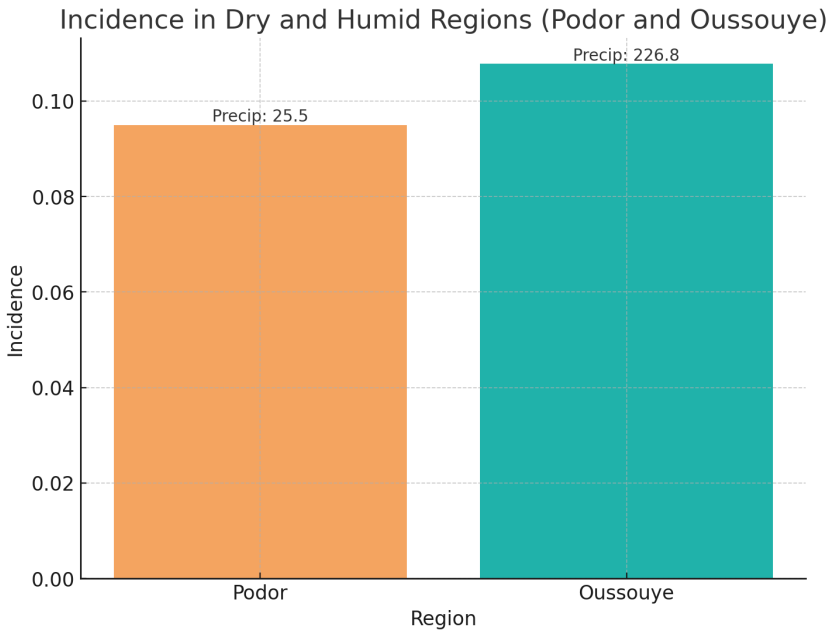
Incidence in Dry and Humid Regions (Podor and Oussouye)
Precip: 25.5
Precip: 226.8
0.10
0.08
0.06
0.04
0.02
0.00
Incidence
Podor
Oussouye
Region

Figure: 3