**Introduction:**

Malaria is a disease caused by a parasite. The parasite is spread to humans through the bites of infected mosquitoes.  Each year nearly 290 million people are infected with malaria, and more than 400,000 people die of the disease.

**Variable:**

 Malaria is an extremely climate-sensitive tropical disease. Each attribute is a factor that will decide weather there will be a malaria outbreak or not.

MaxTemp: Temperature is a deciding factor in malaria outbreak as the Plasmodium falciparum (which causes malaria) cannot complete its cycle in Anopheles mosquito when the temp is below 20 ° and hence it cannot transmit the disease.

MinTemp: The minimum temperature required for the parasite to complete its cycle is 20 °.

AvgHumidity: Humidity in the air plays an important role in the growth and transmission of malaria. The ideal humidity for most conducive conditions is at lest 60%.

Rainfall: when rain falls and there is standing water, mosquito breeding is extensive, and malaria infections become more prevalent. Hence rainfall is also an important factor to look for when predicting the outbreak.

Positive: These are the number is positive cases which will decide weather this is an outbreak of malaria.

PF: The malaria pf/pv test which helps in detection and differentiation of Plasmodium falciparum(pf) and vivax(pv) antigen in human blood sample.

Outbreak: This is a Boolean value which indicates if there is an outbreak or not.

**Temperature Patterns:**

The maximum temperatures range from 29 to 45 degrees Celsius, while the minimum temperatures range from 18 to 32 degrees Celsius. The average maximum temperature appears to be around 35 degrees Celsius, while the average minimum temperature is approximately 24 degrees Celsius. These temperature values suggest a moderate to hot climate overall.

**Insights:**

The occurrence of outbreaks appears to be somewhat frequent, with several instances marked as "Yes."

Higher maximum and minimum temperatures are associated with outbreak occurrences. This could indicate a potential correlation between warmer weather and the likelihood of an outbreak. However, further analysis would be required to establish a definitive relationship. The average rate of increase in positive cases per degree rise in minTemp is approximately 52.72%

Rainfall does not seem to have a direct correlation with outbreaks, as outbreaks occurred both on days with no rainfall and days with moderate to heavy rainfall.

The average rate of increase in positive cases per unit rise in pf values is approximately 230.59%.

The number of positive cases varies significantly across different days, suggesting fluctuations in disease prevalence or testing patterns.

**Interpreting the results:**

This fitted model shows that, as the number ofPlasmodium falciparum(pf) increase in the human blood the chances of him/her having malaria will increase. The pf and outbreak are strongly correlated with 0.75 coefficient.

The number of positive cases is a deciding factor. Number of cases and outbreak are strongly correlated with 0.72 coefficient. i.e. with increase in number of positive cases the chances of outbreak will increase significantly.

The Average humidity and outbreak are positively correlated with a coefficient of 0.41. The scattered plot below will show the the relationship accurately. When the average humidity is between 70 and 90 the outbreak is significantly higher.

The increase in rainfall above a certain point will decrease the chances of outbreak. When the temperature is above 13 the chances of an outbreak are significantly lower.

**Conclusion:**

* After analyzing the results and the data we can say that avgHumidity, rainfall, pf and positive are very tightly coupled with the outbreak.
* With pf and positive having the most impact

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