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USING SEMI AVERAGE METHOD FOR THE TREND OF MALARIA CASES IN NIGERIA

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Abstract

This paper examines the semi average methods to estimate the trend of malaria cases in Nigeria. Median of the semi average method was therefore employed to formulate the appropriate model for the malaria cases with respect to time and to know whether the trend of malaria is either increasing or decreasing for the period of 1990 to 2020. Trend analysis of the case of malaria reported which indicated that the rate of malaria reported cases is increasing as the year is moving gradually and the reported cases of malaria by 2030 will increase to 501.69 per 1000 population. Malaria is still increasing and causing big problem in the health of children and adult.

Keywords: Average methods, Median, Malaria

1.0 Introduction

Time series is a series of observation recorded over a period of time. The trends of a time series data can be obtained using the free hand method, Semi average methods, smoothing methods and the least squares method. In this study, semi average using the median method was considered to estimate the trend of malaria in Nigeria.

Several authors have written papers on various methods of the trends of a time series data .The work of [1] focuses on using simple exponential smoothing and simple moving average. The findings shows that the simple exponential smoothing generates a reliable forecast than the single moving average. Also, the findings of [2] revealed that the increase in output was largely due to expansion of harvested area (152%) while the interaction between area and yield effect declined production output by 45.8%. The article of [3] compares Box jenkin SARIMA and Holt-winter Exponential smoothing as a forecasting method for the frequency of rainfall in Umuahia. It was observed that Box jenkin SARIMA method is a better method for forecasting rainfall. In [4], the method of least squares and moving average in the trend estimation, seasonal variation and projecting trend. The findings revealed that the study area has high recorded cases of measles as from November to March which are usually characterized with severe heat.

2.0 Materials and Methods

The set of data is first partitioned into two equal or nearly halves. The middle observation is omitted in case of odd number of data. The median of each part is obtained by first arranging the values in ascending or descending order and then select the middle values in the distribution. The middle value and year of the first part is y_1 *and* x_1 respectively and the middle value and year of the second part is y_2 *and* x_2 respectively. The trend value are then obtained directly by using the least squares method.

The model of the partitioned data can be given as

$$y - y_1 = \frac{\Delta y}{\Delta x}(x - x_1) \quad (1)$$

Where $\Delta y = y_2 - y_1$ *and* $\Delta x = x_2 - x_1, b = \frac{\Delta y}{\Delta x} = slope, a = intercept$

$$y - y_1 = b(x - x_1) \quad (2)$$

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$y = (y_1 - bx_1) + bx$ (3)
$but\ a = (y_1 - bx_1)$
$y = a + bx$ (4)

3.0 Data Analysis

The secondary data for this work were extracted from the Annual reported cases of malaria of the World Health Organization portal through the National Health Insurance Scheme publication between year 1990 and 2020. Using the median method for the data obtained, it was observed that year 2005 is the middle year and therefore omitted

TIME SERIES PLOT OF MALARIA CASES

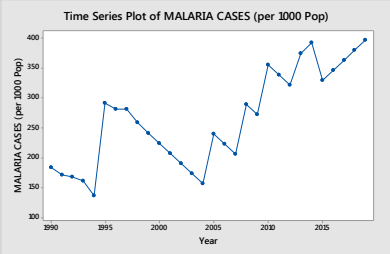

Fig. 1. , Time Series Plot
The plot shows that the rate of malaria cases is in sinusoidal movement and the trend form indicates the increase in yearly data of malaria cases.

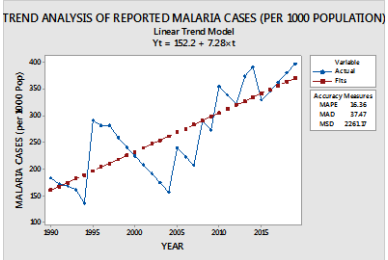

Fig. 2. Trend analysis plot for malaria cases (per 1000 population)
The plot indicates that the chart is in sinusoidal movement and in trend form.

3.1.1: Semi Median Average (Median)
$y_1 = 190.5\ (median\ part\ 1), x_1 = 2002 \qquad omitted\ year = 2005$
$y_2 = 346.1\ (median\ part\ 2), x_2 = 2016$
Recall from equation (1) that the model is $y = 190.5 + 11.114(X - 2002)$
$y - 190.5 = 11.114(x - 2002)$
The model is $y = 190.5 + 11.114(x - 2002)$
Table1: Forecast value of the estimate of reported Malaria cases in Nigeria per 1000 population

Period	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Forecast	401.67	412.78	423.89	435.01	446.12	457.24	468.35	479.46	490.58	501.69

4. Discussion of Results

The time series plot and the trend analysis plot for malaria cases shows that the rate of malaria cases is in sinusoidal movement and the trend form indicates the increase in yearly data of malaria cases. The model of $y = 190.5 + 11.114(x - 2002)$ was used to forecast the estimated values of malaria between the year 2021 and 2031.

5. Conclusion

This study uses the Semi average method (median) to formulate a model for the reported cases of malaria of the World Health Organization between 1990 and 2020. The formulated model was further use to forecast the estimated cases of Malaria between 2021 and 2021. It was observed that the reported malaria cases will increase to 501.69 per 1000 population in the year 2030.

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