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Maternal Mortality, Still Birth and Caesarian Operation in Northern Nigeria: a Case Study of Sir Yahaya Memorial Hospital Birnin Kebbi, Kebbi State - Nigeria

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Abstract

This paper set out to analyse the likelihood future trend of maternal mortality in Northern Nigeria and also to investigate if there exist relationships between cases of still birth, caesarean operation and maternal death in the study area. Trend analysis of time series data and correlation analysis were employed for the monthly data collected from Sir Yahaya Memorial Hospital Birnin Kebbi, a Premier Hospital in Kebbi state North western Nigeria. Three functional models one each for maternal mortality, still birth and caesarean operation were fitted to the collected data and forecast were made based on these models. Results obtained revealed a monthly estimate of 2 maternal death, 6 still birth and 8 cases of caesarean operation in the next 12 months which implies that the trio are likely going to be on the increase though more pronounced in cases of still birth and caesarean operation than maternal death if mitigating measures are not put in place. It was also observed that relationship exist between maternal death, still birth and caesarean operation. It is recommended that the relevant health agencies should sensitize pregnant women on the importance of antenatal care in order to detect and manage conditions during pregnancy that have the potential to lead to adverse maternal outcomes.

Keywords: *Maternal mortality, still birth, Caesarean operation, Trend Analysis, Correlation Analysis*

Background to the Study

In recent years, increasing attention has been paid to maternal mortality trends in developing countries, especially in the context of the United Nations Millennium Declaration. According to the United Nations maternal mortality estimation Inter agency group (2002), which consists of representatives from the World Health Organization (WHO), United Nations Children Fund (UNICEF), the United Nations population Fund (UNFPA), United Nations Population Division, the World Bank and world renowned academics, maternal death is "The death of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and size of the pregnancy from any cause related to or aggravated by pregnancy, the pregnancy or its management, but not from accidental or incidental causes. The definition recommended by World Health Organization (WHO) (2008) for international comparison for still births are babies born with no sign of life at or after 28 weeks of gestation.

A stillbirth is defined as the death of a baby in the weeks before birth, or during labour and birth. Cut-off points vary, with the World Health Organization (WHO) defining a stillbirth as the death of a baby at 28 weeks of pregnancy or later, while the UK normally defines stillbirth as a death at 24 weeks or later, and other high-income countries use a cut-off date of 22 weeks. In this paper, both definitions are used, with the WHO definition used for international comparisons. A stillbirth is one of the most common adverse outcomes of pregnancy. In the United States, a stillbirth occurs in nearly 1% (or 7 per 1000) of all births. As with most other adverse pregnancy outcomes, African American women have a greater (2-fold) risk of stillbirth than white women do. Stillbirth occur far more frequently in developing countries than developed countries, with rates as high as 90:1000 reported in some areas (Infant mortality, 1999).

Every minute a woman dies during labour or delivery. The highest maternal mortality rates are in Africa, with a lifetime risk of 1 in 16; the lowest rates are in Western nations (1:2800), with a global ratio of 400 maternal deaths per 100,000 live births. The main causes of death are postpartum hemorrhage (24%); indirect causes such as anemia, malaria, and heart disease (20%); infection (15%); unsafe abortion (13%); eclampsia (12%); obstructed labour (8%); and ectopic pregnancy, embolism, and anesthesia complications (8%). Forty-five percent of postpartum deaths occur within the first 24 hours and 66% occur during the first week. Of the estimated 211 million pregnancies, 46 million result in induced abortions. Sixty percent of these abortions are unsafe and cause 68,000 deaths annually (AbouZahr *et al,* 2004).

In many countries, especially the most developed ones, over the last several decades there has been a significant reduction in stillbirths. Much of this decrease has occurred in term or near-term stillbirths and is mostly due to improvements in medical care. Stillbirths are frequently categorized by presumed etiology. Important noninfectious causes of stillbirth include congenital anomalies, asphyxia related to preeclampsia, abruption placenta, and umbilical cord accidents. Maternal and fetal trauma, maternal obesity, low education, smoking, fetal growth restriction, advanced maternal age and diabetes mellitus are risk factors for stillbirth. More than half the cases of stillbirth are associated with or caused by one or more of these conditions. A smaller, but unknown, percentage of stillbirths may be caused by various types of maternal or fetal infections (Kunzel *et al*, 2006)

In 1987, the international Safe Motherhood Conference convened in Kenya. The conference raised global awareness of the devastating maternal mortality rates in developing nations and formally established the Safe Motherhood Initiative. The goal was to reduce maternal mortality 50% by the year 2000, and announce to the global community the plight of the pregnant woman. Initially, donors, United Nations (UN) agencies, and governments focused on 2 strategies to reduce maternal mortality: increasing antenatal care and training for traditional birth attendants. By the year 2000, the goal was far from realized. The global community reaffirmed its commitment in 2000, and the United Nations issued 8 Millennium Development Goals (MDG); the fifth goal (MDG-5) stipulated a reduction of the maternal mortality stipulated a reduction of the maternal mortality rate by 75% by 2015.

Statement of the problem

Maternal mortality is unacceptably high. About 800 women die from pregnancy-or childbirth related complications around the world every day. In 2013, 289,000 women died during and following pregnancy and childbirth. Almost all of these death occurred in low resource settings, and most could have been prevented (UNICEF, 2013).

One of the United Nations' Millennium Development Goals is to reduce maternal mortality rate by 75% by 2015. Causes of maternal mortality include postpartum hemorrhage, eclampsia, obstructed labour, and sepsis. Many developing nations lack adequate health care and family planning, and pregnant women have minimal access to skilled labour and emergency care. Basic emergency obstetric interventions, such as antibiotics, oxytocics, anticonvulsants, manual removal of placenta, and instrumented vaginal delivery, are vital to improve the chance of survival (martin *et al*, 2002).

Even though the government of the Republic of Nigeria has put in place several measures such as the National Health Insurance Scheme (NHIS), Free Child Delivery Program (FCDP) for pregnant women among other measures in order to meet the Millennium Development Goals (MDG's) on health, the problem of stillbirths continues to prevail in the country at still alarming rates.

Despite the efforts being made by the government and other non-governmental agencies to reduce or possibly eradicate stillbirths, the rate at which stillbirths continue to occur in the country has motivated the researcher to undertake this study with a view to ascertain the what the situation is in northern Nigeria using Kebbi state as a case study.

Objectives of the Study

The aim of the study is to study the pattern of maternal death in the light of still birth and caesarean operation at Sir Yahaya memorial hospital Birnin Kebbi, Kebbi state in order to observe the trend pattern of maternal death in the study area with a view to make future forecasts. To achieve these, the following objectives are formulated:

i. To assess the rate of maternal mortality and stillbirth in the study area
ii. To ascertain if there is any relationship between maternal death, caesarean operation and stillbirth in the study area.
iii. To develop trend line models that can be used to forecast maternal death, stillbirth and cesarean operation in the study area

Scope and limitation of the Study

This research work is intended to analyze secondary data on the rate of cesarean operation, stillbirth and maternal death in the study area and to forecast future trend. The analysis and interpretation of the data for this study is limited to Sir Yahaya Memorial Hospital Birnin-Kebbi, Kebbi state for a period of 5yrs i.e. between January, 2011 and December, 2015.

Materials and Methods

The data contained the number of patients registered, number of normal delivery, cases of maternal death, cesarean operation and stillbirth in the study area. The preliminary steps of the editing, coding and tabulating of the data were done. The data were sorted into five different tables, table1 showing the monthly record of patients registration for a period of 5 years, table 2 shows the number of normal delivery, table 3 depicts monthly cases of maternal death, table 4 monthly cases of still birth and table 5 shows monthly record of cesarean operation.

To analyze the data, two statistical tools namely: time series analysis and correlation analysis were used. The results of these analyses were obtained using a statistical software package MINITAB for windows for accuracy and consistency. The method of least squares was used to fit linear trend models to the data as well as make forecasts. The Pearson coefficient of linear correlation on the other hand was used to measure the degree and direction of relationship between the variables.

For the time series data, unit root test was performed to test for stationarity. The graph of the data, Auguemented Dickey- Fuller test and KPSS test were run on the data to determine whether it contains unit root or not. Thereafter, the Autocorrelation function (ACF) and the partial Autocorrelation function (PACF) were also obtained. At 5% level of significance, it was observed that the data was not stationary and therefore the original data was transformed by taking the first difference after which the procedure was repeated on the transformed data set. The result of these revealed that the data became stationary after taking the first difference. This was then used to fit linear trend models for forecasting.

Results and Interpretation

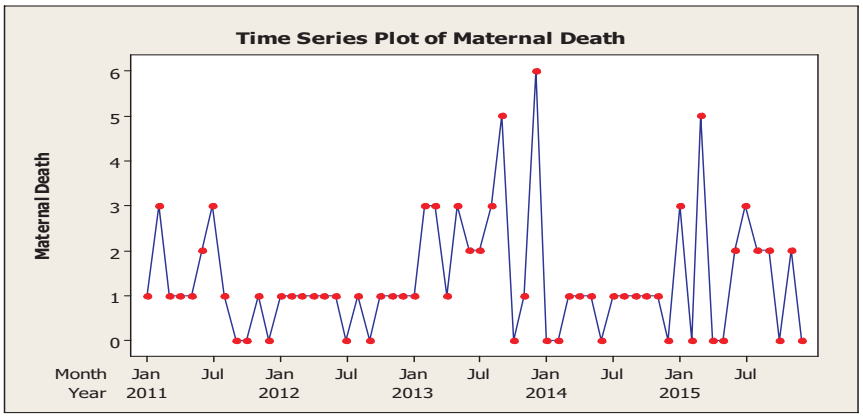


Figure 1: *Time series plot of Recorded cases of Maternal Death at Sir Yahaya Memorial Hospital B/Kebbi (Jan.2011-Dec 2015)*

Trend Analysis for Maternal Death

Data: Maternal Death
Length: 60
N Missing: 0

Fitted Trend Equation: $Y_T = 1.215 + 0.00442*t$

Forecasts

Period	Forecast
61	1.48475
62	1.48916
63	1.49358
64	1.49800
65	1.50242
66	1.50684
67	1.51125
68	1.51567
69	1.52009
70	1.52451
71	1.52892
72	1.53334

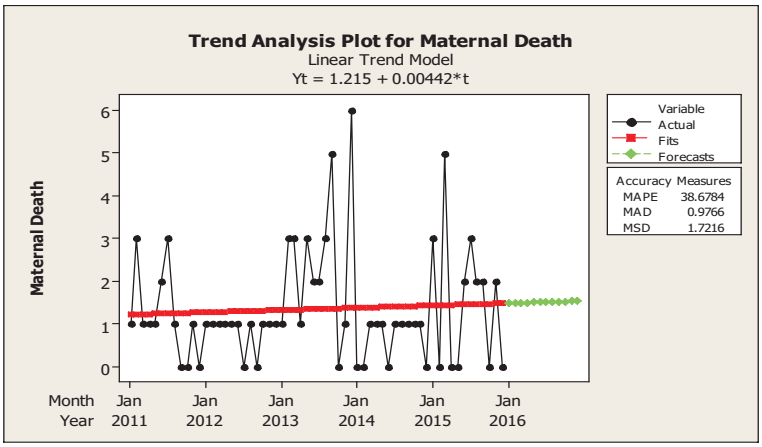


Figure 2: *Trend Analysis plot of Recorded cases of Maternal Death at Sir Yahaya Memorial Hospital B/Kebbi (Jan.2011-Dec 2015)*

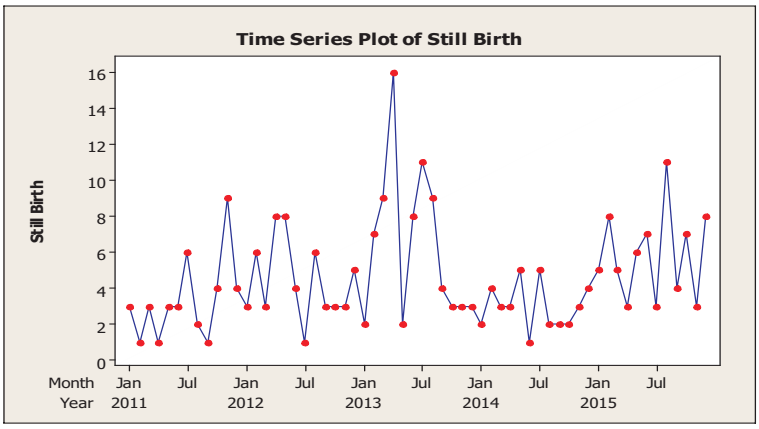


Figure 3: *Time series plot of Recorded cases of Still Birth at Sir Yahaya Memorial Hospital B/Kebbi (January 2011-December 2015)*

Trend Analysis for Still Birth

Data: Still Birth
Length: 60
N Missing:

Fitted Trend Equation: $Y_t = 3.758 + 0.0276*t$

Forecasts

Period	Forecast
61	5.44237
62	5.46999
63	5.49761
64	5.52523
65	5.55285
66	5.58047
67	5.60809
68	5.63570
69	5.66332
70	5.69094
71	5.71856
72	5.74618

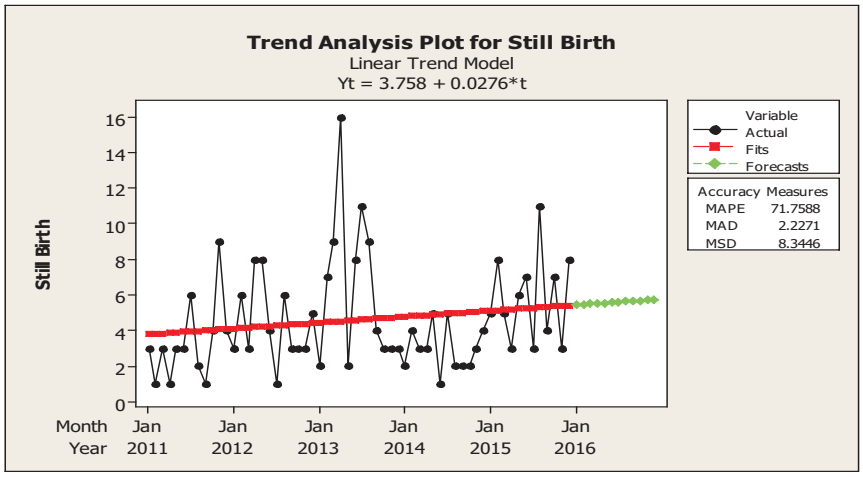
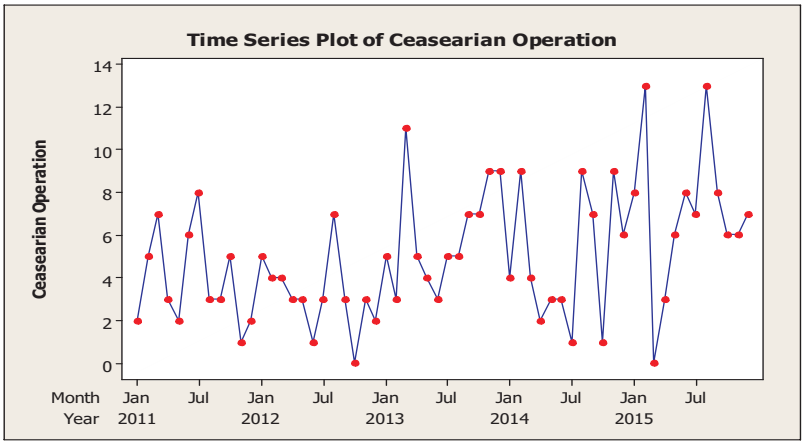


Figure 4: *Trend Analysis plot of Recorded cases of Still Birth at Sir Yahaya Memorial Hospital B/Kebbi (January 2011-December 2015)*



B/Kebbi (January 2011-December 2015)

Trend Analysis for Caesarean Operation

Data: Caesarean Operation
Length: 60
N Missing: 0

Fitted Trend Equation: $Y_t = 3.031 + 0.0651*t$

Forecasts

Period	Forecast
61	7.00226
62	7.06736
63	7.13246
64	7.19756
65	7.26267
66	7.32777

67	7.39287
68	7.45797
69	7.52307
70	7.58817
71	7.65327
72	7.71838

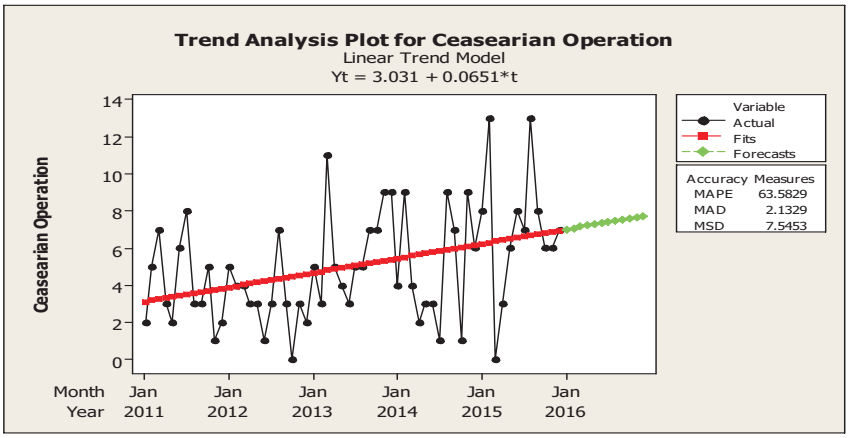


Figure 6: Trend Analysis plot of Recorded cases of Caesarean Operation at Sir Yahaya Memorial Hospital B/Kebbi (January 2011-December 2015)

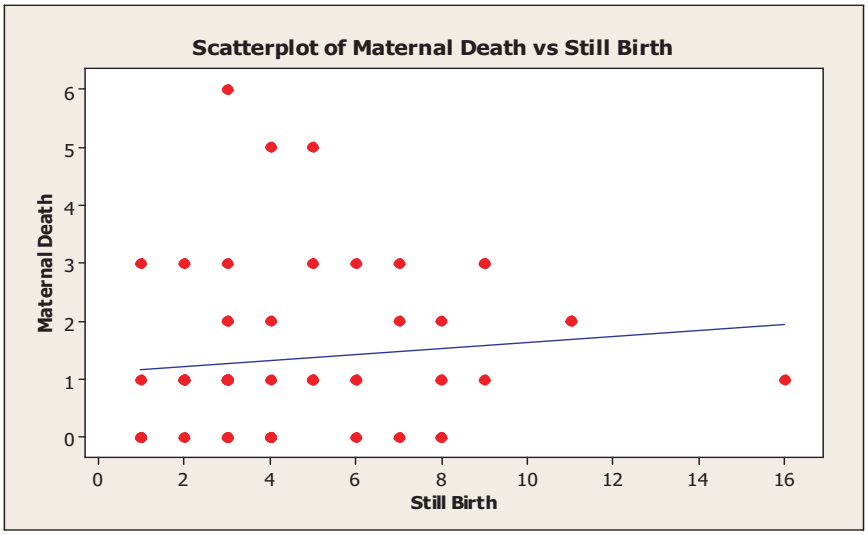


Figure 7: Scatter plot of Maternal Death VS. Still Birth at Sir Yahaya Memorial Hospital Birnin Kebbi

Correlations: Maternal Death VS. Still Birth

Pearson correlation of Maternal Death and Still Birth = 0.114
P-Value = 0.384

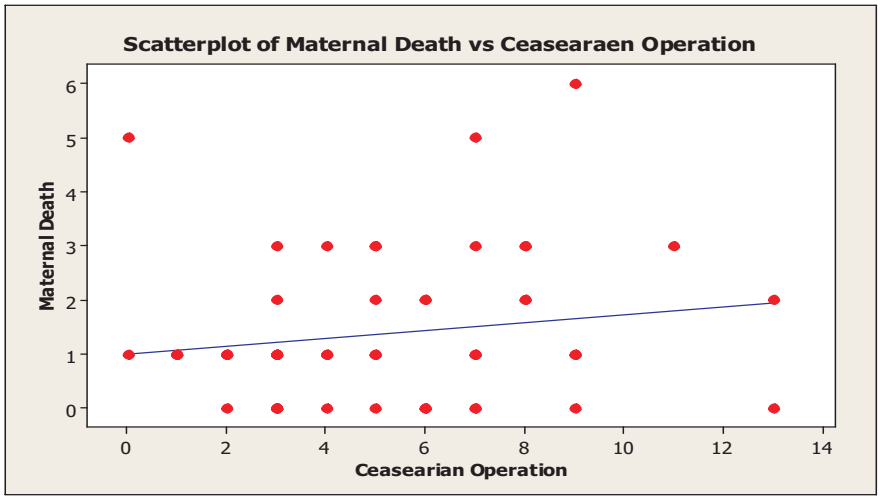


Figure 8: Scatter plot of Maternal Death VS. Cesarean Operation at Sir Yahaya Memorial Hospital Birnin Kebbi

Correlations: Maternal Death, Caesarean Operation

Pearson correlation of Maternal Death and Caesarean Operation = 0.165

P-Value = 0.208

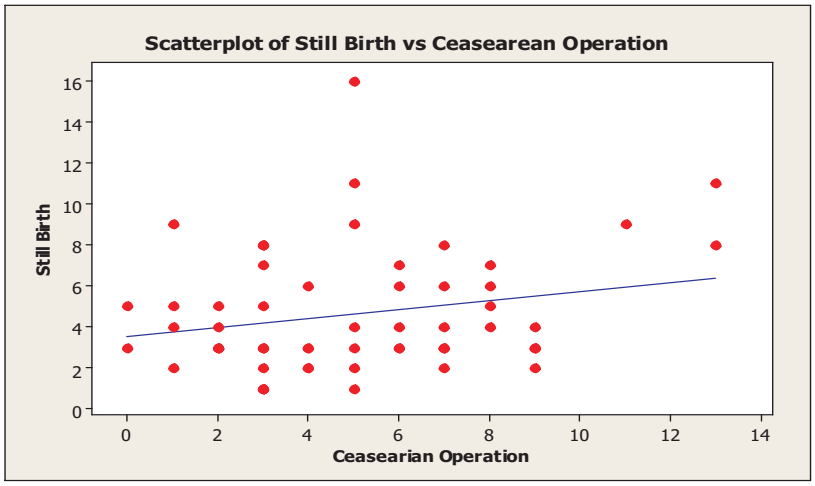


Figure 9: Scatter plot of Still Birth VS. Cesarean Operation at Sir Yahaya Memorial Hospital Birnin Kebbi

Correlations: Still Birth, Caesarean Operation

Pearson correlation of Still Birth and Caesarean Operation = 0.223

P-Value = 0.087

Interpretation of Results

3 linear trend models one each for maternal death, still birth and cesarean operation were fitted to the collected data to observe the trend pattern of each. Thereafter, the said models were used to forecast future cases of each of the three variables under consideration for the next twelve months (i.e. from January – December of 2016). Results obtained indicated that the 3 models adequately fit the data.

The forecast results based on these models indicated that for the next twelve months, all the three variables namely: Maternal death, still birth and caesarean operation will be on the increase although the increase is more pronounced for still birth and cesarean operation than the recorded cases of Maternal death. According to the forecast results there will be on the average 2 maternal death, 6 Still birth and 8 cesarean operations to be realized by December, 2016 as portrayed in figures 2, 4, and 6 respectively.

Furthermore, correlation analysis was run to determine the relationship if any between recorded cases of maternal death, still birth and caesarean operation for the period under study. Results obtained indicated a very weak positive correlation (there is only a possibility of correlation) between recorded cases of maternal death and still birth, maternal death and caesarean operation and still birth and caesarean operation as indicated by the scatter diagrams in figures 7, 8 and 9 with the correlation coefficients of 0.114, 0.165 and 0.223 respectively. However it was also observed that even though weak relationships exist between the variables, they all move in the same direction i.e. as one increases, others also increase.

Conclusion

Based on these results it can be concluded that the recorded cases of maternal death, still birth and caesarean operation will all be on the increase in the next twelve months in the study area if adequate mitigating measures are not put in place. Similarly the recorded cases of maternal death, still birth and cesarean operation all increase together even though only a very weak relationship exist between them for the period under consideration.

Recommendations

Based on the findings of this study, it is recommended that:

I. The efforts of various governmental and non-governmental organizations should be sustained to sensitize pregnant women on importance of ante-natal care in order to detect and manage conditions during pregnancy that have the potential to lead to adverse maternal outcomes.

II. The management of Sir Yahaya Memorial Hospital Birnin Kebbi and other public health agencies should engage the services of qualified and seasoned medical staff and the use of modern technological innovations in handling cases of cesarean operation, stillbirth and other delivery complicated issues.

III. Further research could be done by increasing the study area and also with affordability of more resources and time to be able to generalize the findings of this research.

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