

# **T**HE PREVALENCE AND TREND OF MATERNAL MORTALITY RATE IN NIGERIA (2000-2018)

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## **ABSTRACT**

**T**he aim of this study is to determine the prevalence and trend of maternal mortality rate. The data used was obtained from WHO/UNESCO BULLETIN 2018 and was analysed using prevalence rate and trend analysis. The findings revealed that AIDS was 39% in 2012, hemorrhage 16% in 2012, anemia 47% in 2015, infection 16% in 2015, tuberculosis 16% in 2017, malaria 35% in 2001, hepatitis 15% in 2018, STI 22% in 2018, abortion 21% in 2004, and sepsis 26% in 2018. The trend of maternal mortality have an upward and downward movement, it increased in 2001, 2011, and 2018.

**Keywords:** Prevalence, Trend, Maternal Mortality Rate (MMR),

## **Introduction:**

Maternal mortality known as maternal death which continues to be the major cause of death among women of reproductive age in many countries and remain a serious health issue especially in developing countries (WHO 2007). According to Shan and Say (2007) a maternal death is defined as the death of a woman while pregnant or with 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy.

Maternal mortality to developing countries has been described as a silent tragedy. The tragedy is underscored by the fact that death here follows a physiological process

necessary for the perpetuation of human race rather than pathology of all the health statistics monitored by the World Health Organization (WHO) maternal mortality is the one with the largest discrepancy between developing and developed countries. The WHO estimates about 1600 maternal deaths occur each day worldwide and the total is around 585,000 a year of which 99% are in developing countries. In the developing countries maternal mortality ratios (MMRs) have stabilized at under report of 26 to 56 percent.

The Nigeria Demographic and Health Survey 2008 found out that only 39 percent of birth were assisted by a skilled health worker 19 percent by a relative or other person and equal proportion of births were attended by no one.

The situation is made worse by concentration of health facilities in the urban areas and neglecting the rural areas where over 80 percent of the population reside with few facilities. Nigeria's MMR has been indicated as one of the highest in the world second only to India whose population is eight times larger than that of Nigeria. A recent official document from the Federal Ministry of Health indicated a figure of 948 maternal deaths per 100,000 live births. The MMR of over 1500 African standards as seen by comparing Namibia (300) and Ghana (540), the MMRs in developing countries have consistently shown a rising trend for more than two decades after the Safe Motherhood Initiative (SMI) which was launched in Kenya in 1987. A comparative review of maternal deaths (before and after SMI) is a teaching hospital in Enugu, Nigeria showed that MMR was significantly higher in the period after the launch of the Safe Motherhood Initiative (SMI).

Beazley (2002) showed that the causes of maternal death are similar throughout the world. Globally, around 80 percent of all maternal deaths are direct result of complications arising during pregnancy. The most common death causes include the following; hemorrhage, malaria, and abortion. Beazley (2002) showed that vulnerable mothers include those who deliver at extremes of maternal age particularly those under 20 years or over 40 years.

## STATEMENT OF THE PROBLEM

Maternal mortality is the most important indicator of maternal health and well being in any country (Herfom 2006). Maternal mortality is a tragedy, many children are rendered motherless, and such children are deprived of maternal care which goes a long way to affect both their physiological and psychological developments.

The chance of Nigerian women dying from reproductive health disorders and complications was put at line 10 in 2002 (Population Reference Bureau, 2002) 1 in 18 in 2005 the situation is more alarming in Nigeria. The society cannot stand without the help of women, which lead the researcher to know or determine the trend and level of maternal mortality, causes and possible ways maternal mortality could be prevented.

## AIMS AND OBJECTIVES

- i. To determine the prevalence of maternal mortality rate.
- ii. To determine the trend of maternal mortality rate.

## MATERNAL MORTALITY AND SDGS

Between 1990 and 2015, the global maternal mortality ratio (MMR) decreased per 100,000 live births. Despite the progress, the world still fell far short of the Millennium Development Goals target of a 75% reduction in the global MMR by 2015. Moreover, large geographic inequalities persist. For example, regionally sub-Saharan Africa has by far the highest MMR at 546 maternal deaths per 100,000 live births.

Maternal mortality reduction remains a priority under “Goal 3; Ensure health lines and promote well being for all at all ages” in the new Sustainable Development Goals (SDGs) agenda through 2030. In February 2015, the World Health Organization published “strategies toward Ending Preventable Maternal Mortality” (EPMM) strategies / a direction-sectioning report outlining global targets and strategies for reducing maternal mortality under the SDGs. The result of the globe the targets and strategies in the EPMM strategies report are grounded in a human rights

approach to maternal and newborn health rights approach to maternal and newborn health and focus on eliminating the inequalities that lead to disparities in access, quality and outcomes of health care within and among countries achieving the SDG's target of a global MMR of fewer than 70 maternal deaths per 100,000 live births by 2030 will require continued investment in maternal health research, programs and policy at the global level and very focused action in countries.

The global burden of disease (GBD) 2015 article on maternal mortality by Nicholas Kassebaum and colleagues (Oct 8. P.1775) contains a serious error reflecting a basic misunderstanding of the Sustainable Development Goal (SDG) target for maternal mortality one that is potentially very dangerous to the lives of childbearing women and to the vital programmes around the world that support them.

### **PREVALENCE OF MATERNAL MORTALITY**

Globally, facts and figures on maternal mortality are not the same. Because it is difficult and costly to estimate maternal mortality accurately, alternative ways of measuring the progress and impact must be used. Campbell (1998) said that since maternal mortality is directly linked to the coverage and quality of maternal health services, information on such indications as who cares for women during childbirth, where the delivery takes place and the quality of services at health facilities should be collected and analyzed.

Campbell (1998) overview on measuring progress, focusing on two major challenges. First, what are the optimal indicators on maternal mortality, and can they be measured easily and with sufficient accuracy to show progress, and second, can we attribute changes to actual intervention?

The most commonly used indicators of maternal mortality include; maternal mortality ratio which is number of maternal deaths per 100,000 live births). These measures indicate the risk of maternal death among pregnant and recently pregnant women. It reflects a woman's basic health status, her access to health care, and the quality of service that she receives. Maternal mortality rate which is the number of maternal deaths per

100,000 women aged 15-49 per year). This measure reflects both the risk of death among pregnant and recently pregnant women and the proportion of all women who became pregnant in a given year. It therefore can be reduced by making childbearing safe or by reducing the number of pregnancy.

Cynthia (1999) said that the way to monitor maternal mortality is through vital registration, in most countries or developing countries, vital registration are not being noticed whereby many death are not being recorded and many maternal deaths are misclassified even in developed countries.

Harrison (2000) said that over the years there had been an increase and decrease on maternal mortality despite all the efforts made by the government and non-governmental agencies. Over the years, the rate of maternal mortality has been rising and falling.

In year 2005 maternal mortality continued to be one of the most serious development challenges in the country. Maternal mortality in Nigeria is extremely big, representing of the country most significant development challenges.

National population census NPC (2006) in Rooney (2001) about two million of the 27million women of reproductive age do not survive pregnancy, childbirth or the immediate six weeks after delivery. Beazley (2002) has written on the causes of maternal mortality which are similar throughout the world. The most common direct obstetric causes of death in Nigeria include; hemorrhage, sepsis, preeumpsia, clampsia, anemia, cephalopelvic disproportion, uterine rupture, and traditional birth attendants, while indirect causes of maternal deaths include malaria, heart disease, and hepatitis.

## **METHODS**

The data for this research was collected online from WHO /UNESCO BULLETIN 2018, which is secondary source of data.

## **MATERNAL MORTALITY**

Maternal deaths are defined as any death that occurred during pregnancy, childbirth, or within few months after the birth or termination of a pregnancy.

### MATERNAL MORTALITY RATE

Maternal mortality rate is the number of registered maternal deaths due to birth or pregnancy related complications per 100,000 registered live births, which is given by

$$MMR = \frac{D_m}{B} \times K$$

Where;  $D_m$  is maternal death

B number of live births

K is a constant taken to be 1000

### PREVALENCE RATE OF CAUSES OF MATERNAL MORTALITY

Prevalence sometimes referred to as prevalence rate to the proportion of persons in a population who have a particular disease or attribute at a specified point in time or over a specified period of time. There are two types of prevalence rate.

**POINT PREVALENCE:** This refers to the prevalence measured at a particular point in time. It is the proportion of persons with a particular disease or attribute in a particular date.

**PERIOD PREVALENCE:** This refers to prevalence measured over an interval of time. It is the proportion of persons with a particular disease to attribute at any time during the interval.

Hence, prevalence rate can be computed using;

$$PR = \frac{\text{All new and pre-existing cases during a given time period}}{\text{Population during the same time period}} \times 100$$

### PROPERTIES AND USES OF PREVALENCE

Prevalence is based on both incidence and duration of illness. High prevalence of a disease with a population might reflect high incidence or

prolonged survival without care or both. Conversely, low prevalence might indicate low incidence, a rapid fatal process or rapid recovery.

Prevalence rather than incidence is often measured for chronic diseases such as diabetes or osteoarthritis which have long duration and dates of onset that are difficult to point out.

The numerator of an incidence proportion or rate consists only of persons whose illness began during the specified interval. The numerator for prevalence includes all persons ill from a specified cause during the specified interval regardless of when the illness began. It includes not only new causes but also pre-existing cause representing persons who remained ill during some portion of the specified interval.

Prevalence and incidence are frequently confused, prevalence refers to proportion of persons who have a condition at or during a particular time period, whereas, incidence refers to the proportion or rate of persons who develop a condition during a particular time period. Therefore, prevalence and incidence are similar but prevalence includes only new cases.

## RESULTS

### DATA ON THE CAUSES OF MATERNAL MORTALITY

YEAR	LIVE BIRTHS	AIDS	ANAEMIA		MALARIA		STI		SEPSIS		
			HEMORRHAGE	INFECTION	TUBERCULOSIS	HEPATITIS	ABORTION				
2000	85058	212	251	35	110	134	336	131	93	239	60
2001	378078	282	205	156	324	138	3989	329	221	58	83
2002	175429	222	227	99	105	55	230	88	41	36	23
2003	33298	124	103	51	83	109	227	427	107	349	31
2004	798428	183	159	108	132	81	296	123	49	42	69
2005	118821	126	43	10	110	60	1078	139	15	6	11
2006	347668	309	192	47	138	238	554	312	138	159	64
2007	836496	269	181	75	165	125	301	104	79	53	53
2008	117302	242	126	50	91	45	326	110	10	22	34
2009	221292	1676	176	55	211	134	1075	241	33	53	30

2010	90726	205	116	31	87	57	213	102	43	38	47
2011	267842	3106	473	98	268	210	850	714	83	37	82
2012	219231	400	153	28	120	99	406	126	35	9	16
2013	54423	219	109	30	172	80	348	137	82	79	27
2014	402961	165	157	912	233	73	248	135	102	39	62
2015	14046	467	363	83	285	167	541	421	154	273	97
2016	794	226	338	69	160	97	261	107	123	89	90
2017	9934	243	190	74	144	108	558	227	87	119	94
2018	14647	416	410	128	250	194	591	439	313	138	222

*SOURCE: WHO/UNESCO BULLETIN 2018*

### MATERNAL MORTALITY RATE

$$MMR = \frac{D_m}{B} \times K$$

### PREVALENCE RATE (AIDS)

$$PR \text{ of AIDS (2001)} = \frac{\text{No of cases in 2000 and 2001} \times 100}{\text{Total no. of cases}}$$

### TIME PLOT

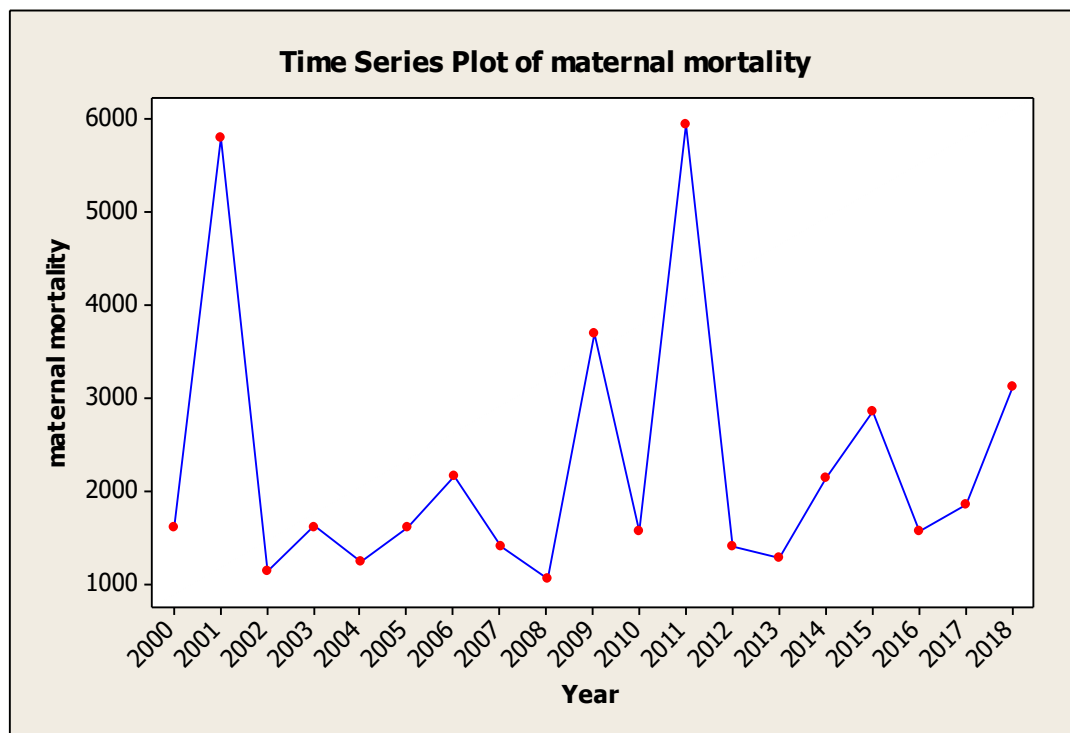


Figure 1: Time series plot of maternal mortality



From the time series plot for maternal mortality (2000-2018). We observed that the series is not stationary. Since the data (original) is not stationary, we consider Transformation.

## TEST FOR NORMALITY

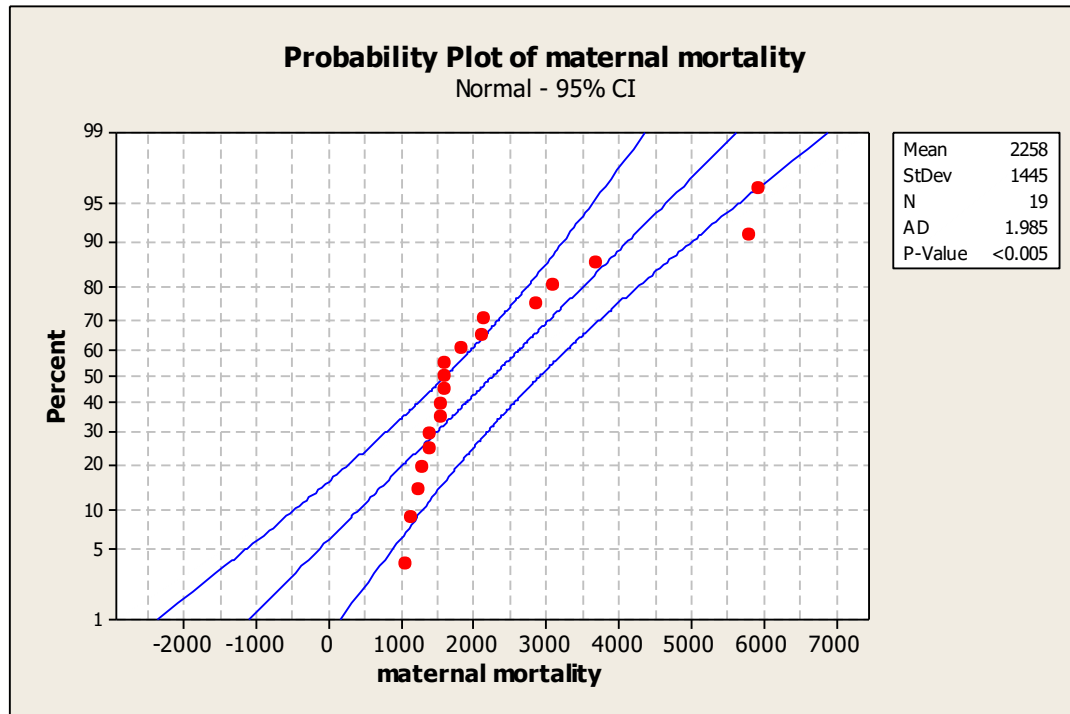


Figure 2: probability plot of maternal mortality

The chart above shows that the data is not normal, as the data points are outside the bound. We will transform the data to make them normal.

## UNIT ROOT TEST

### Augmented Dickey-Fuller Test

#### Hypothesis

$H_0$ : There is a unit root in the series (the data is not stationary).

**Decision Rule:** If the computed p-value  $< 0.05$ , we will reject  $H_0$ , otherwise, we will not.

Test Statistics:

Tau (Observed value)	-2.7255
Tau (Critical value)	-0.3106
p-value (one-tailed)	0.2076
alpha	0.05

### Conclusion

As the computed  $p\text{-value} > 0.05$ , we cannot reject the  $H_0$ , therefore we conclude that there is a unit root in the series (the data is not stationary). We will transform the data to make it stationary.

### TRANSFORMATION OF THE DATA

#### Second Order Differencing

YEAR	MATERNAL MORTALITY	DIFF(MATERNAL MORTALITY)
2000	1601	
2001	5785	
2002	1126	-8843
2003	1611	5144
2004	1242	-854
2005	1598	725
2006	2151	197
2007	1405	-1299
2008	1056	397
2009	3684	2977
2010	1560	-4752
2011	5921	6485
2012	1392	-8890
2013	1283	4420
2014	2126	952
2015	2851	-118
2016	1560	-2016
2017	1844	1575
2018	3101	973

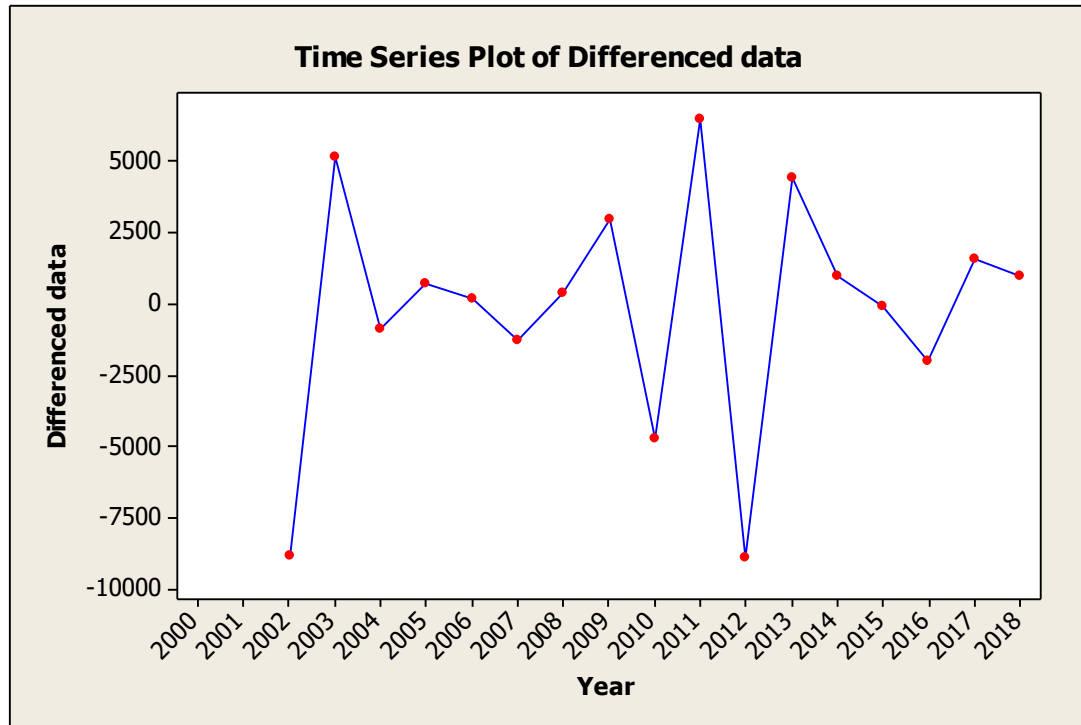


Figure 3: Time series plot of differenced data

## UNIT ROOT TEST

### Augmented Dickey-Fuller Test

#### Hypothesis

$H_0$ : There is a unit root in the series (the data is not stationary).

**Decision Rule:** If the computed p-value  $< 0.05$ , we will reject  $H_0$ , otherwise, we will not.

#### Test Statistics:

Tau (Observed value)	-3.7771
Tau (Critical value)	-0.2583
p-value (one-tailed)	0.0444
Alpha	0.05

## Conclusion

As the computed p-value  $< 0.05$ , we reject  $H_0$  and conclude that there is no unit root in the series (the data is stationary).

**TIME SERIES TREND ANALYSIS**

**Linear Trend Model**

Trend Analysis for Differenced Data

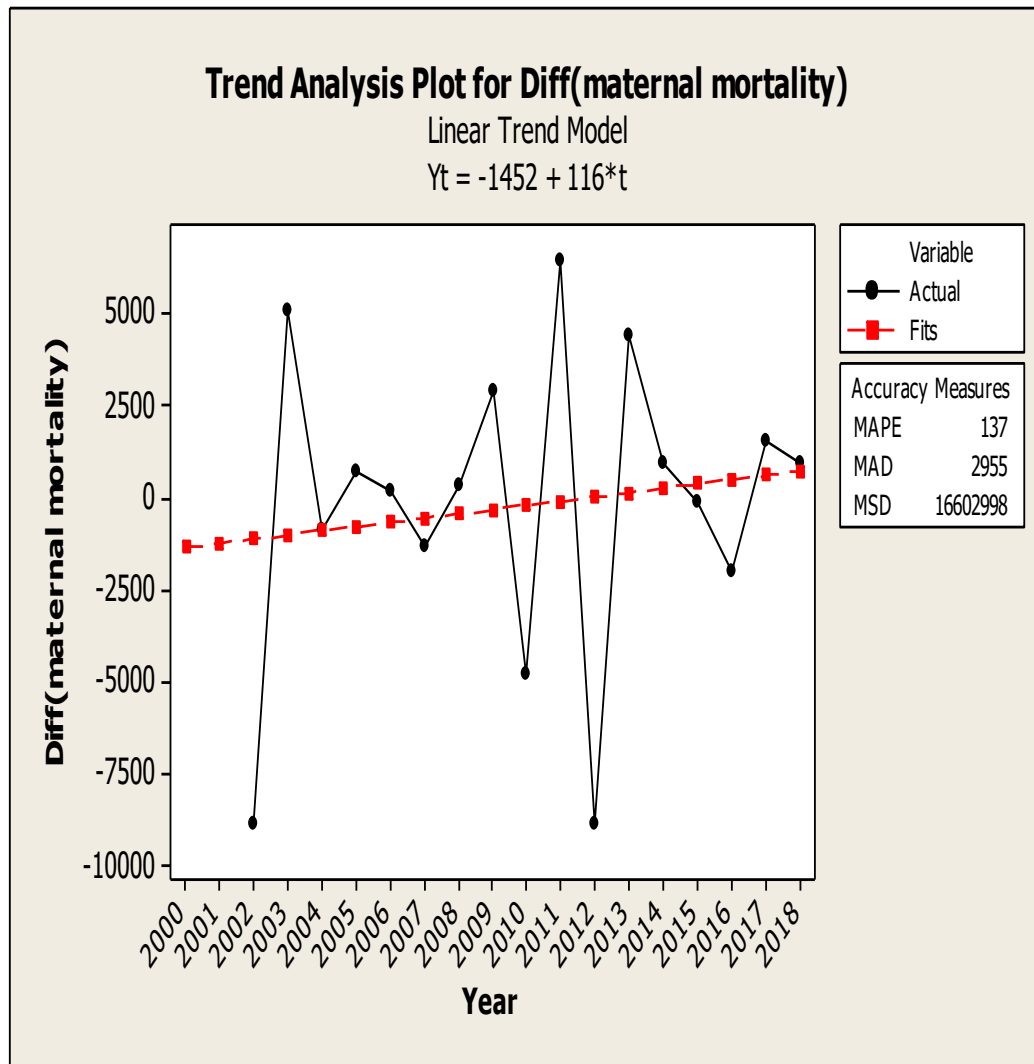
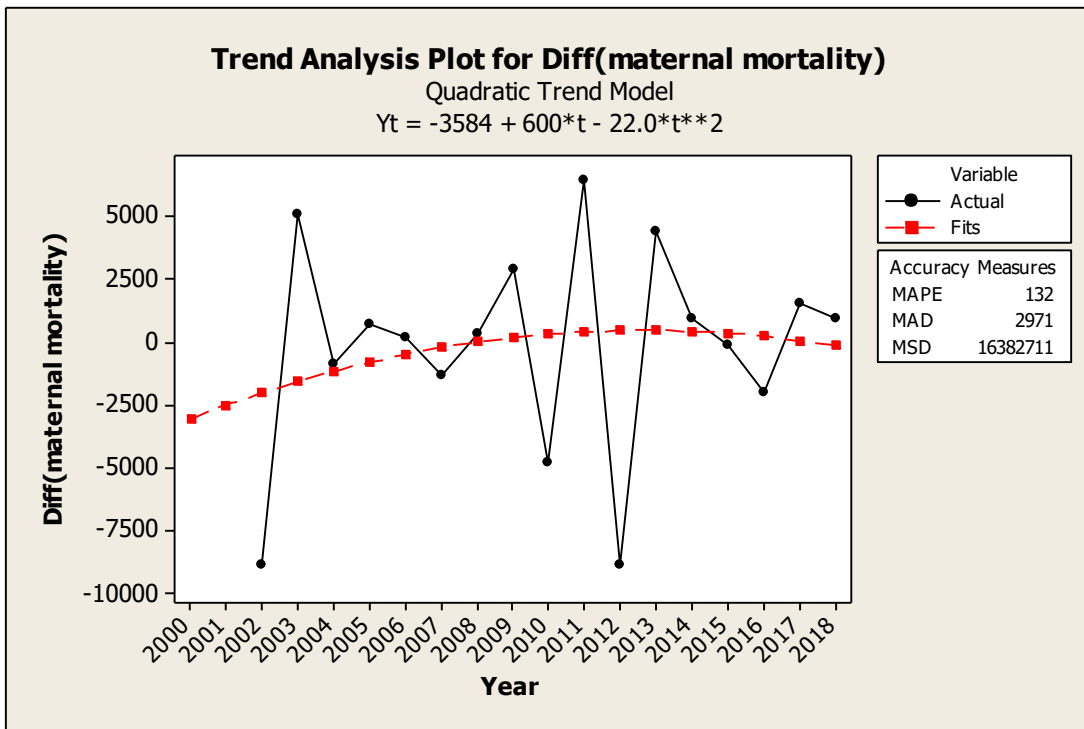


Figure 4: Trend analysis plot for differenced data

**Quadratic Trend Model**



**Exponential Trend Model**

\* Some data are non-positive; therefore growth model cannot be fitted.

**Model Comparison**

Table 4.3

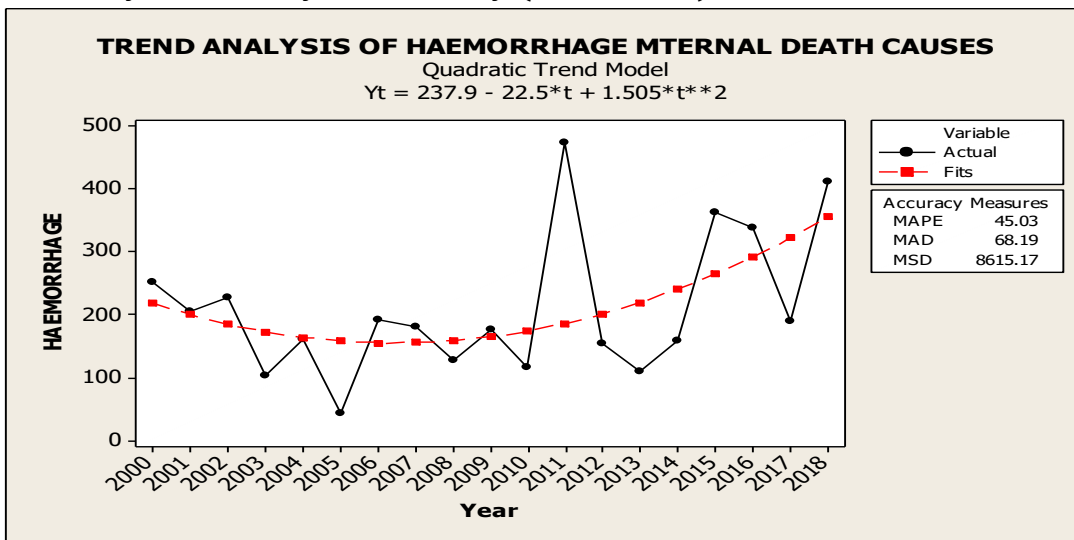
Trend model	Accuracy measure		
	MAPE	MAD	MSD
Linear	137	2955	16602998
Exponential			
Quadratic	132	2971	16382711

**Conclusion**

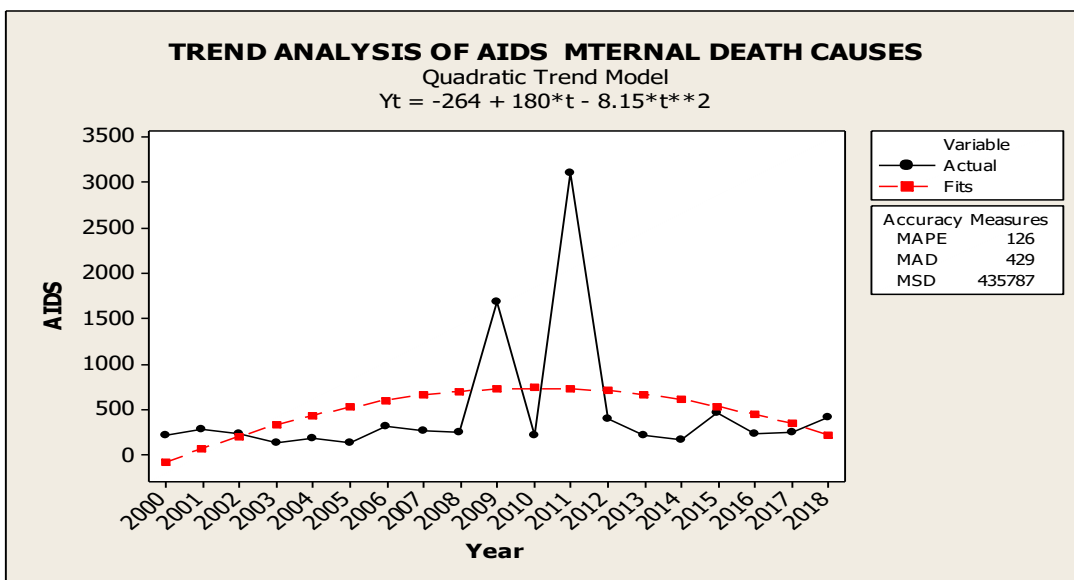
Since the model with the least accuracy measures is the quadratic model, we conclude that maternal mortality for the period under study grows quadratically.

**TIME SERIES TREND ANALYSIS**

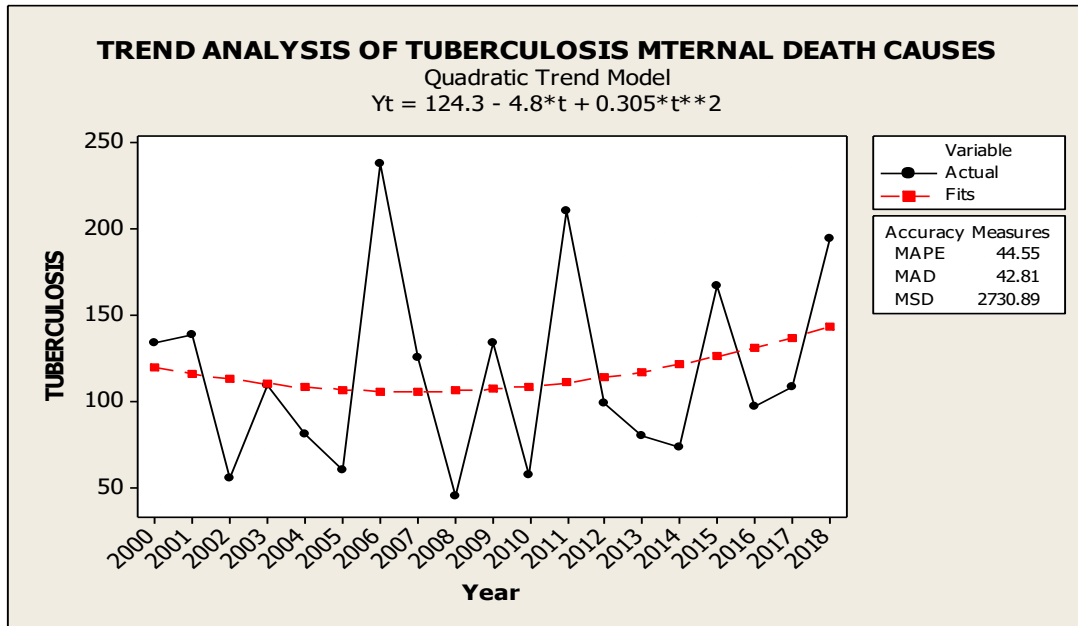
The trend analysis was employed to determine the movement of maternal mortality under the years of study (2000-2018).



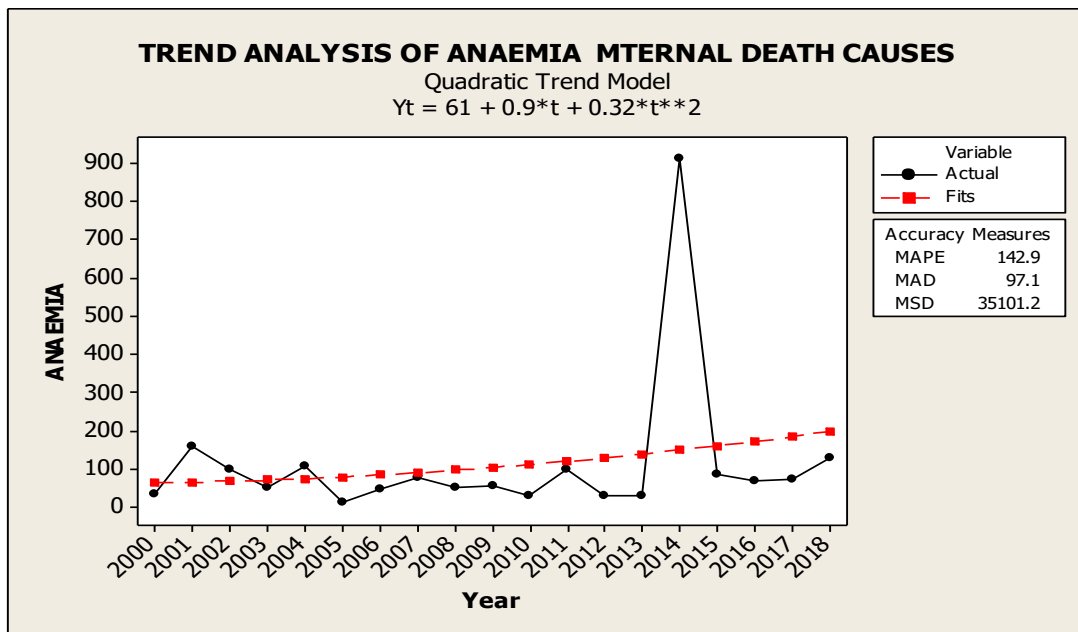
**INTERPRETATION:** The trend of Hemorrhage cause of maternal death occurs more in 2011 than in other years.



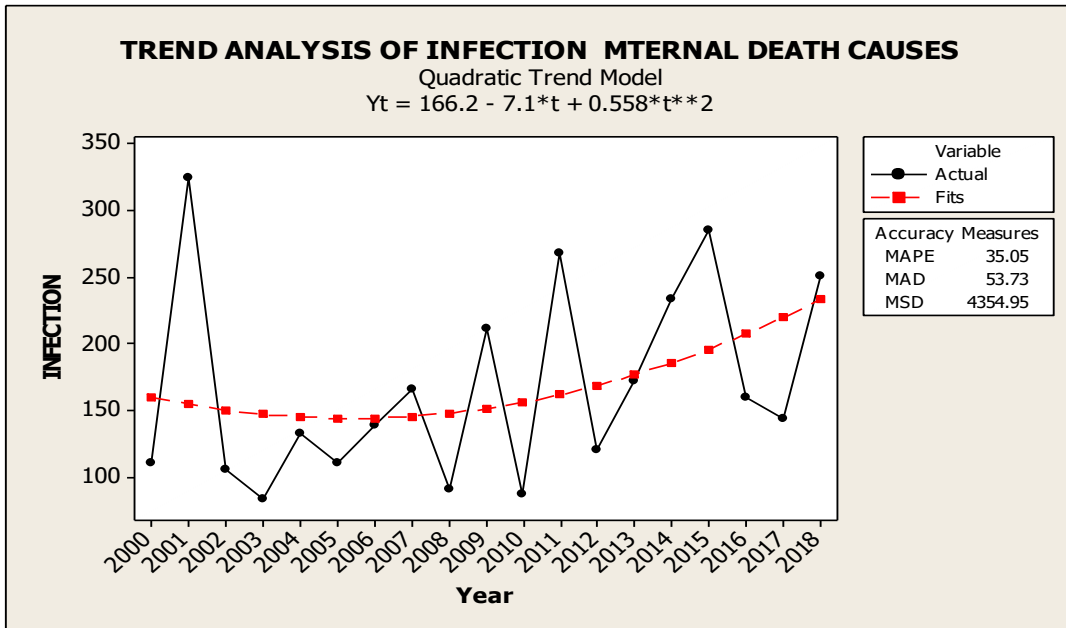
**INTERPRETATION:** The death occurs more in the year 2011 and 2009. It occurred less in other years.



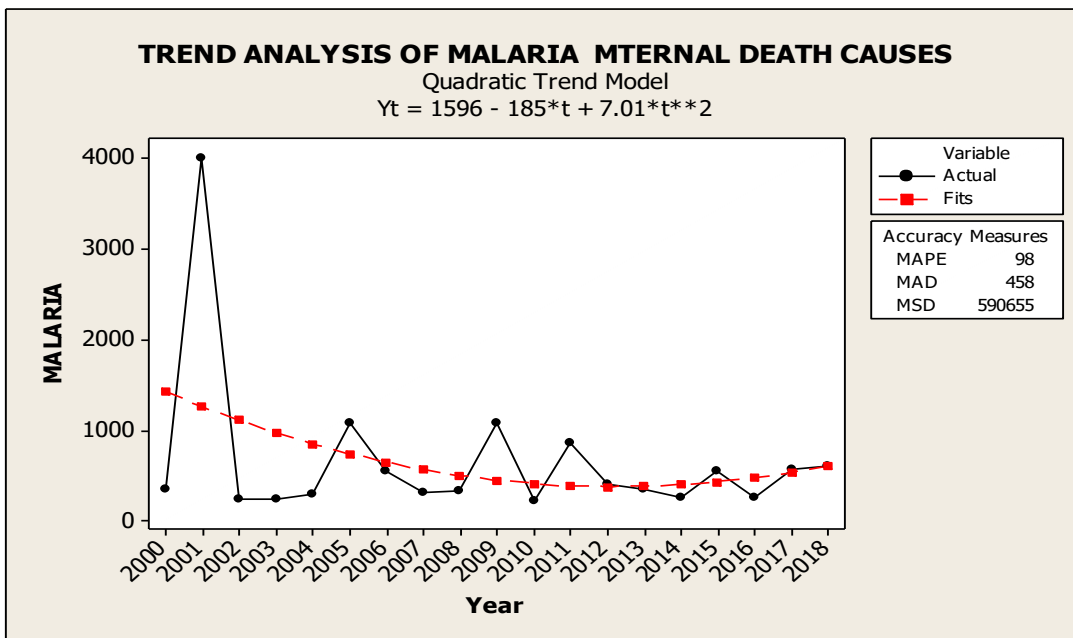
INTERPRETATION: The occurrence of the death occur more in several years from 2000 to 2018.but more prevalence in 2006 and 2011.



INTERPRETATION: The Anemia as a maternal cause of death occur more in 2014 and less in the other years.

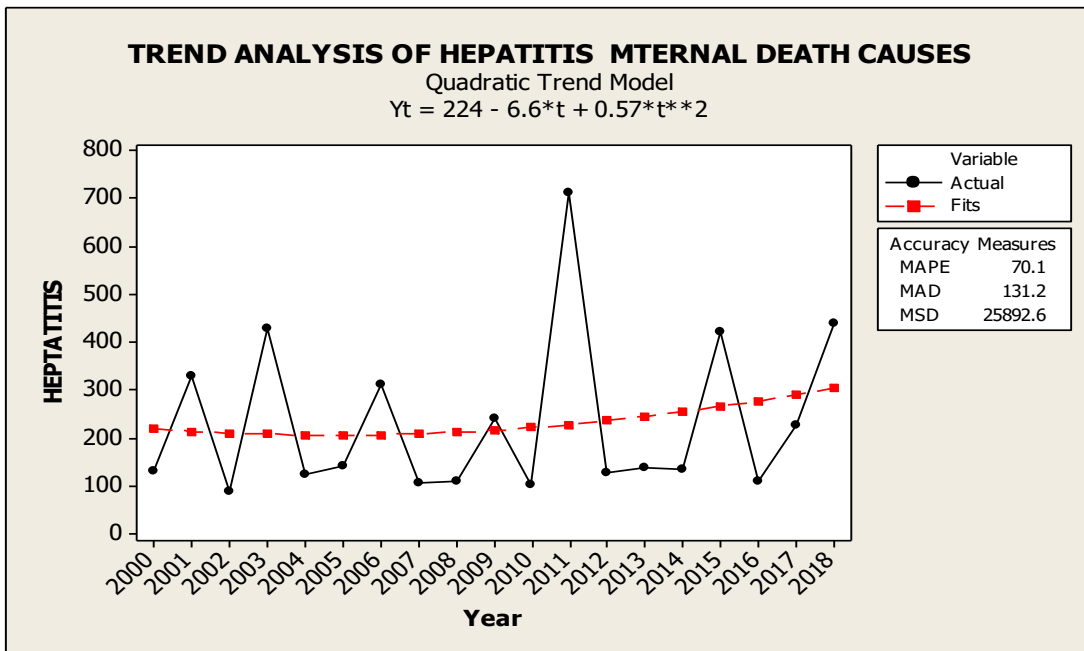


INTERPRETATION: This cause of maternal death occur high in all years under study. The occurrence is in the 2001.

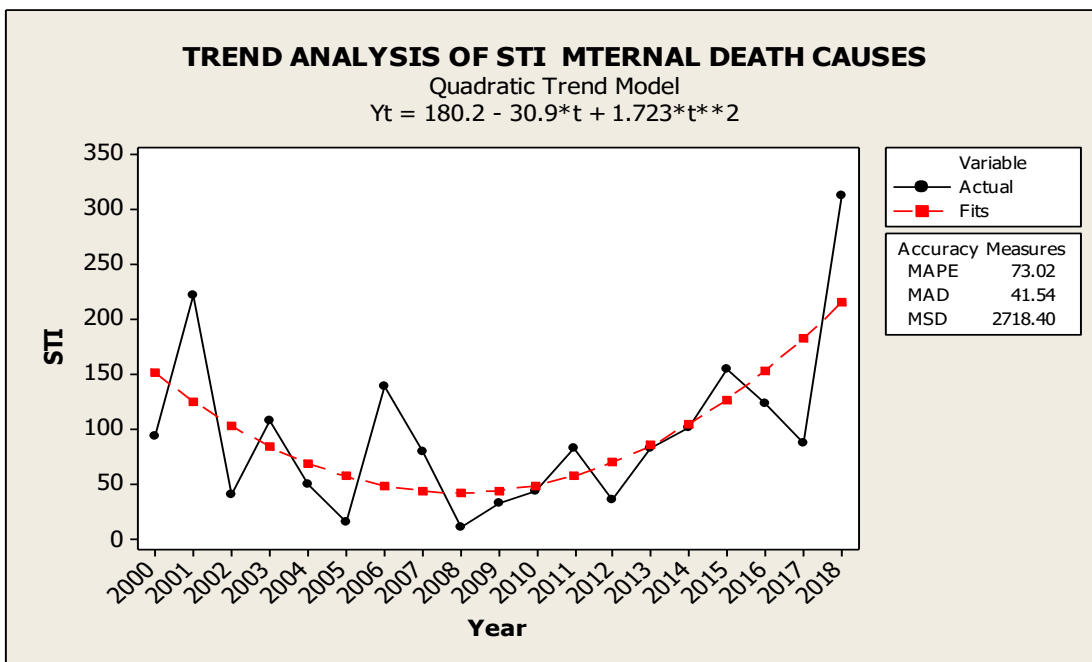


INTERPRETATION: The occurrence of death is more in the year 2001 than in the other years.

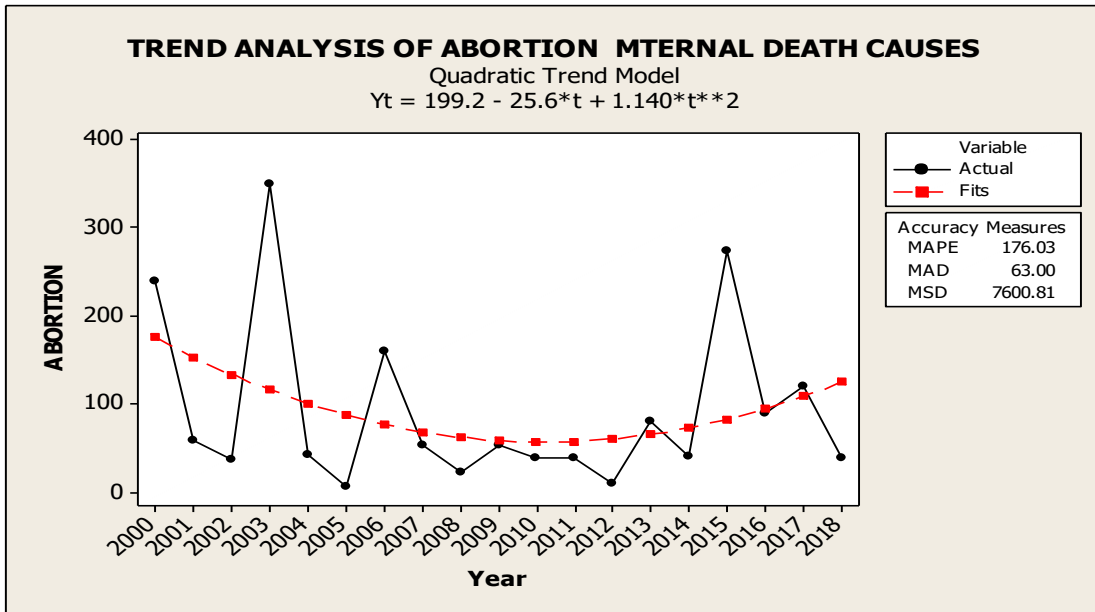




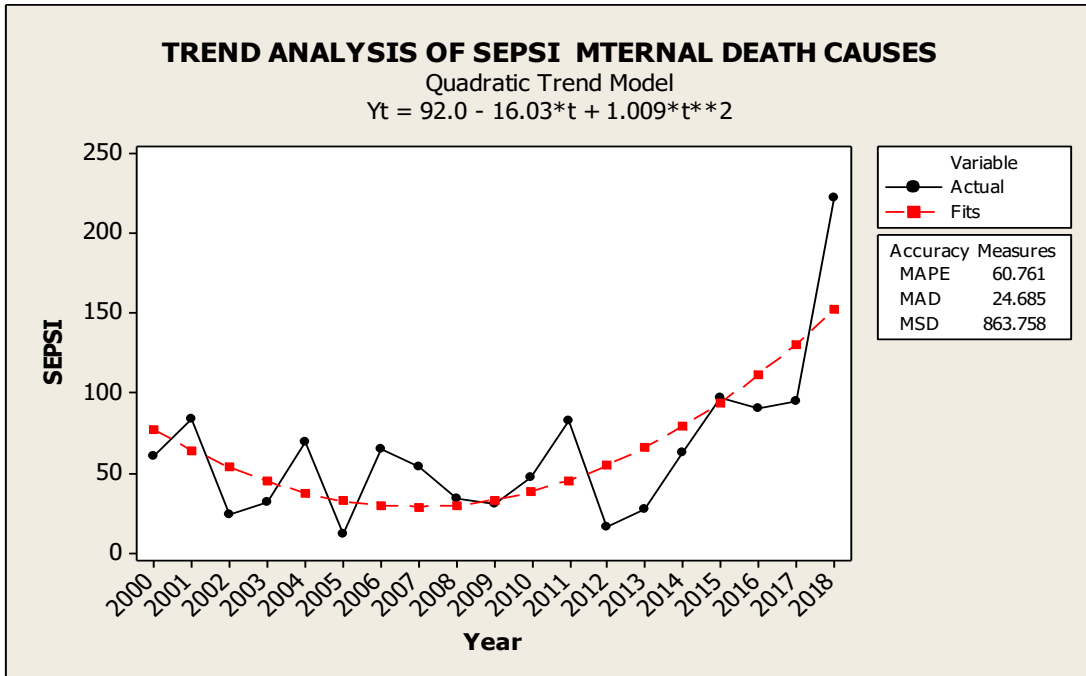
INTERPRETATION: The occurrence of maternal death caused by hepatitis is approximately equal in all the years under consideration.



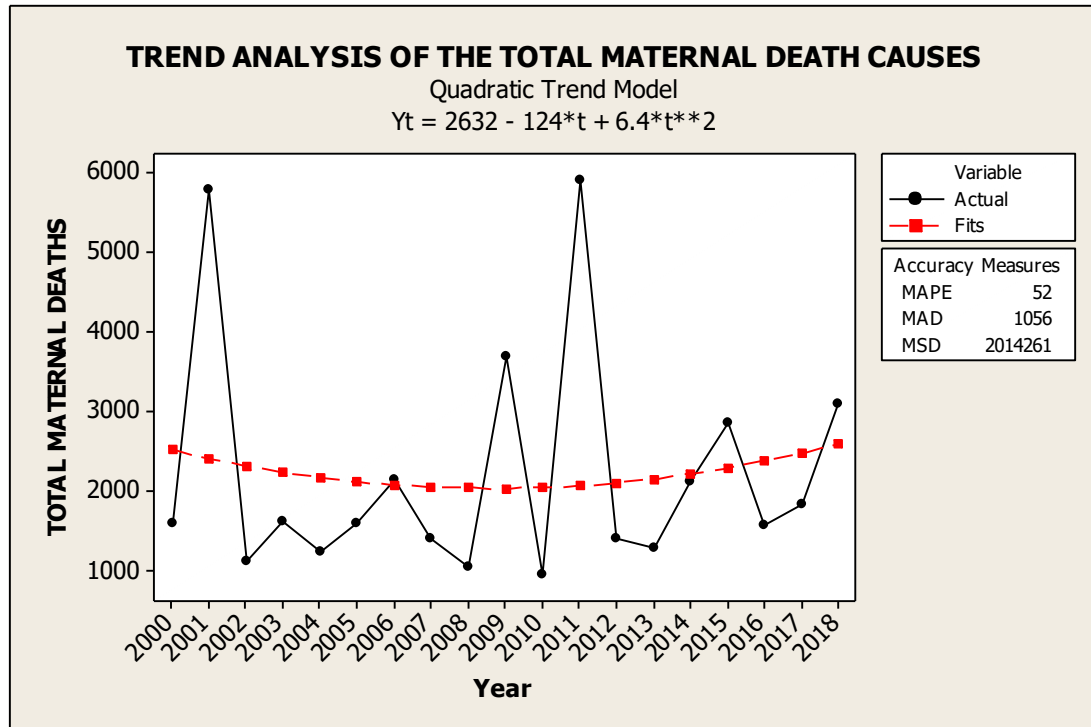
INTERPRETATION: The death occur more in the year 2018.



INTERPRETATION: The maternal death caused by Abortion is more in 2000, 2003 and 2015.



INTERPRETATION: The death is more in 2018 than the other years.



### INTERPRETATION:

The trend of maternal death is an up and down movement through the years under study. But these death occurs more in 2001, 2009, 2011 and 2018. The deaths are prevalence in the year 2011 than in the other years under consideration.

### FINDINGS

Using one of the techniques which is prevalence rate, maternal mortality caused by the following diseases were high; AIDS is 39% in 2012, hemorrhage 16% in 2012, anemia 47% in 2015, infection 16% in 2015, tuberculosis 16% in 2017, malaria 35% in 2001, hepatitis 15% in 2018, STI 22% in 2018, abortion 21% in 2004, and sepsis 26% in 2018.

Also, using trend analysis, maternal death is an upward and downward movement through the years under study. But, this deaths occurred more in 2001, 2011, and 2018. The deaths are prevalence in the year 2011 than in the other years under consideration.

## CONCLUSION

This research showed that maternal mortality is not a steady movement is mainly caused by aids, abortion, hemorrhage, hepatitis, sepsis, STIs, malaria and infectious diseases.

## RECOMMENDATIONS

Based on the findings of this study, the following recommendations were made;

1. Government should provide health facilities such as qualified health personnels, equipments, hospitals, and primary health centres in all communities.
2. Women empowerment programmes should be introduced to improve women economic and social status.
3. Adults should be actively used in the awareness campaign programmes on maternal mortality
4. Local languages should be used during enlightenment campaign for the understanding of all adults, educated and uneducated in the country.
5. Family planning should be encouraged in other to reduce maternal mortality.

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