

Analysis of the Temporal and Seasonal Patterns of Maternal Mortality Ratio in Yenagoa, Bayelsa State of Nigeria

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Abstract: The study analyzed the temporal and seasonal patterns of maternal mortality (both levels and ratios) in Yenagoa, the capital city of Bayelsa State, Nigeria. The objectives are to determine the levels and ratios of maternal mortality per month and per season over 8 years period (2010 to 2017). Data were collected from primary and secondary sources. A major tertiary hospital was used for this work based on its function and accessibility to women. Data were collected from the hospital records and was updated with the case folder. Both descriptive and inferential statistics were employed to analyze the data. The study revealed that the year 2015 witnessed the highest maternal mortality ratio of 1445.09 per 100,100 livebirth in Bayelsa state. Maternal mortality level was 10, while the number of livebirth was 692. The study also reviewed higher maternal mortality ratio during the wet season (1031.25 than dry season (961.87)). Results further showed that there is no significant difference in maternal mortality ratio between the two seasons in the study area. Empirical results show Mann Whitney test 13.0032, and p-value of 0.619 was obtained ($p > 0.05$), at 5 % significant level, meaning that there is no significant difference in maternal mortality ratio between wet and dry season in the study area.

Keywords: Maternal, Mortality, Ratio, level, Temporal, Seasonal

1. INTRODUCTION

The impacts of mortality on the population structures, composition, and development of the economy cannot be emphasized. It is age and sex selective, it is high among infants, from 0-1 year, 1-5 years and at older ages. It is higher among women within (15-49) years old which coincides with their reproductive years and it is generally referred to as maternal mortality. (Okigbo, Adegoke & Olorunsaiye, 2017; Waugh, 2014)¹

However WHO (2014)² and ISCDHP (1992)³, gave a more refined definition and meaning to maternal death. In their words, maternal mortality “is the death of women while pregnant or within 42 days of termination of pregnancy irrespective of the duration and site of the pregnancy from any cause related to, or aggravated by the pregnancy or its management but not from accidental or incidental causes”. The world's greatest concern today is the reduction in maternal mortality apparent by its frequent appearance in most development goals and its inclusion in the defunct millennium development goal (MDG) and sustainable development goal (SDGs). Despite all these efforts, the ratio of maternal mortality is still rated high in Nigeria. (Adam Franz-Vasdeki; 2012⁴; Saraki, 2008⁵; Rosenfield, Min & Freeman, 2007⁶).

Several attempts have been made in the area of maternal health services to achieve permanent solution to the maternal and infant mortality ravaging the country.

Efforts include: clamoring for reproductive rights of women in Nigeria, Safe Motherhood Initiative, Midwives Scheme of the MDGs, that includes training and re-training of nurses and midwives in reproductive health-care and services, among others (United States Agency for International Development, 2009⁷, WHO, 2013⁸). In spite of all these programmes, the challenge has been the same, and this could be considered as a demographic outrage especially in Nigeria.

One of the factors that can have significant impact on maternal mortality is high rate of poverty in a society. Poverty in terms of availability of amenities, adequate supply of power and water, school enrolment, low female education, no or little income of women. (Lanre –Abass, 2008)⁹. Yenagoa has been chosen for this study due to the prevalence high ratio of poverty, underdevelopment, early marriage/cohabitation, inadequate access to social amenities. All these indices add to the increasing ratio of maternal mortality in the area. Previous studies on maternal mortality in Nigeria concentrated on the causes of maternal mortality in several parts of Nigeria, moreover, most of the studies focused on village or town (Omidiji and Akpoghomeh, 2019¹⁰; ; Audu, Takai and Bukar, 2010¹¹; Oladapo, Lamina and Fakoya, 2006¹²; Aniefiok, Umoyibo, Edem and Saturday, 2005¹³; Aboyeji A.P. 1988¹⁴) There is no work on temporal and seasonal variation in maternal mortality in Yenagoa. This constitutes a gap in the literature that this present study seeks to fill.

Therefore the aim of this research is to analyze the seasonal pattern of maternal mortality in Yenagoa Bayelsa State of Nigeria. The objectives are to determine the maternal mortality in levels and in ratio over the years, months, and between the seasons of the year.

2. MATERIALS AND METHODS

2.1. Research Design

Cross sectional research design was employed in this study with retrospective study of maternal mortality

2.2. Sources of Data

The sources of data were primary in nature as information needed was collected from the hospital register. Secondary data were sourced from journals and Government establishment’s documents

2.3. Data Collection

Accessibility and functions of the hospital was the major reason for choosing the hospital among other ones in Yenagoa. Data on the year and month of death were obtained directly from the death register, and updated with information on the patient’s folder. Deaths that occurred from November to February were classified under Dry season, while the deaths occurring from April to October were classified under wet season. The data collection took almost a year to be completed.

3. RESULTS AND DISCUSSION

Data was discussed descriptively with tables, frequency counts, percentages, and the values depicted in line graphs. Hypothesis was analyzed using SPSS version 22.0. Data on maternal mortality level and number of live birth was got from 2010 to 2017. Over the 8 years period, there were 60 incidences of maternal mortality, 9209 live births and maternal mortality rate (MMR) was 651.16, with a mean MMR of 672.6. (See table 1). The MMR was calculated using the formula below:

$$\text{MMR} = \frac{\text{No of maternal mortality}}{\text{No of livebirth}} \times 100,000 = 651.16 \text{ per } 100,000 \text{ livebirth.}$$

MMR has been fluctuating over the years, despite the fact that number of live birth (692) was low in 2015, the incidence of maternal death was high (10 cases of maternal death). The year 2015 witnessed high MMR in Bayelsa state. The rise in maternal mortality ratio in 2015 was due to the fact that government shifted attentions to other public health matters in the area, like Ebola, monkey pox and other health issues that were claiming lives instantly. However, the MMR reduced drastically to 202.43 in 2016. In 2017, MMR increased again to 645.16 per 100,000 livebirth. The total maternal mortality ratio over the period is 651.16 per 1,000,000 livebirth.

Table1: Levels and ratios of maternal mortality in Bayelsa State

Years	Maternal Mortality	Number of Livebirth	MMR per 100,000
2010	9	1190	756.30
2011	11	1534	717.08
2012	9	1528	589.01
2013	10	1434	697.35
2014	3	913	328.59
2015	10	692	1445.09

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2016	2	988	202.43
2017	6	930	645.16
Total	60	9209	651.16

Source: Researcher’s fieldwork, 2018

Tables 2 and Figure 1 show the mean temporal pattern of MMR (in years) in Bayelsa state. The mean MMR of 1382.7 per 100,000 livebirth in 2015 was very high. The lowest mean MMR was obtained in 2014, with 213.6 per 100,000 livebirth. The region experienced two peak periods of MMR. It was first high in 2015(1382.7 per 100,000 livebirth) it reduced drastically to 193.03 per thousand livebirth, in 2014 and increased again to 776.38 per thousand livebirth in year 2017

Table2: Temporal patterns of Mean MMR in Bayelsa State (years)

Year	Mean	std dev	Minimum	Maximum
2010	718.7	563.5	0.0	1470.6
2011	730.3	846.4	0.0	3100.8
2012	592.4	575.1	0.0	1388.9
2013	637.4	821.4	0.0	2419.4
2014	213.6	388.4	0.0	943.4
2015	1382.7	1936.2	0.0	5454.5
2016	160.9	394.8	0.0	1250.0
2017	776.4	1115.0	0.0	3448.3

Source- Researcher’s fieldwork, 2018

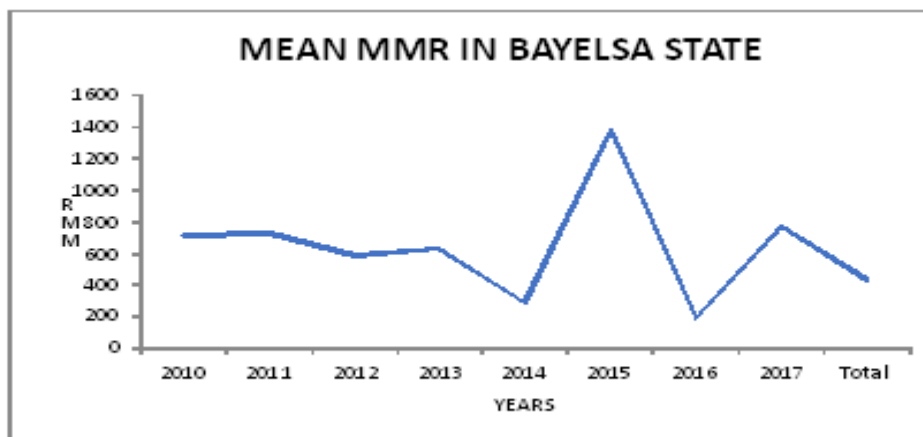


Figure1: Mean maternal mortality ratio in Bayelsa state (years)

Source- Researcher’s fieldwork, 2018

In relation to months of the year (table 3.and figure 2), the highest mean MMR per month was reported in the month of April, with MMR of 1217.1 per thousand livebirth), while the lowest was recorded in the month of September, with mean MMR of 105.0 per thousand livebirth.

Table3: Temporal patterns of maternal mortality in Bayelsa State (Monthly Basis)

Month	Mean	Std Deviation	Minimum	Maximum
January	714.6	1218.2	0	3448.276
February	577.1	632.9	0	1449.275
March	1189.0	1607.2	0	5000
April	1217.1	1817.0	0	5454.545
May	553.7	700.1	0	1639.344
June	1064.8	858.7	0	2419.355
July	550.8	660.8	0	1680.672
August	420.2	620.2	0	1587.302
September	105.0	297.1	0	840.3361
October	351.4	487.2	0	1020.408
November	874.9	1113.2	0	3100.775
December	199.9	372.1	0	869.5652

Source- Researcher’s fieldwork, 2018

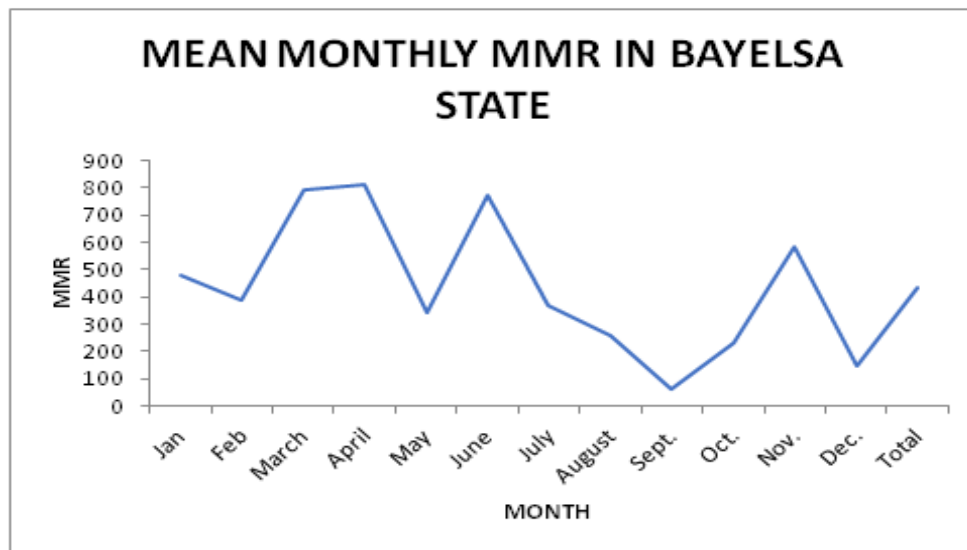


Figure2: Mean MMR in Bayelsa State (Months)

Source- Researcher’s fieldwork, 2018

Tables 4 reveals MMR between the dry season (November to February) and wet season (March to October). Result shows that in Bayelsa State, the average MMR during the dry wet season was obtained to be 961.9 per thousand livebirth, while in wet season, it was 1031.3 per 100,000 livebirth. The result reveals higher MMR during wet season than dry season

Table4: Maternal mortality ratios between seasons in Bayelsa State

		n	Mean	Std. Deviation	Std. Error Mean
	Wet season	8	1031.25	367.98	130.10
	Dry Season	4	961.88	330.41	165.20

Source- Researcher’s fieldwork, 2018

The work has revealed the distribution of MMR and the season in each year from 2002 to 2017. It was observed that the distribution of MMR is the same across the categories of season from 2002 to 2017.

3.1. Hypothesis Testing

Ho₁: There is no significant difference in maternal mortality ratio between the two seasons in the study area.

Result in Table 5 shows maternal mortality ratio (MMR) between dry and wet season in the study area. In Bayelsa State, the result Mann- Whitney statistic statistics yielded 13.0032, and p-value of 0.619 was obtained ($p > 0.05$) meaning that there is no significant difference in maternal mortality ratio between the two seasons in the study area.

Table5: Mann- Whitney (Non- Parametric test) result summary comparing maternal mortality ratio (MMR) between wet and dry season

State	Season	Mean Rank (MR)	Sum of Rank	Mann- Whitney Statistic	p-value	Remarks
Bayelsa	Wet	6.88	55	13	0.61	NS
	Dry	5.75	23			

NS- not significant at 5 % ($p > 0.05$).

Source- Researcher’s fieldwork, 2018

Ho₂: There is no significant difference in the incidence of maternal mortality between the two seasons of the year.

Table 6 shows 67 cases of maternal mortality in Bayelsa State during wet season and 26 cases during dry season with χ^2 calculated. =18.08; χ^2 - Critical. = 3.84, meaning that χ^2 calc. $>$ χ^2 - crit.). This means that incidence of maternal mortality was significantly higher during wet season the dry season.

Table6: Chi- Square result summary showing differences in the maternal mortality levels between wet and dry season

Season	Wet	Dry	χ^2 - calc.	Df	χ^2 -crit.
Bayelsa (n=93)	67 (46.5)	26 (46.5)	18.08	1	3.84

Values in the parentheses are the expected frequencies, df= degrees of freedom,

**significant at 5%

Source- Researcher's fieldwork, 2018

Thus, this study shows that there are variations in MMR over the past eight years and over the months. These findings align with the submission of Abe and Omo-Aghoja (2008)¹⁵, whose work revealed that temporal variations in maternal mortality ratio existed in Benin City. Their work shows a progressive increase in maternal mortality ratios over 10 years period. Furthermore, the findings from this work, support that of Izugbara, Wekesah and Adedini, (2016)¹⁶, they recorded MMR of 560 per 100,000 livebirth for Nigeria and posited that, MMR is generally high in Nigeria and the average MMR for Sub Sahara African was put at 510 per 100,000 livebirth. However, the MMR in Yenagoa could be considered as high in line with the work of Adam and Franz-Vasdeki (2012)¹⁷, who stated categorically that maternal mortality ratio is considered to be high is the ratio is 400 and above

4. CONCLUSION

The temporal and seasonal patterns of maternal mortality have been analyzed, maternal mortality ratio varied over the years, months and the two seasons. It was revealed that when government shifted her attention to other public health issues, there was an upsurge in maternal mortality rate. Hence, the researchers are agitating for continuous and intensified support from the Government and other stakeholders, in other to meet up the target of the Sustainable Development Goal before 2030 and to bring maternal mortality rate to the barest minimum.

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