Research Article
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Evaluating the impact of preventive interventions against malaria during antenatal care of pregnant women from 2014 to 2018 in Ondo State, Southwest Nigeria

Abstract

Background: Malaria is a major public health burden that is endemic in sub-Saharan Africa. Malaria infection during pregnancy can be deleterious not only to the mother but also the fetus. The objective of this study was to evaluate malaria programme and the utilization of malaria commodities between 2014 and 2018 in Ondo State, Southwest Nigeria.

Materials and methods: This study analyzed malaria-related indicators tracked on a routine basis in Ondo State, Nigeria. A retrospective cohort analysis of data retrieved from the District Health Information Management version 2.0 (DHISv2.0) database was conducted. Data was analyzed using Stata 13 statistical software. The prevalence of utilization of ANC and the proportions of pregnant women accessing malaria commodities were assessed using frequency tabulation, means, and analysis of variance (ANOVA). Correlation coefficient for association among some variables was employed.

Results: The mean proportion of women who had at least 1 ANC visit during the period of study was 34.3±3.9, highest in 2017 (39.1±14.8) and lowest in 2018 (26.8±12.1). The overall mean proportion of women who had at least 4 ANC visits during pregnancy was 20.3±14.1 (F-statistics=2.88, P-value=0.03), highest in 2015 (25.9±18.9) and lowest in 2018 (14.0±10.6) and the mean proportion of those who had at least 1 ANC visit before 20 weeks of pregnancy was 38.1±10.0 (F-statistics=5.63, P-value=0.0005), highest in 2017 (45.4±10.7) and lowest in 2014 (32.6±9.1). During the study period, significant variations were observed in the mean proportion of pregnant women who received LLIN at first ANC visit (F-statistics=9.52, P-value=0.00001) and those who received IPTs at ANC revisit (F-statistics=5.17, P-value=0.0009) but not in the proportion of pregnant women with anemia. None of the indicators for malaria in pregnancy correlated with anemia rate during the study period. Geographical variations observed in the measured indicators were discussed.

Conclusion: This study observed disparity in proportion of pregnant women assessing ANC services and in the proportion of those that utilized malaria commodities from 2014 to 2018. Residential variances, and geographical locations were detected in the consumption of ANC services. Areas farthest from the state capital, such as the Atlantic Ocean coastline in the south and the Savannah ecological zone in the north seemed to have low utilization of ANC. The State Malaria Elimination Program should be supported strongly in terms of technical and financial assistance to improve ANC service utilization throughout the State. The disparity in ANC accessibility in Ondo State will further reduce maternal and infant morbidity and mortality as well as improve the socio-economic living standards of the people.

Keywords: antenatal care, malaria in pregnancy, indicators, District health information management, National health information management system, geographical variations, Ondo State malaria elimination program

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Abbreviations: ANOVA, analysis of variance; ANC, antenatal care; DHIS, District health information system; FMOH, federal ministry of health; IPT, intermittent preventive treatment; LGA, local Government authorities; LLINs, long-lasting insecticide treated nets; M&E, monitoring and evaluation; MIP, malaria in pregnancy; NHIMS, National health information management system; RBC, red blood cells; SMOH, State ministry of health; SP, sulphadoxine-pyrimethamine; STI, sexually transmitted infections

Introduction

During pregnancy, adequate care is necessary for the maintenance of good health of the mother and consequently, the development of and preparation for the birth of the baby. It is also a critical period to initiate healthy actions, behavioral pattern and child-nurturing skills. Antenatal care (ANC) is a major public health intervention aimed at ensuring safe pregnancy outcomes.[1]

Improving maternal health resulting in a reduction of maternal mortality and morbidity relates to the third of 17 goals of the United Nations Sustainable Development Goals. Receiving antenatal and postpartum care in healthcare facilities by trained medical personnel are some of the key interventions that support this goal.[2] In 2007, the World Health Organization (WHO) promoted an integrated approach to ANC called the focused ANC model, emphasizing quality over quantity of visits, focusing on the maintenance of a normal healthy pregnancy, preventing obstetric complications and the early recognition and management of complications.[3–5] Apart from essential interventions in ANC such as identification and management of preeclampsia, administering tetanus toxoid immunization, screening for and management of infections including HIV, syphilis and other sexually transmitted infections, pregnant women are also routinely examined for malaria parasitemia. Addressing malaria is a crucial intervention as complications such as anemia, cerebral malaria, pulmonary edema, hypoglycemia, puerperal sepsis, miscarriage, premature delivery, low birth weight, congenital malaria infection, and/or perinatal death are conceivable sequalae of malaria infection during pregnancy.[6–12]

Malaria-induced anemia can be an aggressive clinical condition in pregnancy because hemoglobin level diminishes secondary to an expansion of plasma volume relative to the concentration of red blood cells (RBC), particularly in the second trimester.[13] According to WHO,[14] anemia increases when there is elevated number of malaria cases and the incidence of anemia during pregnancy is aggravated in malaria high-transmission settings. Further, studies have shown that adverse effects of P. falciparum infection in pregnancy are most pronounced for women in their first pregnancy.[15,16] In an earlier report, the WHO estimated that between 200,000 and 500,000 pregnant women in sub-Sahara Africa develop severe anemia as a result of malaria.[17] Anemia, defined by the World Health Organization (WHO) as low blood hemoglobin (Hb) concentration level in the body, which decreases oxygen-carrying capacity of RBC to tissues,[18,19] is the most common complication related to pregnancy, affecting almost half of pregnant women worldwide.[20] Low birth weight (LBW) is another deleterious effect of malaria directly on the mother and consequently on the fetus. Malaria parasites not only destroy the RBC to cause hemolytic anemia, but also to induce placenta fibrosis which averts maternal-fetus transfer of adequate nutrients causing fetal distress, intrauterine growth retardation (IUGR), low birth weight (LBW), abortion, stillbirth, fetal death or, in rare cases, congenital malaria or possibly congenital malformation.[13] To tie all up together, good ANC not only prevents or at least minimizes complications on pregnancy, it also links the woman and her family with the formal health system, increases the chance of using a skilled attendant at birth and contributes to good health through the life cycle. Therefore, inadequate ANC puts the woman and her unborn child in jeopardy and also breaks a critical link in the continuum of care. Antenatal care (ANC) coverage is considered a success story in Africa, since over two-thirds of pregnant women (69 percent) have at least one ANC contact. However, in Nigeria, the recommended minimum of four times ANC attendance is underutilized.[21] In this study, dataset from Ondo State Malaria Elimination Program Demographic and Health Information System 2014 to 2018 was analyzed with the objectives of identifying possible disparities in the utilization of ANC services, accessing malaria commodities among people in different ecological zones of the state such as the southern Atlantic Ocean coastline, the middle rain-forest zone and the northern Savannah area and evaluating the impact of anemia status of pregnant women in the state.

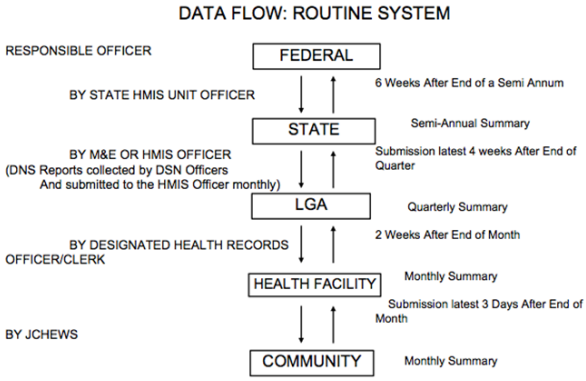
Materials and methods

The study was a retrospective analysis of cohorts derived from District Health Information System 2.0 (DHIS) between 2014 and 2018. The database comprises qualitative and quantitative encounter data of patients' visits at healthcare facilities. The DHIS is a software that shows all health information at the different tiers of organization unit at different periods. When the website is logged into, it displays a dashboard from which the application icon is clicked to reveal an array of further applications. For this study, the pivot table icon was clicked, and a dropdown menu of different categories, timeframe and location were displayed. The data thus retrieved were proportion of women who had (i) at least one (1) ANC visit, (ii) at least four (4) ANC visits, (iii) at least one (1) ANC visit before 20 weeks of pregnancy (iv) ANC revisits receiving IPT2 (v) ANC first visit receiving LLNs and (vi) anemia rate. In Ondo State, the DHIS contained data for up to 100,000 patients with 15 datapoints per patients and 50 facilities.

Data collection, flow and reporting mechanism paper and electronic

Data collected and stored in the National Health Management Information System (NHMIS) include patient specific health data captured at healthcare facilities by local government authorities (LGA) health department. The information was uploaded to a central DHIS server viewed at the State, Federal or Global level with a feedback flow in reverse (Figures 1) (Figure 2).

Figure 1 Routine system data flow.



Source: NHMIS policy document, 2006.

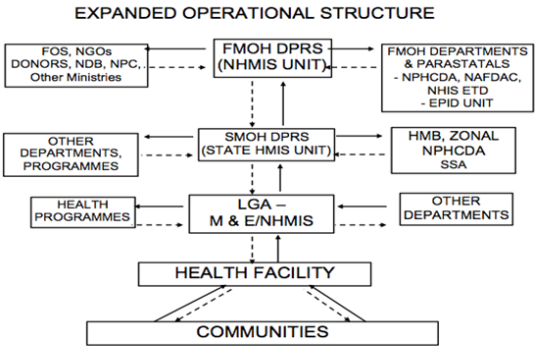


Figure 2 Expanded operational NHMIS structure.
Source: NHMIS policy document, 2006.

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Community to healthcare facilities

All implementing partners and government-supported community-based healthcare workers within the catchment areas of Primary Health Care (PHC) reported community-based data to the PHC on a monthly basis. Community-based reporting was done using designated reporting tools. Community-based reports were submitted to the healthcare facilities within the first five days of the new month.

Healthcare facilities to LGA

Data were collated from daily registers using the harmonized NHIS summary forms collected from healthcare facilities and submitted to recording officers for internal data validation prior to submission to LGA M&E focal person. The healthcare facilities recording officer signed off on the internal data submitted to the LGA M&E officer as an agreement that the data was a true reflection of the situation within the catchment area.

Reporting from secondary and tertiary facilities to LGAs

All data captured by secondary and tertiary facilities were done using the harmonized tools from Federal Ministry of Health (FMOH). Secondary and tertiary healthcare facilities entered monthly summary data into the DHIS platform electronically. The secondary and tertiary facilities sent monthly summary forms to the designated LGA where they are located.

LGAs to DHIS

The State Ministry of Health (SMOH), in collaboration with other stakeholders, conducted monthly review meetings to validate data prior to entry into the National DHIS instance. Members of LGA M&E team were responsible for data entry into the DHIS. Data entry at the LGA level to the National DHIS was done on or before the 15th of the new month.

Study area

The study area, study population and infrastructure have already been reported in a previous publication.[22] Ondo State is located in the Southwest geo-political zone of Nigeria (Figure 3), with the Atlantic Ocean on the southern border, the states of Ogun and Osun on the southwest border, the states of Ekiti and Kogi to the north and Edo state to its east. For the purpose of this paper, 4 LGAs–Ilaje, Ese-Odo, Okiti-pupa and Irele, were grouped into the Atlantic Ocean Coastline ecological zone; another four LGAs in the northernmost part of the state–Akoko Southwest, Akoko Southeast, Akoko Northwest and Akoko Northeast were grouped into the Savannah ecological zone.; while the remaining ten LGAs–Odigbo, Ondo West, Ondo East, Idanre, Ose, Owo, Akure North, Akure South, Ifedore and Ile-Oluji/Okeigbo–were categorized as rainforest ecological zone.

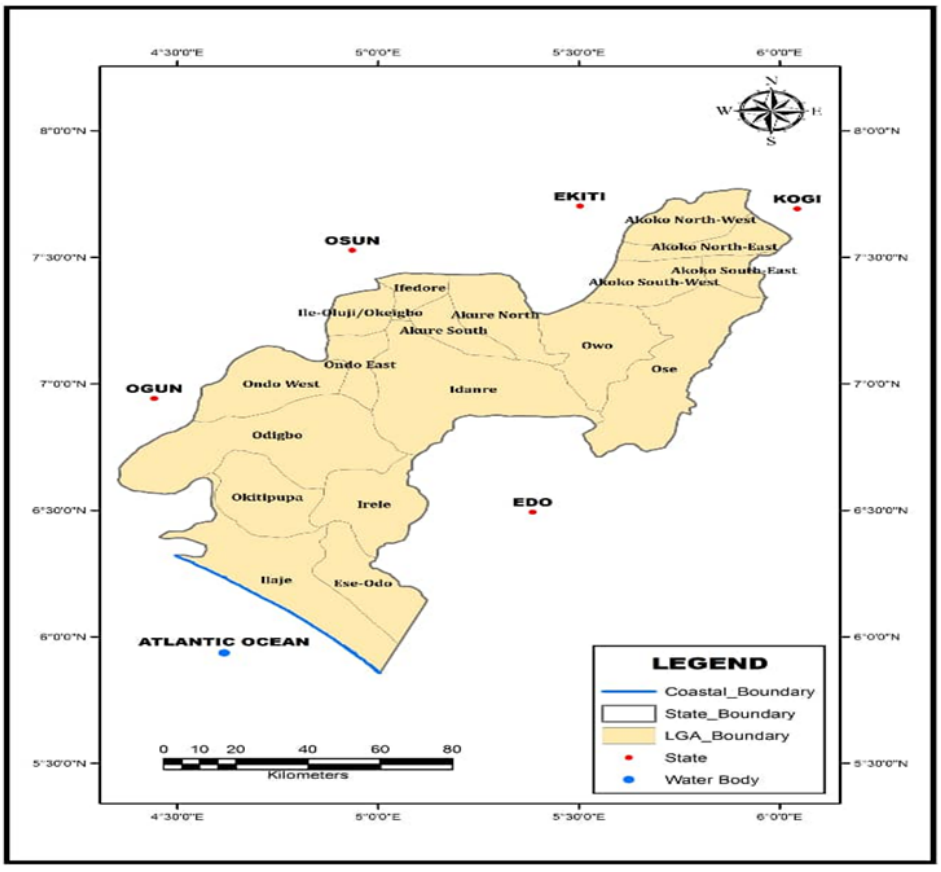

Figure 3 Map of Ondo State with its 18 LGAs.

Sampling inclusion and exclusion criteria, ANC visits

The data for all ANC visits in the state during the study period was retrieved. All LGAs were included in the study because the health facilities in each of the LGAs was mostly government-owned. Data from private and from Faith-based health facilities were excluded from the study.

Outcomes measured

Outcomes were based on the proportion of women who had at least 1 ANC visit, 4 ANC visits and those that had 1 ANC visit before the 20th gestational week. To evaluate, the proportion of pregnant women who received long-lasting insecticide treated nets (LLINs) during the first ANC visit and intermittent preventative treatment (IPT) at any ANC revisit as well as prevalence of anemia was disaggregated according to geographical location before analysis.

Statistical analysis

Data were analyzed using Stata-13 statistical software. The mean±standard deviation and various rates were determined for continuous variables. Students t-test and chi squared analysis were used to compare differences of two variables and Analysis of Variance (ANOVA) for more than two variables. Differences of means were considered significant at a 95% confidence limit i.e. when P-values were below 0.05. Association was determined by computing logistic regression analysis of LGAs with other exposure variables at 95% confidence interval. Data were presented as Tables, graphs and charts.

Results

A 5-year data generated from 2014 to 2018 is reported in this study.

Proportion of women who had at least 1 ANC visit, 2014-2018

There was no significant difference (F-statistics=1.98, P-value=0.10) in the overall mean proportion of women who had at least 1 ANC visit from 2014 (35.1±14.7) through 2015 (35.1±14.9), 2016 (40.9±26.6), 2017 (39.1±14.8) and 2018 (26.8±12.1). However, there was a significant difference (t=2.05, P-value=0.02) in the mean (± sd) proportion of women who had at least 1 ANC visit in 2016 (40.9±26.6) compared to 2018 (26.8±12.1) throughout the 18 LGAs in the state. Akure South, the urban state capital LGA, had the highest proportion in 2014 (71.1%), 2015 (80.0%) and 2018 (64.8%) of pregnant women who had at least 1 ANC. Data appraised on the ecological zone of the state showed that pregnant women in rainforest ecological zone, had the highest mean proportion of women who had 1 ANC visit in 2014 (38.5%), 2015 (38.5%) and 2016 (38.9%) before decreasing in 2017 (37.2%) and further in 2018 (29.1%). In the Savannah ecosystem, the mean proportion of pregnant women who had a minimum of 1 ANC visit was low throughout the study period, except in 2014 (35.3%). The mean proportion of pregnant women on the Atlantic Ocean coastline was mostly in-between those of the two other ecosystems (Table 1) (Figures 4) (Figure 5).

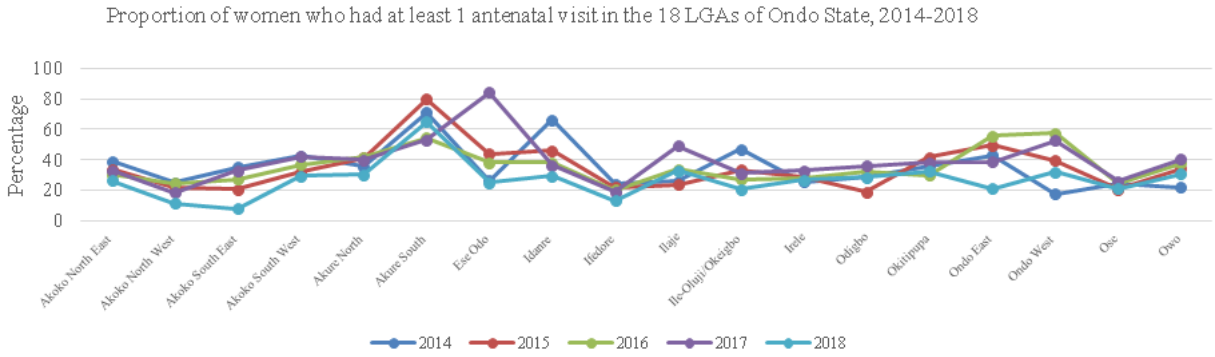

Figure 4 Proportion of women who had at least 1 antenatal visit in the 18 LGAs of Ondo State, 2014-2018.

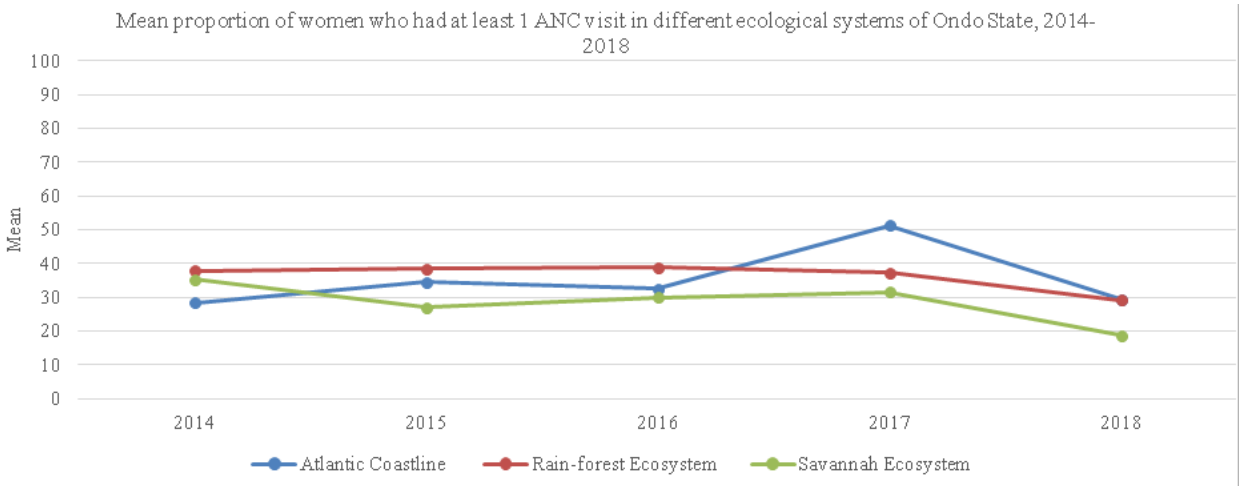

Figure 5 Mean proportion of women who had at least 1 ANC visit in different ecological systems of Ondo State, 2014-2018.

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Proportion of women who had at least 4 ANC visit, 2014-2018

There was an overall noteworthy variance (F-statistics=2.88, P-value=0.03) in the mean proportion (20.3±14.1) of women who had at least 4 ANC visits in all the LGAs between 2014 and 2018. The mean of this proportion was lowest in 2018 (14.0±10.6) and highest in 2015 (25.9±18.9). There was an overall significant variation (t=2.02, P-value=0.03) which was probably driven by a reduction in the mean proportion of women with at least 4 ANC visit in 2016 (16.4±6.5). From 2014 through 2018, Akure South LGA, the urban epicenter where the state capital is located, had the highest proportion of women who had a minimum of 4 ANC visits in 2014 (71.4%), 2015 (80.1%), 2017 (36.2%) and 2018 (52.2%) (Figure 6). The overall mean proportion of women who had at least 4 ANC visits on the Atlantic Coastline area and the Savannah ecosystem were lower than the mean proportion in the rain-forest ecological zone throughout the study period except in 2017 (21.3%) when the mean proportion was highest on the Atlantic Ocean coastline (Table 1) (Figure 7).

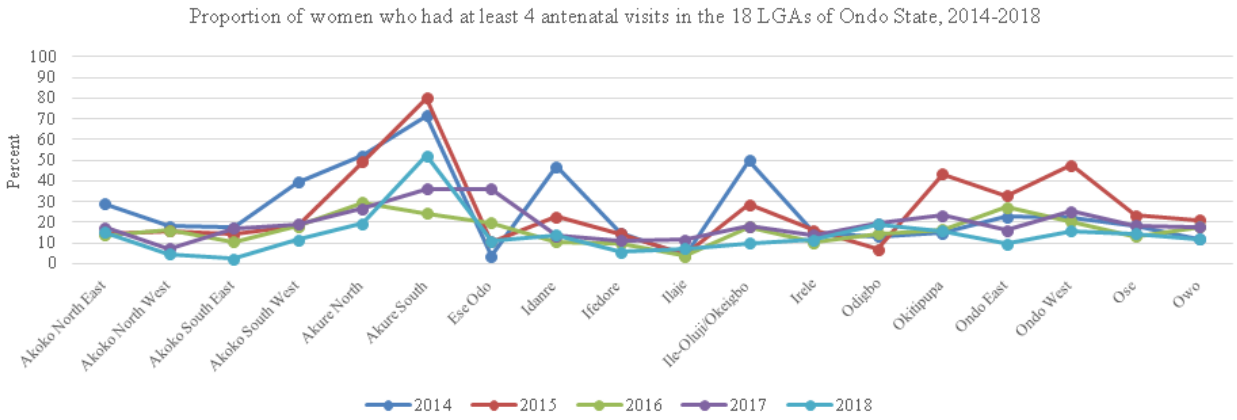

Figure 6 Proportion of women who had at least 4 antenatal visits in the 18 LGAs of Ondo State, 2014-2018.

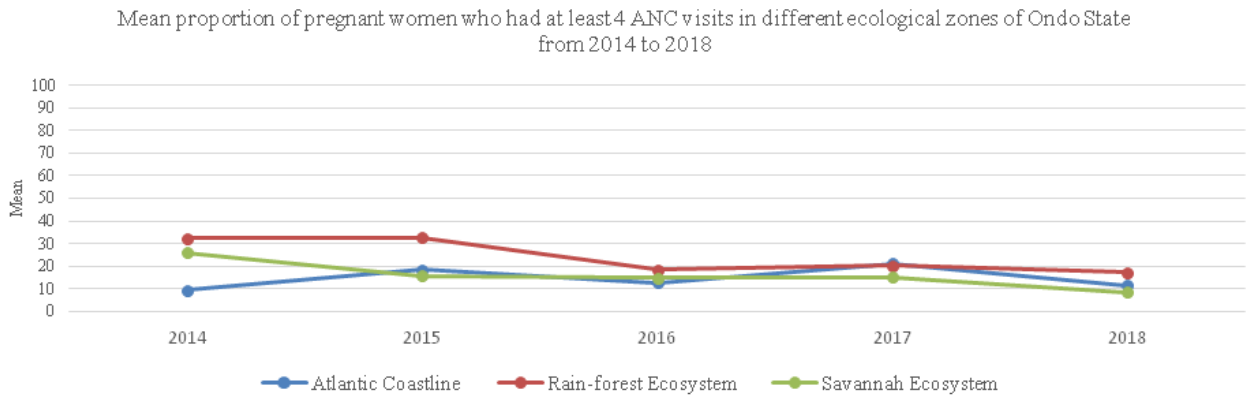

Figure 7 Mean proportion of pregnant women who had at least 4 ANC visits in different ecological zones of Ondo State from 2014 to 2018.

There was a significant difference in the mean proportion of women who had at least 1 ANC before 20 weeks of pregnancy in 2014 (F-statistics=4.19, P-value=0.04) on the Atlantic Ocean coastline (35.9%), Rain-forest ecosystem (However, there was no significant difference.

Proportion of women who had at least 1 ANC visit before 20 weeks of pregnancy, 2014-2018

There was significant variation (F-statistics=5.63, P-value=0.0005) in the overall mean proportion of women who had 1 ANC visit before 20 weeks of pregnancy between 2014 through 2018. The mean of this proportion was lowest in 2014 (32.6±9.1) and highest in 2017 (45.4±10.7), with a statistically substantial variation (t=-2.73, P-value=0.005). In 2014, the proportion of women who had at least 1 ANC visit before 20 weeks of pregnancy in rural LGAs such as Akoko Southeast was 15.0% compared to 44.1% in Akure South, an urban LGA where the state capital is located. However, by 2018, the proportion of women who had a minimum of 1 ANC visit before 20 weeks of pregnancy in Akoko Southeast had increased to 37.7% but had reduced to 34.1% in Akure South LGA (Figure 5a). In 2014, there was a noteworthy difference (F-statistics=4.19, P-value=0.04) in the mean proportion of women who had at least 1 ANC visit before 20 weeks of pregnancy on the Atlantic Ocean Coastline (35.9%), in the Rain-forest ecosystem (35.3%) and in the Savannah ecosystem (22.7%) respectively. There was no such observable significant difference at any other point in time during the study period (Table 1) (Figure 8) (Figure 9).

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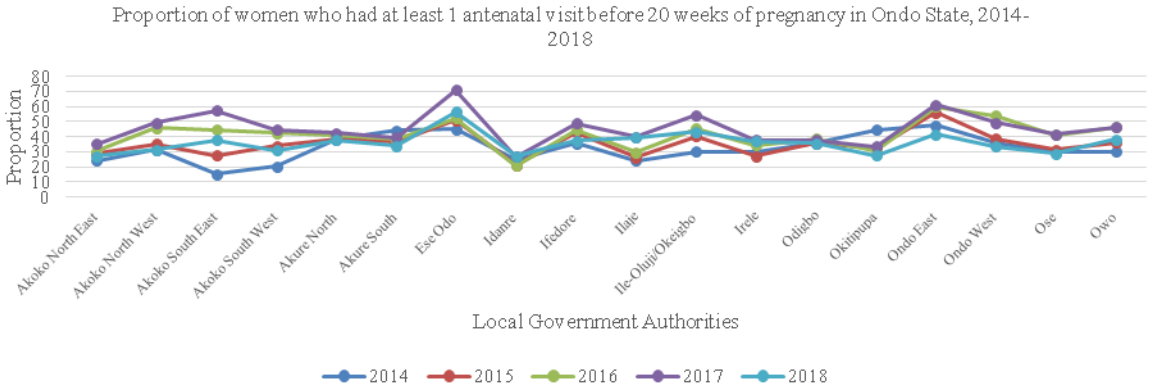

Figure 8 Proportion of women who had at least 1 antenatal visit before 20 weeks of pregnancy in Ondo State, 2014-2018.

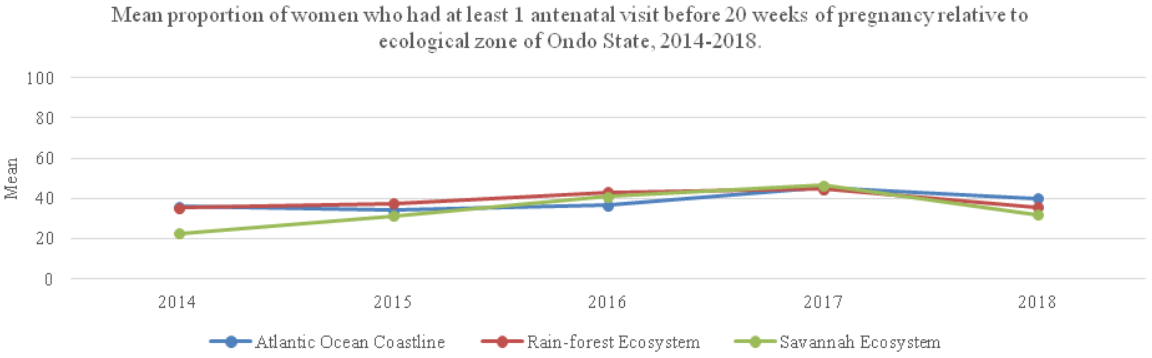

Figure 9 Mean proportion of women who had at least 1 antenatal visit before 20 weeks of pregnancy relative to ecological zone of Ondo State, 2014-2018.

In 2014, there was a significant dofference in the mean proportion of women who had at least 1 ANC visit before 20 weeks of pregnancy (F-statistics=4.19, P-value=0.04) but not in 2015 (F-statistics=0.83, P-value=0.46), 2016 (F-statistics=0.59, P-value=0.57), 2017 (F-statistics=0.04, P-value=0.96) or 2018 (F-statistics=1.39, P-value=0.28).

Proportion of pregnant women who received long-lasting insecticide treated nets (LLINs) at first ANC visit, received intermittent preventative treatment (IPT) at any ANC revisit and prevalence of anemia, 2014-2018 (Table 2).

Long-lasting Insecticide-treated Nets (LLINs) and Intermittent Preventive treatment are two malaria commodities that the WHO recommended for malaria prevention in pregnancy. While there was no substantial difference in the mean proportion of women who received LLINs yearly in each of the ecological zones of the state, there was an overall significant variation (F-statistics=29.52, P-value=000001) throughout the study period. From 2014 to 2018, this mean proportion increased from 23.1±18.9% to 64.7±6.5 on the Atlantic Coastline LGAs; from 17.6±19.0 to 60.4±27.2 in Rain-forest ecological zone and from 7.8±9.0% to 74.7±27.2% in the Savannah ecological zone of the state. There was also a significant difference (F-statistics=5.17, P-value=0.0009) in the proportions of women who revisited at ANC for IPT2 from 2014 to 2018. Among the three ecological zones, the Atlantic Ocean coastline had the highest mean proportions of women revisiting for IPT2 in 2017 (44.1±14.0; F-statistics=6.70, P-value=0008) and 2018 (43.7±17.3; F-statistics=7.01, P-value=0.007). Throughout the study period, there was no noteworthy alteration (F-statistics=0.41, P-value=0.80) in the proportion of pregnant women with anemia.

Correlation study (Tables 3–6)

Over the study period, indicators of malaria in pregnancy were responsible for a significant 56.1% (P-value=0.000001) variation observed in the proportion of women with anemia (Table 3). However, in 2017, the indicators of malaria in pregnancy was responsible for an insignificant 50.8% (P-value=0.0699) of the variation observed in the anemia rate. The proportion of women who had at least 1 ANC visit positively and significantly correlated with anemia rate only in 2014 (r=0.20, P-value=0.04) and in 2018 (r=0.56, P-value=0.03). A positive and significant correlation with anemia rate was also observed in the proportion of women who had at least 4 ANC visits in 2014 (r=0.20, P-value=0.02) (Table 4).

The indicators of malaria in pregnancy provided significant 63.3% (P-value=0.0058), 56.1% (P-value=0.000001) and 74.6% (P-value=0.0005) explanations of the variations observed in the anemia rate on the Atlantic Ocean coastline, in the Rain-forest and Savannah ecological zones respectively (Table 5). A significant and positive correlation was observed between proportion of women with anemia and the proportion of women who had at least 4 ANC visits (r=0.47, P-value=0.03) on the Atlantic Ocean coastline. A significant and positive correlation was also observed between the proportion of women with anemia and the proportion who had at least 1 ANC visit before 20 weeks of pregnancy (r=0.41, P-value=0.04).

Discussion

One of the critical components of the Sustainable Development Goals (SDGs) is the Universal Health Coverage (UHC). The SDGs contain a specific health goal which is: "Ensure healthy lives and promote wellbeing for all at all ages" stressing that all people receive quality, essential health services they need, without being exposed to financial hardship. ANC services open a window of opportunity for pregnant women to receive essential health services for themselves and their baby and improve birth outcomes.[23,24] This study evaluated the impact of preventive interventions against malaria during antenatal care of pregnant women in Ondo State, Southwest Nigeria from 2014 to 2018. Our study showed a somewhat downward trend in the proportion of women who had at least 1 ANC visit over the study period. Expectedly, our findings were not consistent with the findings of other studies conducted over a shorter time period and among smaller communities. However, the maximum proportions of women who had at least 1 ANC visit in 2014 and 2015 were 71.1% and 80.0% respectively. This was lower than the 99.34% reported from a Ghana study.[25] Similarly, the maximum proportion that had at least 4 ANC visits in 2014 and 2015 were 71.4% and 80.1% respectively which were comparable to the report from the same Ghana study[25] and higher than the 40% and 46% reported from Bauchi State in Northern Nigeria and Cross River State in Southern tip of Nigeria bordering Cameroon Republic.[26] Barriers to the utilization of ANC in sub-Sahara Africa have imposed major human and economic loss to that part of the continent. A Nigerian study[27] reported that rural dwellers were in the majority of those who do not use ANC, which confirms our finding that rural LGAs such as Ondo West LGA had the least proportion of women who had at least 1 ANC visit in 2014 and Akoko Southeast in 2018. Other possible barriers that mitigate against the use of ANC include educational status, distance from health facility, presence or absence of husband, influence of other relatives and socio-economic status of the pregnant woman.[27,28] The Rain-forest ecological zone of Ondo State seemed to have higher proportion of pregnant women who had a minimum of 4 ANC visits and who had at least 1 ANC visit before 20 weeks of pregnancy during the period of study. This may be due to the location of the state capital, easy access to mass media, urban nature of some LGAs and their influence on surrounding LGAs. It is also possible that Maternal and Child Health Programs of some Partners in Health concentrated in the urban areas of the state leaving out the rural areas. Lack of awareness of danger signs in pregnancy is also a possible reason why women do not visit ANC in early pregnancy. An earlier study reported that approximately 2.2% women responded that ANC is not important during pregnancy and another 8.7% were not sure of the importance of ANC while about 76% and 79% respectively, disagreed that bleeding and high blood pressure were obstetric danger signs.[29] These responses might be related to poor services some women received at ANC and they in turn informing other pregnant women to avoid ANC, though their proportion is small. However, the services provided at ANC should be of high quality that would induce or entice pregnant women to want to utilize ANC facilities.

Malaria commodities such as Long-lasting Insecticide-treated Nets (LLINs) and Intermittent Preventive Treatment (IPT) using Sulphadoxine-Pyrimethamine (SP) are given to women as incentives and rewards for visiting ANC clinics. Although the ownership of LLINs has increased tremendously, from a mean of 16.6±17.2 in 2014 to 64.5±23.7 in 2018, nevertheless the utilization of this commodity is still low[22] and, as stated in this study, has no strong association with anemia rate. Also, the overall use of IPT using SP has improved though not many pregnant women are gaining access to this commodity. A general decline in all proportions of women utilizing ANC services was noted from 2017 to 2018. This may be due to the fiscal dispensation in those years as funds were not released on time for the state to run most of its programs which probably contributed to weaken the health system more. According to Bryan et al.,[30] three mutually reinforcing problems constitute the most important barriers to ANC visit: (i) access to primary care (ii) acute shortage of health workers and (iii) systemic weakness

Study limitations

This study has some inherent limitations that deserve discussion. First, there might have been a bias in sample size used for the study. Also, data was captured electronically and any inter- or intra-personal error at the stage of initial data entry may be difficult to detect, though trained data officers were employed for data collection. Another important limitation is that the study did not collect ANC data from private or Faith-based health facilities since not all these facilities report their data to DHS. Finally, data from this study was limited to a certain part of the country and may not be used to generalize health information on pregnant women for the entire country.

Conclusion

This descriptive study revealed an overall low mean proportion of women who had at least 1 ANC visit, who had at least one ANC visit before 20 weeks of pregnancy and an even lower proportion who had a minimum of 4 ANC visits in the study period. The northern part of the state which has Savannah ecological system recorded the lowest while the Rain-forest ecological system recorded the highest proportion of women who had at least 1 ANC visit and a minimum of 4 ANC visits throughout the study period except in 2017. Geographical, ecological and rural-urban variations are apparent in the utilization of ANC services and malaria commodities in the state. There seemed to be low impact of the malaria program on anemia status of pregnant women in the state. Interventions aimed at addressing factors identified in this study may help to improve the utilization of ANC services both in rural and urban Nigeria. Such interventions need to focus more on reducing socioeconomic, geographic and regional disparities in access to ANC in Nigeria.

Recommendations

Stakeholders and decision-makers on maternal and child health including pregnancy and delivery should prioritize improvement of ANC services in rural settings, find out, through studies, why women are not fully patronizing ANC services and undertake regular resource (personnel, funding, materials) record to prevent stock outs and motivate the providers to improve their clinical practice. The state government needs to prioritize investments in her health systems and establish procedures to guarantee the delivery of high-quality services at all ANCs across the state. When all these are achieved, there will be improved perception, suitability, sustainability and utilization of government ANC as well as the establishment of a strengthened health care system in the state.

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Conflicts of interest

The authors declare there are no conflicts of interest.

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