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INTERMITTENT PREVENTIVE TREATMENT AND BED NETS UPTAKE AMONG PREGNANT WOMEN IN KENYA

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ABSTRACT

***Background*: Malaria in pregnancy is a preventable disease which results in poor pregnancy outcomes. The use of intermittent preventive treatment in pregnancy (IPTp) and long-lasting insecticide treated nets (LLINs) have been shown to reduce maternal malaria episodes.**

***Objectives*: To describe i) The proportion receiving first and second dose (IPTp1 and 2) in malaria endemic zones, ii) proportion receiving IPTp 1 and 2 stratified by coast and lake endemic zones iii) proportion receiving LLINs, stratified by coastal and lake endemic zones.**

***Design*: A retrospective descriptive study.**

***Setting*: Lake and Coast region malaria endemic zones.**

***Subjects*: Pregnant women.**

***Results*: IPTp2 dose during an ANC revisit fell by 29% between 2012 and 2015, with 76% receiving an IPTp2 in 2012 and only 47% receiving it in 2015. More pregnant women in Coastal endemic areas received IPTp2 compared to Lake, with 88% versus 73% in 2012, and 53% versus 44% in 2015, respectively.There was steady increase in bed net usage from 69% and 54% in 2012 to 96% and 95% in 2015 for lake and coast endemic zones respectively. The uptake of LLINs was 15% higher in the lake region compared to the coastal endemic region in 2012 and significantly declined over the five years to 6%, 7% and 1% in 2013, 2014 and 2015, respectively.**

***Conclusion*: Our study found that there has been a significant decline from 2012 through 2015, in the number of pregnant women in Kenya receiving recommended malaria prophylaxis in the regions of highest malaria burden. However, the coverage of LLIN has consistently improved over the same period.**

INTRODUCTION

Malaria in pregnancy is a preventable disease which results in maternal mortality and poor birth outcomes in sub-Saharan Africa(1). Evidence has demonstrated that pregnant women and their unborn babies are more vulnerable to both symptomatic and asymptomatic forms of malaria(2). Primagravida are more prone to malaria than multigravida women, because they have not developed placental immunity(2). During pregnancy, the risk of malaria infection is also highest in the first trimester secondary to loss of immunity, which later rebounds to mount a satisfactory immune response during the last trimester(3). Furthermore, prenatal exposure to malaria parasites lowers development of protective immunity in infants, shortening the time to a first incidence of malaria and increased frequency of malaria in the first two years of life(4,5).

Because of these increased risks, prevention of malaria during pregnancy is crucial for both the mother and infant. The use of intermittent

preventive treatment in pregnancy (IPTp) and long-lasting insecticide treated nets (LLINs) have been shown to reduce maternal malaria episodes which are associated with maternal and foetal anaemia, placental parasitaemia, low birth weight, and neonatal mortality(7).

Sulfadoxine-pyrimethamine (SP) is the current IPTp of choice in Kenya and is given to reduce the risk of malaria infections and subsequent complications. There have been concerns that SP provides limited benefit to mothers in areas of east Africa with high rates of resistance. However, recent studies have shown continued benefit for both primigravid and multigravida(3).

In 2012, the World Health Organisation (WHO) recommended that at least three IPTp doses be provided to pregnant women attending antenatal care visits (ANC) in all malarious areas before delivery(6). Nevertheless, in 2014 the WHO reported that only 52%, 40% and 17% of all pregnant women attending ANCs received their first, second and third IPTp doses, respectively (7). These statistics suggest there a significant gap in care when only 15 million of 28 million pregnancies at malaria risk were protected in 2014 (7).

Provision of IPTp to pregnant women in Kenya has routinely been carried out through ANC attendance at all levels of the health system. The current Kenya malaria strategy (KMS 2009-2018 revised 2014) recommends the provision of at least three doses of SP to pregnant women at every successful ANC visit after the first trimester.

The frequency of IPTp provision within Kenya is routinely reported as aggregate data to the Kenya National Malaria Control Programme (KNMCP). However, there have been no published reports of whether the scale up of this crucial malaria prevention tool is being successfully implemented within the country.

The goal of this study is to describe among women attending ANC visits between 2012-2015, trends in: i) proportion receiving first and second dose (IPTp1 and 2) in malaria endemic zones, ii) proportion receiving IPTp 1 and 2 stratified by coast and lake endemic zones iii) proportion receiving LLINs, stratified by coastal and lake endemic zones.

MATERIALS AND METHODS

Study design: This was a retrospective descriptive review of de-identified aggregate programme data collected by the NMCP in Kenya between the years 2012 to 2015. Malaria programme data is routinely reported through the MOH district health information software (DHIS2) platform nationally.

Setting : Kenya is a developing state which lies on the eastern side of sub-Saharan Africa region. In 2009, Kenya's population was projected to be approximately 39.4 million (8). A quarter of the entire population consists of women of reproductive age (15 to 49 years). Kenya has four malaria epidemiological zones: i) endemic zones with stable malaria include the lake (areas around Lake Victoria in western Kenya) and coastal endemic regions (along the Indian ocean coastline), ii) seasonal transmission zones in the arid and semi-arid areas of northern and south-eastern regions, iii) epidemic prone regionsof western highlands where malaria transmission is seasonal, and iv) low risk malaria regions of the central highlands, including Nairobi.

Prevention of malaria in pregnancy remains a key healthcare priority in the endemic regions of Kenya and it is recommended that all pregnant women are given IPTp prophylaxis who reside in these areas of the country.

Study sites: The two malaria endemic regions in Kenya have an approximate population of 12 million (30% of the country's population) comprised of seven counties in the Lake region and six counties in the Coastal region(9). In 2014, the reported malaria morbidity in these regions ranged from 5% and 38% for Coast and Lake endemic regions, respectively (9). The regions have benefitted from continuous insecticidal residual spraying (IRS) and mass provision of bed nets every three years, the last being 2014/2015. In addition, IPTp is recommended for all pregnant women.

Study population: The study included aggregate data on all pregnant women who attended ANC visits in public health facilities in the two malaria endemic regions of Kenya between the period January 2012 to December 2015, and were recorded and reported through the DHIS2 to the NMCP.

Data collection: All dispensed IPTp drugs to pregnant women during ANC visits are captured at the point of service delivery and entered into the MOH 405 register. All entries summarised onto a workload form which is then delivered to the sub-county health records information officer (HRIO) before the 15th day of every month. The information officer reviews the data and enters it into a data base. In the event of observing any discrepancies in this form, it is returned to health facility level for rectification. All aggregated sub-county level data is then reviewed by the sub-county health management team before it is submitted nationally through the district health information system software (DHIS2).

During the validation process, the particular healthcare provider may be reached by mobile phone or a supervisory visit by the sub-county health management team for verification. Only the sub-county HRIO has access to the DHIS2 platform, therefore officials from county-level or the national level supervisors must contact him regarding any

queries or amendments required in the data set. Biannually, data quality is assessed by county and national officers for completeness.

Data analysis: Data were downloaded from the DHIS2 and analysed in Microsoft Excel (Seattle, Washington) for proportions in uptake of IPTp and distribution of LLINs in the two malaria endemic zones.

Ethical approval: Ethical approval was granted by the ethics review boards of Médecins San Frontières (Geneva, Switzerland) and Moi University and Teaching Hospital (Eldoret, Kenya). Permission to use the data for this study was granted by the Kenya MOH.

RESULTS

The proportion of pregnant women who lived in the malaria endemic Highland or Coastal regions of Kenya from 2012-2015 and were eligible to receive IPTp1 and IPTp2 are shown in Figure 1. There was a relatively steady decline in women attending their first ANC visit who received IPTp1 from 81% in 2012 to 56% in 2015. Likewise, pregnant women who received an IPTp2 dose during an ANC revisit fell by 29%,with 76% receiving an IPTp2 in 2012 and 47% receiving it in 2015. Over the four years reported, there was also a growing failure in the proportion of women receiving the IPTp2 dose compared to the proportion taking an IPTp1 dose. The subsequent yearly fall in IPTp2 dosing from 2012-2015 was 5%, 6%, 8% and 9%, respectively.

Figure 2 show the trends in proportions of first-visit ANC attendees who received the IPTp1 dose, compared between Lake and Coastal endemic regions. Pregnant women in the Coastal compared to Lake epidemic regions were consistently more likely to receive the first IPTp dose across all four years reported. Additionally, both groups of women were given the first IPTp less than 60% of the time in 2015, in comparison to 2012-2014.

Comparison of pregnant women by malaria region who received their second IPTp doses are shown in Figure 3. More pregnant women in Coastal endemic areas received IPTp2 compared to Lake, with 88% versus 73% in 2012, and 53% versus 44% in 2015, respectively.

The number of pregnant women who reported LLIN uptake from 2012-2015 is shown in Figure 4. There was steady increase in bed net usage from 69% and 54% in 2012 to 96% and 95% in 2015 for lake and coast endemic zones respectively. The uptake of LLINs was 15% higher in the lake region compared to the coastal endemic region in 2012 and significantly declined over the five years to 6%, 7% and 1% in 2013, 2014 and 2015, respectively.

Figure 1

Proportion of ANC attendees who received IPTp1 and 2 in the malaria endemic zones of Kenya, 2012-2015
ANC = antenatal care; IPTp = intermittent preventive treatment in pregnancy

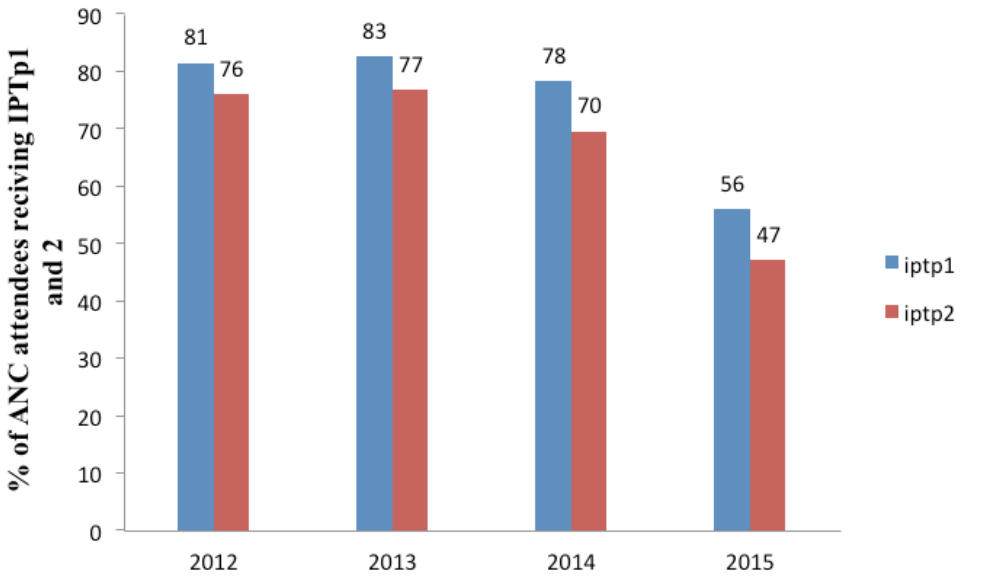
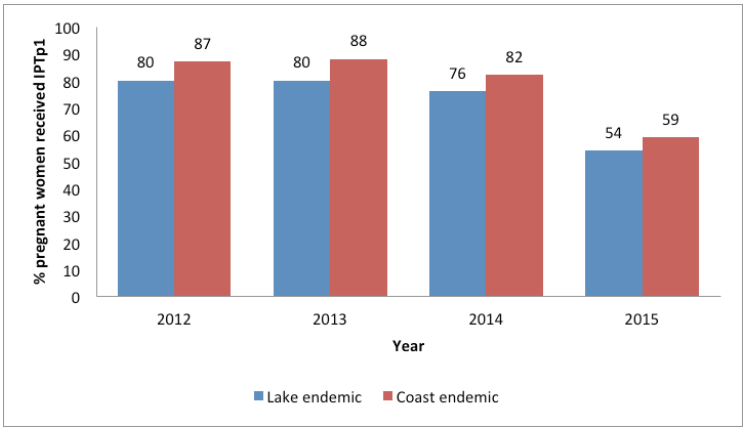


Figure 2 shows the trends in proportions of first visit ANC attendees who received the IPT$_p$1 dose, compared between lake and coastal endemic regions. Preganant women in coastal compared to lake epidemic regions were consistently more likely to receive the first IPT$_p$ dose across all four years reported. Additionally, both groups of

women were given the first IPT$_p$ less than 60% of the time in 2015, in comparison to 2012-2014.

Figure 2

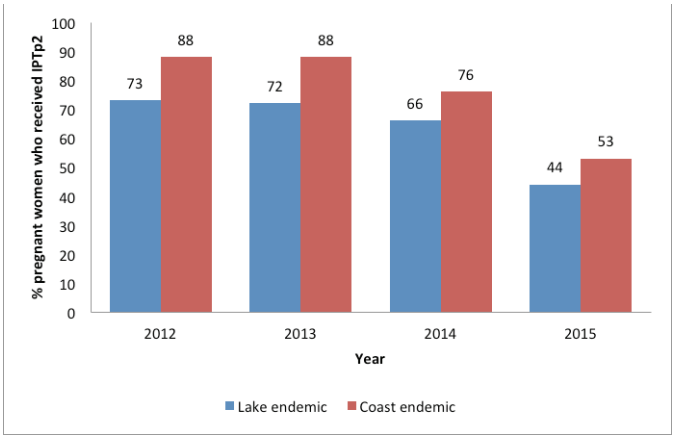
Proportion of first visit ANC attendees who received an IPTp1 dose stratified by malaria endemic regions of Kenya, 2012-2015. ANC = antenatal care; IPTp = intermittent preventive treatment in pregnancy



Comparison of pregnant women by malaria region who received their second IPT$_p$ doses are shown in figure 3. More pregnant women in coastal endemic areas received IPTp2 compared to lake, with 88% versus 73% in 2012 and 53% versus 44% in 2015, respectively.

Figure 3

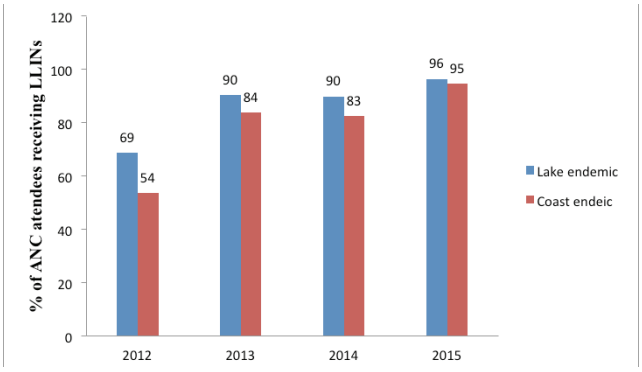
Proportion of follow-up visit ANC attendees who received an IPTp2 dose stratified by malaria endemic regions of Kenya, 2012-2015. ANC = antenatal care; IPTp = intermittent preventive treatment in pregnancy



The number of pregnant women who reported LLIN uptake from 2012-2015 is shown in Figure 4. There was steady increase in bed net usage from 69% and 54% in 2012 to 96% and 95% in 2015 for lake and coast endemic zones respectively. The uptake of LLINs was 15% higher in the lake region compared to the coastal endemic region in 2012 and significantly declined over the five years to 6%, 7% and 1% in 2013, 2014 and 2015, respectively.

Figure 4

Proportion of ANC attendees who received LLINs in coast and lake endemic regions of Kenya, 2012-2015. ANC = antenatal care; LLINs = long-lasting insecticidal nets



DISCUSSION

The WHO emphasizes on the importance of pregnant women receiving IPTp and sleeping under LLINs as key in controlling malaria especially in areas where the disease is endemic. Our main findings show that uptake of both IPTp1 and IPTp2 doses amongst pregnant women attending ANC are sub-optimal with one in five women and a quarter of pregnant women in 2012 respectively missing this life-saving prophylaxis.

There is a further declining trend over the years with nearly half of all pregnant women registered in ANC not having received either their first or second dose of IPTp in 2015. Even if a pregnant woman may have received their initial first dose, approximately 10% would have eventually missed their second IPTp dose by 2015.

Lower uptake of IPTp was noted in the lake endemic regions in comparison to coastal endemic regions, despite malaria burden being higher in these areas. Remarkably, there where overall increasing trends in proportions of pregnant women receiving an LLIN over time, almost reaching 100% by 2015.

The strengths of our study include:1) national aggregate data was utilised and 2) data utilised in this analysis were extensively validated at multiple levels. Limitations include use of aggregate data taken at a single point in time, women who presented for ANC visits may not entirely translate to all those who received IPTp or LLINs. The proportion of pregnant women receiving their second IPTp dose in revisit ANC may have been over estimated because data collection tools do not separate the second IPTP from all other subsequent doses. Documentation in paper-based registers may not be fully complete, especially in busy health settings.

Though not optimal, uptake of IPTp in Kenya is much higher than WHO global coverage estimates of 52% and 40% for first and second IPTp doses, respectively. (WHO 2015 REPORT). In our study the uptake of IPTp1 in the lake endemic areas is comparable to that obtained in the KDHS 2014 of 75% whilst higher than 51% for the coastal areas. However, the proportions of pregnant women receiving their second doses of IPTp are much higher in our findings than those reported in the KDHS of 55% and 26% for the coastal and lake endemic areas respectively. Worryingly, similar to our findings, the KDHS shows declines in the proportions of pregnant women who receive a second dose of IPTp and furthermore the third dose for both coastal and lake endemic areas. Despite having a high coverage of pregnant women who received LLINs in ANC, data from the KDHS show that 76% and 71% of pregnant women in lake and coastal endemic areas had slept under a net on the night prior to the survey. This reflects that one in ten pregnant women receiving these nets likely do not utilise them.

The declining uptake of IPTp over the years is a concern and could be explained by several of reasons. First, it may be related to availability of IPTp stocks at health facility level, as shown in Tanzania and Uganda (10). This also may be due to high volumes of at risk mothers attending endemic area clinics where malaria transmission is highest. Lastly, the declining uptake could be attributed to supply chain challenges at national level (11).

Late attendance of ANC is another important factor that has been found to be associated with low uptake of IPTp and may have contributed to our findings (12). This concurs with KDHS statistics which show that late ANC attendance is high in Kenya, with only 20% of pregnant women presenting in the first trimester of pregnancy as recommended, whilst one-third present in the second trimester. Although first ANC attendance in pregnancy is high at ninety-six percent, only fifty-eight percent of pregnant women achieve the recommended ≥4 ANC visits and this can explain the drop in proportions receiving their second IPTp dose compared to the first dose(KDHS).

The higher HIV prevalence in the lake region compared to the coastal endemic region is (13% versus 5.2%) could also partially explain the lower uptake of IPT, as it is contraindicated to use concurrently with cotrimoxazole among HIV-positive mothers (B). Cotrimoxazole is commonly taken by persons living with HIV to prevent opportunistic infections.

Other factors which could influence IPTp uptake include lack of knowledge regarding IPTp benefits and parity. The increase in LLIN uptake compared to declines in IPTp uptake could be a result of nets being distributed at the initial ANC visit in pregnancy and concurs with the high proportion of mothers who have ever attended ANC according to KDHS.

There are a number of implications for this study. Firstly, despite overall uptake of IPTp being high, the declining trend over the years is concerning, particularly given the malaria endemicity in these regions. This could result in increased numbers of malaria cases among pregnant women who have lowered immunity (13). Secondly, the drop in numbers of pregnant women accessing subsequent ANC visits requires innovative approaches for dispensing IPTp to pregnant women in communities. This could include the use of village health workers to encourage earlier and more consistent ANC attendance. There is need to conduct further assessments on the efficiency of the supply-chain system in preventing IPTp stock-outs and routine monitoring of health facilities to check on consumption patterns.

In conclusion, our study found that there has been a significant decline from 2012 through 2015, in the number of pregnant women in Kenya receiving recommended malaria prophylaxis in the regions

of highest malaria burden. However, the coverage of LLIN has consistently improved over the same period, approaching almost 100%. These findings suggest that innovative strategies need to be implemented to improve the uptake of malaria prophylaxis, otherwise malaria will continue to cause significant morbidity and mortality for pregnant women and the youngest Kenyans.

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