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An integrated approach to training of healthcare providers to improve the administration of intermittent preventive therapy for malaria in pregnancy in Kaduna State, Nigeria

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AN INTEGRATED APPROACH TO TRAINING OF HEALTHCARE PROVIDERS TO IMPROVE THE ADMINISTRATION OF INTERMITTENT PREVENTIVE THERAPY FOR MALARIA IN PREGNANCY IN KADUNA STATE, NIGERIA.

BY

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A research report submitted to Faculty of Health Sciences in partial fulfilment of the requirements for the degree of

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DECLARATION

I, Simbiat Sophia Nuhu declare that this research report is my own original work. It is being submitted in partial fulfilment of the requirements for the Degree of Master of Science in Epidemiology (Field of Implementation Science) at the University of the Witwatersrand, Johannesburg. It has not been submitted either in part or full for any degree or examination at this or any other University.



Simbiat Sophia Nuhu

DEDICATION

I dedicate this work to Almighty Allah for His fruitful help in finishing this project as well as my parents who have been the pillar of support throughout my studies.

ABSTRACT

Background

Intermittent Preventive Therapy using sulfadoxine pyrimethamine (IPTp-SP) is a malaria control strategy to reduce cases of malaria in malaria endemic countries. However, the administration of the recommended three doses of IPTp throughout the stages of pregnancy still remains low in Nigeria even though, Nigeria is a malaria endemic country. Quality improvement approach has been demonstrated to improve practice among healthcare providers. This study therefore used a quality improvement approach to train and coach healthcare providers in order to improve the administration of the recommended doses of IPTp to pregnant women receiving antenatal care (ANC) services.

Methods

A quasi-experimental study design was carried out to evaluate the effect of quality improvement approach consisting of training and coaching of healthcare providers to improve the administration of IPTp during ANC service. Primary Healthcare Centre (PHC) Samaru was purposively selected and twelve healthcare providers participated in the study. ANC daily register was reviewed pre-intervention, intervention and post-intervention period of the study. Data were analysed using line graphs and run charts.

Results

A total of 36 ANC visit weeks were observed between 21st November 2016 and 27th July 2017. The mean level for IPTp1 administration pre-intervention was 105.85% (SD: 29.28) and 75.20% (SD: 16.89) for IPTp2+. The levels of IPTp1 administration were relatively stable from Week 1 to Week 10 although, there was overestimation of IPTp1 as 8 of the 16 Weeks in the pre-intervention period i.e. Weeks 3, 5, 7, 8, 11, 13, 15 and 16 all had more than 100% of eligible women administered IPTp1. The patterns of IPTp2+ administrations shows the levels of IPTp2+ administration were erratic. There was evidence indicating the process of IPTp1 was relatively stable post-intervention as the data crosses the median line only six times i.e. 7 runs. This indicates that the process of IPTp1 was within normal variation over the post-intervention period. There was an upward shift showing immediate improvement of the administration of IPTp2+ post-intervention although, there was a non-random variation in the administration of IPTp2+. The

improvements of IPTp were not sustainable due to stock-outs. The quality of the ANC daily register was poor.

Conclusion

The integrated training and coaching intervention approach improved the administration of the recommended three doses of IPTp within the context of a PHC. These findings should be interpreted with caution as the impact of the intervention may not have reached its full impact due to the short post-intervention assessment. Stock-outs remains a huge barrier to the administration of IPTp under DOT during ANC services. The data quality of the ANC daily register improved post-intervention however, there were still slight errors thus, indicating that healthcare providers need constant coaching. It is important to integrate training and coaching of healthcare providers in order to have desired and sustained outcomes.

Keywords: Malaria in pregnancy, IPTp, IPTp-SP, SP, ANC, Pregnant women, Healthcare providers, administration, QI, integrated training and coaching.

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DEFINITION OF TERMS

Coaching: This is the supervision, monitoring, follow-up meetings and putting up posters at the clinic within the context of this study.

Direct Observed Therapy (DOT): Taking medication under the supervision/ observation of a healthcare provider.

Healthcare providers: This includes nurses, auxiliary nurses, midwives and community healthcare workers (CHWs: These cadre of healthcare providers work in the clinic even though ideally they are supposed to be in the community providing healthcare services) who are directly involved in providing ANC services within the context of this study.

Implementation strategy: This involves the intervention methods used in this study

Integrated approach to training: This involves training and coaching of healthcare providers within the context of this study.

Intermittent Preventive Therapy using sulfadoxine pyrimethamine (IPTp-SP): It is a full therapeutic course of anti-malaria medicine administered to pregnant women during routine ANC visit, regardless of whether the women is infected with malaria or not (WHO, 2014b). **It is otherwise known as IPTp.**

Intermittent Preventive Therapy (IPTp1): This is the first dose of therapeutic course of antimalarial medicine administered to pregnant women (WHO, 2014b).

Intermittent Preventive Therapy (IPTp2): This is the second dose of therapeutic course of antimalarial medicine administered to pregnant women (WHO, 2014b)

IPTp 2+: This is the combination of IPTp2 and IPTp3 (Exavery *et al.*, 2014).

Pills: Refers to the three tablets of IPTp-SP administered per dosage within the context of this study.

Quality Improvement: This is an effective, proven way to improve care for patients, clients and residents as well as improve practice for healthcare staff. Also, quality improvement consists of systematic and continuous action that leads to measurable improvements in the health status of target population and health services (US Department of Health and Services, 2011)**.**

Run Chart: This is a measure of a line graph plotted over time with the median showing as the horizontal line in order to identify improvement or degradation in a process (Anhøj and Olesen, 2014).

LIST OF ABBREVIATIONS

ANC	Antenatal Care
CHEW	Community Healthcare Extension Worker
DOT	Direct Observed Therapy
EBI	Evidenced-Based Intervention
IDI	In-depth Interviews
IPTp	Intermittent Preventive Therapy
IPTP-SP	Intermittent Preventive Therapy using Sulfadoxine Pyrimethamine
ISF	Interactive Systems Framework
LGA	Local Government Area
mRDTs	Malaria Rapid Diagnostic Tests
NDHS	Nigeria Demographic and Health Survey
NIRN	National Implementation Research Network
NMHIS	National Health Management Information System
NPC	National Population Commission
PHC	Primary Healthcare Centre
QI	Quality Improvement
SDGs	Sustainable Development Goals
SP	Sulfadoxine Pyrimethamine
WHO	World Health Organization

CHAPTER 1: INTRODUCTION

1.0 INTRODUCTION OF CHAPTER

This chapter discusses the background information of the research project, literature review on the topic and a rationale to support why the study was conducted. It further explores the research problem, study aim, research question and objectives of the study.

1.1 Background

Worldwide, maternal health has continued to be a global public health issue that has received so much attention, yet maternal mortality indices are unacceptably high especially in sub-Saharan Africa (WHO, UNICEF, UNFPA, 2015). Studies have shown that one of the leading causes of maternal morbidity and mortality is malaria and more than half of the world population live in malaria endemic areas (Diala *et al.*, 2013; WHO, 2014a). The Nigeria Demographic and Health Survey (NDHS) reported that each year approximately 7.5 million pregnant women developed malaria (NPC and ICF 2009). Nigeria a sub-Saharan country, has one of the highest maternal mortality ratio of approximately 814/100 000 live births (WHO, UNICEF, UNFPA, 2015).

Malaria in Pregnancy (MIP) is one of the leading causes of maternal deaths accounting for about 11% of maternal mortality in Nigeria (USAID 2013). Due to malaria being endemic in Nigeria, all pregnant women have the risk of developing the disease (Sanyaolu et al., 2013). In addition, reports show that about $36 211 760 million lost annually to malaria which has an impact on the economic growth and burden of disease in the country (NPC and ICF 2014). Thus, malaria is a significant threat to the country in achieving good health and well-being in relation to Sustainable Development Goal (SDG) three (Oleribe and Taylor-Robinson 2016).

As a strategy for MIP prevention, the Nigerian government adopted the World Health Organization recommended guideline on Intermittent Preventive Therapy (IPTp) using Sulfadoxine Pyrimethamine (SP) (NPC and ICF 2009). In accordance with the WHO guidelines, it was recommended that IPTp-SP should be administered to all pregnant women at each scheduled ANC visits beginning from the second trimester until time of delivery, provided the doses were given one month apart (WHO 2014). Further, IPTp-SP should be administered as Directly Observed Therapy (DOT) of three tablets of Sulfadoxine/Pyrimethamine (500 mg/25 mg) monthly with a

minimum of three doses throughout antenatal period (WHO 2014). However, the NDHS (2013) showed that overall, only 49% of pregnant women took at least one dose of IPTp-SP while only 15% took two or more doses of IPTp-SP, suggests a high attrition rate from IPTp1 (first dose) to IPTp2 (second dose) (NPC and ICF 2014). Additionally, the uptake of IPTp-SP remains low across the country with marginal increase of 13.8% in 2010 from 6.5% in 2008 (NPC and ICF 2014). A study conducted by Fawole and Onyeaso (2008) showed that healthcare providers in primary healthcare clinics had limited knowledge about malaria prevention in pregnancy as only 13.9% had adequate knowledge on WHO strategy on IPTp. As a result contributing to the barriers of IPTp administration.

1.2 Problem Statement

Malaria in pregnancy continues to be a major public health burden in Nigeria that results in poor maternal health and adverse birth outcomes (Oyefabi, Sambo and Sabitu, 2015). The adoption and implementation of IPTp-SP strategy since 2005 by the Nigerian government for prevention of malaria in pregnancy has had little impact on the reduction of malaria prevalence in pregnancy (Agomo *et al.*, 2009). Although, the World Health Organisation considered IPTp-SP to be effective when two or more doses are administered to pregnant women under directly observed therapy during ANC services, only 13% of pregnant women in Nigeria took at least two doses of IPTp-SP (USAID, 2015) and the uptake was lowest in northwestern Nigeria with only 3.9% of pregnant women receiving at least two doses of SP in IPTp as compared to 14% and 17% in south-west and south-east, respectively (NPC and ICF 2009). Kaduna state, in north-west Nigeria, has one of the highest maternal mortality ratios in the country at 1012/ 100 000 live births. This doubles that of the national average and 25% more than the north-west region average (Kaduna State Ministry of Health, 2010). Studies conducted in Sabon-Gari and Giwa Local Government Areas (LGAs) of Kaduna State, Nigeria showed that healthcare workers had misunderstanding on the recommended doses/administration schedule of IPTp leading to low compliance to guidelines which contributed significantly to poor coverage of IPTp in the LGAs (Katsayal *et al.*, 2014a; Oyefabi, Sambo and Sabitu, 2015). Reports also showed that only 3% of the primary healthcare workers in Sabon-Gari LGA had adequate training on focused ANC of which IPTp was delivered routinely (NPHCDA, 2016). Additionally, the administration of IPTp to pregnant women is low in Sabon-Gari LGA as only about 8% of pregnant women receive the second dose of IPTp-SP during ANC services in this setting (NPHCDA, 2016) .

1.3 Justification

Malaria in pregnancy has a negative impact on the health of the mother and child as it contributes to low birth weight, miscarriage, maternal anaemia and it is one of the leading causes of neonatal and maternal deaths in Nigeria (Amoran, Ariba and Iyaniwura, 2012). The IPTp policy was adopted to prevent malaria in pregnancy as all pregnant women are at risk of developing malaria in Nigeria (Oyefabi, Sambo and Sabitu, 2015). However, the administration of IPTp has been generally low within the context of Sabon-Gari Local Government Area (LGA), Kaduna State, Nigeria (Oyefabi, Sambo and Sabitu, 2015). Healthcare providers play a crucial role in the administration of IPTp. However, studies have shown that they had limited knowledge on the administration of the recommended doses of IPTp to pregnant women receiving ANC services (Arulogun and Okereke 2012; Katsayal et al. 2015). Although, a study by Oyefabi et al. (2015) conducted training to healthcare providers on IPTp policy in Sabon-Gari PHCs, it was focused on creating awareness of IPTp to pregnant women. Thus, the effect of the training on IPTp-SP administration among healthcare providers in Sabon-Gari LGA remains unclear (Oyefabi, Sambo and Sabitu, 2015). Furthermore, studies have shown that training alone in clinical settings is not always sufficient in changing healthcare providers' behaviour in implementing evidenced-based interventions (Garces *et al.*, 2010; Ramaswamy *et al.*, 2015). Rather, successful performance of service delivery first needs an implementation team in order to contextualize intervention into local settings, then training followed-up with coaching (Ramaswamy *et al.*, 2015). The 2015 study by Oyefabi, Sambo and Sabitu (2015) that showed low knowledge on IPTp among healthcare providers in Sabon-Gari LGA, indicate a need for training of healthcare providers in the setting to improve IPTp administration to pregnant women during ANC services. Additionally, Wandersman et al. (2015) indicated that the use of quality improvement (QI) is an effective way to improve care for patients and improve practice among healthcare providers. Thus, this study uses a QI approach to train and coach healthcare providers (integrated approach to training) on the administration of IPTp in a primary healthcare centre in Sabon-Gari LGA of Kaduna State, Nigeria. This study has the potential to improve the administration of IPTp during ANC services which is expected to contribute to reduction in maternal morbidity and mortality attributable to malaria.

1.4 Research Question, Aim and Objective

1.4.1 Research question

To what extent will an integrated approach to training improve the administration of IPTp by primary healthcare providers at PHC Samaru in Sabon-Gari LGA, Kaduna state, Nigeria?

1.4.2 Aim

To improve IPTp administration through training and coaching of healthcare providers at PHC Samaru in Sabon-Gari LGA, Kaduna State.

1.4.3 Specific Objectives

1. To determine the pre-intervention level of IPTp administration by healthcare providers at PHC Samaru.
2. To conduct an integrated training and coaching intervention aimed at improving the administration of IPTp among healthcare providers at PHC Samaru.
3. To measure the effect of the integrated training and coaching intervention on IPTp administration at PHC Samaru.

1.5 Literature Review

1.5.1 Malaria in pregnancy (MIP): Issues in the administration of the recommended IPTp-SP doses

Malaria in pregnancy remains a major cause of adverse pregnancy outcomes and maternal deaths in Nigeria, a country with world's largest population at risk of developing malaria (Diala *et al.*, 2013). Similarly, pregnant women living in places with high prevalence of malaria were four times more likely have malaria and two times more likely to die of malaria than other adults (Gies *et al.*, 2009). Furthermore, malaria accounts for 11% of all maternal mortality in Nigeria (Dawaki *et al.*, 2016). It has been well established that various factors affect the effective administration of SP in IPTp all of which varies in duration of malaria transmission, intensity and seasonality (National Population Commission (Nigeria), National Malaria Control Programme (Nigeria) and MEASURE DHS/ICF International, 2012). In an attempt to reduce the high prevalence of malaria in pregnancy, the IPTp-SP strategy for malaria in pregnancy was adopted in Nigeria and many other sub-Saharan countries. However, studies have shown that the uptake is generally low in sub-Saharan Africa (Oyefabi, Sambo and Sabitu, 2015; Yoder *et al.*, 2015; Hill *et al.*, 2016).

1.5.2 Level of IPTp administration

A study conducted in Sekondi-Takoradi region of Ghana showed that despite high awareness of IPTp-SP only 57.8% of pregnant women had received their first dose of IPTp-SP while 42.2% had not and of those that received only 47.7% had received the recommended two or more doses by their third trimester of pregnancy while 35.5% received only one dose (Orish *et al.*, 2015). Similarly, a study conducted in Burkina Faso showed that of the 90% of pregnant women who attended ANC only 10.6% received the recommended doses of IPTp-SP (Brieger et al. 2013). In addition, studies have shown that missed opportunities among healthcare providers to administer IPTp-SP during ANC was evident, as a study by Sangar et al. (2010) showed that only 31.8% of women who attended ANC received at least two doses of IPTp-SP in Uganda. In addition, a systematic analysis conducted across sub-Saharan Africa showed that 72.9% of women attending ANC services were not administered IPTp despite high ANC attendance among pregnant women. As a result, showing deficiencies in the administration of IPTp among healthcare providers during ANC services (Andrews *et al.*, 2015). In addition, Fawole & Onyeaso (2008) showed of the 60% of women who attend ANC services, only 18.7% were administered IPTp.

Furthermore, studies have shown that the administration of IPTp-SP remains generally low in Nigeria (Onoka *et al.*, 2012; Ameh *et al.*, 2016). One of such studies is a study by Olorunda and Ajayi (2013) which showed that of the 62.2% of women who attended ANC services in South-West Nigeria, only 26.0% received at least one dose of IPTp-SP and 4.9% received at least two doses of the recommended IPTp-SP. In addition, a study by Onyebuchi et al. (2014) showed that of the women who attended ANC in South East Nigeria, 72.1% took at least one dose of IPTp-SP while 59.7% took two doses of IPTp-SP and only 4.9% took a third dose despite bookings at the ANC. Another study conducted by Nneka, Maxwell and Nze (2014) showed that although healthcare providers had adequate knowledge on IPTp-SP and its role malaria in pregnancy they however, had limited understanding on the best strategies to administer drugs such as IPTp-SP during focused ANC services. However, the study failed to use a qualitative approach to understand the underlying reasons behind the poor practices of IPTp administration during ANC services (Nneka, Maxwell and Nze, 2014).

A current survey of the strategies to prevent malaria in south-south Nigeria showed that only 55.95% of healthcare providers were aware of the current recommended IPTp-SP strategy of which 44.5% administered SP in IPTp during ANC services (Oranu, Ojule and Ordu, 2016). Furthermore, confusion among healthcare providers on the timing of the administration of SP in IPTp and whether it should be given on empty stomach was apparent in many studies (Akinleye, Falade and Ajayi, 2009; Oyefabi, Sambo and Sabitu, 2015; Ameh *et al.*, 2016) .

1.5.3 Barriers to the recommended administration of IPTp-SP

A substantial amount of evidence has shown that the barriers to the administration and utilisation of IPTp-SP was largely attributable to the healthcare providers (Hill *et al.*, 2015; Ameh *et al.*, 2016). One of such studies is a study by Yoder et al. (2015) which showed that healthcare providers in Malawi partly contributed to the low compliance of IPTp-SP as healthcare providers were not able to show the guidelines on IPTp administration. The same study indicated that although, healthcare providers displayed adequate knowledge of IPTp administration during antenatal care (ANC) services and the rationale behind giving pregnant women, they however showed uncertainty on the timing of the doses thus, resulting to the inconsistencies in the dissemination of IPTp-SP (Yoder *et al.*, 2015). One major limitation of this study is that it only interviewed the

nurses without systematically considering the knowledge and perception of the manager or head of each health facility in order to elaborate on the IPTp-SP strategy (Yoder *et al.*, 2015).

Moreover, a recent report conducted in Mozambique by Salomão, Sacarlal and Gudo (2017) indicated that the steep decline between IPTp1 and IPTp2 administration could not be entirely attributed to number of ANC visits but rather, the practices of the healthcare providers influenced the coverage of IPTp and its drop-out rate. These findings corroborate with a study conducted in Gambia which showed that poor knowledge on the correct timing of administration of SP was associated with low administration of IPTp (Brabin *et al.*, 2009). A meta-analysis on the barriers to IPTp-SP showed that misunderstanding among healthcare providers on the administration of IPTp was a contributing barrier to the effective uptake and utilisation of IPTp-SP (Hill, Hoyt, *et al.*, 2013).

1.5.4 Issues around compliance and attitude among healthcare providers on IPTp administration

A study by Obieche et al. (2015) showed that poor adherence to IPTp guideline such as poor routine administration of SP during ANC services among healthcare providers contributed to the low administration IPTp-SP. In addition, a study conducted in Sabon-Gari local government area of Kaduna state, Nigeria showed that healthcare providers had limited knowledge on the timing of IPTp-SP administration and this contributed to its low uptake (Oyefabi, Sambo and Sabitu, 2015). The same study further trained healthcare providers on the recommended guideline of IPTp-SP. However, the study assessed the effect of training among pregnant women and not among the healthcare providers. Another study conducted in Ibadan, Nigeria showed that only 24.5% of the healthcare providers had adequate knowledge on the content and strategy of IPTp-SP of which only 23.1% reported to have complied with the DOT strategy (Arulogun and Okereke 2012). The same study found that 22.5% of pregnant women were still prescribed chloroquine by healthcare providers despite overwhelming evidence of its increasing resistance. One reason behind poor compliance of IPTp-SP was due to poor knowledge on the dissemination of the current IPTp strategy among the healthcare providers as the study found knowledge to be significantly associated with practice and compliance of IPTp-SP (Arulogun and Okereke 2012).

A cross-sectional study conducted by Katsayal *et al.*, (2014a) on the acceptability of IPTp-SP in Zaria, Nigeria found that only 50% of primary healthcare facilities had satisfactory knowledge on

the administration of SP in IPTp of which only 30% of t hem were practicing DOT (Katsayal *et al.*, 2014a). The study further indicated that for effective administration of IPTp as per the national guidelines, healthcare providers should be trained regularly (Katsayal *et al.*, 2014a). A similar study found that two-third of the primary healthcare providers in Enugu, Nigeria were not complying with the national IPTp guidelines as SP was administered to the pregnant women to take home rather than a DOT (Onoka *et al.*, 2012). In addition, the study failed to engage with healthcare providers in order to understand the issues behind non-compliance of IPTp-SP and build capacity on addressing those issues (Onoka *et al.*, 2012).

Furthermore, a study conducted in Cross-river state, south-south region of Nigeria showed that 33% of non-utilisation of IPTp-SP was due to the non-compliance of the healthcare providers to practice DOT (Ameh *et al.*, 2016). One possible explanation to this is that it could be a process issue on the administration of the IPTp because the healthcare providers were not practicing DOT (Obieche, Enato and Ande, 2015). These findings concur with the findings conducted in south-west and northern Nigeria which showed that high level of awareness of IPTp among healthcare providers were important predictors on the uptake and utilisation of SP in IPTp (Akinleye, Falade and Ajayi, 2009; Iliyasu *et al.*, 2012).

A similar study conducted by Amoran et al. (2012) showed that missed opportunity among healthcare providers to administer IPTp-SP during ANC was evident in Nigeria as only 14.6% of women in rural areas of western Nigeria received at least two doses IPTp. The study further showed that ANC attendance was not necessarily a factor for the utilisation of IPTp-SP rather, routine administration of SP during ANC visits, unclear messages and limited understanding of IPTp-SP among healthcare providers contributed to its low administration (Amoran, Ariba and Iyaniwura, 2012). A similar study highlighted the role of healthcare providers expertise in IPTp uptake given high ANC coverage and low IPTp refusal rate among the pregnant women (Christian Rassi *et al.*, 2016).

Furthermore, low administration of IPTp-SP was found to be a major determinant of malaria in pregnancy (MIP) as a study conducted in north-eastern Nigeria found that parasitaemia was higher in this region due to non-adherence among the healthcare providers to administer IPTp-SP (Muhammad *et al.*, 2016). In addition, the study found that a vast majority of mothers who took less than two doses of IPTp-SP gave birth to babies with low birth weight. Also, there was high

prevalence of maternal anaemia and malaria parasitaemia among mothers who reported low utilisation of IPTp-SP (Muhammad *et al.*, 2016).

1.5.5 Stock-Outs of IPTp

On the other hand, studies have shown that stock-outs was another contributor to poor administration of IPTp (Hill, Hoyt, *et al.*, 2013; Katsayal *et al.*, 2014a). One of such studies is a study by Diala *et al.*, (2013) which showed that system-based challenges such as lack of provider knowledge and stock-outs of IPTp all contributed to the administration of IPTp-SP (Diala *et al.*, 2013). Nonetheless, a quasi-experimental study showed that stock-out of IPTp-SP may not be completely eliminated due to funding issues especially in countries dependent on external funding (Maheu-Giroux and Castro, 2014). The same study showed that simple structural and informational flow changes such as following of the IPTp guidelines among healthcare providers could improve the administration of IPTp during ANC visits (Maheu-Giroux and Castro, 2014).

1.5.6 Summary of the literature

Poor knowledge, compliance and attitude among healthcare providers contributed to the low level of IPTp administration. Also, stock-outs contributed to the poor administration of IPTp.

1.6 Conceptual Framework for improving IPTp-SP administration

The Ridge-Kybele Model

This study adapted the Ridge-Kybele Model. This model was adapted because it uses a quality improvement approach (selecting change agent, build capacity and learning from improvement) to implement interventions which has the potential to produce desired outcomes.

The core idea behind the model is that there is need for a mechanism whereby skills are used together to address performance issues (Ramaswamy *et al.*, 2015) . This model posits that implementation of complex interventions cannot be successful with training alone. Rather, for successful performance in service delivery, evidence-based interventions needs to be contextualized and translated to fit a particular setting then a support system such as data collection and coaching need to be conducted to ensure that the contextualised intervention fit into the context.

In implementing the model, five steps are required which are; selection and development of change agents, building foundational capacity in QI and leadership, identifying performance gaps, creating

contextualised training modules and learning through QI. The original conceptual framework is attached in Appendix A. This study adapted the five steps of the Ridge- Kybele Model to improve the administration of IPTp during ANC services and some of the steps were modified to fit the context of our clinic (PHC Samaru). These steps are; selection of QI team, building QI capacity (consisting of meetings focusing on when and how the intervention was conducted as well as contextualizing the IPTp guideline), identifying implementation gaps of IPTp administration, training and coaching of healthcare providers and learning through QI (which consists of assessment of the intervention and improving IPTp administration during ANC services). These steps have the potential to reduce maternal morbidity and mortality due to malaria. The modified conceptual model to improve IPTp administration using an integrated approach is shown in Figure 1.

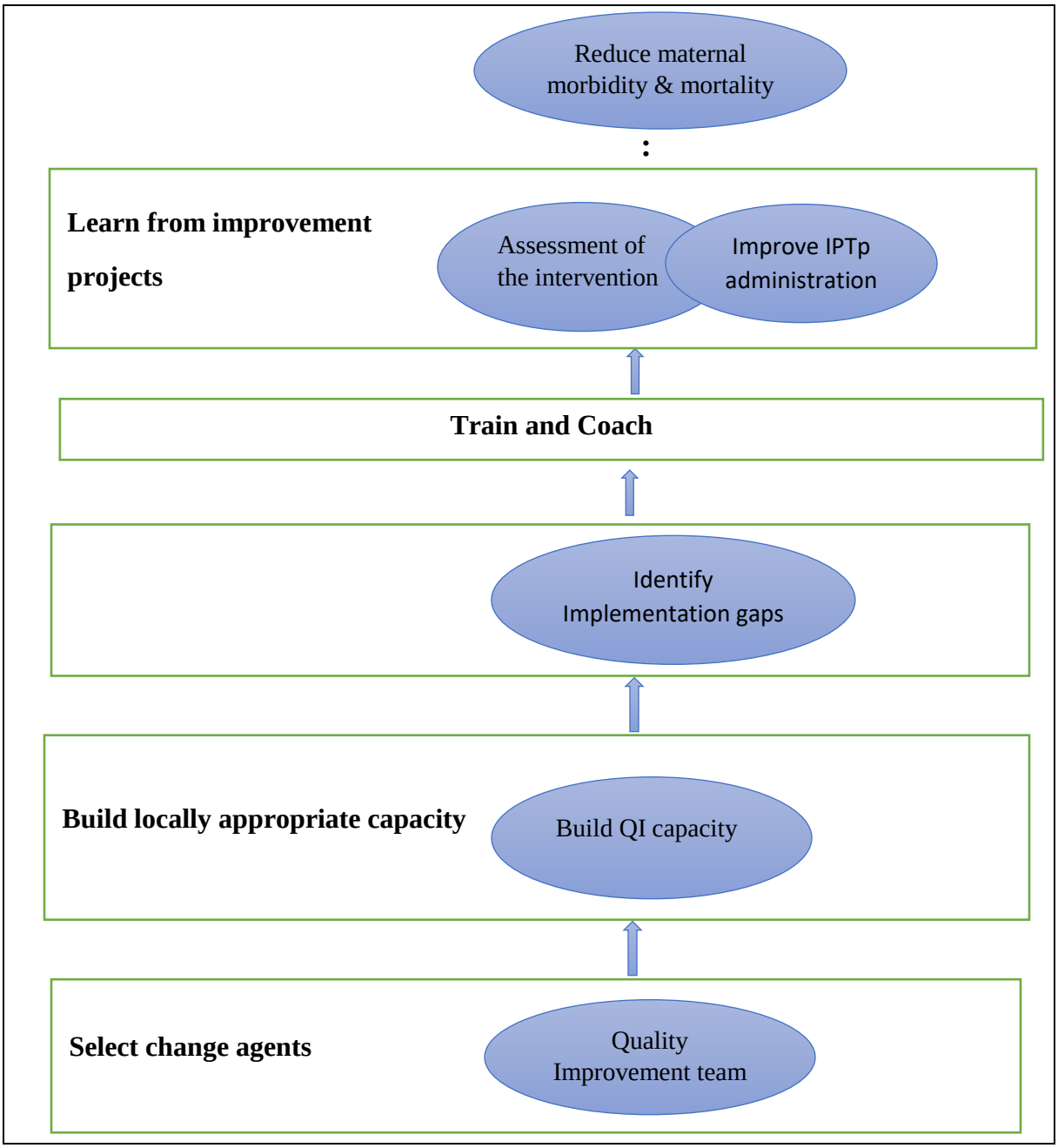


Figure 1: The modified Ridge-Kybele Model to improve IPTp-SP administration using an integrated approach.

CHAPTER 2: METHODOLOGY

This chapter explains the research methodology used for this study. It discusses the study settings, study population, the intervention, how the data was collected and managed. This chapter also explains how the data was analysed and the ethical consideration of the study.

2.1 Study design

This is a quasi-experimental study design consisting of pre-intervention, intervention and post-intervention components. Information on the administration of IPTp in the ANC daily register of pregnant women receiving ANC services at PHC Samaru (located in Sabon-Gari LGA, Kaduna, Nigeria) were collected at pre-intervention, intervention and post-intervention phases from 21st November 2016 to 27th July 2017.

2. 2 Study setting

The present study was conducted in PHC Samaru, Sabon-Gari local government area (LGA) of Kaduna state which is located in the guinea savanna area of northern Nigeria. This area is situated in a malaria endemic area (Sufiyan, Umar and Shugaba, 2013; Oyefabi, Sambo and Sabitu, 2015). The most spoken language in Sabon-Gari is Hausa. It is an urban local government with a population of 286 671 in its two district of Basawa and Sabon-Gari of which 64 256 are women in the child bearing ages of 15-49 years (Sufiyan, Umar and Shugaba, 2013). Also, Sabon-Gari local government area has a total of 22 PHCs consisting of 5 health posts, 9 health clinics and 8 family health units. These PHCs facilities are all distributed between 6 health districts of the local government of which they all provide ANC and malaria services with only 6 PHCs providing ANC services free of charge thus, often overloaded with patients. These are PHC Jama'a, PHC Audu Kwari, PHC Sakadadi, PHC Basawa, PHC Samaru and PHC Muchia. This study was conducted in PHC Samaru at Sabon-Gari local government area because it offers ANC services and provides IPTp to pregnant women free of charge. In addition, PHC Samaru is easily accessible and it is one of the biggest PHCs in Sabon-Gari LGA.

Study Context

Primary healthcare Samaru provides ANC services to pregnant women three times in a week which is on Mondays, Wednesdays and Thursdays. Majority of the woman who attends ANC on Mondays are within their first and second trimester of pregnancy and these group of women are the majority that attend ANC services throughout the week while those that attend on Wednesdays

and Thursdays are within their second and third trimester of pregnancy. Prior to each pregnant woman being attended to individually, the healthcare providers give health talk to all the pregnant women attending ANC services as a group before they proceed individually to the healthcare provider providing ANC services. During this routine, the healthcare provider asks the pregnant women about any signs and symptoms they were experiencing. If any pregnant woman complains of any feverish symptoms, her routine/ procedure ends immediately as she is sent to the lab for malaria test. If she tests positive for malaria, she gets treated first before commencing with IPTp-SP. However, in severe malaria cases the healthcare provider refer the pregnant woman to the teaching hospital immediately, while the pregnant woman without any signs, symptoms or complains of feverish feelings is administered IPTp-SP and proceeds for palpitation.

2. 3 Study population and sampling

Primary healthcare providers who provide ANC services at PHC Samaru constituted the study sample. Twelve out of the fifteen healthcare providers in the facility were purposively selected, being those who provide ANC services. To achieve maximum variation of characteristics, different categories of healthcare providers were selected. These are auxiliary nurses, community healthcare providers, and ANC service providers involved in providing ANC services were recruited.

Inclusion and exclusion criteria

Inclusion: The study included all healthcare workers who provided ANC services at PHC Samaru in March 2017.

Exclusion: Healthcare providers providing ANC services at PHC Samaru not present during the study period.

2. 4 Overview of the intervention

A QI intervention which is an integrated approach of training and coaching of healthcare providers on IPTp-SP intervention was implemented and tested in PHC Samaru. This involved training of healthcare providers at the facility level on the administration of the recommended IPTp for two weeks which was followed up with coaching for a period of another two weeks. To do this, a quality improvement (QI) team was created and roles and responsibilities were assigned. The QI team comprised of practitioners in the field who are confronted with quality issues on a daily basis. This included the senior community healthcare workers (CHWs), midwives, auxiliary nurses and a QI facilitator (the researcher). The QI team came up with strategies on how best to conduct the

integrated training and coaching of which they chose appropriate days and time to conduct the training. The training sessions were conducted on ANC service days and were done in the afternoon as ANC services at PHC Samaru are mainly provided in the morning. This was done in order for the training not to interfere with the normal clinic services. To keep the project and team on track, the healthcare providers were fully engaged in the planning phase of the integrated approach to training in order to have their explicit buy-in of the intervention. Upon creation of the QI team, a workshop was organised in which healthcare providers were trained on the recommended administration of IPTp of which two training sessions were conducted over a period of two weeks. Four coaching sessions were conducted over a period of two weeks and the coaching package involved follow-up meetings, supervision and putting up wall charts with clearly illustrated diagram and messages to the healthcare providers on the protocol of IPTp administration. Training and coaching was done by the researcher with active support from the senior healthcare provider. The tools (protocol guide and wall charts) used were the IPTp guide developed by the Nigerian government which was adopted from WHO. In order for the healthcare providers to understand the IPTp guide clearly, the training guide was translated to "Hausa" (the local) language. This is because Hausa is the main language of communication in Sabon-Gari LGA and will enable the message in the training to be passed more effectively to the healthcare providers without miscommunication and or misunderstanding. In most cases, the integrated training was adapted to fit a specific context of the PHC Samaru since the clinic has different mix of healthcare providers, skills, level of education and different level of understanding IPTp policy. For example the training guide was translated to the local language (Hausa) in order to have the buy-in of healthcare providers and engage with all participating healthcare providers. The use of contextualized training guide is not unique in our study as previous studies have used such approach (Ramaswamy *et al.*, 2015; Rye *et al.*, 2017).

As part of the QI intervention process, interviews were conducted with eleven healthcare providers (QI team) who directly provided ANC services before the intervention to identify implementation gaps within the context of the clinic. This aided in providing information that contextualized the intervention. Prior to the intervention, the healthcare providers were administering IPTp to take home rather than under DOT. However, this changed during the training sessions as the healthcare providers (QI team) learned the procedures on how to administer IPTp as per protocol from the Federal Ministry of Health. As part of the training session, the healthcare providers discussed the

importance of administering IPTp under DOT whether the pregnant woman has eaten or not. As a result, IPTp was administered to eligible pregnant women receiving ANC services and the ANC daily register were not ticked for any pregnant women who doesn't take IPTp-SP under DOT. In addition, the head of the clinic agreed to provide water and disposable cups to pregnant women during ANC services. In addition, the QI team discussed on the eligibility of IPTp administration. This includes administering the first dose of IPTp at 13 weeks of pregnancy, the second dose four weeks interval from the first dose and the third dose four weeks interval from the second dose. As part of the intervention, the healthcare providers learnt how to use the wall charts showing IPTp key messages as a reminder. There were also site visits for coaching, mentoring and feedback for any change idea that is necessary for the intervention. This motivated the healthcare providers to distribute available nets to the pregnant women attending ANC services. The healthcare providers were also trained on how to appropriately tick IPTp administration and its doses in the ANC daily register.

2. 5 Data collection

Data collected in the ANC clinic register before, during and after the intervention were used to estimate the proportion of eligible women administered IPTp1 and IPTp2+ over the period. All data were obtained from the ANC clinic register which is routinely recorded in the National Health Management Information System (NMHIS) health facility daily ANC register at Samaru PHC.

Data recorded for four months (sixteen weeks) i.e. from 21st November 2016 – 09th March 2017 at the PHC were analysed as the pre-intervention phase. This was followed by four weeks of integrated training (two weeks of training and two weeks of coaching) which was from 13th March to 6th April 2017 which was analysed as the intervention phase. Data recorded four months (sixteen weeks) post-intervention from 10th April to 27th July 2017 were analysed as the post-intervention phase. Although, the data were collected on specific days of the week during ANC services they were, summarized and analysed on a weekly basis.

A copy of the National Health Management Information System (NHMIS) health facility daily ANC register used to collect information at the ANC, from where the required data for this study was extracted is attached in Appendix B. Also, attached in Appendix C is the list of variables extracted and analysed for this study.

2. 6 Implementation measures and outcome

The outcome measures are proportion of eligible pregnant women administered IPTp1 and IPTp2+. The national guideline describes eligibility for IPTp1 as women who are in their second trimester of pregnancy (gestational age thirteen weeks and above) with their first ANC visit within that period. Eligibility for IPTp2+ in this context refers to ANC clients who had received IPTp1 with at least four weeks interval. These measures were calculated from data collected from the routine health facility daily ANC register.

The proportion of those eligible for IPTp1 was calculated by dividing the number of pregnant women administered IPTp1 (numerator) by number of eligible women for IPTp1 (denominator) multiplied by 100. The denominator i.e. number of eligible women for IPTp1 was calculated using the eligibility criteria of pregnant women in their gestational age 13 weeks and above with their first ANC visit. The proportion of those eligible for IPTp2+ was calculated by dividing the number of pregnant women administered IPTp2+ (numerator) by number of eligible women for IPTp2+ (denominator) multiplied by 100. The denominator i.e. number of eligible women for IPTp2+ was calculated using the eligibility criteria of pregnant women who had received IPTp1 with at least four weeks interval.

2. 7 Data Management

Selected variables were extracted from the NMHIS into excel spreadsheet. The data entry spreadsheet was double checked to ensure accuracy and completeness of the data.

2. 8 Data Analysis

Objective 1: To determine the level of IPTp administration among healthcare providers at PHC Samaru.

The number of women administered IPTp doses and the number of eligible women for IPTp doses were used to calculate the proportion of eligible women administered IPTp doses. Line graphs were used to display the levels of (trend in) IPTp administration over the sixteen weeks pre-intervention phase.

Objective 2: To conduct an integrated training and coaching intervention aimed at improving the administration of IPTp among healthcare providers at PHC Samaru.

For QI interventions, context specificity is important in identification of implementation gaps in order to conduct interventions that are tailored to the unique needs and context of different populations (Wandersman *et al.*, 2008). As a result, in-depth interviews were conducted among healthcare providers prior to the intervention in order to determine the implementation gaps in IPTp administration within the context of the clinic using a developed interview guide (Appendix D). The key findings of the interview are: inconsistent implementation of national guideline on IPTp, inconsistencies with timing of IPTp administration, poor knowledge of IPTp and poor knowledge on data entry in the ANC daily register among healthcare providers. These corroborate the findings of the Oyefabi, Sambo and Sabitu (2015) study and shows that the low level of knowledge of the IPTp guideline still persist among the healthcare workers in this PHC. See details of the interview results in Appendix E. The findings also shows that the selected intervention for the study is indeed appropriate as the need to retrain and follow up with coaching are apparent in the setting.

Line graphs were plotted over the intervention period to display the level and patterns of IPTp administration over the intervention period.

Objective 3: To measure the effect of the integrated training and coaching intervention on IPTp administration at PHC Samaru.

Run charts were plotted over the entire duration of the study (pre-intervention, intervention and post intervention periods) to measure the effect of the integrated training and coaching intervention on IPTp administration. Run charts are graphs plotted over time which displays the trend and pattern of a process (Anhøj and Olesen, 2014). All data were analysed retrospectively sixteen weeks prior to the intervention, four weeks of the intervention (training two weeks which was followed up with coaching for two weeks) and sixteen weeks post-intervention.

2.9 Limitations of the data

1) Inconsistencies in data entry, errors in data entry and missing data on IPTp were prominent in the ANC daily register. For example, some healthcare providers ticked the column of both IPTp1 and IPTp2+ on the same day for the same pregnant women. As a result, the

data may not reflect the true situation of IPTp administration in the clinic. However, this was controlled for by recording the data as IPTp2+ (The QI team which consists of healthcare providers had meetings on the inconsistencies in the data entry of which some healthcare providers admitted that both IPTp1 and IPTp2+ were ticked for the same day for pregnant women who had received IPT1 in their previous visit thus, indicating that entering the data as IPTp2+ is more accurate in this case).

2) IPTp1 was administered to some pregnant women at less than 13weeks of gestational age resulting at times, in higher number of pregnant women administered IPTp1 compared to number of eligible women for the dose.
3) The denominator used in calculating proportion of eligible women administered IPTp1 and IPTp2+ respectively (i.e. the number of eligible women for IPTp1 and IPTp2+) were not refined. For instance, some pregnant women were administered IPTp1 but were considered ineligible because it was not their first visit but they were not administered IPTp1 at previous ANC visits due to factors such as stock-outs or presenting with malaria, which had to be treated first before administration of IPTp. Hence, the number of eligible pregnant women used as denominator may be an underestimation of the total number of eligible pregnant women administered IPTp.
4) There was no eligibility record (i.e. gestational age and number of ANC visits) for some pregnant women administered IPTp1 and IPTp2+. Thus, they were excluded from analysis. Approximately 8.03% of pregnant women records extracted from the ANC daily register were excluded from the analysis.
5) The ANC daily register was not designed to collect information for this evaluation. Thus, it limits the way the denominator (number of pregnant women eligible for both IPTp1 and IPT2+) was calculated. To control tis challenge, an eligibility criteria was set for the denominator (Check implementation measures and outcomes page 16).

2. 10 Ethical consideration

Written informed consent were obtained from the healthcare providers to participate in the study. Standard ethical principle of confidentiality and privacy were adhered to as all information on the data were de-identified and kept secured. Permission was sought from Kaduna State Primary Healthcare Development Agency (approval no: KDSPHCA/SF/ADM/20/VOL.1/P.89 – Appendix F), director of the PHC and head of the PHC in order to use the daily ANC clinic register and

conduct the integrated training. Ethical approval was obtained from the Ministry of Health, Kaduna State Research Ethics Committee in Nigeria (approval no: MOH/ADM/744/VOL1/502 – Appendix G) and the University of Witwatersrand Human Research Ethics Committee (approval no: M161171 – Appendix H).

CHAPTER 3: RESULTS

This chapter focuses on reporting the results obtained from the data analysed.

A total of 36 ANC visit weeks were observed between 21st Nov 2016 and 27th July 2017. For each ANC visit, the maximum number of pregnant women administered IPTp1 and IPTp2+ per week were 59 and 64 respectively. The average number of pregnant women who received IPTp1 and IPTp2+ were 25.76 and 35.36 respectively. Table 1 shows the descriptive summary of the IPTp doses.

Table 1: Descriptive Statistics of IPTp administration

	IPTp1	IPTp2+
Minimum no of pregnant women administered IPTp per week during the 36 weeks study period	0	0
Maximum no of pregnant women administered IPTp per week during the 36 weeks study period	59	64
Mean (SD)	25.76 (13.21)	35.36 (17.69)

3.1 Pre-intervention Level of IPTp Administration

The level of IPTp administration to eligible women varied across IPTp doses. The mean level for IPTp1 administration pre-intervention was 105.85% (SD: 29.28). The levels were relatively stable from Week 1 to Week 10 after which the pattern became undefined. There was overestimation of IPTp1 as 8 of the 16 weeks in the pre-intervention phase i.e. weeks 3, 5, 7, 8, 11, 13, 15 and 16 all had more than 100% of eligible women administered IPTp1. The mean level for IPTp2+ administration pre-intervention was 75.20% (SD: 16.89). Week 7 had the highest level of IPTp2+ administration of 98.04%. However this dropped in subsequent weeks and later increased in weeks 14, 15 and 16. The patterns of IPT2+ administrations shows the levels of IPTp2+ administration were erratic. The pattern of IPTp1 and IPTp2+ administration is shown in Figures 2 and 3 respectively.

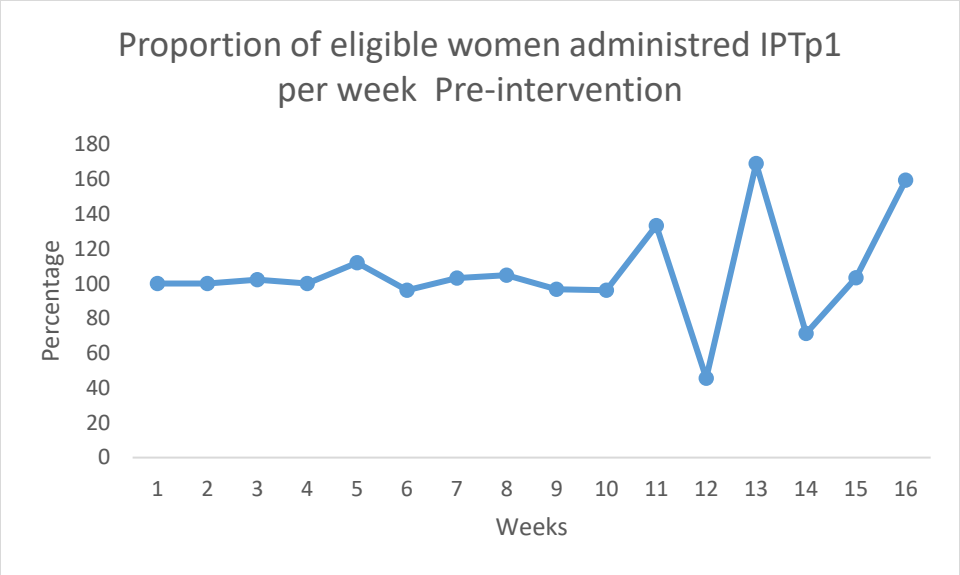


Figure 2: IPTp1 administration pre-intervention

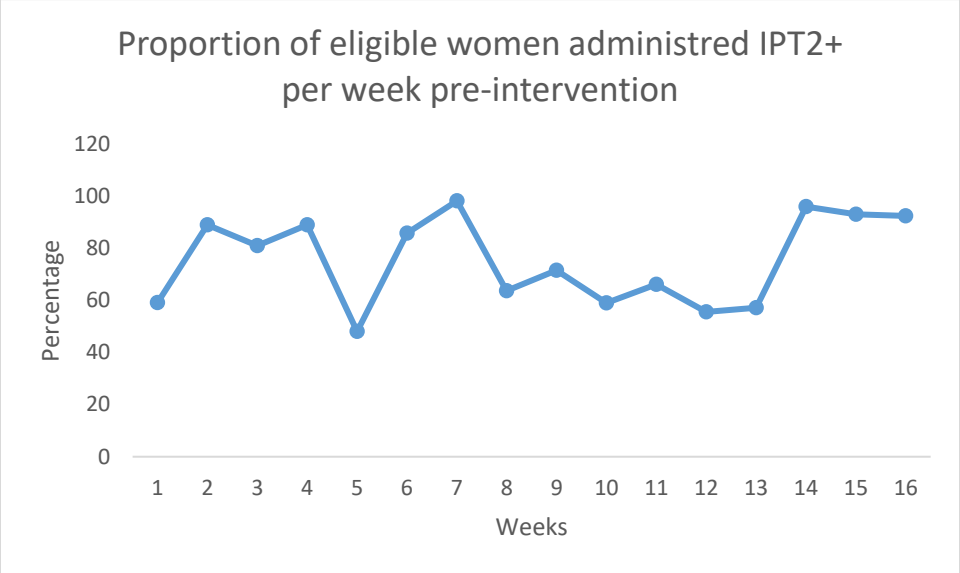


Figure 3: IPTp2+ administration pre-intervention

3.2 The Intervention Process

An integrated training and coaching approach was the strategy used in the implementation of the intervention in order to improve IPTp administration. The integrated training was conducted for a period of one month which comprises of two weeks training and two weeks coaching. The findings in the pre-intervention interview showed that there were inconsistent implementation of national guideline on IPTp, inconsistencies with timing of IPTp administration, poor knowledge on IPTp administration and poor knowledge on data entry in the ANC daily register among healthcare providers. As a result, training was conducted to fit the implementation gaps of IPTp identified within the context of PHC Samaru. The Ridge-Kybele framework was used as a guide for the QI intervention. The process and content of the intervention is shown in Figure 4.

<table>
<tr><td>  </td><td colspan="5">Quality Improvement</td></tr>
<tr><td rowspan="5">Pre-intervention activities</td><td colspan="5">Baseline record review</td></tr>
<tr><td colspan="5">Baseline interview with healthcare providers</td></tr>
<tr><td colspan="5">Meeting with the head of ANC service provider</td></tr>
<tr><td colspan="5">Select QI leader/ team</td></tr>
<tr><td colspan="5">Identified model for domesticating integrated training guide</td></tr>
<tr><td colspan="6"></td></tr>
<tr><td rowspan="2">Intervention activities</td><td colspan="6">Integrated training and coaching activities carried out</td></tr>
<tr><td colspan="2">Information, Education & Communication (IEC) on IPTp</td><td colspan="2">Malaria Intervention commodities</td><td>Screening</td><td>ANC daily register</td></tr>
<tr><td>Health talk</td><td>Patient-provider counselling/ consultation</td><td>IPTp-SP administration under DOT</td><td>Distribution of insecticide treated nets</td><td>Palpitation & mRDT</td><td>Capturing of ANC daily register</td></tr>
<tr><td>Post-intervention activities</td><td colspan="5">ANC record review to assess impact</td></tr>
</table>

Figure 4: A refined and more detailed version of the Ridge-Kybele framework showing the process of the QI intervention.

3.2.1 Assessment of IPTp1 administration over the intervention period

During the intervention period, the proportion of eligible pregnant women administered IPTp1 was 100% in the first week. This dropped in the second week to 66.67% and increased to 72.72% and 98.78% in the third and fourth week of the intervention period, respectively. Figure 5 shows the pattern of the IPTp1 administration during the four weeks of the intervention period.

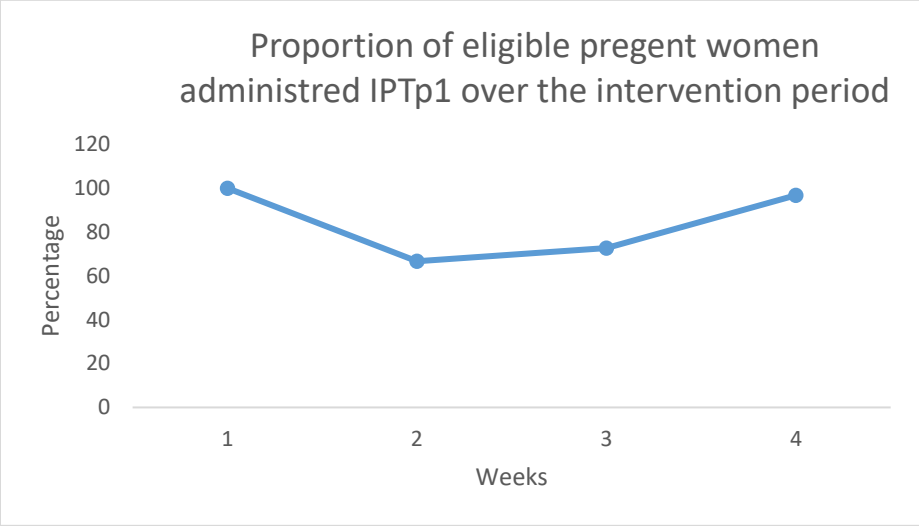


Figure 2: IPTp1 administration over the intervention period

3.2.2 Assessment of IPTp2+ administration over the intervention period

During the intervention period, the proportion of eligible pregnant women administered IPTp2+ was 88.89% in the first week. This dropped in the second week to 81.03% and further dropped to 51.02% in Week three. The administration of IPTp2+ increased to 90.14% in Week four of the intervention phase. Figure 6 shows the pattern of IPTp2+ administration during the four weeks of the intervention period.

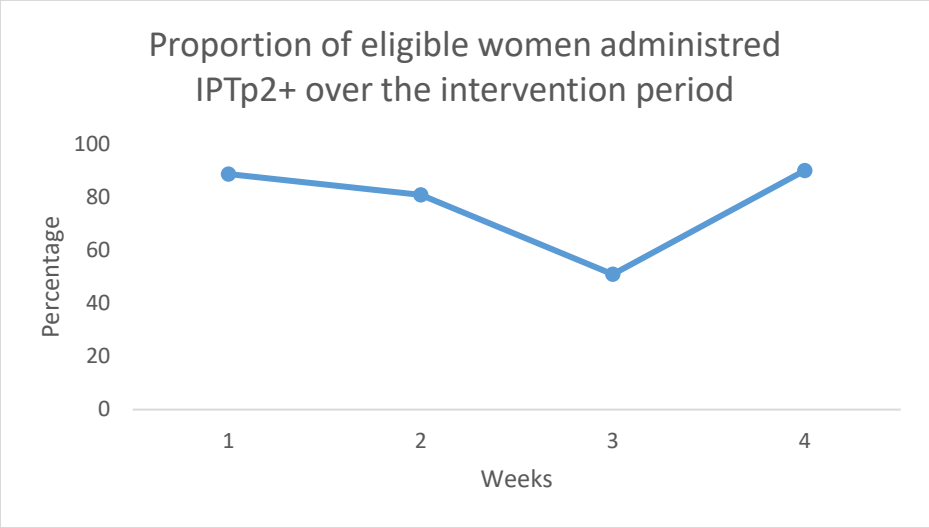


Figure 3: IPTp2+ administration over the intervention period

3.3 Effect of the integrated training and coaching on IPTp administration

Although the study period was 36 weeks, analysis is restricted to the first 30 weeks (meaning 10 weeks post intervention data points) only due to stock-outs of IPTp in Weeks 31, 32, 35 and 36. This affected IPTp administration at the PHC over the last six weeks of the study. The median proportion of eligible pregnant women administered IPTp1 were 101.16%, 84.75% and 100% across the pre-intervention, intervention and post-intervention periods respectively which suggests improvement in the post-intervention assessment. In Weeks 11, 13 and 16 (of the pre intervention period) there were astronomical points as a number of women that received IPTp1 during these weeks were not eligible. The administration on IPTp1 dropped in the 1st and 2nd week of the intervention period and slightly increased in the 3rd and 4th Week of the intervention period. The results presented in Figure 7 suggest that the administration of IPTp1 post-intervention (i.e. Weeks 21 -30) was stable as the data crosses the median line six times i.e. 7 runs[1]. This indicates that the process of IPTp1 was within normal variation over the post-intervention period. According to the run chart rules for 10 data points the lower limit for number of runs is 3 and upper limit is 8. As a

[1] Run chart is a measure of line graph plotted over time with the median line shown in order to identify whether there is an improvement or degradation in a process (Anhøj and Olesen, 2014). Runs are a series of data points that fall either above or below the median. Too frequent or too few runs indicate a non-random variation. Expected number of runs are based on a table adapted from Swed and Eisenhart.

result, having runs between 3 and 8 suggests the process is within normal variation[2]. (See Appendix I for a more detailed run chart rules).

[2] Normal variation in run charts indicate a natural part of the process i.e. the process is usual (variation occurs in all processes).

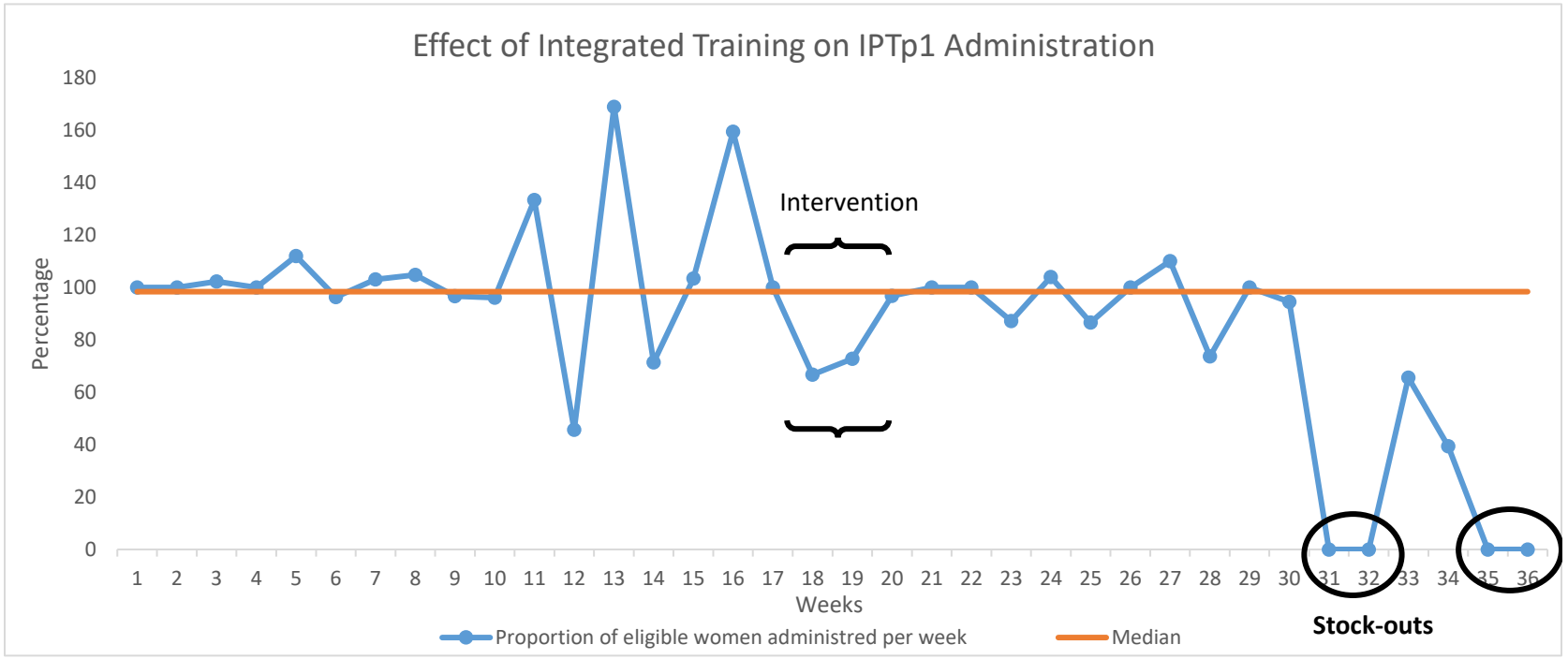


Figure 4: Run chart showing the effect of the integrated training on IPTp1 administration

The median proportion of eligible pregnant women administered IPTp2+ were 76.14%, 84.96% and 80.94% across the pre-intervention, intervention and post-intervention periods respectively. There was evidence of a non-random pattern of IPTp2+ administration as there was a downward shift in the administration of IPTp2+ from Weeks 8 to 13. Also, there was a downward trend of IPTp2+ administration from Weeks 14 to 18 which was within the pre-intervention and intervention period. There was an upward shift immediately after the intervention which was from Weeks 21 to 26 suggesting some improvement of IPTp administration post-intervention. The numbers of missing data for IPTp were more frequent in IPTp2+ as compared to IPTp1. Figure 8 shows the effect of an integrated training on IPTp2+ administration.

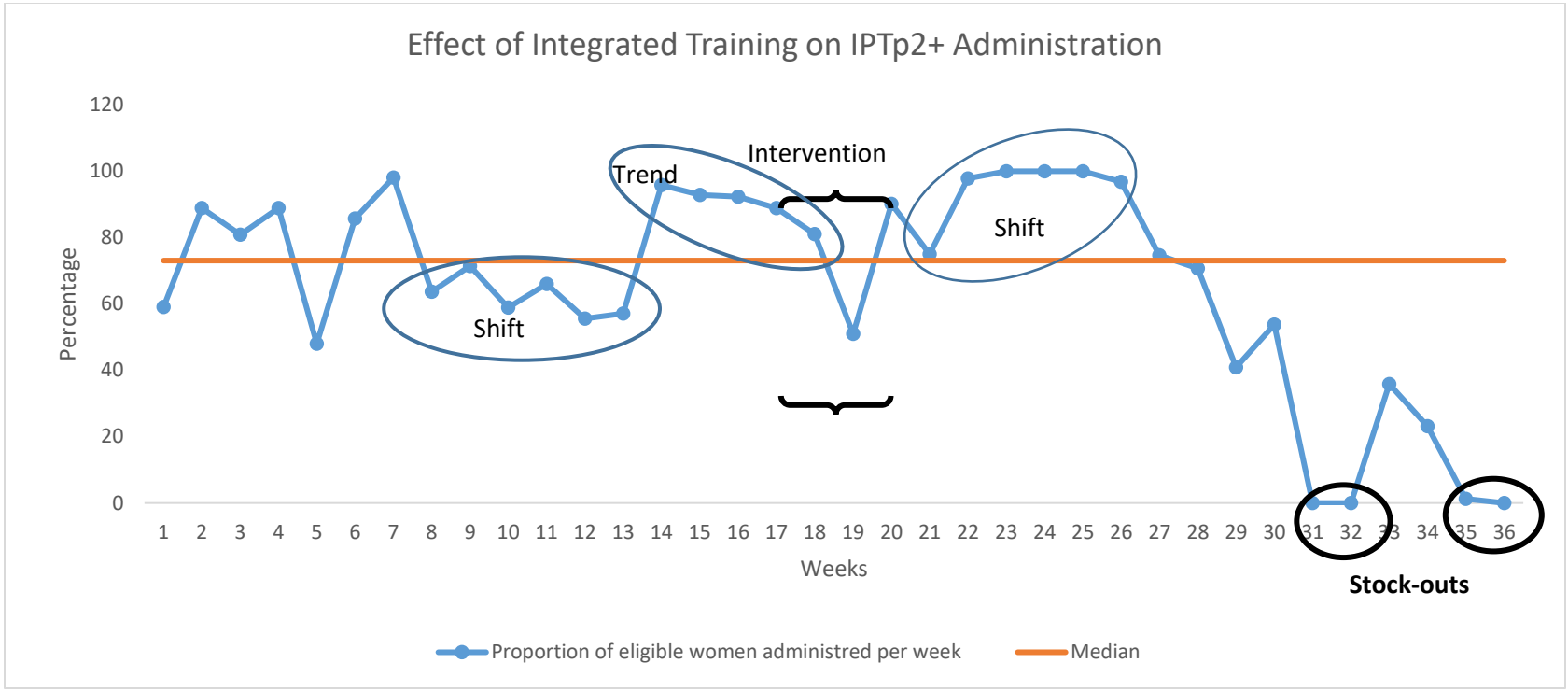


Figure 5: Run chart showing the effect of the integrated training on IPTp2+ administration

CHAPTER 4: DISCUSSION

In this study, a quality improvement approach consisting of training and coaching of healthcare providers was used to improve the administration of IPTp at Samaru primary healthcare clinic in Sabon-Gari local government area, Kaduna State, Nigeria. This study results showed over-estimation of IPTp1 prior to the intervention and suggests that the process of IPTp1 administration was relatively stable post-intervention. On the other hand, there was evidence of a non-random variation[3] in the administration of IPTp2+ over the pre-intervention period. This indicates a change in the normal process, possibly due to other factors that influence the normal IPTp administration pattern. However, an upward shift was observed in the immediate post-intervention period, suggesting an improvement in the administration of IPTp2+ which may be due to the intervention. The numbers of missing data for IPTp were more frequent in IPTp2+ as compared to IPTp1. Stock-outs were found to be a major challenge that hampered the administration of IPTp in the post-intervention assessment.

[3] Non-random variation in run charts indicates the process is unusual (due to something outside the system) which causes recognizable trends, shifts or pattern in the data.

4.1 Intervention Impact

This study found that the process of IPTp1 administration was relatively stable post-intervention. For IPTp2+, there was an upward shift suggesting immediate improvement in its administration post-intervention. This is consistent with other findings which showed significant improvement in the administration of IPTp post-training of healthcare providers (Ng and Odhiambo, 2014; Oyefabi, Sambo and Sabitu, 2015). Similarly, Arulogun, O.S., and Okereke (2012) indicated that knowledge of IPTp among the healthcare providers was significantly associated with practice as healthcare providers who had received training on IPTp were more likely to administer the pills as per national guidelines. To support these findings, the Interactive Systems Framework (ISF) shows that providers form part of the delivery system in an intervention and it is necessary to train healthcare providers regarding the implementation of interventions in order to have the desired outcomes (Wandersman *et al.*, 2008). Furthermore, the National Implementation Research Network (NIRN) identified the role of training and coaching of providers as implementation drivers, complementing each other to yield consistent and desired outcomes, as was the case in this study (NIRN (National Implementation Research Network) FCDI, 2017). Moreover, Durlak and DuPre (2008) emphasized the importance of training and monitoring of providers for improvement in healthcare practice within a particular context.

Although this study showed some improvement, the integrated training and coaching intervention on IPTp administration may not have reached its full impact due to the short post-intervention assessment. Durlak (2011) indicated that the impact of an intervention may not be noted in a short period rather, it may take over a year to achieve quality implementation as there is need for patience in estimating the true value of some interventions.

4.2 Overestimation of IPTp

Overestimation of IPTp1 was found in the baseline record review and pre-intervention interview. This is consistent with other findings which showed that healthcare providers administer the first dose of IPTp (IPTp1) to pregnant women receiving ANC services regardless of their eligibility status (Anchang-kimbi *et al.*, 2014; Exavery *et al.*, 2014). On the other hand, Hurley *et al.*, (2016) showed that there was underestimation of IPTp2+ as healthcare providers seldom fail to record IPTp2+ administered to pregnant women in the ANC daily register. This was consistent in our

study as there were a lot of missing data of IPTp2+ thus, resulting in underestimation. The above findings concur with a study conducted by Gross *et al.*, (2011) which showed that as compared to IPTp2+, healthcare providers were more likely to administer and record IPTp1 as they were reluctant in administering IPTp2+ considering the pregnant women had received the first dose in their previous ANC visit.

4.3 Stock-outs

Stock-outs were found to be a major challenge that hampered the administration of IPTp in the post-intervention assessment of this study as without IPTp there is no administration of the pills thus, no record on its administration. This resulted in missed opportunities of IPTp administration among pregnant women receiving ANC services. These findings are similar to previous findings which showed that, missed opportunities at health facilities contributed to the greatest losses in IPTp implementation strategies (Hill, Hoyt, *et al.*, 2013; Doku, Zankawah and Adu-Gyamfi, 2016). Similarly, other studies have shown IPTp stock-outs as a major barrier to its administration during ANC services (Arulogun, O.S., and Okereke, 2012; Katsayal *et al.*, 2014; Ameh *et al.*, 2016; Doku, Zankawah and Adu-Gyamfi, 2016). Furthermore, Rassi *et al.*, (2016) showed that ANC visits were not assurance for IPTp administration. Moreover, based on the pattern of IPTp administration in this study some pregnant women receiving ANC services were not administered IPTp due to stock-outs thus, attributing for missed opportunities. These findings further corroborate with other findings which showed that while ANC attendance is high, IPTp administration remains low with a high dropout rate of IPTp2+ from IPTp1 and stock-out was a contributing factor to these drop-out rates (Andrews *et al.*, 2015; Salomão, Sacarlal and Gudo, 2017). However, Hill, Dellicour, *et al.* (2013) showed a contradictory report by indicating that stock-outs were unlikely to be the primary issue of low compliance of IPTp administration as the process of IPTp administration (such as administration of IPTp under DOT, checking for eligibility and screening for malaria) among healthcare providers during ANC services could contribute to low administration.

4.4 Data quality

Our study found that there were poor data quality in the ANC daily register as missing data and poor data entry were evident for both IPTp1 and IPTp2+. The numbers of missing data is more

frequent in IPTp2+ compared to IPTp1. These findings concur with a study conducted by Ashwood-Smith *et al.* (2002) which showed that there were inconsistences of IPTp records in the ANC daily register and in some cases the second doses of IPTp i.e. IPTp2 is often not administered or administered but not ticked in the record as healthcare providers do not check the records properly to determine whether the pregnant women receiving ANC services had received the first dose. Furthermore, healthcare providers often miscount the weeks of previous IPTp administration and mistakenly calculate that the second dose was too soon to be administered (Ashwood-Smith *et al.*, 2002).

4.5 Strength of the study

A major strength of the study is that the use of a QI approach of training and coaching improved the administration of IPTp. Also, the use of the routine ANC daily register provides the opportunity for making comparison of IPTp administration across different ANC weeks of the pre-intervention, intervention and post-intervention durations. Furthermore, the routine ANC daily register shows the natural variation of IPTp administration within the context of the clinic.

4. 6 Limitations of the study

1) The study was prone to information bias as the use of secondary data from the routine data system (ANC register) is known to have poor data quality which is occasioned by inadequate training of data officers resulting in fluctuations in data reporting rates. Regardless of these challenges, the routine data is still acceptable and used in health programmes and policy making across all levels of the health system (Eboreime, Abimbola and Bozzani, 2015).
2) The post intervention period was short. However, Durlak (2011) indicated it may take considerable periods before impacts emerge.
3) The study was conducted in real life settings thus, could not control for confounders such as stock-outs as procurement of IPTp were beyond the scope of this study. Moreover, stock-outs affected the impact of the post-intervention assessment as there were high levels of stock-outs in the post-intervention phase. This resulted in bias in terms of comparing pre and post-intervention outcomes. Also, stock-outs may have affected healthcare providers' compliance with the IPTp guidelines in improving the administration of IPTp which was the

main aim of this study as they could not administer IPTp to pregnant women receiving ANC services.

4) The lack of post-intervention interview limits the understanding of the factors that affect the intervention outcome.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

In conclusion, the QI approach of integrated training and coaching intervention carried out in this study suggested improvement in IPTp administration within the context of Samaru PHC.

Several challenges were identified, including stock-outs and poor quality of using ANC daily register which affected the real impact of the intervention assessment.

5.2 Recommendations

- Future studies should consider a longer post-assessment duration in order to yield desired outcomes.
- To yield desired outcomes in QI interventions, there is need for regular training and coaching of healthcare providers that will yield insights regarding the quality of IPTp administration within a particular context. Also, regular and consistent monitoring of healthcare providers entering routine ANC daily register could reduce errors and improve the quality of ANC daily register which will yield reliable results.
- A reliable IPTp supply system should be set up from procurement stage through, storage and distribution to the clinic in order to avoid stock-out. This will improve the administration of IPTp during ANC visits and reduce the rate of missed opportunities among pregnant women receiving ANC services.
- Process measures which uses the actual process of healthcare delivery as an indicator of quality (by analysing healthcare providers' activities in order to determine whether IPTp was administered according to the guidelines) should be considered in future studies.
- There should be multiple test of change (i.e. different intervention cycles) in order to adjust and make changes during an intervention as this is ideal in QI interventions. This has proven to yield desired outcomes.

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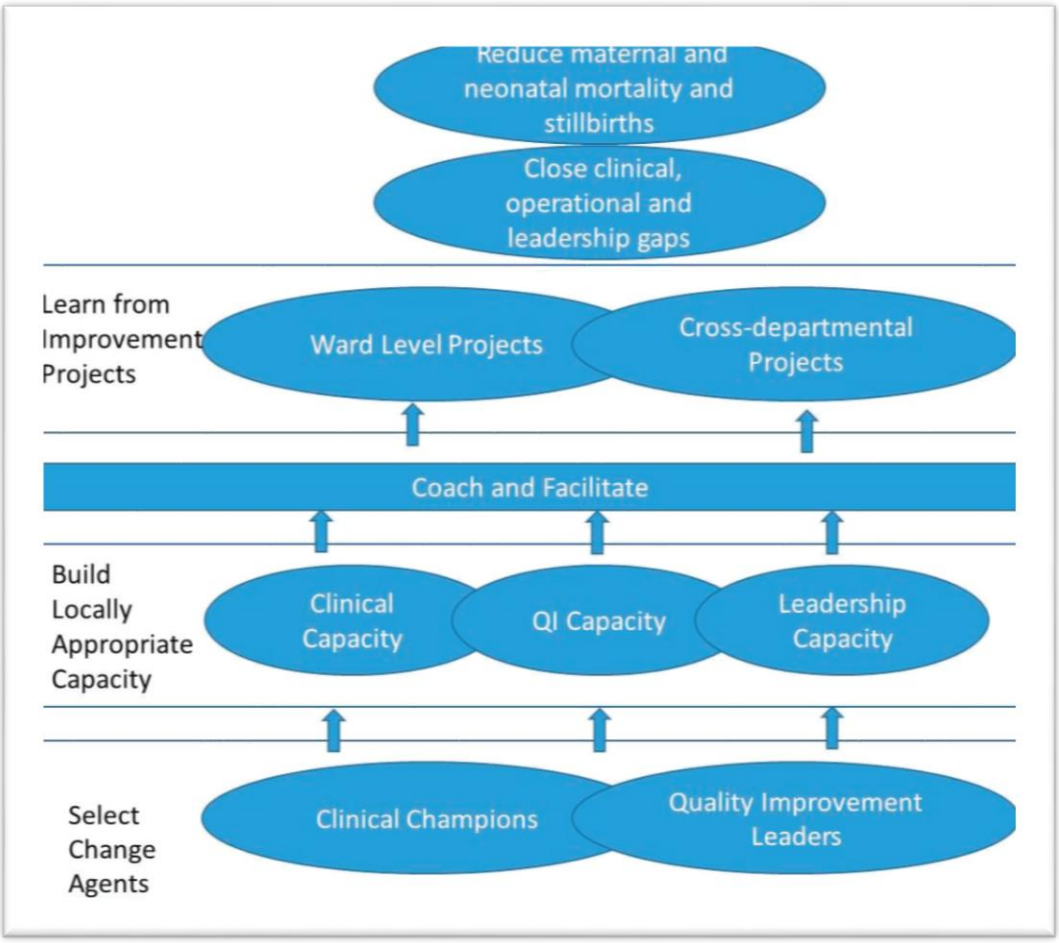
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APPENDICES

Appendix A: The Ridge-Kybele model theory of change



Appendix B: ANC Daily Register (Part I)

NATIONAL HEALTH MANAGEMENT
DAILY ANTE NATAL CLINIC &

1. State:________________________ 2. LGA:________________________ 3. Ward: ________________________

6. S/N	7. Date	8. Name of client	9. Client number	10. Age	11. Type of Visit (Tick) as appropriate)		12. Parity	13. Antenatal clinic attendance (Tick as appropriate)		14. Age of pregnancy (in wks.)	15. No. of antenatal clinic visit(s) to date	16. ANC HIV counselling & testing (Tick)			17. ANC Partners' Testing (Tick)				18. Syphilis Testing & Treatment(Tick)			
															Partners of HIV pos. pregnant women		Partners of HIV neg. pregnant women		18a. Testing			
					ANC	PNC		13a. N	13b. R			Previously known HIV positive status	ANC HIV counseled tested and received result	HIV test result positive	tested negative	tested positive	tested positive	tested negative	Not Done	Positive	Negative	18b. Treated (tick if treated)
TOTAL																						

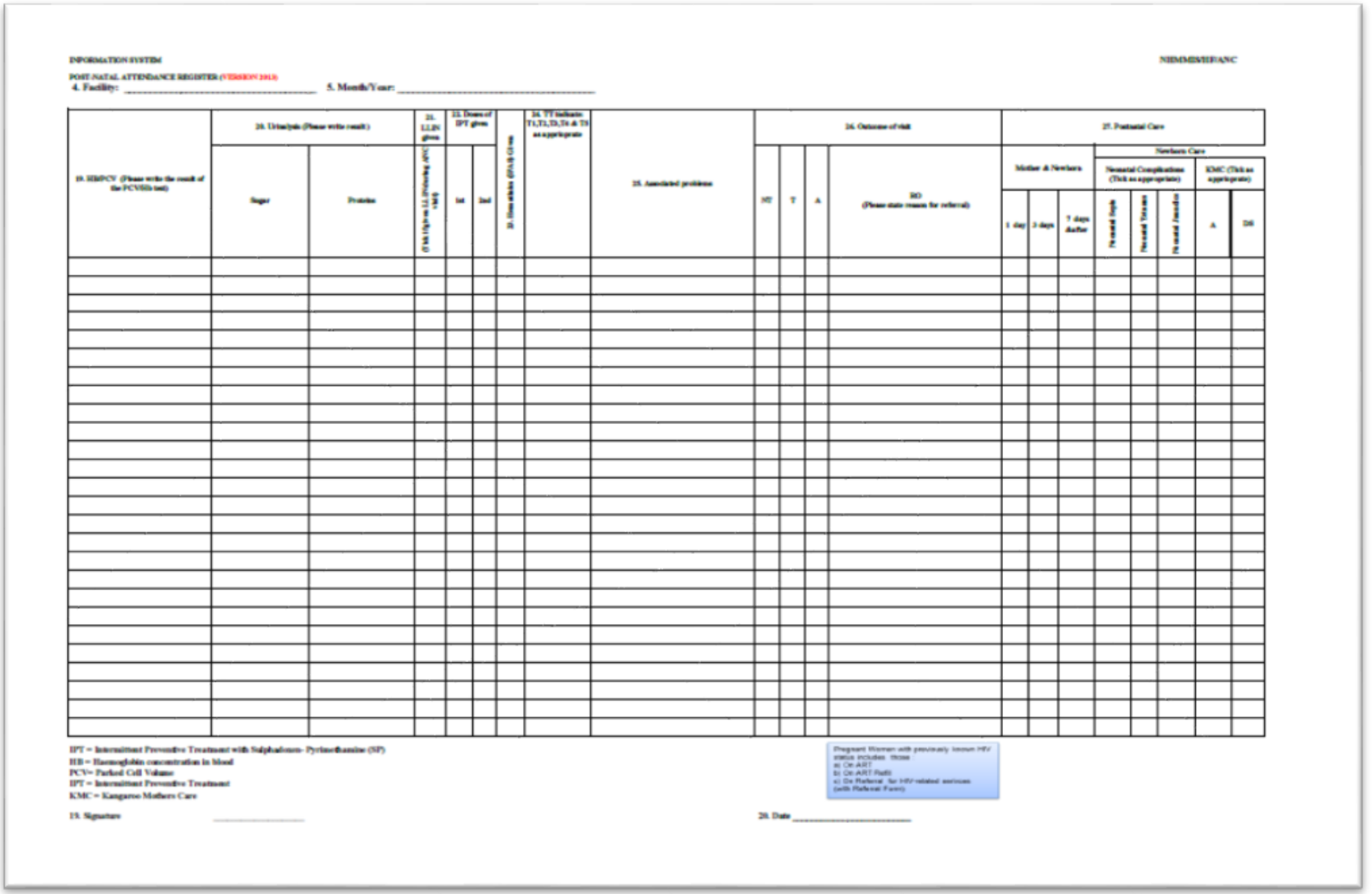
Key
N = New
T= Treated
A=Admitted
DS = Discharged

R= Revisit
NT = Not treated
RO= Referred out

ANC= Ante -Natal Care
PNC= Post-Natal Care

17. Name of reporting officer____________________ 18. Designation of Reporting Officer________________________

ANC daily register part II



INFORMATION SYSTEM

NHMMIS/HIF/ANC

POST-NATAL ATTENDANCE REGISTER (VERSION V 2013)

4. Facility: _____ 5. Month/Year: _____

19. HB/PCV (Please write the result of the PCV/Hb test)	20. Urinalysis (Please write result:)		21. LLIN given	22. Doses of IPT given		23. Iron tablets given (30+5) Given	24. TT Indicate: T1,T2,T3,T4 & T5 as appropriate	25. Associated problems	26. Outcome of visit				27. Postnatal Care						
	Sugar	Proteins	(Tick Yes or No) (Prescribing ARV with child)	1st	2nd				HT	T	A	RO (Please state reason for referral)	Mother & Newborn			Newborn Care			
													1 day	3 days	7 days &after	Neonatal Complications (Tick as appropriate)			KMC (Tick as appropriate)	
																Neonatal Sepsis	Neonatal Tetanus	Neonatal Jaundice	A	DS

IPT = Intermittent Preventive Treatment with Sulphadoxine- Pyrimethamine (SP)
HB = Haemoglobin concentration in blood
PCV= Packed Cell Volume
IPT = Intermittent Preventive Treatment
KMC = Kangaroo Mothers Care

Pregnant Women with previously known HIV status includes those
a) On ART
b) On ART Refill
c) On Referral for HIV-related services (with Referral Form)

29. Signature _____

30. Date _____

Appendix C: Data extraction form

Data extraction form (Information extracted from the ANC daily register)

Weeks	IPTp1	No of pregnant women eligible for IPTp1	IPTp2+	No of pregnant women eligible for IPTp2+
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				
21				
22				
23				

24				
25				
26				
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				

Appendix D: Semi-structured interview guide

Semi-structured Interview Guide

Let me begin by asking you a few questions about your job.

What is your job title?

How long have you been in your current role?

Role and responsibilities

What are your role and responsibilities with regard to attending to pregnant women in this facility/

Which malaria in pregnancy interventions are being implemented in this clinic?

Have you had previous training on IPTp administration?

How important is the administration of IPTp during ANC services as compared with other areas you are responsible for?

IPTp guidelines

At what age in pregnancy are you supposed to administer IPTp1?

At what age in pregnancy are you supposed to administer IPTp2+?

Do you administer IPTp under Direct Observed Therapy (DOT)?

Do you administer IPTp in an empty or full stomach?

Are there clean drinking water available during ANC?

According to the information gotten from this clinic's ANC record on IPTp, there is a huge difference in the administration of IPTp1 and IPTp2+. What do you think are the main reasons why more pregnant women were being administered IPTp1 than IPTp2+?

Does your clinic have a plan with regard to increasing IPTp administration?

ANC daily register

When do you tick IPTp in the ANC daily register?

What are the challenges in terms of recording this information?

Are there difficulties in terms of distinguishing between the timing of IPTp1 and IPTp2+ administration?

In your opinion, how could the administration of IPTp be better improved within this clinic?

Appendix E: Implementation gaps

Appendix E shows the characteristics of the healthcare providers' interviewed. Healthcare providers were interviewed in order to identify the implementation gaps of IPTp administration within the context of the clinic. Interviews were audiotaped and these were transcribed and translated into English Language. The data were then cleaned and imported into QDA miner. Transcribed interviews were coded and thematic analysis was done in order to identify the implementation gaps in IPTp administration within the context of a PHC.

Appendix E: Characteristics of Healthcare Providers

Job category	Gender	Frequency
Auxiliary nurse	Female	5
CHEW	Female	4
ANC service provider (Support staff)	Female	2

Interviews were audiotaped and these were transcribed and translated into English Language. The data were then cleaned and imported into QDA miner. Transcribed interviews were coded and thematic analysis was done in order to identify the implementation gaps in IPTp administration within the context of PHC Samaru. These includes, inconsistent implementation of national guideline on IPTp, inconsistencies with timing of IPTp administration, poor knowledge on IPTp and poor data entry.

Inconsistent implementation of national guideline on IPTp

While the national policy reveals that IPTp could be taken in either empty or full stomach, there were misperceptions amongst healthcare providers that IPTp should not be taken on an empty stomach. As a result, healthcare providers administered the pills to pregnant women to take it home and instructed them to take it after meal thus, opening up chances that they could either decide not to take the pills or forget to take it.

> *"Some of the pregnant women do say they haven't eaten (taken breakfast), so we give them to take home since you know it is necessary to eat. That's why we give them to take home". (Healthcare provider #02)*

Although, the healthcare providers administer SP for the pregnant women to take home, they were however not confident that the pregnant women actually take it at home. Regardless of these doubts, the healthcare providers still administer the IPTp to the pregnant women to take home.

> *"We (healthcare providers) are not sure of the pregnant women taking IPTp at home" (Healthcare provider #03).*

Inconsistencies with timing of IPTp administration

Despite high levels of ANC attendance, missed opportunities were prominent amongst pregnant women attending ANC services as pregnant women eligible for IPTp-SP were not administered IPTp-SP. Thus, indicating that there were deficiencies in IPTp administration at ANC services. Pregnant women in gestational age 13 weeks and above attending ANC services for the first time were not administered the first dose of IPTp-SP. Consequently, pregnant women attending ANC services for the second time who received IPTp1 for their first visit were not administered the second dose (IPTp2). Furthermore, some pregnant women were administered the first dose of IPTp at gestational age 28 weeks and above even though they had previously attended the first ANC visit as a result, they were administered IPTp at later stages of pregnancy which subsequently results in missed opportunities of taking the three recommended doses of IPTp throughout their pregnancy period.

> *"We the healthcare providers also detected the mistake of poor timing of IPTp administration as some pregnant women eligible for IPTp doses were not administered". (Healthcare provider #03).*

Furthermore, there was high compliance with IPTp1 administration as compared to IPTp2+ as there were missed opportunities for those doses (IPTp2+). Healthcare providers were reluctant to administer IPTp2+ and in some cases they were unwillingly to check the client's record for eligibility in order to determine if they should be administered IPTp-SP or not.

*"When the pregnant women come for ANC it's like my colleagues (healthcare providers) don't remember to administer IPTp2 to them" (Healthcare provider #03).*Furthermore, the policy reveals that IPTp should be given from gestational age 13weeks and above. However, healthcare providers administered IPTp to pregnant women as early as 8 weeks which is potentially harmful to the foetus.

"We administer the first dose at least two months of pregnancy". (Healthcare provider #01).

Poor knowledge on IPTp among healthcare providers

Poor knowledge on SP among healthcare providers contributed to the low administration of the pills especially when it is not administered under DOT. Majority of healthcare providers know of SP but don't understand its use and importance. A senior healthcare provider for ANC services explained that those directly involved in the ANC services had limited knowledge on what SP is and its role in malaria in pregnancy.

"What needs to be changed is that those directly involved in providing ANC services to pregnant women should know actually what IPTp is? What actually IPTp does to the pregnant women, why that pregnant woman really needs that IPTp? Because if I am handling a drug, I don't know the importance of what I am doing then…" (Healthcare provider #03)

In addition, poor knowledge on IPTp among healthcare providers contributed to missed opportunities and low administration of the pills amongst eligible pregnant women receiving ANC services.

"If they ask the healthcare providers conducting the ANC if they know the importance of IPTp, what malaria in pregnancy is…? What you told me (errors in the ANC records and missed opportunity amongst pregnant women) you wouldn't have detected any deficiencies such as some clients receiving ANC services not being administered IPTp" (Healthcare provider #03).

According to the policy, IPTp should be administered to eligible pregnant women under observation regardless of their age or gestational ages. However, some healthcare providers had limited understanding of this, as they administered IPTp under observation to pregnant women in their late gestational age while those in their early gestational age were allowed to take it home.

"Like pregnant women that attended ANC services yesterday (Wednesday) we administer IPTp under observation in our presence because they are old. But on Mondays and …… we administer it to them to take home". (Healthcare provider #02).

Despite the known side effects of SP such as fever, dizziness, rashes amongst others, it is generally well tolerated. However, healthcare providers had limited knowledge on this and do not administer it to pregnant women who complain of potential side effects.

> ***"****Some of the pregnant women complain of side effect so we don't administer it to those that complain. (Healthcare provider #02).*

Poor data entry

Baseline data from the ANC daily register showed poor quality of data entry. This is consistent with what the healthcare providers revealed on data entry. The healthcare providers explained the errors in the ANC daily register as a result of inadequate knowledge on entering the data amongst themselves.

> *"The challenges just like I have said. The healthcare providers entering the records is not entering what was administered to the pregnant women card because of inadequate knowledge". (Healthcare provider #03)*

Furthermore, inconsistencies in data entry were dominant in the ANC daily record as healthcare providers ticked IPTp for pregnant women that were not administered the pills and fail to tick IPTp for those administered. Thus, resulting in underestimation and overestimation of IPTp administration in some ANC records.

> *"We the healthcare providers administer IPTp to pregnant women but maybe sometimes we fail to put it in record" (Healthcare provider #01)*

Inadequate knowledge on data entry of the daily ANC record resulted in healthcare providers less concerned about the errors in the record as a result, reluctant in improving the quality of data entry and they thought the errors in the ANC daily register were not vital.

> *"Nobody is perfect. But the error isn't a lot in the register. Or is it a lot?" (Healthcare provider #01).*

The review of the baseline data and the baseline IDIs showed inconsistent reporting of missing data and inappropriate methods of reporting missing data. Inappropriate method of reporting IPTp-SP and missing data were more dominant in IPTp2+ as compared to IPTp1. In addition, healthcare providers ticked IPTp1 and IPTp2 at the same time for the same ANC visit of a pregnant woman.

This resulted in bias and loss of statistical precision and power of the data extracted from the ANC daily register.

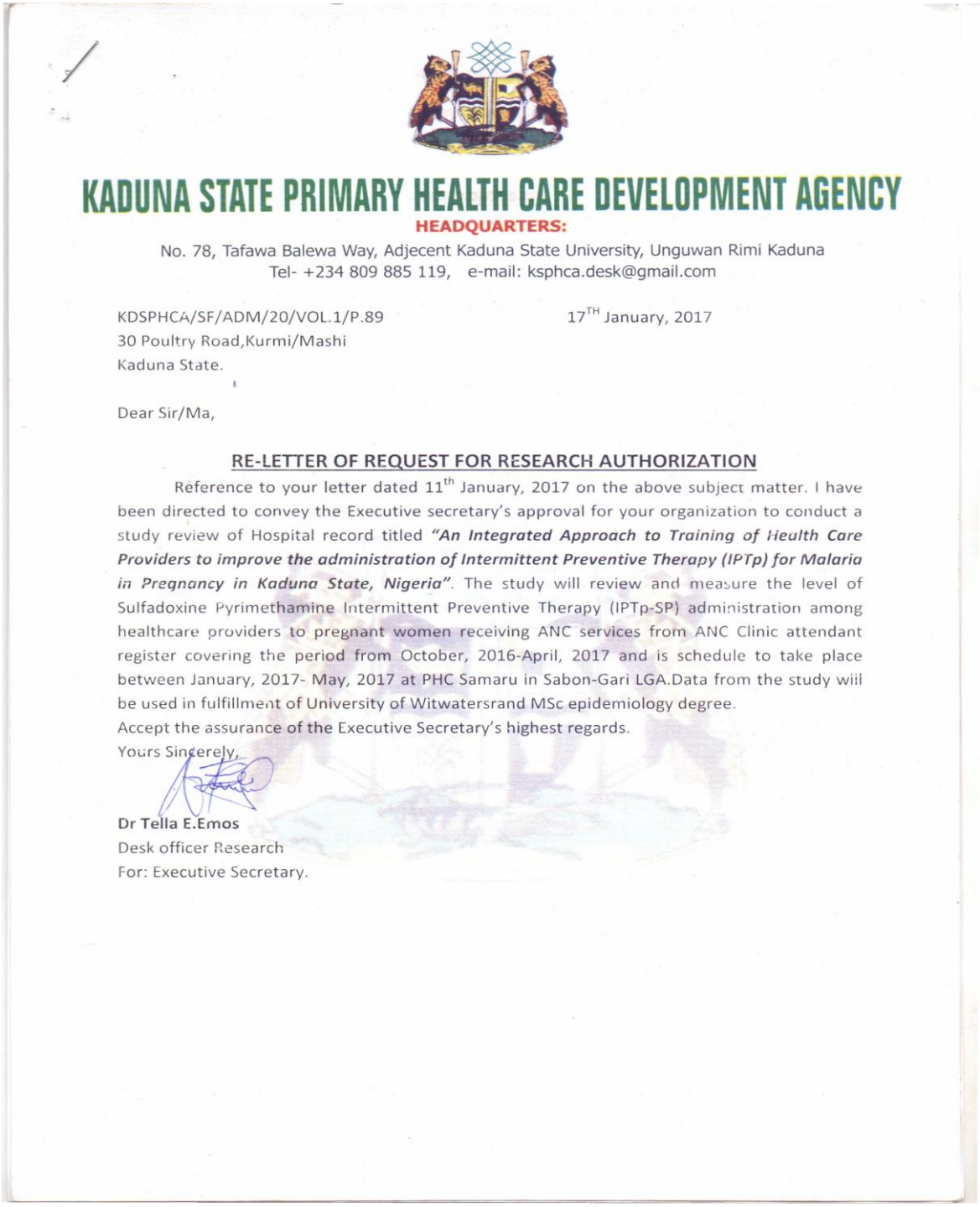
> *"It was based on the initial training, we the healthcare providers were thinking we will tick both columns of IPTp1 and IPTp2 if the women have attended both ANC visits. But they later told us it should be ticked based on their specific ANC visits …" (Healthcare provider #01).*

Furthermore, healthcare providers were reluctant to check the previous ANC record of the pregnant women to determine if they were administered IPTp in their previous ANC visit thus, fail to administer IPTp2+ to eligible pregnant women receiving ANC services.

> *"Some of my colleagues (healthcare providers) don't remember to go through the previous record of the pregnant women in order to determine whether she was administered IPTp or not". (Healthcare provider #03).*

Appendix F: Letter of research authorisation

(Attached is letter authorisation from the research site)



KADUNA STATE PRIMARY HEALTH CARE DEVELOPMENT AGENCY

HEADQUARTERS:

No. 78, Tafawa Balewa Way, Adjecent Kaduna State University, Unguwan Rimi Kaduna
Tel- +234 809 885 119, e-mail: ksphca.desk@gmail.com

KDSPHCA/SF/ADM/20/VOL.1/P.89 17TH January, 2017
30 Poultry Road,Kurmi/Mashi
Kaduna State.

Dear Sir/Ma,

RE-LETTER OF REQUEST FOR RESEARCH AUTHORIZATION

Reference to your letter dated 11th January, 2017 on the above subject matter. I have been directed to convey the Executive secretary's approval for your organization to conduct a study review of Hospital record titled ***"An Integrated Approach to Training of Health Care Providers to improve the administration of Intermittent Preventive Therapy (IPTp) for Malaria in Pregnancy in Kaduna State, Nigeria"***. The study will review and measure the level of Sulfadoxine Pyrimethamine Intermittent Preventive Therapy (IPTp-SP) administration among healthcare providers to pregnant women receiving ANC services from ANC Clinic attendant register covering the period from October, 2016-April, 2017 and is schedule to take place between January, 2017- May, 2017 at PHC Samaru in Sabon-Gari LGA.Data from the study will be used in fulfillment of University of Witwatersrand MSc epidemiology degree.

Accept the assurance of the Executive Secretary's highest regards.

Yours Sincerely,

Dr Tella E.Emos
Desk officer Research
For: Executive Secretary.

Appendix G: Kaduna State ministry of health research clearance certificate



MINISTRY OF HEALTH AND HUMAN SERVICES
KADUNA STATE, NIGERIA

MOH/ADM/744/VOL.1/502 17th FEBRUARY, 2017

NOTICE OF APPROVAL AFTER FULL COMMITTEE REVIEW

AN INTEGRATED APPROACH TO TRAINING OF HEALTH CARE PROVIDERS TO IMPROVE THE ADMINISTRATION OF INTERMITTENT PREVENTIVE THERAPY FOR MALARIA IN PREGNANCY IN KADUNA STATE, NIGERIA

Name of Principal Investigator:	SIMBIAT SOPHIA NUHU
Address of principal Investigator:	UNIVERSITY OF THE WITWATERSRAND, SCHOOL OF PUBLIC HEALTH JOHANNESBURG
Date of receipt of application	1ST JANUARY, 2017
Date of Ethical Approval:	16th FEBRUARY, 2017

This is to inform you that the research described in the submitted protocol, the consent forms, advertisements and other participant information materials have been reviewed and given full approval by Health research Ethics Committee (HREC).

If there is delay in starting the research or any change, inform the HREC so that the dates of approval can be adjusted accordingly.

However, Researcher is kindly requested to submit a copy of his/her findings to the state

Ministry of Health, please.

DR. B.M. JATAU
Chairman

20/02/17

Independence Way, P.M.B 2014, Kaduna, Kaduna State-Nigeria
Tel: +234 (0) 818 407 8693 | Website: www.kdsg.gov.ng | Email: health@kdsg.gov.ng

Appendix H: Ethics clearance certificate from Wits HREC

R14/49 Miss Simbiat Sophia Nuhu

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M161171

NAME: (Principal Investigator)	Miss Simbiat Sophia Nuhu
DEPARTMENT:	Epidemiology and Biostatistics Samaru Primary Healthcare Centre, Sabon-Gari Local Government Area, Kaduna State, Nigeria
PROJECT TITLE:	An Integrated Approach to Training of Healthcare Providers to Improve the Administration of Intermittent Preventive Therapy (IPTp) for Malaria in Pregnancy in Kaduna State, Nigeria
DATE CONSIDERED:	25/11/2016
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr L. Ibisomi and Dr I.O. Ajayi
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	31/03/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in November and will therefore be due in the month of November each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

Appendix I: Table showing the description of the run charts

Rules	Description
Rule 1 (Shift)	Six or more consecutive data points either all above or all below the median line. This suggests a non-random pattern of data.
Rule 2 (Trend)	Five or more consecutive data points either going up or going down.
Rule 3 (Runs)	Runs are a series of data points that fall either above or below the median. Too frequent or too few runs indicate a non-random variation. Expected number of runs are based on a table adapted from Swed and Eisenhart.
Rule 4 (Astronomical data)	Astronomical data points are data that are distinctly extraordinary in relation to the other data points.

(Anhøj and Olesen, 2014)

Appendix J: Participants' information sheet

PARTICIPANTS' INFORMATION SHEET

Good Day

My name is Simbiat Sophia Nuhu and I am a Masters student in the Division of Epidemiology and Biostatistics, School of Public Health at the University of the Witwatersrand, Johannesburg, South Africa.

I am conducting a study to improve the administration of Intermittent Preventive Therapy using sulfadoxine pyrimethamine (IPTp-SP) among healthcare providers through an integrated approach to training. This will involve training of healthcare workers providing antenatal care (ANC) services at primary healthcare Samaru which will be followed up with coaching.

The reason why I am conducting this study is to improve the IPTp administration among healthcare providers in Samaru Primary Healthcare Centre (PHC) at Sabon-Gari local government area of Kaduna state.

Being that you are a healthcare provider, I would like to train you on the administration of the recommended IPTp. It is hoped that the integrated training will provide useful approach to healthcare providers on the administration of IPTp with regards to the national guideline. Before you decide to take part, you need to understand why the research is being conducted and what would be required of you. Therefore, take your time to read this information sheet carefully. Please ask any question if anything you have read is not clear or would like further information.

The training will last for a period of two weeks and the training content will be translated into Hausa language for easy understanding. In these two weeks, we will come up with a team from PHC Samaru in order to choose the appropriate time and days to conduct the training. The team will be made up of healthcare providers providing ANC service in Samaru PHC. This means you will be part of the team. The training will be followed up with coaching which will last for two weeks. The coaching package will involve follow-up meetings, supervision and putting up wall charts with clearly illustrated diagram and messages to the healthcare providers on the protocol of IPTp administration.

As a healthcare provider in this clinic you are selected to further participate in our interview on IPTp policy. Also, during some ANC visits days, you will be observed on the processes of IPTp

administration. The researcher will ensure confidentiality and anonymity of all information gotten from you.

If you decide to take part in this study, be assured that your participation is voluntary and you are free to withdraw at any time without giving any reason. There are no risk, penalty or loss of benefits whether you participate or not.

If you have any concerns or questions regarding any aspect of this study or wish to obtain a copy of the results of the study, please kindly contact me on;

Name: Simbiat Sophia Nuhu Tel: (+234)8176620273

Email: nuhu_sophia@yahoo.com ; ssnuh1@gmail.com

Dr. Latifat Ibisomi (Supervisor)
Senior Lecturer and Course Coordinator,
School of Public health,
The University of the Witwatersrand.
Email: **Latifat.Ibisomi@wits.ac.za**

In case of any complaint or other concerns about any aspect of this study, please get in touch with the Ethics Committee on the following contacts:
Chairperson: **peter.cleaton-jones1@wits.ac.za**
Administrators - Ms Zanele Ndlovu/ Mr Rhulani Mkansi/ Mr Lebo Moeng
Tel: 011 717 2700/2656/1234/1252
Email: HREC-Medical.ResearchOffice@wits.ac.za

Appendix K: Informed consent form

Informed Consent Form for In-depth Interviews

I _____ consent to participate in a training intervention on improving the administration of Intermittent Preventive Therapy using sulfadoxine pyrimethamine (IPTp-SP) among healthcare providers in Primary Healthcare centre Samaru which is situated in Sabon-Gari local area of Kaduna state, Nigeria. The study is being conducted by Simbiat Sophia Nuhu; a Master's student from University of the Witwatersrand, Johannesburg, South Africa.

I confirm that:

- I was provided with an information sheet that explained what the study is about. I have read and understood the information about the study as provided in the information sheet.
- I have also consented that the training intervention will be followed up with coaching. Thus, I understand I will be involved in follow-up meetings and I will be supervised after the training.
- I understand I will be observed during ANC services.
- I may, at any stage, without prejudice, withdraw my consent and participation in the study.
- I understand that I will not be paid for participating in the study.
- It has been clearly explained to me that the research is confidential and anonymous. I.e. what I say will not be linked to me as a person and the information obtained from this study will only be used for research purposes.
- I have had sufficient opportunity to ask questions (of my own free will) and declare myself prepared to participate in the study.
- It has been clearly explained to me that information from this research may be used in a thesis report, publications, presentations or conferences.

PARTICIPANT:

Signature Date

Consent to Audio Record the Interview

I have read the project information sheet, and I understand that it is my decision whether or not the interview is audio-recorded. My decision will not affect in any way how the interviewer treats me if I do not want the interview to be audio-recorded.

I understand that if the interview is audio-recorded that the audio will be destroyed two years after the interview.

I understand that I can ask the person interviewing me to stop audio recording, and to stop the interview altogether, at any time.

I understand that the information that I give will be treated confidentially and that my name will not be used when the interviews are typed up.

☐ Yes, I give my permission for the interview to be audio recorded.

☐ No, I do not give my permission for the interview to be audio recorded.

Signature ….....

Date …….