

**KNOWLEDGE, PERCEPTION AND PRACTICE OF SEASONAL
MALARIA CHEMOPREVENTION AMONG HEALTH CARE WORKERS
AND PATENT MEDICINE VENDORS IN KANO STATE**

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SCIENCE; PUBLIC HEALTH (MSc. PH)”**

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DECLARATION

“I hereby declare that this dissertation is the product of my research efforts under taken under the supervision of Associate Prof. Abubakar Sanusi and Associate Prof. Auwal Umar Gajida and has not been presented anywhere for the award of a degree or certificate. All sources have been duly acknowledged.

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LIST OF ABBREVIATIONS

ACT	Artemisinin Combination Therapy
AJOL	Africa Online Journal
AQ	Amodiaquine
BCC	Behavioural Change Communication
CDD	Community Drug Distributors
CHAI	Clinton Health Access Initiative
CHO	Community Health Officer
DDT	Dichlorodiphenyltrichloroethane
DFID	Department For International Development
DOD	Department Of Defense
DOT	Directly Observed Treatment
DSMA	Drugs Supply Management Agency
EPI	Expanded Program On Immunization
ESMPIN	Expanded Social Marketing Program In Nigeria
FGD	Focus Group Discussion
GF	Global Fund
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
IPTC	Intermittent Preventive Treatment In Children
IPTI	Intermittent Preventive Treatment In Infant
IPTP	Intermittent Preventive Treatment In Pregnant Women
ISR	Indoor Residual Spray
ITN	Insecticide Treated Net
JCHEW	Junior Community Health Extension Worker

KII	Key Informant Interview
LGA	Local Government Area
LLIN	Long Lasting Insecticide Treated Nets
MDG	Millenium Development Goals
MKAP	Malaria Knowledge Attitude and Practice
MSF	Medecins San Frontieres
NMEP	National Malaria Elimination Program
PEPFAR	President Emergency Plan for Aids Relief
PHC	Primary Health Care
PMI	President Malaria Initiative
PMV	Patent Medicine Vendors
PSN	Pharmaceutical Society of Nigeria
RDT	Rapid Diagnostic Test
SCHEW	Senior Community Health Extension Worker
SFH	Society for Family Health
SMC	Seasonal Malaria Chemoprevention
SMOH	State Ministry Of Health
SP	Sulfadoxine Pyrimethamine
SUNMAP	Support for the National Malaria Program
TSHIP	Targeted States High Impact Project
UNICEF	United Nations Children Fund
USAID	United State of America Agency For International Development
WHO	World Health Organization

ABSTRACT

Seasonal malaria chemoprevention is a relatively new method of malaria prevention introduced by the WHO in 2012. Being a relatively new program the knowledge, perception and practice of seasonal malaria chemoprevention among health care workers and patent medicine vendors need to be assessed.

The aim of this study is to determine the knowledge, perception and practice of SMC among health care workers and patent medicine vendors in Kano State.

The study is a descriptive cross-sectional study. One hundred and twenty health care workers and patent medicine vendors were interviewed using semi-structured interviewer administered questionnaire which assessed knowledge, perception and practice of seasonal malaria chemoprevention. KII was done with 22 respondents, which include selected officials of the State health sector and executives of Kano State patent medicine vendors.

Majority of the respondents 42.5% (51) have poor knowledge, where as 24.2% (29) have good knowledge on seasonal malaria chemoprevention. Majority of the respondents have positive perception 87.5% (105) and 12.5% (15) have negative perception on seasonal malaria chemoprevention. Practice of SMC, 30.8% (37) have poor practice and 28.3% (34) have good practice. Factors such as level of education ($p = 0.001$), numbers of years working experience ($p = 0.004$), marital status ($p = 0.007$) and religion ($p = 0.003$) were found to be associated with knowledge and practice of SMC respectively.

The study showed that there is poor knowledge and practice on seasonal malaria chemoprevention among health care workers and patent medicine vendors in Kano state. Although the perception on seasonal malaria chemoprevention among health care workers and patent medicine vendors is positive. Factors such as level of education, marital status and religion were found to have a significant association with knowledge, perception and practice of SMC.

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CHAPTER ONE

Introduction

1.0 Background

Malaria is an infectious disease caused by plasmodium parasites transmitted by the bites of infected female anopheles mosquitoes. Malaria is caused by four species of parasites belonging to the genus Plasmodium. *Plasmodium falciparum*, *plasmodium vivax*, *Plasmodium malariae*, and *plasmodium ovale*. Of these four species of *Plasmodium falciparum* causes the most severe malaria illness and death throughout the world (WHO1998).⁵¹

Worldwide, it is estimated that malaria kills more than one million people each year, making it the world's third deadliest infectious disease, after AIDS and Tuberculosis.⁵² According to world malaria report 2013, the number of cases was estimated to have increased globally from 226 million in 2000 to 244 million in 2005, before decreasing to 207 million in 2012. Malaria still remains a major public health problem in Sub-Saharan Africa with over 80% of malaria cases and 95% of malaria mortality worldwide occurring in this region. The burden of malaria is also reported to be significantly lower in large cities than in rural areas of sub-Saharan Africa.^{53,54} Malaria is endemic in Nigeria with all year transmission and 97 percent of the population at risk. *Plasmodium falciparum* is the predominant parasite species, mainly transmitted by *Anopheles gambiae*, *An. funestus* and *An. Arabiensis*.

Prior to 2010, available data was insufficient to clearly micro stratify the country's malaria epidemiological profile. However, the 2010 Nigeria Malaria Indicators Survey (NMIS) revealed that malaria parasite prevalence is still high, with an average parasite prevalence of 42% among children under five years of age.⁵⁵ Malaria has been reported to account for 60% of outpatient visits and 30% of hospitalizations among children under five years of age in Nigeria.⁵⁵ Thus, malaria remains an important cause of morbidity and mortality in Nigeria.

Nigeria accounts for 32% of the global estimate of 655,000 malaria deaths annually in 2010. Along with two other countries, India and Democratic Republic of Congo, Nigeria accounted for over 40% of the estimated total of malaria cases and deaths globally in 2010.⁵⁶ With an estimated population of 160 million, Nigeria has a large population at risk of malaria and children under five years of age and pregnant women are the most vulnerable to illness and death from the infection. It has been estimated that approximately 30% of the population lived in areas of high to very high transmission intensity and 67% in the moderate transmission zone. However, recent information has provided evidence of a progress divergence of in-country variation in malaria endemicity.⁵⁷

Malaria is both preventable and treatable, and effective preventive and curative tools have been developed.⁵⁸ Current national malaria control strategies in Sub Saharan Africa have been developed around targets agreed at the Africa Head of States meeting in Abuja in 1998, coordinated by the Roll Back Malaria initiative (RBM).⁵⁹ A major theme for RBM has been to maximize effective use of existing resources and develop efficient strategies and tools for malaria prevention and control. These strategies include access to appropriate and adequate treatment within 24 hours of the onset of symptoms, access to effective antimalaria prophylaxis and treatment for women particularly during their 1st and 2nd pregnancies, Long lasting Insecticidal nets and other materials should be available and accessible to person at risk of malaria particularly pregnant women and children under 5 years of age and epidemics of malaria should be recognized and steps initiated for their containment within one week of their onset.⁶⁰

Sequel to this, the National Malaria Control Programme (NMCP) Strategy now National Malaria Elimination Programme (NMEP) was aligned to these continental strategies. Specifically, the National Programme recommends the use of long lasting insecticide treated nets (LLINs),

prompt access to diagnostic testing of suspected malaria and treatment of confirmed cases, and/or indoor residual spraying (IRS) for vector control.⁶¹ Substantial malaria control efforts have been made in Nigeria in the last decade in the context of the National Malaria Strategic Plans, 2001-2005, 2006-2010 and 2009-2013. The 2014-2020 Malaria Strategic Plan presents a major scale up of key interventions that aim to achieve pre elimination status and reduction of malaria related deaths to zero by 2020 in Nigeria.⁶²

The main objective of the National Malaria Elimination Programme for the 2014-2020 Strategic Plan is to provide at least 80% of targeted population with appropriate malaria preventive measures by 2020.⁶² The thrust of the strategies under this objective is the provision of high impact vector control interventions towards universal insecticide coverage which will be implemented through sustained and improved distribution of LLINs to all households, rapid scale up of IRS and larval source management targeting at least 80% coverage of selected intervention households/LGAs, establishment of vector surveillance sites and capacity building in Integrated Vector Management(IVM), promotion of other vector control strategies such as house screening and personal protection.⁶² Prevention of malaria in children and pregnant women will also be further complemented with use of Sulfadoxine-pyrimethamine for intermittent preventive treatment(IPT) targeting 100% of pregnant women and SMC targeting 2 million children under five years in nine Northern states within the Sahel belt .⁶²

IPTp consists of administration of curative dose of an efficacious anti-malarial drug at least twice during the second and third trimesters of pregnancy during routinely scheduled antenatal clinic visits regardless of whether the woman is infected or not.⁶⁵ Following the successful implementation of IPTp among pregnant women and the fact that in the Sahel and sub-Saharan regions of Africa, malaria transmission is highly seasonal and the main burden of malaria is in

children,⁶³⁻⁶⁴ Intermittent preventive treatment of malaria in children (IPTc) now called Seasonal malaria chemoprevention (SMC), was seen as a promising new strategy for malaria control in such areas.⁶⁵ It is defined as the intermittent administration of full treatment courses of an antimalarial medicine during the malaria season to prevent malarial illness and death with the objective of maintaining therapeutic antimalarial drug concentrations in the blood throughout the period of greatest malarial risk.⁶¹

SMC is recommended in areas where on average more than 60% of clinical malaria cases occur within a maximum of 4 months. These are areas of high seasonal malaria transmission across the Sahel sub-region and are characterized by more than 60% of the average annual rainfall falling within 3 months. They are also the target areas for implementation and the clinical attack rate of malaria is greater than 0.1 attacks per transmission season in the target age group.⁶¹

Like IPT in pregnant women (IPTp)⁶⁶ and IPT in infants (IPTi), SMC consists of administration of a treatment dose of an effective anti-malarial drug (or drug combination) at predetermined time points to a specified at-risk population, regardless of parasite burden or symptoms.^{60,67} A complete treatment course of amodiaquine plus sulfadoxine pyrimethamine (AQ+SP) is recommended to be given to children aged between 3 and 59 months at monthly intervals, beginning at the start of the transmission season, to a maximum of four doses during the malaria transmission season (provided both drugs retain sufficient antimalarial efficacy).⁶¹ The age-based recommended dosing schedule for infants < 12 months old is AQ – half (½) of a 153mg tablet given once daily for three days and a single dose of SP - half of a 500/25mg tablet and for children 12 – 59 months is AQ – a full tablet of 153 mg given once daily for three days and a single dose of SP - a full tablet of 500/25mg. The single dose of SP is given only on the first day together with the 1st dose of AQ.⁶¹

Based on results from previous studies on SMC conducted in areas of high seasonal transmission of malaria, the potential benefits of SMC appear to be substantial. They include prevention of approximately 75% of all malaria episodes, prevention of approximately 75% of severe malaria episodes, reduction in child mortality of around 1 in 1000, and reduction in the incidence of moderately severe anaemia. Others include prevention of clinical malaria in the following malaria transmission season after one year of administration (but the consequences of giving SMC for several years have not yet been evaluated) and rare serious adverse events.⁶¹

SMC is however contraindicated in a child with severe acute illness or those who are unable to take oral medication, a HIV-positive child receiving co-trimoxazole, a child who has received a dose of either AQ or SP drug during the preceding month and a child who is allergic to either drug (AQ or SP).⁶¹

In some countries, the eligibility for SMC deployment might only apply to part of their malaria endemic area.⁶⁸ SMC is also not currently recommended for countries in southern and eastern Africa, even though there are some locations where the transmission pattern would suggest suitability, because of the high level of *P. falciparum* resistance to AQ and/or SP, and the absence of adequate efficacy and safety data for other potential anti-malarial regimens for use in SMC.⁶¹

IPTi has a major advantage over seasonal IPT in that an effective delivery system already exists. i.e the EPI programme.⁶⁹ While pregnant women and infants receive IPTp or IPTi during existing health service contacts, children under five years of age do not have pre-existing contacts with the health service at the necessary intervals to receive IPTc.⁶⁹ Finding a way to deliver IPT to children outside the age range of the administration of EPI vaccines is a major challenge that was also faced by chemoprophylaxis programmes who employed either community volunteers,

village health workers (VHWs) or caregivers to deliver anti-malarial drugs.⁶⁸ Thus IPTc shares many of the implementation challenges of Vitamin A distribution, polio and measles vaccination campaigns, and mass drug administration (MDA) to combat helminthes infections. Also, unlike these other campaigns, current IPTc drug regimens require that children receive tablets on three consecutive days each month, as single-dose formulations are not currently available.⁶⁹

Sulphadoxine Pyrimethamine resistance is increasing in many parts of Africa and an alternative is needed.⁶⁸ Mefloquine is a possible choice but the safety of this drug when used for IPT has not been established. Piperaquine is eliminated slowly and is another possible alternative. If the IPT approach becomes widely adopted in infants and/or older children, it may be necessary to develop new drugs with a long half-life specifically for this purpose. The ideal for areas where seasonal IPT might be introduced would be a drug which in a single treatment, gives 12 weeks of protection.⁶⁸ Single dose treatment is highly desirable for IPT programmes so that administration can be given under supervision, thus reducing the risk that subsequent doses will not be taken and/or used by others in the community.⁶⁸ A drug used for IPT in infants or children must be very safe as it will be given to large numbers of non-infected subjects. It must have few minor side effects as these will influence compliance and the acceptability of the intervention, and any other interventions given at the same time.

1.2 Problem statement

Malaria remains a leading cause of ill health causing an estimated 216 million cases of clinical malaria and an estimated 660,000 deaths in Africa.⁵⁸ More than 85% of malaria cases and 90% of malaria deaths occur in Africa south of the Sahara, majority of which are young children.⁶¹

Across the Sahel and sub-sahel region, most childhood malaria mortality and morbidity occurs during the rainy season, which is generally short.⁵⁸ It is estimated that more than a million people

die annually of malaria in Africa. Malaria has serious economic impacts in Africa, slowing economic growth and development and perpetuating the vicious cycle of poverty.⁶⁰

The disease also contributes greatly to anaemia among children which is a major cause of poor growth and development and majority of those affected are children under the age of five years.⁶⁰

The disease which is endemic in this part of Africa, accounts for 20% of childhood deaths and on the average, an African child suffers 2-5 episodes of malaria fever each year.^{58,60} About 5%-10% of those children who survive an attack of cerebral malaria are left with severe neurological sequelae, and a lesser degree of brain damage which may impair learning and development.^{60,70}

Nigeria carries the greatest malaria burden among countries in the world with over 300,000 malarial deaths each year most of them occurring in children under five years of age.⁷¹ It is one of the leading causes of morbidity and mortality with a prevalence rate of infection of 919/100,000. With an estimated 58 million cases and 225,000 thousand deaths occurring annually as a result of the disease, Nigeria bears 25% of the global malaria burden.² The disease accounts for 40% of all childhood deaths and is associated with 11% of all maternal deaths.⁵¹

Aside from human toll, malaria wrecks significant economic havoc resulting in a decreased gross domestic product (GDP) and slower economic growth by 1.3% per year in countries with few resources and high levels of transmission.⁷² This costs Africa more than \$12 billion annually.

In countries with very high prevalence of the disease, it may account for as much as 40% of all public health expenditures, 30%-50% of in-patient admissions and up to 50% of all out-patient visits. In Nigeria, it is estimated to cause about 132 billion naira (£530m) direct loss to the economy due to costs of treatment, transport to source of treatment, loss of working hours etc. Therefore, malaria is both a cause and consequence of poverty in Nigeria afflicting primarily the

poor who tend to live in malaria-prone rural areas in poorly-constructed dwellings that offer few, if any, barriers against mosquitoes.⁷³

North-western Nigeria has one of the highest intensities of malaria transmission. According to the National Malaria Indicator Survey 2010, out of the annual 300,000 malarial mortalities recorded in Nigeria, 21% occurred in this region alone.⁵⁵ Furthermore 56% of children aged 6-59 months tested positive for malaria and the disease contributes to more mortality and morbidity among under-fives than any other childhood killer disease in the region.⁵⁵

1.3 Justification

With the changing epidemiology of malaria, there is a progressive paradigm shift from a “one size fits all” approach, to the targeting of malaria control strategies to specific populations and/or locations for maximal effectiveness. In keeping with this approach, WHO is now recommending Seasonal Malaria Chemoprevention (SMC) as a new intervention against *Plasmodium falciparum malaria*. It has been shown to be effective, cost-effective, safe, and feasible for the prevention of malaria among children less than 5 years of age in areas with high seasonal malaria transmission including parts of Nigeria.⁷⁴

However, an intervention may have a high level of efficacy under clinical research conditions, but this does not necessarily mean that the populations for which it is intended will accept the intervention and this may reduce the effectiveness of the intervention.⁷³ Many parameters such as strong health system, trained staff in public health facilities can affect the effectiveness of a new intervention,⁴¹ but an effective intervention can easily be made to function properly with training and reorientation of personnel before its implementation.⁷⁴ Kano state, located in northern Nigeria where seasonal malaria transmission is high presents an opportunity for those at

risk to benefit from the implementation of SMC but clear, local information is needed to support decision making on its adoption and scale up.

Moreover, despite a growing clinical literature supporting the efficacy of IPTc^{65,75} and interest from policy makers in implementing this intervention, no studies have been reported from northern Nigeria regarding knowledge, perceptions and practice of SMC and how such may facilitate or pose challenges to its implementation in the State.

1.4 Research Questions

- 1) What is the level of Knowledge of seasonal malaria chemoprevention among health care providers and patent medicine vendors in Kano State?
- 2) What is the level of perception of seasonal malaria chemoprevention among health care providers and patent medicine vendors in Kano State?
- 3) What is the level of practice of malaria seasonal chemoprevention among health care providers and patent medicine vendors in Kano State?

1.5 General and Specific Objectives

1.5.1 General Objective:

To determine the knowledge, perception and practice of seasonal malaria chemoprevention (SMC) among health care providers in both the facilities and patent medicine vendors (PMVs) in communities of Kano State.

1.5.2 The specific objectives

- 1) To determine knowledge of Seasonal Malaria Chemoprevention among health care providers and PMVs.

- 2) To determine health care providers and PMV's perception on seasonal malaria chemoprevention.
- 3) To determine practice of seasonal malaria chemoprevention among health care providers and PMVs.
- 4) To determine the factors associated with knowledge and practice of seasonal malaria chemoprevention among health care providers and PMVs.

1.6 scope of the study

The study targeted four different category of respondents which includes officials of the State Ministry Of Health, who are involved in oversight functions and regulation of operations of PMVs. Executives of association PMVs, members of the association of PMVs as well as health care workers in PHC facilities.

All these respondent provided information during data collection through either quantitative or qualitative methods. The study focuses on assessing knowledge, perception and practice regarding SMC. Only health care workers and PMV in the selected LGAs where SMC was piloted in the State were targeted.

CHAPTER TWO

LITERATURE REVIEW

2.1 Background

Malaria remains one of the most important tropical diseases of all times. Nigeria accounted for 32 percent of the global estimate of 655,000 malaria deaths in 2010.¹ An estimated 97 percent of the country's approximate population of 160 million residents are at risk of malaria. Children under age 5 and pregnant women are the groups most vulnerable to illness and death from malaria infection in Nigeria.² In addition to the direct health impact of malaria, there are also severe social and economic burdens on communities and the country as a whole,¹ with about 480 billion Naira lost to malaria annually in the form of treatment costs, prevention efforts, loss of work time, etc²

Epidemiology of Malaria

Globally, an estimated 3.2 billion people in 97 countries and territories are at risk of being infected with malaria and developing disease, and 1.2 billion are at high risk (>1 in 1000 chance of getting malaria in a year). According to the latest estimates, 198 million cases of malaria occurred globally in 2013 and the disease led to 584 000 deaths, representing a decrease in malaria case incidence and mortality rates of 30% and 47% since 2000, respectively. The burden is heaviest in the WHO African Region, where an estimated 90% of all malaria deaths occur, and in children aged under 5 years, who account for 78% of all deaths.³

Malaria is an endemic disease in Nigeria, with year-round transmission. Rates of transmission are slightly lower in the Sahel Savannah regions when compared to the mangrove swamps/rain forest in the southern part of Nigeria. Kano State belongs to the Sahel savannah which has a

slightly lower transmission and the high mountain areas of the Plateau. Malaria is caused by four species of parasites belonging to the genus *Plasmodium*. *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae*, and *Plasmodium ovale*. Of these four species of *Plasmodium falciparum* causes the most severe malaria illness and death throughout the world (WHO1998).² However, there is fifth species known as *Plasmodium knowlesi* that has been known to cause malaria in human.² The transmission of the parasite is facilitated through the bite of an infected female *Anopheles mosquito*. The *Anopheles* mosquitoes are made up of different species which includes, *Anopheles gambiae* S.S., *An. funestus*, and *An. arabiensis*. The dominant species of malaria parasites is the *Plasmodium falciparum* which account for more than 95% of malaria cases, with *Plasmodium ovale* and *Plasmodium malariae* playing a minor role with the latter being quite common as a double infection in children. Dominant vector species are *Anopheles gambiae*.s.I and the *Anopheles funestus* group with some other species playing a minor or local role: *A. moucheti*, *A. pharoaensis*, *A. coustani*, *A. hancocki* and *A. longipalpis*. within the *Anopheles gambiae* complex *A. gambiae* s.s is the dominant species with *A. arabiensis* being found more often in Northern Nigeria and *A. melas* only in the mangrove coastal zone.²

Malaria control and Elimination Programmes

In the fight against malaria different strategies have been adopted during the years, including: control whose goal is to exclude new illnesses and death caused by malaria without blocking transmission; elimination, whose aim is to obtain disappearance of malaria cases and transmission in a localized area; eradication, which expands elimination objective globally.

In the first half of the past century, malaria diffusion has been restricted to tropical and subtropical areas, while it has been eradicated from temperate areas, such as Western Europe and

the United States, where economic development occurred and public health measures became disposable.

As a consequence of these successes, a first global malaria eradication program was launched by World Health Organization (WHO) in 1955.²⁴ Use of Chloroquine for treatment/chemoprevention and dichlorodiphenyltrichloethane (DDT) for vector control played a key role in the program, which gained several successes in some areas, including India and Sri Lanka. Unfortunately, during the following two decades, mutations in *P.falciparum* chloroquine resistance transporter gene conferring chloroquine resistance originated and spread from at least five independent foci worldwide; the first mutation originated in Southern Asia, rapidly diffused towards Africa, while the others spread independently in South America (two foci), Papua New Guinea and Melaneasia. Additionally DDT-resistant mosquitoes emerged. Finally in 1969 the global malaria eradication program was abandoned. Therefore, sulphadoxine-pyrimethamine treatment replaces chloroquine-based therapy, but soon triple or quadruple mutant *P.falciparum* dihydrofolate reductase alleles conferred pyrimethamine resistance, which can be traced again to a few origin, Southern Asian parasites sharing a common ancestor with African. Such situation prompted the efforts to find new tools to control malaria, especially in Asian areas, leading to delivery of artemisinin derivative drug- based therapies and to improve insecticide- based measures.²⁴

Recently due to large-scale disposability of antimalarial tools, a new hope for global eradication spread in the malaria community. In 2007, the Bill and Melinda Gates Foundation announced that malaria elimination would be prosecuted as a primary goal. Because of the perceived failure of the initial global malaria eradication program, many concerns spread among malaria experts. However, such intent was rapidly endorsed by the World Health Organization and the Roll Back

Malaria Association. As a consequence of the renewed interest in malaria eradication, what will change are not the contents of research agenda, but priorities in each research area, including treatment, chemoprevention, vector control, vaccines, as it has recently been suggested by Greenwood.⁴

Partners and Roles in the Malaria Control/ Elimination Programme

Nigeria has benefited from increasing support from various partners for malaria control. Currently, the largest funding partners are Global Fund (GF), the World Bank, and DFID. Other key partners include the Clinton Health Access Initiative, the United Nations Children's Fund (UNICEF), and the World Health Organization (WHO). There is also increasing corporate sector support for malaria including Exxon Mobil, Dutch Shell, and the Dangote Foundations.

Prior to 2014, Nigeria had three approved grants for malaria from GF, the latter two designating the NMEP as the Principal Recipient. In March 2014, GF launched the New Funding Model, which consolidated funding for Nigeria's existing malaria grants and added approximately \$316 million in additional funding for a combined total of \$499 million for 2014-2017. The NMEP submitted a Concept Note to GF on June 15, 2014, with a total request budget of \$605 million for 2015 and 2016. Following review by the Technical Review Panel and the grant processes, a final budget is expected to be approved by the GF Board before December 2014.⁴

Prior to 2014, Nigeria had three approved grants for malaria from GF, the latter two designating the NMEP as the Principal Recipient. In March 2014, GF launched the New Funding Model, which consolidated funding for Nigeria's existing malaria grants and added approximately \$316 million in additional funding for a combined total of \$499 million for 2014-2017. The NMEP submitted a Concept Note to GF on June 15, 2014, with a total request budget of \$605 million

for 2015 and 2016. Following review by the Technical Review Panel and the grant processes, a final budget is expected to be approved by the GF Board before December 2014.

In February 2013, GF named the NMEP as an “interim applicant” during GF’s transition to its new funding model. As such, Nigeria received an additional \$167 million during the 2013-2014 period. The bulk of this funding – \$125 million – was used to purchase ITNs to replace the 30 million nets distributed in 2009-2011, while the remaining \$42 million was used to purchase RDTs and ACTs.

The World Bank Booster Program provided a total of about \$280 million in loans between 2007 and 2009 to support seven Nigerian States and central level malaria activities, including ITN campaigns in target states, IRS, and purchases of ACTs, RDTs, and SP for malaria control. The project supported training, supervision, and monitoring activities, including two rounds of lot quality assurance sampling surveys, to assess the impact of the program. The Booster Program ended in June 2013, but the country has requested a no-cost extension of the project to June 2014 and then to March 2015.⁶ Beyond March 2015, it is unclear whether there will be any continued support to malaria control activities from the World Bank.

DFID supports a five-year, £50 million project (about \$80 million) called Support for the National Malaria Program (SuNMaP), which started in 2009. Currently, the program is in a period of costed extension, but DFID has indicated a willingness to maintain funding at similar levels for 2014 and 2015 (£8-10 million per year; with an additional £9-10 million per year for commodities). The program provides substantial support for the NMEP in ten selected states, none of which overlap with PMI’s eleven states. In the DFID states, SuNMaP supports malaria prevention, diagnosis, and treatment, and supplies limited quantities of malaria commodities. The SuNMaP developed a private sector component that will examine diagnosis and treatment in

the private sector, as well as a “market sector” component that will explore market interventions. DFID has provided \$14 million to continue the subsidy for ACTs for an additional two years, up to 2016.

The WHO supports a national malaria program officer in each of the six geopolitical zones of Nigeria. They assist the states in their zones with malaria program planning and management. The WHO supported the first-ever malaria program review in Nigeria in 2012. The review recommended some strategic shifts for Nigeria, such as using different strategies for different states. All PMI activities are coordinated with these efforts.

The Clinton Health Access Initiative worked closely with the NMEP in the preparation for and management of the AMFm(Affordable Medicines Facility-malaria) program, particularly in terms of relations with private sector manufacturers and distributors. They have also taken a special interest in promoting the use of injectable artesunate as the first-line treatment for severe malaria. National policy has been changed to reflect the new WHO guidelines and hospitals are being encouraged to purchase this drug.

Private Sector

Although PMI recognizes the potential for private sector approaches in malaria control, the opportunities to work with these organizations under PMI have been limited. Large oil firms carry out their own malaria control activities in their work areas. Some firms also include malaria control in their corporate social responsibility work. ExxonMobil has funded a study on extending IPTp and other malaria interventions to community-directed distributors in Akwa Ibom State. This study demonstrated the potential of using community-directed distributors and has helped inform PMI plans for ITN keep-up and other activities.

The AMFm program, managed by GF, has worked with a large number of private importers as “first-line buyers” of subsidized ACTs. From the time the AMFm grant was signed in September 2010 until October 2012, Nigeria had AMFm orders approved for 118.2 million treatments (96.8 million private for-profit, 11.7 million public, and 9.7 million private not-for-profits) of which 98.2 million have been delivered. Most of this has passed through purely private sector channels and has dramatically increased the supply of ACTs in the Nigerian market.

The Private Sector Alliance for MDGs includes polio and malaria as target areas for attention. This alliance is co-chaired by the state minister for health and the former chief executive officer of a Nigerian bank, and the secretariat is supported by Aliko Dangote, one of Nigeria’s most prominent businessmen. The NMEP created a committee to seek private sector support, though what role the private sector will play through these actions remains unclear,⁵ there has been discussion of local production of ITNs and ACTs, but it is unlikely that they could be competitively priced.

Within the United States Government (USG)

PMI Nigeria has identified opportunities to integrate its work with other activities within the USAID Health Population and Nutrition team and with other USAID, U.S. Department of Defense (DOD), and President’s Emergency Plan for AIDS Relief (PEPFAR) activities. The overarching strategic document for this integration, the United States Global Health Initiative Strategy Document, was completed in September 2011 and took into account the expanding PMI program in Nigeria. In mid-2013, PMI and PEPFAR agreed to collaborate in two states and are considering opportunities to expand collaboration to other states.

Malaria is fully integrated into primary health care supported under the bilateral Targeted State High Impact Project (TSHIP) project, which is active in two of Nigeria’s 36 states. In those

states all PMI-supported public sector malaria work is channeled through this project. Malaria was included in the Expanded Social Marketing Program in Nigeria (ESMPIN). This collaboration leverages this project's large presence in terms of mass media BCC (national radio drama, spots/jingles, and a weekly radio magazine) and interpersonal approaches (community-based interpersonal communication in 15 priority states). Malaria messaging is included at low cost. This program also provides a link through mobile drug suppliers to drug vendors and private sector providers since the lead on this project, the Society for Family Health (SFH), is also a co-Principal Recipient of the Global Fund Round 8 malaria grant. Mobile suppliers working with SFH also efficiently combine malaria, family planning and maternal/child health messages with product promotion. Malaria funds also leverage the large reach of the Voice of America Hausa language service in northern Nigeria.

Support for improved diagnostics has built on the base provided by the PEFAR DOD-Walter Reed Program to improve HIV-related laboratory services. This program included improved malaria microscopy and RDT use under PEFAR. PMI is expanding on this base to support malaria activities.

PMI and PEPFAR are working to support Nigeria's integrated Health Management Information System (HMIS). This is requiring a shift from the NMEP's previous parallel system, which was created to support Global Fund reporting, and from the parallel PEPFAR HIV system. It will take some time for the new system to become operational, but it is already active in several states and should eventually replace the older systems.

Steps are being taken to integrate approaches to logistics support for PEPFAR, PMI, and USAID-supported family planning programs. This is particularly promising in terms of warehousing, which is a challenge in Nigeria. In Ebonyi State, family planning and malaria

funds are jointly supporting an innovative model – Direct Delivery and Information Capture – to improve distribution within states and collect better facility-level consumption data.

PMI is cooperating more intensively with the PEPFAR program in two states, Benue and Cross River, which have a PMI presence and are a PEPFAR priority because of the relatively high HIV prevalence. This cooperation includes shared warehousing, PEPFAR-procured ITNs, ACTs, and RDTs, and laboratory strengthening activities in the form of combined training, supervision, and quality assurance of laboratories for malaria, HIV, and tuberculosis testing. This cooperation will expand malaria prevention and treatment programs in these two states, providing better protection of target populations.⁶

An appraisal of SMC strategy as against the other two main strategies

In March 2012, the World Health Organization (WHO) issued a policy recommendation for a new intervention against *Plasmodium falciparum* malaria - seasonal malaria chemoprevention (SMC), previously referred to as intermittent preventive treatment in children (IPTc), in children under five years old. SMC is defined as the intermittent administration of full treatment courses of an anti-malarial treatment combination during the malaria season to prevent illness and death from the disease.⁷

The objective is to maintain therapeutic anti-malarial drug concentrations in the blood throughout the period of greatest risk. This will reduce the incidence of both simple and severe malaria disease and the associated anemia and result in healthier, stronger children able to develop and grow without the interruption of disease episodes. SMC has been shown to be effective, cost effective and feasible for the prevention of malaria among children in areas where the malaria transmission season is no longer than four months.⁸

A review of trials that evaluated the impact of SMC in preventing malaria in pre-school children living in endemic areas with seasonal transmission showed that SMC prevented approximately three quarters of all clinical malaria episodes and a similar proportion of severe malaria episodes, and that these benefits remained even where insecticide treated net usage is high. Other studies have also showed the beneficial additive effect of SMC given during the transmission season alongside other malaria control interventions such as the distribution and promotion of use of LLINs. Although the effectiveness and safety of SMC using amodiaquine and sulphadoxine/pyrimethamine has been proved in clinical trials, there is no established delivery system.

In 2012, WHO recommended seasonal malaria chemoprevention (SMC) with sulfadoxine-pyrimethamine and amodiaquine (SP-AQ) to prevent malaria in children under five in the Sahel sub-region. As the National Malaria Elimination Program in Nigeria plans to apply the recommendation to protect 6 million children in its nine northern states, identifying the most effective ways to deliver the drug is critical. From August-November 2013, SP-AQ was delivered monthly to under-fives in 3 local government areas of Kano State using 3 delivery mechanisms: door-to-door using community drug distributors, at public health facilities (fixed points), and for a low cost in the private sector. A household survey was conducted in December 2013, one month after the final round of SMC distribution, to assess the coverage achieved through each distribution method. Data were collected on demographics, malaria knowledge, treatment practices, and SMC awareness. We estimated the partial SMC coverage (proportion of under-fives receiving at least one of the four monthly doses) and full coverage (proportion of under fives receiving all doses), and identified factors associated with coverage using multivariable logistic regression models. 176,281 doses of SP-AQ were distributed over four

months. The survey collected data from 5,291 children and 3,206 caregivers in 3,079 households. Adjusted partial coverage was significantly higher via door-to-door distribution (86.5%) than via health facility (46.7%) or private sector (27.9%). Full coverage was also highest in the door-to-door delivery arm (56.3%) compared to health facility (19.4%) and private sector (12.2%). Children 1-4 years old were significantly more likely than those <1 year old to receive SMC ($p<0.001$), and child use of an insecticide-treated bed net was significantly associated with partial coverage (OR=1.4).

Door-to-door delivery achieved the highest coverage although a substantial population did not receive SMC. The findings are informing plans for 2014 SMC scale-up across Kano State including community mobilization and sensitization strategies and other fixed-point distribution opportunities.

IPTi

Intermittent preventive treatment involves the administration of a therapeutic dose of an ant malarial drug at predefined times regardless of an individual's infection status. The effect of administering intermittent preventive treatment in infants (IPTi) at the time of routine vaccination delivered through the Expanded Programme on Immunization (EPI) has been evaluated in several randomized controlled trials. A pooled analysis of the results of the first six trials of sulphadoxine-pyrimethamine showed an overall protective efficacy of 30% (95% confidence interval, CI: 20–39) against clinical malaria, 38% (95% CI: 13–56) against hospital admission for infection with malaria parasites, 23% (95% CI: 10–34) against all-cause hospital admission and 21% (95% CI: 8–33) against anaemia in the first year of life.

Status of SMC in Nigeria

Nigeria is made up of six geopolitical zones and 36 states including the Federal Capital Territory. Nigeria has a tropical climate with wet and dry seasons. The country landscape includes both Sahel savannah and mangrove coastal regions. Kano State lies in the Sahel Savannah region with the dry season occurring from October to March and the wet season between April and September. There is a period of cooler weather accompanied by the dry, dusty Harmattan wind, felt mostly in the north in December and January. The temperature in Nigeria varies between 25°C to 40°C, and rainfall ranges from 2,650 millimeters in the southeast to less than 600 millimeters in some parts of the north, mainly on the fringes of the Sahara Desert.⁷ The ecology of Nigeria varies from the mangrove swamps and tropical rain forest belts in the coastal areas through to open woodland and savannah on the low plateau, which extends through much of the central part of the country to the semi-arid plains and Sahel grassland in the North and the highlands to the East.

The geographic location of Nigeria makes the climate suitable for malaria transmission throughout the country. It is estimated that up to 97 percent of the country's more than 150 million people risk getting the disease. The remaining three percent of the population who live in the mountains in Southern Jos (the Plateau State), at an altitude ranging from 1,200 to 1,400 metres, are at relatively low risk for malaria. The seasonality, intensity and duration of the malaria transmission season vary according to the five ecological strata that extend from the South to the North.⁸ These include:

- Mangrove swamps
- Rain forest

- Guinea-savannah
- Sudan-savannah
- Sahel-savannah

The duration of malaria transmission is longer in the south and reduces as one moves north, being perennial in duration in most of the south, but lasting three months or less in the northeast region bordering Chad. The dominant vector species in Nigeria are the *Anopheles gambiae* species and the *A. funestus* group. The most prevalent species of malaria parasites in Nigeria is *Plasmodium falciparum* (over 95 percent). It is responsible for the most severe forms of the disease. The other types found in the country, *Plasmodium ovale* and *Plasmodium malariae*, play a minor role. *Plasmodium malariae* tends to only occur in children with mixed infections⁷

The areas of Northern Nigeria where malaria transmission lasts less than four months present an opportunity for those at risk to benefit from the implementation of SMC. Whereas the feasibility and effectiveness of SMC has been demonstrated elsewhere, the approaches to implementation, which require high coverage levels, have to be contextualized to fit the local setting. Thus there is a need to explore possible approaches in the Nigerian context that will provide effective delivery systems for the eventual scaling up of the intervention to cover areas in Northern Nigeria with highly seasonal malaria transmission. Malaria Consortium has already started working with the Ministry of Health to roll out SMC in Katsina through its management of SuNMaP (the DFID-funded Support for the National Malaria Programme) and with support from the Bill & Melinda Gates Foundation. SuNMaP will also support the roll out of SMC across Jigawa State and Malaria Consortium has plans to extend the activity to additional states in due course.⁹

SMC in Kano State

In areas of the Sahel suitable for SMC there are an estimated 25 million children under 5 who experience 24.1 million malaria episodes and 108,506 childhood deaths from malaria each year.¹⁰ CHAI piloted three SMC delivery methods in some states in Northern Nigeria in 2013 including Kano to determine the most efficient and cost-effective strategy for a multiyear scales up. CHAI selected Kano State, tested the three different delivery models to evaluate the most effective and cost-efficient strategy to scale up SMC. Malaria cases in under-fives in Kano: 1,360,934. Assuming 65% coverage of SMC, and 80% efficacy with 4 monthly doses, there is a potential to avert 650,000 malaria episodes in Kano and almost 3,000 deaths in Kano State. However, although we know SMC prevents the majority of malaria cases, there is a lack of data on cost effective methods for scale up. Therefore CHAI recommends that for the 2013 rainy season, the SMOH/CHAI pilots SMC delivery methods in several LGAs to determine whether a private sector and/or campaign method is most effective and cost-effective for SMC delivery.¹⁰

The campaign method will test coverage achieved through SMC delivery by health facilities (fixed point campaign) as well as community health workers (door-to-door campaign), and will leverage infrastructure from existing campaigns such as Polio and Vitamin A supplementation. The private sector delivery method will test what coverage can be achieved by delivering SMC through the private sector supply chain as well as identify the most effective demand generation activities.

Overview of three delivery methods: Advocacy visits were conducted in communities where SMC will be deployed to obtain buy-in from community Leaders. Health Workers were trained across the 3 delivery systems on how to administer SPAQ Community Sensitization activities were conducted in communities where SMC will be deployed.

Community Drug Distributors (CDDs) achieved both the highest coverage among the three distribution arms. Special attention needs to be drawn to advocacy and sensitization to ensure household who began treatment are maintained throughout administration period. More analysis is needed to understand whether health facilities or PMVs can play a role in scale-up – once the GPS coordinates of distribution facilities are collected, GIS mapping can inform whether they played a significant role in relation to their distance from surveyed households. CDDs best coverage but also most costly – discussion with State Ministry of Health to forecast sustainability.¹⁰

A responsible scale-up strategy needs to be designed in order to further address coverage needs, and to avoid poor implementation that could lead to inadequate protective efficacy and drug resistance .

2.2. Knowledge of seasonal malaria chemoprevention among health care workers and PMV.

The knowledge of health care workers and regarding SMC has not been studied in this environment. However, other studies in other part of the world have revealed different level of knowledge regarding malaria in general and SMC in particular. According to the Italian Guidelines for malaria chemoprophylaxis for travelers to endemic countries. A group interviewed shows that awareness about malaria risk and characteristics, as well as protection from mosquito bites, are recommended for all travelers visiting malaria-endemic countries.

According to a study titled Malaria knowledge and utilization of chemoprophylaxis in the UK population and UK passengers departing to malaria-endemic areas, shows that the knowledge of chemoprophylaxis among UK population and travelers to malaria endemic area was significantly

high.¹¹ However, the study show that West Africans have higher knowledge score compared to other Africans and Asian travelers. Comparing the knowledge scores of those who had received professional pre-travel advice with those who were self-informed or those who received no advice, the scores were almost the same. Ethnicity provided a mixed picture, with Asians scoring highest while the mixed and other ethnic groups scored lowest. Knowledge scores were not influenced by reason for travel or household income.¹⁰

A study conducted in Papua New Guinea on community response to intermittent preventive treatment of malaria in infants (IPTi), two thirds of mothers interviewed knew that the IPTi trial involved malaria prevention (67%[143/213])and almost three quarters knew they were participating in research (74% [157/213]). However the vast majority (87% [186/213]) were unsure about the names of the drugs used, and only four named Fansidar (the brand name for SP) as one of the study drugs.¹² Nevertheless, the mothers were almost universally content with their experiences of the trial: the IPTi drugs, the outreach clinics and the free treatment. Mothers reported a decrease in malaria amongst the participating infants and commented more generally on the health of the infants, comparing it favorably with that of other children who did not participate. They also reported that study participation had brought broader benefits as they travelled less often to the clinic and had more time to do other activities such as work. Indeed, mothers commonly enrolled more that one of their children in the study. Trial staff was considered diligent and caring, compared to other health staff that were rude, slow to deal with mothers, and did not give proper care. One mother conceded that this might be due to the health workers' heavy workload.

A common concern expressed by respondents was what would happen when the IPTi trial came to an end in the area. Reports of side effects from the IPTi drugs were also rare: two mothers

referred to the child's body being weak, but that they quickly recovered; a third, described how her child was seen by one of the trial doctors after suffering a reaction to the trial drugs. In none of the cases was the mother discouraged from continuing her participation. IPTi was delivered in three doses at four intervals to infants who participated. Two doses were left with the mother to give to the child the following days. Fifteen percent of mothers (31/213) reported that they sometimes did not give the IPTi drug as instructed. The majority, who reported having followed the instructions, did so out of the belief that the drugs would help the child and not doing so would be akin to neglect or due to pressure from health workers.

Furthermore, all participant mothers were positive about their participation. Participant mothers perceived IPTi as offering complete prevention from malaria: 98% (208/213) of mothers stated that after IPTi their children would not get malaria.¹² This finding is however contradicted by the extent of bed net usage: over three-quarters (77% [163/213]) of participant mothers reported using bed nets as a means of malaria prevention. There was however debate about the effectiveness of bed nets. The new bed nets that were being handed out to trial participants were considered effective at repelling the mosquitoes, in contrast to the less useful older nets. One health worker attributed the popularity of bed nets, to previous campaigns of mosquito eradication that had left a strong message about the importance of preventing mosquito bites.

A study done in Tanzania and Mozambique titled varying efficacy of intermittent preventive treatment for malaria in infants in two similar trials: public health implications. The analysis estimated the protective efficacy of SP for 30 days after each IPTi dose and found protection above 50% in both sites. The analysis also estimated the risk of malaria for the periods when there should have been no pharmacological effect the period between the second and the third IPTi doses and the 6 months beginning 30 days after the third dose. The results show that SP

efficacy was lower in Manhiça compared to Ifakara between the second and third doses [14.7% (95% CI, - 14.6; 36.5) vs 52% (95% CI, 14.0; 74.1)] and for the period after the third dose [7.4 (95%, CI -21; 29.3) vs 32.2% (95% CI, -3.5; 55.6)].¹³

In another study conducted in Ethiopia on knowledge and practice on malaria prevention shows all the 454 (100%) respondents had information about malaria and 394 (86.8%) of the respondents mentioned fever as a symptom of malaria. Chills, headache, nausea/ vomiting, loss of appetite and body/ joint aches were pointed out by 77.3%, 64.8%, 46.7%, 40.8% and 31.5% of the respondents respectively as possible symptoms of malaria. Four hundred and forty six (98.2%) of the respondents mentioned being bitten by mosquitoes as the cause of malaria. The respondents also supposed stagnant water (34.4%), hunger (30.0%), overwork (4.6%), and drinking dirty water (3.7%) as causes of malaria. Children under five years and pregnant women were mentioned by 410 (90.3%) and 268 (59.0%) of the respondents respectively as the people most likely to be seriously affected by malaria.¹⁴ The Rainy Season and the time immediately following it were mentioned by 54.9% and 49.6% of the respondents respectively as the times in a year when mosquitoes bother or bite the most. Three hundred and ninety six (87.2%) of the respondents replied that mosquitoes bother or bite the most at night during sleeping.¹⁴

Four hundred and fifty two (99.6%) of the respondents have got information about how to avoid getting malaria in the 12 months preceding the study. The principal source of information was health personnel (346 (76.6%)) followed by radio (269 (59.5%)). Mosquito nets (treated/ untreated/ unspecified) were mentioned by 433 (84.6%) of the respondents as protective measures against mosquitoes. Furthermore, 247 (54.4%) of the respondents pointed out keeping surroundings clean, 167 (36.8%) cited closing windows/ doors, 115 (25.3%) indicated smoking

rooms with olive twig, sugarcane, etc, and 109 (24.0%) stated insecticidal aerosols as protective measures against mosquito bites.¹⁴

Regarding the advantages of sleeping under mosquito net, 415 (91.4%) of the respondents mentioned that it avoids getting bitten by mosquitoes, 214 (47.1%) stated that it avoids getting malaria and 78 (17.2%) replied that it protects other insects/ pests (e.g.: lice, bed buds, fleas, etc). Three hundred and seventy two (81.9%) of the respondents responded that mosquito nets have no disadvantage. With regard to the advantage of ITNs relative to untreated nets, 415 (96.5%) of those who have heard of ITNs reported that it kills mosquitoes, 247 (57.4%) mentioned that it repels mosquitoes away from the net, and 143 (33.3%) replied that it kills/ repels other insects/ pests (e.g.: lice, bed bugs, fleas, etc).

Mentioning fever as a symptom of malaria, identifying mosquito bite as the cause of malaria, pointing out children under five years as being highly vulnerable to malaria, and stating mosquito nets as preventive measure against mosquito bite didn't show statistically significant difference between urban and rural residents. However, identifying pregnant women as being highly vulnerable to malaria was higher among urban residents (161 (72.5%)) compared to rural residents (107 (46.1%)) ($p < 0.001$).

There were few studies on knowledge, practices and perception of SMC in northern Nigeria. However, studies from other part of the country example a study on Perception and practice of Malaria Prophylaxis in pregnancy among Health Care Providers in Ibadan reveal that out of 387 respondents' interviewed. Majority 353 (94.1%) of the respondents were aware about malaria chemoprevention and their sources of awareness range from friends 13.6%, husband(8%), health workers (56%) and media (22.4%). Similarly in another study from Rivers State title: Community Perceptions and Practices in Management of Malaria in Under-five Children in

Rivers State in Nigeria, shows that up to three quarters of the women (76.3%, 95% CI=73.3–79.2) were aware that mosquito-bite ‘cause’ malaria, while the rest had no idea or attributed it to ‘working hard in the sun’ or ‘consuming much palm oil’. Health facilities were reported as the main source of information on malaria by 63.7% (95% CI=60.3–67.1) of the women,. Most of these women (709 out of 811 or 97.4%) acknowledged the occurrence of an illness in a child under-five years within the two weeks preceding the study. Fever was the commonest illness reported in the children by 62.9% (95% CI=59.5–66.2) of the women.¹⁵

In another survey carried out to assess the Malaria Knowledge, Attitude and Practice (MKAP) of the multiethnic population of Ile-Ife town in Nigeria, most of the respondents (> 60%) were familiar with at least 3 signs/symptoms associated with malaria as defined by western medicine and the use of untreated bed nets, fumigation and insecticide impregnated bed nets were not common for reasons bordering mostly on perceived ineffectiveness and inconvenience. Factors influencing respondents’ choice of malaria treatment and preventive methods included cost (22.7%), religious beliefs (5.4%), perceived safety (20.8%), convenience (26.5%) and respondents’ state of health (24.6%). The study was however mainly carried out within an urban community using only quantitative methods of data collection. Also recommendations mainly focused on intensification of malaria public enlightenment efforts and improved affordability of effective malaria preventive methods despite all the findings made.

Other surveys conducted among residents of the Atlantic coast within Nigeria revealed a lack of knowledge and many misconceptions about the transmission and treatment of malaria, which could adversely affect malaria control measures and ant malarial therapy. Recommendations that preventive measures be incorporated into malaria alleviation programs in addition to developing an appropriate educational intervention strategy highlighting the importance of compliance have

been made. The malaria preventive health behaviors among pregnant women as well as the knowledge about malaria and the treatment-seeking behaviors in the rural communities have also been found to be generally poor across the six geo-political zones.

In another study conducted in Nassarawa State title: Perceptions of intermittent preventive treatment of malaria in pregnancy (IPTp) and barriers to adherence in Nasarawa State north-central Nigeria¹⁶ Only a few women knew how many tablets constituted the recommended dose or that the requisite number of tablets were to be swallowed at the same time under the direct observation of a health provider (DOT).

2.3 Perception of seasonal malaria chemoprevention among health care workers and PMV.

In the same study from Papua New Guinea, Participant mothers perceived IPTi as offering complete prevention from malaria: 98% (208/213) of mothers stated that after IPTi their children would not get malaria. This finding is however contradicted by the extent of bed net usage: over three-quarters (77% [163/213]) of participant mothers reported using bed nets as a means of malaria prevention.¹² There was however debate about the effectiveness of bed nets. The new bed nets that were being handed out to trial participants were considered effective at repelling the mosquitoes, in contrast to the less useful older nets. One health worker attributed the popularity of bed nets, to previous campaigns of mosquito eradication that had left a strong message about the importance of preventing mosquito bites.

Many respondents reported a low perception of their occupational risk for malaria, especially disturbing among the FA as the majority had made at least one trip in the previous year to West Africa. Despite the confidence in insect repellents and the small number with concerns about DEET and its odor, less than half in each group indicated they always used insect repellent. On

the basis of this, crew members should also be educated about effective topical insect repellents other than DEET and the practice of wearing long pants and sleeves, preferably treated with permethrin, for protection when at malaria-intense destinations.

A study conducted in Babati district of Tanzania on knowledge, perception and practice in relation to infectious and other non communicable diseases, of all the 42 house hold members involved in the study 92.9% perceived malaria to be the most disturbing and burdening.¹⁷ At Magugu ward level, the members of WDC during a FGD also identified malaria as the leading communicable disease in their area. They also perceived malaria as being contributed by the presence of stagnant waters in the rice farms found in rift valley with climatic conditions supporting mosquito breeding. Moreover, they believed mosquitoes breeding in those sites could eventually bite the farmers cultivating rice even during day times as they do at evening and night hours while people are sleeping in their huts. Opinions were also given about the physical living environment supporting mosquito breeding sites in many places, as indicated by stagnant waters, petty and large dry pot holes on the ground in the streets near the residential houses. Poverty was also perceived as a barrier since people were said to be still living in houses built with mud walls, un-cemented floors and roofed with grass or palm thatches, lacking ventilation and no mosquito gauzes. These features were confirmed by the observation of the study team. The team also found a considerable number of residents living with animals such as goats, sheep, donkeys' cows and chickens in the same houses. According to the village health workers involved in the FGD with villagers, this was a great constraint to effective malaria control through community sensitization on adopting certain preventive measures.

2.4 Practice of seasonal malaria chemoprevention among health care workers and PMV.

Although the data suggest that mothers are responsible for the healthcare of the children, taking them to the clinic and caring for them in the home, fathers often play the role of ultimate decision-maker, to whom women have to seek permission to travel to the clinic. Fathers also take a more prominent role in emergencies.

In Senegal, SMC using trained community health workers was implemented in four districts through the health system. More than 890,000 courses of SP+AQ were administered to more than 180,000 children.³ High coverage was achieved and the intervention was well accepted by the community. Cost per monthly course per child was USD\$ 0.50. SMC has been administered to more than 175,000 children between 3 months and 5 years of age in southern Mali and in two areas of Chad.⁴ Preliminary results from the programme show that the number of cases of simple malaria dropped by 65% in the intervention area in Mali, and by up to 86% in Chad.⁴ A significant decrease in cases of severe malaria has also been recorded.

Likewise Médecins Sans Frontières (MSF) was testing the concept in two African countries, Mali and Chad. MSF reported that, 'Antimalaria medicines have been administered prophylactically to approximately 175 000 children between 3 months and 5 years of age in Koutiala District in southern Mali and in two areas of Moissala District in Chad, through an intervention known as seasonal malaria chemoprevention (SMC). Children in that age group are among the most vulnerable to death from malaria due to weaker immunity. Preliminary results show more than a two-thirds drop in the number of simple malaria cases in the intervention area in Mali and up to an 86% drop in Chad. A significant decrease of cases of severe malaria is also being recorded.' Using the same medicine combination recommended by, MSF provided three tablets of

amodiaquine (AQ) and one of sulphadoxine/pyrimethamine (SP) over a 3-day period once a month.

The concern about parasite resistance to SP should be considered. First the challenge is greater in eastern and southern Africa. The important point is that resistance does not mean that SP does not work, only that its half-life is reduced, hence the recommendation of monthly administration of SP. These studies are yet to be carried out in the study area.

In a study conducted in River State Nigeria on Community Perceptions and Practices in Management of Malaria in Under-five Children shows that nearly all (91.8%) the mothers and caregivers claimed that they had taken an action within 24 hours of their child's illness: they had either administered a form of medication at home on the same or next day; or they took the ill child to a health facility. A description of the places where the mothers/caregivers sought treatment, within or beyond the 24 hours of the suspected malaria showed that patent medicine vendors (PMVs) were the choice of more than half of them (53.3%, 95% CI= 49.6–57.0). Nearby health centres were only half as patronized as the PMVs at 26.8% (95% CI=23.4–30.2), while close two-fifth (15.5%, 95% CI=12.9–18.4) stayed home to practice self-medication.¹⁸ An examination of the medications that the mothers and caregivers gave to their children showed that chloroquine was the most common drug of choice (33.6%, 95% CI=30.1–37.2) when compared with ACTs (18.9%, 95% CI=16.8–21.9), sulphadoxine- pyrimethamine (19.5%, 95% CI=16.6–22.6) or herbal medicine (14.2%, 95% CI=11.8–17.0).¹⁸

2.5 Factors associated with seasonal malaria chemoprevention among health care workers and PMV.

A study on Knowledge, Attitudes, and Practices on Malaria Prevention among Chinese International Travelers. Overall, 2,560 questionnaires were collected, 65 were incomplete and

not included in the study. So, 2,495 (97.5%) questionnaires were included; the five international airports each contributed between 391 and 629 questionnaires. The travelers had destinations in 80 countries, including 39 malaria endemic countries. All respondents were Chinese nationals with a male/female ratio of 1.55:1, of whom 2,274 (91.1%) could access the Internet without difficulty. Among 2,495 respondents, 1,036 (41.5%) were on their first trip and 1,459 (58.5%) had previously been abroad. The purposes of travel were tourism/holiday for 48.7%, business/work abroad for 24.9%, visit to family/friends for 10.6%, research/education for 9.8%, missionary/religious/volunteer accounted for 1.3%, and other for 4.7%. Most travelers were accompanied by a partner, their spouse, friends, colleagues, children, or other team members, while 26.7% traveled alone. While 2,069 (82.9%) travelers declared that they would stay in cities, 121 travelers (4.8%) would travel in rural areas. Among the 527 (21.1%) who intended to backpack, 285 (54.1%) were on their first trip. High and low malaria risk destinations were visited by 1,573 (63.0%) travelers, risk-free countries by 922 (37.0%) travelers.¹⁹

A study on malaria among the pastoral communities of the Ngorongoro crater area, northern Tanzania shows, among a total 295 people were selected and interviewed using a convenient sampling design. The majority (66.4%) of the respondents were aged between 25 and 44 years old. Over 94.9% of the respondents were married. In 98.0% of the households, men were the head of the house of the households. The majority 55.4% of the respondent were following traditional religions. Christians and Muslims accounted for 43.9% and 0.7% respectively. Most (80.4%) of the inhabitants lived in mud grass thatched houses. The overall level of education was low, with only 44.6% of the respondents having had primary school education. The majority of the respondents were livestock herders (94.2%). Keeping mainly cattle. Sheep and goats. Respondents owning radios were only 5.7%.²⁰

A study done on Community Perceptions and Practices in Management of Malaria in Under-five Children in Rivers State in Nigeria, in order to inform policy recommendations that will improve malaria control programme in the State. Where a total of 811 women aged between 15 and 49 years who were mothers or caring for children under 5 years of age were interviewed on their perception of the causes of fever, and on their practices of treatment of fever suspected to be caused by malaria in their children mean age was 28.15 ± 3.10 years; 74.2% (95% CI=69.1–75.4), were married; only 15% (95% CI=12.5–17.6) had no formal education; the occupation of the majority of them were farming or fishing (40.9%), while 39.6% were engaged in house work. Nearly all (91.1%) of them had more than a single child to care for.

Another study on Perception and practice of malaria prevention and treatment among mothers in Kuje Area Council of the Federal Capital Territory, Abuja, Nigeria. Shows the mean age of mothers of children in the intervention group was 28.1 ± 5 years old while in the control group it was 26.3 ± 5.9 years old. Up to 60 - 70% of the population had either primary or secondary education. About 16% had no formal education at all in the two groups. Majority of mothers were traders, accounting for 37.7% in the intervention group and 53.4% in the control group. Farmers comprised 10.8% of the intervention group, 13.1% were civil servants while 17.7% were unemployed. In the control population 19.6% were farmers, 4.2% civil servants while 11.9% were unemployed.

**CONCEPTUAL FRAME WORK ON KNOWLEDGE, PERCEPTION AND PRACTICE
OF SEASONAL MALARIA CHEMOPREVENTION**

Independent variables

dependent variable

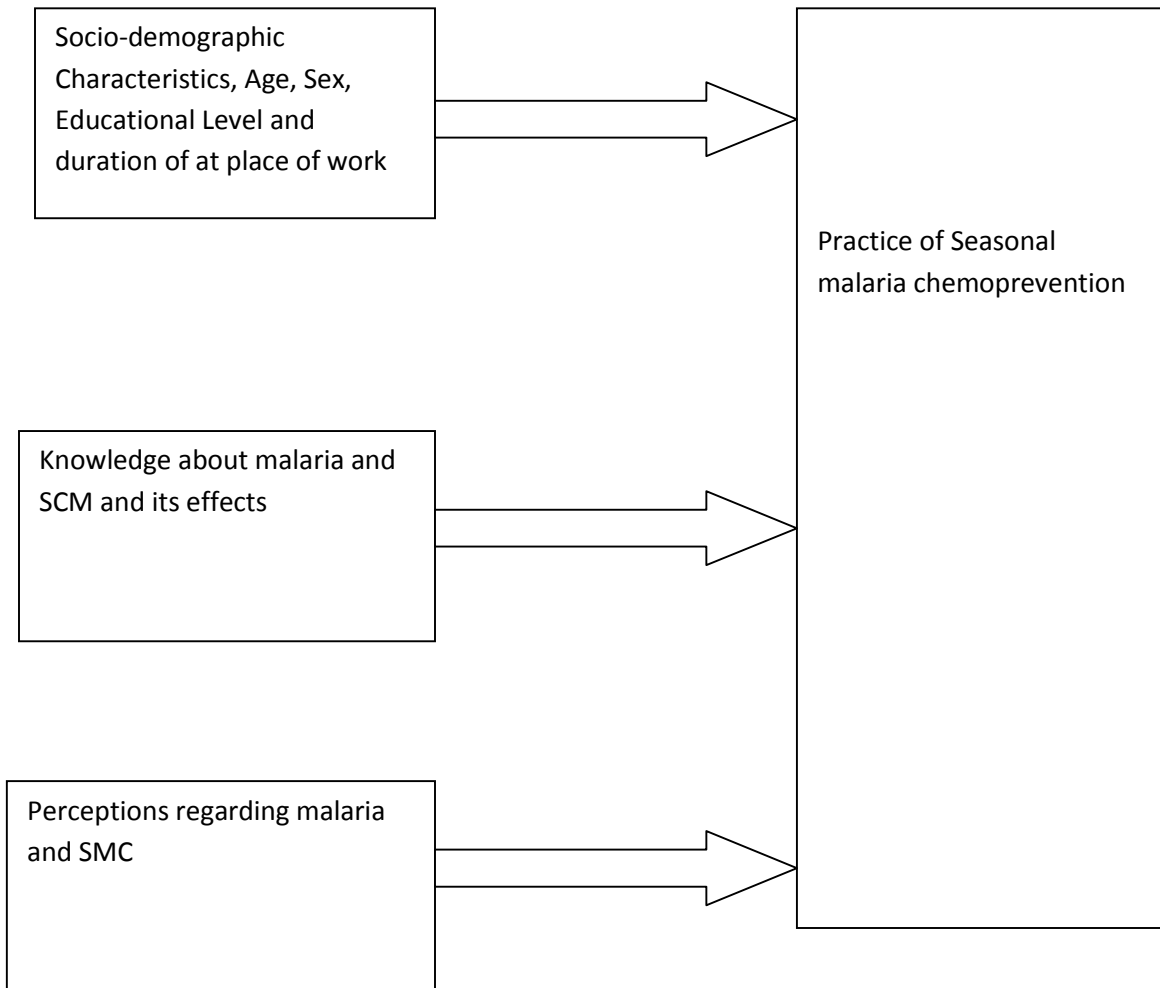


Figure 1: Conceptual Frame work showing factors relating to knowledge, perceptions and practices of SMC

CHAPTER THREE

METHODOLOGY

3.1. Study Area

The study was carried out in three LGAs (Albasu, Danbatta and Garun Malam) of Kano State. Kano State formally came into being on April 1, 1968. It is situated in a semi-arid region located between latitudes 10.30oN to 13oN and longitude 7.40oE and 10.39oE. Kano city is at 472.45 meters above sea level. The state is bordered by Jigawa State in the north-east, Katsina State in the north-west and Kaduna State is on the southern boundary. It has a total land area of 20,760 square kilometers with 1, 754, 200 hectares agricultural and 75,000 hectares forest vegetation and grazing land. The state is noted for its fairly stable climate with relatively minor changes in temperature and humidity.²¹

The year is divided into rainy and dry seasons. The dry season lasts from October to May. During the months of December and January the harmattan is at its peak, and the temperature can fall as low as 10oC, but between March-May the mean temperature can go up to 30oC - 33oC. The rainfall pattern is uni-modal; with an average rainfall of 600mm.

The population is predominantly rural, but around one-quarter of them lives in urban areas, mainly in the city of Kano within the 8 metropolitan Local Governments Areas (LGAs) which are: Kano Municipal, Dala, Gwale, Fagge, Nassarawa, Tarauni, Ungoggo and Kumbotso LGAs. Kano State is largely Muslim. Christians form a small part of the population. The family structure is mostly polygamous and extended family households are the norm. The state is homogenous and inhabited predominantly by Hausa and Fulani. However, a considerable

proportion is made up of Kanuri, Yoruba, Igbo, Egbira, Igala, Nupe and many other ethnic groups.²¹

The state political, administrative and traditional structure is made up the state capital, 44 LGAs, each with its Chairman and Councilors. It has three senatorial zones, and 484 political wards, 8,074 poling units, 1 first class emir, 44 district heads and a ward head in each of the political wards.

The main occupation of the people is subsistence farming (major crops grown include millet, guinea-corn, maize, yam and rice). Animal husbandry and cattle rearing are also notable in the state and cut across the three senatorial districts. Traders, artisans, civil servants and Arabic/ Quranic teachers are also found among the population. Kano is the main commercial Centre of northern Nigeria. The Three selected LGAs are Albasu, Garun Malam and Danbatta which are located in the three senatorial zones.

Health services in the State are more concentrated in the urban areas as opposed to the rural areas where most of the health problems exist. Eighty nine percent (89%) of all doctors and 73% of nurses in the employment of State Government are located in the metropolis. The state has 1030 public owned primary health care facilities ranging from health posts to primary health care centres. Of these 58% are health posts which provide mostly preventive services with little or no clinical care. This has implications for policy on access to clinical care as the absolute numbers of primary health care facilities may mislead one to think its access to primary health care centres, which provide a good complement of preventive and curative health care services. This number however does not include private health care facilities of which it is estimated that there

are 161 of them across the state and the information does not disaggregate them according to the level of care they provide. This may however be an underestimation.

Albasu local government is situated along Bauchi road in the southern part of Kano state i.e 11 40'26''N 9 08'28''E and 11.67389 N 9.14111 E (coordinates). It has a population of 190,153 according to the 2006 population census data. Its land mass covers 398KM sq (154 sq miles). It borders Sumaila, Garko, Takai and Wudil Local Government Areas. The area council is divided into 10 political wards. Albasu has a total of 35 health care facilities, which consist of 4 PHCs, 5 Dispensary, 25 health post and 1 school clinic.

Danbatta Local Government is located along Katsina road in the northern part of Kano State i.e 12 25'59''N 8 30'55E and 12.433306 N 8.5'528 E (coordinates). Its land mass covers 732KM sq (283 sq mile). It has a population of 207,968 according to the 2006 populations census data. It borders Makoda, Minjibir, Barbura and Kazaure Local Government Areas ,the last two Local Government Areas are in Jigawa state. It also has 10 political wards. Danbatta has a total of 36 health care facilities, which consist of a General hospital, Cottage hospital and 34 primary health care facilities.

Garun Mallam Local Government Area is situated along Kaduna-Zaria road i.e 11 41'N 8 22E and 11.683 N 8.367 E (coordinate). Its land mass covers 214 KM sq (83 sq mile). It has a population of 116,494 according to the 2006 population census data. It has 11 political wards and borders Kura, Bebeji and Tudunwada local government areas. Garun Mallam has a total of 18 health care facilities, which consist of 2 PHC, 2 BHC, 2 Health Clinic and 12 Health post.

3.2. Study Design

The study is a descriptive cross-sectional study. It will use a mixed method of data collection.

3.3. Study Population

The respondents for the study included all health care workers in Primary health care facilities and all Patent Medicine Vendors in the three (3) selected Local Government Areas. These 3 LGAs were selected because they were the pilot LGAs for the State SMC programme implemented by the Kano State Ministry of Health with support from Clinton Health Access Initiative (CHAI).

3.3.1 Inclusion criteria

- All PMV operating for at least six months and residing in the study areas.
- All PHC workers who has been working in the facilities for more than three years.
- All health care workers who has been practicing for more than three years.

3.3.2 Exclusion criteria

- All PMVs and health care workers who are temporarily away.
- All PMVs and health care workers who refuse consenting to the study.
- All PMVs that are not formally registered with PSN registration office (as obtained from the list of registered PMVs)

3.4. Sample Size Determination

All the PMVs in the selected LGAs were recruited for the study. Minimum sample size for health facilities was not calculated because the three LGAs have four PHC facilities each where SMC was piloted. This gives a total of twelve health facilities across the LGAs . Therefore it was feasible to study the entire population of health care workers across the 12 health care facilities. There were a total of 60 health care workers obtained from general outpatients and pharmacy department of the health facilities.

3.5. Sampling Technique

A multi stage sampling technique was used for the study and this includes the following stages:

Stage 1: The three LGAs were purposefully selected in order to represent each senatorial zone and they are the beneficiaries of the piloted SMC intervention in the state. These included Albasu, Danbatta and Garun Malam LGAs.

Stage 2: The total number of PHC facilities in each of the LGA was obtained. Using simple random sampling technique 25% of the facilities were selected.

Stage 3: All the health care workers in the selected facilities were studied.

Stage 4: The total number of registered PMV from each LGA was obtained from their regulatory body Pharmaceutical Society of Nigeria (PSN). All the identified PMVs were studied.

3.6. Study Instruments

The instruments for the study include a semi-structured interviewer administered questionnaire that was used to collect quantitative data on knowledge, practice and factors associated with SMC. Similarly a key informant interview was used to collect in-depth qualitative data on views, opinion and perception among both the head of health facilities and relevant stake holders.

3.8. Data collection methods

Qualitative data was collected using semi structured interviewer administered questionnaire. This obtained information on knowledge, perception and practice of SMC. Qualitative data was collected using key informant interview guide.

3.9. Data Management

a) Quantitative Data

1. Training of data collectors with support from internal supervisors.
2. Pre test of questionnaire at Hotoro PHC, Nasarawa Local Government Area.
3. Correction and finalization of questionnaire. The study language used was English as all respondent were able to understand all questions asked.
4. Field work for three weeks.

Two persons were selected as moderator and note taker, while the interview was done by the researcher. Chi square test statistic was used for the data analysis.

The quantitative data collected using questionnaire were entered in to a Microsoft Excel spread sheet and cleaned. This was transferred in to SPSS version 16 for windows soft ware for analysis. Quantitative variables were summarized using mean and standard deviation or median and range as the case may be, while qualitative variables were summarized using proportion and percentage. Statistical test of association between categorical variables was done using bivariate and/or multivariate analysis as the case may be. The result was then presented in the form of tables, charts and graphs as necessary. Knowledge scores obtained was classified into good (6-8), fair (3-5) and poor (0-2). Perception was classified into positive (4-7) and negative (0-3) perception. Practice was also classified into good (3-4) and poor (0-2).

The outcome variables measured include knowledge, perception and practice regarding SMC among the study subjects.

b) Qualitative Data.

The qualitative data collected using the KII from the head of health facilities, executives of PMVs association and officials of SMOH, was transcribed verbatim, translated and coded in to various thematic areas. This was then analyzed using the thematic analysis .The result of the qualitative data was then triangulated with that of quantitative data to obtain additional information for discussion, conclusion and recommendation.

3.9. Ethical Considerations.

Ethical clearance for the study was obtained from the ethical review committee of Aminu Kano Teaching Hospital. Similarly all respondents willing to participate in the study were asked to sign an informed consent form. All information were treated with confidentiality in line with Helsinki Declaration on Human subject research.

3.10 Limitation

The piloted SMC in the three LGAs used different strategies for delivery of SMC drugs, these strategies includes health facilities, PMVs and house to house. This may affect the knowledge, perception and practice of SMC of some respondents depending on the strategies used in their LGAs. This limitation was address by interviewing equal respondents from all LGA.

CHAPTER FOUR

RESULTS

There are a total of 120 questionnaires administered out of 120, giving a response rate of 100% and non response rate of 0%.

Table 1: Socio-Demographic Characteristics

Variable	Frequency	Percentage
Age of respondents (Years)		
20-30	35	29.2
31-40	54	45.0
41-50	26	21.7
51-60	5	4.2
Mean age and SD 34.0 \pm 7.9 years		
Sex of respondents		
Male	99	82.5
Female	21	17.5
Respondents Education		
None	1	0.8
Primary school	1	0.8
Secondary school	23	19.2
Post secondary school	94	78.3
University	1	0.8
Religion of respondents		
Islam	105	87.5
Christian	15	12.5
Marital Status		
Single	31	25.8
Married	86	71.7
Divorced	3	2.5
Cadre of health worker		
Junior Community Health Extension Worker	9	7.5
Senior Community Health Extension Worker	36	30.0
Pharmacy Technician	4	3.3
Environmental Health Officer	23	19.2
Laboratory Technician	12	10.0
Patent Medicine Vendor	34	28.3
Community Health Officer	1	0.8
Dental Assistant	1	0.8
Ethnic group of respondents		
Hausa	110	91.7
Fulani	2	1.7
Yoruba	1	0.8
Others	7	5.8

The socio demographic characteristics with frequency and percentages. Majority 45% of the respondents age are between the age of (31-40) years, 29.2% of the respondents were(20-30) years,21.7% of the respondents were (31-50)years and 4.2% of the respondents were (51-60)years respectively. The mean age and standard deviation of the respondents was 34 ± 7.9 years.

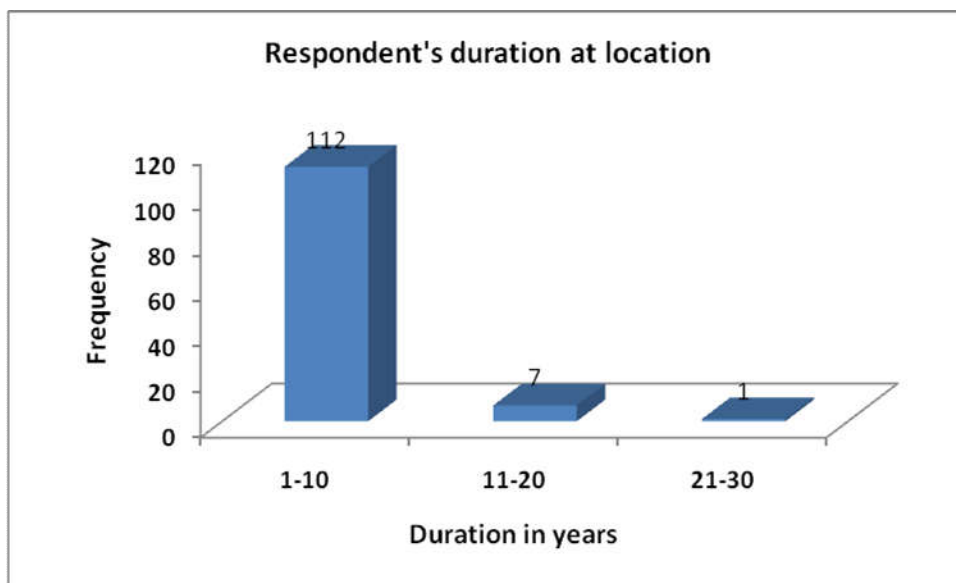


Figure 11: Respondent duration of years at their work area in years.

Duration in years of respondents spent at their work location. Majority of the respondents have stayed (1-10)years 93.3%, (11-20)years 5.8% and (21-30)years 0.8%. The mean number of years working at location was 5.6 years and SD of 4.1 years.

Table 2: knowledge of SMC

Questions on knowledge on SMC		Frequency and percentage	
		Yes	No
1	Do you know SMC?	78 (65)	42 (35)
2	What is SMC?	45 (37.5)	75 (62.5)
3	What is the drug combination in SMC?	40 (33.3)	80 (66.7)
4	How do you administer SMC?	95 (79.2)	25 (20.1)
5	What is the drug formulation in SMC?	95 (79.2)	25 (20.1)
6	What is SMC used for?	57 (47.5)	63 (52.5)
7	Which group are recommended for SMC?	50 (41.7)	70 (58.3)
8	What are the side effect of SMC drugs?	33 (22.5)	87 (72.5)

Knowledge of respondents on SMC shows majority 79.2% know how to administer SMC as compared to 20.1% who don't know how to administer SMC, similarly 79.2% knows the drug formulation used in SMC as compared to 20.1% who don't know it. Only 22.5% of respondents knows about the side effects of SMC drugs as compared to 72.5% who don't know it.

Table 3: Knowledge of seasonal malaria chemoprevention(SMC)

S/No	Knowledge	Frequency	Percentage
1	Poor (0-2)	51	42.5
2	Fair (3-5)	40	33.3
3	Good (6-8)	29	24.2
	Total	120	100

Knowledge of SMC among respondents. Majority of the respondents 42.5%(51) has poor knowledge as compared to only 33.3%(40) and 24.2%(29) with fair and good knowledge respectively.

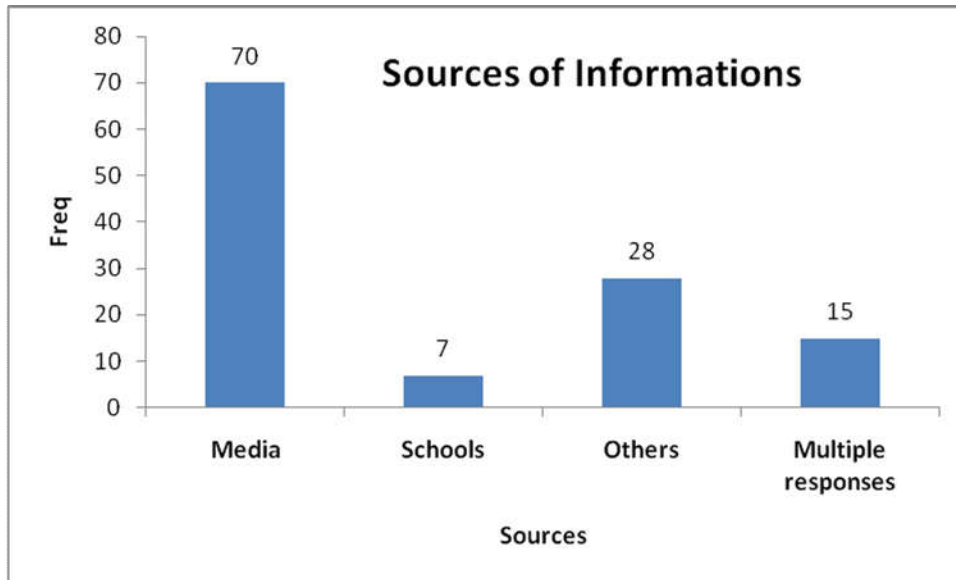


Figure III: Showing source of information of respondents on knowledge of SMC

Shows source of information of respondents, majority (70%) said they heard of SMC from the media, (28%) heard about SMC from others sources e.g. relatives, friends, colleagues, (15%) heard from multiple sources whereas (7%) heard it from school.

Table 4: Perception on SMC

Question on perception on SMC	Frequency and Percentage	
	Yes	No
1 Do you think SMC is useful?	109 (90.8)	11 (9.2)
2 What are your reasons?	53 (44.2)	67 (55.8)
3 Do you think SMC should be recommended?	101 (84.2)	19 (15.8)
4 What are your reasons?	20 (16.7)	100 (83.3)
5 Do you think drugs used in SMC protect children >5yrs against malaria?	87 (72.5)	33 (27.5)
6 Do you think drugs used in SMC are cheap?	100 (83.3)	20 (16.7)
7 Do you think drugs used in SMC are readily available?	79 (65.8)	41 (34.1)

Perception of respondents toward SMC shows that majority 90.8% reported that SMC is useful as compared to only 9.2% who said it is not useful. Similarly 84.2% of them said they will recommend SMC as compared to 15.8% who said they will not. Only 16.7% give reasons for recommending SMC as compared to 83.3% who could not a reason.

Table 5: Perception about seasonal malaria chemoprevention(SMC)

S/No	Perception	Frequency	Percentage
1	Negative (0-3)	15	12.5
2	Positive (4-7)	105	87.5
	Total	120	100

The table shows perception of SMC among respondents. Majority of respondents 87.5%(105) has a positive perception, while 12.5 %(15) has a negative perception.

Table 6: Practice of SMC

Questions on practice of SMC		Frequency and percentage	
		Yes	No
1	Prescribe SMC	37 (30.83)	83 (69.17)
2	Information about SMC	37 (30.83)	83 (69.17)
3	Administer SMC	34 (28.33)	86 (71.67)
4	Handling of side effects of SMC	55 (45.83)	65 (54.17)

Practice of SMC among respondents majority 86(71.6%) do not administer SMC as compared to only 34(28.3%) who administer SMC. similarly 65(54.17%) said they don't treat side effects as compared to 55(45.85%) who said they do treat side effects.

Table 7: Practice of Seasonal Malaria Chemoprevention(SMC)

S/No	Practice	Frequency	Percentage
1	Poor (0-2)	86	71.6
2	Good (3-4)	34	28.3
	Total	120	100

Practice of SMC among respondents. Majority of respondents 71.6% (86) has poor practice, where as 28.3% (34) has good practice.

Table 8: Factors Associated with Knowledge of seasonal Malaria chemoprevention (SMC)

Variable	Good	Fair/Poor	Test Statistic	P-Value
Age group (years)	Freq&%	Freq/%		
1-30	15(37.5)	25(62.5)	$\chi^2= 5.81$	0.055
31-40	29(53.7)	25(46.3)		
41-60	14(53.8)	12(46.2)		
Sex				
Male	50(50.5)	49(49.5)	$\chi^2= 0.88$	0.35
Female	10(47.6)	11(52.4)		
Religion				
Islam	55(52.4)	50(47.6)	$\chi^2=8.55$	0.003**
Christian	7(46.7)	8(53.3)		
Ethnic group				
Hausa	60(54.5)	50(45.5)	$\chi^2= 6.28$	0.012
Others	1(10.0)	9(90.0)		
Educational level				
Post secondary school	58(61.1)	37(38.9)	$\chi^2=14.50$	0.0001**
Others	4(16.0)	21(84.0)		
Marital status				
Single	12(35.3)	22(64.7)	$\chi^2=7.21$	0.007**
Married	51(59.3)	35(41.7)		
Cadre of health worker				
CHEW	50(83.3)	10(16.7)	$\chi^2=0.26$	0.61
Non CHEW	48(80.0)	12(20.0)		
Number of years working at location				
1-5years	55(79.7)	14(20.3)	$\chi^2=0.71$	0.39
6-30years	42(82.4)	9(17.6)		

** Those starred shows significant association $p < 0.005$

Factors associated with knowledge on seasonal malaria chemoprevention, where religion, educational level and marital status shows a significant association with a p-value of p= 0.003, p= 0.0001 and p= 0.007 respectively.

Table 9: Factors Associated with perception of seasonal malaria chemoprevention (SMC).

	Positive	Negative	Test Statistic	P-Value
Variable				
Age	Frequency & %	Frequency&%		
20-35	76(85.4)	13(14.1)	$\chi^2=0.042$	0.84
36-60	26(83.1)	5(16.1)		
Sex				
Male	84(84.1)	15(15.1)	$\chi^2=0.010$	0.92
Female	18(85.7)	3(14.1)		
Ethnic group				
Hausa	94(84.1)	16(14.1)	$\chi^2=0.21$	0.64
Non Hausa	8(80.0)	2(20.0)		
Educational status				
Higher education	82(87.2)	12(12.8)	$\chi^2=1.7$	0.19
No higher education	20(76.9)	6(23..1)		
Marital status				
Married	76(88.4)	10(11.6)	$\chi^2=2.71$	0.10
Non married	26(76.5)	8(23.5)		
Cadre of health worker				
CHEW	52(86.7)	8(13.3)	$\chi^2=0.26$	0.61
Non CHEW	50(83.3)	10(16.7)		
Number of years working at facility				
1-5years	57(82.6)	12(17.4)	$\chi^2=0.71$	0.39
6-30years	45(88.2)	6(11.8)		

Factors associated with perception on seasonal malaria chemoprevention where the p-values are greater than the recommended p-value of 0.05.

Table 10: Factors Associated with Practice of seasonal malaria chemoprevention (SMC).

Variable	Positive	Negative	Test Statistic	P-Value
Age group(years)	Frequency & %	Frequency & %		
20-35	75(84.3)	14(15.7)	$\chi^2=0.69$	0.41
36-60	28(90.3)	3(9.7)		
Educational status				
Higher education	78(82.9)	16(17.0)	$\chi^2=7.47$	0.006**
No higher education	15(57.7)	11(42.3)		
Marital status				
Married	76(88.4)	10(11.6)	$\chi^2=1.61$	0.21
Non married	25(79.4)	9(20.6)		
Number of years working at location				
1-5years	57(82.6)	12(17.4)	$\chi^2=8.32$	0.004**
6-30years	30(58.8)	21(41.2)		
Cadre of health worker				
CHEW	51(85.0)	9(15.0)	$\chi^2=0.07$	0.79
Non CHEW	52(85.8)	8(13.3)		

** those starred shows strong association $p < 0.005$

Factors associated with practice of seasonal malaria chemoprevention, where level of education and number of years working at a location shows significant association with a p-value of p= 0.006 and p= 0.004 respectively.

Table 11: Binary logistic regression model for knowledge of SMC against sociodemographic factors.

Variables	p-value	Adjusted O.R	95% CI	
Constant	0.000		Lower	Upper
Number of years	0.84	1.18	(0.25	5.63)
Educational level	0.0001**	65.9	(6.96	623.61)
Marital status	0.0001**	12.9	(2.88	57.38)

** Those starred have a strong association.

There is significant association between knowledge of SMC and level of education and marital status with $p < 0.005$.

Table 12: Binary logistic regression model table for practice of SMC against number of years working and educational level.

Variables	p-value	Adjusted O.R	95% CI	
Constant			Lower	Upper
Number of years working	0.055	1.22	(1.00	1.49)
Educational level	0.22	0.40	(0.09	1.73)

There is no significant association between practice of SMC and variables (number of years working at a location and educational level).

KEY INFORMANT INTERVIEW RESULT AS REPORTED

PMVs as reported

Knowledge: Majority of the respondents knows what SMC, its full meaning is and the drug used in SMC which they said is SPAQ (sulfadoxine pyrimethamine and Amodiaquine). He narrated that the *“The pilot study was conducted in three LGAs, where different mode of delivery of SMC was carried out, PMVs, house to house and health facilities were the selected mode of delivery”*. The program was sponsored by Clinton Health Access Initiative (CHAI). He also described how the drugs are administered. *“The pilot study was conducted in three LGAs, where different mode of delivery of SMC was carried out, PMVs, house to house and health facilities were the selected mode of delivery”* he further said it is given during the last three month of the rainy season to children less than 5 years old.

Perception: Majority of the respondents reported that the program is good and can be implemented to cover the whole state if there is the political will. It can reduce the prevalence of malaria in high risk group of children less than 5 years. They also reported *“the program was introduced by WHO based on the research conducted that it can protect children less than 5 years from malaria during the rainy season, as such there is the need for the population to accept the program whole heartedly”*

Practice: Majority of the respondents said they do prescribe drugs used in SMC in the past, but have stopped now due to non availability of the drugs. They also reported many ways of malaria prevention which include environmental sanitation, use of LLIN. Few of them didn't foresee any challenge with implementation of SMC because the money involved is not much.

“The money is not much. The combination of the medicine is SP and AQ. Fancidar is SP and amodiaquine is the normal medicine you know that is being used i.e. AA. So, you see these are not expensive medicines”

Many of the respondents foresee challenges of finance which may hinder the implementation of the program to cover the whole state.

“I will say it is all about money because there is no problem with the manpower. There are health workers on ground. Even if they are not working, there are temporary staffs and those that are not temporary staff some do it voluntarily, and some even run their own chemist. If they are to run this program, allprogram. There is no problem with the manpower except that the money involved would be a challenge in this program. Since you are talking about the government, her challenge is money”

SMOH officials as reported

Knowledge: Respondents know about SMC, which they said is about malaria prevention in children less than 5 years old, and is given during the rainy season. The drugs used are sulfadoxine-pyrimethamine and Amodiaquine which are administered orally.

“It is SPAQ Sulfadoxine-pyrimethamine and also amodiaquine. These are all the drugs. The seasonal malaria chemoprevention is used at the time...for instance; mosquitos are much during rainy season. Mostly, they target raining season because that is when there is high prevalence of malaria. It was given to prevent occurrences of malaria disease. They mostly give it in four months mostly during raining season. The rain normally starts here by July, August, September, and October. That is all for it. The medicine is the spike. Sulfadoxine-pyrimethamine that is SP and AQ. The SP is Sulfadoxine-Pyrimethamine and AQ is amodiaquine. They add it all and

administer it for four days only in every month. They will administer starting dose and then one each at a time. For the full start is a white and yellow and then subsequently, yellow...yellow”

Perception: Respondents all agree that it is a good program, and do advice people to enroll into it. This is because it has to do with people’s health. One of the respondent has this to say;

“If it is to distribute drugs, honestly, I will very much encourage them to bring medicines. In my own opinion, they should treat the source...doctor control... to me it is the best option. If you don’t have Mr. Right, you can use Mr available. But to me, we can control the vector, it is the best option. Because I know there was a time they tested one of the options around Tudun Wada, it was the community that were calling out so that they will come and administer it again. Though it was a pilot because they said it is too expensive to use the paint from house to house. So, it controls the vector effectively and the community still wants the government to come and do it again. They said it was too expensive so it cannot be sustained. The whole state...it is ideal because there are countries that are also malaria roll but with the control of doctors, they have come out of it. If we are able to do that, it will be the best option rather than spending it on drugs. Honestly, it is better”

Practice: One of the respondent said he has never prescribed drugs for SMC, while the other said he has done that several times.

“No, but I use it. But we don’t prescribe. As a pharmacist, I don’t prescribe. I advise people to go to the medical doctor and obtain the prescription and the come home. In fact, we don’t encourage prescription because if you are prescribing, you will become an addict. As a pharmacist, we avoid drugs as much as much as possible”

Other methods of malaria prevention mention include the use of LLIN, insecticide, keeping a good and clean environment, proper use of insecticide treated nets and health education. These will reduce the getting infected with Malaria there by reducing the burden of malaria as a whole.

About the willingness of the ministry to implement the SMC program and possible challenges it may encounter.

“It should. The ministry is willing because it is part of its mandate. It is part of the mandate of the ministry”

There are challenges but the only challenge is because of this recession. And you know everything is tied to money especially financial challenges. In fact, it is the number one challenge. Apart from that is manpower because malaria is everywhere. So you need a very large number of manpower to reach the nooks and corners. Transportation to the venue may also present a challenge if the program is to cover the whole state.

Health facility in-charges & head of pharmacy units as reported

Knowledge: Majority of the respondents know what is SMC, where as few of them don't know about it. Half of them mention sulfadoxine-pyrimethamine and Amodiaquine as the drugs in SMC. Majority of the respondents are aware of SMC, but cannot say where it is being implemented. Some claimed to have attended training on seasonal malaria chemoprevention. One respondent said that:

“yes, the drugs used in SMC are 1)ACT which is mainly administered only after due laboratory test when result is found to be positive. 2) we give them SP(fansidar),Quinine and oral ACT suspension”

Others said they heard it over the Radio. All respondents says SMC drugs are administered orally, while others confuses SMC with IPT used for pregnant women. Another respondent said that:

“I have seen some PMV selling the SMC drugs in their store”

Perception: All respondents agree it is a good program, and that it is possible for the government to implement the program to cover the whole state, if the political will is there. If implemented, people will benefit tremendously since drugs will be available and at an affordable rate. One of the respondent said that

“the incidence of anaemia and malnutrition in children will also be reduce considerably”

All respondents agree that they can advice not only their relatives but the whole population to enroll into SMC. One of the respondent said that,

“since the program reduces the incidence of malaria” another said that *“It is a very good and can prevent and cure malaria especially in children less than 5years old”*

Practice : Majority of respondents said they have prescribed drugs for SMC in the past when the pilot study was launched. Those who said no, gives reasons such as not trained on SMC, never heard about it.

All respondents mention different ways used in the prevention of malaria, these include sleeping under LLIN, proper environmental sanitation, fumigation, health education clearing of stagnant water, use of engine oil in stagnant water to kill mosquito larvae, and provision of affordable malaria drugs etc. Some mention that supply of SMC drugs to communities at the grass root levels will help in the prevention of malaria, use of IPT(intermittent preventive therapy) for

pregnant women, and also someone mention the use of mosquito coil(smoke). One respondent said that;

“Some use their position as a traditional title holder(village head)to ask his town announcer to make a public campaign on the dangers of malaria during naming ceremony”

All respondents agree that the government is willing to implement the program and gives various suggestions which include the following; They should partner with NGO e.g. CHAI and MNCH2 who are involved in malaria control program.

The Primary Health Care Management Board (PHCMB) should be involved in the training of health care providers, recruitment of additional staff etc.

Majority of respondents agree that there is going to be some challenges but the major challenge is that of finance. While others think of training of health care workers and their resistance to change will present a challenge. Some see no challenges if there is the political will from the government. Other challenges mentions include sustainability of the program, poor coordination, poor monitoring and supervision. Lack of, or inadequate manpower may also present a challenge just like hard to reach areas. One of the respondents said that:

“On the part of the population, ignorance, poverty, and lack of awareness may present a challenge to the government. Parents or care givers may not want to bring their children to health facilities when they are sick”.

CHAPTER FIVE

DISCUSSION

Seasonal malaria chemoprevention is a relatively new method of malaria prevention especially in children less than 5 years old, that was introduced by WHO in the year 2012 for regions in the Sahel savannah. Nigeria is yet to implement the SMC for the states that fall within the regions although pilot studies has been conducted in at least two states. It is therefore very important to assess the Knowledge, Perception and Practice on seasonal malaria chemoprevention among health care workers and patent medicine vendors that participated in that pilot study.

The age of respondents is between (20-60)years, with majority 45% between the age of (31-40)years, while others (29.2%) were between the age of (20-30)years, 21.7% (41-50)years, and 4.2% (51-60)years. The mean age and standard deviation of the respondents was 34.0 ± 7.9 years. This age group is different from the one in a study conducted in Rivers State, which reported age group of 15-49 years among women of child bearing age. This difference in the age groups may be because, while my own study focus on both sexes with predominantly male respondents, the study in rivers focuses on women of child bearing age.

The sex distribution of respondents (82.5%) 99 male and female (17.5%) 21, this is in contrast to finding of a study in Ethiopia on knowledge and practice on malaria prevention method in Arba Minch province where , one hundred and six (23.3%) of the respondents were males while the remaining 348 (76.7%) of the respondents were females(36). The difference may be as a result of the fact that the study on SMC targeted health workers and patent medicine vendors who are mostly males. The educational status of all respondents are as follows 78.3%(94) have higher education after secondary school, 12.5%(15) have completed secondary school, 6.7%(8)

have not completed secondary school where as 0.8% (1) have not completed primary school.0.8% (1) have no educational qualification, and others 0.8% (1) this finding is found to be different from a study done in Tanzania where 44.6% of the respondents have had primary school education. The difference may be as a result of the fact that the respondents in the area of study are health care workers and generally have post secondary school education. Most of the respondents 87.5%(105) are Muslims while 12.5%(15) are Christians, this is quite different from another study done in Tanzania where 43.9% of respondents are Christians and only 0.7% of the respondents are Muslims. This may be due to the fact that the area of study is predominantly populated by Muslims. Majority of the respondents 71.7% (86) were married,25.8% (31) were single, 1.7% (2) were separated and 0.8% (1) divorced. This finding is similar to a study done in Ethiopia west region of Menge district where 75% of respondents are married 20.8% single and 4.2% are divorced(37). The distribution of the Cadre of health workers sampled in the study showed that,30%(36) are Senior Community Health Extension Workers,28.3%(34) are Patent Medicine Vendors,19.2% (23) are Environmental Health Officers,10.0%(12) are Laboratory Technicians,7.5%(9) are Junior Community Health Extension Workers, 3.3%(4) are Pharmacy Technicians, and 1.7%(2) others. This results is similar to a study done in Kenya where participants included 5 (14.7%) clinical officers, 22 (64.7%) nurses, and 7 (20.6%) community health workers.⁵⁰ Ethnic group of respondents are as follows 91.7%(110) are Hausa, 1.7%(2) are Fulani, 0.8%(1) is Yoruba and 5.8%(7) others. This contrast clearly with a study done in Ilorin North Central Nigeria where 20.8% of the respondents were Yoruba and only 4.5% were Hausa/Fulani.⁴⁶ The difference may be due to location of the study area being populated by indigenous people as compared to peri-urban area where the population of other ethnic group is much higher. The number of years working at location for all respondents range between 1-30

years. Respondents who spend between 1-10years are (112) 93.3%,11-20years (7)5.8% and those that spend 21-30years (1) 0.8%. The mean and standard deviation is 5.59 ± 4.1 respectively. This results is different from a study done in Bungoma district, Kenya where the maximum number of years spent at a location is 1-10years. Where (15) 44.1% participants had stayed in their stations for between 5 - 9 years, (12) 35.3% indicated less than 5 years, while (7) 20.6% stated at least 10 years.⁵⁰

The knowledge of seasonal malaria chemoprevention (SMC) is categorized into good, fair and poor. Those with good knowledge of SMC are (29) 24.2%, fair (40) 33.3% and with poor knowledge are (51) 42.5%. This shows majority of the health care worker who responded have poor knowledge on seasonal malaria chemoprevention. This is quite different from a study done on malaria knowledge, attitude and practice of a multiethnic population of Ile Ife town⁴¹ in Nigeria where most of the respondents >60% were familiar with at least 3 signs/symptoms associated with malaria as defined by western medicine and the use of untreated bed nets, fumigation and insecticide impregnated bed nets were not common for reasons bordering mostly on perceived ineffectiveness and inconvenience. The difference in the finding of this study may not be unconnected to the fact that the population of study in Ile-Ife could be more educated than those in the study area who are mostly post secondary school people. This finding is similar a study done in Bungoma district Kenya,⁵⁰ which showed that only one-third (29.4%) of the participants provided correct responses to all the test items; hence, were considered to be 'knowledgeable' about the guidelines. Besides, slightly more than one-half (55.9%) of the participants had accessed some training on IPTp. Based on this, a significant variation in providers' knowledge of all the IPTp guidelines used in the study emerged between trained and untrained providers. In this regard, trained providers were likely to be more knowledgeable on

the guidelines than their untrained counterparts were. This implies that trained providers were likely to be providing better quality services than those with no training. Nonetheless, with more than two-thirds (70.6%) of the providers failing to provide correct response for all the test items, one can safely deduce that the level of providers' knowledge on IPTp guidelines remains low.⁵⁰

On perception of seasonal malaria chemoprevention, 87.5% (105) of respondents have a positive perception on SMC, 12.5%(15) have negative perception SMC, this finding is similar to a result of a study conducted in Papua New Guinea on perception IPTi which shows 98% of respondents perceived IPTi prevents their children from getting malaria.¹¹ This similarities may be as a result of the respondents in the area of study are health care workers. In another study conducted in Iseorun, Nigeria. 63.7%(269) of mothers have a poor perception on malaria. Poor perceptions of malaria correlated with lack of education among mothers in the study area. This finding showed that being educated correlated with good perception about malaria. Mothers who have at least elementary education are more likely to make appropriate decision on health of children and seek care in formal health facilities. This may be as result of the level of education of the respondents in the area of study, who are educated beyond secondary school level. Likewise a study done in Kenya on perception showed some respondents with positive view on preventive measures (IPTp) and treatment of malaria, others held more negative views. Some of the latter group suggested that participating in such studies was a waste of time, especially when they receive no benefits from participating, and linked this with deeper issues of poverty.⁴⁹

The practice of SMC however shows that 28.3 % of respondents have good practice of SMC. 71.6% have a poor practice of SMC. This finding is similar to a study conducted in Rivers¹⁷ State Nigeria on Community Perceptions and Practices in Management of Malaria in Under-five Children which showed that nearly all (91.8%) the mothers and caregivers claimed that they had

taken an action within 24 hours of their child's illness: they had either administered a form of medication at home on the same or next day; or they took the ill child to a health facility. Another study done in Aliero, Kebbi State, Nigeria. Only 16% have good practice despite 90% comprehensive knowledge on malaria preventive measures.⁴⁷ This is slightly different from this study which showed 28.3% of the respondents have good practice. The differences may be as a result of the fact that the populations of the study in Aliero are rural communities and hence their levels of education are quite different from those at my study area. In a study done in northern Botswana on malaria prevention methods known and practiced by the respondents showed that most 94.4 % (68) of the respondents had good practice on malarial preventive measures.⁴⁸

The study determined association between respondent's knowledge of SMC and socio-demographic factors. Factors such as ethnic group, level of education, and marital status were found to be significantly associated with the knowledge at 5% level of significant ($P < 0.05$). This is similar to a study done in Ile-Ife Nigeria, where an association of religious beliefs (5.4%) to knowledge on malaria chemoprevention. Additionally, another study established a relationship between levels of education and appropriate malaria preventive measure as over 72% of respondents use untreated bed nets, insecticide sprays and insecticide treated nets as preventive measures and are educated to at least secondary school level.

Factors such as level of education and number of years working were found to be significantly associated with practice at 5% level of significant ($p < 0.05$). Logistic regression analysis was performed to identify factors which were associated with knowledge and practices on seasonal malaria chemoprevention. In the bivariate, factors which were independently associated with knowledge of seasonal malaria chemoprevention were level of education has odd ratio OR- 65, 95% CI (6.96-623.6) and $p < 0.0001$ and marital status OR-12.9. 95% CI (2.88-57.4) and

$p < 0.0001$. For practice number of years working at location has OR-1.22, 95% CI (1-1.49) and $p < 0.22$, level of education has OR-0.40, 95% CI (0.09-1.73) and $p < 0.033$

The study however has not determined any association between respondents perception of seasonal malaria chemoprevention with any of the variables.

The public health significance of the findings were thus; knowledge and practice of SMC among respondents was found to be poor. This means that eligible clients who may be passing through these respondents will not be benefitting from the SMC services. And this will pose a great challenge on malaria control in the State.

However the study reveals good perception of SMC among respondents, which means that with enlightenment programme and sensitization of these respondents there is likelihood of attitudinal change toward good practice of SMC.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study showed that there is poor knowledge on seasonal malaria chemoprevention among health care workers and patent medicine vendors in Kano State. Although the perception on seasonal malaria chemoprevention among the health care workers and patent medicine vendors is very positive. The study also showed that the health care workers and patent medicine vendors have poor practice on seasonal malaria chemoprevention. Factors such as level of education, marital status and religion were found to have a significant association with knowledge, perception and practice of seasonal malaria chemoprevention.

6.2 Recommendations

To government officials

The state ministry of health should retrain all health care workers especially those working in the Primary Health Care centres to improve their knowledge and practice on seasonal malaria chemoprevention before implementing SMC in the state.

To health care workers

Health care workers should continue to prescribe SMC drugs to the target populations.

To Patent Medicine Vendors (PMVs)

The executives of PMVs should partner with SMOH/NGO to sensitize their members to improve their knowledge and practice on SMC.

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APPENDIX I
QUESTIONARE
BAYERO UNIVERSITY KANO
DEPARTMENT OF COMMUNITY MEDICINE
PROJECT QUESTIONNAIRES

My name is Dr. Adamu Tella Garba, a student of Master in Public Health, conducting a study on Knowledge, perception and practice of seasonal malaria chemoprevention among health care workers and patent medicine vendors in Albasu, Danbatta and Garun Mallam LGAs of Kano State. I want to ask you some questions and, need your cooperation to answer the questions honestly. I promise to keep whatever you told me to be confidential and there is no penalty for not answering the questions.

Local Government Area: _____

Date of Interview: _____

Day

Month

Year

Name of Interviewer: _____

SOCIODEMOGRAPHIC PROFILE OF RESPONDENTS

S/N	DESCRIPTION	FILL IN THE RESPONSE
1	Age in years	
2	Sex 1= male 2= female	<input data-bbox="1159 890 1360 1020" type="text"/>
3	What is your Religion	
	1= Islam	<input data-bbox="1159 1360 1360 1491" type="text"/>
	2= Christianity	
	3= Traditional	
	4= Others (<i>specify</i>)	
4	What is your ethnic group 1= Hausa 2= Fulani	

	<p>3= Yoruba</p> <p>4= Others</p>	<input type="text"/>
5	<p>What is the highest education acquired</p> <hr/> <p>1= None</p> <p>2= Qur'anic school</p> <p>3= Primary school completed</p> <p>4= Primary school uncompleted</p> <p>5= Secondary school completed</p> <p>6= Secondary school uncompleted</p> <p>7= Higher education after secondary school</p> <p>8= Others(specify)</p>	<input type="text"/>
6	<p>What is your marital status</p> <hr/> <p>1= single</p> <hr/> <p>2= Married</p> <hr/> <p>3= Divorced</p> <hr/> <p>4= widowed</p> <hr/> <p>5= separated</p>	<input type="text"/>
7	Cadre of health worker	<input type="text"/>

	1= JCHEW	
	2= SCHEW	
	3= PHARM TECH	
	4=ENV. HEALTH OFF.	
	5=LAB TECH	
	6=PMV	
8	Number of years working at location	

SECTION B: KNOWLEDGE ON SEASONAL MALARIA CHEMOPREVENTION

9	Do you know what is SMC	
	1= Yes	
	2= No	
10	What is the full meaning of SMC?	
	1=Special men and child	

	2= <i>special mother and child</i>	
	3= special mother and children	
	4= Seasonal Malaria chemoprevention	
	5=Others (specify)	
11	What is the source of information?	
	1=Radio	
	2=TV	
	3= Newspaper	
	4= School	
	5=Others (specify)	
12	What is the drug combination in SMC	
	1=Chloroquine and Fansidar	
	2=Arthemeter +Lumefantrine	
	3=Amodiaquine +SP	
	4=Proguanil +Mefloquine	

	5=Others (specify)	
13	How do you administer SMC drugs?	<input type="text"/>
	1= Oral	
	2= Injection	
	3=Ointment	
	4= Syrup	
	5=Others (specify)	
14	<i>What is the drug formulation used for SMC?</i>	<input type="text"/>
	<i>1=Tablet</i>	
	<i>2=Injection</i>	
	<i>3=Cream</i>	
	<i>4=Suspension</i>	
	<i>5= Others (specify)</i>	
15	<i>What is SMC used for?</i>	<input type="text"/>
	<i>1=Treatment of Malaria</i>	
	<i>2=treatment of Pneumonia</i>	
	<i>3=Treatment of typhoid fever</i>	

	<i>4=prevention and treatment of malaria</i>	
	<i>5=Others (specify)</i>	
16	<i>Which group are recommended for SMC?</i>	
	<i>1=Everybody</i>	<input style="width: 100px; height: 80px;" type="text"/>
	<i>2=Children less than 5years old</i>	
	<i>3=adults</i>	
	<i>4=Pregnant women</i>	
	<i>5=Others (specify)</i>	
17	<i>What are side effects of SMC?</i>	
	<i>a).....</i>	<input style="width: 100px; height: 80px;" type="text"/>
	<i>b).....</i>	
	<i>c).....</i>	
	<i>d).....</i>	

SECTION C: PERCEPTION OF SEASONAL MALARIA CHEMOPREVENTION

18	Do you think SMC is useful? 1= Yes 2= No	<input data-bbox="1182 262 1360 359" type="text"/>
19	What are your reasons 1=..... 2= 3=	<input data-bbox="1182 506 1360 638" type="text"/>
20	Do you think SMC should be recommended? 1= Yes 2= No 3= Don't know	<input data-bbox="1182 804 1360 936" type="text"/>
21	What are your reasons. 1..... 2..... 3.....	<input data-bbox="1182 1081 1360 1213" type="text"/>
22	Do you think drugs used in SMC protect children >5yrs against malaria 1= Yes 2= No 3= Don't know	<input data-bbox="1182 1379 1360 1554" type="text"/>
23	Do you think the drugs used in SMC are cheap?	<input data-bbox="1182 1675 1360 1747" type="text"/>

	1= Yes 2= No 3= Don't know	<input type="text"/>
24	Do you think the drugs used in SMC are readily available	<input type="text"/>
	1= Yes 2= No 3= Don't know	<input type="text"/>

SECTION D: PRACTICE OF SEASONAL MALARIA CHEMOPREVENTION

25	Do you ever prescribed SMC? 1= Yes 2= No	<input type="text"/>
26	Do provide information to patients ro their care givers about SMC	<input type="text"/>
	1= Yes 2= No	
27	Do you administer SMC? 1= Yes 2- No	<input type="text"/>



28	What do you do when a patient develop side effect after administering SMC? 1= Reassure patient 2= treat side effect 3= refer 4= Others(specify)	<input type="text"/>
29	Do you know how many doses of SMC a child is to have?	<input type="text"/>
	1= Yes	
	2= No	
30	If, yes, how many doses?	<input type="text"/>
	1= One	
	2=Three	
	3=Four	
	4=Two	
	5= Others (<i>specify</i>)	
31	Do you know in which months of the year when SMC is to be given?	<input type="text"/>
	1= Yes	
	2= No	
32	If yes, which months?	<input type="text"/>
	1= Dry season	
	2= Rainy season	
	3= Harmattan season	

APPENDIX II

KII GUIDE

KNOWLEDGE, PERCEPTION AND PRACTICE OF SEASONAL MALARIA CHEMOPREVENTION AMONG HEALTH CARE WORKERS AND PATENT MEDICINE VENDORS IN ALBASU,DANBATTI AND GARUN MALLAM LGAs OF KANO STATE,A MIXED METHOD DESCRIPTIVE CROSS SECTIONAL STUDY

KII guide- officials of the pharmacy unit of the state ministry of health, executives of the association of Patent Medicine Vendors(PMV) and head of health facilities/pharmacy units.

(KEY INFORMANT INTERVIEW GUIDE)

Introduction and consent

Thank you very much for meeting with me today. My name is Dr Adamu Tella Garba. Am a post graduate student of Bayero University Kano carrying out a study title *Knowledge ,Perception and Practice of Seasonal Malaria Chemoprevention among Health Care Workers and Patent Medicine Vendors (PMVs) in Albasu, Danbatta and Garun malam LGAs of Kano state.*

I want to discuss with you to better understand the knowledge, perception and practice of seasonal malaria chemoprevention among health care workers and patent medicine vendors in kano state(Albasu,Danbatta and Garun mallam LGAs). This is to enable us gain a better understanding of implementation, challenges and the awareness of seasonal malaria chemoprevention in kano state.

We will then share it with policy makers so that they can make relevant adjustments so that the implementation of SMC will commence to cover the whole state. We have requested an interview with you because we believe that you have experience which may be helpful to others. You are the real expert and there is a lot to learn from you. This is very informal; you can talk about anything you think is important for us to know. The interview will take about thirty minutes to one hour. I will be taping the session and taking notes because I don't want to miss any of your comments. All your responses will be kept confidential and will not be shared with anyone outside our research team members. We will ensure that any information we include in our report does not identify you as a respondent.

Remember you don't have to talk about anything you don't want and if there are any questions you will rather not answer, just let me know—that's fine. Is there anything you will like to ask me at this point?

Obtain consent using the consent form_____

Interviewer: To begin our conversation, I will like to ask you some information regarding your position and role in the health care system and the community in general with regard to seasonal malaria chemoprevention(SMC)

1. How long have been working in this facility?
2. What is your position and role in the facility/community regarding seasonal malaria chemoprevention(SMC)?

Interviewer: Now I will like to ask you about knowledge on seasonal malaria chemoprevention(SMC)

3. How long have been practicing?
4. What do you think of the term Seasonal Malaria Chemoprevention(SMC)?
5. What do you know about the drugs used in SMC?
6. Are you aware if SMC is practice in Kano? If yes where and how?

7 Can you explain how SMC drugs are administered?

Interviewer:Now I will like to ask you about perception on seasonal malaria chemoprevention (SMC)

7 What do you think about seasonal malaria chemoprevention? Is it good or bad and can it be implemented for the whole state, if yes how and if no why?

8 Can you advise your relatives or patients to enrol into SMC? If yes why, if no why?

Interviewer:Now I will like to ask you about the practice of seasonal malaria chemoprevention(SMC)

9 Have you ever used or prescribe SMC for anybody? If yes why and if no why?

10 What other things do you do for malaria prevention?

11 Do you think the ministry is willing to enforce the use of SMC for the whole state?

12 Do you foresee challenges with regards to the implementation of SMC in the State?

Thank you very much for participating in the study, I really appreciate it.

APPENDIX III

CONSENT FORM

CONSENT FORM

I am Dr. Adamu Tella Garba, a student of Master in Public Health, conducting a study on Knowledge, Perception and Practice of seasonal malaria chemoprevention (SMC) among Health Care Workers and Patent Medicine Vendors (PMVs) in Kano State.

The general objective is to determine the Knowledge ,Perception and Practice of Seasonal Malaria Chemoprevention(SMC) among health care providers in the health facilities and patent medicine vendors in the communities of Kano State.

As a participant, I would request you to respond to the research questionnaire which may take 30 minutes. If you agree to participate, kindly sign in the space provided below. Participation is entirely voluntary. Refusal to participate will not affect you in any manner.

Thank you.

Name of participant.....sign/thumb print.....

Yours faith

Dr Adamu Tella Garba

APPENDIX IV

LITERATURE SEARCH STRATEGY

Literature search: In conducting the literature search, i searched for published studies using Africa Journal Online (AJOL),Med-Line, Science Direct; other data bases were explored, using Key Words and phra ses to narrow search to obtain relevant materials. The criteria used is based on relevance/similarities with the study area, and also similarities with the primary or secondary outcomes. Open sources such as PubMed and WHO websites, Reports, published and important unpublished data from the State and Federal Ministries of Health and related Agencies, Non-governmental organizations, other stake holders and key players. Journal articles published in English language used. Much data is not available with regards to studies on Seasonal Malaria Chemoprevention in the study area. I had over 1000 materials of which I read through and the relevant ones to my study were identified and saved for easy referencing and further reading.

APPENDIX V

LIST OF DATA COLLECTORS

1. Shamsudeen Sani	Bsc, Health education/PGD health economics
2. Zahradeen Surajo	CHEW/ Bsc, community health
3. Musa Rufai	SCHEW
4. Mohammed Ummate	WASC
