Facilitators and Barriers to SMC Uptake in Nigeria: A Qualitative Approach

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Abstract

Nigeria adopted Seasonal Malaria Chemoprevention (SMC) for children under 5 years of age as part of national malaria control policies, in 2014. By 2021 the intervention was being implemented in 18 states, delivered over 4 months between June and October by 143,000 community drug distributors (CDDs) to a target population of 23.1 million children. Further expansion of SMC is planned, extending to 21 states in 2022 with a target population of 27.1 million children, and an increased number of monthly cycles, from 4 to 5, may be needed in some states. In view of this massive scale-up of SMC, the National Malaria Elimination Programme conducted a qualitative research study shortly after the 2021 campaign to understand community attitudes to SMC, and to identify barriers to uptake and facilitating factors, in order to ensure that community perspectives inform future planning of SMC delivery in Nigeria. In each of five states (Kano, Kwara, Nasarawa, Yobe and Kebbi), Local Government Areas (LGAs) were ranked based on administrative coverage of SMC in 2021, and one LGA with high coverage and one with low coverage selected. In two wards (one urban and one rural) in each LGA, focus group discussions (FGDs) were held with caregivers, and in-depth interviews (IDIs) were conducted with community leaders and with community drug distributors. State-level and LGA malaria focal persons were also interviewed. At national level, key-informant interviews (KIIIs) were held with the NMEP coordinator, and representatives of partners working on SMC in Nigeria. Interviews were recorded and transcribed, and those in local languages translated into English, and the transcripts were analysed using NVivo software. A total of 190 FGDs, KIIIs and IDIs were undertaken. In all study areas malaria was seen as a major health concern and SMC was widely accepted as a key preventive measure, and community drug distributors (CDDs) were generally trusted. Caregivers preferred SMC delivered door-to-door to the fixed-point approach, because in addition to allowing them to continue daily tasks, door-to-door delivery allowed more time for the CDD to explain how to administer the treatments and advise about adverse reactions and to answer questions. Barriers identified included perceived side effects of SMC drugs, a lack of understanding of the purpose of SMC, mistrust and suspicions that medicines provided free may be unsafe or ineffective. Key informants and caregivers reported SMC distributions limited by drug shortages, supplies running out before all children in the community had been treated. Key findings from this study were shared with delivery teams during national and state level training in 2022 and through cascade training to all community drug distributors and others involved in SMC campaigns. Other steps to act on the findings will include updating the training curriculum to show SMC teams how to strengthen communication to caregivers on the importance, safety and effectiveness of SMC, during campaigns; more involvement of state and national level pharmacovigilance coordinators during implementation to improve completion and submission of individual case safety reports and investigation of suspected adverse drug reactions. To avoid local shortages of SMC drugs, NMEP will ensure stricter adherence to the planned medicine allocations for each facility based on microplanning estimates. Study findings were shared with donors and implementing partners, to reinforce the importance of retaining primarily door-to-door delivery of SMC in Nigeria.

Introduction
Nigeria accounted for 27% of the world malaria cases and 32% of deaths caused by malaria worldwide in 2020, according to WHO estimates [1], most of this burden being in young children. In 2019 Nigeria initiated the High Burden to High Impact approach to malaria control [2], which involves defining optimal combinations of core interventions according to the local epidemiology [3]. The country stratification (Figure 1) identified 21 of 36 states as suitable for Seasonal Malaria Chemoprevention (SMC). Current recommendations are for 4 monthly cycles in children aged 3-59 months but a fifth cycle may be required in some areas.

SMC was adopted by the Federal Ministry of Health as a national malaria control policy in Nigeria in early 2014. After pilot schemes in Katsina state in 2013 and 2014 [4,5], and Kano in 2014 [6], SMC was introduced in Sokoto and Zamfara states in 2015 and 2016 [7], and its use gradually scaled up, with the intervention implemented in 18 states by 2021 (Figure 2). In 2021, SMC was delivered over 4 or 5 months between June and October by 143,000 community drug distributors (CDDs) to a target population of 23.1 million children, with 5 monthly cycles in Kogi, Nasawara, Plateau states and 4 cycles elsewhere. In 2022, SMC was planned to be implemented in all 21 eligible states, to a total of 27.1 million children.

Pilot implementation in Katsina (3 cycles in 2013 and 4 cycles in 2014), showed SMC was acceptable to communities, 83.9% of eligible children received at SMC at least once, no serious adverse drug reactions were reported, and average economic cost of $3.98 per child per year in 2013 and $3.77 in 2014 [4]. Evaluation of the scaling up of SMC in 7 countries including Nigeria in 2015 and 2016 found that uptake varied but was associated with marked reductions in numbers of malaria cases at health facilities in all countries, serious adverse drug reactions were rarely reported, drug resistant parasite genotypes were uncommon but there was evidence of selection for resistance to Sulfadoxine-Pyrimethamine. SMC cost an average of US$3.63 per child per year, and was highly cost-effective [7]. In Nigeria, 76.8% of eligible children received SMC at least once and 54.6% received SMC four times in 2015, and 82.7% and 19.5% in 2016; protective efficacy over 28 days post treatment was 83% in a case-control study in Zamfara state in 2016, and there was an estimated 26% reduction in the incidence of malaria during the transmission season in a sample of health facilities associated with SMC in 2015 and a 25% reduction in 2016. In 2017, SMC was implemented in Sokoto and Zamfara states and parts of Katsina and Jigawa states. Surveys found that 88.6% of children received SMC at least once but only 46.4% received SMC four times [8]. Coverage surveys undertaken in 2019, 2020 and 2021, with a modified sampling methodology, showed generally very high levels of coverage in all surveyed areas [9].

Effective delivery of SMC relies on community support and participation. There is increasing recognition of the importance of public engagement in planning all healthcare delivery [10,11]. SMC programmes have generally been welcomed by communities [5; 12-18], but as SMC programmes are expanded there is a need for robust methods to listen to community perspectives and include them in the design of delivery strategies. At the end of the 2021 campaign, the National Malaria Elimination Programme conducted a qualitative research study to understand community attitudes to SMC, factors facilitating uptake, and barriers, to ensure that community perspectives inform future planning of SMC delivery in Nigeria.
Methods

Study setting:

Malaria is endemic in Nigeria occurring throughout the year. The intensity and seasonality of transmission varies considerably across the highly diverse ecological zones existing in succession from south to north. Highly seasonal malaria in Nigeria occurs during and shortly after the period of intense rainfall (3-4 months) within the Savanna ecological zones of Derived Savannah, Guinea Savannah, Sudan Savannah and Sahel Savannah. SMC was initially implemented in the Northern states where malaria is most highly seasonal. SMC implementation in Nigeria started as a pilot project in 6 LGAs (Local Government Areas) of Katsina state in 2013 and 2014. In 2014 the country adopted SMC as a country-wide policy, in those states meeting the eligibility criteria [19]. These areas have the highest burden of malaria and of child mortality in Nigeria [24], Figure 1. In 2019, more eligible states were added, following stratification through the HBHI initiative in collaboration with WHO, which defined highly seasonal areas as those where more than 60% of annual rainfall fell in four consecutive months for four consecutive years, thus broadening the original definition (60% of cases in 4 months or 60% of rainfall in three months) leading to a wider geographical area being eligible for SMC [20]. This led to 21 states (including the Federal Capital Territory, FCT) being considered eligible for SMC (Figure 1). In 2021, SMC was implemented in 18 of these states, in a total of 389 LGAs, with a targeted population of 23.1million eligible children. Figure 2 shows the gradual scale-up of SMC between 2013 and 2022.

Protocol development and interview guides:

Interview and discussion guides were developed in consultation with stakeholders including topics identified in coverage surveys and reflecting the need to explore both demand and supply side factors.

Selection of study areas:

Five states were purposively selected, to represent areas supported by each of the three SMC funding agencies (Global Fund, USPMI, and Malaria Consortium philanthropic funding), to include states which started in 2021 and states with more experience of SMC, and to represent the 3 geopolitical zones (North West, North East, and North Central). Within each state, LGAs were ranked according to the administrative coverage in 2021 and the LGAs with highest and lowest coverage selected. In one State, Yobe, the four LGAs with lowest coverage were excluded from the list before selection, due to security concerns. In each selected LGA, rural and urban wards were listed and one ward from each stratum selected at random.

Stakeholder Engagement:

Nigeria operates a three-tier system of government consisting of the Federal, State and Local Governments. At the national level, letters were sent to states, partners and agencies to secure their commitment and cooperation as well as to grant permission to conduct interview with the suitable officer within the state, partners and agencies. At the state level, the State Ministries of Health, State Primary Health Care Boards and Health Departments of the selected LGAs were engaged of the intent to conduct
this research and to secure their permission and commitment. In each state, meetings were held with the State Malaria programme manager. These engagement meetings were replicated by the research and state teams at the LGA level with the LGA Malaria Focal Persons, who selected an SMC Lead Mother (LM) and a Town Announcer (TA) in each of the chosen wards to help select participants for interviews and focus groups.

**Training of interviewers:**

Interviews were undertaken by 2 researchers in each State, supervised by 2 investigators and assisted by 5 staff of the NMEP. An additional two researchers were responsible for analysis of the interview transcripts. The interviewers were seven staff of the National Population Commission and three university faculty members experienced in qualitative and quantitative field research. Interviewer training was held over 2 days (11-12 November, 2021), facilitated by the principal investigators, staff of NMEP and London School of Hygiene and Tropical Medicine (LSHTM), and one of the data analysts. Following engagement with state and LGA authorities, data collection took place between 14 Dec 2021 and 14 Jan 2022. The training, which included presentations and role play, included a refresher on key features of malaria and malaria control, the implementation of SMC in Nigeria and the steps involved in SMC delivery, the dynamics and process of qualitative interviews, effective facilitation of FGDs, a review of human research ethics in the context of this study, and a detailed review of the interview guides.

**Selection of study participants:**

In each ward, four Focus Group Discussions (FGDs) were held (one with mothers who could read and write, one with fathers who could read and write, one with mothers who could not read, and one with fathers who could not read). These participants were identified by SMC Lead Mothers (LMs) and town announcers (TAs) chosen by the LGA Malaria Focal Person. In addition, four In-depth Interviews (IDIs) were conducted, with a CDD, a health facility worker, and with two community leaders. This process was repeated in each ward (one rural and one urban ward) in each LGA. In addition, in each LGA, an IDI was held with the malaria focal person, and in each state an IDI was held with the Director of Public Health/Disease Control, and with Malaria Programme Manager. Thus, a total of 16 FGDs and 20 IDIs were completed in each State, a total of 80 FGDs and 100 IDIs. Each FGDs included 8 to 12 participants.

Key informant interviews (KIIs) were conducted with Coordinator of the National Malaria Elimination Programme (NMEP), and a representative of each of the partners involved in malaria programme (principal recipient in Nigeria for the Global Fund, WHO, PMI and MC).

**Data Collection:**

All FGDs and interviews were recorded on mobile phones. Five KIIs were conducted via telephone due to COVID-19 restrictions as mandated by their organizations to work from home preventing face-to-face interviews. All FGDs and IDIs were conducted in local languages and later translated into English, while KIIs were conducted in English. The IDIs, KIIs and FGDs were conducted from December 14, 2021 to
January 14, 2022. Audio recordings were uploaded to a secure Google drive location along with a verbatim transcript (with names replaced by initials) of each FGD and IDI, and an English translation of each transcript, prepared by each interviewer. For each KII, the recording in English and the transcript was similarly uploaded.

**Data Analysis:**

The data were imported into NVivo 10 for thematic analysis, and the results obtained were presented in narrative statements and subjected to further analysis, using ethnographic summary and content analysis.

**Ethics:**

The protocol was approved by the National Health Research Ethical Committee (NHREC) at the Federal Ministry of Health, Abuja. All researchers undertook an ethics course provided by TRREE. 19 Administrative approvals were obtained from the State Ministries of Health as well as the Local Government Area Councils via the Health Departments. In each community, the head of the health facility, assisted by a lead mother and a town announcer, identified potential participants in FGDs and IDIs, and explained the aims and activities of the study in the local language, using an information sheet, and verbal consent was documented. Each participant was given 2 bars of soap and a plastic bucket as incentive, refreshments were provided during the interviews, and for attendance at FGDs transportation costs were provided. Consent was reconfirmed at the start of the FGDs or interview and recorded.

**Results And Discussion**

The study identified several factors associated with utilization of SMC among children in Nigeria. These factors are related to the drug itself, caregivers or beneficiary characteristics and service providers.

Generally, SMC is widely accepted as a form of preventive measure against malaria but certain identified factors either facilitate or serve as barriers for its uptake. These factors include perceived side effects, ignorance, attitude of CDDs, alleged ineffectivity of the drugs, incomplete coverage/shortage of drugs, mode of delivery of drug and social desirability of campaign.

In all study areas malaria was seen as a major health concern, SMC was widely accepted as a key preventive measure, and community drug distributors (CDDs) were generally trusted. Caregivers preferred SMC delivered door-to-door to the fixed-point approach, because in addition to allowing them to continue daily tasks, door-to-door delivery allowed more time for the CDD to explain how to administer the treatments and advise about adverse reactions and to answer questions. However, barriers identified included perceived side effects of SMC drugs, a lack of understanding of the purpose of SMC, and mistrust and suspicions that medicines provided free may be unsafe or ineffective. The use of CDDs from the local area, and endorsement of SMC by local opinion leaders, were reported to be key factors in building trust.
The most common reason caregivers gave for not receiving SMC medicines was local shortages of drugs. Where local stock-outs did occur, this may have arisen when drug allocations were adjusted during the campaign, providing additional drugs in certain areas based on informal feedback, this can then lead to shortages elsewhere. To address this problem, it is proposed to ensure stricter adherence to annual microplanning allocations. In some areas where there was interruption of SMC delivery due to security problems, this could have been interpreted by caregivers as a shortage of drugs. To maintain delivery in such situations, a strategy that has been used effectively in other areas with security problems, facilitated through WHO with cooperation from the military, is so-called ‘hit and run’ strategies whereby drugs are delivered rapidly at pre-arranged fixed points.

Strengths of the study were that it was conducted shortly after the 2021 SMC campaign, in a range of settings across 5 states, including over 800 participants interviewed by experienced interviewers. Interviewers and analysts were independent of the NMEP. Limitations were that the study was purely qualitative, we were not able to quantify how widespread specific issues were; and we were not able to work in areas with current security problems limiting our ability to generalize to such areas. Analysis of transcripts has not been exhaustive, and a further report is planned.

Actions taken to put these findings into practice included, in 2022, sharing the key points from the study with delivery teams during national and state level training, and then through cascade training to all community drug distributors and others involved in SMC campaigns. To strengthen pharmacovigilance, more involvement of the state-level pharmacovigilance coordinators is needed during implementation to strengthen completion and submission of individual case safety reports, and of National PV officials to strengthen collation and investigation of suspected ADRs submitted on paper forms or online. There will be an emphasis on recruiting CDDs from the local community, and the training curriculum will be updated to show SMC teams how to strengthen communication to caregivers on the importance, safety and effectiveness of SMC, during campaigns. To avoid local shortages of SMC drugs, NMEP will ensure stricter adherence to the planned allocations for each facility. Our study findings reinforce the importance of retaining primarily door-to-door delivery of SMC in Nigeria.

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**Declarations**

**Ethical approval**

Ethical approval was obtained from the National Health Research Ethical Committee (NHREC) at the Federal Ministry of Health, Abuja. Nigeria Permissions were obtained from the State Ministries of Health.
as well as the Local Government Area Council via the Health Departments. Consent to participate and recording of the interviews were equally obtained from all the participants.

**Competing interests**

All the authors declared no competing interest

**Authors' contributions**

N.O and E.S contributed in conceptualization of the manuscript, proposal development, training of data collectors, data management, supervision of data collection and writing of draft report.

P.U contributed in conceptualization of the manuscript and writing of draft report.

J.N contributed in the conceptualization, proposal development, training of data collectors and writing of draft report.

C.O contributed in conceptualization, proposal development, data management and writing of draft report.

N.F contributed in training of data collectors, data management and analysis and writing of draft report.


S.S contributed in conceptualization, proposal development and writing of draft report.

P.M contributed in conceptualization, proposal development, training of data collectors, writing of draft report and preparation of the figure.

A.A and H.Y contributed in training of data collectors, data management and analysis and writing of draft report.

S.O and T.D contributed in conceptualization, proposal development, training of data collectors, supervision of data collection and writing of draft report.

All authors contributed in the review of the manuscript.

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**Availability of data and materials**
The transcripts for all the interviews are available from National Malaria Elimination Programme, Abuja, Nigeria. Interested persons can contact the corresponding author

**References**


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Figures
Figure 1

Literacy among women, prevalence of malaria in children, and child mortality, from the 2018 DHS survey [24], and the areas defined as eligible for SMC in the HBHI stratification [20]. A: Proportion of women 15-49 yrs able to read; B Prevalence of malaria in children 6—59 months (proportion who tested positive by RDT); C: Under 5 mortality (deaths per 1000 live births in the 10 years before the survey). D: Areas where more than 60% of annual rainfall occurred consistently in 4 consecutive months, considered suitable for SMC in the HBHI stratification.

Figure 2

Scale-up of SMC 2013-2022