Jagua Publication

*J. Appl. Health Sci. Med., 4(8) (2024), 1-3. DOI: 10.58614/jahsm481*

**Journal of Applied Health Sciences and Medicine**

*Journal homepage: https://www.jpub.org/journal-details.php?journal-id=39*

ISSN (E): 2583-1887
Journal of Applied Health Sciences and Medicine

***Explanatory Study***

# Impact And Acceptability of Seasonal Malaria Chemoprevention (SMC) And Pharmacovigilance Campaign Among Under-Five Children In Nigeria: An Explanatory Study

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**Article Info**

***Keywords:*** *Chemoprevention, Health, Seasonal Malaria, Under-five Children, Pharmacovigilance*

***Received:*** *8 July 2024*
***Accepted:*** *20 August 2024*
***Published:*** *2 September 2024*



Globally, an estimated 249 million malaria cases occurred in 2022, leading to 608,000 malaria deaths in a single year. Malaria is one of the most severe public health problems, with nearly half of the world's population at risk for infection [1]. Infants and young children continue to suffer the greatest mortality; in 2022, an estimated 4 out of 5 malaria-related deaths in the African Region were from children under 5 years of age. Inequities in access to education and financial resources further exacerbates risk: children under 5 years of age from the poorest households in sub-Saharan Africa are 5 times more likely to be infected with malaria than those from the wealthiest house holds [2]. Malaria is transmitted throughout Nigeria, with 97% of the population at risk of malaria. The duration of the transmission season ranges from year-round transmission in the south to three months or less in the north. Plasmodium falciparum is the predominant malaria species. According to the 2021 World Malaria Report, Nigeria had the highest number of global malaria cases (26.6% of global malaria cases) and the highest number of deaths (31% of global malaria deaths) in 2021. The country accounted for an estimated 54% of malaria cases in West Africa in 2021 [3]. The under- five malaria in Nigeria is a leading cause of global child mortality, accounting for 95,000 annual child deaths [4]. Malaria is one of the leading causes of death in Nigeria. According to the 2020 World Malaria Report, Nigeria accounts for 27 percent of malaria cases globally and 23 percent of deaths from the disease, 30 percent of admissions to Nigeria's hospitals are as a result of malaria. In rural populations, prevalence is 2.4 times that in urban populations (31% vs. 13%). Compared to the highest socioeconomic group, prevalence among children in the lowest socioeconomic group is seven times higher (38% vs. 6%). In Nigeria, there is still insufficient data around health more widely, which impacts the amount of evidence available for decision-making. In response to the malaria situation and to

**Cite as:** Abuhuraira Ado Musa, Shuaibu Sulieman, Abdulbaqi Alhaji Magaji, Rashidat Oluwabukola Owolabi, Maryam Dahiru Umar. Impact And Acceptability of Seasonal Malaria Chemoprevention (SMC) And Pharmacovigilance Campaign Among Under-Five Children In Nigeria: An Explanatory Study. *Journal of Applied Health Sciences and Medicine*, 4(8):1-3, 2024. https://doi.org/10.58614/jahsm481

guide implementation, the National Malaria Elimination Program (NMEP) initiated the High Burden High Impact (HBHI) approach with technical support from the WHO and technical partners to address the malaria situation in Nigeria [5]. In Nigeria, malaria is a major public health concern especially among under-five of age. SMC was adopted in Nigeria in 2014 and by 2021 was being implemented in 18 states, over four months between June and October by 143,000 community drugs distributors (CDD) to target population of 23 million children [6]. In 2012, the NMEP changed the first-line treatment for severe malaria from quinine to injectable artesunate, consistent with WHO treatment guideline. The recommended pre-referral intervention for severe malaria is intramuscular or rectal artesunate, intravenous quinine, or intravenous artemether. Microscopy data from the 2018 Nigeria Demographic and Health Survey (NDHS) show that the prevalence of malaria parasitaemia in children under five years of age is 2% (a decrease from 2% in 2015 and 42% in 2010), although there are significant regional, rural-urban, and socioeconomic differences: prevalence ranges from 16% in the South and South East Zones to 34% in the North West Zone. The current 2021–2025 National Malaria Strategic Plan (NMSP) is based on the vision of achieving a malaria-free Nigeria with a goal of reducing malaria morbidity to less than 10 percent parasite prevalence and mortality attributable to malaria to less than 50 deaths per 1,000 by 2025 [5]. Malaria Consortium supported the National Malaria Elimination Programme to build capacity within the health system more broadly and support in the delivery of interventions in the country. Seasonal malaria chemoprevention (SMC) is the administration of a full course of antimalarial treatment combination during the malaria season to prevent illness and death from the disease. It is an important public health intervention that is being used to reduce the burden of malaria in sub-Saharan Africa, particularly in at risk populations such as children under 5 years of age. SMC campaign is a widely accepted intervention to reduce the burden of malaria in this population [2, 7, 8]. SMC involves the administration of a full course of antimalarial drugs, typically at monthly intervals, during the malaria transmission season. [9] This intervention has effectively reduced the burden of malaria in children under 5 years of age in other parts of sub-Saharan Africa and has malaria been recommended by the WHO as a strategy for malaria prevention in this age group. [10] The drugs used for SMC include Sulfadoxine, Pyrimethamine (SP) and Amodiaquine (AQ). The combination of these is called SPAQ. These drugs are administered in combination as a single dose, which is repeated monthly for 3–4 months during the high transmission season. SMC is recommended for children aged 3–59 months, and it has been shown to significantly reduce the incidence of malaria in areas with seasonal transmission. SPAQ 1 and SPAQ 2 refer to the different regimens of SP and AQ used in SMC in Nigeria. SPAQ 1 is a single dose of SP and AQ given together, which is administered monthly for 4 to 5 months during the high transmission season. The dose of SP is 25 mg/kg, while the dose of AQ is 10 mg/kg given once daily for 3 consecutive days. This regimen is used for children weighing between 5 and 14 kg. SPAQ 2, on the other hand, is a similar regimen of SP and AQ given together, but it is used for children weighing more than 14 kg. The dose of SP is 1.25 g, while the dose of AQ is 50 mg/kg given once daily for 3 consecutive days. The difference between SPAQ 1 and SPAQ 2 is primarily in the dosages of SP and AQ used and the weight of the children for whom they are recommended. SPAQ 1 is for children weighing between 5 and 14 kg, while SPAQ 2 is used in children weighing more than 14 kg. It is important to note that only qualified health care professionals should administer these drugs as part of the SMC program [11, 12, 13, 14, 15, 16]. Case numbers decreased 2% between 2020 and 2021, from 312.7 to 306 per 1000 of the population at risk. Deaths decreased 3.5%, from 0.94 to 0.91 per 1000 of the population at risk during that same period [7]. SMC is an important public health intervention that can reduce the malaria burden in at risk populations, such as children under 5 years of age. [6, 17, 18, 19, 20, 21, 22, 23, 24, 25] SMC campaign utilizes door to door channels, with the health facilities serving as a hub unit of operation and quality assurance points for health product management, training, supervision, and monitoring and evaluation. The distribution strategy for these commodities was designed to fit into the National Malaria Commodity Logistics Management System. According to SMC Alliance annual meeting report, it was announced that 53 million children were covered by SMC in 2023. The largest number of children were reached in Nigeria, with about 28.7 million children treated per cycle of SMC. Cumulatively 1,078 million treatments delivered since 2012 [25].

## Article Information

**Supporting/Supporting Organizations:** No grants were received from any public, private or non-profit organizations for this research.

**Conflict of Interest Disclosure:** Authors have declared that no competing interests exist.
**Plagiarism Statement:** This article was scanned by the plagiarism program.

**Ethical Approval and Participant Consent:** It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited from are stated in the bibliography.

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