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CLINICAL ARTICLE

Characteristics of Nigerian women taking sulfadoxine/pyrimethamine twice during pregnancy for the prevention of malaria

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ABSTRACT

Objective: To investigate the characteristics of women in Nigeria who are likely to take sulfadoxine/pyrimethamine (SP) as recommended for the prevention of malaria in pregnancy to reduce maternal and child mortality rates. Methods: A cross-sectional survey of 1380 women was conducted using a structured questionnaire. The women had given birth within 6 months prior to the survey and were drawn from 6 local government areas in Nigeria. Results: Several demographic factors—older age bracket, ever attended school, currently living with a partner, ever married, and wealth—were significantly associated with compliance. Compliance was higher among respondents who had ever been married than among those who had never been married ($\chi^2 = 6.733$; $P = 0.006$). Compliance was also higher among those in paid employment ($\chi^2 = 17.110$; $P < 0.001$) and those in a higher wealth quintile ($\chi^2 = 34.861$; $P < 0.001$). Knowledge of malaria, which included prevention of malaria in pregnancy through use of IPTp with 2 doses of SP, showed a positive association with compliance. Compliance with 2 doses of SP among those with good knowledge was higher (63.9%) than among those with poor knowledge (46.9%) ($\chi^2 = 26.981$; $P < 0.001$). Conclusion: The present findings could help in targeting health education programs to specific subgroups of women to increase compliance with the recommended 2 doses of SP for the prevention of malaria in pregnancy.

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1. Introduction

Despite the availability of simple, cheap, and effective interventions, malaria in pregnancy (MIP) remains a major risk factor for severe anemia and death in pregnant women [1]. Increased risks to the child include spontaneous abortion, stillbirth, low birth weight, and death in the first 7 days of life [2,3]. The prevention of malaria using intermittent preventive treatment in pregnancy (IPTp) reduces these risks.

In its recommendations for Focused Antenatal Care, the WHO stipulates that pregnant women in malaria-endemic areas receive a minimum of 2 doses of sulfadoxine/pyrimethamine (SP) for IPTp (IPTp2) at monthly intervals after quickening. The Roll Back Malaria Partnership set itself the target of achieving 80% coverage with IPTp2 in areas of high transmission by 2010 [4].

However, 39 countries with an IPTp policy reported low IPTp coverage even though prenatal care attendance in endemic countries is relatively high [4]. The gap between coverage and targets indicates missed opportunities, such as in Nigeria, where only 13.2% of women received IPTp twice during their last pregnancy [5]. The gap persists despite low manufacturing costs for SP.

The present study was conducted to learn more about women in southern Nigeria who took IPTp2 and those who did not, despite having had the opportunity to obtain SP. The information will help to plan better strategies to achieve the targets for IPTp2 coverage.

2. Materials and methods

The present study was a cross-sectional analysis of data from a comparative intervention–control study [6] with a parallel-group design that evaluated an 18-month MIP prevention program in 6 LGAs in Akwa Ibom State, Nigeria (Fig. 1). Each LGA has a population of approximately 130 000 individuals with an average of 6500 pregnancies per year. The study area provides an ideal climate for malaria transmission throughout the year, with Akwa Ibom State being one of the areas with the highest malaria transmission rate in the whole region [7]. The prevention program ran from August 3, 2008, to February 3, 2010. The target population comprised women who had given birth within 6 months prior to the survey.

Ethics approval was obtained through the Committee on Human Research at Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA, and the National Malaria Control Programme, Abuja, Nigeria. Before commencement of the interviews, informed consent of the respondents was sought and documented in a signed consent form.

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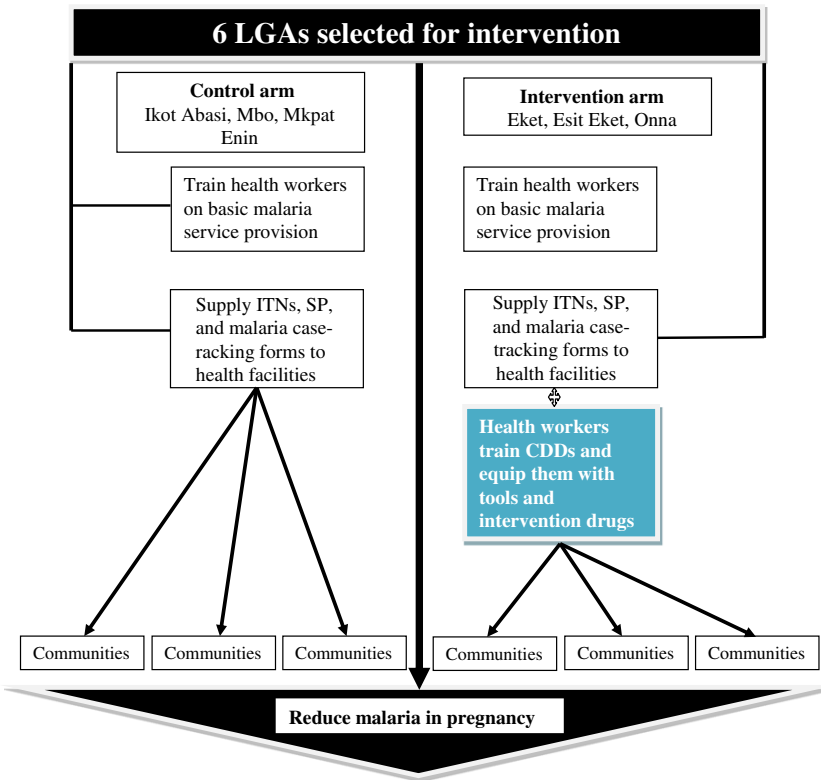E-mail address: nkechux@yahoo.com (N.G. Onyeneho).

Fig. 1. Study design and interventions. Abbreviations: CDDs, community-directed distributors; ITNs, insecticide-treated nets; LGA, local government area; SF, sulfadoxine/pyrimethamine.

At baseline, the national MIP policy with regard to IPTp [8] had not been implemented in the study area, SP supplies were inadequate, and awareness of IPTp among prenatal care staff was poor. During the MIP prevention program, prenatal care staff received MIP update training and supplies of SP in order to provide IPTp to eligible women in the study area. In 3 of the LGAs (Eket, Esit Eket, Onna), the frontline prenatal care staff trained community-directed distributors to deliver the IPTp drugs and to refer the women to prenatal care for additional services (intervention arm). In the other 3 LGAs (Ikot Abasi, Mbo, Mkpat Enin), women had to attend prenatal care to receive the IPTp drugs (control arm).

The present analysis used data from a random sample of 1380 women who were interviewed at the end of the study period. The women were selected from communities in close proximity to the 25 prenatal care clinics participating in the intervention–control study, with 13–16 women selected per community.

The interviews were based on a structured questionnaire that collected information on household and sociodemographic characteristics, pregnancy experience, and knowledge of health issues during pregnancy including measures for the prevention of MIP. Trained field assistants interviewed an average of 80 respondents, with 2 supervisors working alongside the data collectors and reviewing the completed questionnaires daily.

Based on the answers provided during the interviews, a malaria knowledge score was calculated, with 1 point allotted for each mention of the following: (1) malaria is worse in pregnancy; (2) malaria can lead to a low birth weight; (3) malaria is bad for the child; (4) malaria can cause abortion; (5) malaria can lead to anemia; (6) malaria can cause premature delivery; (7) malaria can be prevented by the use of SP; (8) malaria can be prevented by sleeping under an insecticide-treated net; and (9) malaria can be prevented by indoor residual spraying.

Principal component analysis was used to compute a wealth index and to allocate the households to 1 of 5 wealth quintiles. The index was based on observations about house size and construction, access to amenities, and possession of items such as a refrigerator, a motorcycle, and a radio.

The data were entered and checked using Epi Info version 6.04 (Centers for Disease Control and Prevention, Atlanta, GA, USA) and transferred to SPSS version 15 (IBM, Armonk, NY, USA) for analysis. Simple descriptive statistics were employed in characterizing the respondents. The χ^2 test was used to assess differences in compliance with the recommended 2 doses of SP for IPTp between the 2 study groups across different personal characteristics. $P < 0.05$ was considered statistically significant. On variables that showed a significant association with compliance, logistic regression analysis was conducted, both for the overall sample and for each arm separately.

3. Results

The women were aged between 15 and 49 years with a mean age of 25.65 ± 8.84 years. In total, 1109 (80.4%) women were married or in a partnership (Table 1). Most (1315 [95.3%]) had attended school. Almost half (679 [49.2%]) were engaged in paid employment. The prenatal care clinics were within 2 km of the communities/homes, and 85.9% of women in the intervention arm and 79.1% of women in the control group accessed prenatal care services at their local clinic. The respondents made 4.92 ± 2.06 prenatal care visits. The number of prenatal care visits was slightly higher in the control arm (5.02 ± 2.21) than in the intervention arm (4.86 ± 1.96). There was a normal distribution around the middle wealth quintile, which included 557 (40.4%) respondents, and a steady increase in IPTp2 compliance with increasing wealth (from 35.4% to 78.6%) (Table 1).

Almost every respondent (1369 [99.2%]) indicated awareness of malaria. Respondents commonly called it *uto eyin*. Malaria was seen as a fearsome and overwhelming problem. The majority (903 [66.0%]) mentioned mosquito bites as the cause of transmission. The respondents also had some knowledge of the effects of malaria during pregnancy (e.g. spontaneous abortion, prematurity), of measures to

Table 1
Factors influencing compliance with the recommended 2 doses of sulfadoxine/pyrimethamine for intermittent preventive treatment in pregnancy (n = 1380).

Factor	Category	Frequency[a]	Compliance[a]	χ^2	P value
Study arm	Intervention	753 (54.6)	485 (64.4)	197.794	<0.001
	Control	627 (45.4)	178 (28.4)		
Age	15–19 years	253 (18.3)	107 (42.3)	17.953	0.012
	20–24 years	425 (30.8)	196 (46.1)		
	25–29 years	374 (27.1)	200 (53.5)		
	30–34 years	213 (15.4)	123 (57.7)		
	35–39 years	88 (6.4)	40 (45.5)		
	40–44 years	14 (1.0)	5 (35.7)		
	45–49 years	1 (0.1)	1 (100.0)		
Marital status	Ever married	1109 (80.4)	550 (49.6)	6.733	0.006
	Never married	271 (19.6)	82 (30.3)		
Currently living with partner	Yes	134 (9.7)	60 (44.8)	1.299	0.155
	No	137 (9.9)	52 (38.0)		
Ever attended school	Yes	1315 (95.3)	654 (49.7)	3.107	0.050
	No	65 (4.7)	25 (38.5)		
Paid employment	Yes	679 (49.2)	372 (54.8)	17.110	<0.001
	No	701 (50.8)	306 (43.7)		
Wealth quintile	Lowest	147 (10.7)	52 (35.4)	34.861	<0.001
	Second	382 (27.7)	162 (42.4)		
	Middle	557 (40.4)	296 (53.1)		
	Fourth	266 (19.3)	146 (54.9)		
	Highest	28 (2.0)	22 (78.6)		
Prenatal care attendance	Yes	1125 (81.5)	639 (56.8)	143.293	<0.001
	No	255 (18.5)	39 (15.3)		
Location of prenatal care	Home	13 (0.9)	6 (46.2)	0.003	0.589
	Government health facility	476 (34.5)	268 (56.3)	25.482	<0.001
	Private health facility	50 (3.6)	24 (48.0)	0.023	0.496
	Faith-based organization	88 (6.4)	46 (52.3)	1.067	0.176
Number of prenatal care visits	1–2	97 (7.0)	38 (39.2)	16.346	<0.001
	3–4	332 (24.1)	195 (58.7)		
	≥5	503 (36.5)	308 (61.2)		
Parity	1–2	725 (52.5)	356 (49.1)	0.688	0.709
	3–4	384 (27.8)	194 (50.5)		
	≥5	271 (19.6)	128 (47.2)		
Knowledge of malaria	Poor (0–3)	893 (64.7)	419 (46.9)	26.981	<0.001
	Good (4–8)	323 (23.4)	206 (63.9)		

[a] Values are given as number (percentage).

prevent malaria during pregnancy (e.g. taking SP, using bed nets), and of the need for prompt treatment. The malaria knowledge score ranged from 0 to 8, with an average score of 2.7 ± 1.4 points and with 323 (23.4%) women having a score of 4 points or more (Table 1).

The majority (979 [91.0%]) of the respondents had used SP during their most recent pregnancy for the prevention of malaria, but only 661 (67.5%) had taken IPTp2 as recommended. As expected, compliance was better in the intervention group, but some demographic and cognitive factors were also associated with reduced compliance (Table 1).

In particular, compliance was better among women aged 25–29 years or 30–34 years (53.5% and 57.7%, respectively) than among younger (15–19 years) or older (40–44 years) women (42.3% and 35.7%, respectively). Women who had ever been married were more likely to comply with IPTp2 than those who had never been married (49.6% versus

30.3%). Compliance was slightly higher among those with formal education than among those without (49.7% versus 38.5%; χ^2 = 3.107; P = 0.051). Parity had no influence on the women's compliance with IPTp2.

The employment and wealth status of the women also influenced their compliance with IPTp2. Compliance was higher among those who were engaged in paid employment (54.8%) than among those who were not (43.7%). The higher the wealth quintile, the higher the compliance (χ^2 = 34.861; P < 0.001).

Compliance with IPTp2 was 46.9% among those with poor (0–3 points) knowledge of MIP and 63.9% among those with good knowledge (4–8 points) of MIP (Table 1).

In the regression analysis, being in the intervention arm and being wealthy were positively associated with compliance in the group

Table 2
Logistic regression analysis of variables associated with compliance with the recommended 2 doses of sulfadoxine/pyrimethamine for intermittent preventive treatment in pregnancy.

Variable	B coefficient	SE	Wald statistic	df	P value	Exp(B) coefficient
Being in intervention arm	1.577	0.125	159.866	1	<0.001	4.839
Age	0.278	0.148	3.536	1	0.060	1.320
Marital status	−0.035	0.161	0.047	1	0.829	0.966
Schooling	0.027	0.303	0.008	1	0.929	1.027
Wealth quintile	0.296	0.128	5.368	1	0.021	1.344
Employment status	0.343	0.125	7.509	1	0.006	1.409
Number of prenatal care visits	0.832	0.123	46.161	1	<0.001	2.299
MIP knowledge	0.227	0.128	3.140	1	0.076	1.255
Location of prenatal care	0.276	0.130	4.515	1	0.034	1.318
Constant	−1.937	0.331	34.159	1	<0.001	0.144

Abbreviations: df, degree of freedom; SE, standard error.

Table 3
Logistic regression analysis of variables associated with compliance with the recommended 2 doses of sulfadoxine/pyrimethamine for intermittent preventive treatment in pregnancy in the intervention arm.

Variable	B coefficient	SE	Wald statistic	df	P value	Exp(B) coefficient
Age	0.093	0.195	0.228	1	0.633	1.098
Marital status	0.016	0.207	0.006	1	0.938	1.016
Schooling	−0.334	0.500	0.447	1	0.504	0.716
Wealth quintile	0.215	0.167	1.656	1	0.198	1.240
Employment status	0.453	0.160	8.020	1	0.005	1.573
Number of prenatal care visits	0.444	0.163	7.436	1	0.006	1.559
Location of prenatal care	0.327	0.167	3.824	1	0.051	1.386
MIP knowledge	0.372	0.164	5.172	1	0.023	1.451
Constant	0.022	0.529	0.002	1	0.966	1.023

Abbreviations: df, degree of freedom; SE, standard error.

Table 4

Logistic regression analysis of variables associated with compliance with the recommended 2 doses of sulfadoxine/pyrimethamine for intermittent preventive treatment in pregnancy in the control arm.

Variable	B coefficient	SE	Wald statistic	df	P value	Exp(B) coefficient
Age	0.574	0.228	6.350	1	0.012	1.775
Marital status	−0.053	0.264	0.040	1	0.842	0.949
Schooling	0.295	0.433	0.464	1	0.496	1.343
Wealth quintile	0.425	0.204	4.361	1	0.037	1.530
Employment status	0.076	0.208	0.135	1	0.714	1.079
Number of prenatal care visits	1.297	0.204	40.357	1	<0.001	3.659
Location of prenatal care	0.153	0.210	0.535	1	0.464	1.166
MIP knowledge	0.072	0.219	0.108	1	0.742	1.075
Constant	−2.457	0.483	25.916	1	<0.001	0.086

Abbreviations: df, degree of freedom; SE, standard error.

overall (Table 2). There was also an association between the number of prenatal care visits and compliance. When the regression analysis was run separately for the 2 study arms, the number of prenatal care visits remained a significant factor in both study arms (Tables 3 and 4). The level of knowledge about MIP and its prevention emerged as a significant factor in the intervention arm (Table 3), whereas age was a significant factor in the control group (Table 4).

4. Discussion

Studies investigating the compliance with community disease control programs [9–13] have shown that some subgroups have a lower compliance based on social and demographic characteristics. The present study highlights the same problem for the prevention of MIP and pinpoints subgroups of women who could benefit from more focused health education. In addition, the results underscore the importance of prenatal care attendance. Not only is prenatal care a place where first or additional IPTp doses can be obtained, but prenatal care also offers an important opportunity for health education on the broader risks of malaria in pregnancy. Community outreach programs also have an important role in this regard. In the present study, formal education per se was not as important as disease knowledge acquired informally through neighbors and community volunteers.

Knowledge is not the only variable of importance, as seen in the control group, where compliance was associated with maternal age. This association is not likely to be attributable to age per se but to social differences or barriers characteristic for different age groups. Younger women, especially teenagers, and older, more experienced women attend prenatal care less often for different reasons. The former may be embarrassed to attend public prenatal care sessions, whereas the latter may downplay the risks of pregnancy because of their advanced experience. When community-directed distributors deliver the IPTp drugs to the community, some of these age barriers are overcome.

Financial or economic factors— represented in the present study by wealth quintiles and employment status—may be a common barrier to participation in MIP prevention programs. In the present study,

IPTp with SP was provided for free, but fees were charged on registration for prenatal care (US $2–3 depending on the LGA). This might explain why the wealth status was associated with IPTp2 compliance in the control arm, where women could access IPTp at a prenatal care clinic only.

In conclusion, the present study characterized women who took the recommended 2 doses of SP for IPTp during their last pregnancy to protect themselves against MIP and those who did not, and assessed the association between compliance with IPTp2 and parameters such as malaria knowledge, prenatal care attendance, maternal age, and financial circumstances. Further qualitative research could help to better understand the social barriers that exist for different age groups and the role of the employment status in a woman's decision and ability to obtain IPTp2. With this additional information, health education strategies can be improved to close the identified gap between IPTp targets and actual coverage.

Acknowledgments

Conflict of interest

The authors have no conflicts of interest.

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