

Factors Influencing Health Workers' Compliance with the WHO Intermittent Preventive Treatment for Malaria in Pregnancy Recommendations in the Northern Region, Ghana

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Abstract

Background

Although IPTp-SP is a lifesaving WHO recommended preventive intervention for pregnant women in malaria-endemic regions, IPTp-SP uptake in the Northern region of Ghana is much lower than the sub-optimal national coverage level. Assessing the extent of health workers' compliance and its associated factors will generate valuable pointers to be targeted at the program level. The study examined the factors influencing health workers' compliance with the WHO recommended guidelines for IPTp-SP in the Northern Region.

Methods

A cross-sectional study among 315 health workers in the Northern region was conducted. Semi-structured questionnaires were used to collect data on health workers' sociodemographic characteristics, facility-based factors and knowledge level. Data were collected on health workers' compliance with the recommended practices through covert observations using a checklist. Facility observations were carried out using a checklist. Crude and adjusted logistic regression were used to determine predictors of health workers' compliance, at 5% significance level adjusting for clustering.

Results

Of the 315 health workers studied, the median age was 29 years (26 – 34 years). Females constituted 252 (80.5%) of the 313 workers. The majority 148 (47.44%) of the 312 health workers were midwives. Overall, 56.2% (CI 51.0 – 62.0) were adequately complying with the recommended guidelines. Lower levels of compliance were recorded in health centers 15.6% (5.0 - 33.0) and CHPS compounds 21.2% (11.0 - 35.0). The factors associated with compliance included health workers' knowledge (aOR = 7.64, 95% CI 4.21 - 13.87, $p < 0.001$), job satisfaction (aOR 10.87, 95%CI 7.04 - 16.79, $p < 0.001$), in-service training (aOR 10.11, 95%CI 4.53 - 22.56, $p < 0.001$), supervision (aOR 4.01, 95%CI 2.09 - 7.68, $p < 0.001$), availability of job aids (aOR 3.61, 95%CI 2.44 - 5.35, $p < 0.001$), health workers experience (aOR = 10.64, 95% CI 5.99 - 18.91, $p < 0.001$) and facility type (aOR 0.03, 95%CI 0.01 - 0.07, $p < 0.001$).

Conclusion

Compliance with the recommended IPTp-SP guidelines is suboptimal in the region, with lower-level health facilities recording the least compliance levels. Health centers and CHPS facilities should be prioritized in distributing limited resources to improve health worker quality of care for antenatal care clients.

Background

Malaria in pregnancy is a significant public health problem. In 2018, an estimated 11 million pregnant women living in 38 countries with moderate-to-high malaria transmission in Sub-Saharan Africa were diagnosed with malaria ¹. Malaria in pregnancy accounts for 16.8% of all hospital admissions and 3.4% of deaths, making it the singular highest contributor to all OPD admissions among pregnant women in Ghana ^{2,3}.

To reduce the morbidity and mortality associated with malaria, the World Health Organization (WHO) recommended the use of the Intermittent Preventive Treatment for malaria in pregnancy using sulfadoxine-pyrimethamine (IPTp-SP) in 2000 alongside other preventive and curative interventions. The IPTp-SP protects between 65 and 85% of pregnant women from placental malaria infection⁴. The WHO updated the recommendations for IPTp-SP in 2012. The updated three or more doses of IPTp-SP has been demonstrated to be associated with an enhanced reduction in maternal parasitemia, malaria-related maternal anaemia and poor birth outcomes⁵⁻¹⁰. Per the updated guideline, IPTp-SP should be commenced early in the second trimester, with doses given at least one month apart under direct observation until delivery⁶. Subsequently, the Ghana National Malaria Control Programme revised the national IPTp-SP policy from up to three doses of IPTp-SP to three or more doses until delivery in 2014¹¹. The three or more IPTp-SP doses are linked with a greater mean birth weight and fewer low birth weight (LBW) newborns than the two doses¹².

However, two-thirds of pregnant women do not receive the recommended IPTp-SP doses during their visits to ANC units in Africa¹³. Data from cross-sectional surveys demonstrate that despite the availability of SP, eligible women accessing ANC services in the Volta and Northern regions of Ghana were not offered SP dose^{14,15}. Additionally, although the national target for IPTp-SP3 uptake is 80.0%, data from the District Health Information Management System II (DHIMS II) at the national level indicates that IPTp-SP3 uptake has been below 49% since 2017^{16,17}. In fact, the Northern region of Ghana recorded a more significant decline in uptake from 36.4% in 2019 to 27.2% in 2020¹⁶.

Health workers' inappropriate delivery of IPTp-SP services is a threat to reducing maternal malaria, maternal deaths, and poor birth outcomes. According to the WHO, an essential factor for the low uptake of IPTp-SP3 among pregnant women is confusion among health workers about the IPTp-SP recommendations⁶. In a national survey conducted in 2019, the commonly cited reasons for which 39.0% of pregnant did not receive the required dose during their most recent pregnancy were that they were not aware they had to take more (42%), and health workers did not give it to them (35%)¹⁸.

A combination of interventions is required to improve health workers' compliance with the WHO IPTp-SP recommendation. These include; regular in-service training, monitoring, supportive supervision, career development programs, providing logistics (portable water, cups for DOT practice, SP drug, and IPT manuals or leaflets). Reducing staff workload and motivating staff are equally important conditions worth addressing^{15,19,20}.

Measuring health workers' compliance with the revised IPTp-SP guidelines and the associated factors will enhance the early identification of areas that need the attention of policymakers and implementors. Researchers can create a composite compliance indicator using 7 binary questions-items¹⁹. In an attempt to examine the problem of poor compliance to the recommended IPTp-SP guidelines in Ghana, most of the studies considered less than the ideal number of question-items of the IPTp-SP guideline in assessing health workers compliance, potentially leading to an underestimation of compliance level and thus masking the actual burden^{15,20-23}. Therefore, this study sought to generate data on health workers compliance considering all components of the IPTp-SP guideline and the factors associated in the Northern region.

Methods

Study design and Setting

We conducted a cross-sectional study among antenatal health workers in the Northern Region of Ghana from April to July 2021. The Northern Region is one of the sixteen regions of Ghana. The annual temperature range is between 25 and 30 °C, which is favourable for Anopheles larval development. The region has 308 registered health facilities offering antenatal care services. The region has an estimated 3346 registered community health nurses, enrolled nurses, professional nurses and midwives. Each month, hospitals and polyclinics obtain their supplies of sulphadoxine-pyrimethamine for IPTp administration from the Northern Regional medical stores at no cost. Health centers and CHPs at the district level depend on the district medical stores for SP supplies. According to the 2019 Malaria Indicator Survey, 64.5% of pregnant women in the region received three or more doses of IPTp-SP between 2017 - 2019, although 91.8% ANC attendance was recorded ¹⁸.

Study Eligibility and Sampling Process

ANC staff who had worked for at least one year at the selected health facilities and were present at the study time were eligible. Those who had worked for at least one year but were not directly involved in IPTp-SP administration were excluded.

We employed a multistage sampling approach in the sampling of 286 health workers. The first stage involved a simple random sampling of 8 districts from the 16 districts in the region. The next stage involved using a restricted stratified sampling approach to select 16 health facilities from the sampled eight districts. In each district, we divided the health facilities into stratum A (district hospitals) and stratum B (Community-based Health Planning and Services (CHPS) compounds, health centres, polyclinics). One facility was selected from each stratum, making up the two health facilities in the district. The last stage involved sampling of 286 health workers from the 16 health facilities sampled. We used a proportionate to size sampling approach to determine the number of health workers to sample from each health facility. Simple random sampling was then used to sample health workers at the various facilities on survey days.

Data Collection and Study Variables

Data was consecutively collected in two phases. During the first phase, semi-structured questionnaires were administered to the sampled health workers. The questionnaire collected information on health workers' sociodemographic and individual-based factors. Knowledge was measured using an 11 question item tool for assessing health workers knowledge by Oluwasomidoyin, Bello, & Oni, (2020) (**Supplement 1**). The second phase involved the collection of data on the primary outcome; health workers compliance with the revised IPTp-SP guidelines. This data was collected by covertly observing how health workers performed 7 activities prescribed in the revised guidelines (**Supplement 2**). Each research assistant was responsible for observing the IPTp-SP practices of their respective respondents. The research assistants observed each of the respondents as they administered the services to their clients. Finally, using a checklist, each health facility was assessed for the availability of SP, portable water and IPTp-SP posters (**Supplement 3**).

Data Management and Statistical Analysis

The returned questionnaires were cleaned and edited to ensure accuracy and completeness before coding in Microsoft Excel 2017 and analyzing using STATA version 15.0 (StataCorp LLC). We excluded all forms with missing data on the primary outcome from the analysis (n=15). Regarding the dependent variable, a correct practice was scored 1, and a wrong practice scored 0. We categorized the total scores obtained by each health worker into inadequate compliance (0-3) and adequate compliance (4-7) ²⁵. Each correct response to the knowledge question

items was scored 1, and an incorrect response scored 0. We categorized the scores into low knowledge (0-4), moderate knowledge (5-8) and high knowledge (9-11) ²⁴. All categorical variables comprising age, sex, cadre, level of education, length of practice, awareness and level of knowledge, type of facility, monitoring and supervision, staff workload, routine training, IPT job aids and manuals, and staff motivation were analyzed into frequencies and proportions at 95% CI. Skewed continuous variable, for example, age was presented using a median and interquartile range.

We performed a crude logistic regression analysis to test the association between the independent variables and compliance.

We further selected variables with statistically significant association with the health workers' compliance at a significance level of 0.1 for an adjusted logistic regression. Robust standard errors were used to adjust for clustering in both the crude and adjusted analyses, with the type of facility as the main clustering variable. A significance level of 5% was set for the adjusted logistic analysis. Findings from the health facility assessments were analyzed into frequencies and proportions.

Results

Health Workers Background Characteristics

Of the 315 health care workers studied, more than two thirds 252 (80.5%) were females. The median age of the health workers was 29 years (26 – 34 years). On education, 149 (48.7%) of the 306 health workers studied were diploma holders, while 53 (17.3%) were degree holders. The majority 177 (59.2%) of the 299 health workers studied had been providing obstetric care for less than five years (**Table 1**)

Table 1: Background Characteristics of Health Workers studied, Northern Region, 2021

Characteristics	Frequency (N=315)	Percentage (%)
Sex		
Male	61	19.5
Female	252	80.5
Subtotal	313	100.0
Experience		
> 5	177	59.2
5 – 10	72	24.1
10+	50	16.7
Subtotal	299	100.0
Cadre		
General nurse	124	39.7
Midwife	148	47.5
Others	40	12.8
Subtotal	312	100.0
Education		
Certificate	104	34.0
Diploma	149	48.7
Degree	53	17.3
Subtotal	306	100.0
	Median (years)	IQR (years)
Age of HWs	29.0	26.0 – 34.0

Health Workers' Compliance with the IPTp-SP Recommended Treatment Guidelines

Majority 231 (73.3%) of the 315 health workers properly documented the IPTp-SP services rendered in patients' ANC cards. Also, 228 (72.4%) of the 315 health workers studied did not ask if pregnant women were on other medications for example co-trimoxazole. On informing pregnant women on the next dose's date, 179 (56.8%) of the 315 health workers failed to inform the pregnant women they attended (**Table 2**).

Table 2: Observation of Antenatal Health Workers IPTp-SP practices, Northern Region, 2021 (N=315)

Compliance to IPTp treatment guidelines	Frequency (N)	Percentage (%)
Confirmed gestational period		
Yes	210	66.7
No	105	33.3
Report adverse reactions		
Yes	110	34.9
No	205	65.1
Proper documentation		
Yes	231	73.3
No	84	26.7
DOT practice		
Yes	277	87.9
No	38	12.1
Other medications (co-trimoxazole)		
Yes	87	27.6
No	228	72.4
Required dosage		
Yes	306	97.1
No	9	2.9
Next dose		
Yes	136	43.2
No	179	56.8

Stratification of Health Workers' Compliance level by Health Facility Type

Overall, the majority 56.2% (CI 51.0 – 62.0) of the health workers complied with the recommended IPTp-SP practices adequately. However, lower levels of compliance were recorded in the health centers and CHPS compounds (**Table 3**).

Table 3: Stratification of Health Workers' Compliance level by Health Facility type, Northern Region, 2021

Facility type	Compliance level (%)	95% CI
CHPS	21.20	11.0 - 35.0
Health Centre	15.60	5.0 - 33.0
Hospital	69.70	63.0 - 76.0

Association between Health worker-related factors and their Compliance with IPTp-SP guidelines

From the multivariable regression analysis, health workers' experience, knowledge and use of manuals from personal sources were significantly associated with their compliance with the WHO IPTp-SP guidelines. Health workers who personally sourced and read IPTp-SP manuals had 1.9 times odds of compliance with the recommended guidelines compared to their counterparts (aOR = 1.89, 95% CI 1.04 - 3.43, $p < 0.036$). Similarly, the odds of complying with the recommended guidelines was 2.8 times among health workers with 5 – 10 years working experience (aOR = 2.78, 95% CI 1.06 - 7.24, $p < 0.037$) and 10.6 times among those with more than ten years of working experience (aOR = 10.64, 95% CI 5.99 - 18.91, $p < 0.001$) compared with health workers with less than five years working experience.

Regarding the knowledge level of the health workers, the odds of complying with the recommended guidelines was 3.2 times among health workers with moderate knowledge compared to those with low knowledge (aOR = 3.20, 95% CI 2.28 - 4.49, $p < 0.001$). Also, the odds of complying with the recommended guidelines was 7.6 times among health workers with high knowledge compared to those with low knowledge of the guidelines (aOR = 7.64, 95% CI 4.21 - 13.87, $p < 0.001$) (**Table 4**)

Table 4: Association between Health worker-related factors and their Compliance with IPTp-SP guidelines in the Northern Region

Variable	cOR (95 % C.I)	P-value	aOR (95 % C.I)	P-value
Age of HWs	1.11 (1.1 1.16)	0.001	0.99 (0.96 1.01)	0.325
Sex				
Male	1.00			
Female	0.85 (0.48 1.51)	0.586	0.52 (0.15 1.79)	0.302
Experience				
< 5	1.00			
5 – 10	3.23 (1.78 5.85)	0.001	2.78 (1.06 7.24)	0.037 ⁺⁺
>10	5.65 (2.59 12.33)	0.001	10.64 (5.99 18.91)	0.001 ⁺⁺
Cadre				
General Nurse	1.00			
Midwife	1.66 (1.02 2.68)	0.041	0.15 (0.06 0.37)	0.001
Others	1.98 (0.95 4.15)	0.070	1.34 (0.65 2.78)	0.429
Education				
Certificate	1.00			
Diploma	1.36 (0.82 2.24)	0.232	2.37 (0.99 5.68)	0.052
Degree	3.69 (1.74 7.81)	0.001	2.27 (0.71 7.26)	0.165
Awareness				
Not Aware	1.00			
Aware	1.51 (0.91 2.48)	0.108	2.56 (0.86 7.78)	0.092
Knowledge level				
Low	1.00			
Moderate	2.90 (1.17 7.17)	0.021	3.20 (2.28 4.49)	0.001 ⁺⁺
High	9.21 (3.54 23.96)	0.001	7.64 (4.21 13.87)	0.001 ⁺⁺
Access to IPTp materials				
Not Accessed	1.00			
Accessed	2.21 (1.39 3.51)	0.001	1.89 (1.04 3.43)	0.036 ⁺⁺

++statistically significant

Association between Facility-based factors and Health Workers' Compliance Level

Facility type, job training, staff motivation, supervision and availability of IPTp-SP job aids and manuals were significantly associated with health workers compliance. Health workers who received in-service training on the revised IPTp-SP guidelines had 10.0 times odds of complying with the guidelines compared with those who had not received any training on IPTp-SP administration (aOR 10.11, 95%CI 4.53 - 22.56, $p < 0.001$).

The odds of compliance among health workers satisfied with the ANC unit's conditions were 10.9 times compared with those not satisfied with the conditions of their working environment (aOR 10.87, 95%CI 7.04 - 16.79 $p < 0.001$).

Similarly, health workers who had been supervised had 4.0 times odds of compliance with the recommended practices than those who had not received any supervisory visits (aOR 4.01, 95%CI 2.09 - 7.68, $p < 0.001$). Health workers who received IPTp-SP training manuals from their facilities had 3.6 times odds of compliance compared with their counterparts who did not receive these materials from their facilities (aOR 3.61, 95%CI 2.44 - 5.35, $p < 0.001$) (**Table 5**).

Table 5: Association between facility-based factors and health workers' Compliance with IPTp-SP guidelines, Northern Region

Variable	cOR (95% CI)	P-value	aOR (95% CI)	P-value
Facility type				
Hospital	1.00			
Health Centre	0.08 (0.03 0.22)	0.001	0.03 (0.01 0.07)	0.001 ⁺⁺
CHPS compound	0.11 (0.06 0.24)	0.001	0.03 (0.02 0.05)	0.001 ⁺⁺
Staff workload				
0 – 30	1.00			
>30	0.95 (0.60 1.52)	0.829	-	-
Training				
No	1.00			
Yes	13.11 (7.60 22.62)	0.001	10.11 (4.53 22.56)	0.001 ⁺⁺
Monitoring				
No	1.00			
Yes	16.63 (9.21 30.02)	0.001	4.01 (2.09 7.68)	0.001 ⁺⁺
Job satisfaction				
Not satisfied	1.00			
Satisfied	12.24 (7.04 21.26)	0.001	10.87 (7.04 16.79)	0.001 ⁺⁺
IPT training manual				
Not provided	1.00			
Provided	4.50 (2.55 7.95)	0.001	3.61 (2.44 5.35)	0.001 ⁺⁺
Shortage of SP				
No	1.00			
Yes	0.42 (0.25 0.71)	0.001	1.08 (0.71 1.64)	0.730

++statistically significant

Health facility IPTp-SP implementation assessment

Health education programs on malaria in pregnancy were available in 75.0% (12/16) of the facilities visited. The majority 62.5% (10/16), of health facilities visited had their quarterly education programs, including IPTp-SP. Health talks were delivered in 8 of the 16 health facilities visited. Of these eight facilities, five included malaria in pregnancy in their presentation, whereas only three mentioned IPTp-SP in their presentation. SP was available in all the facilities visited, with eight facilities having posters of IPTp-SP pasted on the walls of the ANC unit. DOT was practiced in all the facilities visited; however, only two of these health facilities had potable water available for pregnant women.

Pregnant women bought water from a seller in the ANC unit or a nearby provision store in the remaining 14 health facilities.

Discussion

The study indicates that health workers' experience, knowledge level, training on IPTp-SP, job satisfaction, monitoring, type of facility they work in, and availability of IPTp-SP Job aids were significantly associated with health workers' appropriate delivery of IPTp-SP. Our study used a non-participant observation design, which allowed the identification of health workers compliance with the IPTp-SP recommended guidelines and eliminated the possibility of Hawthorne's effect.

Overall, low compliance by health workers recorded at all health system levels was more pronounced in the health centers and CHPS compounds. These CHPS compounds and health centers serve as the first point of health care for most pregnant women in the villages. If not addressed, the high inappropriate delivery of IPTp-SP services will curtail the impact of all demand-side related measures taken to address the low uptake of IPTp-SP in the region. More cost-effective measures adopted to address low compliance in the region should be targeted at the health centres and CHPS compounds. The observed high inadequate compliance among health workers from the CHPS compounds and health centers corroborates the results of a study in the Volta region of Ghana, where inappropriate delivery of IPTp-SP and ITN services were recorded in all facilities studied and more pronounced in the lower level of health care¹⁴. The consistency in findings could be attributed to the use of observations to assess IPTp-SP delivery in both studies though, De-gaulle & Kamgno used a three-indicator algorithm to assess health workers' compliance compared to the seven-indicator algorithm employed in the present study.

In-service training of Antenatal health care workers keeps them informed and technically equipped to deliver IPTp-SP services to pregnant women. Despite its relevance, training is sometimes overlooked, affecting health workers' perception of IPTp-SP and its administration. The increased odds of compliance among trained health workers in this study further substantiate the relevance of training to frontline health workers. The significance of training on health workers' compliance with appropriate practices has also been revealed in other studies among African countries^{26,27}. To ensure adequate training of health workers, the NMCP needs to move from the cascade form of training and adopt a more peripheral system of training where health workers at the health centers and CHPS compounds benefit from the training.

Supervision and monitoring are necessary to keep frontline health workers on their toes and to make them comply with the recommended guidelines. Health workers who had been supervised had an increased odds of compliance with the recommended guidelines. The finding is consistent with a study conducted in Uganda where health workers' uncertainty of SP and the new IPTp-SP guidelines was associated with a lack of supervision²⁸. This implies that an increase in supervision might increase the appropriate delivery of IPTp-SP services in the region. The Onsite Training and Supportive Supervision (OTSS) adopted by the National Malaria Control Program and IMPACT MALARIA for other malaria control areas such as case management and laboratory diagnosis could be extended to the delivery of IPTp-SP services.

Nevertheless, in a study conducted by Maheu-Giroux & Castro (2014), health care staff supervised during the six months prior to the study were less likely to deliver IPTp during a consultation than those not supervised. The study, unlike this one adopted a secondary data analysis design which could have accounted for the inconsistency in findings.

Health workers access to IPTp training manuals and job aids keep them informed on relevant changes made to existing guidelines. Health workers with access to job aids and training materials had increased odds of complying with the recommended guidelines. This is similar to the findings of a study conducted among five African countries where IPTp guidelines at health facilities was a significant determinant of IPTp-SP appropriate delivery ²⁹.

Health workers are supposed to be motivated to perform IPTp-SP services to the best of their abilities. However, motivating health workers has not been given the needed attention it deserves as a factor that can influence all forms of health service deliveries. In a study conducted in Tanzania, about 80.0% of health workers expressed dissatisfaction as a constrain to their performance ³⁰. Health workers who were satisfied with the ANC unit's conditions had increased odds of compliance. Incentivizing best performing health workers at the ANC units of health facilities will motivate health workers to deliver IPTp-SP services.

A few limitations were, however, identified in the study design used. The study used covert observation to determine whether health workers were complying with all indicators of the recommended guidelines. One indicator, the proper documentation of services rendered could not be reported based on the observation in a few cases. Research assistants engaged ANC clients to confirm proper IPTp-SP services in their ANC booklets to curtail this limitation. Before the actual data collection, the research assistants received thorough training on data collection tools and extensive pre-test activities to ensure that they were able to gather the data accurately by observing and listening intently to the delivery of care by ANC health workers.

Conclusion

Compliance with the recommended IPTp-SP guidelines is suboptimal in the region, with lower health facilities recording the least compliance levels. Health centers and CHPS facilities should be prioritized in the distribution of limited resources to improve health worker quality of care for antenatal care clients.

List Of Abbreviations

ANC	Antenatal Care
CHPS	Community based Health Planning and Services
DHIMS	District Health Information Management System
DOT	Direct Observation Therapy
GFELTP	Ghana Field Epidemiology and Laboratory Training Programme
IPTp-SP	Intermittent Preventive Treatment for Malaria in Pregnancy using Sulfadoxine Pyrimethamine
NMCP	National Malaria Control Programme
OPD	Outpatient Department
OTSS	Onsite Training and Supportive Supervision
WHO	World Health Organization

Declarations

Ethical declarations

The Ethical Review Committee of the Ghana Health Service approved the protocol for the study with ethics approval number GHS-ERC 032/05/21. The Northern Regional Health Directorate and heads of the various health facilities provided administrative authorization. We obtained written informed consent from all the health workers.

Consent for publication

Not applicable

Availability of dataset or materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interest

The authors declare that they have no competing interest

Funding

Not applicable

Contributions

AGM conceptualized the study, collected data and drafted the initial manuscript. HAB and AM supervised the entire research project. DD, JN, EK and AGM, and HAB, performed the analysis and interpreted the results. All authors reviewed, edited and approved the final manuscript for submission.

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Supplementary Files

Supplements 1-3 are not available with this version.