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Research Article

Assessment of Coverage and Mothers' Knowledge on SP-IPTp Implementation and Factors Associated with High Knowledge in the Hohoe Municipality of Ghana

Margaret Kweku[1], Michael Ofori[3], Wisdom Takramah[1], Wisdom Kudzo Axame[1], Richard Owusu[1], Phyllis Atta Parbey[1], Elvis Tarkang[2]* and Martin Adjuik[1]

[1]Department of Epidemiology, and Biostatistics, School of Public Health, University of Health and Allied Sciences, Ho, Volta Region, Ghana
[2]Department of Population and Behavioral Science, School of Public Health, University of Health and Allied Sciences, Ho, Volta Region, Ghana
[3]Department of Immunology, Noguchi Memorial Institute for Medical Research, University of Ghana, Ghana

***Corresponding Author**: Elvis Tarkang, Department of Population and Behavioral Science, School of Public Health, University of Health and Allied Sciences, Ho, Volta Region, Ghana.

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Abstract

Background: Malaria in pregnancy is a major health concern worldwide. The currently recommended package for malaria control includes the use of long-lasting insecticide-treated bed nets (LLIN), administration of intermittent preventive treatment (IPTp) with Sulphadoxine-pyrimethamine (SP) during pregnancy (SP-IPTp). This study assessed coverage and knowledge of mothers on the SP-IPTp programme in the Hohoe Municipality.

Method: A descriptive cross-sectional survey among 430 mothers with children under five years. Interviews with semi-structured questionnaire were used to collect information. Chi-square test and logistic regression were used to determine the association between dependent and independent variables. A p-value < 0.05 was considered significant.

Results: Of a total of 430 respondents, 420 (97.7%) received at least a dose of SP during pregnancy, 234 (54.3%) experienced an adverse reaction to the SP and 94 (21.9%) had a high knowledge on SP-IPTp. There was a significant association between education, occupation and high knowledge ($\chi^2 = 15.12$, p = 0.002) and ($\chi^2 = 12.72$, p = 0.013) respectively. Civil servant mothers were 3.65 times more likely to have a high knowledge as compared to those unemployed (AOR = 3.65, p = 0.012). Mothers perceived Direct Observation Therapy (DOT) approach as a way of ensuring that they actually swallowed the drug. Suggestions made by mothers were that more information about the SP-IPTp programme should be provided and the smell, taste and side effects of SP should be improved.

Conclusion: Knowledge on SP-IPTp among mothers was very low. However, uptake of SP was very high due to DOT approach. The DOT approach should be maintained and there should be more training for midwives to enable them to provide more information to mothers.

Keywords: *Knowledge; SP-IPTp Programme; Mothers; Children Under Five Years; Hohoe Municipality; Ghana*

Abbreviations

ANC: Antenatal Care; CWC: Child Welfare Clinic GDHS: Ghana Demographic Health Survey; GHS-ERC: Ghana Health Service-Ethics Review Committee; GHS: Ghana Health Service; IPTp: Intermitted Preventive Treatment of Malaria in Pregnancy; LLINs: Long Lasting Insecticide Nets; MoH: Ministry of Health; SP: Sulphadoxine-Pyrimethamine; SP-IPTp: Intermitted Preventive Treatment of Malaria in Pregnancy using Sulphadoxine-Pyrimethamine; WHO: World Health Organization; HMHD: Hohoe Municipal Health Directorate; DOT: Direct Observation Therapy

Introduction

Malaria in pregnancy is a major health concern worldwide. The effects of malaria are more dangerous during pregnancy and adverse effects are more serious for the pregnant woman as well as the foetus and the newborn. In endemic areas, women have high levels of immunity and thus may not suffer from fever or other malaria symptoms. However, during pregnancy, their immunity is altered making them more vulnerable to complicated and severe malaria [1]. The effects of malaria in pregnancy include chronic anaemia, acute severe anaemia, miscarriage/forced abortion and preterm delivery for the mother and for the foetus and the newborn; low birth weight, congenital malaria, stillbirth, perinatal and neonatal deaths. In sub-Saharan Africa (SSA), the major detrimental effect of malaria infection is low birth weight and maternal anaemia. Malaria infection during pregnancy has been estimated to cause 75,000 - 200,000 infant deaths each year in stable transmission areas [2].

To control malaria in pregnancy, the World Health Organization (WHO) currently recommends a package of interventions for controlling malaria during pregnancy in areas with stable transmission of *Plasmodium falciparum*, which includes the use of long-lasting insecticide treated nets (LLINs), the administration during pregnancy of at least two doses of intermittent preventive treatment (IPTp) with Sulphadoxine pyrimethamine (SP) (SP-IPTp) after quickening and the effective case management of malaria [3]. Starting as early as possible in the second trimester, the SP-IPTp is recommended by WHO for all pregnant women at each scheduled antenatal care (ANC) visit until the time of delivery, provided the doses are given at least one month apart [4].

SP has been rated as having the most favorable cost-benefit profile because of its relatively low cost, high compliance and efficacy in reducing maternal anaemia and low birth weight [5].

SP reduces malaria-related anaemia in pregnant women as compared to those who did not take SP during pregnancy [6]. A major detriment to SP-IPTp utilization among pregnant women was their knowledge of prophylaxis for malaria prevention. Therefore, for pregnant women to use IPTp properly, they must be well informed about the dangers of pregnancy-related malaria and receive the appropriate therapy at the right time during pregnancy [7].

A study conducted in Ghana found that knowledge of pregnant women on IPTp was significantly associated with the number of doses of SP receive [8]. Another study found that, the pregnant woman's knowledge about the purpose of taking SP at the ANC, the number of doses of SP to be taken during pregnancy, the timing of taking the SP as well as the effects of malaria on the mother and the baby influenced women to return for subsequent doses of SP [9].

Report from a study conducted in the Sunyani West District of Ghana showed that the majority (68%) of the participants did not have knowledge on SP-IPTp [9]. On the contrary, a study in Nigeria found a high knowledge (77%) among pregnant women with respect to SP [10]. In Tanzania, a study conducted reported that the number of SP doses taken had an association with the level of knowledge of pregnant women [11]. This study, therefore, assessed the coverage and knowledge of mothers on the SP-IPTp programme in the Hohoe Municipality.

Methods

Study Area

The study was undertaken in the Hohoe Municipality which is one of the twenty-five administrative districts of the Volta Region. The Municipality is located in the central part of the region with a total land surface area of 1,172 km square. The Municipality consists of 102 communities with a total population of 167,016 people (projected from 2010 population census). It is located at longitude 0 degrees 15 East and 0 degrees 45 East and latitude 6 degrees 45 North and 7 degrees 15 North and lies almost in the heart of the Volta Region. It is bounded by Jasikan District to the North, Northwest by Biakoye District, South by Afadjato South District, West and South West by Kpando Municipality and East by the Republic of Togo. There are two main seasons, the wet and dry seasons. The major wet season lasts from April to July and the minor one from September to November. The rest of the year is relatively dry. The average recorded annual rainfall

in the district is 1,592 mm with approximately 1,296 mm rain falling between April and October. Malaria is hyper-endemic but with seasonal peaks. The Municipality has been divided into seven (7) Health Sub-Municipalities namely: Akpafu/Santrokofi, Alavanyo, Agumatsa, Lolobi, Gbi-Rural, Hohoe-sub, and Likpe. Hohoe Municipality has a total of Twenty-one (21) health facilities including Municipal Hospital (1) Health centres (14) and CHPS compounds (5). There are 57 EPI outreach clinics.

Study Population

The population of the study included mothers with children aged less than five years (0 - 59 months) attending Child Welfare Clinics (CWCs) within the Hohoe Municipality and the mothers consented to participate.

Inclusion Criteria

The inclusion criteria were a mother with a child aged less than five years, residing in the Hohoe Municipality and attending CWC clinic during the period of the survey and consent to participate.

Exclusion Criteria

The exclusion criteria were a mother without a child aged less than five years, not residing in the Hohoe Municipality, was not attending CWC clinic during the period of the survey and did not consent to participate.

Study Design

A descriptive cross-sectional study was carried out in February 2017 involving 430 children under five years. Data were collected in the form of interviews.

Sample Size Determination

The sample size was calculated using the formula for a single population. Reliability coefficient (z-score) of 1.96 at 95% confidence level, the margin of error (e) of 5% and prevalence of high knowledge among mothers (p) of 50% were substituted into the formula to determine a minimum sample size of 376. Adjusting for a non-response rate of 5% gives the total sample size of 395. However, 430 children aged 0 to 59 months were recruited.

Sampling Method

Selection of Child Welfare Clinics and Study Participants

A sampling frame of all (57) Child Welfare Clinics (CWCs) within the Municipality was obtained. A simple random sampling method was used to select 10 CWCs. The participants were proportionately distributed to the CWCs based on 2016 clinic attendants. A probability (simple random) sampling technique was used for the selection of participants in each clinic. The balloting method specifically, the non-replacement type was used. With this, the expected number of mothers of children under-five (participants) needed for each clinic was estimated. This was done by counting the number of under-five children that reported at the CWCs in the same period of the previous year (2016) for each clinic. Once the sampling frame for each clinic was obtained and the number of respondents to be interviewed for each clinic known, ''yes'' and ''no'' was written on pieces of papers and then folded. The number of ''yes'' was equal to the number of respondents required per clinic and the number of ''no'' was equal to the number remaining after subtracting the required number of children from the total number for each clinic. Parents of all children who were eligible randomly picked one paper. Those who picked ''yes'' and consented were interviewed. In a situation where the number of respondents was less than or equal to the number required, all those who visited the CWC were enrolled and interviewed.

Data Collection

Pre-tested semi-structured questionnaires were used to collect the data. The questionnaires were administered to mothers of eligible children below five years immediately after they had completed the CWC activities and were exiting the clinic. The exit interview was

conducted in a convenient and conducive place, in the English language, and in Ewe for respondents who did not understand or speak English. Mothers were asked where they delivered their children, whether they attended ANC and if they received SP-IPTp. Information was obtained on the demographic characteristics, socio-economic status, and LLIN ownership and usage, knowledge on SP-IPTp, the number of ANC visits, the number of SP doses received, adverse effects experienced after administering SP. Information was also obtained on the perception about Direct Observation Therapy (DOT) of SP at ANC and their suggestions to improve upon the programme.

Statistical Analysis

After entry, data were cleaned and validated to ensure quality before they were analysed. Data were entered in Epi Data software. The cleaned data were then exported to STATA version 14.1 for analysis. Simple frequencies and percentages were used to determine the prevalence of categorical variables. Binary logistic regressions (CI of 95% and p-value) and Chi-square were used to determine the association between high knowledge (dependent) and independent variables. Statistical significance was considered based on p-value < 0.05.

Ethical Issues

Ethical approval for the study was obtained from the Ministry of Health (MoH)/Ghana Health Service (GHS) Ethical Review Committee (ERC) with approval number GHS-ERC: 13-07-2014. In addition, permission was obtained from the Hohoe Municipal Health Directorate (HMHD). The respondents were assured that the findings from the study and its dissemination would not have their names or any information that could be used to trace them. By this, confidentiality was assured. Special codes were assigned to the respondents; this was to ensure that individuals were not identified by their names.

Results

A total of 430 mothers of children under five years were interviewed. The mean age of the children was 13.91 ± 10.27 months and the mean age of the mothers was 28.8 ± 6.7 years. Most of the mothers 198 (46.0%) had primary education. The majority 151 (35.1%) of the mothers were traders. The majority 359 (83.5%) of the mothers were married (Table 1).

Characteristic	Frequency [N = 430]	Percent (%)
Mean age (SD) (months)	13.9 (10.3)	
Child's sex		
Male	205	47.7
Female	225	52.3
Age (months)		
< 12	209	48.6
12 - 23	152	35.3
24 - 35	43	10.0
36 - 47	18	4.2
48 - 59	8	1.9
Mothers' mean age (SD)(years)	28.8 (6.7)	
Age (years)		
< 20	30	7.0
20 - 29	210	48.8
30 - 39	159	37.0
40 - 49	31	7.2
Education		

No formal education	68	15.8
Primary	198	46.0
Secondary	119	27.7
Tertiary	45	10.5
Occupation		
Unemployed	84	19.5
Farming	52	12.1
Trading	151	35.1
Artisanship	107	24.9
Civil servant	36	8.4
Marital status		
Single	64	14.9
Married/Co - habiting	359	83.5
Divorced	7	1.6
Religion		
Christianity	419	97.4
Islam	11	2.6
Tribe		
Ewe	355	82.6
Guan	75	17.4
Socio - economic status		
Low socio - economic status	270	62.8
High socio - economic status	160	37.2
Delivery location		
Hospital	308	71.6
Health centre	54	12.6
Home	68	15.8
Locality		
Urban	221	51.4
Rural	209	48.6
Knowledge about SP - IPTp		
Low	336	78.1
High	94	21.9

Table 1: *Background characteristics.*

Coverage, knowledge of mothers, side effects experienced and impression about the direct observation therapy of SP-IPTp

Figure 1 shows that the majority of the respondents, 420 (97.7%) took at least a dose of SP-IPTp during pregnancy. Only 94 (21.9%) of the respondents had a high knowledge about SP-IPTp (Figure 2).

Figure 3 shows that more than half of the respondents, 234 (54.4%) experienced some form of adverse effect after the administration of SP-IPTp. The adverse effects reported were vomiting/nausea and bodily weakness/dizziness.

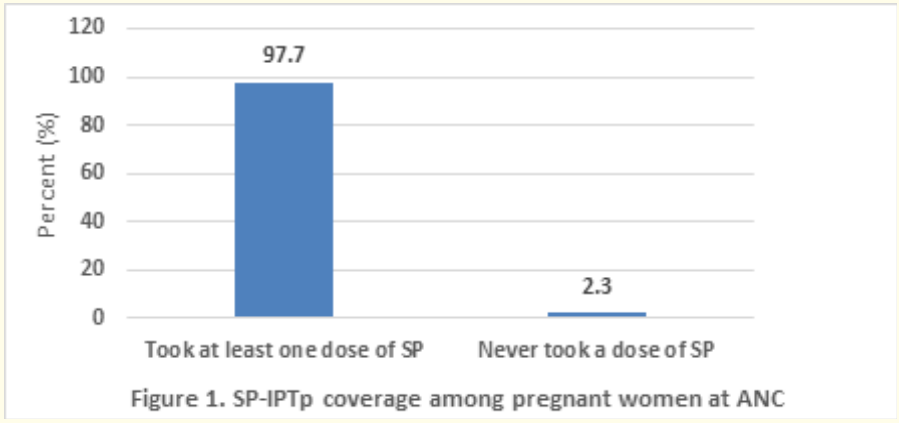

Figure 1: *SP-IPTp coverage among pregnant women at ANC.*

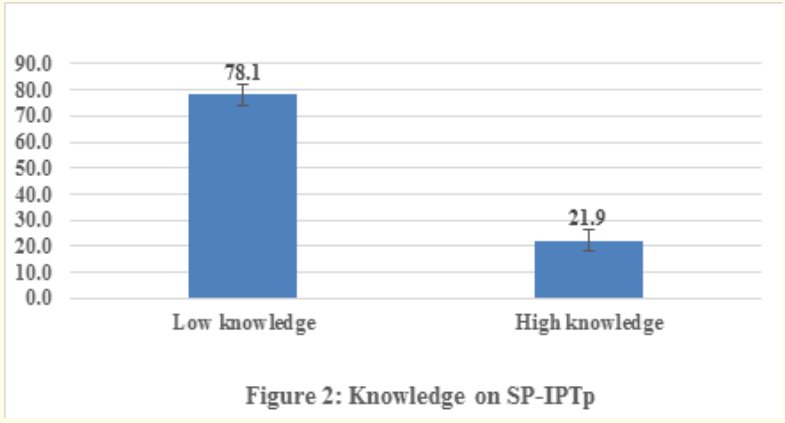

Figure 2: *Knowledge on SP-IPTp.*

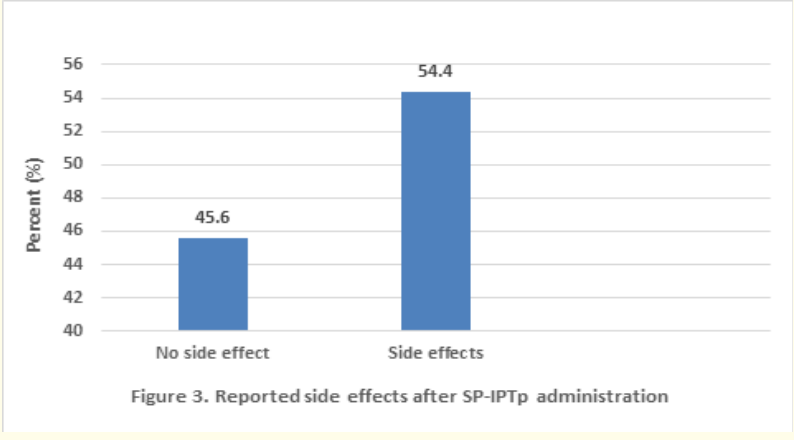

Figure 3: *Reported side effects after SP-IPTp administration.*

Of the 430 respondents, 240 (55.8%) thought there was nothing wrong with the DOT approach but did not give any reason. Of the 190 (44.2%) who gave reasons why DOT is good, the majority, 126 (66.3%) said they may not take the drug if given to them to administer at home (Figure 4).

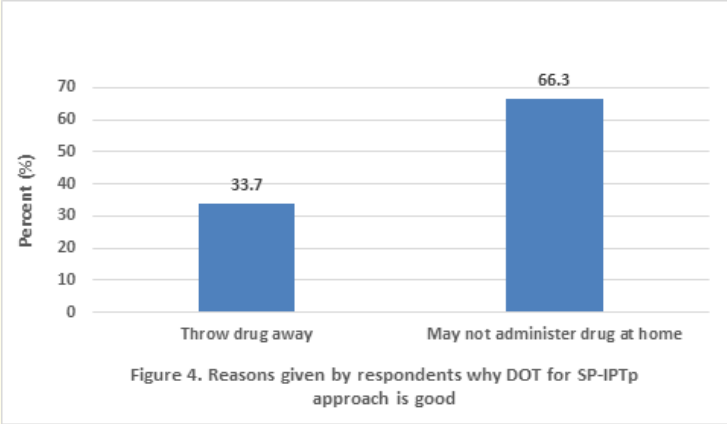

Figure 4: *Reasons given by respondents why DOT for SP-IPTp approach is good.*

Association between socio-demographic characteristics and the odds of high Knowledge on SP-IPTp

Table 2 shows that there was, a significant association between mother's educational level, occupation and knowledge about SP-IPTp ($\chi^2 = 15.12$, p = 0.002) and ($\chi^2 = 12.72$, p = 0.013) respectively.

Table 2 shows that mothers who were civil servants were 3.65 times more likely to have a high knowledge as compared to those who were unemployed [AOR = 3.65 (95% CI: 1.33, 9.99), p = 0.012]. Even though not statistically significant, mothers who were divorced were 5.48 times more likely to have a high knowledge as compared to those who were single [AOR = 5.48 (95% CI: 0.86, 34.84), p = 0.071]. Mothers who took SP during pregnancy were 2.36 times more likely to have a high knowledge as compared to those who did not [AOR = 2.36 (95% CI: 0.25, 22.26), p = 0.452]. Mothers who delivered their babies at the health centre were 0.37 times less likely to have a high knowledge as compared to those who delivered at home but, the difference was also not statistically significant [AOR = 0.37 (95% CI: 0.12, 1.13), p = 0.081].

	Knowledge on SP-IPTp					
Character-istic	**Low knowledge [N = 336] N (%)**	**High knowledge [N = 94] N (%)**	**Total [N = 430] N (%)**	**Chi-square (p-value)**	**COR (95% CI) p-value**	**AOR (95% CI) p-value**
Mother's age (years)						
< 20	27 (8.0)	3 (3.2)	30 (7.0)			
20-29	165 (49.1)	45 (47.9)	210 (48.8)		2.45 (0.71, 8.46) 0.155	1.45 (0.38, 5.48) 0.583
30-39	118 (35.1)	41 (43.6)	159 (37.0)		3.13 (0.90, 10.85) 0.073	1.58 (0.40, 6.31) 0.514
40-49	26 (7.7)	5 (5.3)	31 (7.2)	4.52 (0.210)	1.73 (0.37, 7.99) 0.482	0.73 (0.14, 3.91) 0.714

Education						
No formal education	57 (17.0)	11 (11.7)	68 (15.8)			
Primary	153 (45.5)	45 (47.9)	198 (46.0)		1.52 (0.74, 3.14) 0.255	1.29 (0.60, 2.80) 0.515
Secondary	92 (27.4)	27 (28.7)	119 (27.7)		1.52 (0.70, 3.30) 0.289	1.42 (0.63, 3.21) 0.399
Tertiary	34 (10.1)	11 (11.7)	45 (10.5)	15.12 (0.002)	1.67 (0.66, 4.28) 0.280	1.43 (0.51, 4.00) 0.494
Occupation						
Unemployed	73 (21.7)	11 (11.7)	84 (19.5)			
Farming	41 (12.2)	11 (11.7)	52 (12.1)		1.78 (0.71, 4.46) 0.219	1.57 (0.54, 4.52) 0.406
Trading	115 (34.2)	36 (38.3)	151 (35.1)		2.08 (0.99, 4.34) 0.52	1.68 (0.75, 3.76) 0.206
Artisanship	86 (25.6)	21 (22.3)	107 (24.9)		1.62 (0.73, 3.58) 0.233	1.22 (0.52, 2.88) 0.642
Civil servant	21 (5.3)	15 (16.0)	36 (8.4)	12.72 (0.013)	4.74 (1.89, 11.86) 0.001	3.65 (1.33, 9.99) 0.012
Marital status						
Single	55 (16.4)	9 (9.6)	64 (14.9)			
Married/ Co-habiting	277 (82.4)	82 (87.2)	359 (83.5)		1.81 (0.86, 3.82) 0.120	1.54 (0.68, 3.48) 0.299
Divorced	4 (1.2)	3 (3.2)	7 (1.6)	4.29 (0.117)	4.58 (0.88, 23.97) 0.071	5.48 (0.86, 34.84) 0.071
Religion						
Christianity	328 (97.6)	91 (96.8)	419 (97.44)			
Islam	8 (2.4)	3 (3.2)	11 (2.6)	0.19 (0.660)	1.35 (0.35, 5.20) 0.661	
Tribe						
Ewe	276 (82.1)	79 (84.0)	355 (82.6)			
Guan	60 (17.9)	15 (16.0)	75 (17.4)	0.18 (0.668)	0.87 (0.47, 1.62) 0.668	
Took SP during pregnancy						
No	10 (3.0)	0 (0.0)	10 (2.3)			
Yes	326 (97.0)	94 (100.0)	420 (97.7)	2.86 (0.091)	1.98 (0.24, 16.29) 0.526	2.36 (0.25, 22.26) 0.452
Number of Doses						
No dose	7 (2.1)	3 (3.2)	10 (2.3)			
1 - 2 doses	74 (22.0)	22 (23.4)	96 (22.3)		0.69 (0.16, 2.91) 0.617	0.70 (0.155, 3.12) 0.638
3 - 4 doses	193 (57.4)	43 (45.7)	236 (54.9)		0.52 (0.13, 2.09) 0.357	0.46 (0.11, 1.98) 0.296
> 4 doses	62 (18.5)	26 (27.7)	88 (20.5)	5.32 (0.150)	0.98 (0.23, 4.08) 0.976	1.01 (0.23, 4.59) 0.979
Socio-economic status						
Low socio-economic status	210 (62.5)	60 (63.8)	270 (62.8)			

High socio-economic status	126 (37.5)	34 (36.2)	160 (37.2)	0.06 (0.814)	0.94 (0.59, 1.52) 0.814	1.11 (0.62, 2.09) 0.943
Delivery location						
Home	52 (15.5)	16 (17.0)	68 (15.8)			
Hospital	235 (69.9)	73 (77.7)	308 (71.6)		1.01 (0.54, 1.87) 0.976	1.03 (0.50, 2.09) 0.943
Health center	49 (14.6)	5 (5.3)	54 (12.6)	5.74 (0.057)	0.33 (0.11, 0.97) 0.045	0.37 (0.12, 1.13) 0.081
Locality						
Urban	166 (49.4)	55 (58.5)	221 (51.4)			
Rural	170 (50.6)	39 (41.5)	209 (48.6)	2.44 (0.118)	0.69 (0.43, 1.01) 0.119	0.73 (0.43, 1.26) 0.261

Table 2: *Associations between background characteristics and the odds of high knowledge on SP-IPTp.*

Recommendations made by mothers for improving the SP-IPTp programme

Of the 430 respondents, 158 (37.4%) could not give any recommendation. Of the 272 that gave recommendations, the majority, 198 (72.8%) recommended that the SP-IPTp programme is good and should be continued (Figure 5).

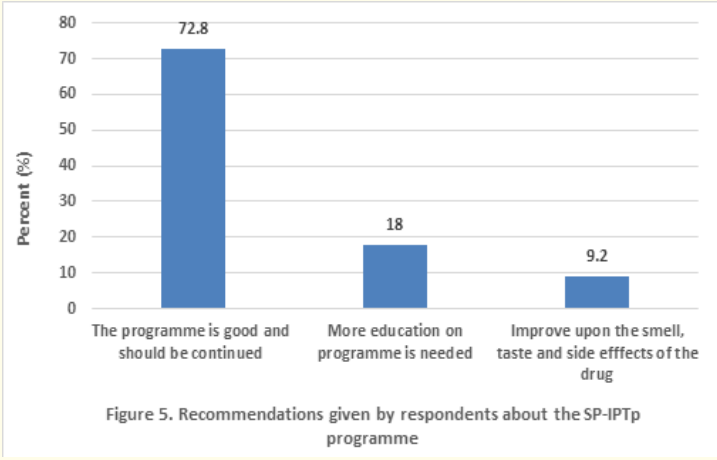

Figure 5: *Recommendations given by respondents about the SP-IPTp programme.*

Discussions

This study assessed the coverage of SP and the knowledge of mothers on SP-IPTp implementation as well as the factors associated with a high knowledge among 430 mothers with children under five years. This current study revealed that the coverage of SP-IPTp was 97.7%. This is higher than the 83% reported by the GDHS, 2014 [12]. A study conducted in Sekondi-Takoradi of Ghana between March and October 2010 revealed that only 57.8% of study pregnant women had received a dose of SP-IPTp [13]. A low coverage of 40% of SP-IPTp was also recorded in Western Nigeria [7]. The high coverage of SP-IPTp reported in this study could have been as a result of the DOT approach by the Midwives in the administration of the drug.

Direct observation by health workers is a way of ensuring SP-IPTp is taken by the pregnant woman. It makes it possible for proper recording and monitoring the number of doses and the timing of the administration of the drug. All participants who received SP-IPTp

stated that they took the drug under the supervision of a midwife. This is contrary to what was found in a study conducted in Tanzania [14] which reported that 40% of those who received SP at ANC did not swallow the tablets at the clinic because of sharing of cups or had not eaten. Another study showed that only 34.4% of pregnant women studied took SP under the supervision of a health worker [15]. In the current study, the participants highly praised the DOT approach as they stated that they may not adhere to the administration of the drug if they were to take it at home.

The current study reported some side effects associated with SP doses. It was found that dizziness, weakness, vomiting and nausea were the side effects experienced by the respondents, which is similar to other findings [16].

The findings from the current study indicated that a high knowledge on SP-IPTp was very low, 21.9%, which is similar to the 23.9% reported in Nigeria [17]. On the contrary, a study conducted in Uganda among women attending ANC reported higher knowledge (57%) on SP-IPTp [18]. The low knowledge on SP-IPTp reported in the current study could be due to the fact that the pregnant women did not receive sufficient information about the programme.

This current study showed that civil servants had 3.65 times more knowledge on SP-IPTp. This could be because civil servants are known to have attained higher educational levels and therefore have more access to different sources of information about the programme. Our findings also indicate that pregnant women who delivered at health centres were 0.37 times less likely to have a high knowledge about the SP-IPTp programme. This implies that there is not enough information about the SP-IPTp programme at the health centre level. It could also mean that the Midwives administering the drug may not be knowledgeable enough about the programme or they might have assumed that the pregnant women knew about the programme.

Limitations

Recall bias of mothers on information about the programme may have contributed to the low knowledge on the programme.

Conclusion and Recommendations

Knowledge of the SP programme was very low in the Hohoe Municipality. Despite the low knowledge, the coverage of SP-IPTp was very high as a result of the DOT approach. It is therefore important that the DOT approach in the administration of the drug be maintained. We also recommend that there should be more training for Midwives for them to regularly provide information about the SP-IPTp programme and not assume that pregnant women already have the information.

Availability of Data and Material

Available upon request.

Competing Interests

The authors declare that they have no competing interests.

Funding

None.

Authors' Contributions

MK and MO conceived the study, MK, MA, WT, WA, PP and WK did the data analysis and wrote the methods section. MK, MO, MA, WT, and ET and were responsible for the initial draft of the manuscript. All authors reviewed and approved the final version of the manuscript.

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