IAA Journal of Biological Sciences 12(1):20-31, 2024
©IAAJOURNALS
https://doi.org/10.59298/IAAJB/2024/121.2031.11

www.iaajournals.org
ISSN:2636-7254
IAAJB:121.2031.11

Assessment of Implementation of Malaria Control Strategies among Pregnant Mothers Attending Antenatal Care at Bumanya Health Centre IV in Kaliro District

Afaayo Benjamin

Faculty of Clinical Medicine and Dentistry Kampala International University Western Campus Uganda

ABSTRACT

Although a high proportion of pregnant women had an antenatal care (ANC) visit at least once during pregnancy, the coverage level of intermittent preventive treatment of malaria in pregnancy (IPTp-SP) and insecticide-treated bednets (ITNs) remains low in Sub-Saharan Africa. A hospital-based descriptive cross-sectional study was carried out. The outcome of the survey revealed that the majority of participants, 79%, were above 20 years old, with a mean (+/-SD) age of 25.6 (+/-SD) years. The survey also revealed that 62.67% of the participants knew about IPTp; the biggest number of participants (86.67%) reported utilizing IPTp during their current pregnancy, while 13.33% did not take IPTp. Occupation, gestational age, several ANC visits, and information about IPTp were significantly associated with IPTp uptake. The current study explored malaria IPTp uptake among pregnant women attending ANC at Bumanya HCIV. It established that an increased number of ANC visits, providing IPTp information to pregnant women, and the gestational age of pregnancy resulted in increased uptake of IPTp and thus reduced incidences of malaria cases.

Keywords: Pregnancy, Women, ANC, IPTp, Malaria, Gestational age.

INTRODUCTION

Malaria in pregnancy affects more than 25 million pregnant women every year, both in high- and low-malaria-endemic areas. Pregnancy is a period of increased vulnerability, even for those living in malaria-endemic areas who develop immunity against malaria [1, 2]. Therefore, malaria infection (especially with *Plasmodium falciparum*) during pregnancy remains a major public health problem, especially in sub-Saharan Africa [3]. The high burden of malaria in Africa is due to *P. falciparum*, which adapts and co-specializes with *Anopheles gambiae*, the most effective and widespread malaria [4–7]. The long lifespan and strong human-biting habit of the Anopheles species that carry malaria are the main reasons for the high incidence of malaria in Africa. Malaria can be prevented by avoiding mosquito bites and by taking medicines. Treatments can stop mild cases from getting worse [8, 9]. A characteristic infection of *Plasmodium falciparum* includes a process involving the accumulation of parasitized red blood cells (RBC) in various organs and organ systems. Pregnant women have a large amount of RBC accumulated in the intervillous spaces of the placenta. Many studies have been carried out to explain the preference for malaria parasite proliferation in the placenta, and the accumulation of brown malarial pigment was found in almost all cases of infected placenta examined. This may show placental infection even in the absence of peripheral parasitemia. Malaria infection during pregnancy may cause hepatosplenomegaly and megaloblastic changes in the bone marrow. Further during the labor and course of pregnancy, falciparum malaria may cause pyrexia and a heart attack in the mother, as well as intrauterine growth retardation (IUGR) and intrauterine death (IUD) in the developing fetus. Placental infection acquired during the high transmission season may persist for a long time in the placenta itself. It causes the clogging of intervillous spaces with macrophages. The extent of clogging incurred due to infection is directly proportional to the severity of the infection. Severe parasitization of the placenta causes congenital anemia, premature delivery, and stillbirth in newborns, which is primarily due to the decrease in maternal blood output and exchanges between mother and fetus [11, 12]. As malaria control was designated as one of the Millennium Development Goals, many countries have prioritized combating malaria as a public health issue. Many global health initiatives, such as the Global Fund or Roll Back Malaria, were established to fight malaria by collecting funds and scaling up malaria interventions. Many organizations and governments have seen substantial progress through well-implemented malaria prevention, treatment, and vector control [13]. Consequently, a considerable reduction in malaria morbidity and mortality has been observed. However, even though many malaria-endemic countries have achieved remarkable progress in malaria control, with some even succeeding in malaria elimination, malaria remains a major global public health concern [14]. In highly malaria-endemic countries such as Uganda, intermittent preventive treatment in pregnancy with SP (IPTp-SP) is recommended to prevent the adverse consequences of malaria on maternal and fetal outcomes. In 2012, the WHO updated its recommendations on IPT-SP and now requires that at least three doses of SP be given to all pregnant women at each scheduled antenatal care (ANC) visit,

starting as early as possible in the second trimester and given at one-month intervals [15]. In Uganda, the target is to have 93% of pregnant women receive at least two doses of SP during antenatal care (ANC) visits, and 80% receive at least three doses (optimal doses). The use of ITNs is also recommended for all pregnant women in malaria-endemic countries, and in Uganda, the Malaria Reduction Strategic Plan 2014–2020 set targets for 100% of the population, including pregnant women, to be distributed with ITNs and up to 85% to be sleeping under ITNs the previous night by the end of 2020 [15]. Despite these set national targets, the uptake of at least three doses (the optimal dose) of IPTp-SP in Uganda is low, at 18% [16]. Regarding ITN use, 90% of households owned at least one ITN, but 75% of pregnant women aged 15–49 reported having slept under an ITN the previous night, according to the latest malaria indicator survey [15]. Utilization of these interventions may be more challenging in rural districts of the country due to poor access to health facilities and a lack of information on these strategies [15]. This justifies the need to examine factors that could contribute to this underachievement. A review of the literature on factors associated with the utilization of these preventive measures in sub-Saharan Africa highlighted both health system-related factors (anti-malarial drug stockouts, limited safe water at ANC clinics, unavailability of skilled attendants, poor health personnel attitudes, and unavailability of ITNs) and individual factors (women's knowledge, pregnancy, and women's economic and social position and religious practices) [17]. However, there exists geographical variation (between country and in-country differences) in these predictors, thus justifying the need for this study. There is limited information on the assessment of the implementation of malaria control strategies among pregnant women attending ANC in rural Uganda. The eastern region of Uganda has one of the highest malaria prevalence rates in the country. Understanding factors that influence this implementation can increase the uptake of IPTp and ITNs during pregnancy and consequently reduce the malaria burden in Uganda. This study aimed to assess the implementation of malaria control strategies among pregnant women attending ANC at Bumanya Health Center IV in Kaliro district.

METHODOLOGY

Study Design

The study design was a hospital-based cross-sectional study.

Area of Study

The study was conducted at Bumanya HCIV, which serves the region of Bumanya, Bulamogi County, Kaliro District, Eastern Region, Uganda. It is a hospital for outpatients, and it provides ANC services.

Study Population

The study enrolled women of reproductive age.

Inclusion Criteria: All pregnant mothers who had at least one ANC visit before the interview consented.

Exclusion criteria: Registering for the first time in the facility and disabilities that disallow responses to the questionnaire

Estimation of the Sample

$n=z2p(1-p)/e2$

n= estimated minimum sample size requiredp= proportion of a characteristic in a samplez= 1.96 (for 95% confidence interval)

e= margin of error set at 5%

p= 37% (Kawungezi et al. [18])

$n= 1.96^2 \times 0.37(1 - 0.37)/0.05^2$

n=358 patients

Due to limited resources, I limited my sample size to 73 patients.

Sampling Technique

The simple random sampling technique was applied; mothers were given numbers randomly, and all those with odd numbers were chosen. The process was repeated on other consecutive days while switching between even and odd numbers on different days until the required number was acquired.

Data collection instruments

Respondents were interviewed using structured questionnaires. The researcher subjected the questionnaires to eligible consenting individuals to generate the data.

Data Analysis

Data was coded, cleaned, and entered into the computer using Microsoft Excel, and then analyzed using SPSS version 20. Descriptive statistics were presented in the form of frequency tables, charts, and graphs.

Quality Control

Data collection tools were pre-tested outside the study area to ensure accuracy and consistency. Data collection tools were checked for completeness and accuracy and stored safely after each field day. The chief researcher gave training to the data collectors a week prior to the study.

Ethical consideration

A letter of introduction was obtained from the Dean of the Faculty of Clinical Medicine and Dentistry and endorsed by IREC Kampala International University, Western Campus, which was taken to the district health officer (DHO) and a copy to the hospital director, Bumanya HCIV. Informed consent was sought from each respondent (consent forms will be attached). The participants were informed that the information they gave was confidential, and they were

allowed to withdraw from the study at any stage in case they felt so. They were also informed that their refusal or withdrawal did not have any punitive consequences for their health services-seeking rights.

RESULTS

Individual factors

A total of 73 pregnant women were interviewed. All women were in the reproductive age group between 15 and 48 years old. The mean (+/-SD) age of the respondents was 25.6 (+/-6.5) years, with a median age of 24 years. Most of the respondents (30.7%) had attained a secondary level of education, 26% had a primary education level, and a few made it to the university. Catholics (33%), Anglicans (26.7%), and Muslims (22.7%) were the main religious dominions. The majority, 65.3% of the participants, are currently not married. Most of the respondents, 65%, were students or unemployed. The majority of the respondents had attained 1 parity or more.

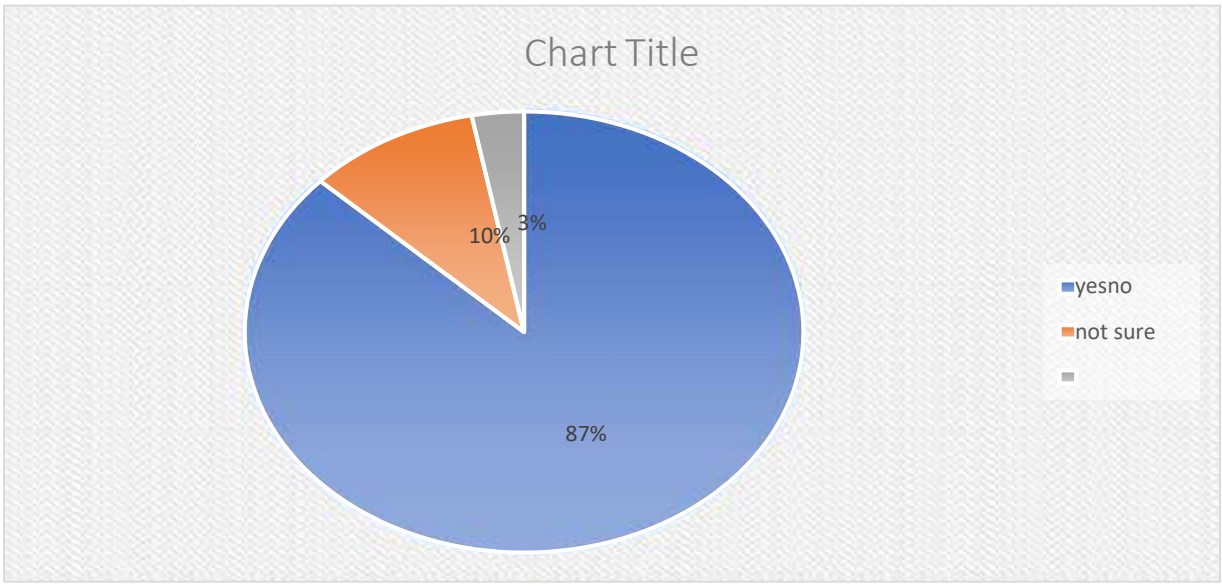
Table 1: Individual factors

Variable	Category	Frequency (n)	Percentage (%)
Age	15-19	16	21.3
	20-24	22	29.3
	25-29	19	25.3
	Above 29	18	24
Education level	None	10	13.3
	Primary	20	26.7
	Secondary	23	30.7
	Post-secondary	22	29.3
Religion	Catholic	25	33.3
	Anglican	20	26.7
	Muslim	17	22.7
	Others	13	17.3
Marital status	Single	24	32.9
	Married	32	43.8
	Cohabiting	17	23.3
Parity	0	1	1.92
	1	21	40.4
	2	12	23.1
	3+	18	34.6
	Unemployed	42	56
	government/non-government employment	14	18.7
	Self-employment	19	25.3

Uptake of IPT

Most of the participants (87%) took IPTp as shown in Figure 1 below.

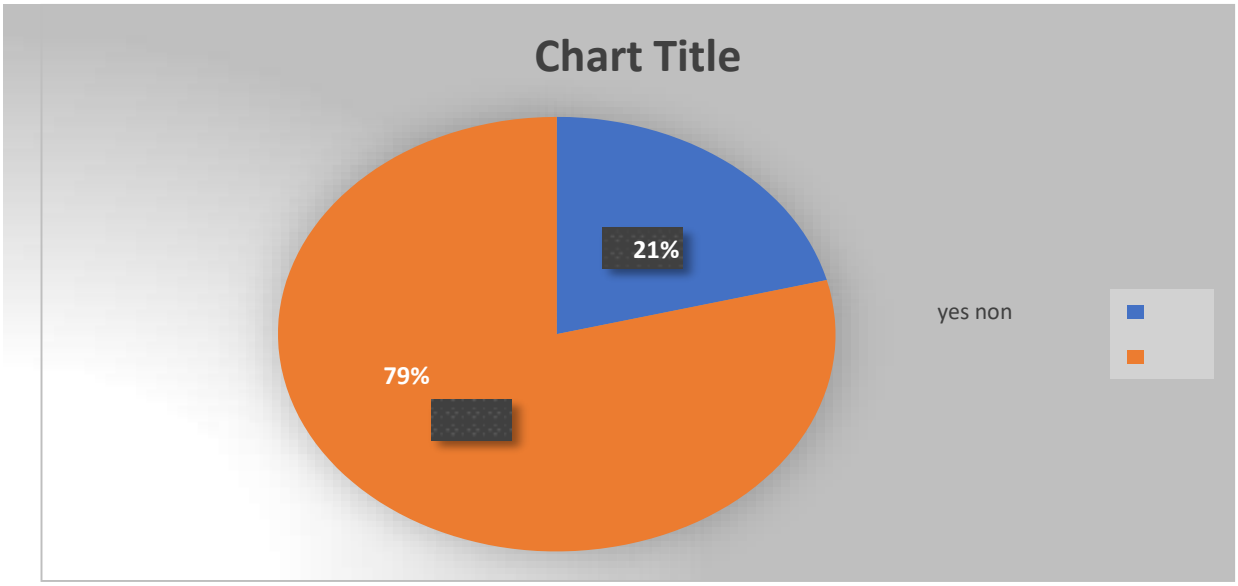
Figure 1: Participants that took IPTP



Side effects

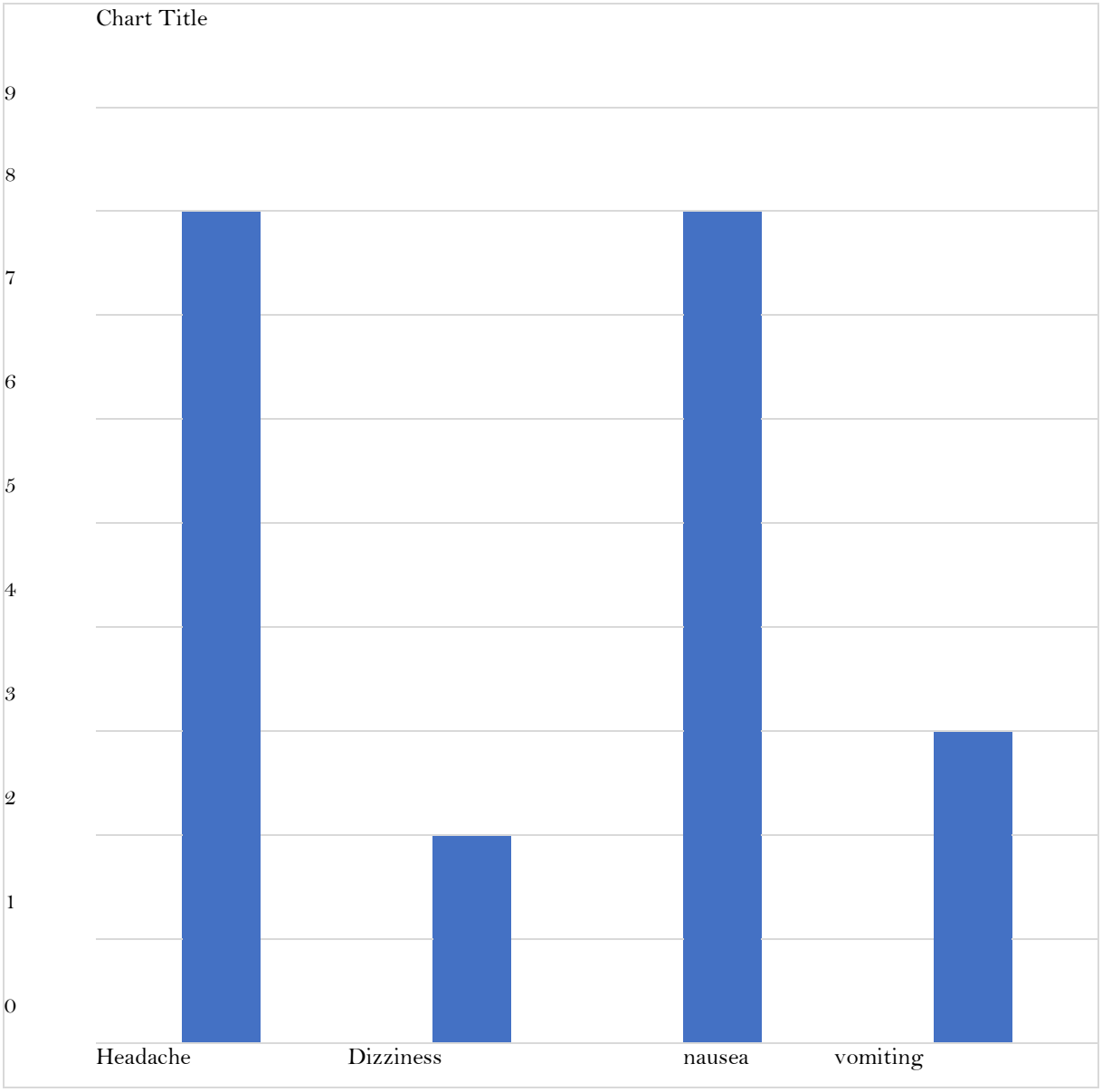
Only 21% of the participants reported to have experienced side effects after taking IPTp as shown in Figure 2 below

Figure 2: participants reported to have experienced side effects after taking IPTp



Frequently reported side effects of IPTp as shown in figure 3 below, the most frequent were headache and nausea.

Figure 3: Frequently reported side effects of IPTp



Frequency of sleeping under nets for the last month

Majority of participants slept under nets only some nights as shown in figure 6 below.

Figure 4: participants that slept under nets only some nights

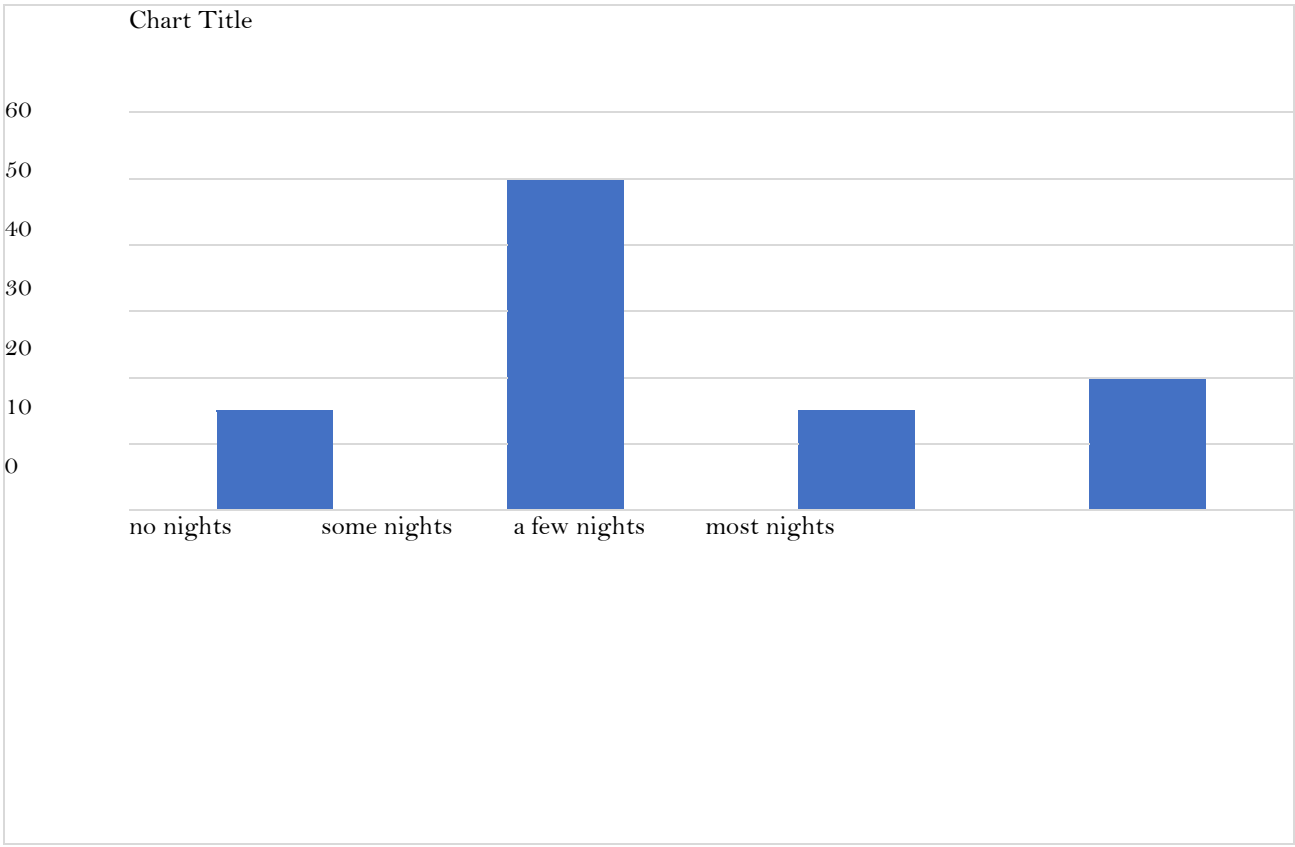


Table 2: Uptake of malaria IPTp

Variable	Category	Uptake of malaria IPTp	
		Yes (%)	No (%)
Age	15-19	14(87.5)	2(12.5)
	20-24	20(90.9)	9(9.1)
	25-29	17(89.5)	2(10.5)
	Above 29	14(82.3)	3(17.7)
Education level	None	8(80.0)	2(20.0)
	Primary	17(85.0)	3(15.0)
	Secondary	19(82.6)	4(17.4)
	Post-secondary	21(95.40	1(4.6)
Religion	Catholic	24(96.0)	1(4.0)
	Anglican	16(80.0)	4(20.0)
	Muslim	16(94.1)	1(5.9)
	Others	9(69.2)	4(30.8)
Marital status	Single	20(90.9)	2(9.1)
	Married	37(88.1)	5(11.9)
	Cohabiting	8(72.7)	3(27.3)
Parity	0	21(87.5)	3(12.5)
	1	20(95.2)	1(4.8)
	2	11(91.7)	1(8.3)
	3+	13(72.2)	5(27.8)
Occupation	Unemployed	37(88.1)	56
	government/non government employment	12(85.7)	
	Self-employment	16(84.2)	3(15.8)
Pregnancy age (weeks)	0-13	1(33.3)	2(66.7)
	14-26	23(82.1)	5(17.9)
	27-40	41(93.2)	3(6.8)
Timing of first ANC (months)	1	28(84.8)	5(15.2)
	2	21(91.3)	2(8.7)

	3	10(100.0)	0(0.0)
	4	3(60.0)	2(40.0)
		1(100.0)	0(0.0)
		2(60.7)	1(33.3)
Number of ANC visit	1	4(50.0)	4(50.0)
	2	19(82.6)	4(17.4)
	3	17(94.4)	1(5.6)
	More than 3	25(96.1)	1(3.9)
Information about IPT	No	21(75.0)	7(25.0)
	Yes	44(93.6)	3(6.4)
Knowledge about pregnancy-related dangers of malaria	I don't know any danger	1(100.0)	0(0.0)
	Knows single danger	19(90.5)	2(9.5)
	Knows two dangers	13(72.2)	5(27.8)
	Knows three dangers	32(91.4)	3(8.6)

Drug availability

Most of the participants had taken 1 or 2 doses of Fansidar, however, most (83%) of them reported the drugs were not always available at the health facility as shown in Figure 4 and Figure 5.

Figure 5: Participants that reported about the availability of fansidar at the health facility.

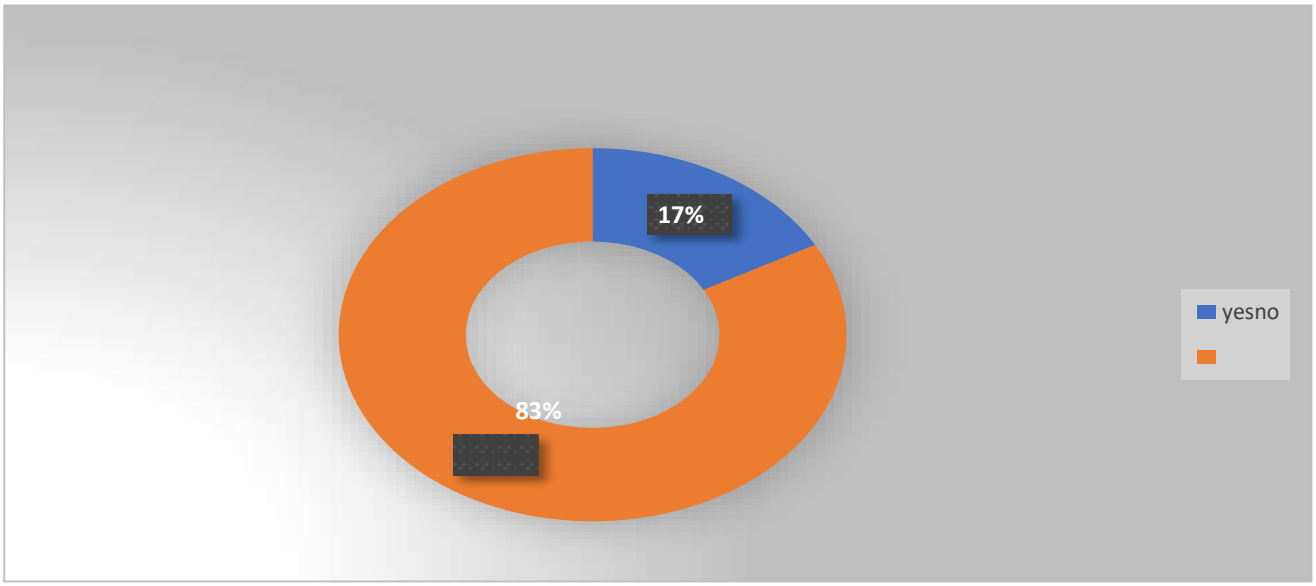


Figure 6 Availability of safe drinking water

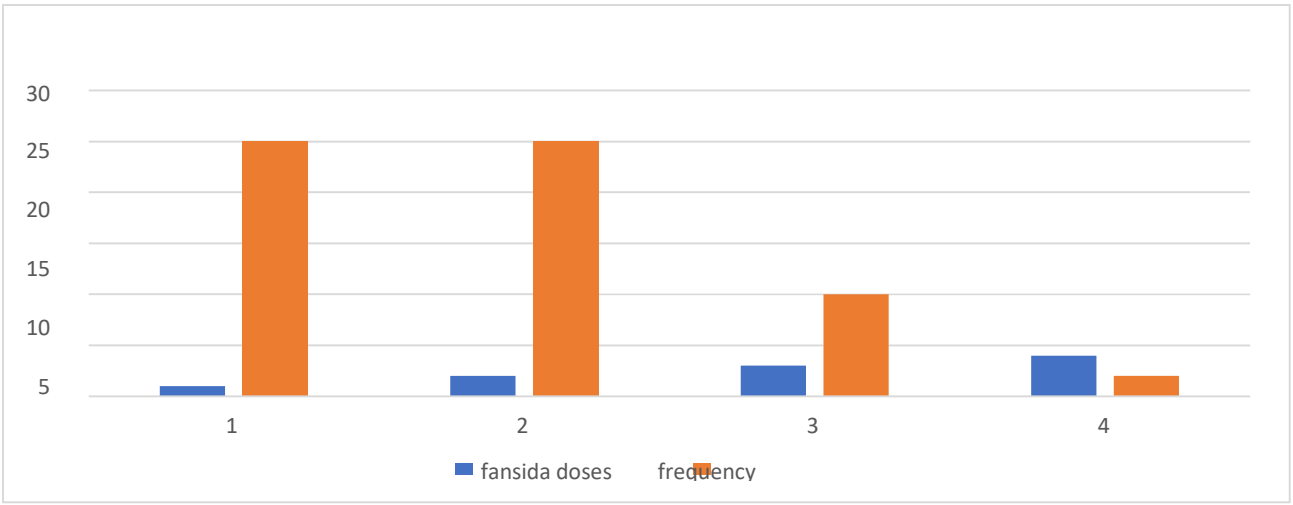
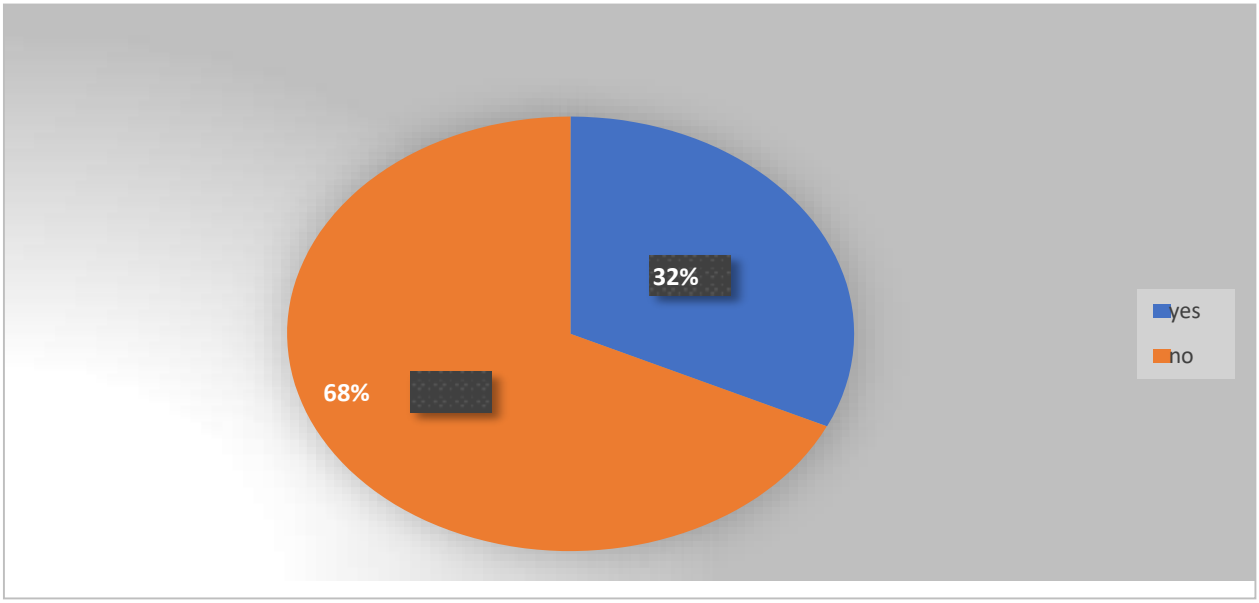


Figure 7: scarcity of drinking water at the facility with 68% participants' not able swallow the medication due to lack of water at the facility.



DISCUSSION

A cross-sectional survey was carried out to explore the extent of malaria control strategy uptake and associated factors among pregnant women attending Bumanya HCIV. The outcome of the survey revealed that the majority of participants, 79%, were above 20 years old, with a mean (+/-SD) age of 25.6 (+/-SD) years. This demonstrates that most respondents were mature people and would thus get pregnant. The survey also revealed that 62.67% of the participants knew about IPT, the ways malaria is transmitted, and the main complications of malaria in pregnancy. This could be a result of the fact that most of the participants had attained secondary level education and above, and hence they could have attained knowledge from the basic secondary curriculum. In addition to this, all the participants had attained at least 1 ANC visit, and yet most were attended to by trained health professionals (mainly midwives) that are trained to provide such information to the patients. The malaria knowledge about its complications is in line with the study done by Bachmann et al. [19]. The largest number of participants (86.67%) reported utilizing IPTp during the current pregnancy, although some 21% reported getting side effects after taking IPTp. Those who reported having side effects reported headaches and nausea as the main side effects. This is also documented in most books of pharmacology, and it is also in line with a study done by Hill et al. [20] who found that the side effects of medication used in IPTp were a hindrance to taking the medicine. However, 13.33% of the participants who missed IPTp gave reasons for drug stockouts and reporting late for their first antenatal visit. Most of the participants had taken 1 to 2 doses of fansida because many of them were in the 2nd ANC visit and hence could not have received more than 2 doses of fansida. This is in line with the WHO recommendations that all pregnant women should receive at least 3 doses of fansida starting as early as possible in the second trimester [3]. Occupation, gestational age, several ANC visits, and information about IPTp were significantly associated with IPTp uptake [21-22]. This is in line with the study done by Muhumuza et al. [17].

CONCLUSION

The current study explored malaria IPTp uptake among pregnant women attending ANC at Bumanya HCIV established that an increased number of ANC visits, providing IPTp information to pregnant women, and the gestational age of pregnancy resulted in increased uptake of IPTp and thus reduced incidences of malaria cases.

RECOMMENDATION

The Ministry of Health should continue to maintain the IPTP programs in all health facilities with antenatal services. All pregnant women should be tested for malaria on every antenatal visit, and long-lasting insecticide-treated mosquito nets should be provided. Health education talks to mothers during antenatal should aim at providing information on IPTp use.

REFERENCES

1. Obeagu, E. I., Obeagu, G. U., Ezeonwumelu, J. O. C., Alum, E. U. and Ugwu, O. P. C. Antioxidants and Pregnancy: Impact on Maternal and Fetal Health. *Newport International Journal of Biological and Applied Sciences*. 2023; 4 (1):17-25. https://doi.org/10.59298/NIJBAS/2023/1.3.11111
2. Alum, E. U., Ugwu, O. P. C., Obeagu, E. I., Aja, P. M., Ugwu, C. N., Uti, D. E., Samson, A. O., and Akinloye, D. I. Nutritional Requirements During Pregnancy: A Comprehensive Overview. *International Journal of Innovative and Applied Research*. 2023; 11(12):26-34. Article DOI: 10.58538/IJIAR/2058 DOI URL**:** http://dx.doi.org/10.58538/IJIAR/2058
3. Kapisi, J., Kakuru, A., Jagannathan, P., Muhindo, M. K., Natureeba, P., Awori, P., Nakalembe, M., et al. Relationships between infection with Plasmodium falciparum during pregnancy, measures of placental malaria, and adverse birth outcomes. Malaria Journal. 2017 Oct;16(1):400. DOI: 10.1186/s12936-017-2040-4.
4. Ekpono, E. U., Aja, P. M., Ibiam, U. A., Alum, E. U., & Ekpono, U. E. Ethanol Root-extract of Sphenocentrum jollyanum Restored Altered Haematological Markers in Plasmodium berghei-infected Mice. *Earthline Journal of Chemical Sciences*. 2019;*2*(2):189-203. https://doi.org/10.34198/ejcs.2219.189203.
5. Egwu, C. O., Aloke, C., Chukwu, J., Agwu, A., Alum, E., Tsamesidis, I, et al. A world free of malaria: It is time for Africa to actively champion and take leadership of elimination and eradication strategies. Afr Health Sci. 2022 Dec;22(4):627-640. doi: 10.4314/ahs.v22i4.68.
6. Egwu, C. O., Aloke, C., Chukwu, J., Nwankwo, J. C., Irem, C., Nwagu, K. E., et al. Assessment of the Antimalarial Treatment Failure in Ebonyi State, Southeast Nigeria. J Xenobiot. 2023 Jan 3;13(1):16-26. doi: 10.3390/jox13010003.
7. Obeagu, E. I., Alum, E. U. and Ugwu, O. P. C. Hepcidin: The Gatekeeper of Iron in Malaria Resistance NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES. 2023;4(2):1-8. https://doi.org/10.59298/NIJRMS/2023/10.1.1400
8. Kungu, E., Inyangat, R., Ugwu, O.P.C. and Alum, E. U. (2023). Exploration of Medicinal Plants Used in the Management of Malaria in Uganda. NEWPORT INTERNATIONAL JOURNAL OF RESEARCH IN MEDICAL SCIENCES 4(1):101-108. https://nijournals.org/wp-content/uploads/2023/10/NIJRMS-41101-108-2023.docx.pdf
9. Obeagu, E. I., Alum, E. U. and Ugwu, O. P. C. Hepcidin's Antimalarial Arsenal: Safeguarding the Host. NEWPORT INTERNATIONAL JOURNAL OF PUBLIC HEALTH AND PHARMACY. 2023;4(2):1-8. https://doi.org/10.59298/NIJPP/2023/10.1.1100
10. Adehin, A., Igbinoba, S. I., Soyinka, J. O., Onyeji, C. O., Babalola, C. P., & Bolaji, O. O. Pharmacokinetic parameters of quinine in healthy subjects and in patients with uncomplicated malaria in Nigeria: analysis of data using a population approach. *Current Therapeutic Research*, 2019; *91*, 33-38.
11. Ifeanyi, O. E., Chibunna, O. M., Braxton, N. A. Q., & Uche, E. C. Impact of Plasmodium falciparum malaria and hookworm infection on anaemia among pregnant women of ikwuano local government area, Abia state, Nigeria. *Int J Curr Microbiol Appl Sci*, 2014; *3*(1), 104-11.
12. Maniga, J. N., Rael, M., Bwogo, P., Ntulume, I., Tibyangye, J., Atiku, S. M., ... & Mong'are, S. In-vivo efficacy profiles of plasmodium falciparum to Artemether-Lumefantrine, the recommended first-line treatment of uncomplicated Malaria in Kisii County

Kenya. South Asian Journal of Parasitology, 2021; 5(4): 114-128
13. Steketee, R. W., Choi, M., Linn, A., Florey, L., Murphy, M., & Panjabi, R. WorldMalaria Day 2021: Commemorating 15 Years of Contribution by the United States President's Malaria Initiative. The American Journal of Tropical Medicine and Hygiene, 2021; 104(6), 1955.
14. Okorie, H. M., Obeagu, E. I., Obarezi, H. C., & Anyiam, A. F. Assessment of some inflammatory cytokines in malaria infected pregnant women in Imo State Nigeria. *International Journal of Medical Science and Dental Research*, 2019; *2*(1), 25-36.
15. Wafula, S.T., Mendoza, H., Nalugya, A. *et al.* Determinants of uptake of malaria preventive interventions among pregnant women in eastern Uganda. *Malar J.* **20**, 5 (2021). https://doi.org/10.1186/s12936-020-03558-1
16. Okethwangu, D., Opigo, J., Atugonza, S., Kizza, C. T., Nabatanzi, M., Biribawa, C., Kyabayinze, D., & Ario, A. R. Factors associated with uptake of optimal doses of intermittent preventive treatment for malaria among pregnant women in Uganda: Analysis of data from the Uganda Demographic and Health Survey, 2016. Malaria Journal, 18(1), 1–8. https://doi.org/10.1186/S12936-019-2883-Y/TABLES/2.
17. Muhumuza, E., Namuhani, N., Balugaba, B. E., Namata, J., & Kiracho, E. E. Factorsassociated with use of malaria control interventions by pregnant women in Buwunga subcounty, Bugiri District. Malaria Journal, 2019; 15(1), 1–8. https://doi.org/10.1186/S12936-016-1407-2/TABLES/4.
18. Kawungezi, P. C., AkiiBua, D., Aleni, C., Chitayi, M., Niwaha, A., Kazibwe, A., Sunya, E., Mumbere, E. W., Mutesi, C., Tukei, C., Kasangaki, A., & Nakubulwa, S. Attendance and Utilization of Antenatal Care (ANC) Services: Multi-Center Study in Upcountry Areas ofUganda. Open Journal of Preventive Medicine, 2015; 5(3), 132. https://doi.org/10.4236/OJPM.2015.53016.
19. Bachmann A, Bruske E, Krumkamp R, Turner L, Wichers JS, Petter M, et al. Controlled human malaria infection with *Plasmodium falciparum* demonstrates impact of naturally acquired immunity on virulence gene expression. PLoS Pathog. 2019; 15(7): e1007906. https://doi.org/10.1371/journal.ppat.1007906
20. Hill, J., Kayentao, K., Touré, M., Diarwara, S., Bruce, J., Smedley, J., Doumbo, O. K., Ter Kuile, F. O., & Webster, J. Effectiveness of Antenatal Clinics to Deliver Intermittent Preventive Treatment and Insecticide Treated Nets for the Control of Malaria in Pregnancy in Mali: A Household Survey. PLOS ONE, 2014; 9(3), e92102.https://doi.org/10.1371/JOURNAL.PONE.0092102.
21. Ugwu, O. P., Nwodo, O. F., Joshua, P. E., Odo, C. E., Bawa, A., Ossai, E. C., & Adonu, C. C. Anti-malaria and hematological analyses of ethanol leaf extract of Moringa oleifera on malaria infected mice. *International Journal of Pharmacy and Biological Science*, 2013 *3*(1), 360-371.
22. Ugwu, O. P. C., Nwodo, O. F. C., Joshua, P. E., Odo, C. E., Ossai, E. C., & Aburbakar, B. Ameliorative effects of ethanol leaf extract of Moringa oleifera on the liver and kidney markers of malaria infected mice. *International Journal of Life Sciences Biotechnology and Pharma Research*, 2013 *2*(2), 43-52.

CITE AS: Afaayo Benjamin (2024). Assessment of Implementation of Malaria Control Strategies among Pregnant Mothers Attending Antenatal Care at Bumanya Health Centre IV in Kaliro District. IAA Journal of Biological Sciences 12(1):20-31. https://doi.org/10.59298/IAAJB/2024/121.2031.11