Research Paper

PRECEDE Model in the Management of Uncomplicated Malaria among Facility-Based Primary Healthcare Workers in Surulere, Lagos Nigeria

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ABSTRACT
Background: *Malaria is a disease of global public health concern. Nigeria's contribution to the 409,000 estimated deaths globally in 2019 was 23%. Malaria control requires effective malaria case management guidelines. Adherence and non-adherence to recommended guidelines may be associated with variouscomplexities that impact on the healthcare worker's management practices. The study aimed to use PRECEDE model to assess the management of uncomplicated malaria among facility-based primary health care workers.*
Methodology: *A descriptive cross-sectional study that adopted a structured, self-administered questionnaire and the multistage sampling technique.*
Results: *The knowledge, attitude and self-efficacy components of these healthcare workers were good. (>85%). However, the reinforcing and enabling factors were poor. The p-value for reinforcing and enabling factors were statistically significant at p = 0.03 and p = 0.01 respectively.*
Conclusion: *The PRECEDE model is a suitable universal tool to evaluate reasons for adherence and non-adherence from a public health perspective.*
Keywords:
Health care workers, PRECEDE, uncomplicated malaria management, predisposing factors, reinforcing factors, enabling factors.

I. INTRODUCTION

Malaria is a widespread communicable disease of public health concern. It is an acute, life threatening vector-borne disease caused by parasites of the genus *Plasmodium*. There are five (5) species known to cause malaria in the human population via transmission through the infected female *Anopheles* mosquito with *Plasmodium falciparum* and *Plasmodium vivax* posing the greatest threat to at least three (3) billion susceptible

people of the global population living in the tropical areas of the affected countries and territories most at risk of malaria transmission. According to the World Health Organization (WHO), *Plasmodium falciparum* is most prevalent in the WHO African region whilst *Plasmodium vivax* is most prevalent in the WHO Region of the Americas (Peletiri, 2013; WHO, 2015; Yir-Erong et al., 2018).

According to the World Malaria Report (2020), the world experienced 229 million cases of malaria, with as many as 409,000 estimated deaths globally in 2019. Most of the morbidity and mortality associated with malaria occurred in sub-Saharan Africa as the region, which constitutes the WHO African region, had 94% of the global burden of malaria cases and deaths (WHO, 2020). Malaria is endemic in 91 countries and territories globally and 43 countries in sub-Saharan Africa currently (Maduka, 2018). Thus, the burden of malaria remains a great public health challenge to many African countries.

Nigeria is the most populated African country with an estimated population placed at 206,139,589 as at mid-year of 2020 according to data from the United Nations (UN). This is equivalent to 2.64% of the total world population (Worldometer, 2021). Nigeria contributed about 23% to the malaria mortality cases globally out of the 91 countries and territories worldwide. This is worrisome as it means Nigeria is solely and proportionately responsible for a significant one-quarter of the global deaths (WHO, 2020). In Nigeria, *Plasmodium falciparum* is the most common *Plasmodium* species implicated in malaria transmission (Omola & Onademuren, 2010). The Federal Ministry of Health (FMOH) in Nigeria has estimated that 30% of the populace habitually resided in areas of high malaria transmission intensity and 67% in areas of moderate transmission intensity. Hence, it can be inferred that 97% of Nigerians, in terms of population, are at risk of being infected with malaria. Malaria is noted to be responsible for about 60% of outpatient visits to healthcare facilities and 30% of inpatient admission or hospitalization. Uncomplicated malaria is usually managed on outpatient basis at healthcare facilities whilst severe malaria usually requires hospitalization during malaria case management (Bamiselu et al., 2016; FMOH, 2014; Jimam et al., 2019).

Various initiatives and programmes in recent decades have sought to reduce malaria mortality and morbidity through effective malaria control tools that have included deliberate preventive intervention measures and curative case management tools to combat the disease malaria. Effective case management via prompt and accurate diagnosis remains a vital component and essential strategy in achieving malaria control in sub-Saharan Africa. The World Health Organization (WHO) in 2001 recommended the use of the artemisinin-based combination therapy (ACT), not monotherapy agents, as the first-line antimalarial drug of choice for the treatment of uncomplicated malaria (Ezenduka et al., 2014; Yakassai et al., 2015). In Nigeria, according to the FMOH's 2014 National Malaria Programme Guidelines, ACT is the first line antimalarial drug for the treatment of uncomplicated malaria. The first line drug is artemether-lumefantrine (AL) while the alternate drug of choice is artesunate-amodiaquine (AA). Recommended ACTs should only be prescribed and/or dispensed only after parasitological confirmation of presumptive clinical diagnosis via rapid diagnostic kits (RDTs) or light microscopy(FMOH, 2015; WHO, 2015).

A study showed that out of the seven (7) major barriers that posed as great challenges to achieving effective malaria control in Nigeria and thus, by extension, uncomplicated malaria management in healthcare facilities, four (4) were attributable to healthcare workers practices. These included clinical diagnostic inadequacies, medical laboratory diagnostic inadequacies, therapeutics inadequacies and drug resistance due to irrational drug use and polypharmacy (Peletiri, 2013). Another study showed sub-optimal levels of healthcare workers' knowledge in the diagnostic and prescription practices of the management as evidenced by presumptive diagnoses alone and irrational prescription practices of monotherapy and polypharmacy(Jimam & Ismail, 2019). Apart from insufficient theoretical knowledge, public health practitioners should evaluate the variousecological factors that may be implicated in the behavioural practices of healthcare workers in the case management of uncomplicated malaria. In primary health care settings, the complexities of intrapersonal (knowledge, attitude and self-efficacy), interpersonal (job satisfaction, peer relationships, communication and support systems), cultural (social and professional norms), institutional (resource availability of RDTs/ACTs, training and professional development, organizational supervision, protocols, policies and support) and health policy factors (public policy and guidelines at national, state and local government levels) may influence these healthcare workers uncomplicated malaria case management practices.

There have been limited studies and paucity of data on the use of valid ecological models in the assessment of primary healthcare worker's intrapersonal, interpersonal, organisational, institutional, environmental and policy contexts of health behaviour that contribute to theiradherence and non-adherence to the current national malaria guidelines in the management of uncomplicated malaria at primary health care facilities in Nigeria.

II. LITERATURE/THEORETICAL UNDERPINNING

The studysought to use the PRECEDE (**P**redisposing, **R**einforcing and **E**nabling **C**onstructs in **E**ducational **D**iagnosis and **E**valuation) model to assess the predisposing, enabling and reinforcing factors

relating to uncomplicated malaria and its management among facility-based primary healthcare workers in Surulere, Lagos State, Nigeria as well as to understand the multiple and interacting determinants of these health management behaviours. The PRECEDE framework was first developed and introduced in the 1970s by Lawrence W. Green and Marshall W. Krueter. PRECEDE is based on the premise that, just as a medical diagnosis precedes a treatment plan, an educational diagnosis of a problem of socio-cultural construct is very essential before developing and implementing the intervention plan.

The predisposing and enabling factors are antecedents to behavioural change whilst the reinforcing factors serve as an incentive system to further encourage sustenance of positive behavioural change.Predisposing factors include knowledge, attitudes, beliefs, personal preferences, existing skills and self-efficacy towards the desired behaviour of change. Reinforcing factors include social support, peer influence, economic rewards and changing social norms. Enabling factors are health-related skills or physical factors such as availability and accessibility of health resources or services that facilitate motivation to change behaviour.

The PRECEDE model as a diagnostic tool may be useful to enhance behaviour and facilitators, anticipate and mitigate against potential barriers experienced by facility-based health care workers in order to improve the quality of care provided by these healthcare workers thereby setting the attainment of quality of life as the ultimate goal.
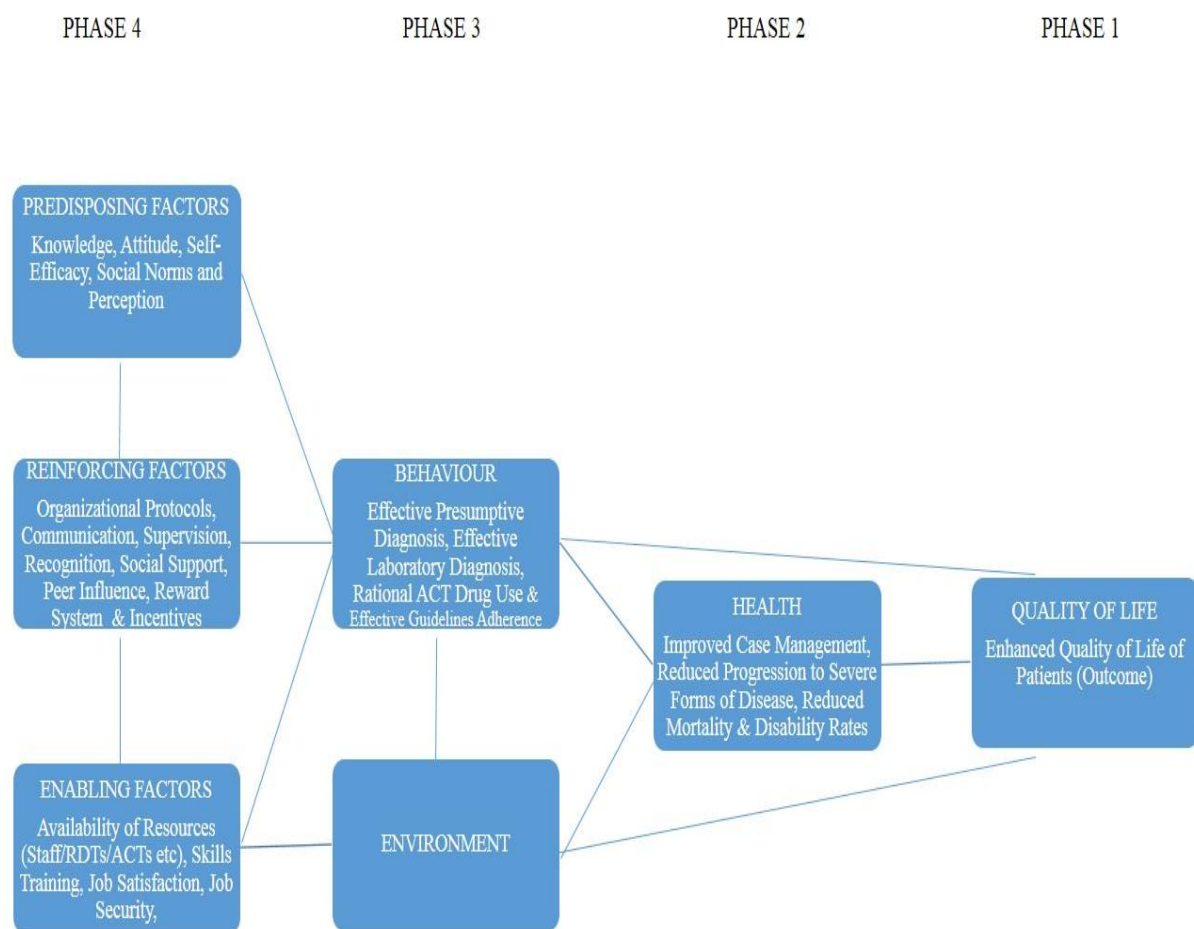

FIGURE 1: PRECEDE MODEL CONCEPTUAL FRAMEWORK ADOPTED BY RESEARCHER FOR THE STUDY.

III.   METHODOLOGY

The research adopted a descriptive cross-sectional study design to assess the impact of predisposing (knowledge, attitude and self-efficacy), reinforcing and enabling factors relating to uncomplicated malaria and its management among facility-based primary health care workers in Surulere, Lagos State, Nigeria. The study was carried out in Surulere Local Government Area of Lagos State in southwestern Nigeria. The study population consisted of facility-based primary health care workers working to provide health services within

Surulere Local Government Area. An eligible facility-based health care worker was a worker that offered uncomplicated malaria management in either private or public primary health care facilities. These included the medical doctors, nurses, pharmacists, pharmacy technicians, medical laboratory scientists, laboratory technicians and community health extension workers.

A calculated sample size of 152 health care workers. A multistage sampling technique was adopted.In stage 1, stratified sampling technique was used to stratify the facilities into public and private primary health care health care facilities. In stage 2, simple random sampling was employed to select private and public primary health facilities. In stage 3, simple random sampling was used to select the health care workers involved in the management of uncomplicated malaria, that were willing to participate in the study, at these primary health care facilities.

A structured, self-administered questionnaire was adopted as the research instrument used to gather data and collect necessary information from the study respondents. The research instrument comprised four sections; these included respondents' socio-demographic characteristics, respondents' predisposing factors characteristics, respondents' reinforcing factors characteristics and respondents' enabling factors characteristics. There were 147 respondents who completed the study.

Permission to conduct the study was obtained from the Babcock University Health Research Ethics Committee. The purpose and objectives of the study were explained to therespondents, their consent was obtained and confidentiality assured.

IV. RESULTS/FINDINGS

These include the respondent's socio-demographic characteristics, respondent's pre-disposing factors (knowledge, attitude and self-efficacy) towards health care workers behavioural practices, enabling factors that promote or inhibit adherent practices among health care workers and reinforcing factors enhancing or mitigating against adherent practices to national malaria guidelines. Three hypotheses were tested for statistical significance. One hundred and fifty two (152) questionnaires were administered and one hundred and forty seven (147) questionnaires were completely and correctly filled. The responses rate was 96.71%. Data analyses were based on these 147 healthcare workers who participated as respondents.

The socio-demographic characteristics of the respondents are summarized in Table 1. The mean age of the respondents was 33.52 ± 0.832 years. These health workers were drawn from both public and private primary health care facilities, in a ratio approximation of 2 to 1 (private - 66.0%; public - 34.0%). The majority of health care workers interviewed were females (61.2 %) and married (63.3%). More than 80% of the respondents had a level of experience below 15 years while less than 20 % had level of experience above 15 years. Over half of the respondents were of Yoruba ethnicity probably due to the study being conducted in the Yoruba dominated south west region of Nigeria. Almost three-quarters (73.5%) of the respondents were affiliated with Christianity.

The respondents' knowledge, attitude and self-efficacy percentage correct responses towards management of uncomplicated malaria were generally good as seen in Table 3, Table 4 and Table 5 respectively. The knowledge section assessed cause, transmission, symptoms, diagnosis and recommended antimalarial drugs. The attitude section showed the respondents'attitudes were generally positive based on their responses to the attitudinal items. The results also showed that the respondents' self-efficacy to their patients were good.

Table 1: Respondents' Socio-demographic Characteristics

	Frequency(n)	Percentage (%)
Age Group (Years)		
(Mean = 33.52 + 0.832)		
≤ 20	0	0
21-30	38	25.9
31 -40	74	50.3
41-50	28	19.0
51-60	6	4.1
>60	1	0.7
Gender Distribution		
Male	57	38.8
Female	90	61.2
Marital Status		
Single	47	32.0
Married	93	63.3
Divorced/Separated	4	2.7
Widowed	3	2.0
Tribe		
Yoruba	82	55.8
Igbo	44	29.9

Hausa	5	3.4
Others	16	10.9
Religion		
Christianity	108	73.5
Islam	39	26.5
Traditional	0	0
Others	0	0

Table 2: Respondents' Occupational Demographic Characteristics

	Frequency(n)	Percentage (%)
Occupation		
Medical Doctor	51	34.7
Pharmacist/Pharmacy Technician	22	15.0
Medical Laboratory Scientist/Technician	14	9.5
Nurse	45	30.6
Community Health Worker	15	10.2
Employment Status		
Full-time	125	85.0
Part-time	16	10.9
Casual (Locum)	6	4.1
Job Status		
Respondent has 1 Job	99	67.3
Respondent has 2 Jobs	45	30.6
Respondent has > 2 Jobs	3	2.0
Educational Level (Highest Degree)		
Primary School Certificate	1	0.7
Secondary School Certificate	1	0.7
Diploma	59	40.1
Bachelor	65	44.2
Postgraduate	21	14.3
Level of Experience (Years)		
1 - 5	43	29.3
6 - 10	43	29.3
11 - 15	34	23.1
16 - 20	17	11.6
21 - 25	7	4.8
> 25	3	2.0
Healthcare Facility		
Private Facility	97	66.0
Public Facility	50	34.0

Table 3: Respondents' Knowledge Characteristics

	Correct (Good) Frequency (n)/ Percentage (%)	Incorrect (Poor) Frequency (n)/ Percentage (%)
Knowledge of severity of uncomplicated malaria	130 (88.4%)	17 (11.6%)
Knowledge of uncomplicated malaria transmission	100 (100%)	0 (0%)
Knowledge of causative aetiology of uncomplicated malaria	145 (98.6%)	2 (1.4%)
Knowledge of guidelines on clinical (presumptive) diagnosis of uncomplicated malaria	133 (90.5%)	14 (9.5%)
Knowledge of signs and symptoms of uncomplicated malaria	137 (93.2%)	10 (6.8%)
Knowledge of parasitic confirmation of uncomplicated malaria	142 (96.6%)	5 (3.4%)
Knowledge of diagnostic options routinely used for parasitological confirmation of uncomplicated malaria	143 (97.3%)	4 (2.7%)
Knowledge of recommended treatments for uncomplicated malaria	100 (100%)	0 (0.0%)
Knowledge of non-recommended options for treatment of uncomplicated malaria	132 (89.8%)	15 (10.2%)
Knowledge of groups highly susceptible to uncomplicated malaria	145 (98.6%)	2 (1.4%)

Table 4: Respondents' Attitude Characteristics

	Positive (Good) Frequency (n)/ Percentage (%)	Negative (Poor) Frequency (n)/ Percentage (%)
Attitude to provide high quality malaria management services	100 (100.0%)	0 (0.0%)

Attitude to adhere to recommended national policy guidelines	146 (99.3%)	1 (0.7%)
Attitude to be sufficiently skilled in uncomplicated malaria management	140 (95.2%)	7 (4.8%)
Attitude to rightfully diagnose malaria	133 (90.5%)	14 (9.5%)
Attitude to access malaria diagnostic tools for laboratory confirmation of malaria parasites	136 (92.5%)	11 (7.5%)
Attitude to use reliable Malaria Rapid Diagnostic Tests (RDTs)	130 (88.4%)	17 (11.6%)
Attitude to ensure patients adhere to prescribed treatments	142 (96.6%)	5 (3.4%)
Attitude to ensure patients appreciate the services they receive	146 (99.3%)	1 (0.7%)
Attitude to counsel demanding patients	130 (88.4%)	17 (11.6%)
Attitude to accurately record data on services provided for every patient	147 (100.0%)	0 (0.0%)

Table 5: Respondents' Self-efficacy Characteristics

Items (Self-Efficacy) (Malaria Suspected Case)	Strongly Disagree	Disagree	Agree	Strongly Agree
Fever clerking	0 (0.0)	1 (0.7)	48 (32.7)	98 (66.7)
Temperature check	0 (0.0)	3 (2.0)	60 (40.8)	84 (57.1)
ACT non-rational prescription	0 (0.0)	16 (10.9)	89 (60.5)	42 (28.6)
Laboratory diagnostic testing	0 (0.0)	1 (0.7)	51 (34.7)	95 (64.6)
Referral for parasitological confirmation where necessary	0 (0.0)	4 (2.7)	77 (52.4)	66 (44.9)
Irrational poly-pharmacy use prevention	1 (0.7)	21 (14.3)	75 (51.0)	50 (34.0)
Prescription according to guideline (positive result)	0 (0.0)	0 (0.0)	35 (23.8)	112 (76.2)
Non-prescription according to guideline (negative result)	0 (0.0)	13 (8.8)	75 (51.0)	59 (40.1)
Accurate records of final diagnosis maintained	0 (0.0)	3 (2.0)	71 (48.3)	73 (49.7)
Preventive measure counselling	5 (3.4)	35 (23.8)	86 (58.5)	21 (14.3)

Table 6: Respondents'Reinforcing FactorsCharacteristics

Variable Items (Reinforcing Factors)	Strongly Disagree Frequency/ (Percent)	Disagree Frequency/ (Percent)	Agree Frequency/ (Percent)	Strongly Agree Frequency/ (Percent)
Presence of clear line of authority for effective work supervision	22 (15.0)	44 (29.9)	48 (32.7)	33 (22.4)
Management directives issuance, follow-ups and effective feedback mechanism	28 (19.0)	46 (31.3)	34 (23.1)	39 (26.5)
Availability of institutional policy on treatment guidelines	34 (23.1)	34 (23.1)	58 (39.5)	21 (14.3)
Employee support to comply with guidelines and protocols	37 (25.2)	34 (23.1)	39 (26.5)	(25.2)
Available mentorship culture	43 (29.3)	45 (30.6)	47 (32.0)	12 (8.2)
Good welfare package	34 (23.1)	50 (34.0)	50 (34.0)	13 (8.8)
Recognition for outstanding performance	35 (23.8)	43 (29.3)	52 (35.4)	17 (11.6)
Termination of employment based only on genuine reasons	35 (23.8)	37 (25.2)	34 (23.1)	41 (27.9)
Proud advocate of institutional facility	25 (17.0)	50 (34.0)	45 (30.6)	27 (18.4)
Effective peer/colleague professional interaction and social support	21 (14.3)	44 (29.9)	52 (35.4)	30 (20.4)

Table 7: Respondents'Enabling FactorsCharacteristics

Variable Items (Enabling Factors)	Strongly Disagree Frequency/ (Percent)	Disagree Frequency/ (Percent)	Agree Frequency/ (Percent)	Strongly Agree Frequency/ (Percent)
Insufficient workforce being responsible for workload	24 (16.3)	42 (28.6)	52 (35.4)	29 (19.7)
Work stress attributable to job	24 (16.3)	56 (38.1)	33 (22.4)	34 (23.1)
Patient load responsible for use of presumptive diagnosis of uncomplicated malaria alone based on symptoms	40 (27.2)	34 (23.1)	55 (37.4)	18 (12.2)
Frequent drug stock outs at facility's pharmacy	29 (19.7)	52 (35.4)	37 (25.2)	29 (19.7)
Availability of light microscopy for	27 (18.4)	43 (29.3)	60 (40.8)	17 (11.6)

laboratory parasitological confirmation of uncomplicated malaria			
Availability of malaria Rapid Diagnostic Test kits for parasitological diagnosis	26 (17.7)	54 (36.7)	53 (36.1)	14 (9.5)
Frequent lack of Artemisinin-Based Combination drugs (ACTs)	23 (15.6)	51 (34.7)	56 (38.1)	17 (11.6)
Institutional regulation and protocols hamper job duties	41 (27.9)	31 (21.1)	36 (24.5)	39 (26.5)
Trained periodically for professional development	34 (23.1)	54 (36.7)	30 (20.4)	29 (19.7)
Possess high self-esteem and self-confidence	15 (10.2)	27 (18.4)	62 (42.2)	43 (29.3)

Table 8: Relationship between Predisposing, Enabling and Reinforcing Factors

	r	p-value
Variable (n = 147)		
Knowledge	0.031	0.65
Attitude	0.080	0.24
Self-Efficacy	0.038	0.62
Reinforcing Factors	0.144	0.03
Enabling Factors	0.271	0.01

V.   DISCUSSION

The PRECEDE model has been applied as a successful framework to resolve a wide range of problems. Some studies have suggested that applying the PRECEDE model to prevent, diagnose, manage and decrease health problems is a reliable approach for successful behavioural change (Aboumatar et al, 2012). The model will assist in recognition and classification of predisposing, reinforcing and enabling factors which influence the health-related behaviour as behavioural promotors or behavioural inhibitors.

Predisposing factors are usually modified before enabling and reinforcing factors can be changed. According to Green and Krueter, predisposing factors are individual level factors of the human being which promote or prevent health behaviours which include knowledge, attitude, beliefs, values, perceptions and self-efficacy (Green & Krueter, 2005). These predisposing factors are significant human behaviour predictor, however, sufficient knowledge alone does not relate to expected behaviour change. The management practices of healthcare workers is an interplay of activities that intervene between health status and health outcome. There is the need for good knowledge, attitude and self-efficacy in ensuring proper action in the management of uncomplicated malaria which may ensure health care workers adherence to guidelines or hinder them from practicing these guidelines. This study showed an overall good knowledge, attitude and self-efficacy amongst the healthcare workers in Surulere Local Government Area of Lagos State.

The enabling factors are the needed abilities, skills and resources required for the effective case management of uncomplicated malaria. Enabling factors in this present study showed that these necessary skills and resources were generally poor as elicited in over half of these health care workers. Enabling factors are powerful predictors of human behaviour as availability and accessibility of required resources can serve as major barriers in providing the needed qualitative case management of uncomplicated malaria. There have been noticed in a similar study for diabetes management (Azar et al, 2017).

Reinforcing factors can be referred to as the outcomes of action as it relates to social support in terms of positive or negative feedback or factors. This study showed poor reinforcing factors in over half of the respondents. These serve as major inhibitory factors even in the event of sufficiently adequate knowledge, attitude and self-efficacy of the health care workers to provide standardized level of care to the general populace. It is worthy to note that these contributory reinforcing and enabling factors may be contributory to the outcome of Nigeria's high mortality rate of 23% as reported in the 2020 WHO World Malaria Report (WHO, 2020).

The summary of findings in these primary health care workers were that although predisposing factors were excellent as evidenced by the 88.4-100%, 88.4-100% and 72.8-100% for the sub-scales for knowledge, attitude and self-efficacy respectively. The reinforcing and enabling factors, referred to as the ecological, systemic or environmental factors were generally poor in over half of the respondents. The result of the correlation analysis showed that enabling factors as well as reinforcing factors had significant impact on the behavioural practice of the respondents towards management of uncomplicated malaria.

Hence, as public health practitioners, there is the need to optimize these reinforcing and enabling factors to remove inhibiters through policy drive and resource allocation to provide the enabling and reinforced environments required for the effective management of uncomplicated malaria at the primary health care level by various health care workers in order to mitigate the high morbidity and mortality of malaria in Nigeria. The PRECEDE component of the PRECEDE-PROCEED model has provided an acceptable framework for the development of valid and reliable psychometric diagnostic tools in public health research of human behaviour.

VI. CONCLUSION

Malaria is a communicable disease of global public health concern with high mortality rates. Hence, it is critical to have an understanding of the how to approach the ecological factors relating to the health care workers to mitigate against this high mortality trend. Adherence and compliance to standardized national malaria management guidelines are solely not dependent on the health care workers personal level predisposing factors such as knowledge, attitude and self-efficacy.

This study shows there is a significant relationship between respondents enabling factors, reinforcing factors and management practices. Respondents agreed that these factors, if such factors were available, would have positive impact on their approach to management of uncomplicated malaria. Interpersonal relations with colleagues or peers, effective access to required resources such as provision of ACT drugs and diagnostic availability, adequate training, adequate organizational policies and feedback mechanism with social support were seen as generally lacking by respondents. Respondents believed that if all these factors are looked into, this will increase adherence and compliance to regulatory requirements resulting in positive practice of standardized level of care.

The PRECEDE model is suitable as a universal usable tool to evaluate the health care worker's knowledge and practice skills in the management of uncomplicated malaria in subsequent studies. Researchers may use this tool to find a comprehensive understanding of the predisposing, enabling, reinforcing, environmental and behavioural factors relating to the management of malaria. The supervision of health workers and monitoring of behaviouralpromoting and inhibitory interrelated ecological factors in these primary health care facilities is therefore essential to promote adherence and compliance to protocols and guidelines.

FUTURE RESEARCH

Based on the findings of this study, the study recommends that more studies need to be carried out to design a diagnostic psychometric tool of universal acceptance using the PRECEDE model for the measurement and monitoring of the health care workers towards behavioural compliance and adherence in a wide range of diseases of public health concern in order to improve the health indices of populations.Further studies should be done to compare the various aspects of PRECEDE model to ensure predictive validity in various health care communities as contribution to knowledge.

CONFLICT OF INTEREST

The authors declare no conflict of interests.

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