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Community Based Approach to Malaria Prevention among Pregnant Women and Children Less Than Five Years of Age in Cameroon

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Abstract

Malaria is a major public health concern in Cameroon which for a long time has remained the second leading cause of morbidity and mortality after HIV/AIDS, and the most widespread endemic disease in the country. Cameroon, historically has been implementing malaria prevention programs through a community based strategy from the pre-colonial era, through the independence to the post-independence period till date. Despite the adoption and implementation of the CBA in the fight against the scourge in the country which has yielded results in many countries like Cape Verte, the Mauritius Island and Algeria, malaria prevalence rate remains high especially among pregnant women and under five children. This is a proof that the CBA faces enormous challenges in effectively tackling malaria in the country. This qualitative study has as objective to analyze the barriers/challenges that are faced in implementing the CBA in the country and how these challenges can be overcome to ensure that preventive measures are effective. This study used two types of data; primary data collected using structured interview guides sectioned into themes having as indicators; health educational programs, community participation/engagement, environmental/larval source management and recruiting, training, equipping and using community health workers. A total of 233 key informants were interviewed; 40 community health workers, 70 community leaders, 75 Pregnant women, 24 health care providers, and 24 care givers through purposive sampling. Secondary data was collected through reading documents; textbooks, research reports, journal articles, conference papers, workshop papers, theses, seminar reports and dissertations on malaria prevention among the vulnerable populations through the CBA. Data from the interview guides were analyzed using the NVIVO software. Findings revealed that factors such as community apathy, language barriers, resource constraints, poor use of media and cultural beliefs are challenges faced by health education. the lack of interest/motivation among community members, geographic barriers, overburdened community, cultural norms, unfamiliarity with the importance of participation, lack of acknowledgment for community contributions were identified to be challenges community participation faced. Environmental degradation, low community participation and awareness, resistance to change, fluctuating mosquito populations were identified as barriers faced by LSM and. logistic challenges, training quality variability, workload stressors, high turnover, resource limitations, cultural barriers were noted to be hurdles encountered by CHW in the fight against through the CBA strategy in Cameroon.

Keywords; *Malaria, Malaria Prevention, Pregnant Women, Under Five Children, Community Based Approach, Community Health Workers, Community Participation, Health Education, Larval/Source Management.*

I. INTRODUCTION

Malaria prevention strategies in Cameroon through the community based approach dates back to pre-independence era through the independence and the post-independence era and rely on the use of long lasting insecticide-treated nets, intermittent preventive treatment in pregnancy (IPTP), health education/promotional programs, environmental/larval source management, recruiting, training, equipping and using community health workers, community engagement/participation, indoor residual spraying (IRS), intermittent preventive treatment for infants (routine immunization), prompt diagnosis and treatment through rapid diagnostics tests for timely treatment with Artemisinin-based combination therapy (ACT) are recommended for children, Seasonal malaria chemoprevention (SMC) which involves the administration of antimalarial drugs at peak transmission periods monthly to children from 3-59 months and mosquito coils are meant to repel mosquitoes using the strong smell of incense (Akweongo. 2011).

Under five Children are vulnerable to this infectious because their immune system is not yet developed making them more susceptible to the infection, Lack of previous exposure to the malaria parasite so they have not developed immunity against it, immunity to malaria builds up over time with respect to exposure, infants rely on their mother's anti bodies for protection during the first few months of life and so lack maternal immunity, these antibodies gradually decline overtime leaving the children susceptible to the infection, malaria can cause severe anemia especially in young children who have low iron reserves and still developing their blood cells, limited access to health care facilities or may not receive timely treatment due to factors such as poverty, lack of awareness, or inadequate health care infrastructure. Delayed or inadequate treatment can lead to severe complications from malaria in children. These factors render children less than five years of age vulnerable to malaria infection (Allen. 2005).

Pregnant women are most vulnerable due to their compromised immune system because during pregnancy a woman's immune system undergoes changes to accommodate the developing fetus. These changes make the pregnant woman more likely to malaria infection, pregnancy decrease immunity by suppressing the immune system to prevent the rejection of the fetus which can make the pregnant woman less able to fight off malaria, malaria parasites infect and multiply within red blood cells.

Prevention in health refers to measures and actions that are taken to reduce or avoid the risk of developing injuries, illnesses or other health issues. This involves the identification and addressing of risk factors, promotion of healthy behaviors, and implementing interventions to prevent the progression of diseases. Three levels of health prevention are identified; **primary prevention** level which focuses on preventing the occurrence of disease before it happens (WHO, 2020). These include actions like health education and promotion, immunization, healthy eating habits, regular exercise and the avoidance of risk factors like stopping alcohol consumption or quitting smoking. **Secondary prevention** level aims to detect and treat diseases in their early stages when they are more easily manageable. These involves regular screening, diagnostics tests and early intervention programs for conditions like hypertension and **tertiary prevention levels** focuses on managing and reducing the impact of existing diseases or injuries to prevent further complications. This includes rehabilitation programs, chronic disease management strategies, support groups and palliative care (WHO, 2019).

Malaria prevention strategies in Cameroon in general rely on the use of long lasting insecticide-treated nets, intermittent preventive treatment in pregnancy (IPTP). Pregnant women are given iron supplement for the prevention and treatment of anemia as part of routine antenatal care (Angrosino 2000). Pregnant women are recommended to take Prophylaxis (Malaria drugs) which kills the malaria parasite in the body once a week during pregnancy to prevent herself and foetus from getting infected with malaria. Indoor residual spraying (IRS), intermittent preventive treatment for infants (IPTI) i.e. (routine immunization), prompt diagnosis and treatment through rapid diagnostics tests (microscopy) for timely treatment with Artemisinin-based combination therapy (ACT) are recommended for children, Seasonal malaria chemoprevention (SMC) which involves the administration of antimalarial drugs at peak transmission periods monthly to children from 3-59 months. Mosquito coils are meant to repel mosquitoes using the strong smell of incense (NMCP, 2021).

Despite these prevention strategies malaria prevalence among pregnant women and children remains high in the country. This is due to a **lack of an effective community based approach targeting these vulnerable populations** and a policy problem which is traditionally a top-down approach that sidelines community members rendering preventive programs ineffective in reaching and engaging the target populations (NMCP, 2022).

- *Statement of the problem*

Malaria constitutes a major public health problem worldwide with approximately3.4 billion people living in endemic areas of the world. Malaria has been identified as is a major public health concern and the second killer disease after HIV/AIDS in the country with more than 90% of the population at risk of contracting the infection and is responsible for 73% of the country's mortality with 54% being pregnant women and children (National Institute of Statistics [NIS], 2021). The ministry of health (MOH) has made the fight against the infection disease a priority with a highlight in the country's Health Sector Strategy of 2016–2027 putting malaria elimination by the year 2027 as one of its main priorities. The path traced this far provides a plethora of empirical observations on malaria which continues to be a significant health problem in Cameroon particularly among children under five years of age and pregnant women. Despite enormous efforts made in combating this scourge the prevalence of malaria remains high (NMCP and CMI 2022). Studies by Antonio-Nkondjio (2019) on malaria prevention/control through a CBA focused on inadequate knowledge on the effectiveness of community based approach, understanding of community perspectives and beliefs in combating this scourge in the country. Public health policy which is traditionally a top-down approach and sidelines community members rendering preventive programs ineffective in reaching and engaging the target populations constitute a problem. Again, efforts to enforce preventive measures are so lazed, little attention is paid to monitoring and evaluation, community participation efforts measures by policy makers are so lazed whereas malaria preventive measures to yield results need the local populations to be main actors in the planning and implementation of such programs (U.S PMI, 2023).

Findings by CDC (2021) have shown that using a community based approach for malaria prevention has drastically reduced the mosquito population and the prevalence of malaria in some rural communities in the country and therefore reduced malaria morbidity and mortality among these vulnerable populations. Studies on community-based approach for malaria prevention in rural

Cameroon revealed that malaria prevalence is bound to decline if and only if there is effectiveness in proper health education programs on radios, television in common languages, songs, schools, effective communication strategy, advocacy and resource mobilization, improving linkages between communities and district health system, vector control, using community health care workers, ensuring social behavioral change, and community workshops. Due to the increasing prevalence of malaria mortalities and morbidities, research efforts need to focus on areas such as the effectiveness of the CBA, long term sustainability and scalability, exploring the role of health systems in supporting CBA, access and utilization of preventive measures are important (Antonio. 2015).

Despite implementation of the CBA in Cameroon, malaria prevalence rate, morbidity and mortalities have been remains high in the country [NMCP, 2024]. Therefore, effective malaria prevention among these vulnerable populations can only make a substantial reduction in malaria morbidity and mortality if an effective community based approach is properly implemented. But the central problem here is **"**what are the barriers and challenges faced in implementing an effective community based approach to malaria prevention among these vulnerable populations and how can these challenges be overcome to ensure that preventive measures are effective''

The purpose of this qualitative study is to analyze the challenges that are faced in implementing a community based approach to malaria prevention among the vulnerable populations [under five children and pregnant women] in Cameroon.

II. METHODS

The case study research strategy was used in this qualitative study using two types of data; primary qualitative and secondary data.

- *Tool*

Primary qualitative data was collected from the field using structured interview guides which were sectioned into themes with each theme designed to reveal challenges faced in implementing a CBA in malaria prevention among the vulnerable population. **Theme one** comprised questions designed to revealed challenges faced in implementing health education programs, **Theme two** comprised questions designed to revealed challenges faced in implementing community participation/engagement activities, **Theme three** comprised questions designed to revealed challenges faced in implementing larval source management activities, and **Theme four** comprised questions designed to revealed challenges faced in implementing the using community health workers in malaria prevention programs.

Secondary data was collected by consulting documents on [malaria control in Cameroon through a community based approach]. The documents consulted included workshop papers, focus groups, seminar papers, dissertations theses, textbooks, journal, scientific articles, working papers, research reports, and conference papers. These documents were obtained from libraries, the internet and individuals and at the center for national malaria control program.

- *Sample Size and Selection*

A sample of 233 comprising five categories of respondents was purposively sampled. In the first category, 40 key informants selected among community health workers, neighborhoods and communities. The second category comprises of 70 community leaders, the third category comprises 75 pregnant women, the fourth category included 24 healthcare providers (nurses, midwives, doctors) and the fifth category included 24 care givers (mothers of young children).

- *Sampling Technique*

A **purposive sampling** technique was used in this study because it is more reliant on the researcher's ability for a sample selection. In this purposive sampling, the researcher used his judgment to identify those who were familiar with the phenomenon under investigation (malaria prevention).

- *Techniques of data analysis*

The primary qualitative data analyzed using Nvivo software which generated the results electronically. The secondary data was analyzed by extracting is a systematic procedure for evaluating or reviewing documents printed and electronic (computer-based and internet-transmitted) material. The documentary analysis requires that data be interpreted or examined in order to gain understanding, develop empirical knowledge and elicit meaning.

III. COMMUNITY BASED MALARIA PREVENTION STRATEGIES IN CAMEROON

- *Health Education/ Promotion and Awareness Programs*

Health education is a process of enabling people to enhance the control over their health and its determinants hence improving the health. It could be said that the overall aim of health promotion is to guide and educate people and community on how to better manage their health conditions in order to minimize the occurrence of diseases and other unhealthy conditions. For health promotion to take place, it is always channeled through some educational or environmental programs, the programs are termed health promotion programs (Apinjoh. 2015).

Health promotion programs are the various programs that are designed to enhance good health and wellbeing by increasing individual´s and community´s control over their health. Health promotion programs entail health education which is aimed at improving the health attitude, knowledge, behaviors, indicators, status and skills. Health promotion also entails environmental action to promote social support, legislation, resource development community development, financial support, environmental change and also organization development (Atieli. 2011).

- *The Role of Health Promotion Programs in Preventing Malaria*

Health education improves the health status of individuals, families, communities, states, and the nation and lastly, Health education enhances the quality of life for all people. The need for people to have proper knowledge about the appropriate antimalarial drugs by the population. Community health promotion programs have helped the population in various ways of using the anti-malarial drugs such as traditional medicines. Community health promotion programs have also helped in educating the population on symptoms to identify to allow them to seek appropriate medical attention (Ballard. 2018).

- *Community Participation/Mobilization and Engagement in Malaria Research and Interventions*

Community participation refers to the active involvement of community members in decision making processes related to malaria prevention and control. This involvement can take many forms such as participating in planning meetings, providing inputs on program design and implementing interventions. Community participation is important because it ensures that interventions are responsive to the needs and the priorities of the community and that the community members have a sense of ownership and investment in the success of the program.

- *Pitfalls of Participation*

Participation is difficult to operationalize because there is a gap between theory and practice and development agencies have gone on to conclude that participation is an ideal and not a reality. Also argued that participation is time-consuming which can result in delays in project start-up. Although there can never be too much participation, it can be very expensive in terms of time and resources to both organizers and participants. This results from consulting with and listening to the general public which, in rural communities, is dispersed and difficult to reach out (Barat. 2004).

The intended participants in most cases particularly poor rural people and women, are often simply much busier with the basic livelihoods and survival activities in the field and at home. There is little time for attending meetings where they are supposed to make their voices heard. Even if they attend, such types of meetings are often dominated by a few voices, the more articulate, confident and educated and this leads to the interests of the poor being ignored.

There are growing concerns with literacy and awareness problems in rural areas which can affect malaria prevention programs in these remote areas. Special measures are needed to train, support and facilitate processes and without that local communities might not actively participation.

Beier (2008) posits that, there will be participation in a program in the affected beneficiaries will see the interest in doing so, meaning they must be involved from the outset and in all stages of the project cycle and should have the ability to influence decisions that are taken. Hence, the need to train, educate and support them so that they participate meaningfully. the organizational resources needed for these special measures however, are not adequate in rural areas and personnel have to be brought in from outside and when that happens the local community loses autonomy.

- *Environmental Management (Larval Source Management)*

Larval source management involves the alteration or management, the manipulation of water sources that could harbor the immature, aquatic stages of malaria vectors. The control takes place at the earliest life stage possible and in this way; it contributes to the reduction of adult vector populations. Moreover, in their adult stage, disease vectors display a variety of behaviors, such as indoor versus outdoor feeding and resting. Also, host feeding preferences vary widely, which leads to a wide diversity of niches that mosquito vectors occupy. As a result, conventional control tools may not always affect the adult mosquito, and control efforts aimed at the adult stages may thus be jeopardized. For instance, indoor residual spraying affects those mosquitoes that feed and/or rest inside, whereas outdoor feeding mosquitoes are missed and will still be able to sustain malaria transmission. If all potential breeding sites are eliminated or treated, the number of infective bites per person per year (the Entomological Inoculation Rate [EIR]) will be greatly reduced thereby reducing malaria transmission (Bisong, 2013). Larval source management is a practical application of malaria prevention strategies in Cameroon today complementary intervention to LLITNs and IRS especially where outdoor biting by malaria vectors is problematic or where there is resistance to the insecticides used for LLITNs or IRS.

There are two key elements in environmental **management (larval source management];**

- *Habitat Modification;*

This is a permanent alteration to the environment. It a form of environmental management consisting of any physical transformation that is permanent or long-lasting of land, water and vegetation, aimed at preventing, eliminating or reducing the habitats of vectors without causing unduly adverse effects on the quality of the human environment.

- *Habitat Manipulation.*

This involves flushing of streams, temporary environmental changes to disrupt vector breeding, including Water-level manipulation, drain clearance to eliminate pooling; Shading or exposing habitats to the sun depending on the ecology of the vector.

Larviciding it is complementary to environmental management. It implies the regular application of biological or chemical insecticides to water bodies, such as Surface oils and films, e.g. highly refined oils and biodegradable ethoxylated alcohol surfactants, or "monomolecular films" (MMF) that suffocate larvae and pupae, synthetic organic chemicals, e.g. organophosphates. They work by interfering with the nervous system of immature larval stages, such as chlorpyrifos, fenthion, pirimiphos-methyl and temephos,

Bacteria, e.g. Bacillus thuringiensis subsp. israelensis (Bti), and Bacillus sphaericus (Bs) that produce insecticidal crystal proteins which, when ingested by larvae, attack the gut lining causing cessation of feeding and subsequent mortality, Spinosyns, e.g. metabolites extracted from the bacterium Saccharopolyspora spinosa, that act as nicotinic acetylcholine receptor (nAchR) allosteric activators and can cause mortality through both contact and ingestion, Insect growth regulators, e.g. diflubenzuron, methoprene, novaluron and pyriproxyfen that prevent emergence of adults from the pupal stage (Bowen. 2008).

- *Community Health Workers [CHWs] and Malaria in Cameroon.*

Community health workers [community health volunteers] refer to a cadre of health workers who are selected by the community, trained and work in the communities from which they come. The WHO holds that community health workers should be members of the communities where they work, should be selected by the communities, should be answerable to the communities for their activities, should be supported by the health system but not necessarily a part of its organization, and have shorter training than professional workers. The CHWs are the first point of contact with the health system. Since they live within the community, they know and understand the people and their culture [WHO.2024].

The Cameroon health system has relied on CHWs to deliver essential community health services (ECS) to rural populations. In 2015, CHWs covered over 3 million Cameroonians living in such areas. However, CHWs have not yet been mentioned in the country's national health system law, raising issues related to their eligibility to be paid from the national budget

Community health workers have increasingly become frontline universal health care workers albeit without pay in most countries, hence their being designated as community health volunteers in most cases. Their role in the health care system has significant bearing on attainment of universal health care. The shortage of medical personnel with less than two doctors for every 10,000 people constitutes a major health problem to malaria infection in Cameroon.

Carter (2002) holds that the CHWs carryout early diagnosis and treatment of malaria, carryout sensitization campaigns. They identify things group members can do to improve children's health, identify community groups that are eager to learn about and promote good maternal health, refer pregnant women and caregivers of children under five years of community members to health facilities for IPTP, and other health and developmental challenges, serve as link to health facilities, connecting community members to services. They also carry out and interpret RDT of malaria and to treat positive cases of uncomplicated malaria and they act as first-responders to community members.

Table 1 Words Coverage Percentages for the Theme " Health Education/Awareness Campaigns in Malaria Prevention''.

Mot	Longueur	Nombre	Pourcentage pondéré (%)
sanctions	9	1	0,18
sanctioning	11	1	0,18
sanction	8	1	0,18
resource	8	2	0,36
renders	7	1	0,18
remarks	7	1	0,18
really	6	1	0,18
radio	5	3	0,54
purchase	8	1	0,18
programs	8	22	3,96
problem	7	1	0,18
prevention	10	2	0,36
preventing	10	1	0,18
prevent	7	3	0,54
pregnant	8	3	0,54
positive	8	1	0,18
place	5	3	0,54
persons	7	3	0,54
people	6	8	1,44
partnership	11	1	0,18
participation	13	3	0,54
participate	11	1	0,18
participants	12	2	0,36
organization	12	2	0,36

Source: Field 2024

The excerpt from the verbatim is presented in the following table, which faithfully reflects respondents' answers on the theme of **" Health Education/Awareness Campaigns in malaria prevention''.**

Table 2 Words Coverage Percentages for the Theme «Engaging Community Participation/Engagement in Malaria Prevention»

Mot	Longueur	Nombre	Pourcentage pondéré (%)
malaria	7	25	3,89
clean	5	19	2,95
interest	8	15	2,33
members	7	15	2,33
programs	8	14	2,18
children	8	13	2,02
campaigns	9	12	1,87
knowledge	9	12	1,87
measures	8	12	1,87
pregnant	8	12	1,87
women	5	11	1,71
dangers	7	10	1,56
prevention	10	8	1,24
sanctions	9	8	1,24
community	9	7	1,09
patients	8	7	1,09
motivation	10	6	0,93
sanction	8	6	0,93
sensitization	13	6	0,93
cleaning	8	5	0,78

Source: Field 2024

The excerpt from the verbatim is presented in the following table, which faithfully reflects respondents' answers on the theme of " **Engaging Community Participation/Engagement in Malaria Prevention".**

Table 3 Words Coverage Percentages for the Theme " Implementing Environmental/Larval Source Management in Malaria Prevention''.

Mot	Longueur	Nombre	Pourcentage pondéré (%)
workshops	9	4	0,72
workshop	8	1	0,18
women	5	3	0,54
village	7	1	0,18
versed	6	1	0,18
vernaculars	11	1	0,18
vacines	7	1	0,18
vaccines	8	1	0,18
vaccinated	10	1	0,18
usage	5	1	0,18
unlike	6	1	0,18
together	8	1	0,18
times	5	1	0,18
three	5	1	0,18
think	5	5	0,90
televisions	11	1	0,18
television	10	1	0,18
telephones	10	1	0,18
telephone	9	1	0,18
systems	7	1	0,18

Source: Field 2024

The excerpt from the verbatim is presented in the following table, which faithfully reflects respondents' answers on the theme of **"Implementing environmental/larval source management in malaria prevention".**

Table 4 Words Coverage Percentages for the Theme « Training, Equipping and using Community Health Care Workers in Malaria Prevention»

Mot	Longueur	Nombre	Pourcentage pondéré (%)
malaria	7	39	5,19
funds	5	26	3,46
recruit	7	24	3,19
community	9	23	3,06
members	7	12	1,6
locality	8	11	1,46
provide	7	11	1,46
people	6	10	1,33
prevention	10	10	1,33
available	9	8	1,06
enough	6	8	1,06
involved	8	8	1,06
cases	5	7	0,93
contributing	12	7	0,93
language	8	7	0,93
clean	5	6	0,8
exist	5	6	0,8
recruiting	10	6	0,8
tools	5	6	0,8
barriers	8	5	0,66

Source: Field 2024

The excerpt from the verbatim is presented in the following table, which faithfully reflects respondents' answers on the theme of " **Training, equipping and using community health care workers in malaria prevention".**

IV. DISCUSSION

- *Discussion of Research Objective 1:*

The specific objective was to identify and analyze the challenges/barriers faced in implementing effective health education/awareness campaigns to raise knowledge, attitudes and practices related to malaria prevention among pregnant women and children less than 5 years of age in Cameroon. Regarding the measures being implemented to control malaria, it was established that health education/promotion programs was on effective way in preventing malaria through a community based perspective. From the information gotten through the interview guides and documentary search, it is revealed that cultural beliefs lead to misconceptions about malaria as some of the participants and documentary revealed that malaria is a sort of ill-lock. Language barriers is also another setback in the fight against malaria in that the lack of materials in local language it hinders understanding and engagement among diverse populations. Language barrier is a point which we specifically faced with as we came across many participants who could not utter a single word neither in English nor the French.

Community apathy is a serious problem in malaria prevention, this because it leads to low participation due to lack of interest/motivation among community members. The low participation is due to total lack of engagement on the part of those who manage to participate. For participation to bring meaningful change in the fight malaria, there must be great sense of engagement among members. it is seen that there is a passive participation in health education programs. Some participants made us know they had a lukewarm attitude toward malaria prevention efforts because there is no motivation/incentives given to them who take out their reasonable time to take part in such programs.

Another barrier/challenge is in-effective communication, poor use of media or community network and even misinformation or limited awareness on malaria prevention. There is lack of follow up mechanism as no systems to reinforce learning over time are put in place. The major barriers to malaria prevention lie in the ineffectiveness of health education/promotional programs in that while health educational programs may seem to be effectives strategies for malaria elimination, it may fail if the creators of the programs fail to take into consideration economic, social and cultural factors. These factors are great determining factors in the effectiveness of these programs [Chambers. 2008].

Analysis many documents using document analyses, and direct observations to examine the impact of health education/programs on malaria prevention among the vulnerable populations in rural Cameroon offering exemplary clarity concerning the use of documents, had reported that a review of health education/promotional program’s records provided information on the history, goals, objectives, and substantive content of health educational/promotional programs. These promotional programs are conceived not with the exigencies of the community or locality in mind. This alone hampers the involvement of the local members in the sense that the local members feel these programs have been imposed on them and so they are simply passive actors [onlookers] and are not carefully carved out reason they yield no substantial results.

Mass media campaigns through the radio, television, and newspapers as strategies of health education/promotion program has in no way influenced behavior of community members towards malaria prevention.

Most communities remain seemingly with low literacy rates leading to difficulty in understanding health messages, limited access to information due to inadequate dissemination of educational materials, cultural belief and misconceptions about malaria and its prevention, resource constraints that is insufficient funding for health educational programs and even if the health promotional campaigns are conceived, their implementation due to poor leadership and governance are at the core of the health system challenges. Corruption is identified as another canker that has done severe damage to the effective management of resources of the health promotional campaigns. There is lack of checks and balances and results in a leak of public funds meant for health educational programs. To Corbin (2008), allocation for funds for health promotional campaigns are very minimal and even when the little budget is given, a greater portion of these allocations is lost to individuals due to corruption. There is a continuous practice of medical herbalism, and orthodox medicine due to lack of proper health education/promotional campaigns and the misconceptions surrounding malaria infection. This reveals that health education remains a barrier to malaria prevention and thus explain why community based approach to malaria prevention in Cameroon with health education as a prevention strategy still has a very long way to go, in a time where other countries like **Cape Verte**, the **Mauritius Island** and the **Algeria** have been certified malaria-free for four consecutive years.

- *Discussion of Research Objective 2:*

The specific objective was to identify and analyze the challenges/barriers faced in implementing community participation/engagement in malaria prevention activities and identify strategies to enhance their involvement. Regarding the measures being implemented to control malaria, it was established that there were a number of measures which were put in place by local community leaders in engaging the community members in engaging in malaria prevention efforts from the government and its partnering organization to prevent and control malaria in the country. These measures included; environmental cleaning, filling of potholes, larviciding, use of LLITNs, Sensitization of members on clean-up programs, participation in clean-up campaigns and clearing of bushes around residential areas in the communities. These measures were undertaken by local community members in collaboration with the state partnering organization [Creswell. 2009].

However, this was contrary to what our findings revealed**.** The interview guides and documentary search revealed that people in the locality are hesitant to engage in malaria prevention program because most community members mystify malaria, they hold that malaria is a myth [the disease is a sort of curse]. There is none-compliance to preventive measures by the community members people do not see need in participating in malaria educative or prevention programs. Furthermore, it was revealed that pilot vector control trials such as; larviciding and indoor residual spraying have been operational in the country. The larviciding undertaken in the city of Yaounde spearheaded by the NMCP using a combination of Bacillus thuringiensis israelensis and B. sphaericus for controlling malaria parasite transmission and mitigating the impact of insecticide resistance was less effective in the elimination of the mosquito parasite, adopting larviciding as a complementary approach for controlling malaria parasite transmission in Cameroon was less effective due to the high cost in purchasing the larvicde [Davids. 2005].

- *Discussion of Research Objective 3:*

The specific objective was to analyze the challenges/barriers faced in implementing environmental/Larval source management intervention in reducing mosquito breeding sites within communities. It was established that there were a number of measures which were put in place by local leaders to control mosquito parasites in the localities such as; hygiene and sanitation campaigns, environmental cleanliness, clearing of bushes around homes, filling of potholes in order to elimination mosquito parasite breeding sites, using larviciding, and community engagement [Elizabeth. 2019].

For instance, hygiene and sanitation interventions [environmental cleaning] around major cities in the country are being piloted in epidemiological settings of the country such as larviciding in the cities of Douala and Yaounde and the PADY (Projet d'Assainissement de Yaoundé) program focusing on hygiene and sanitation in Yaounde. The dirt collection company HYSACAM is charged of collecting dirt in many cities in the country coordinated by the city councils. All these efforts are well-coordinated to improve malaria control in Cameroon. the environmental/larval source management strategies are implemented to ensure that areas in the environment do not serve as mosquito breeding sites and the cleanliness of the environment is a natural deterrent to mosquito parasites.

However, the study finding were contrary to the assumptions made, it revealed that the hygiene and sanitation campaigns, community engagement in clean-up programs interventions were not properly implemented and so are not effective and efficient to prevent malaria in the country. For instance, in most quarters in the city of Yaounde, dirt collection as an environment strategy to deal away with mosquito breeding sites, it was noticed that most streets were very dirty, waste could be seen over packed on areas where it is supposed to be dumped by households in communities for the waste collection company to gather and carry them for there are to be emptied. The justification of the over pilled waste at waste dumping sites was that the workers of the waste collection company [HYSACAM] are constantly on a site-down strikes claiming unpaid dues for several months [Fokam. 2016)].

For filling of potholes to eliminate mosquito breeding sites, interviews from community leaders and some local

community members revealed that the lack of tools; cutlasses, wheel barrows, low community participation; community members are hesitant to take part in cleaning programs were factors which justified the dirty nature of the communities. It also revealed even if some community members deem to participate in hygiene and sanitation campaigns, attendance was often low which constitute barriers in implementing larval source and environmental management as malaria prevention aimed at tacking mosquito breeding sites. Some interviewees told us that ''warm temperatures have accelerated mosquito breeding sites and lifespan and equally high humidity levels support survival and reproduction of mosquitoes parasites thus fueling mosquitoes breeds'' [Freeman. 1999].

It was further established that larviciding with lack of appropriate tolls, lack of community engagement, lack of stringent rules that sanction against defaulters were major factors which marred eliminations efforts. A major problem for a successful larviciding is the inability to identify, locate and have access to all potential breeding sites in targeted areas. A large-scale LSM program necessitates the employment of a highly trained professionals which is costly and most communities complained of insufficient financial resources to implement the LSM.

- *Discussion of Research Objective 4:*

The specific objective was to identify and analyze the challenges/barriers faced in using community health care workers [CHWs] in malaria prevention within communities and how these difficulties can be overcome. Regarding challenges faced in implementing CBA using CHWs in controlling malaria, community leaders and cooperating partners of the state in the fight against control malaria using CHWs, a number of factors were considered such as; early diagnosis, rapid diagnostic tests, case management, logistics, training and equipping the CHWs, language, route network, cultural beliefs, financial motivation, formalization of the CHWs, co-operation with health care professionals. These factors were tailored by government in collaboration with cooperating partners through the community leaders. For instance, the National malaria control program [NMCP] has played a very critical role in causing and helping the local community leaders in the recruiting, training, equipping and using CHWs. The US President malaria initiative [US PMI] has provided enough in terms of finances resources in the fight against malaria in Cameroon the ministry of health by recruiting and using CHWs [Gillies.1987].

From the data gathered it seen that malaria prevention through training, equipping and using CHWs as an effective community based strategy for malaria prevention encounters many hurdles in Cameroon. The study revealed that many CHWs complained that frequent supervision causes stress due to inconsistent oversight leading to decreased motivation and performance by the CHWs. The CHWs were heard complaining of there are constantly supervised and that they feel too pressured, some held that their efficiency reduces when they feel pressured. It was also revealed that Language remains a great challenge in malaria prevention efforts as many community dwellers are not able to express themselves in the two official languages [French nor the English language], thereby rendering the task of the CHWs complex and difficult. The extracts from documents revealed that the route network in/around the country constitutes another major barrier in accessing remote areas for service delivery by the CHWs. Documents revealed the routes are very dusty in the dry season and too muddy in the rainy season rendering the transportation of the CHWs a daunting task [Gomes. 2009].

The study revealed that the financial motivation of the CHWs was too little and not adequate to cause the CHWs to effectively, as compared to when the payment was better. For instance, some community health workers around the **Cite Verte health district of the Messa health area** where the **Chantal Biya Foundation** complained that they receive 40000 F per month as financial incentives and frequently complain that they can't cope living an urban city like Yaounde with the set amount which is very little and low and below the minimum wage in the country, this of course is a call for concern, this amount is very discouraging and is a cause for lack of commitment among CHWs the data revealed.

The data also reveals the CHWs face resistance from healthcare professionals. For instance, some documented works by the NMCP 2024 in the month of June reports how that some CHWs complained having resistance from health care professionals at the Djoungolo health district of the Yaounde 1 Subdivision of the Emana district health area of the centre region. The documents report that health care professionals undervalue the role/services of the CHWs by questioning the formality of their training after the recruiting process, these lead to conflicts and lack of collaboration between the parties that is the CHWs and the health care professionals.

The findings also revealed that the services of the CHWs are non-existent in some localities while some do not have adequate CHWs workforce as per the population density in these areas consequently leading to workload stressors, overburdening of CHWs with too many responsibilities without adequate support and also supervision is too poor and the lack of social and emotional support by the CHWs.

There is a high turnover in CHWs revealed by documents. The documents revealed that some CHWs do not spend relative long periods in communities where they are recruited to work. Adequate training of the CHWs upon recruitment is needed to ensure their proficiency in the field. This training necessitates resources; time, money, material etc. which is high cost incurred. It is logical to think that the CHWs spend a relative longer period of time in service to pay-back or commensurate the training and resources received.

It should be noted here that, the recruiting, training, equipping and using community based workers [CHWs] at community levels demands a certain level of decentralized strategy of administration which is not the case on the field. With respect to the assumptions of the structuralist

theory of health, there is need for the central government to deconcentrate or decentralize power to local leaders who will take upon themselves and see a well-leveraged and well-coordinated policies, and programs at the local levels. There is no efficient and effective decentralization of resources [financial and human resources] to district and community levels and thus result in unsatisfactory public service delivery at the community levels by the CHWs. The challenges as can be understood stem from the centralized form of administration. The central government can decentralize operations in order to ensure efficiency health service delivery services at community levels, but perhaps, there is a limit to the process of decentralization certainly by virtue of the fact that the process takes place within the framework of a centralized system of administration in which case the central administration fears to loose of its power to local community leaders [Govella. 2012].

V. CONCLUSION

The results of this study underline the barriers faced in an effective implementation of a community based approach in the fight against malaria in Cameroon in general and among the vulnerable populations [pregnant women and children five] in particular. Having a deeper and good understanding of these barriers/challenges is very vital step for policy makers in the public health sector in Cameroon and partners to rethink about the community-based approach perspective. This calls for urgency to leverage resources [financial, material, human] to address these challenges/barriers accordingly, in this way the CBA without doubt will be effective and for malaria eradication in the country. The CBA strategy in Cameroon with specification interventions including; health education/promotional campaigns, community participation/engagement, larval source/environmental management in an effort to reduce/ eradicate the burden of malarial morbidity and mortality in rural communities especially among under five children and pregnant women. It important for the ministry of health, policy makers and partnering organizations to strategize and create opportunities for a bottom-top approach in the fight against malaria and undermine a top-bottom approach.

The bottom-top approach will create partnership with rural communities to better understand their needs and at the same time enables government and partners to provide needed resources [financial, material, human] and strategize. Overall, the findings have demonstrated some key issues which demonstrate that successful implementation of the **community base strategy** in malaria prevention programs has been done in Cameroon. But, despite the fact that the process and the will to participate in malaria prevention programs maybe devolved not to the local level, the influence of the local community which could conceive, fashion, plan, implement and challenge policy development, supervise and evaluate the outcomes of the said programs is not in the hands of the local authorities but in the hand of health administrators. A well planned malaria prevention and control strategy for future efforts must involve tackling barriers/challenges in the community based strategy for malaria prevention and well leveraging for the CBA to yield expected, necessary satisfactory results and the country will be to a near zero or zero malaria case [malaria –free] and will be among the WHO's list of malaria certification.

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