ORIGINAL ARTICLE

Effectiveness of trained community volunteers in improving knowledge and management of childhood malaria in a rural area of Rivers State, Nigeria

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Abstract

Introduction: Malaria accounts for 70% of illnesses and 30% of deaths among children under 5 years in Nigeria. This study was aimed at determining the effectiveness of trained community volunteers in delivering multiple anti-malaria interventions to achieve rapid reduction in morbidity and mortality among under 5 children.

Materials and Methods: A quasi-experimental study was carried out in two rural communities in Rivers State, Nigeria among 368 mothers/caregivers. A set of 184 of the mothers/caregivers (experimental group) were trained on malaria and provided with bed nets and drugs (artemisinin-lumefantrine) to treat children under 5 years who developed fever during the period of the experiment. Another set of 184 mothers/caregivers (controls) did not receive similar training and drugs. Both groups were compared at baseline and after 6 months of the experiment on their knowledge of malaria prevention and treatment. Level of significance was set at $P = 0.05$.

Results: In the experimental group: Adequate knowledge about malaria increased from 115 (62.5%) to 175 (95.1%) ($P < 0.0001$), early commencement of treatment of fever increased from 68 (37.0%) to 131 (75.7%) ($P < 0.0001$), and children cured of malaria increased from 87 (47.3%) to 146 (84.4%) ($P < 0.0001$). Insecticide-treated bed nets use also increased from 86 (46.7%) to 161 (87.5%) ($P < 0.0001$). There were no significant changes in the control group.

Conclusions: The study demonstrated the inherent potentials in using community-based volunteers in malaria prevention and control for those in rural areas with poor health service delivery. We advocate its adaptation for far-reaching reduction in childhood morbidity and mortality and rapid attainment of millennium development goals 4.

Key words: Community volunteers, malaria, Nigeria, task shifting, under - 5 children

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Introduction

Malaria fever is still a major global public health problem with over 3.3 billion people at risk annually.[1] Most deaths from malaria occur in children under 5 years of age.[1] The World Health Organization (WHO) estimates that every 45 s an African child dies of malaria while several others are seriously ill.[2] In Nigeria, malaria is one of the four most common causes of illness and death among children; accounting for 70% of all illnesses and 30% of deaths.[3] More than 50% of malaria deaths are due to late presentation, delay in commencement of treatment, use of inappropriate medicines and sometimes wrong doses or duration,[4-6] while only about half of children with malaria in rural settings receive anti-malarials within 24 h of onset of symptoms.[7]

The effective and timely treatment of malaria has remained a challenge in many parts of sub-Saharan Africa,

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including Nigeria. This situation led the WHO in 2005 to recommend the use of artemisinin-based combination therapies (ACTs) for the treatment of uncomplicated malaria after confirmation by parasitological-based diagnostic tests.[8] Exceptions were however made for resource-poor settings where such' tests may not be readily available.[9] WHO went further to recommend home management for uncomplicated cases of malaria within 24 h of the onset of fever to prevent progression to severe malaria and deaths, especially for those residing in communities with weak or limited resources for health care services.[8] Home management of malaria is further supported by the acute shortage of health manpower in rural communities, lopsided distribution of available health manpower in favor of urban centers and the recurrent disruptions of health care delivery services as a result of frequent strike actions by health care workers as a result of labor related disputes.[10-12] Home management involves treating children with fever presumed to be malaria with prepackaged anti-malarial drugs by trained caregivers or community members at or near the home in order to increase access to effective treatment of uncomplicated malaria in malaria-endemic areas.[13]

However, a major setback in realizing the objectives of this policy is the poor knowledge of mothers and caregivers residing in rural communities about case management of malaria.[14-17] It, therefore, becomes imperative to explore the benefits of building the capacity of the mothers/caregivers in malaria case management using trained community volunteers. This concept of shifting certain medical or health service responsibilities from health staff to nonprofessionals like community volunteers became increasingly promoted with the advent of the HIV epidemic in most affected countries in Southern Africa in order to rapidly expand human resource capacity for scaling-up antiretroviral treatment.[18] The strategy increased access to life-saving treatment and improved the health system efficiency while mitigating the effect of attrition of health workers and enhancing the role of the communities for sustainable health care.[19]

Although several health education interventions have been carried out in several study settings using community volunteers,[20,21] few have actually considered the effect of multiple interventions on mothers and caregivers knowledge about malaria; recognition of its symptoms, complications, as well as its management at home. This study was therefore designed to determine the effectiveness of using community volunteers in improving the knowledge of mothers and caregivers of children under 5 years in management of malaria in a rural community in Rivers State, Nigeria in order to provide evidence for health care policy makers to scale-up the intervention for the rapid attainment of millennium development goals (MDGs) 4 that targets the reduction of child mortality.

Materials and Methods

Study area

The study was carried out in Akuku-Toru Local Government Area of Rivers State. Akuku-Toru is one of the 23 Local Government Areas of the state. The experimental study was carried out in Obonoma, a large coastal rural community with a population of 2,187 people and an annual growth rate of 3.2%. The control study was carried out in Obuama, also a large coastal community with a population of 3,234 and a similar growth rate of 3.2%.[22] Both communities are Kalabari speaking of Ijaw ethnic extraction. They share similar demographic, cultural and social characteristics and are located about 20 km apart from each other. The communities are both located in the dense rain forest zone of the Niger Delta area of Nigeria, an area characterized by thick vegetation suitable for the breeding of mosquitoes. The traditional occupation of the people is subsistence fishing, although small-scale crop farming on cassava and vegetables and petty trading are also common. Each study community has a primary health care clinic that is barely functional, with limited drugs, equipment and a few primary health care staff. There are also a few patent medicine vendors and traditional birth attendants in the communities.

Study design and population

The study was of quasi-experimental design that provided health education training on malaria for mothers/caregivers of children <5 years of age, with an evaluation of its outcome on their knowledge and practice of malaria prevention and case management among the experimental group compared with the control group. The study made use of eight Community volunteers (six females and two males) who were trained to deliver the experiment (health education).

Subject selection

Inclusion criteria were as follows: For community volunteers: (i) Adult male or female (ii) chosen by the community (iii) regular resident in the community (not visiting) (iv) with regular means of livelihood (v) willing to offer voluntary service to the community. For mothers/caregivers: (i) Mothers/caregivers with a child aged 6-59 months (ii) resident in the community for at least 1-year. Those excluded from the study were: (i) Mothers/caregivers of children whose birth dates were not known (ii) children reported to have other significant co-morbidities like sickle cell anemia or with severe illnesses such as pneumonia, measles, cellulitis, otitis media, etc., (ii) mothers/caregivers who provided care for children 6-59 months on short-term basis (<1-month).

Sample size determination

The appropriate minimum sample size "*n*" for the study was determined using the following formula for comparison of two proportions as follows:[23]

$$n = \frac{\left\{Z \propto \sqrt{\left[\pi_{0(1-\pi_0)}\right]} + Z\beta\sqrt{\left[\pi_{1(1-\pi_1)}\right]}\right\}^2}{\left(\pi_{1-\pi_0}\right)^2}$$

Where n = minimum sample size.

$Z\alpha$ = standard normal deviate (1.96) at 95% confidence level for this study.

$Z\beta$ = standard normal deviate (0.84) with a power of demonstrating a statistically significant difference before and after the experiment between the two groups at 90%.

π_0 = proportion at preexperiment (baseline knowledge of malaria 53.6%).[24]

π_1 = Proportion after experiment (proportion with adequate knowledge after the experiment 85%).[24]

$$= \frac{\left\{1.96\sqrt{[0.54 \times 0.46]} + 0.84\sqrt{[0.85 \times 0.15]}\right\}^2}{(0.85 - 0.54)^2}$$

$$= \frac{\left\{1.96 \times \sqrt{0.25} + 0.84\sqrt{0.13}\right\}^2}{(0.31)^2}$$

$$= \frac{\{1.96 \times 0.5 + 0.84 \times 0.36\}^2}{0.01} = \frac{(0.98 + 0.30)^2}{0.01}$$

$$= \frac{(1.28)^2}{0.01} = \frac{1.64}{0.01} = 164.$$

With the adjustment for 10% attrition, the calculated sample size became n = 182 (164/0.9)

However, a total of 184 mothers/caregivers were recruited into the study in both the experimental and control groups.

Theoretical framework

The study was carried out in three phases: Preexperimental, experimental, and postexperimental (evaluation) phases: Phase one (preexperimental) involved a descriptive cross-sectional comparative study, while phase two was comprehensive health education training in the experimental group only. Phase three (postexperimental) was a comparison between the experimental and control groups.

Preexperimental activities

This involved the development of the data collection tool, training of research assistants, selection and training of community volunteers, household listing and selection of mothers/caregivers of children 6-59 months. A total of 600 households with eligible children were listed in each of the experiment and control groups out of which 184 were selected by a systematic sampling method. The first eligible household and study participant in each of the study arms were selected by a simple random method through balloting. The subsequent households and participants were selected using a sampling interval of 1-in-3. Thereafter, a baseline survey to assess the mothers' knowledge, attitude, and practice about malaria prevention and management was done. The baseline represented the pretraining assessment for the experimental group and the initial assessment for the control group. The baseline data were collected with the aid of a questionnaire adapted from the National Guidelines for Integrated Community Management of Malaria,[25] and from the work of Ajayi *et al.*[15] The questionnaire was administered with the assistance of eight selected research assistants who were trained for 2 days on interviewing techniques and accurate record keeping to enhance the quality of the data collected. Section 1: Of the questionnaire was on socio-demographic characteristics of mothers and caregivers. Section 2: Was on knowledge of malaria and its prevention. Section 3: Was about knowledge of actions to be taken by mothers/caregivers during febrile illness of children, while section 4: was on knowledge of malaria treatment options. The responses of the mothers/caregivers to questions on knowledge of cause, symptoms and prevention of malaria were rated. Each correct response was rated as one while an incorrect response or "don't know" was rated as zero. The scores were summed up, and respondents with scores equal or >50% of total were classified as having "adequate knowledge," while those with scores < 50% were rated as "inadequate knowledge." This phase of the study lasted for 3 months.

Phase two (experimental phase) was a structured health education training program for selected mothers/caregivers in the experimental community. The training was carried out by the community volunteers who earlier trained by the researchers for 3 days, using a standardized training manual for management in Nigeria adapted from Federal Ministry of Health.[26] Thereafter each volunteer was allotted 23 mothers/caregivers as trainees. The training was conducted in pidgin English and in the native kalabari dialect where further explanations were necessary. It consisted of lectures, role-plays, interactive sessions and demonstrations. Posters on malaria, flyers, long-lasting insecticide-treated bed nets (LLINs), pictorial dosage charts for artemether-lumefantrine as well as pictorial illustrations of some common clinical features of uncomplicated malaria and complicated malaria were used as teaching aids. The trainees were also provided with colorful pictorial treatment guidelines to aid them in drug administration.

The training was based on the standardized training manual for management in Nigeria adapted from Federal Ministry of Health.[26] It consisted of 4 modules: Module I focused on the definition of malaria, malaria transmission, causes

and risk factors of malaria and malaria burden. Module II was on recognition of uncomplicated malaria and severe malaria. Module III was on factors that make malaria common in Nigeria, methods of preventing malaria and demonstrations on how to use LLINs. Module IV was on the drug treatment of uncomplicated malaria in children and the use of treatment guideline, side effects of drugs, drug safety and storage at home, monitoring and evaluation of patients and actions to be taken when symptoms of malaria persist for three or more days. The training lasted for 3 h each day for a total of 4 days.

The training was followed by the provision drugs and other supplies to the mothers/caregivers for presumptive treatment of children who come down with fever suspected to be malaria within the study period of 6 months. The drugs comprised of prepackaged, fixed dose combination of artemether (20 mg) and lumefantrine (120 mg) (yellow packets) for children aged 6-35 months and the blue packets for children aged 36-59 months. The mothers/caregivers were also provided with the pictorial treatment guidelines they could consult if the need arose, as well as copies of the home management of malaria community daily case register adapted from the National Malaria Control Program of the Federal Ministry of Health to record treated cases. The first complete dose of anti-malarial drugs was provided free of charge while they were asked to procure any subsequent anti-malarial drugs from their regular medicine vendors in the community. This phase lasted a period of 6 months. There was neither training nor intervention in the control group. Rather study participants were encouraged make use of the regular standard care available to them in the community.

The postexperimental phase was the evaluation of the experiment 6 months after the training, and application of the knowledge gained in the case management of malaria in children 6-59 months of age. It was carried out among both experimental and control groups by administering the same semi-structured questionnaire used at baseline. The outcome was compared with the baseline data.

Table 1: Sociodemographic characteristics of mothers/caregivers of under-5 children

Relationship of caregivers to under-5 children	Experimental group *n* (%) *n*=184	Control group *n* (%) *n*=184	Total *n*=368	Test statistic value χ^2	*P*
Mother	169 (91.9)	163 (88.6)	332 (90.2)	1.13; *df*=3	0.770
Father	6 (3.3)	8 (4.4)	14 (3.8)		
Grand parents	4 (2.2)	6 (3.3)	10 (2.7)		
Relation	5 (2.7)	7 (3.8)	12 (3.3)		
Age of caregivers (years)					
20-29	66 (35.9)	64 (34.8)	130 (35.3)	1.07; *df*=3	0.785
30-39	78 (42.4)	72 (39.1)	150 (40.8)		
40-49	29 (15.8)	36 (19.6)	65 (17.7)		
50-69	11 (5.9)	12 (6.5)	23 (6.3)		
Sex of caregivers					
Male	6 (3.3)	4 (2.2)	10 (2.7)	0.41; *df*=1	0.521
Female	178 (96.7)	180 (97.8)	358 (97.3)		
Educational status of mothers/caregivers					
No formal education	9 (4.9)	7 (3.8)	16 (4.4)	0.41; *df*=2	0.814
Primary education	156 (84.8)	160 (87.0)	316 (85.9)		
Secondary education	19 (10.3)	17 (9.2)	36 (9.8)		
Age of child (months)					
6-11	12 (6.5)	9 (4.9)	21 (5.7)	2.88; *df*=8	0.942
12-17	31 (16.9)	27 (14.7)	58 (15.8)		
18-23	26 (14.1)	30 (16.3)	56 (15.2)		
24-29	20 (10.9)	23 (12.5)	43 (11.7)		
30-35	17 (9.2)	21 (11.4)	38 (10.3)		
36-41	25 (13.6)	24 (13.0)	49 (13.3)		
42-47	21 (11.4)	18 (9.8)	39 (10.6)		
48-53	19 (10.3)	15 (8.2)	34 (9.2)		
54-59	13 (7.1)	17 (9.2)	30 (8.2)		
Marital status					
Single	7 (3.8)	12 (6.5)	19 (5.2)	3.74; *df*=2	0.155
Married	164 (89.1)	151 (82.1)	315 (85.6)		
Co-habiting	13 (7.1)	21 (11.4)	34 (9.2)		

Data analysis

All generated data were checked for inaccuracies and inconsistencies and analyzed with Epi Info version 7 statistical software package (Centre for Disease Control, Atlanta, USA). The Chi-square test was performed to test for association between categorical variables. A $P < 0.05$ was considered statistically significant.

Ethical consideration

Ethical clearance was obtained from the Ethics Committee of the University of Port Harcourt Teaching Hospital. Written informed consent was also obtained from heads of households, volunteers and the mothers/caregivers used for the study. The aim, objectives and benefits of the study were clearly explained to all the participants with assurances of confidentiality of their responses.

Results

A total of 368 mothers/caregivers were recruited for the study; 184 each in the experimental and control groups.

Sociodemographic characteristics of mothers/caregivers and children

Most of the caregivers were females 358 (97.3%), married 318 (85.6%), and mothers 332 (90.2%). Only 14 (3.8%) were fathers and 10 (2.7%) grandparents. Majority of them 316 (85.9%) had primary education, 36 (9.8%) had secondary education, while 16 (4.4%) had no formal education. There were no statistically significant differences in the socio-demographic characteristics of participants in both groups [Table 1].

Knowledge of malaria in under - 5 children by mothers/caregivers

Although 115 (62.5%) mothers/caregivers in the experimental group knew that mosquitoes were responsible for malaria fever at baseline, there was further improvement in their knowledge to 175 (95.1%) after the educational intervention ($P < 0.0001$). The situation was different in the control group with no significant change: 106 (57.6%) at baseline and 112 (60.9%) at evaluation 6 months later ($P = 0.634$). There was also an improvement in the knowledge of signs and symptoms of uncomplicated malaria among the experimental group from 134 (72.8%) at baseline to 178 (96.7%) at evaluation ($P < 0.0001$), compared with the control group ($P = 0.535$). Similarly, knowledge about severe malaria increased from as low as 38 (20.7%) at baseline to 139 (75.5%) in the experiment group ($P < 0.0001$) but did not yield any significant change in the control group: From 43 (23.4%) to 45 (24.5%) ($P = 0.896$). Knowledge of modern methods of preventing malaria, especially with the use of LLINs and indoor residual spays also improved from 56 (30.4%)

Table 2: Number of mothers/caregivers with knowledge of malaria

	Experimental group				Control group			
	Preexperiment (%) $n=184$	Postexperiment (%) $n=184$	Degree of change (%)	P	Preexperiment (%) $n=184$	Postexperiment (%) $n=184$	Degree of change (%)	χ^2 P
Knowledge of the cause of malaria in under-5 children								
Adequate	115 (62.5)	175 (95.1)	32.6	0.0001	106 (57.6)	112 (60.9)	3.3	0.634
Inadequate	69 (37.5)	9 (4.9)	−32.6	0.060	78 (42.4)	72 (39.1)	−3.3	0.670
Knowledge of seasonal prevalence of malaria								
Rainy season	128 (69.6)	165 (89.7)	20.1	0.0001	135 (73.4)	136 (73.9)	0.5	0.862
Dry season	56 (30.4)	19 (10.3)	−20.1	0.158	49 (26.6)	48 (26.1)	−0.5	0.951
Knowledge of symptoms/signs of uncomplicated malaria								
Adequate	134 (72.8)	178 (96.7)	23.9	0.0001	138 (75.0)	144 (78.3)	3.3	0.535
Inadequate	50 (27.2)	6 (3.3)	−23.9	0.318	46 (25.0)	40 (21.7)	−3.3	0.699
Knowledge of symptoms/signs of severe malaria								
Adequate	38 (20.7)	139 (75.5)	54.8	0.0001	43 (23.4)	45 (24.5)	1.1	0.896
Inadequate	146 (79.3)	45 (24.5)	−54.8	0.0001	141 (76.6)	139 (75.5)	−1.1	0.836
Knowledge of methods of preventing malaria								
Adequate	56 (30.4)	168 (91.3)	60.9	0.0001	47 (25.5)	52 (28.3)	2.8	0.712
Inadequate	128 (69.6)	16 (8.7)	−60.9	0.0001	137 (74.5)	132 (71.7)	−2.8	0.550
Practice of prevention of malaria								
Adequate	86 (46.7)	161 (87.5)	40.8	0.0001	77 (41.8)	82 (44.6)	2.8	0.651
Inadequate	98 (53.3)	23 (12.5)	−40.8	0.0001	107 (58.2)	102 (55.4)	−2.8	0.764

Adequate (≥50% of cumulative rating); inadequate (<50% of cumulative rating)

Table 3: Management of malaria by mothers/caregivers

Variable	Experimental group				Control group			
	Preexperiment (%) $n=184$	Postexperiment (%) $n=173$	Degree of change (%)	P	Preexperiment (%) $n=184$	Postexperiment (%) $n=169$	Degree of change (%)	P
Time interval between onset of fever and actions taken (h)								
0-24	68 (37.0)	131 (75.7)	38.7	<0.0001	48 (26.1)	39 (23.1)	−3.0	0.669
25-48	46 (25.0)	28 (16.2)	−8.8	0.414	60 (32.6)	53 (31.4)	−1.2	0.887
49-72	37 (20.1)	8 (4.6)	−15.5	0.423	36 (19.6)	34 (20.1)	0.5	0.905
>72	33 (17.1)	6 (3.5)	−13.6	-	40 (21.7)	43 (25.4)	3.7	0.743
Commonly administered anti-malaria drugs								
Paracetamol/aspirin	63 (34.2)	10 (5.8)	−28.4	0.226	71 (38.6)	67 (39.6)	1.0	0.785
Sulfadoxine/pyrimethamine	28 (15.2)	6 (3.5)	−11.7	-	32 (17.4)	22 (13.0)	−4.4	0.901
Artemisinin-lumefantrin	13 (7.1)	141 (81.5)	74.4	<0.0001	17 (9.2)	16 (9.5)	−0.3	0.639
Artemisinin only	19 (10.3)	8 (4.6)	−5.7	-	16 (8.7)	17 (10.1)	1.4	0.956
Chloroquine	37 (20.1)	6 (3.5)	−16.6	-	34 (18.5)	28 (16.6)	−1.9	0.755
Amodiaquine	24 (13.0)	2 (1.2)	−11.8	-	14 (7.6)	19 (11.2)	3.6	0.781
Dose of anti-malarial drug								
Correct	72 (39.0)	164 (94.8)	55.8	<0.0001	78 (42.4)	65 (38.5)	−3.9	0.641
Incorrect	112 (61.0)	9 (5.2)	−55.8	<0.0001	106 (57.6)	104 (61.5)	3.9	0.556
Number of times drug was given to the child per day								
Correct	68 (37.0)	162 (93.6)	56.6	<0.0001	80 (43.5)	77 (45.6)	2.1	0.830
Incorrect	116 (63.0)	11 (6.4)	−56.6	0.002	104 (56.5)	92 (54.4)	−2.1	0.738
Number of days drug was given to the child								
Correct	86 (46.7)	159 (91.9)	45.2	<0.0001	88 (47.8)	77 (45.6)	−2.2	0.770
Incorrect	98 (53.3)	14 (8.9)	−44.4	0.001	96 (52.2)	92 (54.4)	2.2	0.756
Treatment outcome								
Child got well	87 (47.3)	146 (84.4)	37.1	<0.0001	92 (50.0)	83 (49.1)	−2.2	0.937
Child got a little better	44 (23.9)	15 (9.8)	−14.1	0.249	32 (17.4)	34 (20.0)	−0.9	0.851
No improvement in child condition	34 (18.5)	8 (4.6)	−13.9	0.470	39 (21.2)	37 (21.9)	0.7	0.906
Sickness got worse	19 (10.3)	4 (1.2)	−9.1	-	21 (11.4)	15 (8.9)	−2.5	0.760

at baseline to 167 (91.3%) post-experiment ($P < 0.0001$) compared to an insignificant increase in the control group ($P = 0.712$). The practice of malaria prevention with under - 5 children sleeping under insecticide-treated bed nets increased by 40.8%: from 86 (46.7%) to 161 (87.5%) among the experimental group ($P < 0.0001$), while the control group experienced only a minor change of 2.8%: From 77 (41.8%) to 82 (44.6%) ($P = 0.651$) [Table 2].

Management of malaria in under - 5 children by mothers/caregivers

At baseline, only 68 (37.0%) mothers/caregivers commenced anti-malaria treatment with appropriate anti-malarials within 24 h of onset of symptoms among the experiment group. This proportion increased significantly to 131 (75.7%) ($P < 0.0001$) after the health education training. There was no significant change in the control group. Furthermore, the use of ACTs increased from as low as 13 (7.1%) at baseline to 141 (81.5%) at evaluation in the intervention group ($P < 0.0001$). There was no corresponding change in the control group ($P = 0. 956$). Similarly, it's correct dosing increased from 72 (39.0%) at baseline to 164 (94.8%) at evaluation ($P < 0.0001$) while no significant change took place in the control. There was also an improvement in the number of caregivers administering the correct number of doses of anti-malaria drugs to children with fever: From 68 (37.0%) to 162 (93.6%) ($P < 0.0001$) in the intervention group, while no change occurred in the control ($P = 0.781$). Furthermore, the number of caregivers administering anti-malarials for the correct duration of treatment increased in the experiment group from 86 (46.7%) at baseline to 159 (91.9%) at evaluation, while only a marginal change took place in the control group (2.2%) ($P = 0.760$). The proportion of mothers whose children got well after treatment for malaria increased from 78 (42.4%) at baseline to 146 (84.4%) after the experiment, while those whose children got worse and had to be referred to the Primary health care center for treatment declined from 19 (10.3%) at baseline to 4 (1.2%) at evaluation. There were no significant changes in the control group [Table 3].

Discussion

The study demonstrated considerable improvement in knowledge of the cause, symptoms and signs of uncomplicated and severe malaria among the mothers and caregivers. There was also a remarkable increase in their knowledge of prevention and case management of malaria, thus corroborating the results from other studies where educational interventions on malaria by community volunteers improved knowledge, attitude and treatment seeking behavior among caregivers.[27,28] The result was further comparable to what was observed in a study of capacity building for village malaria workers' (VMWs) project in Cambodia, where the proportion of VMWs who gave correct answers to all questions regarding malaria symptoms, transmission route, vector breeding places, development time significantly increased after a health education program.[29] The findings buttresses the fact that mothers/caregivers in rural settings with limited education can also benefit from correct basic health information and skills they can apply for the improvement of the health of their children.

The Alma Ata declaration on Primary Health Care stresses the importance of full participation of communities in the spirit of self-reliance as one of the key strategies in preventing and controlling prevailing health problems.[30] Therefore, the concept of using community volunteers in health care interventions not only conforms to this vision, but serves as a viable alternative in mitigating the effect of widespread shortages in health workforce in rural communities and strengthening the primary health care system. The strategy has become even more appropriate in present day Nigeria because of the dwindling health sector budgets at the local government level responsible for providing primary health care service for people in rural and remote communities and because of the incessant labor related disputes and strike actions in the health sector. Evidence from countries of Southern Africa in using lower level cadres of health workers or nonprofessionals like community volunteers in advent of the HIV epidemic to scaling-up antiretroviral treatment yielded positive results by increasing access to life-saving treatment to infected persons and improving health system efficiency, and also enhancing the role of the communities for sustainable health care.[18,19]

Although the use of community volunteers for priority health interventions has been successfully implemented with ivermectin distribution in the onchocerciasis control program, home management of malaria and insecticide-treated net distribution and Vitamin A distribution,[31] its application has been limited in scope. The outcome of this study further demonstrates that this approach can be harnessed to deliver the multiple interventions characteristic of malaria programs: Drug treatment, bed net distribution as well as education on their usage. This is significant because correct mothers' knowledge of malaria, coupled with timely and effective case management are indispensable factors in reducing malaria morbidity and mortality in high-burden areas, especially among the poor,[32,33] with potentials of hastening the attainment of the MDG 4.

It is also important to observe that some studies have highlighted concerns over the long-term effects and sustainability issues of using community volunteers in health care programs, highlighting challenges with quality assurance, safety, professional and institutional resistance, etc.[18,19] These issues are therefore recommended for further research.

Limitation of the Study

The outcome of the study might not entirely be attributed to the educational and capacity building intervention, as other educational programs on malaria aired through the mass media by the Rivers State Malaria Control Programme or nongovernmental organizations might also have contributed to improvement of knowledge of malaria by mothers/caregivers.

Conclusion

This study highlights the intrinsic potentials in community-based approach in malaria prevention and control, especially for those in rural areas with limited health manpower resources. It underscores the effectiveness of using trained community volunteers in increasing knowledge and case management of childhood malaria. Its universal adaptation is therefore advocated in order to achieve far-reaching reduction in malaria-related morbidity and mortality among children and for rapid attainment of MDGs 4.

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