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IMPROVING MALARIA RECOGNITION, TREATMENT AND REFERRAL PRACTICES BY TRAINING CARETAKERS IN RURAL NIGERIA

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Summary. A caretaker training programme was carried out in Ugwuogo-Nike, a rural area in south-east Nigeria, based on formative research within the community. A training of trainers workshop was organized for 30 leaders of women groups who subsequently trained other mothers in their group. Community information activities, which lasted for a period of eight months, included the use of posters, drama group and jingles. The programme was evaluated using the quantitative and qualitative methods that were employed at baseline, which included community survey and focus group discussions (FGDs). For the community survey, households with children under five years of age were identified and provided the sampling frame, from which 300 households were chosen using the systematic sampling method. The target population for the FGDs were caretakers of children under five years. Post-intervention evaluation of the programme showed significant ($p<0.05$) improvements in knowledge, home management of malaria and referral practices for severe malaria. Those who correctly reported that mosquitoes were the cause of malaria rose markedly from 39.7% to 88.7%. Knowledge of symptoms of mild and severe malaria also increased significantly. Only 1.5% of caretakers were aware of the correct dose of anti-malarial before intervention, but this increased to 41.5%. The impact of intervention brought about a dramatic change in the practice of taking severely ill children, especially those with convulsion, to a traditional healer. A minority (6.7%) of caretakers took a severely ill child to a traditional healer as against 60% pre-intervention. There was also a significant increase in use of formal health facilities for the treatment of severely ill children. The study findings support the view that training of mothers to recognize, treat appropriately and refer severe cases of malaria is feasible and may lead to a reduction in the incidence of severe disease.

Introduction

Malaria is a major public health problem killing at least one to two million people each year, mostly in sub-Saharan Africa (Snow *et al*., 1999; WHO, 2000a). In Nigeria,

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malaria is one of the leading causes of morbidity and mortality. It is responsible for 25% of infant mortality, 30% of childhood mortality and about 50% of outpatient visits (WHO, 2003). African heads of state agreed in the Abuja Declaration on a concerted effort to reduce the burden of malaria on the continent and endorsed the goal of the Roll Back Malaria Partnership of halving malaria incidence by the year 2015, as enshrined in the Millennium Development Goal (MDG) (WHO/RBM, 2000). Current strategies to combat malaria led by the World Health Organization's 'Roll Back Malaria' (RBM) initiative include access to prompt and effective treatment for malaria (WHO/RBM, 2000). A major obstacle to the implementation of this strategy is the often low attendance rates at health centres. Reasons for this include the physical difficulty of reaching the health centre, scarcity of affordable drugs, cost of treatment and poor performance of health personnel (Sauerborn *et al*., 1989; Foster, 1995; Ruebish *et al*., 1995; McCombie, 2002). In these circumstances most people resort to self-treatment at the household or village level. Many studies have shown that the majority of early treatments for childhood fever occur through self-medication, using drugs bought over-the-counter from untrained retailers (Deming *et al*., 1989; Ejezie *et al*., 1990; Ruebush *et al*., 1995; Hamel *et al*., 2001; McCombie 2002). One of the problems associated with home management is that in most cases neither the drug seller nor the consumer is aware of the correct dosage of treatment (Gomes *et al*., 1998). These treatments are often incorrect (Ramakrishna *et al*., 1989; Agyepong, 1992; Slutsker *et al*., 1994; Adome *et al*., 1996) and the ineffectiveness of these early practices represents a major problem, since most malaria mortality occurs within the first 48 hours of illness (Greenwood *et al*., 1987). These incorrect practices may also contribute to the spread of anti-malarial drug resistance (White, 1999). However, appropriate home treatment increases the proportion of children receiving correct anti-malarial therapy and facilitates prompt treatment, possibly preventing some of the complications of malaria and reducing child mortality (Greenwood *et al*., 1987; Deming *et al*., 1989; Kidane & Morrow, 2000).

During the formative stage of this study, it was discovered that the majority of caretakers were unaware of the correct cause, mode of transmission, symptoms and signs of mild and severe malaria, and practise self-medication with inappropriate dosages of anti-malarials bought over-the-counter. It was also noted that traditional healers were consulted preferentially for severe malaria, especially convulsion.

Based on the results of this formative phase, an intervention programme was developed to determine the feasibility of training caretakers to provide appropriate home treatment for childhood malaria and refer severe cases to a health facility, with a view to reducing childhood morbidity and mortality.

This report is part of a larger study designed to improve home management of childhood malaria and referral of severe malaria at the household and community levels.

Methods

The study area and population

The study was carried out in Ugwogo-Nike, a rural area situated in the newly created Iyiukwu local government area (LGA), which is about 20 km east of Enugu,

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the capital of Enugu State in Nigeria. It is made up of ten villages with a population of about 13,952. They are mostly Christians, ethnically Ibos and most are farmers and petty traders. It has one primary school and one secondary school. There is a primary health centre managed by the local government and a comprehensive health centre, manned by the state government. There are no good roads, no piped water supply, refuse disposal facilities are non-existent and open dumping is commonly practised. It has a big market square that attracts a lot of customers from the capital city and neighbouring villages every *Orie* (4 days) market day. Market days offer a good opportunity to communicate with community members. Malaria is holoendemic, with a high transmission rate all year round and an average incidence rate of 20%. The main malaria vector is *Anopheles gambiae* and *P. falciparium* is responsible for more than 90% of all malaria infections (Federal Ministry of Health, 2000).

Baseline survey

The aim of the baseline survey, which was conducted in 2002, was to identify caretakers' knowledge of cause, symptoms and treatment for malaria and referral practices for severe cases, with a view to developing appropriate intervention strategies for the control of the disease. Both qualitative and quantitative research methodologies were employed. The quantitative component was in the form of a household survey and the minimum sample size (n) required was calculated using the formula:

$$n = z^2 \frac{P(1-P)}{d^2}$$

where z is the corresponding value of the standard normal deviation test statistic at 5% level of significance (z=1.96); P is the proportion of households with children aged under five years, obtained from a pilot study conducted for this purpose (P=0.75); d is the sampling error (d=0.05). The minimum sample size obtained was 288. Making allowance for non-response this number was increased to 300. Since there was no household numbering in the rural study area, houses were numbered and mapped and a census was taken. Households with children under five years of age were identified and provided the sampling frame, from which 300 households were chosen using the systematic sampling method. Trained interviewers administered a pre-tested structured questionnaire, which was used to elicit information from a sample of 300 caretakers on socio-demographic characteristics, knowledge, beliefs, treatment-seeking and referral practices for malaria. Six interviewers were recruited from the study community, to give a sense of participation in the project. These were indigenes of the area, who speak the local *Igbo* dialect and their training was for a period of three days.

The qualitative aspect comprised of focus group discussions (FGDs) in which caretakers of children under five years were the target population. Sampling in the qualitative arm of the study was purposive, that is persons with the necessary study attributes were enlisted in the study. Since caretakers are usually women, only one gender category, that is females, was selected. Other criteria for selection of the

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respondents included age and educational background. The different age groups were young (30 years and below) and old (31 years and above). Stratification by educational status used no formal education, primary education, and secondary and post-secondary education as one category. For each of the age groups, respondents were selected to cover the three categories under educational background to give a total of six groups, and since each FGD comprises 8–10 persons, an upper limit of 60 persons participated. For qualitative data, the databases were created through immediate transcription of the interviews on the day they were conducted. The aim was to bring out the range of ideas and opinions expressed by different respondents during the qualitative study. These were pulled as illustrative quotes to confirm or refute the statistical findings from the quantitative study. The FGDs elicited information on knowledge, beliefs, treatment and health-seeking behaviours of mothers in relation to mild/severe malaria.

All the research instruments for this study were pre-tested before use, in a different community but with similar characteristics as the study community and appropriate modifications were made. The findings of the study were used to develop the intervention programme.

The intervention

The intervention programme commenced in 2003 for a period of 18 months, until May 2005. The main components of the programme were training of caretakers, community information activities, and monitoring and evaluation of the programme.

In recognition of the prominent role that traditional, administrative and political leaders play in ensuring community participation and successful implementation of an intervention programme, a series of sensitization meetings were held in the community. Having obtained the support of the community leaders, a core group known as Project Community Communication Group (PCCG) was formed, the composition of which included women leaders, opinion leaders, representatives of patent medicine vendors and traditional healers associations. The main aim was to promote community participation and for the group to help in the design, implementation and monitoring of the project and also to act as a link between the research team and the community. A request was made for the various representatives to disseminate information about the programme to other members of their groups so as to enhance community participation. Some members of the research team, representatives of women groups and a graphic artist then worked together to design various information, education and communication (IEC) materials, which included posters depicting a child with mild and severe malaria with a list of the clinical symptoms. This was to serve as a client awareness poster to help caretakers differentiate between mild and severe malaria and to take appropriate action. Posters were placed in strategic places throughout the community, such as market squares, churches and village halls where social gatherings took place. Audio jingles produced in the local language were aired several times on market and non-market days in the villages at regular intervals. Market days were chosen because people travelled from all the ten villages within the community to either buy or sell products. To avoid early message fatigue, two versions were produced: the first was played for the first 4 months and

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the second for the next 4 months of intervention. A drama group was also constituted in the primary school, to dramatize the clinical events, depict the attitudes and perceptions of caretakers elicited from the formative research, and the appropriate actions expected. They performed in the community by moving from one village to the other. This was usually preceded by an announcement by the village town crier, informing the villagers of the time and place. Sundays were chosen as the most convenient day, because being mostly Christians, they did not go to the farms and the children did not go to school.

The community information activities aimed at creating awareness of the programme, provide information on recommended anti-malarial drug policy, the importance of appropriate early treatment and symptoms of severe disease requiring referral to a health facility.

A training of trainers (TOT) workshop was organized for 30 leaders of women groups. Trained field workers familiar with techniques of effective communication carried out the TOT workshops. To ensure full participation, training activities took place during weekends so as not to interfere with their farming activities as it was the farming season. The participatory approach was adopted for the training, which lasted for three days; a re-training workshop took place one month later. The training emphasized culturally appropriate methods such as story-telling, role play, drama and use of proverbs. It focused on appropriate treatment of malaria, on misconceptions about the cause and mode of transmission of the disease, early recognition of symptoms of mild malaria and severe disease requiring referral. The caretakers were encouraged to obtain treatment dose guides each time they bought anti-malarials from a drug vendor. Emphasis was placed on the responsibility of the primary caretaker of the sick child at the household level, which in a majority of cases was the mother. At the end of the workshop, teaching guides were provided to participants to serve as reminders during their own training activities. They were encouraged to share their knowledge with family members, neighbours and friends through small group and face-to-face discussions. Furthermore, they were also asked to provide the knowledge acquired from the workshops to their group members during their usual monthly meetings in which mothers from all the villages participated. It was mandatory that every mother should belong to an appropriate women's age-grade group. The trained women leaders were ordinary members of the community who were chosen by their own people, and this promoted sustainability.

Monitoring and evaluation

Monitoring was carried out by some members of the PCCG and trained research assistants. Activities of the trained women leaders were monitored for eight months by sitting in during the monthly age-grade meetings, when they were expected to train other community members. In addition, the drama groups and jingles were also monitored to ensure that the printed schedule of activities was adhered to. To evaluate the intervention programme, the quantitative and qualitative methods that were employed at baseline, that is community survey and FGDs, were also used on a comparable sample of caretakers in the same community.

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Data analysis

Data entry and statistical analysis were conducted using EPI-INFO and SPSS statistical packages. Chi-squared test was used to test for any significant differences between proportions before and after the intervention. For the qualitative data, the transcriptions were organized under thematic headings and later developed into an ethnographic summary with illustrative quotes. The trajectories of their responses to questions were captured with a trajectory tree and then the different ranges of opinions, perceptions and stated practices were noted.

Ethical issues and informed consent

Ethical approval was sought and obtained from the Ethical Committee of the University of Nigeria Teaching Hospital, Enugu (UNTH). The research objectives and methods were explained to individual respondents and written informed consent was obtained from the study participants before the research instruments were administered. Confidentiality was maintained by making the information accessible to only the members of the research team.

Results

The socio-demographic characteristics of caretakers are shown in Table 1. The respondents in the pre- and post-intervention phases were comparable. In the pre-implementation phase, out of the 300 households, a total of 264 had children under five years who had febrile illness within the preceding two weeks, while in the post-intervention phase the number was 260.

Perceptions of causes of malaria and mode of transmission

Malaria was perceived to be caused by various factors. Table 2 shows that in the pre-intervention phase, most (49.3%) of the respondents reported that heat from exposure to the sun caused malaria. As some mothers explained in the FGD:

> . . . the sun can cause malaria by either shining directly on the child or on the breast of a lactating mother, if she stays too long under the sun, especially while at work in the farm, the breast milk will heat up and when that child eventually sucks, it will cause *iba* (malaria).

This view completely changed in the post-intervention phase as no respondent reported exposure to sun as a cause of malaria. One caretaker in an FGD described:

> . . . when *anwunta* (mosquitoes) bites someone with *iba* and bites another person without *iba* it will give *iba* to that person.

Those who correctly reported that mosquitoes were the cause of malaria markedly increased in the post-intervention phase, being 88.7% as against 39.7% in the pre-intervention phase ($p<0.05$).

As shown in Table 2, in the pre-intervention phase, some (37.3%) of the respondents were aware that mosquito bites transmit malaria but they were unsure of the process. It was also believed that malaria can be acquired in other ways such as

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Table 1. Socio-demographic characteristics of respondents (N=300)

Variables	Pre-intervention *n* (%)	Post-intervention *n* (%)
Age		
15–24	24 (8.0)	27 (9.0)
25–34	97 (32.3)	126 (42.0)
35–44	106 (35.4)	104 (34.7)
45–54	63 (21.0)	42 (14.0)
55 and above	10 (3.3)	1 (0.3)
Sex		
Male	9 (3.0)	13 (4.3)
Female	291 (97.0)	287 (95.7)
Status in family		
Mother	275 (91.7)	290 (96.7)
Father	9 (3.0)	2 (0.7)
Grandmother	10 (3.3)	7 (2.3)
Other	6 (2.0)	1 (0.3)
Level of education		
No formal education	81 (27.0)	77 (25.7)
Primary	174 (58.0)	176 (58.7)
Secondary	32 (10.7)	30 (10.0)
Post-secondary	13 (4.3)	17 (5.7)
Occupation		
Housewife	20 (6.7)	18 (6.0)
Trader	66 (22.0)	77 (25.7)
Farmer	193 (64.3)	181 (60.3)
Civil servant	2 (0.7)	3 (1.0)
Teacher	2 (0.7)	2 (0.7)
Other	17 (5.7)	19 (6.3)

through breast milk (26.7%), from bodily contact (15.3%), drinking dirty water (14.7%) and inhalation (8.7%). As noted by a caretaker:

> Mosquitoes cause malaria by perching on dirty things which can be transmitted into a person's blood after a bite and cause *iba*.

However, after intervention the majority (85.3%) of respondents understood fully the mode of transmission of malaria. This difference was again statistically significant (p<0.05). As a caretaker explained:

> ... how malaria enters the body is, the bushes around our house, mosquito thrives there in the bush, mosquito from there bites a person with malaria, sucks the person's blood, when it deposits the bad substance [parasite] into another person it has transmitted malaria into that person. This is how mosquito transmits malaria in a person.

Knowledge of symptoms of mild/severe malaria

Table 3 shows that before the intervention, weakness (48.7%) was the most frequently reported malaria symptom. This was followed by chills (46.7%), headache

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Table 2. Perceptions of causes of malaria and mode of transmission (N=300)

	No. responses (%)		
	Pre-intervention	Post-intervention	p-value
Causes of malaria			
Too much sun	148 (49.3)	0 (0)	NA
Mosquitoes	119 (39.7)	266 (88.7)	<0.001*
Fried food	113 (37.7)	10 (2.3)	<0.001*
Hard work	96 (32.0)	0 (0)	NA
Cold weather	58 (19.3)	8 (2.7)	0.0002*
Dirty environment and flies	42 (14.0)	2 (0.6)	NA
Weakness	18 (6.0)	0 (0)	NA
Alcohol	17 (5.7)	0 (0)	NA
Don't know	14 (4.7)	14 (4.7)	1.000
Other	8 (2.7)	0 (0.00)	NA
Mode of transmission			
Mosquito bites	112 (37.3)	256 (85.3)	<0.001*
Breast milk	80 (26.7)	6 (2.0)	<0.001*
Body contact	46 (15.3)	5 (1.7)	<0.001*
Drinking dirty water	44 (14.7)	8 (2.7)	0.003*
Inhalation	26 (8.7)	0 (0)	NA
Sharing same cup	34 (11.3)	0 (0)	NA
In-born	5 (1.7)	0 (0)	NA
Don't know	35 (11.7)	20 (6.7)	0.227
Other	7 (2.3)	5 (1.7)	1.00

*Statistically significant at p<0.05; NA=not applicable.

(43.0%), dark yellow urine (36.0%) and sweating (10.3%). Fever, diarrhoea and abdominal pain were reported by 7.7%, 6.7% and 6.3% of respondents respectively. Most of the symptoms mentioned by the respondents seemed to reflect correct clinical symptoms of malaria. The main effect of intervention activities on knowledge of symptoms of mild malaria was that most caretakers (79.7%) now recognized fever as an important symptom of malaria (p<0.05). A mother in an FGD noted that:

> ... the child will have *ahuoku* (hot body).

At the post-intervention period, there was a marked increase in knowledge with regard to recognition of severe symptoms requiring referral. A mother summed it up:

> ... how we recognize severe malaria is it starts from the head, the child feels hot in the head, his eyes will be sunken, making the child to breath inwardly and fast. Yellowness of the eyes, the mouth will be dry and when you look at him he will be *ocha-ocha*, white [pale] and he will be vomiting if he has eaten anything, he will be weak. If you come down to the waist like this, if he urinates the colour will be like Coke, or pass very small urine, that is if he urinates at all, because there are some who do not urinate, then if you want him to stand he will not stand, he will fall.

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Table 3. Knowledge of symptoms of malaria as reported by respondents (N=300)

	No. responses (%)		
	Pre-intervention	Post-intervention	p-value
Symptoms of mild malaria			
Fever	23 (7.7)	239 (79.7)	<0.001*
Weakness	146 (48.7)	197 (65.7)	0.005*
Chills	140 (46.7)	189 (63.0)	<0.001*
Headache	129 (43.0)	130 (43.3)	0.886
Yellow urine	108 (36.0)	110 (36.7)	0.865
Vomiting	64 (21.3)	97 (32.3)	0.077
Body pain	58 (19.3)	76 (25.3)	0.305
Bitterness in mouth	54 (18.0)	79 (26.3)	0.172
Sweating	31 (10.3)	14 (4.7)	0.179
Diarrhoea	20 (6.7)	7 (2.3)	0.602
Abdominal pain	19 (6.3)	16 (5.3)	0.772
Other	5 (1.7)	11 (3.6)	0.402
Symptoms of severe malaria			
High fever	178 (59.3)	270 (90)	<0.001*
Inability to eat	175 (58.3)	201 (67.0)	0.03*
Drowsiness	105 (35.0)	136 (45.3)	0.009*
Convulsion	80 (26.0)	142 (47.3)	<0.001*
Yellowness of eyes	60 (20.0)	89 (29.6)	0.102
Inability to sit or stand	48 (17.4)	41 (13.7)	0.55
Repeated vomiting	46 (16.0)	83 (27.7)	0.041*
Unconsciousness	23 (8.7)	78 (26.0)	0.0015*
Diarrhoea	14 (5.3)	9 (3.0)	0.470
Coke-coloured urine	0 (0)	90 (30.0)	NA
Fast breathing	0 (0)	6 (2.0)	NA
Lack of blood	0 (0)	3 (1.0)	NA

*Statistically significant at p<0.05; NA=not applicable.

The knowledge that high fever (59.3% vs 90%), convulsion (26% vs 47.3%), drowsiness (35% vs 45.3%), Coke-coloured urine (0% vs 30%) and unconsciousness (8.7% vs 26%) were symptoms of severe malaria increased significantly after the intervention (p<0.05).

Prior to intervention most respondents were of the view that there was no relationship between malaria and convulsion, but rather convulsion was as a result of the high fever. As some of the mothers put it:

> . . . they will have high fever, which will lead to *ihe odido* (convulsion).

Some of the mothers also attributed the cause of convulsion to cold weather saying that:

> . . . if rainy season or cold weather comes it causes fever which results in convulsion.

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Table 4. Sources of care for mild malaria

Sources of care	No. responses (%) Pre-intervention N=264	Post-intervention N=260	p-value
Drug vendors	138 (52.3)	208 (80.0)	<0.001*
Home herbs	51 (19.3)	7 (2.7)	0.0003*
Drug hawkers	22 (8.3)	0 (0)	NA
Government health centre	16 (6.1)	29 (11.2)	0.205
Private clinics	15 (5.7)	16 (6.1)	1.0
Traditional healers	12 (4.5)	0 (0)	NA
Left-over drugs	6 (2.3)	0 (0)	NA
Other	4 (1.5)	0 (0)	NA
Total	264 (100)	260 (100)	

*Statistically significant at p<0.05; NA=not applicable.

Post-intervention, the majority of mothers could recognize the relationship between malaria and convulsion.

Treatment and care-seeking behaviour

The preferred sources of care, that is the first action taken for the treatment of mild malaria, are shown in Table 4. It is noteworthy that if a child had mild malaria that later progressed to severe illness, both episodes were recorded. In the pre-intervention period, drug vendors were the most (52.3%) popular source of care followed by home treatment with herbal remedies (19.3%). Other sources included drug hawkers (8.3%), government clinic (6.1%) and private clinic (5.7%). A few (4.5%) sought help from traditional healers and 2.3% used left-over drugs at home. When this is summarized, self-treatment was used by 221 (83.7%), the formal sector by 31 (11.7%) and traditional healers by 21 (4.5%). Use of herbal remedies at home was the second most popular form of treatment for febrile illness. On the other hand, after the intervention, drug vendors still remained the major source of care for mild malaria, increasing to 80% (p<0.05). Very few used home treatment with herbal remedies and almost none used traditional healers; therefore self-treatment increased significantly.

Before the intervention, only 1.5% of caretakers were aware of the correct dose of anti-malarial (chloroquine) and 98.5% of the drugs were administered incorrectly. This pattern changed after the intervention as 41.5% of the caretakers became aware of the correct dose of anti-malarial to administer (p<0.05).

The sources of care for severe febrile illness before and after the intervention are shown in Table 5. Before the intervention most (60%) of the caretakers took their children to a traditional healer, drug vendor (8.6%), private clinic (2.6%) or local government health centre (5.7%) and used home herbs (14.3%). Others went to the government-owned secondary health facility, the Park Lane Hospital (4.3%), and the

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Table 5. Sources of care for severe malaria

Source of care	No. responses (%) Pre-intervention (*N*=70)	Post-intervention (*N*=45)	*p*-value
Traditional healers	42 (60)	3 (6.7)	NA
Home herbs	10 (14.3)	4 (8.8)	NA
Drug vendors	6 (8.6)	1 (2.0)	0.029*
Ugwugo health centre	4 (5.7)	5 (11.1)	<0.001*
Park Lane General Hospital	3 (4.3)	18 (40.0)	<0.001*
University Teaching Hospital	2 (2.6)	14 (31.1)	<0.001*
Private clinics	2 (2.6)	8 (17.0)	0.0009*
Other	1 (1.4)	0 (0)	NA
Total	70	45	

*Statistically significant at $p<0.05$; NA=not applicable.

tertiary health facility, the University of Nigeria Teaching Hospital (UNTH); both are located within the capital city Enugu, about 20 km from the study site. The impact of intervention brought about a dramatic change in the practice of taking severely ill children, especially those with convulsion, to a traditional healer. Only 6.7% of caretakers took a severely ill child to a traditional healer and 8% used home herbs. Most of them used the formal health facilities like the local health centre (11%), Park Lane General Hospital (40%), University of Nigeria Teaching Hospital (31%) and private clinics (17%). This increase in use of formal health facilities after the intervention was statistically significantly ($p<0.05$). As a mother explained during an FGD:

> . . . when the fever starts, get tepid water and clean the body, go to the chemist and buy drugs, that is what I do. I will buy drugs, if he does not respond, I will take him to hospital.

This displays her understanding that once a child does not respond to treatment he should be taken to a health facility.

Referring to the old traditional practice, a caretaker observed:

> . . . you should not use *ude-aku* [palm kernel oil] or place the child over a burning fire, this should not be done.

It is interesting to note that there were fewer severe cases after intervention: 70 vs 45. To measure compliance to referral, community members of the PCCG were detailed to follow up the referred patients, to confirm compliance. Over the eight-month period, of the 132 cases of severe malaria referred by trained drug vendors, 115 (80%) complied. For those referred by traditional healers, 71% complied.

Commenting on the effectiveness of the programme, which resulted in a perceived reduced mortality from childhood malaria, the traditional ruler of the community summed up:

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> . . . it is very effective, you created a lot of awareness on malaria that has reduced the death of children from this community, since you came into it. In fact, this shows that you did a great job here, we have seen the good effects of this project, we are so grateful and we thank you people.

Discussion

Throughout Africa, a large majority of malaria episodes in children are first treated at home and self-treatment is common (Van der Geest, 1987; Foster, 1991; Snow *et al*., 1992; Mwenesi *et al*., 1995). The reasons underlying this practice include both ease of access and perceived deficiencies in the performance of formal health services (Kroeger, 1983; Hassouna, 1983; Foster, 1995).

Baseline findings confirmed that uncomplicated fevers were normally first treated at home using shop-bought drugs, and self-medication was common. This and other studies have shown that most begin treatment at home with anti-malarials and antipyretics purchased over-the-counter from drug vendors without prescription and usually with inappropriate doses of chloroquine (Igun, 1987; Derming *et al*., 1989), which often results in poor quality of care and fosters the development of drug resistance (Derming, 1993). Post-intervention, use of drug vendors as a source of care increased significantly and more caretakers also used anti-malarials at correct doses. It may therefore be concluded that appropriate home treatment increased. It has been documented that home treatment of malaria has some potential advantages and that appropriate home treatment increases the proportion of children receiving anti-malarial therapy and facilitates prompt treatment, possibly preventing some of the complications of malaria (Greenwood *et al*., 1987; Derming *et al*., 1989). These considerations have recently led some authors to advocate improving the self-medication practices of the population, as a necessity for more effective malaria control (Foster, 1995; Breman & Campbell, 1988; Ruebush *et al*., 1995). Another study, conducted in Burkina Faso, also confirmed that community-based programmes for training mothers to make presumptive diagnosis and provide treatment to their under-fives were feasible. An Ethiopian study found evidence of a reduction in child mortality after an intervention to encourage prompt and adequate home treatment of suspected malaria (Kidane & Morrow, 2000).

It is noteworthy that chloroquine was the first-line drug for treatment of malaria in Nigeria at the start of this study, and the only anti-malarial drug available in the majority of shops in the study area. A new policy, which recommended a change to artemisinin-based combination therapy (ACT), was officially inaugurated in May 2005 (Federal Ministry of Health, 2005), by which time the intervention programme had ended. However, the choice of drug in this study was not as pertinent as establishing the fact that it is possible to improve a rural community's knowledge on identification of malaria, correct use of anti-malarials in the treatment of children under five years of age and referral of severe cases to a health facility. The study is also considered relevant because chloroquine is usually given over a period of 3 days and ACT over 3–5 days, so dosage patterns are not really dissimilar. In other words, a community that can be trained to use chloroquine correctly can also be trained to use ACT.

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At baseline, the majority of caretakers would resort to traditional healers if the illness got worse, since complications such as convulsion were perceived to be better managed by them. It has been documented that as far as convulsions are concerned, the treatment is perceived to be best done by the traditional healer or at household level. All options must be exhausted before a mother takes a child to a health facility, where it is believed that the chances of dying are high. Especially dreaded is the prospect of a child being injected, which they believe could kill the child instantaneously (Mwenesi, 1993).

The impact of intervention brought about a dramatic change in the source of care for severe febrile illness, especially children with convulsion. There was a shift from traditional healers to the use of health facilities as major providers, thereby improving referral practices. The improved referral may be attributed to improved recognition of symptoms of severe illnesses as confirmed by the post-intervention evaluation and the fact that the community perceived a reduction in childhood mortality, since inception of the project, as was shown by the qualitative data. Pre-intervention, the few traditional healers who referred patients to hospital only did so after they had completed their treatments. As full administration of their treatments requires 3–7 days, it may take as long as 4–8 days after the initial consultation for traditional practitioners to refer patients to hospital. This results in considerable delay in referral to a health facility, as was also found in coastal Tanzania (Winch *et al*., 1996). Delay in seeking treatment, whatever its cause, is probably a very important factor in mortality from malaria, since the majority of mortality from malaria occurs within the first 48 hours of illness (Greenwood *et al*., 1987).

In addition, the benefits derived from a decline in use of traditional practices for severe illness, which included a reduction in the risk of chemical conjunctivitis from the application of palm kernel oil (*ude aku*) to the eyes, the risk of burns from putting their feet over fire and that of tetanus and blood-borne pathogens from scarifications, cannot be over-emphasized.

The primary goal of malaria control is to reduce morbidity and mortality through prompt diagnosis and adequate treatment. The focus of delivery of such service has been through the formal health facilities. However, such settings where treatment is provided by trained personnel, represents only a small part of the providers of care for malaria patients in rural communities. In our study community, with about 10,000 people, there is only one health centre and a cottage hospital with a few nurses. These health facilities have no drugs, no laboratory facilities and diagnoses are made on clinical observations similar to what is being done at home. The formal health sector facilities are therefore inadequate to meet the health needs of the people, including malaria treatment. The post-intervention results have also revealed that they are poorly utilized for treatment of mild malaria, and for severe illness the caretakers prefer to travel to the secondary and tertiary health facilities in the urban area, situated about 20 km away, where a doctor will always be found. The reality is that many years will pass before government programmes will be able to supply communities with adequate supplies of essential drugs. Even if these are made available, the natural human desire for the personal sense of control and convenience offered by self-treatment will not be easily extinguished (Oshiname & Brieger, 1992).

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This study has demonstrated that, by training caretakers, a programme aimed at improving prompt and correct treatment of uncomplicated malaria with referral of severe cases at the household level is feasible and well accepted by the community.

Since the diagnosis and treatment of malaria is occurring in the home, efforts should be directed at improving its quality, and the training of caretakers is one way of improving community knowledge about medications and strengthening the quality of natural self-care tendencies.

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