

# Primary motives for demand of ivermectin drug in mass distribution programmes to control onchocerciasis

Okwuoma Abanobi<sup>1</sup>, Uchechukwu Chukwuocha<sup>1</sup>, Celestine Onwuliri<sup>2</sup>, Kenneth Opara<sup>1</sup>

Departments of Public Health Technology<sup>1</sup>, and Biological Sciences<sup>2</sup>  
Federal University of Technology, Owerri, Nigeria.

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## Abstract

**Background:** Onchocerciasis is a disease with a spectrum of manifestations suffered by different infected people. Based on individual perceptions and manifestations presented, demand for the drug Ivermectin was due to different motives and priorities during mass distribution programmes. **Subjects and Method:** This study presents findings from a sample of 594 persons out of a total of 35,763 treated individuals who voluntarily demanded Ivermectin treatment during a community-based Ivermectin distribution exercise. The distribution, which took place in 2008, was mass distribution of the microfilaricide to control onchocerciasis in endemic communities of Ezinihitte in the Imo River Basin of Nigeria. The subjects who were selected by quota sampling procedure on the basis of community and gender, were asked to rank-order six plausible reasons for seeking treatment in terms of their order of importance in motivating them to demand Ivermectin. **Results:** “To gain treatment and prevention of Skin Problems” and “Desire to be De-wormed” ranked first and second respectively. “To gain promotion of general wellbeing” and “To improve state of vision and prevent blindness” ranked third and fourth respectively. In the fifth and sixth rank-order positions were “To prevent hanging groin” and “to prevent/relieve enlargement of the scrotum or clitoris” in that order. A test of hypothesis to determine if there was significant agreement among treated persons on the rank order of importance of their reasons for demanding Ivermectin gave a Kendall’s Coefficient of Concordance of  $W = 0.62, p < .001$ . **Conclusion:** The findings are interpreted within the framework of the major postulations of the health belief model with consideration to perceptions of severity of the conditions and belief that submitting to treatment will abate the perceived risk of the conditions. The role of endemicity of specific manifestations of onchocerciasis in lay assessment of risk of this disease is also discussed.

**Keywords:** Ivermectin, onchocerciasis, de-worming, onchodermatitis, perception of susceptibility, perception of severity, River blindness, health behaviour, muscular pains.

**Correspondence to:** Uchechukwu M. Chukwuocha, Department of Public Health Technology, Federal University of Technology, Owerri, Nigeria. Tel.: +234 8034712957, Email: chukwuochauchem@yahoo.com

## Introduction

The microfilaricide, Ivermectin, was introduced for the control of onchocerciasis in endemic communities following several clinical and community trials. These trials showed that it reduces microfilarial density in treated persons and abates the prognosis of several debilitating conditions associated with onchocerciasis [1-5]. Since mass Ivermectin treatment results in significant reductions in the community microfilarial load, the transmission potential of the causative agent, *Onchocerca volvulus* from person to person can be broken

[6-8]. As this happens with progressive treatments, eventual control of the disease is achieved.

Because of the close association of onchocerciasis with blindness, community-based Ivermectin distribution programs have often cited blindness prevention as their primary mission or goal. However, people may demand health care goods and services for reasons other than the motives of the providers. Proper understanding of the underlying motives in the use of services is important for predicting patterns of use and, therefore, necessary in

planning the provision of services. This is particularly true of preventive health services where the need to ameliorate disabilities associated with a presenting illness may be the primary motivation to seek treatment and to comply with prescribed regimen. This study was conducted to find out what primary reasons motivate persons in onchocerciasis-endemic communities to voluntarily demand Ivermectin during mass treatment exercises.

## Subjects and Method

The reference population in this study is the estimated 85,042 persons living in densely populated and clustered 120 villages located in the 13 communities of Ezinihitte-Mbaise in Imo State, Nigeria. Results of earlier epidemiological surveys had shown many foci located along tributaries of the Imo River to be hyperendemic for onchocerciasis [9, 10]. Community-directed mass distribution of Ivermectin in Ezinihitte Communities to control onchocerciasis was started in 1993. The response of the villagers to Ivermectin treatment has remained good with the annual treatment coverage ranging between sixty-five and seventy-nine percent [11].

Observations about motives for demanding Ivermectin were made during exit interviews of a random sample of 594 adults from a population of 40,914 treated persons from 13 communities in Ezinihitte, Nigeria. The sample was based on quotas derived from about 1.6 percent of persons treated in each community during 1997-treatment exercise. 60,884 persons had been pre-registered as eligible for treatment. Local area teachers who had been trained on rapid sampling and survey techniques conducted the interviews. In these exit interviews, the subjects were asked to indicate their reasons for demanding Ivermectin in their rank order of importance.

### Statistical Analysis

Kendall's Coefficient of Concordance,  $w$ , available in version 15 of Statistical Package for Social Sciences (SPSS, version 15) was used to test agreement as to the rank order of importance of different reasons for demand of Ivermectin during mass distribution. The level of significance of agreement of the rankings was tested at  $\alpha=0.05$ .

## Results

The highest proportion of those interviewed, 42 percent, ranked relief of dermatological complaints and presentations as the foremost reason for submitting to mass Ivermectin treatment. 20 percent of the interviewees cited de-worming as their foremost reason for demanding treatment. 9 percent of the subjects said their foremost reason was to improve their vision. For a relatively large number of persons their primary reason for demanding Ivermectin treatment was "general health promotion". Based on these responses, an overall rank order of importance of the six cited reasons for demanding Ivermectin treatment during community-directed mass distribution exercises is shown in Table 1. The observed

Kendall's Coefficient of Concordance,  $w$ , for the rank ordering of 0.62 ( $p<.001$ ) shows that there is significant agreement among the treated persons on the rank order of importance.

Analysis of data for statistical association between primary reasons for demanding Ivermectin during mass treatment and age, and gender showed that the ranking of the most important reason for demand of Ivermectin is independent of age ( $\chi^2=12.98$ ,  $p=.23$ , d.f. = 10) and gender ( $\chi^2=8.79$ ,  $p=.04$ , d.f. = 5). Similarly, community of origin, as defined by the health district assignment, was not found to be statistically associated with primary reasons for demanding Ivermectin treatment ( $\chi^2=20.58$ ,  $p=.73$ , d.f. = 25). However, choice of "treatment and prevention of dermatological diseases" and of "de-worming effects" tended to be more popular with women while demand of Ivermectin for general health promotion tended to be more popular with men.

## Discussion

Understanding why eligible residents of onchocerciasis-endemic communities submit to initial Ivermectin treatment and comply with the annual treatment requirement is important for boosting treatment coverage and sustaining same over the ten or more required years of consecutive treatments. Such information is important for purposes of program planning and evaluation. It helps to understand the compliance or non-compliance behaviour of persons who are the intended beneficiaries of health services programs. While much is known about health care services seeking behaviour of ill persons, much fewer studies have been carried out to understand preventive health care services utilization behaviour of otherwise apparently non-ill persons.

Population-based mass distribution of Ivermectin in onchocerciasis-endemic communities is a preventive health services program. Its remarkable high popularity relative to such other programs as Vitamin-A supplementation and contraceptives distribution programs, or for that matter, immunization campaigns, naturally arouses some curiosity as to why many people voluntarily demand Ivermectin. The findings of this study show that people living in oncho-endemic communities have different primary reasons for voluntarily submitting to annual Ivermectin treatments. The most popular reason being prevention and cure of onchocercal skin sessions; followed by expulsion of intestinal helminthes. Promotion of general well-being ranks third ahead of prevention of visual loss, while the desire to mitigate the risks of two forms of lymphatic presentations of onchocerciasis, namely scrotal/clitoral enlargement and hanging groin were ranked least in that order.

Reports of empirical studies carried out to explain health services utilization behaviour of population groups abound in literature [12-15]. A useful conceptual-theoretical framework for explaining health care seeking behaviour is

the health belief model [16]. Heinzelman applied this model to the explanation of why people demanded penicillin prophylaxis for rheumatic fever and associated heart disease [17]. In another study of the use of preventive services, Leventhal, Hochbaum and Rosenstock used the model to explain the demand for vaccination against influenza [18]. Although the present study was not built upon the health belief model *per se*, the fundamental postulates of the model can be used to interpret the present data. The health belief model postulates that people will use available health services to mitigate specific health problems they have; if they reasoned that they are susceptible to the risks associated with the problem. It also posits that readiness to initiate use of available services is a function of the extent to which the persons affected consider the problem to be serious or severe [16].

This model presupposes that utilization of health care services is a process of rational decision making. Certainly this is arguable. Empirical evidence abound to suggest that other influences including the opinion of other people significant to the affected person, income, cultural predisposition in the perception and interpretation of symptoms of illness as well as residential propinquity to facility, among other factors, also determine health services utilization behaviour [14, 15, 19, 20]. The apparent shortcomings of the health belief model is not withstanding, it remains a useful framework for explaining use of services.

On the basis of the major postulates of the health belief model, the current data would imply that the majority of the people in the treated communities surveyed considered themselves more susceptible to onchocercal skin lesions. They may also consider the dermatological involvement to be more serious or severe than other conditions associated with the disease. One or both of these predispositions would account for subject's ranking of the cure and prevention of onchodermatitis as the most important reason for demanding Ivermectin.

The above explanation is quite plausible since the prevalence of onchocercal skin lesions is much higher than blindness rates in the area surveyed. Also the much earlier onset of onchodermatitis relative to that of blindness or visual loss means that the former, more than the latter, will be more readily perceived as the major risk of onchocerciasis by lay persons. The implication here is that if the mobilization messages of Ivermectin distribution programmes emphasized blindness more than onchocercal skin lesions, fewer numbers of the eligible persons will present themselves for treatment. This would mean lower treatment coverage and therefore compromised opportunity to reduce the community microfilarial load to a point where transmission of *O. volvulus* can be broken.

Although the purpose of community treatment with Ivermectin is to control onchocerciasis, the concomitant anti-helminthic action of Ivermectin in treated persons continues to be very popular among treated residents of

onchocerciasis-endemic villages. Mass de-worming effects of Ivermectin has been reported in several community treatment programmes [2, 21]. The tendency for treated persons in oncho-endemic villages to interpret the efficacy of Ivermectin on the basis of worm expulsion has also been severally reported [22, 23].

The high ranking of de-worming effects as a primary reason to use and to continue using Ivermectin may stem from the high prevalence of intestinal helminthiasis in the study area and the fact that it is a readily observable outcome of treatment. While mass Ivermectin treatment is not indicated for de-worming purposes, its efficacy in this regard needs to be mentioned in community mobilization messages to solicit demand for Ivermectin since this is likely to boost coverage. This is particularly true of women and children.

The worm expulsion action of Ivermectin was more popular with women and children as a primary reason for demanding Ivermectin. This is understandable since children in rural villages tend to defecate in the open, giving opportunity for expelled worms to be sited. De-worming is therefore more likely to be associated with demand for Ivermectin by children. Mothers would also tend to direct their children to go for Ivermectin treatment in order to be de-wormed. The role of mothers in influencing the utilization of health care services by their children has been severally documented [15, 24, 27].

The attribution of general promotion of well being to Ivermectin treatment featured high among subjects in this study. Although this category is somewhat vague and may well include several effects of Ivermectin, the emphases tended to be on relief of musculo-skeletal pain and incapacity. Specific aspects mentioned by the treated villagers include rheumatism, lower back pain and muscle fatigue. Indeed, several scholars, working independently, have reported the association of a variety of muscular and skeletal pains with onchocerciasis [28, 29]. In predominantly farming communities, body pain and fatigue can be real threat to productivity and healthful living. No wonder this reason for demanding Ivermectin treatment ranked high among working age males. Some treated villagers have, in some cases, stretched the efficacy of Ivermectin in the relief of body pains and fatigue to imply aphrodisiac effects [23].

Since concern for body pains and fatigue tend to be more predominant during the farming season, one would expect demand for Ivermectin to relieve these conditions to be particularly highest during the farming season. Paradoxically, this is also the period most adult residents of endemic communities are less likely to put aside farm work to receive Mectizan® treatment.

The classical and most commonly cited manifestation of onchocerciasis is eye lesions resulting in some loss of vision; hence the disease is most commonly called River Blindness. Although people in treated communities have

reported noticeable improvements in their vision following treatment; they apparently do not consider themselves as being at the risk of eventual loss of vision. Some people insist that blindness is, and ought to be considered the most serious of the health problems of onchocerciasis. For one thing, they reason that unlike most of the other manifestations, it is not readily reversible. However, because of the low prevalence of onchocercal blindness, and plausibly because partial loss of vision tends to progress rather very slowly, the risk is not rated very high among treated persons in onchocerciasis-endemic communities.

It would be interesting to relate the findings of this study to a similar study of treated persons in communities located in the Savannah bio-ecological region. Observations indicate that while onchocercal skin lesions predominate in the southern rain forest communities of West Africa, they are not very prevalent in the Northern Savannah bio-ecological zone [28, 37].

The low prevalence of scrotal and clitoral enlargements due to filariasis would account for the low ranking of these conditions as important reasons for demanding Ivermectin. These conditions, which arise from filarial blockage of lymphatic pathways in the pelvic region, tend to be rather gross and graphic, as does hanging groin. Their implications for married life and sexuality make them very important. However, because they have relatively low prevalence and because they are also associated with a lot of social stigma, persons in onchocerciasis-endemic communities may not very readily admit that they are primary concerns in the utilization of mass Ivermectin treatment services. Furthermore, the fact that this drug does not reverse any of these lymphatic involvements, unlike skin lesions, may also account for the low ranking of scrotal/clitoral enlargement and or hanging groin as primary reasons for demand of Ivermectin during community-distribution exercises.

It is the public health implications of onchocerciasis and the tendency of the disease to present as obstacles to socioeconomic development in communities where it is highly endemic that justify active mass distribution of the drug to eligible persons for several consecutive years. To achieve the intended goals of mass distribution programmes, high treatment coverage rates are necessary. To boost coverage, it is necessary to understand why persons at risk of onchocerciasis may initiate demand for the microfilaricide and sustain the demand over 10 or more consecutive years. This study shows that prevention and care of onchocercal skin diseases is a paramount reason. According to the World Health Organization Expert Committee Report, these diseases are associated with inflammatory reactions around dead or dying microfilaria of *O. volvulus* [38]. The type and intensity of these skin lesions vary according to the microfilarial density in the skin, the immune response of the infected person as well as bio-ecological zones and the duration of the infection [38]. These skin lesions, which include

among other presentations, severe itching, maculo-papular rashes, scaling, lichenification, oedema, depigmentation and general skin atrophy, tend to give people the characteristic premature aging appearance, making the young look older and the old to wear the skin-look of a reptile [30, 40]. A particular type of skin disease, "Sowda", that is characterized as chronic hyperactive and localized onchodermatitis has been reported to be quite prevalent in the tropical rain-forest zone of Nigeria by Okonkwo and associates [41].

In separate research reports, Goodman et al [42], Porter and Beuf [43] and Goffman [44] have all noted that onchocercal skin lesions constitute serious physical and psycho-social handicap to affected persons. The social impact of onchocercal skin disease in rural rainforest communities of Nigeria has further been documented by Obikeze [45]. Also, in separate studies, Boatman [46] and Mas [47] found the prevalence of onchocercal skin lesions to be positively correlated with community microfilarial load in hyperendemic communities. Observations made in Malawi by Burnham [42] and in Liberia by Pacque [34] also show that Ivermectin treatment not only decreases the microfilaria density and improves the clinical presentation, its overall impact on community microfilarial load means that significant community control of onchocerciasis in general is also achieved.

## Conclusion

It is therefore reasonable to recommend that mobilization messages for community-directed distribution of Ivermectin in the rain-forest communities emphasise the efficacy of the microfilaricide in the relief of skin lesions and in mass de-worming of treated persons. Similar emphasis on the relief of muscular and skeletal pains of all sorts will also potentiate demand for Ivermectin by persons at risk of onchocerciasis. It is important that where endemicity studies indicate that urgent mass treatment with Ivermectin to achieve the public health control of onchocerciasis is in order, that mobilization messages which have the highest potential to produce maximum treatment coverage feasible be applied without inhibitions.

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