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Ivermectin distribution using community volunteers in Kabarole district, Uganda

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Ivermectin mass distribution for the control of onchocerciasis in Uganda began in 1991. This report describes a community based ivermectin distribution programme covering two foci in the Kabarole district which have an estimated 32 000 persons infected and another 110 000 at risk. Through nodule palpation in adult males, 143 villages were identified where nodule prevalence exceeded 20%. Skin snips were also taken from a sample of the population to measure changes in community microfilarial load (CMFL) with treatment. The delivery programme was integrated into the district health management structure, and used community volunteers supervised by medical assistants from adjacent heath facilities for annual ivermectin distribution campaigns. After initial efforts by the community to support distributors in-kind proved inadequate, ivermectin distributors earned money retailing condoms as part of the social marketing component of a district STD/AIDS programme. Reduction in the CMFL ranged from 40–62% twelve months after the second ivermectin treatment in three villages, and from 69–84% six months after the fourth round of treatment in two villages. After four years of treatment, 85% of eligible persons were receiving ivermectin from community volunteers in each treatment cycle. Drop out rates among volunteers did not exceed 20% over the four years reported here. The direct cost of treatment was US$0.29 per person. Among the reasons for low per-person treatment costs were the strong supervisory structure, the presence of health centres in the foci and a well developed and capable district Primary Health Care management team.

Introduction

Onchocerciasis continues to be a serious public health problem. It affects 17.5 million people in Africa, in 27 countries. Of these, about 267 000 are blind as a result of onchocerciasis.[1] Although larvaciding in the Volta Basin and other areas of West Africa has dramatically reduced transmission, this approach is not widely applicable to other foci. The development, and subsequent donation of ivermectin (Mectizan®) by Merck Sharpe and Dohme, made mass-treatment feasible as a method to relieve symptoms and control disease.[2,3,4]

Onchocerciasis is widespread in western Uganda. Transmission by both *Simulium damnosum* s.l. and *S. neavi* occurs, often in close proximity.[5] Most foci were intensively studied by the Ministry of Health's Vector Control Division between 1950 and 1970. Vector control measures were instituted in several foci, leading to eradication of disease in the Jinja focus along the Victoria Nile, and temporary reduction of transmission elsewhere.[6] Two decades of chaos, from which Uganda has only recently emerged, destroyed most vector control efforts. Following the return of peace to much of the country, it appeared to many that the old onchocerciasis foci had expanded and new ones emerged. In 1986 WHO estimated 30 000 persons in Uganda were infected with *Onchocerca volvulus*, a figure which was increased to 1.2 million in 1995.[1,7] There were an

estimated 800 persons blind from onchocerciasis in 1986, but no estimates were made in 1995.

The Uganda National Onchocerciasis Control Programme, formed by the Ministry of Health in 1991, delegated most responsibilities for mass ivermectin distribution to non-governmental organizations. Sight-Savers (UK) distributed ivermectin in three districts in the West and Northwest, Christoffel Blinden Mission (Germany) in two districts in the Southwest, and the River Blindness Foundation (USA) in six districts in the West and two in the East. In Kabarole district in the far West, the German Agency for Technical Cooperation (GTZ) assisted the district health team in distribution. In 1993, the National Control Programme estimated that 1.4 million persons were at risk of infection, and about 1 million should be targeted for treatment. Of this 1 million, 465 828, or 44%, had received treatment.[8] This paper reports the results of a community-based ivermectin distribution programme in Kabarole district.

Methods

Onchocerciasis in Kabarole district

Kabarole district (Figure 1) is predominantly rural with an estimated population of 741 000 (1991), and population density of 87 persons per square km.[9] In 1988 the German Agency for Technical Cooperation (GTZ) began assisting rehabilitation of district health services through technical and financial support. In re-establishing health priorities it became evident that onchocerciasis was a major problem. Affected communities sought out the district health team to ask for control efforts. Adjacent communities expressed fear of potential spread.

To determine the extent of onchocerciasis, a baseline study was carried out in 1991.[10] This estimated that in the two Kabarole foci, there were 32 000 persons infected with *O. volvulus* and a further 110 000 at risk of infection. A detailed clinical and parasitological survey was made in 13 villages of Kigoyere parish to provide basic data for the monitoring of the effects of ivermectin distribution. Using the WHO's Onchocerciasis Control Programme (OCP) skin snip protocols, community microfilarial loads (CMFL) were found to range between 9.1 and 19.3 (Table 1).[11,12] Although blindness due to onchocerciasis was uncommon, complaints about skin disease, particularly pruritus, were widespread and often intense. In Kigoyera parish, 35% of residents had skin disease. Some residents reported such intense itching that they slept on their knees and elbows to minimize contact with bed sheets in order to lessen itching.

Onchocerciasis control programme design

In 1990, a passive ivermectin distribution programme based at the health centres was started. Because of the low coverage of the population at risk (16%), a community-based mass treatment programme was begun in 1991, when Uganda approved ivermectin for mass distribution. The first step in establishing this programme was consultation among community leadership, health centre staff, district health team members, and representatives from the Ministry of Health, Entebbe.

The groups felt that an annual mass treatment campaign, lasting one week, would be the most effective approach. Because only 40% of the population lived within 10 km of a health centre, it was decided to supplement clinic-based distribution with community-based distributors. It was believed that with a well-integrated project, distribution costs could be minimized and could be met through existing district resources. It was also felt that the community would provide support in kind to distributors to supplement time spent in ivermectin distribution. When adequate community support did not materialize, the retail sale of condoms was introduced. The ivermectin distribution programme required only one full-time staff member, and all activities were implemented through existing health and political structures in Kabarole district.

Identification of endemic villages

Endemic villages were identified by finding nodules in at least 20% of a sample of 30 or more males over age 20.[13] A total of 143 villages, with a combined population of 46 000, were identified as eligible for mass treatment using these criteria. To meet local concerns, some areas at risk of infection, and which were adjacent to endemic villages, were included in distribution.

Implementation of mass distribution

The first step was the training of medical assistants stationed in the endemic areas to diagnose and treat onchocerciasis, and to manage adverse reactions to ivermectin. Subsequent training stressed supervision

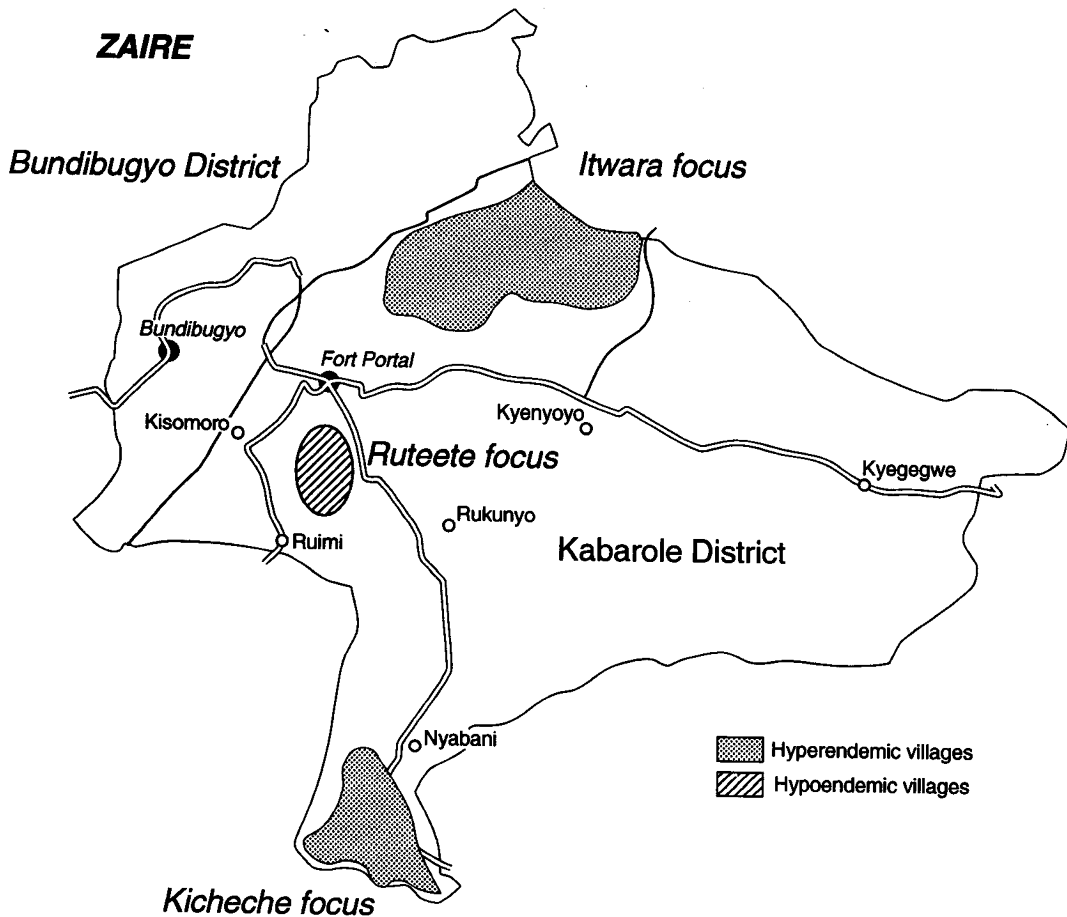

Figure 1. Hyperendemic villages in Kabarole district included in the ivermectin distribution programme. Hypoendemic villages in the Ruteete focus are also shown.

and support of community volunteers who would be distributing ivermectin in adjacent areas. Training was also provided to facility-based health workers who would provide passive treatment for those seeking attention at health facilities. These facility-based personnel were in turn supervised by the district onchocerciasis coordinator.

Prior to beginning mass treatment, an onchocerciasis awareness programme was begun which informed communities about availability of ivermectin, its benefits, and potential adverse reactions. This programme was conducted through community, political and religious leaders. Uganda's President, Yoweri Museveni stressed the importance of ivermectin treatment during his visits to Kabarole district.

Community leaders, in conjunction with health workers, selected volunteers to be trained for annual distribution campaigns. Most villages chose two volunteers. A series of two-day training sessions were conducted for 205 volunteers. These sessions covered registration, record keeping, dosage calculations based on age, criteria for exclusion from treatment,

Table 1. Community microfilarial loads (CMFL) in selected villages in one focus before and two years after mass treatment with ivermectin

Village	Prevalence of microfilariae in skin snips in 1991	CMFL in 1991	CMFL* in 1993	% reduction in CMFL 1991–1993
Kigoyera	80%	9.1	5.3	42%
Mwokya	88%	10.0	3.8	62%
Katambale	91%	11.2	3.5	69%
Igoma A	95%	19.3	3.1	84%

*just before the third round of treatment

referral of adverse reactions to ivermectin, and promoting awareness of onchocerciasis and available treatment.

Ivermectin was supplied to health centres from whence it was collected by community distributors. Quantities were based on estimates of the eligible population, and the previous year's coverage. A single dose of 150 ug/kg was given, calculated by participant's age. Village lists from political leaders were used by distributors to record those treated. Treatment details were recorded for patients treated in the health centres. At the end of the treatment campaign, these lists and facility records were used by the district onchocerciasis coordinator to calculate coverage. In three villages of the Kigoyera parish, treatment was given every six months, and in the other areas, every 12 months. The two intervals were to assess the effect of treatment on transmission potentials by *Simulium* vector. Effectiveness of treatment was assessed in these and other villages six and twelve months following the previous round of ivermectin. Adverse reactions were monitored on the second or third day after ivermectin, and two months after the initial treatment in all areas.

Results

The numbers of persons treated by community-distributors and the coverage of the estimated eligible population achieved are shown in Table 2. In the beginning, village residents promised to assist community distributors during the time they were away for training by providing labour for their gardens, and donating food. Although this happened, community distributors felt the amount provided to be inadequate to compensate for the time away from their gardens. In the next year community distributors decided to try supporting ivermectin distribution through retailing of condoms available though the condom social marketing component of the Kabarole AIDS/STD project. Intensive training about AIDS and STDs was provided to ivermectin distributors, and this was followed by annual refresher training. Community ivermectin distributors sold condoms throughout the year at US$0.10 for a pack of five. By 1994 the average ivermectin distributor was earning US$16 a year from condom sales, equivalent to one month's salary for a medical assistant. The drop-out rate for volunteer distributors was under 20% over the four-year period.

Following the first round of treatment, adverse reactions were common, particularly in villages with a high CMFL. These reactions included increased pruritus, papular rash, oedema, conjunctivitis, and swollen lymph nodes. In one area 31% of persons treated reported some sort of adverse reaction requiring treatment, but in other areas, with a higher CMFL, adverse reactions were reportedly more common. Delayed reactions were treated in health centres. In subsequent years, persons with adverse reactions were advised to report directly to health centres for treatment.

Skin snips in three villages showed a CMFL reduction of 40–60% twelve months after the second round of annual treatment, and 69–84% six months after the fourth round in the area receiving six-monthly treatment (Table 1). In informal discussions, many persons reported prolonged relief from itching and musculoskeletal pain after two or more years of treatment.

Table 2. Achievements of the Kabarole onchocerciasis control programme from 1990–1994

Year	population eligible for mass treatment	No. of persons treated	No. of individual treatments in health facilities	Coverage of mass treatment	No. of condoms sold
1990	–	–	7600*	–	–
1991	50 000	35 215	1894	64%	–
1992	52 500	40 030	442	76%	17 700
1993	52 500	42 330	393	81%	34 865
1994	56 000	47 550	0	85%	130 700

* 5041 cases were treated in outreach services

Direct programme costs were calculated for the 1992 distribution round. These costs, which are shown in Table 3, included all salaries applicable to distribution, as well as travel allowance, mileage and vehicle depreciation for the amount of time the District Health Team vehicle spent with ivermectin distribution. Although costs were not calculated for subsequent years there was little change in the methods of distribution, and any increases were likely to have been minimal.

Discussion

Although 45.9 million ivermectin doses had been given in 27 countries by the end of 1995, there have been few published accounts of treatment strategies, treatment costs and coverage achieved.[14–16] Our results demonstrate that effective distribution can be provided by volunteers, provided appropriate incentives are available. The annual delivery costs in 1992 of around US$0.29 per person treated in Kabarole, are at the low end of a $0.10–$5.00 per person range noted by WHO.[1] Further, it shows that a successful programme can be designed and implemented at district level without a large degree of central design and control. At the same time it must be recognized that an extensive district-level infrastructure, with considerable planning and management capacity, was essential to the programme's success. Although none of the costs of this administrative structure are attributed to ivermectin delivery, it was this administrative capacity which kept the marginal costs of ivermectin treatment low. This underlines the importance of on-going initiatives in Uganda and elsewhere aimed at strengthening district-level management capacity and increasing human and financial resources available for this level. The presence of an active HIV/AIDS programme with a condom social marketing programme provided a fortunate opportunity which promoted sustainability of ivermectin delivery through condom sales, reduced costs and addressed other important health issues at the same time.

The importance of involving the community in planning and implementing ivermectin delivery has been noted elsewhere.[14–16] Although the circumstances for volunteer distributors in Kabarole district were not typical of all areas, the experience does demonstrate some principles. Offering a treatment or intervention which is of clear priority to the community, and which produces a rapidly perceived benefit, strongly reinforces the position of volunteers in the community, and strengthens political support for a programme. But even then, the amount of support which the community could actually provide to these distributors was more limited than anticipated. Often programme planners do not appreciate that the efforts required for daily subsistence may give rural communities little capacity to provide voluntary support to programmes. The obvious benefit of combining an income-generating health activity, in this case condom sales, with a community-service function should give rise to the search for other possible winning combinations. The use of health facilities as the operational base for community activities, rather than creating a parallel structure, as is sometimes done for ivermectin distribution, has strengthened health system links with the community.

Table 3. Programme operational costs for ivermectin treatment in 1992. These figures do not include the 1991 start-up costs; there may have been modest increases to these costs for subsequent years.

Programme item	Annual costs (US$)
District onchocerciasis coordinator salary	1150
District medical assistants' salaries	650
Drivers' salary	183
Health Unit medical assistants' salaries	72
Travel allowances	828
Vehicle mileage 3360 km × $0.55	1680
Motorcycle mileage 2900 × $0.10	290
Bicycle mileage 550 × $0.02	11
Depreciation, vehicle and motorcycles	1003
Purchase of 17 770 condoms	916
Purchase of 216 promotional T-shirts	3240
Stationery, records	155
Training and training materials	1600
Total costs	**11 778**
Number of persons treated with ivermectin	40 030
Cost per person treated	**0.29**

The decrease in microfilarial counts following two rounds of treatment was gratifying, and corresponded with the relief of symptoms many participants reported to ivermectin distributors. Changes in microfilarial counts were similar to those noted elsewhere.[17-19] If the good coverage which has been achieved in Kabarole can be sustained, there is a possibility that not only can there be a major reduction in symptoms, but that transmission of *O. volvulus* can be substantially decreased.[20,21]

Adverse reactions to the first dose of ivermectin were seen frequently in Kabarole and in some cases oedema was severe. In the absence of standard definitions for adverse reactions to ivermectin, it is difficult to say that their incidence was different from that reported by other treatment programmes.[22,23] What is important is that community-based programmes can effectively handle these reactions, and that they do not, in the long term, deter persons from retreatment. As noted in other programmes, many people abstained from the second round of treatment, only to return for subsequent treatment cycles.

It is difficult to compare costs between delivery projects because of variations in accounting methods, wages, exchange rates, and travel required. This is particularly true for Uganda where health worker salaries are very low. The delivery costs for Kabarole district are considerably less than those noted for house-to-house distribution in Enugu and Kwara States, Nigeria, and similar to those observed in Malawi using motorcycle teams (Burnham, unpublished data).[13,16] In Kwara State, Nigeria, volunteer community distributors achieved better coverage with fewer missing tablets than did mobile teams. Costs per person treated for the mobile teams was US$0.82 compared with US$0.50 for volunteer distributors.[24] But in Enugo State, the cost per person treated by mobile teams was half that of community distribution. Potential costs of various alternatives should be examined when establishing a control programme, and weighed against the advantages and difficulties of community-based distribution. Design of the optimum distribution programme may vary with location, and could conceivably include both mobile and community-based components.

The establishment of the African Programme for Onchocerciasis Control (APOC) in 1994, to address onchocerciasis outside the OCP areas, underscores the need for detailed examination of the various distribution methods which have been tried, their costs, their need for organizational support and supervision, and their potential for sustainability.

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