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<td>Author 1</td>
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Comparison of three strategies for mass distribution of ivermectin in Achi, Nigeria

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The Nigerian Ministry of Health has estimated that there are 60 million people in Nigeria at risk of onchocerciasis, and has asked the suppliers of 1vermectin (Maravel) to be donated by Merck, Sharp and Dohme. In anticipation, three methods of distribution—door-to-door, clinic-based and centralized—were compared for cost-effectiveness. Costs were based on market prices, and included salaries of adult per adult payments to staff, cost of transportation, and sustenance during field activities. Effectiveness was measured by the total number of subjects successfully dosed. The total cost of dosage was N3.75 per person for the centralized system, N5.3 for the clinic-based system, and N7.4 for the door-to-door system (N100 = US$1).

Health workers have shown some concern about the cost of delivering health care in developing countries. The cost of transportation and distribution of drugs and vaccines to affected communities sometimes dwarfs the annual cost of the medical products (Handly, 1990). The Nigerian Ministry of Health has estimated that there are 40 million people in risk of onchocerciasis, and has requested free ivermectin (Maravel) to be donated by Merck, Sharp and Dohme. The prefaced cost of distributing the drug to affected communities almost equals the technical situation in health, which in 1990 was approximately US$58 million (Nigeria National Onchocerciasis Control Programme, unpubl. reg.). There is therefore an urgent need to evaluate the various distribution strategies in order to evolve the most cost-effective system of drug distribution (Handly, 1990). Several distribution strategies may be acceptable in pilot projects in order to determine the method that best accommodates the geographical, socio-cultural and religious practices of the community and yet remains cost-effective. In this communication we report our assessment of three methods of distribution: centralized, door-to-door distribution, clinic-based distribution and centralized distribution in Echimi, in the Oyi River local area of Nigeria.

Study Area and Population

The study area, Achi, is located approximately 45 km from Enugu, in south-eastern Nigeria. The area is in humid forest, and is divided into 24 wards or villages at varying distances from the Oyi River. The study population had already been censused, mapped, and structured for onchocerciasis by skin snips and physical and eye examinations. Enormous surveillance had also been initiated. A pre-dosing mobilization campaign was started a month before the beginning of the drug distribution exercise. Meetings between representatives of each ward, clan chiefs and the distribution team preceded the dosing. Thus, although the study design was not linked to a clinical trial with randomization of the subjects, nearly all subjects in the community

multination were employed in all the study areas. The method of drug distribution was carefully explained to the residents.

Drug-Sale/Visit Distribution
Five wards were covered by drug-sale/visit distribution of the drug. The drugs were dispensed on a once weekly basis. This method involved repeated visits, usually in the evenings and mornings when residents other than those who had returned home or were about to go to market were favourably disposed to the new drug.

Choice-based Distribution
Since 1968 a bamboo box has been maintained at the local health worker's house. Twice weekly, the local health workers visited these areas, and on the basis of their observations, the drugs were dispensed to the patients. The patients were then examined at the clinic by the study team and recommissionals were made accordingly.

The choice method was conducted by a trained nurse, who was responsible for the treatment of the patients. The patients were examined in the evenings and mornings by the study team and the results were recorded in the patients' chart.

Centralized Distribution
The remaining 16 wards of the study area were divided into three groups. In the first group, the drug was dispensed at the clinic and in the second group, the drug was dispensed at the hospital. The third group received the drug twice weekly at the clinic by the study team.

Assessment of Costs
Cost assessment was based on market values and included monthly salaries of full-time staff and gross monthly payments to part-time staff on the days they were involved in the distribution, in addition to costs of transportation and subsistence during field activities.

Assessment of Effectiveness
The effectiveness of a health programme should ideally be measured by the extent to which health status is improved (Department, 1969). However, this approach requires a lot of work (Kumar et al., 1969) to the number of cases detected (Uppal et al., 1961). Assessment of the impact of the effects of drug treatment could be difficult. However, in the present study, the assessment of effectiveness was based on the number of patients successfully treated with the drug. The results were compared with previous studies using similar approaches.

RESULTS
The method of drug distribution used in the present study was the choice method. The drug was dispensed at the patient's choice, and the results were recorded in the patient's chart.

DISCUSSION
A number of similar controlled trials have been conducted, with similar results (Baker et al., 1963; Greer et al., 1971; White et al., 1972). The results of these studies suggest that the methods of immunization distribution used in this study can be assumed with reasonable accuracy. The effectiveness was assessed at the end of the study period and the results were in accordance with the objective.
of the programme, namely to deliver immuniza-
tion to the eligible population night the study
area. The area is heterogeneous, and therefore
the whole population is at risk. However,
approximately 70-90% of the population com-
prised of pregnant and nursing women, children
aged less than 5 years, and severely ill patients,
of whom are specifically excluded by the
manufacturers from receiving the antigen. It is
expected that these would be reduced during
subsequent similar drills with measles.

Hatchly (1972) highlighted the difficulty of
assessing the cost of all aspects of a pro-
gramme, by this present study, calculation of
cost did not include those incurred by the
subcommittees in their travels to the
training centre and also while waiting to be
aired. Costs incurred by the community in
providing the objects, for capital costs such
as for buildings for centralised and mobile
clinical service, did also for equipment, were
similarly not included in the calculations.

For use of inadequate records of fuel and
maintenance costs, the transport cost was
based on the current market price for hiring a
vehicle and driver for the trips. Transport
costs arising from daily trips from Konja to
Kisela for supervision, and which were com-
monly paid to all distribution methods, were,
however, omitted from the calculations.

Onset of sickness is itself a major con-
tributor to the sickle. Skin biopsies are hor-
vorous, expensive, and has a low compliance rate
especially among children. The cost of arrest-
ning has not been included in total costs because
a nationwide survey was done; it was observed in
the time to identify areas of highest risk by
using rapid non-vaccination methods such as
mobile and house-to-house vaccination. Conse-
quently, mapping of the community and
searching for test vaccination site was limited to
and physical and the constraints were common
to the three distribution methods, and were
therefore of equal cost.

With these provisions, the average cost of
vaccination distribution was N$57 per subject
(MB9.6 U.S.S.1.5), which was lower than the
cost of house-to-house distribution (N$72) and
mobile distribution (N$75). A feature of the
distribution method was the geographical site of
attendance, and it is not known that the total
number of subject was successfully closed was
lower in this method. A possible explanation
is the size of the village, and for although it is
center to the three settlements, the
inhabitants of the rural or surrounding area have
expressed some trepidation on the advantage in
inflations of the cost in which the clinic was
sited. It is therefore important that, before
using existing facilities in health care delivery
systems, one should understand inter-village
variations and differences.

The clinic-based method approached to
being a primary health care centre, and though
it is subject to the disadvantages of location and
low coverage, it is more efficient than the

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**TABLE I**

<table>
<thead>
<tr>
<th>Method of distribution</th>
<th>Number of subjects</th>
<th>Immunized</th>
<th>Confirmed</th>
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<tr>
<td>Direct through mass</td>
<td>72</td>
<td>68</td>
<td>60</td>
</tr>
<tr>
<td>Case per day</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total case</td>
<td>N$72</td>
<td>N$98</td>
<td>N$98</td>
</tr>
<tr>
<td>Travel cost</td>
<td>1028</td>
<td>988</td>
<td>988</td>
</tr>
<tr>
<td>per subject</td>
<td>N$2</td>
<td>N$5</td>
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Paperwork is a method to prevent a primary health facility from being overstretched, it can therefore enhance the advantages of the centralized and district-based health and avoid duplication of health services and activities. Although the clinic-based method was more efficient than the centralized method, it required the integration of the activities of the community and health care services within the primary health care system. If this is done, the service delivering practice could be at a no extra cost to the government, and it can be engaged in other models for primary health care activities, such as immunization, treatment of chronic diseases and injuries, health education and family planning, thereby further improving the efficiency of the clinic-based system of health care distribution. This could also be a measure of ensuring the sustainability of the system, considering that the distribution of the system for the entire population using the primary health care services may be multifaceted by the country in the absence of assistance from international health agencies.