

Willingness of Individuals to Comply with Annual and Long-term Ivermectin treatment in Abia State, Nigeria

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ABSTRACT

This study was designed to document individuals' adherence to annual ivermectin treatment and people's willingness to continue taking ivermectin, as an important predictor of sustained compliance with long-term ivermectin treatment. The study which was conducted between April and September, 2011 adopted a cross-sectional approach in collecting quantitative and qualitative data from the two Local Government Areas of Abia State that were assessed by REMO as hyper-endemic for onchocerciasis. The study population involved both high and low compliers groups. A Structured questionnaire was administered to 558 people to ascertain their compliance rate to annual and long-term ivermectin treatment and their willingness to sustain the treatment. Of these, 195 (34.9%) were males while 363 (65.1%) were females. Among these groups, 53.8% and 57.3% of males and females respectively were treated before. Of the 195 males and 363 females, only 25 (12.8%) males and 45 (12.4%) females were high compliers. On their willingness to continue with the drug, 483 (86.6%) claimed that most people take the drug, 495 (88.7%) affirmed that most people will continue with the drug while 555 (99.5%) indicated that they are personally willing to continue with the drug if made available. This is confirmed by the Chi-square (χ^2) analysis at 0.05 level of significance that people are personally willing to continue with the drug if available ($\chi^2_{\text{cal}} = 163.585$, $P\text{-value} < 0.0001$). Suggestions on ways to improve compliance to annual and long-term ivermectin treatment showed that health education/enlightenment ranked very high (78.3%). This is followed by "awareness through church/school" (77.5%). It is imperative that the existing health education materials be reviewed by taking into cognizance such factors that will improve individual's willingness to comply with annual and long-term ivermectin treatment. Such materials should emphasize compliance among youths and children 5 years and above.

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Keywords: Improve compliance, annual ivermectin treatment, willingness to treatment, factors affecting compliance.

1. INTRODUCTION

The establishment of African Programme for Onchocerciasis Control (APOC) in 1995 with the mandate to establish within a period of 12 to 15 years, effective and self-sustainable community- directed treatment with ivermectin throughout the endemic areas within the geographical scope of the programme (1), requires a clear understanding of the long-term compliance process in order to guide countries towards sustainability. According to projections by epidemiologists, it is believed that onchocerciasis could be controlled in endemic communities if 100% of eligible populations take their treatment regularly over a period of 10 to 15 years or more (2, 3). With one annual dose of ivermectin, it is estimated that 70% of the target population would have to be treated, for the long-term project of elimination of the disease to be a reality (4).

The current mainstay of onchocerciasis control is chemotherapy, using ivermectin alone or, in small and isolated foci, combined with vector elimination. Currently, over 68 million people are being treated with a single annual dose of ivermectin every year in Africa (5). In CDTI, community ownership of the ivermectin – treatment programme is emphasized, with endemic communities themselves involved in the planning, implementation, coordination and monitoring of all treatment activities (6). As an annual dose of ivermectin does not permanently interrupt transmission of the parasite that causes onchocerciasis, distribution of the drug will probably have to be repeated for many years, even if high treatment coverage are achieved and sustained (7). Compliance with annual ivermectin treatment has become a major challenge for APOC as the original 25 projects which started in 1997/1998 have been operating for over a decade. Annual compliance studies have become possible and extremely desirable, since researchers are now lengthening the timeframe for annual ivermectin dosing from 15 to 25 or more years (8), and the coverage rate from 65% to 80% (9). To date, published reports of CDTI intervention have focused on coverage. While reports of population coverage are encouraging (10), only few studies have centered on compliance to annual ivermectin treatment. Coverage rates in a community may not give the full picture of the success of the programme because there may be individuals or groups who systematically do not comply over the years and thus provide a continued focus for the disease transmission. Such low compliance group needs to be properly informed on the need to comply with annual ivermectin treatment necessary for total elimination of the disease. This study highlights the factors that necessitate individual's willingness to comply to annual and long-term ivermectin treatment and suggests ways to improve this compliance.

55 2. METHODOLOGY

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57 **Study Area:** The study was carried out in Umunneochi and Isuikwuato LGAs of Abia State,
58 Nigeria, assessed by Rapid Epidemiological Mapping of Onchocerciasis (REMO) as being
59 hyper-endemic for onchocerciasis. Abia State is bordered on the north and northeast by
60 Ebonyi and Enugu States respectively and on the east by Cross River and Akwa Ibom
61 States. Its southern border is shared with River State while its western border is shared with
62 Imo and Anambra states. The people of Abia State are part of “Ibo” ethnic group and are
63 known like their kinsmen to be highly mobile. They are very dynamic and are predominantly
64 farmers, artisans and civil servants. The people are united and speak “Igbo” language as a
65 common language, though several dialects exist. Other ethnic groups also reside with the
66 dominant Igbo speaking people. Abia State falls within the rain forest zone. The topography
67 is undulating with hills and valleys hence susceptible to gully erosion. The area is large and
68 terrain very difficult. The area has fast-flowing Imo River with its tributaries and many
69 streams such as Iyi-ukwu and Ihuku that serve as breeding sites for the black fly.

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71 The State is made up of 17 Local Government Areas (LGAs) with a population of 2,883,399
72 according to 2006 census. Eight of the seventeen LGAs in the State are endemic for
73 onchocerciasis (2 hyper-endemic and 6 meso-endemic LGAs) (Ukairo N. Annual Project
74 Technical Report on Abia CDTI Submitted to Technical Consultative Committee of African
75 Programme for Onchocerciasis Control, 2008). **Onchocerciasis control programme started in**
76 **the State with Mbala-Isuochi as pilot site in 1991. In 1998, the State submitted a proposal to**
77 **African programme for Onchocerciasis Control (APOC) for the control of onchocerciasis**
78 **through the use of the community-directed treatment with ivermect (CDTI) strategy. The**
79 **proposal was approved and CDTI commenced fully in all the LGAs of the State with Global**
80 **2000 River blindness programme (GRBP) serving as the support NGDO. The programme**
81 **has lasted for over seventeen years and needs to be evaluated.**

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83 **Study Design:** The study was designed to assess the rate of compliance to annual
84 ivermectin treatment which has lasted for over 17 years, and the factors that can influence
85 individual’s willingness to continue the treatment for the foreseeable future. The study
86 participants were individuals between ages 6 and above who were resident in the area. The
87 participants were grouped into two: the low compliers group comprising of those who had
88 taken ivermectin for less than 8 years and high compliers group comprising of those who
89 had taken ivermectin for 8 years and above. The cross-sectional approach was adopted
90 through collecting quantitative and qualitative data from the two Local Government Areas in
91 Abia State that were assessed by REMO as hyper-endemic for onchocerciasis. A specially
92 designed individual form was used to gather information for respondent’s personal data. The
93 personal data information included the following: household name/code, age, sex, marital

94 status, educational status, occupation, village/village code, community, LGA and the number
95 of years **the individuals are** resident in the village.

96 .

97 **Ethical Clearance:** Ethical review and clearance of the research protocol, research
98 instruments and informed consent procedures were obtained from the Ethical Review
99 Committee of the Department of Animal and Environmental Biology, Imo State University,
100 Owerri. The approval for the survey was obtained from Abia State Ministry of Health.

101 **Preliminary Survey and Advocacy:** The pre-disease survey logistics involved mobilization
102 of the community-directed distributors (CDDs) and other village-based field assistants who
103 were involved in the distribution of the drug. The communities selected on the basis of their
104 hyper-endemic status are currently being treated with ivermectin.

105 **Epidemiological and Social Science Method of Data Collection:** Epidemiological and
106 social science methods of data collection were used to collect data on the study objectives
107 and research questions. The study lasted from April to September, 2011. Individuals (seven
108 men and seven women) who volunteered and have been living in the community for over 8
109 years formed the Focus Group Discussion (FGD) participants. The rate of compliance was
110 determined on the number of times the drug (ivermectin) was swallowed. Individuals who
111 had taken the drug less than eight times were regarded as low compliers while high
112 compliers were those who had taken the drug for eight or more times

113 **Data collection:** **A well structured questionnaire was used to collect information from the**
114 **community members, community-directed distributors (CDDs), and community leaders on**
115 **compliance rate and their willingness to continue the treatment.** Since most of the
116 participants were illiterate, the recruited field assistants assisted the participants in
117 completing the questionnaires. The sample size was estimated using Krejcie and Morgan
118 (15) formula for determining sample size for research activities:

119 $S = X^2NP (1-P) / d^2 (N-1) + X^2P (1-P)$ where N (population size) = 116,749.

120 **Eight hundred and twenty questionnaires were distributed with 558 properly filled and**
121 **returned. To elucidate the issue of recall bias in this study (since most people do not**
122 **remember things easily beyond five years), treatment registers and were used to compare**
123 **the claims of respondents on number of times the drug was swallowed. Where treatment**
124 **registers were not available or inadequate, the claims of the individuals were weighed with**
125 **the reports of the CDDs. .**

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127 **Statistical Analysis:** Chi-square (χ^2) analytical technique was employed to ascertain the
 128 effect of demography on compliance and the level of willingness of community members to
 129 continue ivermectin treatment. Bar Chart was used to allow for quick appreciation of the
 130 suggestions to improve annual and long-term ivermectin compliance.

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132 3. RESULTS

133 The effect of demographic factors on compliance rate from household survey is shown in
 134 Table 1. Out of 558 individuals interviewed, 195 (34.9) were males and 363 (65.1%) were
 135 females. Among these groups, 53.8% and 57.3% of males and females respectively were
 136 treated before. Out of the 195 males and 363 females, only 25 (12.8%) males and 45
 137 (12.4%) females were high compliers. The Chi-square (χ^2) analysis at 0.05 level of
 138 significance revealed that sex does not affect the rate of compliance to drug (i.e. χ^2_{cal}
 139 =0.615; *P-value* =0.433).

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141 Table 1: Effects of demographic factors on compliance

Factors		Sample number N=558	No. treated before and percentage (%)	No. of high compliers	% compliance	Yates χ^2 value, <i>P-value</i>
Sex	Male	195	105 (53.8)	25	12.8	. χ^2_{cal} = 0.615 <i>P-value</i> = 0.433
	Female	363	208 (57.3)	45	12.4	
Age	6-11yrs	89	18 (20.2)	0	0.0	. χ^2_{cal} = 140.486, <i>P-value</i> < 0.0001
	12-24yrs	67	08 (11.9)	1	1.5	
	25 and above	402	289 (71.9)	69	17.2	
Education	None	174	125 (71.8)	23	13.2	χ^2_{cal} = 26.723 <i>P-value</i> < 0.0001
	Primary	242	119 (49.6)	25	10.3	
	Secondary	142	67 (47.2)	14	9.9	

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144 Stratifying by age, the results revealed that out of 558 individuals interviewed, 89 (15.9%)
 145 were between ages 6 -11 years, 67 (12.0%) were between ages 12 – 24 years, while 402
 146 (72.0%) were 25 years and above. Among the ages 25 and above, 289 (71.9%) had been
 147 treated before with 69 (17.2%) as high compliers. Among ages 12-24, only 8 (11.9%) had

148 been treated before with only 1 (1.5%) high complier. Among the 89 between ages 6-11
 149 interviewed, only 18 (20.2%) had been treated before. The statistical analysis revealed that
 150 age has a great effect on the intake of drug and compliance (i.e. $\chi^2_{cal.} = 140.486$; *P-value* <
 151 0.0001). On education and levels of education, result obtained shows that education and
 152 levels of education contributed significantly to the consumption of the drug within the
 153 demographic location under statistical investigation (i.e. $\chi^2_{cal.}=26.723$; *P-value* <0.0001).

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155 On the willingness to continue with ivermectin treatment by most individuals (Table 2), 483
 156 (86.6%) out of 558 indicated that most people take the drug; 495 (88.7%) affirmed that most
 157 people will continue with the drug while 555 (99.5%) said that they are personally willing to
 158 continue with the drug if made available. The *P-value* of 0.0000 against 0.05 level of
 159 significance indicates that the factors of study, “willingness to take ivermectin and response”,
 160 are not independent.

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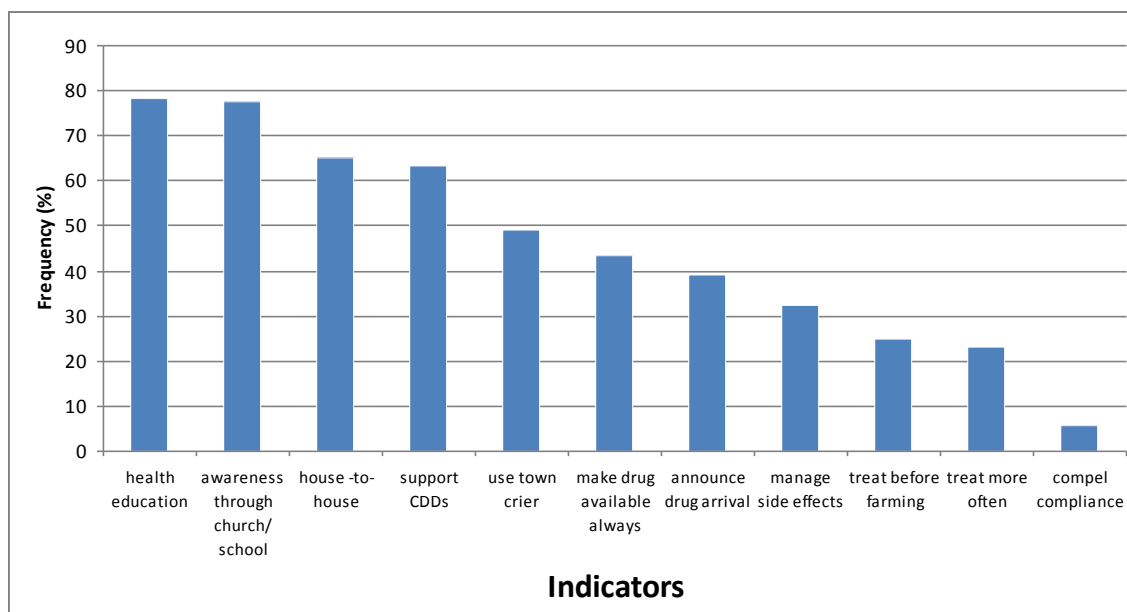
162 Table 2: Willingness to continue ivermectin treatment among individuals

Willingness to take drug	Response		
	Yes (%)	No (%)	Don't know (%)
Most people take	483 (86.3)	49 (8.8)	26 (4.7)
Most people will continue	495 (88.7)	0	63 (11.3)
Personally willing to continue	555 (99.5)	0	3 (0.5)

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165 Suggestions on the ways to improve compliance to annual ivermectin treatment in order of
 166 priority are shown in Figure 1. They are “health education/ enlightenment” (78.3%),
 167 “awareness through church/school” (77.5%), “house-to-house distribution” (65%) and
 168 support CDDs (63.3%).



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171 Fig. 1: Suggested ways to improve compliance to annual and long term ivermectin treatment

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175 **4. DISCUSSION**

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177 Results from the demographic survey on households revealed that gender did not affect
 178 compliance; however age and the levels of education had great effect on compliance.
 179 Findings from the survey revealed that the elderly who were mostly illiterate were available
 180 for treatment while the literate adults and youths were away in cities working or schooling.
 181 This is supported by a Focal Group Discussion (FGD) participant who said that the elderly
 182 are more in the village while the youths travel outside for work.

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184 The study also revealed that most people have knowledge of the drug, hence most of the
 185 respondents indicated that “most people take the drug” and are willing to continue. More
 186 people are willing to take ivermectin than before because the community distributors are part
 187 of the community and understand their people better. It is important that government
 188 ensures that the drug is available and procured early for distribution. Almost every person
 189 interviewed (99.5% of the respondents) said that they are personally willing to continue with
 190 the drug as long as the drug is available. It is important that these individuals who are
 191 personally willing to take the drug maintain the annual treatment if they desire complete
 192 eradication of the disease.

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194 Suggestions were made on how to improve annual and long-term compliance by
195 respondents. From the findings, “health education/enlightenment” ranked very high (78.3%).
196 This is followed by “awareness through church/school” (77.5%), “house-to-house
197 distribution” (65%) and “support CDDs” (63.3%). Health education was recommended as
198 one of the main strategies towards improving treatment (12). It becomes imperative that the
199 existing health education materials should be reviewed by taking into cognizance those
200 factors associated with low compliance as well as perceptual factors like benefits of
201 treatments and seriousness of the problem of *Onchocerciasis*. Health education materials
202 should emphasize compliance, particularly among youths and children (5 years and above).
203 Biannual treatment is recommended as a catch up round only for those who missed the
204 previous round. It is believed that the implementation of these suggestions will not only
205 improve annual compliance to ivermectin treatment but also boost the long-term compliance
206 that will eventually eradicate onchocerciasis in Abia State.

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208 **5. CONCLUSION**

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210 The findings showed there was a low frequency of high compliance. A compliance rate of
211 12.8% and 12.4% were obtained for males and females respectively. Gender did not affect
212 compliance to annual ivermectin treatment while age and levels of education had significant
213 effects on compliance. **The study also showed that most people take the drug (ivermectin)**
214 **and individuals are personally willing to continue with the drug if available.** On suggestions
215 for improvement on compliance, “health education/enlightenment” and “awareness through
216 school/church” ranked very high. However, health education materials should be reviewed to
217 emphasize compliance among youths and children (5 years and above).

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225 **AUTHORS' CONTRIBUTIONS**

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227 Dr. O.R. Ezeigbo designed the study and wrote the first manuscript, Profs. B.E.B. Nwoke
228 and C.N. Ukaga wrote the protocol and managed the analyses, while Ms R. O. Emecheta
229 managed the literature searches. All authors read and approved the final manuscript.

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ETHICAL APPROVAL (WHERE EVER APPLICABLE)

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.”

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