Knowledge and attitude towards onchocerciasis and community directed treatment with ivermectin in endemic communities in Edo State, Nigeria.

***Onowhakpor AO, Okojie OH, Wagbatsoma VA**

Abstract

Objective: Community directed treatment with ivermectin (CDTI) was developed as a solution for the control and elimination of onchocerciasisis. It involves active and structural community participation. CDTI requires that ivermectin be administered continuously over a period of at least 14years before elimination can be achieved in hyper and meso-endemic communities. The study assessed the knowledge and attitude of community's members towards onchocerciasis and the CDTI strategy in endemic communities in Edo State, Nigeria.

Methods: This was a descriptive cross-sectional study involving seven hundred and twenty community members' selected using multistage sampling technique. Data was collected using a pre-tested structured interviewers' administered questionnaire and was analysed using IBM SPSS version 21.0 software. Level of statistical significance was set at $p < 0.05$

Results: The mean age (SD) of respondents was 45.9 (15.2) years. Six hundred and one (83.5%) and 591 (82.1%) of the respondents had good knowledge of onchocerciasis and CDTI strategy respectively. The significant predictors of good knowledge on onchocerciasis were age ($p = 0.001$), sex ($p = 0.001$) and level of education ($p = 0.001$) while that of CDTI strategy were sex ($p = 0.001$) and level of education ($p = 0.001$). Five hundred and ninety seven (82.9%) of the respondents had a good attitude towards the CDTI strategy and its significant predictor was level of education ($p = 0.006$)

Conclusion: Findings from this study revealed that there are still gaps in knowledge as regards onchocerciasis and the CDTI strategy among community members in the study area. Re-enforcement of health education messages on onchocerciasis and CDTI strategy in endemic areas is recommended so as to improve knowledge and consequent acceptance of the CDTI strategy.

Keywords: Community Directed Treatment with Ivermectin, Onchocerciasis. Knowledge, Attitude, Nigeria.

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La connaissance et l'attitude envers l'onchocercose et la communauté dirigés traitement par l'ivermectine dans les communautés endémiques dans l'Etat d'Edo, au Nigeria.

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Resume

Objectif: le traitement par l'ivermectine (CDTI) communautaire dirigé a été développé comme une solution pour le contrôle et l'élimination des onchocerciasisis. Elle implique la participation active de la communauté et structurelle. CDTI exige que l'ivermectine soit administré de façon continue sur une période d'au moins 14 années avant élimination peut être obtenue dans hyper et méso-endémiques communautés. L'étude a évalué les connaissances et l'attitude des membres de la communauté à l'égard de l'onchocercose et la stratégie CDTI dans les communautés endémiques dans l'Etat d'Edo, au Nigeria.

Méthodes: Ce fut une étude transversale descriptive impliquant sept cent vingt membres de la communauté »sélectionnée en utilisant la technique d'échantillonnage à plusieurs degrés. Les données ont été recueillies à l'aide d'un questionnaire administré intervieweurs structurés »pré-testé et a été analysée en utilisant la version IBM SPSS 21.0. Niveau de signification statistique a été fixé à $p < 0.05$.

Résultats: L'âge moyen (SD) des répondants était de 45,9 (15,2) ans. Six cent et un (83,5%) et 591 (82,1%) des répondants avaient respectivement une bonne connaissance de l'onchocercose et de la stratégie CDTI. Les prédicteurs significatifs de bonnes connaissances sur l'onchocercose étaient l'âge ($p = 0,001$), le sexe ($p = 0,001$) et le niveau d'éducation ($p = 0,001$), tandis que celui de la stratégie CDTI étaient le sexe ($p = 0,001$) et le niveau d'éducation ($p = 0,001$). Cinq cent quatre vingt dix sept (82,9%) des répondants avaient une bonne attitude envers la stratégie CDTI et son prédicteur important était le niveau d'éducation ($p = 0,006$).

Conclusion: Les résultats de cette étude a révélé qu'il existe encore des lacunes dans les connaissances en ce qui concerne l'onchocercose et la stratégie CDTI parmi les membres de la communauté dans la zone d'étude. Re-exécution des messages d'éducation sanitaire sur l'onchocercose et de la stratégie CDTI dans les zones endémiques est recommandée afin d'améliorer la connaissance et l'acceptation conséquente de la stratégie CDTI.

Mots clés: Traitement à l'Ivermectine sous directives communautaires, onchocercose. connaissance, attitude, Nigeria.

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INTRODUCTION

Onchocerciasis is endemic in 30 sub-Sahara African countries mainly in rural communities, a few Latin American countries and Yemen. Approximately 25 million people are infected with the disease while 123 million are at risk worldwide (1). Africa bears the highest burden of the disease constituting more than 99% of all cases (1). In 2008, Nigeria accounted for 40.0% of the 40 million people infected with onchoceriasis worldwide (2). Thirty two States and the Federal Capital Territory are hyper- or meso-endemic for onchocerciasis (2). These figures made Nigeria the most onchocerciasis endemic country in the world. Community directed treatment with ivermectin (CDTI) was developed as a solution for the control and elimination of onchocerciasis. It is based on the principle of active and structural community participation. It requires that ivermectin be administered continuously over a period of at least 14years before elimination can be achieved in hyper and meso-endemic communities (3, 4).

The CDTI strategy can achieve maximum impact on the morbidity and transmission of human onchocerciasis through broad and sustained acceptance within endemic communities. Ignorance and false beliefs can lead to negligence in prevention, control measures and in accepting appropriate treatment. Development of educational activities, with careful consideration of community knowledge, can bring about positive treatment seeking behaviour while simultaneously addressing local reservations about the control effort (5, 6).

Non-adherence of individuals to ivermectin treatment which is a consequence of poor knowledge of CDTI among community members creates an avenue for the spread of the disease (7). In Nigeria refusal levels of 2.8% and absenteeism of 38.0% was encountered during drug treatment in Kwara State (8). In Mahenge focus of Morongoro region in Tanzania, refusals and absenteeism constituted 7.6% and 6.7% respectively during drug treatment (7). Likewise in the South West of Cameroon, a high rate of refusal (27.7%) was observed among those eligible for treatment. This was linked to a high level of scepticism, doubt and pessimism among community members and the absence of a strong sensitization and mobilization effort. In the presence of rumours and incomplete information, community members acknowledged fear associated with minor side effects and were understandably reticent to taking ivermectin (9). This has a detrimental effect on the programme as untreated population can still maintain a significant intensity of transmission in the community.

The knowledge and attitude of community members towards onchocerciasis and the CDTI strategy is fundamental for effective implementation of the CDTI strategy as it promotes compliance among communities for long-term ivermectin distribution (9). Community participation and ownership which is the basis of the CDTI strategy, is only feasible when community attitudes, beliefs and perception are taken into consideration in designing communication messages and materials that will better motivate their participation in onchocerciasis control programmes (10-12). Thus, assessing the community members' knowledge and attitude towards onchocerciasis and the CDTI strategy will help identify knowledge gaps among community members. This will lead to targeted health education messages aimed at improving their knowledge on onchocerciasis and CDTI guidelines, as well as participation of community members in the CDTI projects. There is also paucity of data as regards community knowledge and attitude towards this strategy hence, the need for this study. This study assessed the knowledge and attitude of community members towards onchocerciasis and CDTI strategy and their determinants in endemic communities of Edo state, Nigeria.

MATERIALS AND METHODS

Between April 2014 – June 2015 a descriptive cross-sectional study was conducted in onchocerciasis endemic Local Government Areas (LGA) of Edo State. The State has three senatorial districts namely; Edo North, Edo Central and Edo South senatorial zones. CDTI projects spans across the 3 senatorial districts. The State has a total of 18 LGAs of which 7 are hyper and 5 are meso-endemic for onchocerciasis. (13) The population of Edo State as at 2006 census was three million, two hundred and thirty three thousand, three hundred and sixty six (14).

Study population

All community members aged 15 years and above, who were eligible for ivermectin treatment and had resided in the community for at least 1 year as they would have had sufficient exposure to the CDTI strategy which is

conducted once a year. Also, all respondents who consented to partake in the study were included. However, community members who were CDDs or health workers involved in the implementation of the CDTI were exempted from the study population of community members because of the possibility of biased response.

Sample size determination

The minimum sample size for this study was determined by using the Cochran's formula for studying proportions (15).

$$n = \frac{z^2pq}{d^2}$$

For this study, *p* was taken as 30.5% which is the proportion of respondents who were knowledgeable about onchocerciasis in Okpuje community, Edo State, Nigeria. (16) $n = 322.69 \approx 323$. The sample size was increased by 10% to make room for non-response. Therefore, new minimum sample size = 360. The calculated sample size was multiplied by a design effect of 2, (17) giving a final minimum sample size of 720.

Sampling technique

Seven hundred and twenty respondents were recruited for the study using a multistage sampling method.

Stage one: Selection of LGAs

The distribution of the endemic LGAs across the three senatorial zones are as follows: **Edo North** - Akoko Edo, Etsako East, Etsako West, Owan East, Owan West; **Edo Central** - Esan South East, Esan North East, Esan West, Igueben; **Edo South** - Ovia North East, Ovia South West, Uhunwonde. In each senatorial district one endemic LGA was selected using simple random sampling technique (computer generated table of random numbers)

Stage two: Selection of wards

Ovia South West, Esan North East and Etsako West LGAs consist of 10, 11 and 12 wards respectively. Two wards were selected from each of the selected LGAs using simple random sampling technique (balloting). The selected wards are as follow:

Ovia South West – Ward 7 and 8
Esan North East – Ward 4 and 6
Etsako West – Ward 4 and 6

Stage three: Selection of communities

One community from each of the 6 selected wards was selected using simple random sampling technique (computer generated table of random numbers).

Stage four: Selection of respondents

The population of individuals in each of the 6 selected communities was obtained from the Local Government Secretariat. Proportionate allocation was used to determine the number of respondents selected from each community thus:

$$n_c = \frac{\text{Sample size}}{\text{Total population of individuals in the six communities}} \times \text{Population of individuals in a community}$$

Thereafter, a systematic sampling technique was used to select respondents. The Community Directed Distributors (CDDs) census register (2014) was used as the sampling frame in each selected community. Respondents in each community were selected using a sampling interval. Sampling interval was calculated using the formula:

$$k = N/n_c$$

Where,
k = sampling interval,
N = total number of individuals on the census register and
n_c=desired sample size for each community based on proportional allocation.

The 1st respondent was selected by simple random sampling technique using balloting within the calculated sampling interval from the 1st n respondents. Thereafter every n^{th} respondent who met the selection criteria was selected using the calculated sampling interval until the sample size for each community was obtained.

Data collection and instrument: Quantitative data collection method was employed using a pre-tested semi-structured interviewer-administered questionnaire. Face and content validity was done for data collection instrument. Experts involved in onchocerciasis control programme and parasitology checked items in data collection tools to ensure that every aspect in the research questions and objectives were captured. Areas addressed in the questionnaires were as follows: socio-demographic data, knowledge of community members on onchocerciasis and CDTI strategy and attitude of community members towards the CDTI strategy. The Cronbach's Alpha test of reliability was employed in scoring attitude questions, so as to ensure reliability of the measurement

instruments.

Data analysis

The questionnaires were screened for completeness, coded and entered into the IBM-SPSS version 21.0 software.

Scoring knowledge

A total of 29 questions were used to assess knowledge of onchocerciasis. Twenty four questions were used to assess knowledge of CDTI strategy. One mark was awarded for each correct answer and zero mark for an incorrect answer. The total score was converted to percentage and classified as follows: Poor knowledge $< 50.0\%$; Good Knowledge $\geq 50.0\%$.

Scoring attitude

Community members' attitude towards CDTI strategy was scored using a Likert scale as agree, indifferent and disagree. Two marks was given for agree, indifferent was scored 1 mark and disagree 0 mark. The scoring system was reversed for negative questions. The total score was then converted to percentage and classified: Good attitude scores $< 50.0\%$; Poor attitude $\geq 50.0\%$

Univariate and bivariate analysis were done. The level of statistical significance was set at $p < 0.05$. Binary logistic regression was done to further determine the significant predictors of good knowledge of onchocerciasis and CDTI strategy, positive attitude towards CDTI strategy.

Ethical consideration: Ethical approval to conduct this research was sought and obtained from the University of Benin Teaching Hospital Ethics and Research Committee. Permission was obtained from the Chairmen of the LGAs and , the various Community Leaders. Informed written consent was obtained from each respondent before conducting the interviews.

RESULTS

Socio-demographic characteristics of respondents

Seven hundred and twenty respondents participated in the survey. Two hundred and twenty (30.6%) of the respondents were within the age group 55 - 95 years, 164 (22.8%) were within the age group 25-34 years while 32 (4.4%) of the respondents were within the age group 15-24 years. The mean age (SD) of the respondents was 45.9 (15.2) years. Three hundred and eighty five (53.5%) of the respondents were males with a male to female sex ratio of 1.15: 1. Three hundred and sixty four (50.6%) of the respondents were Muslims while 319 (44.3%) were Christians. Six hundred and thirty eight (88.6%) of the respondents were married, 40 (5.6%) were widowed while 26 (3.6%), 9 (1.3%) and 7 (1.0%) were single, cohabiting and divorced respectively. A higher proportion 311 (43.2%) of the respondents had a completed primary level of education while 55 (7.6%) had no formal education. (Table 1)

Knowledge of respondents on onchocerciasis

Five hundred and ninety (81.9%) of the respondents said onchocerciasis was caused by black flies while 58 (8.1%) said the cause was dirty water. Majority 668 (92.7%) of the respondents said that itching was a symptom of onchocerciasis while 3 (0.4%) reported leopard skin as a symptom of onchocerciasis. Four hundred and twenty three (58.8%) of the respondents knew that onchocerciasis can be prevented. Four hundred and forty five (61.8%) of the respondents were aware of the drug treatment of onchocerciasis. Four hundred and thirty two (97.0%) respondents said that the medication stops itching while 1 respondent (0.2%) said it makes people blind.

Ivermectin was correctly identified as the choice drug treatment of onchocerciasis by 419 (94.2%) respondents. Dosage of medication depending on height was proffered by 107 (24.0%) respondents. Four hundred and three (90.6%) respondents said the drug should be taken once a year. Five (1.1%) said it should be taken twice a year. Six (1.3%) and one (0.2%) said it should be taken thrice a year and four times a year respectively. (Table II)

Bivariate analysis of respondents' knowledge on onchocerciasis

Six hundred and one (83.5%) of the respondents had good knowledge on onchocerciasis while 119 (16.5%) had poor knowledge. Respondents < 40 years were 0.34 times less likely to have good knowledge than those ≥ 40 years ($p = 0.001$). (Table III)

Three hundred and thirty nine (88.1%) of the male respondents and 262 (78.2%) of the female respondents had good knowledge of onchocerciasis. Males were 0.49 times less likely to have good knowledge of onchocerciasis than females ($p = 0.001$). Twenty four (43.6%) of the respondents with no formal education, 261 (83.9%) with primary level of education, 252

(89.7%) with secondary level of education and 64 (87.7%) with tertiary level of education had good knowledge of onchocerciasis. Respondents with no formal education were 0.11 times less likely to have good knowledge of onchocerciasis compared to those with tertiary level of education. (Table III)

Respondents' knowledge on CDTI strategy

Five hundred and sixty three (78.2%) of the respondents were aware of CDTI programme in Nigeria. All respondents said the medication was not for under five and pregnant women. Seven hundred and fifteen (99.3%) respondents said that the drugs were not paid for by the consumer.

Four hundred and nineteen (58.2%) of the respondents said government are the ones in charge of the programme while only 74 (10.3%) said it was the community. Selection of CDDs was mainly done by health workers 333 (46.3%). Two hundred and seventy (37.5%) and 79 (11.0%) of the respondents respectively said that the community and the government respectively are in charge of CDDs selection. Thirty eight (5.2%) of the respondents did not know who was in charge of selection of CDDs. Two hundred and eighty five (39.6%) of the respondents said the community determines the time of distribution of ivermectin. (Table IV)

Six hundred and thirteen (85.1%) of the respondents said calculation of dose depended on height while 20 (2.7%) said it was dependent on both weight and height. In terms duration of ivermectin intake majority 482 (66.9%) of the respondents reported that ivermectin is to be taken between 1-5years while 69 (9.6%) said it should be taken for $\leq$1 year (Table IV).

Bivariate analysis of respondents' knowledge on CDTI strategy

Five hundred and ninety one (8.1%) of the respondents had good knowledge on CDTI strategy while 129 (17.9%) had poor knowledge. A higher proportion 240 (85.0%) of the respondents < 40 years of age had good knowledge of CDTI strategy while 42 (14.9%) had poor knowledge. Respondents < 40 years of age were 0.71 times less likely to have a good knowledge of CDTI strategy than those $\geq$ 40 years of age (p = 0.092). Three hundred and thirty six (87.3%) of the male respondents and 225 (76.1%) of the female respondents had good knowledge of CDTI strategy. Males were 0.47 times less likely to have good knowledge of CDTI strategy than the females (p = 0.001).

Two hundred and fifty nine (83.3%) of the respondents with primary level of education, 244 (86.8%) with secondary level of education and 55 (75.3%) with tertiary level of education had good knowledge of CDTI strategy. Respondents with no formal education were 0.49 times less likely to have good knowledge on CDTI strategy than those with tertiary level of education. (Table V)

Attitude of respondents towards CDTI strategy

Six hundred and eighty two (94.7%), 623 (86.5%), 324 (45.0%), 410 (60.0%), 586 (81.4%) and 541 (75.2%) agreed that community involvement in ivermectin distribution is preferred by the community, onchocerciasis control should be best run by the government, ivermectin should be given at the health centre, CDDs should be paid, ivermectin distribution is a solution to onchocerciaisis and community members believe that ivermectin had other health benefits. Three hundred and ninety one (54.3%) disagreed that CDDs in the community cannot handle ivermectin distribution. Five hundred and ninety seven (82.9%) of the respondents had good attitude towards the CDTI strategy while 123 (17.1%) had poor attitude.

Bivariate analysis of respondents' attitude towards CDTI strategy.

Good attitude of respondents towards the CDTI strategy was observed to increase with increasing age. Respondents < 40 years were 1.33 times more likely to have good attitude towards CDTI strategy. (p = 0.033). Three hundred and twenty eight (85.2%) of the male respondents and 269 (80.3%) of the female respondents had good attitude towards CDTI strategy. The male respondents were 0.71 times less likely to have good attitude towards CDTI strategy compared to the female respondents (p = 0.092).

Fifty (90.9%) of the respondents with no formal education, 271 (87.1%) with primary level of education, 218 (77.6%) with secondary level of education and 58 (79.5%) with tertiary level of education had good attitude towards CDTI strategy. Respondents with no formal education were 2.59 times more likely to have good attitude towards CDTI strategy than those with tertiary level of education. Four hundred and eighty five (80.7%) and 112 (94.1%) of the respondents with good and poor knowledge of onchocerciasis respectively had good attitude towards CDTI strategy. Respondents with good

knowledge on onchocerciasis were 0.26 times less likely to have good attitude towards CDTI strategy compared to those with poor knowledge ($p = 0.001$) (Table VI).

Four hundred and seventy five (80.4%) and 122 (94.6%) of the respondents with good and poor knowledge of the CDTI strategy respectively had good attitude towards CDTI strategy. Respondents with poor knowledge on CDTI strategy were 0.24 less likely to have good attitude towards CDTI compared to those with good knowledge ($p = 0.001$) (Table VI).

DISCUSSION

It has been reported that increased knowledge and awareness of onchocerciasis had made it easier for health workers to engage endemic communities in the annual ivermectin treatment programmes (6,7). The acquired knowledge has improved their commitment to carry out and support the treatment themselves. Majority of the respondents said the disease was caused by blackflies. This was in contrast to findings in Bebeka, South West Ethiopia (5), where 10.0% of the respondents knew that *Simulium* flies were responsible for the disease. As regards the symptoms of the disease, majority identified itching as one of the symptoms but only a few related it with loss of vision and leopard skin. This was in concordance with a similar study done in Ethiopia in which 78.1% of the respondents reported itching as a symptom of onchocerciasis (18). More than half of the respondents reported that the disease can be prevented. This finding was in contrast with studies carried out in 2005 and 2014 in Uganda and Ethiopia where majority of the respondents (89.0% and 93.3% respectively) knew about the prevention of the disease (18, 19).

Composite knowledge score revealed that over four-fifths of the respondents had good knowledge about onchocerciasis and CDTI strategy. This finding is supported by reports from Ekpan community, Edo State where 63.6% of the respondents had fair knowledge but in contrast to studies done in Enugu and Imo State in which there was poor knowledge of onchocerciasis among respondents Nigeria (20, 21). Similarly, a study in South West Ethiopia also revealed poor knowledge of the CDTI strategy among respondents as 60.8% and 69.8% of the cases and control respectively were not knowledgeable about the CDTI strategy (22). This overall good knowledge level found among the respondents in this study could be attributed to the community involvement in CDTI activities in these communities, underscoring the importance of community participation. Good knowledge about onchocerciasis and CDTI strategy in the study area may also be due to health education in the community as a result of the CDTI strategy. A study done in 2002 in Kwara State, Nigeria revealed that where health education was given, knowledge about the disease and its treatment was high among respondents. (9) Health education provides the necessary information for change of beliefs, attitudes and behaviour (6). Information on onchocerciasis, ivermectin and its side effects is paramount to the success of the programme. In addition, misconceptions about the ivermectin and its use have been reported to be due to lack of information and this has been linked to poor compliance with treatment (10). This further confirms the importance of health education in the success of the programme.

Evidence from this study revealed that a higher proportion of the males had a good knowledge about CDTI as compared to the females. This finding is similar to that of a study done in South-western Tanzania and Imo State, Nigeria where males had better knowledge about onchocerciasis and its treatment than females (8, 21). This relatively higher level of knowledge could be attributed to lifestyle differences. Males tend to move around and seek information more than females, thus increasing their knowledge about events and involvement in community activities while the females are overwhelmed with the domestic chores. Knowledge about CDTI plays a major role in influencing the treatment seeking behaviour of individuals in onchocerciasis endemic communities and by implication the success of the CDTI strategy and the control of onchocerciasis (6, 7).

Majority of the respondents less than 40 years of age had good knowledge on onchocerciasis and the CDTI strategy. The findings on knowledge of onchocerciasis in this study is in contrast to findings from a survey done in Imo State, Nigeria in which a higher proportion of the respondents (57.7%) greater than or equal to 35 years had a good knowledge of onchocerciasis as compared to those less than 34 years (38.6%) (21). Respondents with tertiary level of education were more likely to have good knowledge of onchocerciasis than those with no formal education. This could have resulted from

the fact that educated people are more informed because of their increased access to information.

Adequate knowledge on the cause, mode of transmission, prevention and treatment of onchocerciasis and CDTI strategy could bring about positive change of attitude and perception or behaviour that would enhance individual and community acceptance of ivermectin.(16) In this study, majority of the respondents had a good attitude towards the programme which could have been the resultant effect of good knowledge of onchocerciasis and CDTI among majority of the respondents, thus leading to possible acceptance of ivermectin among the community members. A higher proportion of the females had poor attitude as compared to the males, it can be inferred that participation in community meetings was more among the males than the female. Hence, the males have more information to make positive decisions.

In conclusion, majority of the respondents had a relatively good knowledge on onchocerciasis and CDTI strategy. Good attitude towards CDTI strategy was also observed among majority of the respondents. Despite these finding, the need for improvement through re-enforcement of the health education messages is recommended. This will aid in attaintment of good knowledge among almost all members of the community which will in turn improve their attitudes towards the CDTI strategy, thereby leading to acceptance and practice of onchocerciasis preventive and treatment measures. Achievement of this may bring about onchocerciasis control and finally its elimination.

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TABLE 1. Socio-demographic characteristics of respondents

Variables	Frequency (n = 720)	Percent (%)
Age group (years)		
15-24	32	4.4
25-34	164	22.8
35-44	154	21.4
45-54	150	20.8
≥ 55	220	30.6
Sex		
Male	385	53.5
Female	335	46.5
Religion		
Islam	364	50.6
Christianity	319	44.3
African Traditional Religion	37	5.1
Marital status		
Single	26	3.6
Married	638	88.6
Divorced	7	1.0
Cohabiting	9	1.3
Widowed	40	5.6
Level of education		
No formal education	55	7.6
Primary completed	311	43.2
Secondary completed	281	39.1
Tertiary completed	73	10.1

Mean age (SD) = 45.9 (15.2) years

TABLE II. Respondents' knowledge on onchocerciasis

Knowledge	# Frequency (n = 720)	Percent (%)
Causes of onchocerciasis		
Blackflies	590	81.9
Worms	226	31.4
Witchcraft	185	25.7
Dirty water	58	8.1
Clean water	37	5.1
Symptoms of onchocerciasis		
Itching	668	92.7
Loss of vision	256	35.5
Pain	36	5.0
Weight loss	4	0.5
Leopard skin	3	0.4
Awareness of preventive measures for onchocerciasis	423	58.8
Awarenedd of drug treatment for onchocerciasis	445	61.8
Drug treatment for onchocerciasis (n =445)		
Ivermectin	419	94.2
Albendazole	13	2.9
Don't know	13	2.9
How medication works (n =445)		
Stops itching	432	97.0
Causes excretion of worms	252	56.6
Kills worm in the body	196	44.0
Makes people blind	1	0.2
Dosage of medication (n =445)		
One tablet per person	17	3.8
Two tablets per person	171	38.4
Three tablets per person	63	14.2
Four tablets per person	2	0.4
Depends on height	107	24.0
Don't know	85	19.2

Multiple response

TABLE III. Predictors of respondents knowledge on onchocerciasis

Variable	Knowledge Freq (%)		OR (95 % CI)	*p* – value
	Good	Poor		
Age group (years)				
< 40	258 (91.5)	24 (8.5)	0.34 (0.209 – 0.541)	0.001
≥ 40*	343 (78.3)	95 (21.7)		
Sex				
Male	339 (88.1)	46 (11.9)	0.49 (0.326 – 0.728)	0.001
Female*	262 (78.2)	73 (21.8)		
Level of education				
No formal	24 (43.6)	31 (56.4)	0.11 (0.045 - 0.262)	0.001
Primary completed	261 (83.9)	50 (16.1)	0.73 (0.343 – 1.570)	
Secondary completed	252 (89.7)	29 (10.3)	1.22 (0.551 - 2.710)	
Tertiary completed*	64 (87.7)	9 (12.3)		

*Reference category OR – Odds ratio CI - Confidence interval

TABLE IV. Respondents knowledge on CDTI strategy

Knowledge	Frequency (n = 720)	Percent (%)
Eligibility for medication		
Healthy people	561	77.9
Everybody	71	9.9
Sick people	30	4.2
Under fives	0	0.0
Pregnant women	0	0.0
Awareness that recipients pay for medication	5	0.7
Awareness of who is in charge of the programme		
Government	419	58.2
Health workers	187	26.0
Community	74	10.3
Don't know	40	5.5
Selection of people for drug distribution		
Health workers	333	46.3
Community	270	37.5
Government	79	11.0
Don't know	38	5.2
Awareness of who determines time of distribution of ivermectin		
Community	285	39.6
Government	272	37.8
Health workers	91	12.6
Don't know	72	10.0
Calculation of ivermectin dosage		
Use of height	613	85.1
Use of weight	23	3.2
Use of both weight and height	20	2.7
Don't know	64	8.9
Duration of drug administration		
= 1 year	69	9.6
> 1 – 5 years	482	66.9
Don't know	169	23.5

TABLE V. Predictors of respondents' knowledge of CDTI strategy

Variable	Knowledge Freq (%)		OR (95 % CI)	*p* – value
	Good	Poor		
Age group (years)				
< 40	240 (85.1)	42 (14.9)	0.71 (0.472 – 1.057)	0.092
≥ 40*	351 (80.1)	87 (19.9)		
Sex				
Male	336 (87.3)	49 (12.7)	0.47 (0.314 – 0.687)	0.001
Female*	225 (76.1)	73 (23.9)		
Level of education				0.001
No formal	33 (60.0)	22 (40.0)	0.49 (0.230 – 1.047)	
Primary completed	259 (83.3)	52 (16.7)	1.63 (0.886 – 3.000)	
Secondary completed	244 (86.8)	37 (13.2)	2.16 (1.144 -4.071)	
Tertiary completed*	55 (75.3)	18 (24.7)		

*Reference category OR – Odds ratio CI - Confidence interval

TABLE VI. Predictors of respondents' attitude towards CDTI strategy

Variable	Attitude Freq (%)		OR (95 % CI)	*p* - value
	Good	Poor		
Age group (years)				
< 40	223 (79.1)	59 (20.9)	1.55 (1.046 - 2.285)	0.033
≥ 40*	374 (85.4)	64 (14.6)		
Sex				
Male	328 (85.2)	57 (14.8)	0.71 (0.480– 1.045)	0.092
Female*	269 (80.3)	66 (19.7)		
Level of education				
No formal	50 (90.9)	5 (9.1)	2.59 (0.878 – 7.619)	0.006
Primary completed	271(87.1)	40 (12.9)	1.75 (0.908 – 3.382)	
Secondary completed	281 (77.6)	63 (22.4)	0.90 (0.475 – 1.686)	
Tertiary completed*	58 (79.5)	15 (20.5)		
Knowledge of onchocerciasis			0.26 (0.119 – 0.576)	0.001
Good	485 (80.7)	116 (19.3)		
Poor*	112 (94.1)	7 (5.9)		
Knowledge of CDTI strategy			0.24 (0.107 – 0.517)	0.001
Good	475 (80.4)	116 (19.6)		
Poor*	122 (94.6)	7 (5.4)		

*Reference category OR – Odds ratio CI - Confidence interval