INTESTINAL PARASITISM IN THREE RESETTLEMENT FARMS IN WESTERN ETHIOPIA

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ABSTRACT: This paper presents results of population based surveys of intestinal parasitism among 242 settlers and 320 indigenous people in and around 3 resettlement schemes in Illubabor Administrative Region in western Ethiopia. Overall prevalence rates in settlers were 61.6% and in indigenous people 65.0%. *Ascaris lumbricoides* was the most common parasite in 5 of the 6 study communities, followed by hookworm, *Trichuris trichiura, Entamoeba histolytica* and *Giardia lamblia*, in that order. Only one case of schistosomiasis mansoni was found and no host snails, further indicating that its prevalence is still low in most of western Ethiopia. Differences in the prevalence of intestinal parasitism among the study communities appear to be associated with environmental sanitation, water supply and socio-economic status of households, although this needs to be verified in more extensive follow-up studies.

INTRODUCTION

The Ethiopian government developed about 80 resettlement schemes in response to the 1984/85 famine and settled about 600,000 drought victims, mostly in western Ethiopia (1). Intestinal parasitism in these settlement areas obtains importance particularly for three reasons. First, the general objective of the resettlement authorities to make settlers self-sufficient has been faced with numerous problems, partly because of the high prevalence of infectious diseases in the resettlement areas (1). Second, the generally poor performance of these schemes, especially during the early stage, and continued food shortages and malnutrition rendered the settlers susceptible to infectious diseases, including morbidity due to intestinal parasitism and diarrhoeal diseases (1). Third, the movement of most settlers from dispersed farmsteads in the cool highlands in central and northern Ethiopia to densely populated villages in the hot, humid western lowlands apparently increased the incidence of these and other infectious diseases (1). This resettlement programme thus raises the question of the comparative epidemiology of settlers and indigenous populations of western Ethiopia. Elsewhere in the country, in the Awash Valley, settlers and migrant labourers acquired higher rates of hookworm, *schistosomiasis mansoni* and *sch. haematobium* infection from local water bodies than in their home areas in the highlands, a pattern which was repeated in local pastoralists who settled in and around these schemes (2,3).

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This paper presents some of the results of epidemiological studies of intestinal parasitism in Kishe, Gera and Didessa resettlement schemes in Illubabor Administrative Region (formerly Keffa Region). Studies of malaria, onchocerciasis, trypanosomiasis, non-filarial elephantiasis (podoconiosis), malnutrition and socio-economic status of settlers and indigenous populations have been reported elsewhere (4,5).

MATERIALS AND METHODS

Three resettlement schemes were selected on the basis of their location, history and development stage, to represent different ecological/socio-economic conditions. Thus two lowland farms and one highland farm were selected in different climatic zones, all with different water supplies. The population of the selected resettlement schemes of Gera, Kishe and Didessa, including their indigenous populations on or near these schemes consisted of 8,214 people in 2,564 households in 1988, based on records of the local peasant associations and producer cooperatives (Table 1). All three resettlement schemes were of the integrated type, characterized by the settlement of settlers in existing peasant associations. Sixty settlers and 60 indigenous households were randomly selected in each of the six study communities from up to date household lists prepared by the respective peasant associations and farmers' producer cooperative offices. A questionnaire containing 76 questions, nearly all of the closed type, was prepared and pretested. Questions were mostly on household demographics, income, expenditure and other socio-economic aspects, and health services utilization. Questionnaires were administrated by eight experienced high school students from nearby towns in Amharic (among the settlers) and Oromigna (among

the indigenous people). Some of the results of this questionnaire survey have been reported elsewhere (4,5). During the questionnaire surveys, household heads, their wives and (where present) one randomly selected child, a total of 907 persons, were given paper stool cups and asked to submit stool specimens to our field laboratory on the same day or the next morning; 562 persons submitted stool specimens (Table 1). This moderate turnout was largely due to the heavy rains, which made walking to our field laboratory difficult, and the voluntary nature of the surveys. Voluntary participation without assistance by peasant association officials was considered essential for the generation of reliable information on socio-economic and environmental problems experienced by settlers. Stool specimens were transferred to 30 ml screw-cap containers, preserved in 10% formalin and examined microscopically by an experienced technician for ova, larva and cysts using the ether concentration method (6). Snail surveys were carried out by the senior author in the rocky streams inside the resettlement schemes using forceps. A chi-square test was used to evaluate differences in infection rates and selected independent variables.

RESULTS

The overall prevalence rates of intestinal parasitism were almost identical in settlers (61.6%) and indigenous people (65%). Among the six study communities rates ranged from 43.8% (indigenous population in Kishe) to 81.7% (indigenous population in Gera); between 57.3% and 63.8% of the settlers were infected. Prevalence rates were significantly higher ($p<0.05$) among settlers than indigenous people in Kishe but higher in non-settlers in Gera ($p<0.05$) (Table 2). Altitude was not associated with infection levels among the three resettlement schemes (Table 1). *Ascaris lumbricoides* was the most prevalent (38.8%) of the 10 helminths and protozoal parasites identified in the study, followed by hookworm (24.9%), *Trichuris trichiura* (6.2%), *Entamoeba histolytica* (3.4%) and *Giardia lamblia* (1.6%) with *Taenia sp., Strongloides stercoralis, Enterobius vermicularis* and *Hymenolepis nana* all below 1% prevalence. Only one case of *Schistosoma mansoni* infection was found, in a settler from Wello Region, and no *Biomphalaria pfeifferi* in local streams.

Females had higher infection rates than males in five of the six study communities, significantly so among settlers in Gera ($p<0.05$) and Kishe ($p<0.01$) (Table 3). However, hookworm was more prevalent in male than female settlers in Kishe and Didessa. No distinct age distribution of infection was noted. Nearly 14% of all persons had multiple infections, with rates ranging from 0-28% in the six populations. All but five persons had double infections. Both average household expenditure and number of cattle owned per household were significantly higher and prevalence of intestinal parasitism

Table 1. The study population and environmental and economic factors in relation to intestinal parasitism in settlers and indigenous populations in Gera, Kishe and Didessa resettlement farms.

Resettlement scheme and population (altitiude)	Total Population	No of people selected for the study	No of people studied	type of water supply	Average household expenditure in 1987/88 (in birr)	Average No of cattle owned per household	Prevalence of intestinal parasitism (%)
Gera (1,950 m) settlers	1,575+	136	82	Protected wells	376	2.61	57.3
Indigenous	1,541	172	115	Streams	355	0.78	81.7
Kishe (1,300m) settlers	1,173+	92	47	Protected wells	204	0.78	63.8
Indigenous	1,146	167	89	Spring in the forest	475	2.26	43.9
Didessa (1,200m) settlers	1,120	165	113	Unprotected wells and stream	337	0.92	61.6
Indigenous	1,059	175	116	Unprotected wells and stream	273	1.03	65.5

+ All settlers originated in Wello and Tigray administrative regions

Table 2. Intestinal parasitism in settlers and indigenous populations, by resettlement scheme

Scheme/population	No. examined	Ascaris Lumbr.	Trich. trich.	Hookworm	Taenia sp.	strong sterc.	Enterverm.	Hymen. nana	Schisto. Mansoni	Entam. histo	Giar. lamb	Multiple infection	Total prevalence
Person Infeccted													
Gera													
settlers	82	42.7	2.4	11.0	1.2	0	0	0	0	1.2	3.7	4.9	57.3
Indigenous	115	62.1	10.4	24.3	0	0.9	0	1.7	0	0.9	0.9	20.0	81.7
Kishe													
settlers	47	27.7	6.4	25.5	0	0	2.1	0	0	6.4	2.1	6.4	63.8
Indigenous	89	19.1	2.2	16.9	1.1	0	0	0	0	11.2	1.1	6.7	43.8
Didessa													
settlers	113	31.0	7.1	36.3	2.7	0	0	0.9	0.9	1.8	1.8	1.8	61.6
Indigenous	116	40.0	6.9	30.2	0.9	2.6	0	1.7	0	1.7	0.9	18.1	65.5
Total													
settlers	242	34.3	5.4	25.6	1.2	0	0.4	0.4	0.4	2.5	2.5	10.7	61.6
Indigenous	320	42.2	9.1	24.4	0.6	0.9	0	1.3	0	4.1	4.1	16.3	65.0

Table 3. Intestinal parasitism by age and sex among settlers and indigenous populations in Gera, Kishe and Didessa resettlement schemes.

Age	No. examined	Ascaris Lumbr.	Trich. trich.	Hookworm	Taenia sp.	strong sterc.	Enterverm.	Hymen. nana	Schisto. Mansoni	Entam. histo	Giar. lamb	Multiple infection	Total prevalence
Settlers													
0-4	3(4)+	67(0)	0	33(25)	0	0	0	0	0	0(25)	0	0(25)	67(25)
5-14	15(18)	40(39)	0	40(33)	0	0	0	0	0	7(6)	0	13(17)	73(61)
15-29	20(35)	36(51)	0(6)	20(20)	0	0	0	0	3(0)	0(3)	0(3)	10(14)	50(69)
30-49	44(53)	30(36)	7(15)	27(26)	5(0)	0	0	0(2)	0	0(2)	2(4)	11(9)	59(75)
50+	40(10)	18(40)	0	20(33)	3(0)	0	6(0)	0	0	0(10)	5(0)	0(30)	48(50)
sub total	122(120)	29(40)	2(8)	25(26)	2(0)	0	0	0(1)	1(0)	1(4)	2(3)	7(8)	57(68)
Indigenous people													
0-4	0(2)	0(50)	0	0	0	0	0	0	0	0	0	0	0(50)
5-14	22(29)	45(45)	0(10)	14(28)	0	5(0)	0	0	0	0(3)	0	3(17)	64(620
15-29	28(37)	50(54)	0(14)	32(27)	0	4(0)	0	0	0	0(4)	4(0)	14(22)	77(81)
30-49	85(66)	32(39)	5(9)	22(26)	1(0)	1(0)	0	2(1)	0	6(7)	0	13(15)	56(62)
50+	28(23)	32(65)	11(13)	18(30)	4(0)	0	0	0	0	4(0)	0(9)	11(30)	57(87)
sub total	163(157)	37(48)	4(14)	22(27)	1(0)	2(0)	0	1(1)	0	4(4)	1(1)	12(21)	60970)

+ Numbers in the brackets - females and outside the brackets - males

lower ($p<0.05$) in the indigenous population than settlers in Kishe. Similarly, settler households in Gera owned, on average, significantly more cattle and had lower infection rates than indigenous people ($p<0.05$).

DISCUSSION

The overall prevalence of intestinal parasitism reported in this study (63.7%) is similar to that reported from Keto resettlement scheme in Wellega Administrative Region (72.8%), in the only other population based survey carried out in Ethiopian resettlement schemes (7). In Gambela in the western lowlands and in another Didessa resettlement scheme in Illubabor rates were 50-80% (8-10). Intestinal parasitism, particularly hookworm infection and ascariasis, thus appear to be more common in resettlement schemes in Illubabor Region than in the areas of settler origin in the eastern and northern Ethiopian highlands (11-15). The high prevalence of *Ascaris* and hookworm in the study area is in contrast with the presence of latrines in more than 90% of the settler homesteads (but only about 30% of the non-settler compounds). Inspection of all latrines by the study team and interviews with household members showed that about three-quarters of the settler latrines were not regularly used. This discrepancy points to the need for intensified health education in the health stations (health posts) in resettlement schemes with the objective of improving environmental sanitation, also suggested by another study (7). The highest sanitation standard, based on cleanliness on house interiors, disposal of rubbish and faeces, and maintenance of latrines was maintained by the indigenous population in Kishe, which also had the lowest rate of parasitism (43.8%).

The role of type of water supply in intestinal parasitism in the study area is not clear from the results. The lower prevalence rates among settlers than indigenous people in Gera may be due not only to their better water supply but also to their higher socio-economic level. In Didessa, where both settlers and indigenous people used unprotected springs and economic indicators were comparable, infection rates were also similar.

The inverse relationship between mean household expenditure and cattle ownership (both indicators of socio-economic status) on one hand and prevalence of parasitism on the other in Kishe and Gera suggests that they are important explanatory variables, although their precise impact needs to be studied in larger, well stratified socio-economic populations and at the household level. Since production levels and income may affect intestinal parasitism levels through food availability and affordability of soap, clothing, better housing and medical care (5), these economic parameters should be considered in health surveys in resettlement schemes and other rural areas in the future.

The single case of *S.mansoni* infection probably originated in Wello Region, where intestinal schistosomiasis is locally hyperendemic (16). This is also suggested by our failure to locate *Biomphalaria pfeifferi* host snails in the three resettlement farms. Both this snail species and *S.mansoni* infections are still relatively uncommon in western Ethiopia (16,17), although infection rates above 90% have recently been reported from Metekel resettlement scheme in Gojam Region (18).

This cross-sectional study provides primarily baseline data in the absence of initial screening of settlers at the time of their arrival in western Ethiopia. While such factors as environmental sanitation, water supply and socio-economic status may be involved in the epidemiology of intestinal parasitism in the study area, their relative impact as well as that of other factors such as health services and level of education needs to be determined in large, socio-economically well defined populations at both the household and farm levels. Household level analysis of our data is in progress and will be reported separately. More comprehensive evaluation of any changes in intestinal parasitism as a result of resettlement must await follow-up studies in the same populations.

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REFERENCES

1.Kloos, H. Health and resettlement in Ethiopia, with an emphasis on the 1984/85 resettlement programme: a review. *Ethiop.J.Dev.Res.* 1989; 11:61-94.

2.Kloos, H. DeSole G. and Aklilu Lemma. Intestinal parasitism in semi-nomadic and subsistence farmers in and around irrigation schemes in the Awash valley, Ethiopia, with special reference to cultural and ecological associations. *Soc.Sci.Med.* 1981; 15B:457-468.

3.Kloos, H., Aklilu Lemma, Belete Kirub, Assefa Gebre, Bahta Mazengia, Getachew Feleke and DeSole, G. Intestinal parasitism in migrant farm labour populations in irrigations schemes in the Awash valley, Ethiopia, and in major labour source areas. *Ethiop.Med.J.* 1980; 18:52-61.

4.Abdulhamid Bedri Kello, Kloos, H. and Abdulaziz Addus. Intersectoral collaboration to improve the health status of resettlers in Keffa resettlement farms. IDR Research Report No.39. Institute of Development Research, Addis Ababa University, 1990.

5.Abdulhamid Bedri Kello, Kloos, H. and Abdulaziz Addus. Production and income levels in three resettlement schemes in Illubabor Region. Proceedings of the workshop on problems and prospects of rural development in Ethiopia. Institute of Development Research, Addis Ababa University. 1991; 47-65.

6.Ritchie, L.S. An ether sedimentation technique for routine stool examination. *Bull. U.S. Army Med. Dept.* 1948; 8:326-329.

7.Adane Mekonnen. Health status in resettled and indigenous

populations in Kelem Awraja, Wellega, northwestern Ethiopia. M.Sc thesis, Dept. of Community Health, Faculty of Medicine, Addis Ababa University, 1988.

8.Tesfamichael Tesfayohannes. Prevalence of intestinal parasites in Gambela, Agaro and Didessa valley. Unpublished report. Dept. of Microbiology, Addis Ababa University, Addis Ababa. 1985.

9.Hailegnaw Eshete, Tekola Endeshaw and Sioum Tessema. Some notes on the occurrence of intestinal parasites among new settlers in western Ethiopia from Shoa, Tigray and Wello administrative regions. Paper presented at the 23rd Annual Conference of the Ethiopian Medical Association, Addis Ababa. 1986; May 29-31.

10.Tesfamichael Tesfayohannes and Kloos, H. Intestinal parasitism. In: Zein Ahmed Zein and Kloos, H. (eds.) *The Ecology of Health and Disease in Ethiopia.* Ministry of Health, Addis Ababa. 1988; 214-230.

11.McConnell, E. and Armstrong, J.C. Intestinal parasitism in fifty communities on the central plateau of Ethiopia. *Ethiop. Med. J.* 1976; 14:159-168.

12.Lo, C.T., Teklemariam Ayele and Hailu Birrie. Helminth and snail survey in Hararge Region of Ethiopia with special reference to schistosomiasis. *Ethiop. Med. J.* 1989; 27:73-83.

13.Shibru Tedla and Teklemariam Ayele. Ascariasis distribution in Ethiopia. *Ethiop. Med. J.* 1986; 24:79-86.

14.Shibru Tedla and Leikun Jemaneh. Distribution of *Ankylostoma duodenale* and *Nector americanus* in Ethiopia. *Ethiop. Med. J.* 1985; 23:149-158.

15.Zein Ahmed Zein and Mekonnen Assefa. The prevalence of intestinal parasites among farming cooperatives, Gondar Region, northwest Ethiopia. *Ethiop. Med. J.* 1985; 23:159-167.

16.Kloos, H., Lo, C.T., Hailu Birrie, Teklemariam Ayele, Shibru Tedla and Fekade Tsegay. Schistosomiasis in Ethiopia. *Soc. Sci. Med.* 1988; 26:803-827.

17.Tilahun Woldemichael and Negash Gemeda. Survey of intermediate snail hosts of human schistosomiasis in resettlement sites in western Ethiopia. *Ethiop. J. Hlth. Dev.* 1987; 2:43-50.

18.Awash Teklehaimanot and Fletcher, M. A parasitological and malacological survey in the Beles Valley, northwestern Ethiopia. *J. Trop. Med. Hyg.* 1990; 93:12-21.