# SURVEY OF INTESTINAL PARASITES IN BURE AREA, ILLUBABOR, SOUTH WESTERN ETHIOPIA

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**ABSTRACT**: Population census and survey of intestinal parasites were conducted in October 1987 in Bure area, Illubabor. Altogether, there were 1063 households comprising 4119 residents, of whom 86.3% (3,555) were indigenous and 13.7% (564) were newly arrived settlers. Four villages among nine were taken randomly, and all individuals living in a 10% sample of households picked by systematic sampling underwent investigation for intestinal parasites. Of these, 8.5% (301) indigenous and 13.7% (77) settlers provided stool specimens which were collected, processed and examined by the formol-ether-concentration technique. Positive rates for one or more parasites turned out to be 82.7% and 67.5 % among the former and latter respectively, the difference being statistically significant ($P < 0.05$). Both population groups combined, Ascaris lumbricoides, hookworms, and Entameba coli were the predominant parasites. Multiple infection was common comprising 48.2 % in the indigenous and 53.8% in the settler population groups. Preventive and control measures are suggested. [Ethiop. J. Health Dev. 1994;8(1):29-35]

## INTRODUCTION

Intestinal parasites are generally taken as indicators of poor socioeconomic and sanitary conditions ( I) .This has been indicated by several studies carried out in Ethiopia (2, 3, 4, 5, 6). Movement of settler populations from dispersed farmsteads in their places of origin in the north and central regions of Ethiopia to the new settlements into crowded villages in the west and southwest may have an impact on the epidemiology of diseases, including intestinal parasites (7). There have been relatively few studies in settlement areas (7, 8).

The purpose of this survey was to establish the prevalence of intestinal parasites among indigenous and settler populations and examine the difference. Treatment of those with overt clinical manifestations of parasitic infections has also been considered.

## METHODS

Bure town is 696km. west of Addis Ababa and is situated in the western pan of Illubabor at an elevation of 1700 meters above sea level. The study area comprises four villages in this town (fig. 1). There is rain during most of the year, yet it has sparse forests despite the abundant rainfall since it is highly cultivated. The population consists of indigenous residents and settlers who came from the northen regions of Ethiopia (Wello. Tigray), about three years prior to the study. All are engaged in farming. The sources of water for home consumption are unprotected springs, rivers and streams. Open field defecation and careless disposal of garbage are widely practised.

The study was cross-sectional and exploratory in nature with no hypothesis a priori. It was carried out in an area here an integrated settlement of new corners \vas implemented among the indigenous line villages with Bure town as their center, since it has a health station with facilities for examination and treatment of subjects when necessary , were considered. Accessibility by four-wheel drive vehicles was the criterion for inclusion of the villages. Four of the nine villages were randomly selected. I All houses in the four villages were numbered and censused. The total number of houses in each village was used as a sampling frame and each household as a sampling unit. A or sample of the households was selected by systematic sampling and all members of the household in the selected houses were included in the study.

Individuals in the selected households were told that they would undergo physical examination following a brief medical history, and a small quantity of stool would be examined for intestinal parasites. They were informed that they were free to reject participating in the study. However. there was a very high compliance. _____

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At the time of registration, individuals were also given paper cup containers for bringing stool specimen on the morning of investigation at Bure Health Station. A small quantity of stool was then preserved in screw-
capped vials containing 10% formalin. The specimens were then transported to the laboratory of the Institute of Pathobiology, Addis Ababa University, where they were processed and examined using Ritchie's method
(9), by a senior and experienced medical laboratory technologist. However, direct stool examination was performed in the field for few individuals who had complaints and/or findings suggestive of heavy parasitic infection. Those who were found positive were given appropriate treatment in collaboration with Bure Health
Station.

The outcome variables of interest were positivity for and the rates of multiple infections with intestinal parasites. The independent variables were age, and whether an individual is a settler or indigenous. Characteristics like occupation, income, marital status, and literacy were not considered because we dealt with fairly homogeneous rural peasant populations. With respect to these variables confounding factors are: living in the same environment and sharing sources of water. However, differences were still anticipated on the basis of the remaining characteristics .

Statistical analysis was made using EPINFO Version 5( 10) Bivariate analyses were found to be sufficient in assessing relationships between variables. in this descriptive study.

**RESULTS**

Population: The age and sex distributions of the total and san1ple populations in the study area are presented in Table I. Out of 4119 people in the area. 86.3% (3555) were indigenous and 13.7%(564), settlers. The 0-14
age group examined for intestinal parasites among the indigenous population outnumbers that of the settlers. This is because all children under three years of age were taken as indigenous since they were born in the study area. 1t was difficult. sometimes impossible. to obtain stool specimens from very young children and few non-complying adults.

Parasitological Examination: Tables 2 and 3 show the parasite positivity rates of indigenous and settler populations respectively. Of the indigenous population examined, 82.7% (249/301) had positive results for one or more intestinal parasites. whereas the rate was 67:5%(52/77) among the settlers. The difference is statistically significant ($P < 0.005$), the indigenous population having more intestinal parasitism. Age was not found t(J be a significant factor in determining positivity for intestinal parasites ($P > 0.05$), in both the indigenous and settler populations.

Among the indigenous peoples Ascaris lubricoides is the most common. 31.8%, followed by hookworms, 25.5%, Entamoeba coli, 21% and Trichuris trichiura, 13.9%.

There were fewer cases of Entamoeba histolytica. Iodoamoeba, Trichostrongylus and Strongyloides species (Table 2). In the settlers, the n::Jst common intestinal parasite was Entameba coli, 39.4%, followed by hookworms, 24.2% , A.lumbricoides 23.2% , and T.trichiura, 9.1 % .Strongyloides, Trichostrongylus. Iodoamoeba and E. Histolytica were least prevalent (Table 3).

Table 4 shows the number of people in each age group with either single or multiple infections. Among the indigenous population with positive stool results, 51.8% (129/249) had single parasite infections, while 48.2 % (120/249) had multiple infections. Among the settlers, the rates were reversed, i.e., 53.8 %(28/52) had multiple infections and 46.2 % (24/52) single infections. However, these differences between the two population groups are not statistically significant ($P > 0.05$). Again, age was not found to be significantly associated with single or multiple infections ($P > 0.05$). Among those with multiple infections, most had two parasites and few had three or more. The common parasite combination was Ascaris lumbricoides and hookworms in the indigenous and Entameba coli, A.lumbricoides and hookworms in the indigenous and Entameba coli, A. lumbricoides and hookworms in the settlers.

Table 1: **Age and Sex Distribution of Base and Sample Population in Bure Area Illubabor, Ethiopia 1987.**

| Age group | Indigenous | | | | | Settlers | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bas e Population | | | Examined Popn. | | Bas e Population | | | Examined Popn. | |
| | Male | Female | Total | No. | % | Male | Female | Total | No. | % |
| 0-4 | 304 | 320 | 624 | 38 | 6.1 | 14 | 13 | 27 | 3 | 11.1 |
| 5-9 | 316 | 300 | 616 | 67 | 10.9 | 46 | 40 | 86 | 16 | 18.6 |
| 10-14 | 223 | 217 | 440 | 34 | 7.7 | 36 | 32 | 68 | 8 | 11.8 |
| 15-44 | 564 | 635 | 1199 | 100 | 8.3 | 132 | 147 | 279 | 34 | 12.2 |
| 45-46 | 173 | 245 | 418 | 47 | 11.2 | 50 | 25 | 75 | 14 | 18.7 |
| 65+ | 131 | 127 | 258 | 15 | 4.7 | 20 | 9 | 29 | 2 | 6.9 |
| Total | 1711 | 1844 | 1555 | 301 | 8.5 | 298 | 266 | 564 | 77 | 13.7 |

Table 2: **Results of Stool Examination Among Indigenous Population, Bure Area Illubabor, Ethiopia 1987**

| Age Group | No. exam | No. | Pos.% | Parasites | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Al | Tr | Hk | St | Eh | Ec | Ib | Ts |
| 0-4 | 38 | 28 | (73.7) | 18 | 3 | 10 | - | 3 | 14 | 2 | - |
| 5-9 | 67 | 52 | (77.6) | 33 | 16 | 21 | 2 | 3 | 18 | 1 | 2 |
| 10-14 | 34 | 34 | (100) | 20 | 8 | 17 | - | 3 | 11 | - | - |
| 15-44 | 100 | 84 | (84) | 36 | 20 | 36 | 1 | 3 | 28 | 2 | 1 |
| 45-64 | 47 | 38 | (80.) | 19 | 9 | 18 | 3 | 4 | 14 | 0 | 3 |
| 65+ | 15 | 13 | (86.7) | 9 | 3 | 7 | - | - | 4 | - | - |
| Total | 301 | 249 | (82.7) | 135 | 53 | 108 | 6 | 16 | 89 | 5 | 6 |

A1 = Ascaris lumbricoides, Tr= Trichuris trichiura, HK = Hookworm species
St = Strongyloides species, Eh = E. Histolytica, Ec = Entameba coli
Ib = Iodoamoeba species, Ts = Trichostrongylus

Table 3**. Results of Stool Examination Among Settlers, Bure Area Illubabor, Ethiopia, 1987**.

| Age group | No. exam | No. | Pos. % | Parasites | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Al | Tr | Hk | St | Eh | Ec | Ib | Ts |
| 0-4 | 3 | 2 | (66.7) | 2 | 2 | 2 | 1 | - | 2 | - | 1 |
| 5-9 | 16 | 11 | (68.8) | 4 | 1 | 7 | - | 1 | 7 | - | - |
| 10-14 | 8 | 6 | (75) | 4 | 1 | 4 | - | - | 3 | - | - |
| 15-44 | 34 | 21 | (61.8) | 8 | 3 | 6 | - | - | 18 | 1 | - |

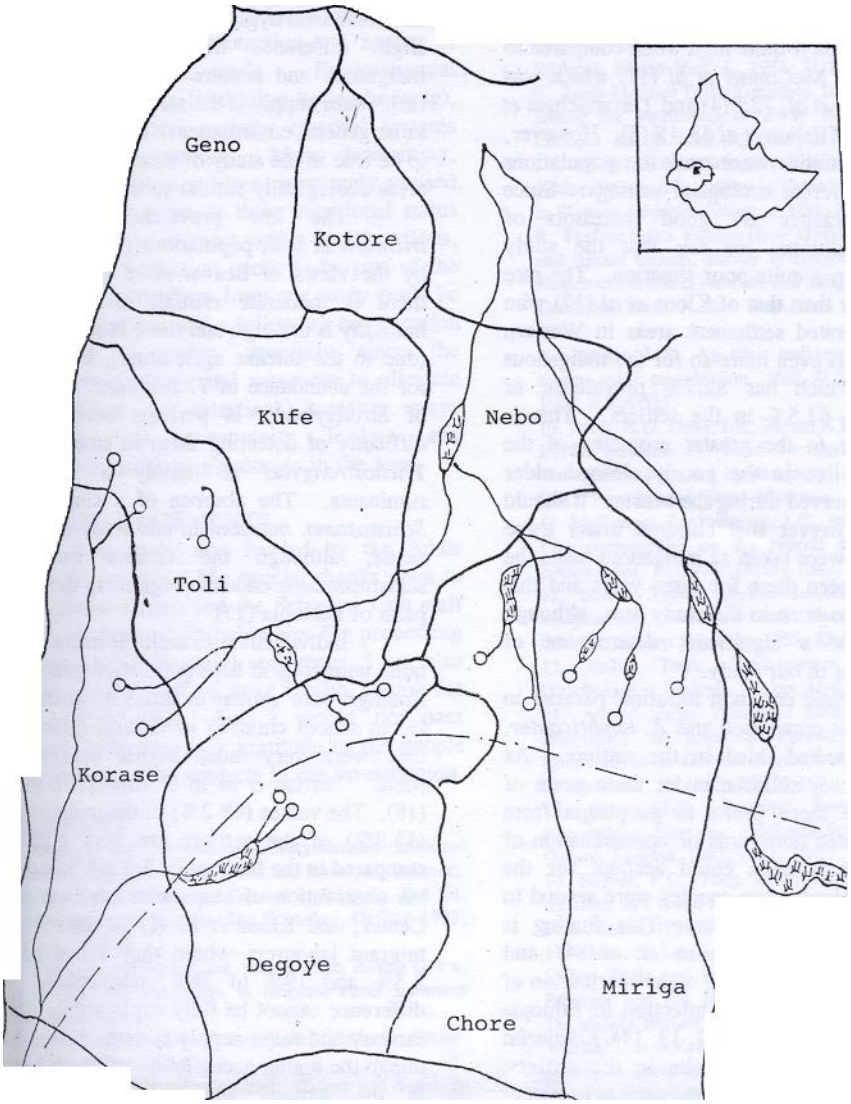
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 45-64 | 14 | 11 | (78.6) | 4 | 2 | 4 | - | - | 8 | - | - |
| 65+ | 2 | 1 | (50.0 | 1 | - | 1 | 1 | - | 1 | - | 1 |
| Total | 77 | 52 | (67.5) | 23 | 9 | 24 | 2 | 1 | 39 | 1 | 2 |

Al = Ascoris lumbricoides, Tr = Trichuris trichiura Hk = Hookworm species
St = Stronguloides species, Eh = E histolytica. Ec = Entameba coli
Ib = Iodoamoeba species, Ts = Trichostrongylus

Table 4. **Proportion of Individuals With Single and Multiple Infections, Bure Area Illubabor, Ethiopia, 1987.**

| Age | No ..Pos. | Single infection | | Multiple * infection | | No. pos | Single infection | | Multiple* infection | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | No | % | No | % | | No | % | No | % |
| 0-4 | 28 | 15 | (53.6) | 13 | (46.4) | 2 | 1 | (50) | 1 | (50) |
| 5-9 | 52 | 27 | (51.9) | 25 | (48.1) | 11 | 6 | (54..5) | 5 | (45.4) |
| 10-14 | 34 | 17 | (50) | 17 | (50) | 6 | 2 | (33..3) | 4 | (66.7) |
| 15-44 | 84 | 49 | (58.3) | 35 | (41.7) | 21 | 11 | (52.4) | 10 | (47.6) |
| 45-64 | 38 | 15 | (39..5) | 23 | (60..5) | 11 | 4 | (36.4) | 7 | (53.6) |
| 65+ | 13 | 6 | (46.2) | 7 | (53.8) | 1 | - | - | 1 | (100.0) |
| Total | 249 | 129 | (51.8) | 120 | (48.2) | 52 | 24 | (46.2) | 28 | (53.8) |

* Two or more parasites




**DISCUSSION**

In this survey we see that the prevalence of intestinal parasites for the indigenous and settler populations combined is 79.6% (301/378). This is quite high when compared to the finding of McConnel et al (11) which was 66%, Seyoum et al, 72%(4) and Tesfamichael et aI56.7%(5), Tilahun et aI58.4%(3). However, most of the studies were made on populations mostly in different ecological settings. Since intestinal parasites are good indicators of sanitary conditions, we see that the study villages are in a quite poor situation. The rate is also higher than that of Kloos et al (17) who studied integrated settlement areas in Western Ethiopia. It is even more so for the indigenous population which has 82.7% prevalence as compared to 67.5 % in the settlers. This is probably due to the greater crowding of the people who live in the poorly cleaned older houses as observed during the census. It should be noted, however that children under three years of age were taken as indigenous since the settlers had been there for three years and this age group was born in the study area, although age was not a significant determinant of infection rates in our study.

The most common intestinal parasite in the indigenous population was A. lumbricoides, whereas it ranked third in the settlers. As indicated above, children under three years of age who are more prone to geophagia from parasite-infested dooryards or contamination of food by soiled hands could account for the difference. Hookworm species were second in both groups of population. This finding is similar to that of .Seyoum et al (4) and McConnel et al (11). The wide distribution of ascariasis and hookworm infection in Ethiopia has been reported earlier (12, 13, 14). Entameba coli was the leading parasite in the settler, which may not be surprising since it is known to be the most widely spread intestinal parasite non-pathogenic to man (15). However, one cannot easily rule out the possibility of confusing this parasite with E. histolytica since they share a lot of morphological characteristics, in spite of the fact that stool examination was performed by an experienced laboratory technician. Nevertheless, is does speak for poor environmental hygiene and refuse disposal. The slight difference in parasites among the indigenous and settlers is temporary , because their water supply is the same and they share the same general environment. This has been found to be true in the study of Kloos et al (7) done in areas ecologically similar to these.

The low prevalence of Trichuris trichiura in both populations may be explained by the views of Beaver et al (16): "although there is moderate rainfall in the area, the humidity is not high and there is no dense shade (due to the intense. agriculture), both required for the abundance of T. trichiura". The rarity of Strongyloides is perhaps because of the difficulty of detecting them in stool specimen. Trichostrongylus is mainly a parasite of ruminants. The absence of a single case of Schistosoma. mansoni in our study needs to be noted, although the settlers came from schistosomiasis endemic regions in the northern parts of Ethiopia (17).

Individuals with multiple infections were quite numerous in both population groups. Our fmdings were similar to those of Tilahun et al (3) in school children in Central Ethiopia; but they were very much higher than those of Melake Berhan et al in Northwestern Ethiopia (18). The values (48.2% ) of the indigenous and (53.8%) of the settlers are very high when compared to the fmdings of Tesfa-Michael (5) in his observation of outpatients of Zway Health Center, and Kloos et al (2) in their study of migrant labourers where they found rates of 2.5% and 19% to 38%, respectively. The difference cannot be fully explained by a better sanitary and water supply system. It is probably due to the higher accessibility of health facilities in the settings where their studies were conducted, which enabled populations to get a better chance of deworming. However, further investigation is again needed to substantiate, this.

Both the indigenous and settler populations have high infection rates with intestinal parasites, a large number having multiple infections. This indicates the poor water supply and sanitation facilities prevailing in the area. Spring protection and zoning of rivers have to be made. Environmental sanitation activities (including better housing), proper latrines and garbage disposal systems need .greater attention. Mass deworming, especially of young children, is strongly advised since it would promote their nutritional status and growth. As in most public health actions, giving health education needs to be part of the package. The findings from our study could be used as a baseline, and a follow up investigation would be in order, specially since the
preliminary findings and measures to alleviate the problem of intestinal parasites were discussed with community leaders and responsible health professionals in the area.

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