

Prevalence of Protozoan and Helminth Infections in Patients Seen at the Sacramento County's Refugee Medical Evaluation Clinic (January 2014 – April 2017)

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Abstract

BACKGROUND: Sacramento County's Refugee Medical Evaluation Clinic provides comprehensive assessments to newly arriving refugees. A retrospective statistical analysis was conducted using data from ova and parasite (O & P) examinations to determine the prevalence of protozoan and helminth infections in this resettlement population.

METHODS: Patients were given two sets of O & P collection kits and instructions for collection. Each kit contained one vial of 5-10% formalin and one vial of Copper-polyvinyl alcohol. This was replaced by a single tube of Total Fix during the last four months of testing. Immigrant background information was obtained through the Refugee Health Electronic Information System (RHEIS). Data was analyzed using Statistical Analysis Software (SAS).

RESULTS: Of the 7,416 people assessed, 7,075 (95.4%) had data in RHEIS and are included in the analysis. The study populations were born in the following regions: Central, Eastern, Southeastern, Southern, and Western Asia; Eastern, Northern, Southern, and Western Europe; Latin America and the Caribbean; and Northern and Sub-Saharan Africa. The majority of this resettlement population were born in Southern Asia (60.8%) followed by Eastern Europe (18.7%) and Western Asia (18.3%). This population ranged from 0 to 92 years old at the time of assessment, with 18 to 34 years olds (35.7%) making up the largest group followed closely by 0 to 10 years old (33.5%). The proportion of males (51.2%) and females (48.8%) were similar.

There were 5,147 positive stools among the 2,107 (29.8%) who were infected. The majority had one protozoa infection (67.0%). Some had multiple protozoan or helminth infections and a subgroup had infections of both. The following accounted for the most infections among those who tested positive: *Entamoeba coli* (39.6%), *Blastocystis hominis* (38.4%), *Entamoeba nana* (17.9%), *Giardia lamblia* (15.8%), and *Ascaris lumbricoides* (8.2%). *Entamoeba coli* infections were the most prevalent among those born in Africa, Eastern Europe, and Southern Asia while *Blastocystis hominis* were the most prevalent among those born in Central Asia and Western Asia. Those with *Entamoeba coli* and *Blastocystis hominis* infections were mainly among those aged 18 to 34 years (42.8% and 42.6%, respectively). Children aged 0 to ten years represented 31.8% of those infected with *Ascaris lumbricoides*.

CONCLUSION: O & P examinations are essential for the treatment and health of this population, especially for helminth infections in younger children.

Introduction

In 2017, 53,691 persons were admitted into the United States and resettled through the federal refugee program (3). People in resettlement populations come to the United States from many regions of the world. Some of these regions are endemic for intestinal parasites (1). Published literature on the prevalence of intestinal parasites in refugee populations show the universal presence of protozoan parasites and limited infections with helminths (1 and 2). Furthermore, one study (2) found a decrease in intestinal parasites in refugees most likely attributed to presumptive pre-departure Albendazole treatment. These studies show the importance of performing ova and parasite (O & P) exams during intake medical examinations. The detection of parasites and resulting treatment measures ensure the future medical health of people resettling in this country. Surveillance and identification of the prevalence and species of intestinal parasites in the immigrant population entering through resettlement programs contribute to important public health investigations and development of policies for the control of intestinal parasites.

This study was a retrospective analysis of O & P results based on a population of refugees and a population with Special Immigration Visas (SIVs), from Iraq and Afghanistan, herein collectively referred to as a resettlement population. The purpose was to determine if there were resettlement population demographic differences in the types of protozoan and helminth infections. The intake medical examinations were conducted at Sacramento County's Refugee Medical Evaluation Clinic and the O & P tests were performed at Sacramento County's Public Health Laboratory.

Methods

LABORATORY METHODS: Stool specimens were collected as part of an overall health assessment. Each patient was given stool collection kits and instructed on methods of collection, timing of collection, and submission of specimens. Each kit contained one vial of 5-10% formalin and one vial of Copper-polyvinyl alcohol. This was replaced by a single tube of Total Fix during the last four months of testing. Public Health Microbiologists processed and performed microscopic examinations on each specimen. The examinations included a trichrome permanent stained slide and a wet mount slide. Results were entered into the laboratory information management system (LIMS). Initial data was collected by using the LIMS AdHoc reporting program called Test by Test Code and Received Date with Organisms. Raw data was extracted from LIMS AdHoc Reports and saved as Excel files. Patient demographics, such as region of birth, age, education, and sex, were collected through the Refugee Health Electronic Information System (RHEIS).

The retrospective data from LIMS AdHoc Reports and RHEIS were then merged and analyzed using SAS 9.3 with descriptive statistics generated using frequency tables, Chi-square tests, or Fisher's exact test. Patients' country of birth were categorized into geographic regions according to the United Nations Statistics Division methodology (5). The map was generated using ArcGIS Pro 2.3. Tables and graphs were generated using Excel.

Results

FIGURE 1. COUNTRY OF BIRTH

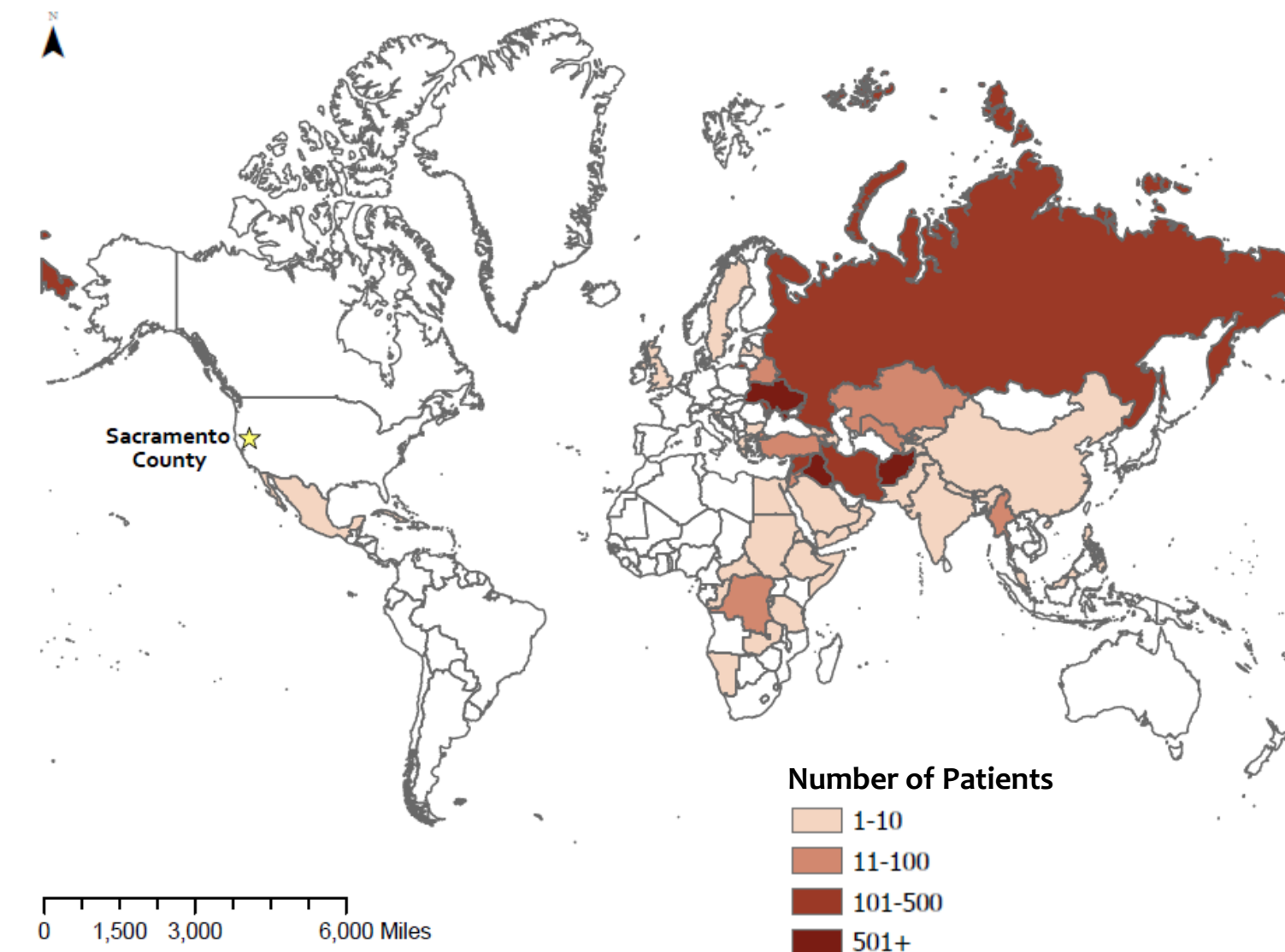


TABLE 1. REGION OF BIRTH

Region of Birth	N	%
Southern Asia	4,303	60.8%
Eastern Europe	1,326	18.7%
Western Asia	1,296	18.3%
Africa	58	0.8%
Central Asia	47	0.7%
Southeastern Asia	30	0.4%
Other ¹	15	0.2%

¹Other includes Eastern Asia (N=1), Latin America and the Caribbean (N=4), Northern Europe (N=7), Southern Europe (N=2), and Western Europe (N=1).

❖ The majority of the resettlement population (60.8%) was born in Southern Asia [Figure 1 and Table 1].

FIGURE 2. AGE GROUP

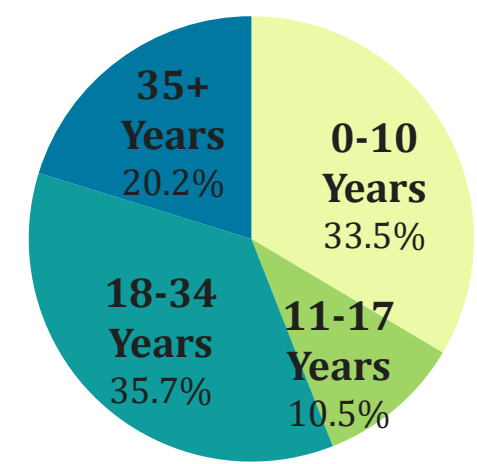


FIGURE 3. GENDER

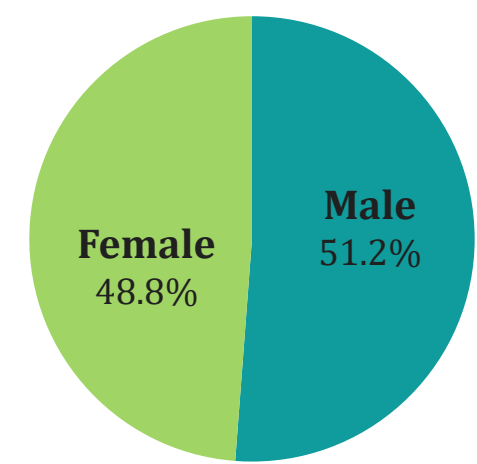
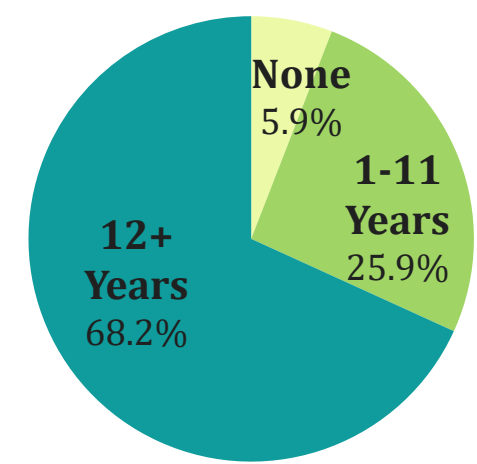


FIGURE 4. EDUCATION



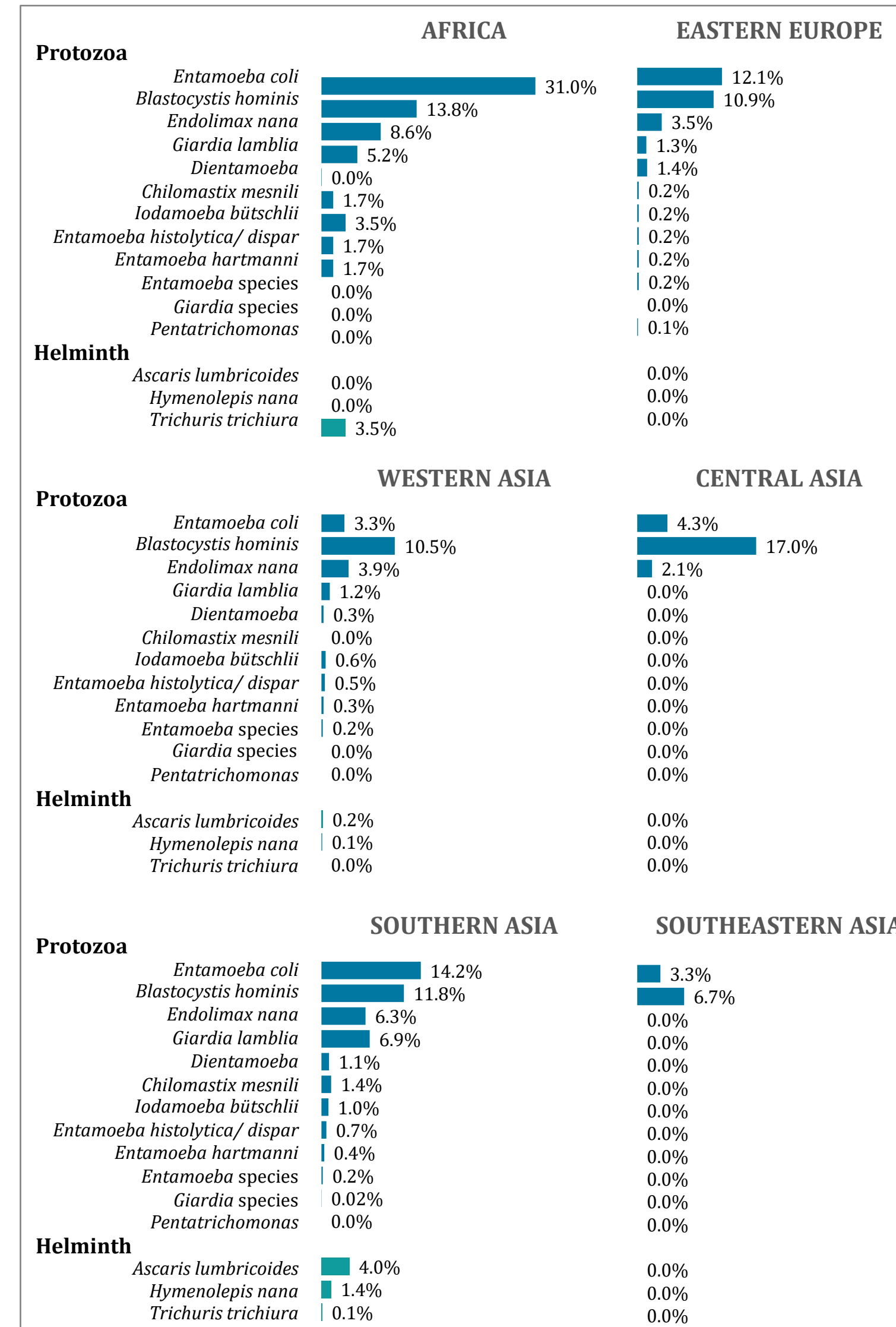
❖ In terms of age, those 18-34 years old and 0-10 years old made up the largest proportion (35.7% and 33.5%, respectively), followed by those 35 years and older (20.2%) and 11-17 years old (10.5%) [Figure 2]. The gender distribution was similar with 51.2% male and 48.8% female [Figure 3]. The majority (68.2%) had at least 12 years of education [Figure 4].

TABLE 2. NUMBER OF PROTOZOA AND/OR HELMINTH INFECTIONS

Protozoa	Helminth					
	0		1		2	
	N	%	N	%	N	%
0			113	5.4%	4	0.2%
1	1,411	67.0%	66	3.1%	5	0.2%
2	366	17.4%	38	1.8%	-	-
3	85	4.0%	6	0.3%	-	-
4	7	0.3%	1	0.1%	-	-
5	5	0.2%	-	-	-	-

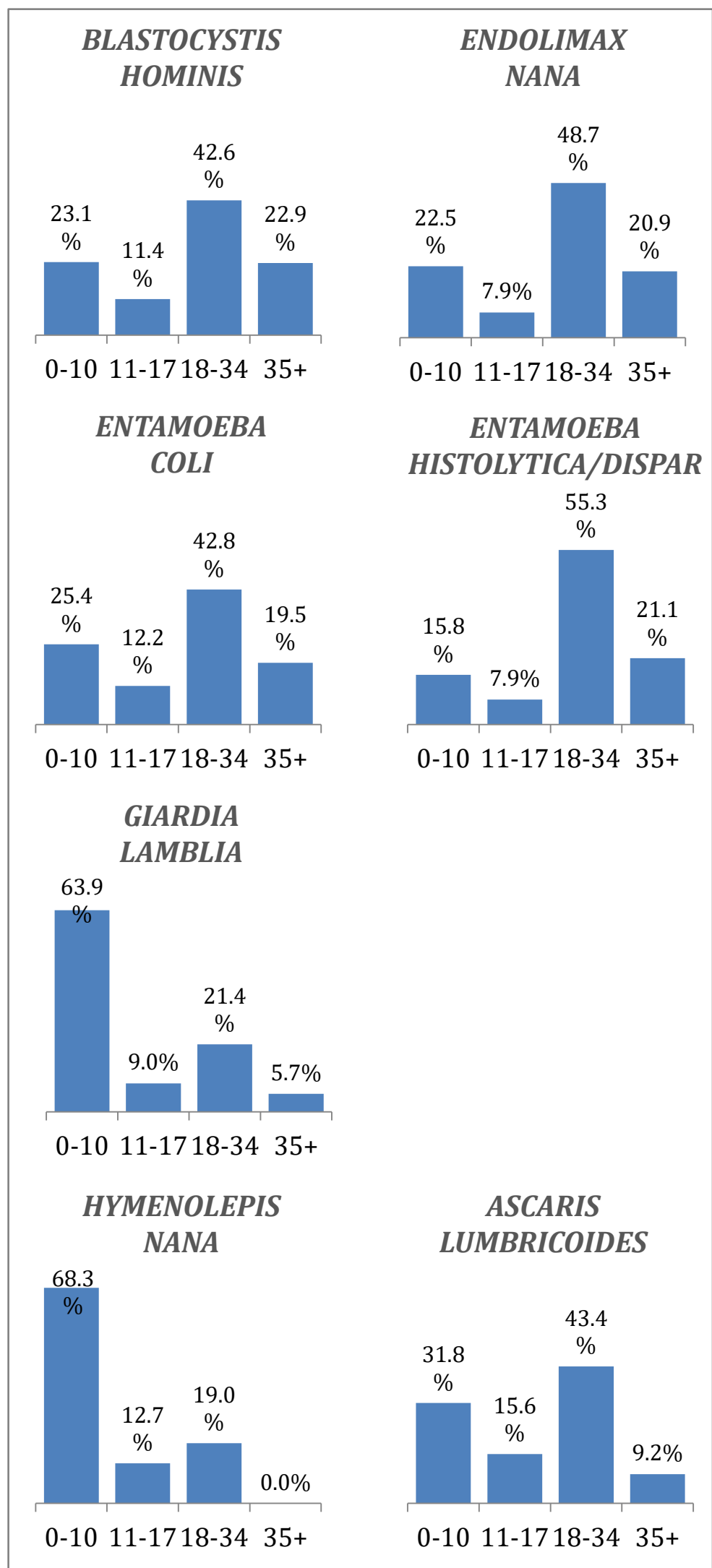
❖ Most (67.0%) had a single protozoan infection while 5.4% had a single helminth infection [Table 2].
❖ The most common protozoans were *Entamoeba coli* (39.6%), *Blastocystis hominis* (38.4%), *Entamoeba nana* (17.9%), and *Giardia lamblia* (15.8%) [Figure 5].

FIGURE 6. FREQUENCY OF PROTOZOA AND/OR HELMINTH INFECTIONS BY REGION



❖ Among those born in Africa, about one third had an *E. coli* infection. [Figure 6]. Central Asia had the highest percent of individuals infected with *B. hominis* (17.0%) followed by Africa (13.8%) and Southern Asia (11.8%)
❖ Those 18-34 years old represented the highest percent infected with *Entamoeba histolytica/dispar* (55.3%), *E. nana* (48.7%), *E. coli* (42.8%), and *B. hominis* (42.6%) [Figure 7]. For *G. lamblia* and *Hymenolepis nana*, over 60% were among those 0-10 year olds. *Ascaris lumbricoides* was the most prevalent among those 18-34 years old (43.4%) followed by those 0-10 years old (31.8%).

FIGURE 7. FREQUENCY OF PROTOZOA AND/OR HELMINTH INFECTIONS BY AGE GROUP



Conclusion

Protozoan infections were widely found among this resettlement population compared to helminth infections. Specifically, *E. coli* and *B. hominis* were found among individuals born in each region. Those 18-34 years old generally had the most protozoan infections. Children 0-10 years old represented 31.8% of those infected with *Ascaris lumbricoides*. Further studies will compare the impact of pre-departure treatment and serological testing for Strongyloidiasis and Schistosomiasis to the results found in this study (4). However, the results presented here show the importance of public health policy of continuing O & P screening to ensure the health of children and young adult in resettlement populations.

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