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PREVALENCE AND RISK ANALYSIS OF HUMAN GEOHELMINTHS, POST COVID 19 PANDEMIC, IN RURAL COMMUNITIES OF ILALO, ECUADOR.

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Abstract: Soil-transmitted helminths (STH) are the most common parasitic infections in the world and are linked to poor sanitation and poverty. Between 2019 and 2021, the Covid-19 pandemic interacted with STHs in rural areas, increasing the risk of infection. The objective of this study was to estimate the prevalence of STH, parasitic agents present, parasitic load, and associated risk factors in the rural area of the Ilaló Strip, Ecuador. A total of 320 people from five communities were tested using three routine diagnostic methods in clinical daily practice: Kato Katz, McMaster and mini-Flotac. A total of 73/320 persons were determined as positive (22.81%, 95% CI 22.3 to 23.4). The most frequent parasite reported was A. lumbricoides with 74.73% (95% CI 73.7 - 75.8). The estimated risk factors were: pig farming (OR 4.16; 95 % CI 2.34, 7.42) and vegetable and fruit cultivation (OR 11.66; 95 % CI 4.32, 41.08). This study presented relevant information on post-pandemic Covid-19 STH, its prevalence and the risk factors associated with it, demonstrating inadequate practices among the rural population of the Ilaló Strip.

Keywords: Soil-transmitted helminth; Covid-19, mini-Flotac; risk factors; Ilaló.

1. Introduction

Soil-transmitted helminths (STH) are the most common parasitic infections worldwide. They are linked to poor sanitation and hygiene and impoverished populations. The main causative agents are the nematodes *Ascaris lumbricoides*, *Trichuris trichiura* and hookworms (*Necator americanus* and *Ancylostoma duodenale*) [1, 2]. Infection is caused by ingestion of infective eggs present in soil, food or water contaminated with human feces (*A. lumbricoides* and *T. trichiura*) or by the presence of larvae in soil and later penetration into human skin (hookworm disease) [3, 4].

Lack of economic development and less access to sanitary infrastructure and treated water, garbage collection, and hygiene services have contributed to the increased burden of STH in rural populations [5]. Children may present severe infections that affect not only their physical growth but also their cognitive development, causing iron deficiency anemia, poor school performance, and absenteeism [6, 7]. Adults and the elderly may present alterations in their digestive process, susceptibility to secondary infections, the presence of a greater number of digestive pathologies with consequent absenteeism from work [8].

In late 2019 and early 2020, coronavirus disease 2019 (COVID-19), emerged in Wuhan, China, and immediately spread worldwide to become a pandemic problem. The disease generated several alterations at pulmonary, renal and cardiovascular levels [9, 10], forcing the population to enter quarantine periods in their different localities, without access to processed food or drinking water, so that raising food in an artisanal way, using well water and growing vegetables and fruits was one of the ways to cope with these

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inconveniences, increasing the risk of contracting STH. The development of a vaccine against Covid -19, the implementation of cleaning and disinfection measures such as hand washing, disinfection of shoes and clothes were one of the main strategies against Covid-19 but also against STH [9, 11]. Therefore, the aim of this study was to describe the epidemiology and risk factors associated with STH, post Covid-19 pandemic, in the inhabitants of the Ilalo Strip, Ecuador.

2. Materials and Methods

2.1. Study Population

The study was conducted between June 2021 and May 2022, in an area known as the Ilaló Strip, Pichincha, Ecuador. The participating communities were: La Merced (0°36'66.67 "S 78°45'00 "W), La Toglla (0°22'31.14 "S 78°49'78.1 "W), Sorialoma (0°15'17.6 "S 78°26'50.4 "W), Rumiloma (0 °19'55.2 "S 78°29'11. 9 "W) and Ubiyus (0°25'0 "S 78°22'60 "W) as seen in Figure 1. A descriptive cross-sectional survey was conducted in adults, elder adults and children, with and without STH symptomatology. Each patient completed a standardized questionnaire and minors were assisted and authorized by their parents to participate in the study. Inclusion criteria were: not taking an antiparasitic drug for the last 6 months, signing an informed consent form and willingness to participate in this study. Exclusion criteria were: Individuals who did not meet the inclusion criteria, refusal to participate, having taken an antiparasitic in the last six months or having used ivermectin as an auxiliary in COVID-19 preventive therapy.

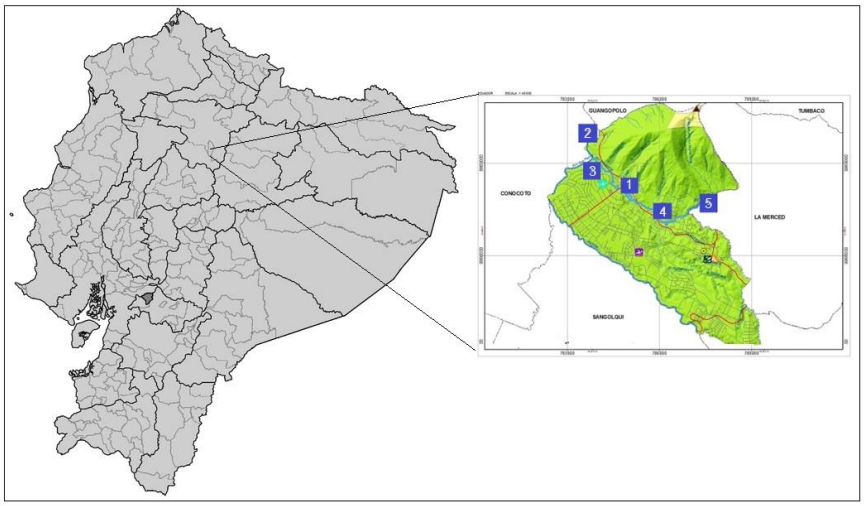


Figure 1. Location of the communities of the Ilalo Strip, Pichincha, Ecuador. 1. La Toglla, 2. Sorialoma, 3. Rumiloma, 4. Ubiyus, 5. La Merced

2.2. Selection of samples and parasitological methods

Three consecutive stool samples were collected from each participant and processed within 24 hours. The samples were examined at the Parasitology Laboratory at the Central University of Ecuador. These were analyzed by 3 coproparasitological techniques: mini-Flotac (SF2 and SF5), Mcmaster (SF2 and SF5), Kato-Katz (6 slides). As a "gold standard" for diagnosis, the combination of all parasitological tests was considered; if any test was positive, the individual was considered positive. The intensity of infection was considered for STH based on WHO guidelines: *A. lumbricoides* mild infection <5000 HPG, moderate 5000-49 999 HPG and high ≥50 000 HPG; for *T. trichiura*: mild infection 1 - 999 HPG, moderate 1000 - 9 999 HPG and high ≥10 000 HPG; Hookworm: mild infection 1 - 1999 HPG, moderate 2000 - 3 999 HPG and high ≥4000 HPG. With regard to the calculation of HPG, an average was made with the values obtained from each quantitative procedure: Mini-flotac, McMaster and KK.

2.3. Statistical analysis

All data were entered into an Excel file (Microsoft 2010). Statistical analysis was performed using R version 4.2.3. The characteristics of the respondents were treated as categorical variables and presented as frequencies and percentages. Prevalence was estimated and each sample that tested positive with any of the methods was considered as true positive. For data analysis, the dependent variables were the components or variables while the independent variables were social and behavioral factors and STH infection status. Odds ratio (OR) and 95% confidence intervals (CI) were calculated. All p values less than 0.05 were considered statistically significant.

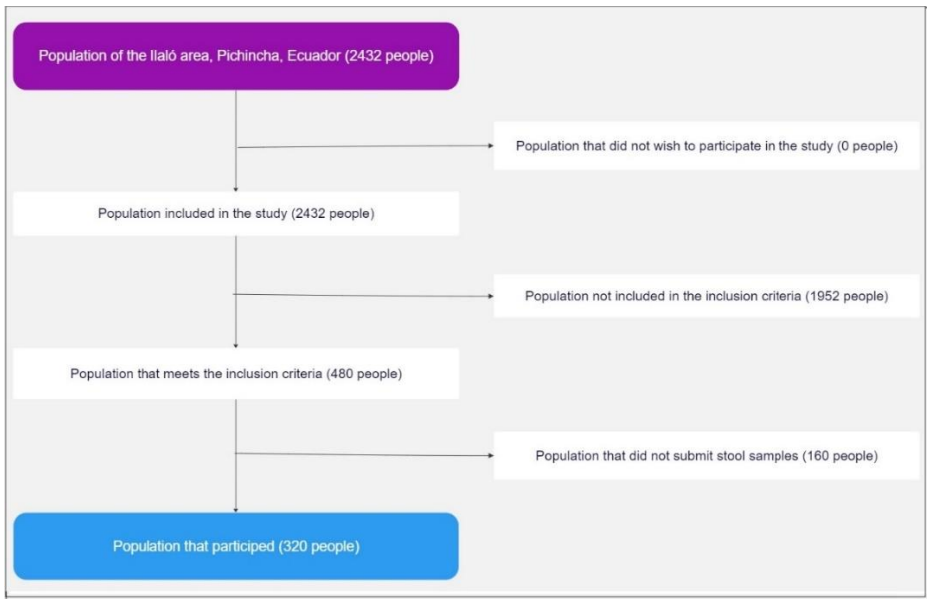
2.4. Ethical considerations

The study was reviewed and approved by the Ethics Committee of the Central University. Samples were collected after obtaining informed consent from patients, following the principles expressed in the Declaration of Helsinki (WMA 2000) and those set forth in the Operational Guidelines for Ethics Committees reviewing Biomedical Research (WHO 2000). All information was confidential, all patients were assigned a code according to their place of residence. After testing, all participants who tested positive were treated with albendazole 400 mg in a single dose according to WHO recommendations.

3. Results

3.1. Characteristics of study population

A total of 320 people belonging to the five communities studied were eligible (Scheme 1), as follows: La Merced 87/635, La Toglla 68/438, Sorialoma 59/356, Rumiloma 40/412, Ubiyus 66/591). Table 1 shows the characteristics of the study population. The average age was 36.5 years (range 17-65) and there were more women than men (62.19% vs 40.94%). For the variable *Water consumption*, the most recurrent category was access to drinking water (75.31%), followed by piped water (19.38%), well (5.31%). As for *Garbage and waste management* the most common response was Garbage collector (69.69%), burning (17.81%), burial (11.25%) and open field (0.94%). Concerning the variable *Animal farming*, 98.44% of those consulted responded affirmatively and pig farming was 22.5%.



Scheme 1. Selection of the participating population from the Ilaló Strip, Pichincha, Ecuador.

Table 1. Characteristics of the Ilaló Strip population, Pichincha, Ecuador.

Variables	Categories	Total = 320	
		n	%
Age	3 a 16 years old	89	27.81
	17 a 65 years old	157	49.06
	> 65 years old	74	23.13
Gender	Male	131	40.94
	Female	199	62.19
Water Comsuption	Drinking water	241	75.31
	Pipe water	62	19.38
	Well	17	5.31
	River	0	0
Excrement handling	Sewage	208	65
	Septic tank	76	23.75
	Latrine	35	10.94
	Open field	1	0.31
Handwashing	Yes	318	99.38
	No	2	0.62
	After using bathroom	64	20.00
	Once a day	211	65.94
	Several times a day	43	13.43
Disinfection	yes	199	62.18
	no	121	37.81
Shoe use	Yes	318	99.38
	No	2	0.62
	Indoors	289	90.88
	Outdoors	318	100
Garbage and waste management	Garbage collector	223	69.69
	Burial	36	11,25
	Burning	57	17.81
	Open field	3	0.94
Animal farming	Yes	315	98.44
	Pigs	72	22.5
	No	5	1.56
Vegetable and fruit growing	Yes	52	16.25
	No	268	83.75
Washing and disinfection of vegetables and fruit	Yes	289	96.25
	No	31	3.75

3.2. Prevalence of STH

Seventy-three positive samples were obtained from a total of 320 people sampled (22.81%, 95% CI 22.3 to 23.4), in the community La Toglla positive cases were 13/68 (19.12%, 95% CI 17.9 to 20.3), Sorialoma 15/59 (25.42%, 95% CI 24.1 to 26.7), Rumiloma 11/40 (27.50%, 95% CI 25.9 to 29.1), Ubiyus 13/66 (19.70%, 95% CI 18.1 to 21.3) and La Merced 21/87 (24.14%, 95% CI 23.1 to 25.2) (Figure 2). The prevalence of STH by gender did not show significant differences (P>0.05), based on gender 36 males were positive (49.31%, 95% CI 48.2 to 50.5) and 37 females (50.6%, 95% CI 49.5 to 51.8). Regarding the different age groups, the highest number of positives was reported in the *17 - 65 years of age* 41/73 (56.16%, CI 55 - 57.3), *3 - 16 years* 24/73 (32.88%, CI 32.7 - 35) and *more than 65 years* 8/73 (10.96%, CI 9.81 - 12.1). The most frequent parasite reported was *A. lumbricoides* with 74.73% (95% CI 73.7 - 75.8) as shown in Table 2. The overall prevalence of infection with at least one parasite was 57 (78.08%, CI 76.9 - 79.2) being the most common determined in this study, two parasites: 17 (19.18 %, CI 18 - 20.3) and three parasites: 2 (2.74%, CI 1.59 - 3.98).

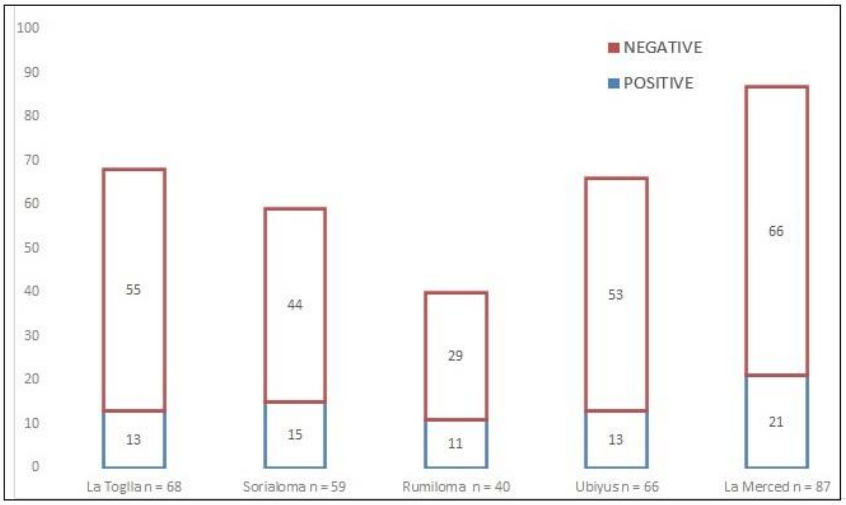


Figure 2. Prevalence of STH per community in the Ilaló Strip, Pichincha, Ecuador.

Table 2. Analysis of the different parasitic agents and type of infection.

Helminthiasis		**Total**		
		n	**%**	**(95% CI)**
Agent	*A. lumbricoides*	68	74.73	(73.7 – 75.8)
	T. trichiura	12	13.19	(12.2 – 14.2)
	Hookworm	11	12.09	(11.1 – 13.1)
Type of infection	Un parásito	57	78.08	(76.9 – 79.2)
	Dos parásitos	14	19.18	(18 – 20.3)
	Tres parásitos	2	2.74	(1.59 – 3.98)
Types of mixed infection	*A. lumbricoides* + *T. trichiura*	5	35.71	(33.1 – 38.3)
	A. lumbricoides + Hookworm	9	64.29	(61.7 – 66.9)
	T. trichiura + Hookworm	0	0	-

3.3. Intensity of STH infection

The overall prevalence of STH of mild intensity was the most identified as shown in Table 2, the highest proportions of mild infections were observed in La Merced 90.5% (19/21) with *A. lumbricoides* (17/19), *T. trichiura* 33.3% (1/3), hookworm (1/1). The highest proportions of moderate infections were detected in Sorialoma 33.3% (5/15) with *A. lumbricoides*. The highest proportions of higher infections, the only ones determined in this study, were found in La Toglla with *A. lumbricoides* 100% (2/2).

Table 3. Classification of parasitosis by intensity of infection.

Agent	Intensity of infection*											
	Mild	%	Average		Moderated	%	Average		High	%	Average	
A. lumbricoides	54	73.97	3398	±477	12	16.44	31329	±4480	2	2.74	72880	±4010
T. trichiura	10	71.43	543	±101	2	28.57	6386	±710	0	0	0	0
Hookworm	9	81.82	1175	±164	2	18.18	3210	±284	0	0	0	0

*The intensity of infection was calculated in Eggs per Gram of Feces (EPGF).

3.4. Factors associated to STH

The bivariate analysis showed that the prevalence of both STH was significantly associated at the age stratum level, with the 3 to 18 years age group having a higher risk (OR 1.85, 95 % CI 1.018- 3.36). *Raising animals*, especially *pigs*, increased the risk of suffering parasitosis (OR 4.16, 95 % CI 2.34- 7.42) and the cultivation of fruits and vegetables (OR 11.66, 4.32 - 41.08). These values remained significant after adjustment for possible confounders. STH infection showed no significant association (protective factor) with Body and hand disinfection (OR 0.15 95 % CI 0.037 - 0.53) and Vegetable and fruit washing (OR 0.0044, 95 % CI 0.00020 - 0.033) which demonstrated its protective factor.

Table 4. Bivariate analysis of the association between STH and variables.

Variables	Categories	Total	Bivariate analysis			
			P value	OR	IC 95%	
Age	3 a 16 years	89	0.04*	1.85	1.02	3.36
	17 a 65 years	157	Ref	-	-	-
	> 65 years	74	0.83	0.93	0.45	1.84
Gender	Female	199	Ref	-	-	-
	Male	131	0.57	1.17	0.69	1.97
Water consumption	Drinking water	241	Ref	-	-	-
	Pipe water	62	0.19	1.52	0.80	2.83
	Well	17	0.81	1.15	0.31	3.40
	River	0	-	-	-	-
Excrement handling	Sewage	208	0.98	0.011	0.003	1.50
	Septic tank	76	0.98	0.185	0.000	2.35
	Latrine	35	0.98	0.216	0.000	2.70
	Open field	1	Ref	-	-	-
Handwashing	Yes	318	0.98	0.136	0.000	4.86
	No	2	Ref	-	-	-
	After using bathroom	64	Ref	-	-	-
	Once a day	211	0.98	0.159	0.022	0.322
	Several times a day	43	1	0.100	0.011	0.89
Disinfection	yes	199	0.000***	0.20	0.11	0.34
	no	121	Ref	-	-	-

Shoe use	Yes	318	0.98	0.13	0.027	0.48
	No	2	Ref	-	-	-
	Indoors	289	0.59	0.12	0.062	0.24
	Outdoors	318	0.98	0.13	0.027	0.48
Garbage and waste management	Garbage collector	223	0.519	0.45	0.04	9.83
	Burial	36	0.614	1.89	0.17	42.88
	Burning	57	0.677	0.59	0.05	13.31
	Open field	3	Ref	-	-	-
Animal farming	Yes	315	0.88	1.18	0.17	23.38
	Pigs	72	0.000***	4.16	2.34	7.42
	No	5	Ref	-	-	-
Vegetable and fruit cultivation	Yes	52	0.000***	11.66	4.32	41.08
	No	268	Ref	-	-	-
Washing and disinfection of vegetables and fruit	Yes	289	0.000***	0.005	0.0003	0.028
	No	31	Ref	-	-	-

(p < 0.05). * Significance; ** high significance; ***very high significance

Table 5. Multivariate analysis of the association between STH and variables.

Variables	**Categories**	**Total**	**Multivariate Analysis**			
			P value	**OR**	**IC 95%**	
Age	3 a 16 years	89	0.038*	4.87	1.17	25.81
	17 a 65 years	157	-	-	-	-
	> 65 years	74	0.13	3.88	0.66	26.03
Disinfection	yes	199	0.004**	0.15	0.03	0.53
	no	121	-	-	-	-
Animal farming	Yes	315	-	-	-	-
	Pigs	72	0.009**	3.11	1.80	12.05
	No	5	-	-	-	-
Vegetable and fruit cultivation	Yes	52	0.000***	7.40	3.25	22.06
	No	268	-	-	-	-
Washing and disinfection of vegetables and fruit	Yes	289	0.000***	0.004	0.000	0.033
	No	31	-	-	-	-

(p < 0.05). * Significance; ** high significance; ***very high significance

The multivariate analysis showed that the risk increased in the age range between 3 and 18 years, where it was significant (OR 4.87, 95% CI 1.17 - 25.81), *pig breeding* (OR 3.11, 95% CI 1.80 - 12.05) and cultivation of fruits and vegetables (OR 7.40, 3.25 – 22.06). With respect to protective values of preventive practices against STH we have: *Disinfection* (OR 0.15, 95% CI 0.03 - 0.53) and *Washing and disinfection of vegetables and fruits* (OR 0.004, 95% CI 0.0002 - 0.033).

Discussion

The prevalence of *A. lumbricoides*, *T. trichiura*, and hookworm was determined in this study, and the values obtained were lower than the averages estimated in several national and regional studies, but nevertheless, the most prevalent agent continued to be *A. lumbricoides*. Studies in the city of Quito, Ecuador [12] determined the prevalence of gastrointestinal parasitosis where 35.5% corresponded to *A. lumbricoides*, 11.3% to *Hymenolepis nana*, 1.0% to *H. diminuta*, 0.7% to *S. stercoralis* and 0.5% to *T. trichiura*. In remote populations of Paquisha, Amazon region of Ecuador, *A. lumbricoides* was present with 44.3%, *T. trichiura* with 23.3%, hookworm 1.8% [13]. The study conducted by Moncayo et al. in 2018 [14], estimated 48.5% of positive individuals where *A. lumbricoides* (18.5%), *T. trichiura* (19.3%) and hookworm (5.0%) were identified. Regionally, the study conducted by Rosas et al. in Peru [15] agrees with the estimated prevalence data from our study as it estimated a prevalence of STH of 23.3%, with *A. lumbricoides* (33.9%), *Hymenolepis nana* (26.4%) and *Enterobius vermicularis* (20.8%) being the most frequent; the study carried out in Colombia by Benavides and others [16] found values well above those reported, where the estimated prevalence was 72% and the presence of *A. lumbricoides* corresponded to 12.2% and hookworm with 1.11%. Finally, in Venezuela, Bracho et al. estimated a prevalence of *A. lumbricoides* 25.20%, *T. trichiura* 14.80% and hookworm 4.40% [17] in 2021.

Hygiene may be one of the main causes that generated the values obtained. In previous studies conducted by Chaccour in 2021 and Li in 2001, it was observed that most of the infected people drank unboiled water and consumed unwashed or inadequately washed food, which increased by almost 90% the possibility of becoming infected, especially with *T. trichiura*, which is transmitted mainly by water and food [18, 19]. The environmental factors of the Ilalo area such as altitude (1800-2500 m) and temperature (10-22 °C) could be suitable for the transmission of STH which would increase the risk of infection as demonstrated in the study of Shahbaznejad (2021) and Chachar (2020) [20, 21] where ecological and environmental factors favor the spread and development of infectious stages of STH [22]. As we have stated before *A. lumbricoides* registers the highest presence in different studies carried out which could be explained by the fact that its eggs are more resistant to environmental inclemencies of excessive humidity or extreme dryness remaining viable and infective in the soil for several days and months [23, 24].

In this study, having a sewage system was an important factor in decreasing the risk of STH. Previous studies in China showed that the possession of toilets and sewage systems was associated with a lower risk of parasitic infection [19], that is, improving sanitary conditions is essential to reduce the risk of Geohelminth transmission. To prevent and control infections of *A. lumbricoides* and *T. trichiura*, one of the most effective measures is to establish toilets or any other form of sanitary facilities such as latrines or communal toilets [25], but they have a problem. At the beginning they have a very high acceptance but in the absence of monitoring by health agencies and communities there is deterioration of latrines and wastewater management systems because there is no maintenance, proper cleaning of facilities or because of the poor quality of such constructions which over time causes a decrease in their use [26].

In this study, the participants who had drinking water were above 75% (75.31), which was a protective factor. However, it was in the different communities that depend on non-drinking water sources where higher values of STH parasitosis were recorded. This has been demonstrated in different studies, as access to potable water sources was associated with significantly lower odds of infection by different parasitoses as reported by Grimes and others in 2014 [27] where they estimated that the use of treated water decreased the risk of acquiring parasitosis (OR 0.53, 95% CI 0.47 - 0.61). Lack of drinking water supply has been identified as an important factor in the spread of different parasitic agents [19].

This is supported by the study conducted by Strunz et al. in 2014 [28], where it was evidenced that the use of drinking water decreases the risk of transmission of Geohelmintiasis in the community (OR 0.46, 95% CI 0.36 - 0.60).

In this study it was observed that hand washing and the use of alcohol as a disinfectant were protective factors for STH since this practice was generated due to the protective effect as a method to avoid infection with Covid-19. This process required a substantial change in behavior, which was accelerated due to the fact that during the pandemic, people constantly disinfected their hands and clothes, and as a requirement for entering commercial premises and some of these requirements were hand washing, hand and body disinfection, and temperature measurement [29, 30]. Hand washing, defined as the cleaning of hands to reduce the microbial load [31], has been identified as a main measure to prevent the transmission of different diseases including respiratory diseases and the distribution of pathogens such as STH. This was corroborated by the studies of Karut et al [32] and Liu et al [33]. Both studies determined the effect of frequent washing, either by hand washing with soap and water or rubbing hands with alcohol produced a frequent protective effect. Secondary attack rates were found to be significantly lower in households with increased hand washing or alcohol use compared to households that did not report increased washing 19% (95% CI 9 - 36) vs. 58% (95% CI 36 - 77). Regarding STH, different studies have estimated that hand washing before eating (OR 0.80) [34] and after toileting (OR 0.37) decreases the probability of infection having a protective factor [35]. In contrast to these results other studies such as that of Ercumen et al. (2019) [36] did not determine additional benefits when combining different hygiene measures due perhaps to the fact that the measures only occurred at school, but in many cases not at home. Studies conducted in China [37] and Peru [38], showed a reduction in the prevalence and intensity of *A. lumbricoides* infection but not of other STH species such as *T. Trichuria* or Hookworm with hand washing.

Other effective measures were the use of shoes, inside and outside the home, as well as disinfection in footbaths when entering the home to reduce the risk of Covid-19, as it has been observed that floors were areas considered highly contaminated surfaces and that the use of disinfectant in the form of cleaning or footbaths reduces the risk of contracting Covid-19, fact that may have indirectly generated a decrease in contracting or transmitting STH [35, 39, 40]. Previous studies by Vaz Nery et al. (2019) have shown that farmers have a higher probability of infection (OR 1.7) because they are exposed to outdoor labor, barefoot on agricultural land with an unhygienic environment [34]. Exposure to soil without shoes may lead to an increased risk of STH infections. Because of the importance of soil in the transmission of these infections, several studies have focused on the prevalence and concentration of STH eggs in different sites including farmland [41]. As this accumulation of STH eggs persists for several months, being resistant to environmental conditions, the risk of infection does not decrease because the soil of crop or animal husbandry farms could contain high amounts of infecting eggs or larvae [42, 43].

Vegetable and fruit cultivation in our study presented a high risk of STH infection possibly due to the reuse of wastewater for cultivation, which is an important route through which STH infection can exist and directly affect exposed farmers and indirectly affect consumers of such products; this is commented by Amoah et al. (2018) and Yajima et al. [44, 45], who reported that there is an increased risk of STH infections from consumption of vegetables fertilized with wastewater and that contamination of vegetables and fruits with infesting forms is mainly due to the quality of wastewater, the irrigation method used, and the type of crops. Post-harvest practices of vegetables and fruits can be risky, as indicated by Uga and others, where transportation, handling

practices, storage and distribution of vegetables and fruits in markets can lead to additional STH contamination [46].

The results of this study show a significant association between the rearing of backyard pigs and the presence of *A. lumbricoides* compared to those without. This has been studied in several analyses where it has been shown that *A. lumbricoides* and *A. suum* can occur in both humans and pigs and have postulated that they may be the same species [47], so the next steps should be to conduct an analysis demonstrating whether or not cross-infection exists. Nevertheless, this finding illustrates the importance of the domestic environment and highlights the potential role of humans and backyard pigs as transmitters and carriers of *A. lumbricoides* and *A. suum* [48]. In recent years, Ascarid infestations, produced by backyard pig feces, have been identified as an important source of infection for humans [49, 50]. Studies by Avery et al. and Sparks et al. demonstrate that *A. lumbricoides* and *A. suum* have the ability to infect and complete their life cycle in another inappropriate host [51]. Recent work has shown that occupational exposure may be a risk factor for the acquisition of *Ascaris spp.* infestation in humans, as those who work on pig farms, whether they are producers or veterinarians, are more likely to be Ascaris positive than those without the same exposure [49].

Finally, we must discuss the various limitations to the conduct of this study. The excluded participants were generally people who consumed continuous doses of Ivermectin and chlorine dioxide as a preventive method for Covid-19 [52]. Many non-participants and participants were unaware of the medications that were administered in their communities during the quarantine period, so it was established that they had not consumed any type of medication for the last 6 months, which limited the number of participants. The recommendation of the use of ivermectin as a mechanism to prevent or control Covid-19 became popular during the pandemic period, based mainly on randomized trials with clinical results that were not totally convincing [53, 54]. These have failed to find a clinical benefit from the use of ivermectin for the treatment of COVID-19 in outpatients, did not reduce the incidence of a composite outcome of emergency department visits, hospitalization, or death (5.7% vs. 4.1%) nor was there a statistically significant difference between its use and placebo in mortality (3.1% vs. 3.5%) [55, 56], but even so, an uncontrolled use of ivermectin was generated at regional and national level, which could be evidenced by the low values obtained in this study.

5. Conclusions

This study presents relevant information on STH, its prevalence and associated risk factors, demonstrating that there are still inadequate practices among the population of the Ilaló Strip, but that procedures associated with the prevention of Covid-19 can be decisive in order to control HTS. Therefore, there is a need to implement an adequate health education program to prevent not only respiratory diseases but also parasitic diseases in the population in the long term.

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