



***ANALYSIS OF FIVE-YEAR DISTRICT HEALTH OFFICE DATA FOR INTESTINAL
PARASITOSIS IN ALETA-CHUKO, SIDAMA, ETHIOPIA***

By

Teshale Degife

September 2021

Addis Ababa, Ethiopia

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ACRONYMS

ACD	Aleta-Chuko District
CSA	Central Statistics Authority
FMoH	Federal Ministry of Health
HMIS	Health Management Information System
IPIs	Intestinal parasitic infections
STH	Soil-Transmitted Helminths
WHO	World Health Organization

ABSTRACT

Intestinal parasitic infections (IPIs) are widely distributed, particularly in low-income countries. The objective of this study was to retrospectively assess the prevalence of IPIs among preschool (1-4 year) and school-age (5-18 year) children in Aleta-Chuko District (ACD), Sidama Region, South Ethiopia, in the past five-year (September 2015 - August 2019). The study was retrospective study. It used secondary data from disease registers of ACD health office (2015 - 2019) to assess the prevalence of IPIs among preschool and school-age children. Overall, 199,241 children visited district health centers during this period and 140,706 (65,292 males, 75,414 females) were school-age children. Of these, 50,057(25.1%) were positive for IPIs with slightly more females (13.2%) than males (11.9%). The number of children diagnosed for IPIs had increased continuously although there was some decline in 2016 and 2017. Six different types of intestinal parasites were identified. *Ascaris lumbricoides* was the most prevalent (41.5%) followed by *Entamoeba histolytica/dispar/moshkovskii* (14.3%). The least identified parasite was *Schistosoma mansoni*. Intestinal parasites remain major health problem among preschool and school-aged children in ACD and emphasis on control measures including periodic deworming is needed. Comprehensive community-based studies are required for better understanding of the impact of IPIs on children in ACD.

Keywords: preschool, schoolchildren, intestinal parasite, prevalence

1. INTRODUCTION

1.1 Background

Intestinal parasitic infections (IPIs) are the most widely distributed infectious diseases, especially in low-income countries (Cleaveland et al. 2001). IPIs are associated with poor socioeconomic status and humid climate and are thus widely distributed in the sub/tropics with the greatest burden in sub-Saharan Africa (WHO 2012). Intestinal protozoa and soil-transmitted helminths (STH) particularly affect marginalized rural communities and children. The most widely distributed human intestinal protozoan parasites are *Entamoeba histolytica*, *Giardia intestinalis* and the coccidian *Cryptosporidium* species and they are major contributors to childhood diarrhea (Kotloff et al. 2013). The most common STHs are *Ascaris lumbricoides* the hookworms (*Ancylostoma duodenale* and *Necator americanus*) and *Trichuris trichiura*. About 438.9, 819.0 and 464.6 million people harbored hookworm, *A. lumbricoides* and *T. trichiura* in 2010 respectively with 4.98 million years lived with disability attributable to STH (Pullan et al. 2014). The growth and development including cognitive development of infected children is impaired (Nga et al. 2011).

Community sanitary facilities like availability of latrine, safe water, and personal hygienic practices including pre-meal and post-defecation hand-washing habits, shoes wearing and trimming of fingernails help prevent and control IPIs among children and adults. This accompanied by regularly deworming of at least 75% of the children could help achieve eliminating morbidity due to STH in children by 2020 (WHO 2012). However, so far, this could not be met and preschool and school-age children are suffering from IPIs including STHs.

In Ethiopia, IPIs among preschool and school-age children are widespread although the distribution and prevalence differ from setting to setting because of several climatic and social factors (Celkeba et al. 2020). These largely preventable infections remain a major health problem in Ethiopia. Sanitation coverage in Ethiopia in 2011 was 21%, which does not meet basic hygiene standards although open defecation free status in the country increased from 7-45% in terms of people's utilization of improved sanitation facilities which increased from 1.1 million in 1990 to 17.5 million in 2018 (Jones 2015).

1.2 Objectives

1.2.1 General objective

The general objectives of the study is to assess the prevalence of intestinal parasites among preschool and school-age children in ACD from past five-year district health office data (Sep 2015 - Aug 2019).

1.2.2 Specific objective

- To estimate the prevalence of IPIs among age and sex groups of pre-school and school-age children in the last five years in ACD
- To determine the prevalence of intestinal parasite species among pre-school and schoolchildren of the last five years in ACD.
- To identify the prevalence of protozoa and helminths among pre-school and school age children.

1.3 Statement of the problem

Up-to-date information on the status of IPIs among preschool and school-age children contributes towards improving the health of the children. This study, thus, assessed the prevalence of IPIs in Aleta-Chuko District (ACD) using previous five-year (2015-2019) data of health facility disease registers. Data about intestinal parasites on preschool and school-age children in Ethiopia is limited in general. This study provided relevant information for better control and management of IPIs in the district.

2. LITERATURE REVIEW

2.1 Global burden of IPIs

About 450 million people are infected with intestinal helminths alone and 135,000 die annually. IPIs are closely associated with poor socioeconomic status and humid climate (Trends 2013). Thus, IPIs are widely distributed in tropical and subtropical areas with the greatest numbers occurring in sub-Saharan Africa (WHO 2012). IPIs in low-income countries causes significant public health problems especially in poor population with inadequate sanitation, lack of clean and safe drinking water and healthcare. Most of the burden of IPIs is born by children, both preschool and school-age children. There is evidence that infected children suffer from significant physical, nutritional and cognitive impairment.

A cross-sectional study on pre-school children in Kibererta, Kenya, reported that from among 205 participants 80(40.5%) were positive for IPIs (Shumbej 2014). Another survey on 106 pre-school children in Elburgon Municipality, Kenya, revealed that the overall prevalence of soil-transmitted helminths (STHs) was 35.8% (Stephanie et al. 2014). Study from Ibilo, Nigeria, reported 91.1% IPIs among pre-school children. Another study in Khartoum, Sudan, showed that from 562 pre-school children investigated, 138(24.5%) were positive for at least one parasite species (Khin 2015).

2.2 IPIs among children in Ethiopia

IPIs are highly prevalent among children in Ethiopia. IPIs are distributed across the country among schoolchildren with prevalence range of 66.7-83.8% (Alemu 2014 et al). However, some parts of the country such as the Amhara Region have relatively more cases. For example, a study in Chuahit, north Ethiopia, recorded 35.2% prevalence among pre-school children (KA 2018). A survey in Butajira, south-central Ethiopia, revealed that from 377 pre-school children examined, 88(23.3%) were positive for IPIs (Agersew 2016). In Shesha, Wondogenet district, South Ethiopia, 288 pre-school children were screened for IPIs and 245(85.1%) were infected with one or more intestinal helminthiasis (Liza 2010).

The low economic standard, poor sanitation and ignorance of simple health promotion practices favor sustained transmission of intestinal parasites in Ethiopia. Several studies stated that,

Ethiopia has one of the lowest qualities of drinking water supply and latrine coverage in the world. Over half a million yearly visits health facilities are due to IPIs (Masoumeh et al. 2012). This is a conservative estimate because most of the facilities lack appropriate diagnostic tools to detect low-level infections. Prevalence of individual parasite species may vary from setting to setting and study to study, *A. lumbricoides* consistently predominates among children in most parts of the country. The subsequently STHs following *A. lumbricoides* is *T. trichiura* or the hookworms (Wegayehu et al. 2013).

Elevation of more than 2400m appears most suitable for ascaris transmission. Of 301 schoolchildren investigated in southwest Ethiopia, 68.4% harbored one or more parasites and *A. lumbricoides* was the leading (52.2%) followed by *T. trichiura* (18.6%) and *Schistosoma mansoni* was the least (0.3%) (Abossie et al. 2014). On the other hand, a study from Babile town, east Ethiopia, showed that from 415 schoolchildren the tapeworm *Hymenolepis nana* was the most prevalent followed by hookworm infection (Gelaw et al. 2013).

2.3 Control IPIs

According to the United Nations estimate, about 2.5 billion people globally do not use an amended sanitation facility and a little over 1 billion people practice open defecation (Deise 2013). Eastern Asian countries have made substantial progress to improve the sanitation coverage between 1990 (27%) and 2011 (67%). However, sub-Saharan African and South Asian nations did not meet the *Millennium Development Goal (MDG) 7c* and their sanitation coverage remains low (Khin et al. 2015). While in sub-Saharan Africa, 44% of the population uses either shared or unimproved toilet, in Southern Asia the proportion of the population using common or unimproved facilities is just 18%. Basic sanitary practices need improvements to control IPIs.

The drug of choice used to treat intestinal protozoa such as amoebae, including extra-intestinal, and giardia is metronidazole. For the treatment of STHs are albendazole, mebendazole; and older drugs including pyrantel, tiabendazole and niclosamide. Health education and promotion of healthy behaviors is the key to reduce the incidence of IPIs. In general, integrated approach is necessary to succeed in the prevention control and eventual elimination of IPIs.

3. MATERIALS AND METHODS

3.1 Study area

ACD is one of 36 districts in Sidama National Regional State (South Ethiopia), the youngest Regional state. It is located 63km to south of Hawassa city along the main asphalt road to Dilla in Gedeo Zone (Fig 1). According to the Ethiopian central statistics agency (CSA) annual sample projection 2016/2017, the total population of ACD was 209,886, (102,215(48.7%) male, and 107,671 (51.3%) female). Administratively, the district is divided into 26 rural and 5 urban *kebeles*, the lowest administrative units. The district has an estimated land area of 32.2km². Altitude varies between 1400m and 2000m (average 1700m) above sea level and the area has mainly (over 75%) lowland agro-ecology (CSA 2010). The agro ecology of the districts has 26% humid and 74% sub-humid tropical climate. The soil type is vertisoil.

The district gets annual rainfall of 1,232-1,400 mm and its temperature 18-28°C. The March to May is a minor rainy season and June to August is major. Crops like coffee, maize, *enset* and potato are cultivated. Avocado, mango and pineapple are the main crops in the area. Coffee and *khat* also grow in the district.

There are 1 primary hospital, 7 health centers, 28 health posts, 7 private clinics, and 6 drug stores in the district. According to district health office 2018 report, the improved latrine coverage of the district was 21.5% and safe water coverage 54%.

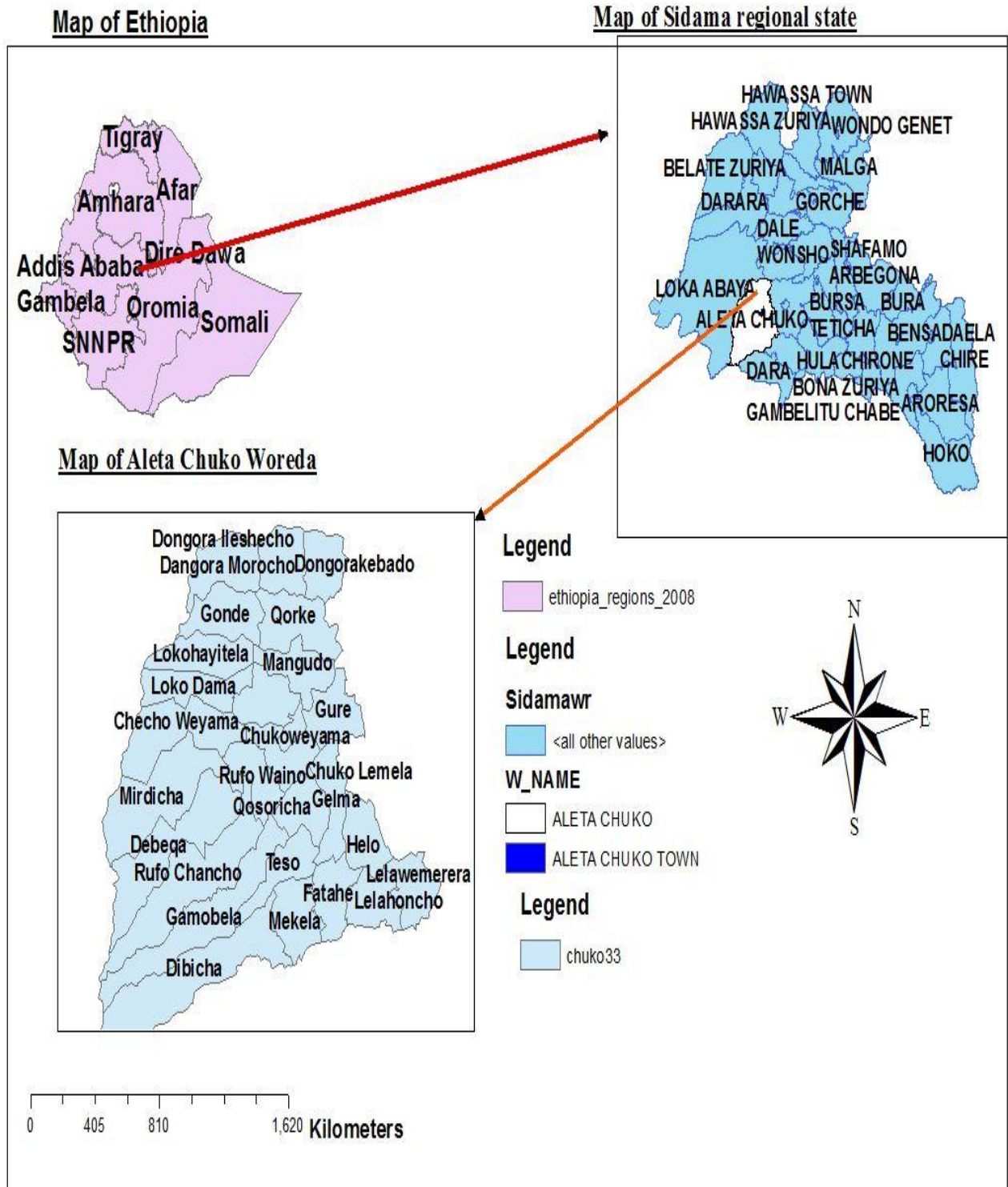


Figure 1:Administrative map of Sidama National Regional State and the study area

3.2 Study design and population

The study was retrospective study. It used secondary data from disease registers of ACD health office (2015 - 2019) to assess the prevalence of IPIs among preschool and school-age children. The source population was all preschool (1-4 year) and schoolchildren (age 5-18 year) who attended facilities for intestinal health problems and the study population was the same age-group reported positive for IPIs. Preschool and schoolchildren permanently living in the study area and fecal sample positive for IPIs were included in the study. Incomplete data like missing identification code, age, sex and address were excluded. The data were collected using disease registers or health management information system (HMIS). Data checked for completeness and consistency and any incomplete information were excluded from the entry.

3.3 Data analysis

Data checked for completeness and consistency. Data coded and entered into Excel version 10 for window for analysis. Descriptive statistics like frequencies, proportions, mean, median and standard deviation were calculated. Pearson's Chi-square analysis was done to determine the association between specific intestinal parasite and socio-demographic variables of the children. P-values less than 0.05 were considered statistically significant.

3.4 Ethical consideration

Ethical clearance was obtained from Addis Ababa University, College of Natural and Computational Sciences Research Ethics Institutional Review Board (IRB). The code of the permission letter is IRB/45/2020. Additionally, written permission was granted from District Health Office, Aleta-Chuko.

4. RESULTS AND DISCUSSION

4.1 Socio-demographic characteristics

In the past five years, 199,241 children (96,658 males, 102,583 females) attended the outpatient departments (OPDs) of eight health centers within ACD for intestinal health problems (Table 1). Of these, 140,706 (75,414 female, 65,292 male) were 5-18 years old or school-age children and the rest 58,535 (31,366 males, 27,169 females) were preschool children (1-4 years).

Table 1: Number of preschool and school-age children attended eight health centers of ACD for intestinal problems between Sep 2015 - Aug 2019

Health Center	Male	Female	Total
Chuko	25,713	24,812	50,525
Gambela	15,183	11,903	27,086
Loko	8,400	10,600	19,000
Dogora Aeelcho	11,250	9,994	21,244
Miridcha	11,000	10,100	21,100
Futahe	6,000	11,000	17,000
Rufo Chancho	9,556	12,174	21,730
Hallo	9,556	12,000	21,556
Total	96,658	102,583	199,241

Key: ACD: Aleta-Chuko District (ACD)

4.2 IPIs among preschool and school-age children

From 199,241 specimens of preschool and school-aged children, 50,057(25.1%) were positive for one or more intestinal parasites. Of these, 23,134(24.8) and 26,923(25.0) were males and females, respectively. Six intestinal parasites were identified. *A. lumbricoides* was the most prevalent (41.5%) followed by *E. histolytica/moshkovskii/dispar* (14.3%) and *H. nana* (10.8%). The least detected parasite was *S. mansoni* (9.3%). Slightly more females (13.5%) than males (11.6%) were positive for IPIs (Table 3).

Table 2: Number of preschool and school-age children attended ACD health centers by age and gender (Sep 2015 - Aug 2019)

Children	Examined		Total	Positive	
	Male	Female		Male	Female
< 5 (Preschool)	31,366	27,169	58,535	8,252	8,590
≥ 5 (School-age)	65,292	75,414	140,706	15,478	17,737
Overall	96,292	102,583	199,241	50,057	

4.3 The distribution of protozoa and helminths

The prevalence of protozoa and helminth among preschool and school children of both sexes and all age groups were 37,185(18.7%) and 12,872(6.4%) respectively (Table 4). The proportion of protozoa was higher than that of helminths. The prevalence of protozoa and helminths among male children were 15,649(17.0%) and 7,485(8.1%) respectively. Similarly, the prevalence of protozoa and helminths among female children were 21,538(19.1%) and 5,387(6.0%) respectively. The prevalence of protozoan infection in female preschool and school-aged children was significantly greater than that of males ($p = 0.01$). This might be related to the high activities indoor or in home. To the contrary, the prevalence of helminths in male preschool and schoolchildren was greater than that of females. This might be male children have a chance to play out of their homes and increased the chance of infection with STHs.

Table 3: Distribution of protozoa and helminths among preschool and school-aged children (Sep 2015 - Aug 2019)

Sex	Examined	Total positive, n(%)	Protozoa, n(%)	Helminths, n(%)	p-value
Male	96,292	23,134(11.6)	15,649(7.7)	7,485(3.9)	0.01
Female	102,583	26,923(13.4)	21,538(10.6)	5,387(2.8)	
Total	199,241	50,057(25.1)	37,187(18.7)	13,059(6.4)	

4.4 Annual distribution of IPIs

For preschool children 58,535 (31,366 males, 27,169 females) were examined and 16,842(28.8%) were positive with nearly equal proportion of positive males and females (Table 5). Generally there was increasing trend of IPIs between 2015 and 2019 and the difference was

statistically significant ($p = 0.046$). On the other hand, among school-age children, of 140,706 (65,292 males, 75,414 females) examined, 33,215(23.6%) were positive (Table 6) with slightly more female attendants than males. Here also prevalence of IPIs increased from 2015 to 2019, except in 2017, and the difference was statistically significant ($p = 0.042$).

Table 4: Preschool children diagnosed for IPIs in ACD between Sep 2015 and Aug 2019

Year	Examined	Positive, n(%)	p-value
2015	11,386	3,163(27.7)	0.046
2016	12,955	2,735(21.0)	
2017	10,531	2,992(28.4)	
2018	11,322	3,419(30.2)	
2019	12,341	4,533(36.7)	
Total	58,535	16,842(28.8)	

Table 5: Number of school-age children examined and positive for IPIs (Sep 2015 - Aug 2019)

Year	Examined	Positive, n(%)	p-value
2015	20,272	4,623(22.8)	0.042
2016	28,969	6,495(22.4)	
2017	35,511	6,536(18.4)	
2018	26,688	6,907(25.8)	
2019	29,266	8,654(29.5)	
Total	140,706	33,215(23.6)	

- ❖ Generally the prevalence of IPIs increases from 2015 to 2019 except some decline in 2016 and 2017 both preschool and school age children. This might be due to improper use of latrine and poor sanitation practices.

Finding the prevalence of IPIs among preschool and school-age children in study area is important to inform decisions regarding the most appropriate preventive and curative strategies, as well as the planning of appropriate primitive measures for these children. The current study had a lower prevalence of IPIs than a study done in Wondogenet, Sidama Region; the prevalence of IP was 85.1% among under-five children. This is might be the result of geographic variation.

In which, Wondogenet is known for having high prevalence of STHs, and intestinal schistosomiasis (Liza 2010)

The prevalence of IPIs in this study was lower with a study conducted in Southern part of Ethiopia that reported the prevalence of IPIs 26.2-27% (Liza 2010). The discrepancy might be because of long period of study difference and improvement of health care services and socio-demographic status over time while our study might include relatively both school and preschool children and retrospective nature of data.

The finding of this study was also lower than a study done in Bahir Dar 65.5% (Kabeta 2017). This variation might be the result of different study periods, which have done before 2, 6 and 5 years respectively. This time difference affects the quality of health care service, when the time is late the care is also coming better and better seen.

The present study had lower prevalence of IPIs in relative to other studies; such as a research done in Eritrea that reported in Sudan 64.4% (Obala et al. 2013). The variation might be because of different study population.

Some of the limitations of this study include that we have used secondary data for analysis, which may compromise reliability, covid-19 pandemic challenged data extraction and incompleteness of some useful data from the HIMS of the district.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSIONS

- Intestinal parasites are major health problem among preschool and school-aged children in ACD.
- More female children were diagnosed positive for IPIs than their male counterparts were.

5.2 RECOMMENDATIONS

- Health education and practical measures on personal and environmental sanitation need to be implemented to reduce IPIs in the study area.
- Adequate provision of safe drinking water is necessary.
- Personal hygiene practices.
- Community sanitary facilities like availability of Latrine

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Appendix: Data collection formats

1. Total population of ACD -----
2. Number of health centers -----
3. Number of government hospitals -----
4. Latrine coverage of the district (any type) -----
5. Latrine utilization rate -----
6. Improved pit latrine coverage -----
7. Pure water coverage of the district -----
8. Total ODF kebeles in the district -----
9. Total ODF schools in the district -----
10. Age of patient ----- in years
11. Sex of patient -----
12. Residence ----- urban/rural
13. Types of parasites ----- in species

Statement of the supervisor

This Thesis has been approved for submission to the Department of Zoological Sciences for public defense.

Name Dr. Hassen Mamo

Signature _____

Date _____