

**Prevalence of intestinal parasite among patients in the
Ho Teaching Hospital: a retrospective cross-sectional
study**

ABSTRACT

Aim: To assess the prevalence of intestinal parasite infections among patients who visit the Ho Teaching Hospital for stool examination from 2012 to 2016.

Study design: Retrospective cross-sectional study.

Place and Duration of Study: Ho Teaching Hospital, August 2017 to January 2018.

Methodology: The hospital's laboratory records were reviewed. Patients' data were recorded using a well-designed data collection tool. Data was analyzed with Statistical Package for Social Science (SPSS) version 20.0.

Results: A total of 7045 patients visited the Ho Teaching Hospital laboratory for routine stool examination within the five-year period. From the 7045 patients, 703 of them were infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasite infection for the five-year period was 10.0%. Intestinal flagellates (90.0%) were the most predominant intestinal parasites, and *Entamoeba histolytica* recorded 5.7%. Hookworm (0.9%) was the most prevailing soil-transmitted helminth. *Ascaris lumbricoides* (0.1%) and *Schistosoma mansoni* (0.1%) were the least recorded parasites. Highest infection was among patients within age group 20 to 29 years. However, age groups below 10 years recorded low infection. This study showed that age was a risk factor for acquiring intestinal parasite infection ($P \leq 0.001$).

Conclusion: Intestinal parasitic infections were recorded among patients who visited the Ho Teaching Hospital. However, most of the patients were infected with intestinal flagellates. Various stakeholders should provide advance techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Sensitization of the public about the dangers of intestinal parasites should also be undertaken by the stakeholders.

Keywords: Parasitaemia, intestine, stool sample, prevalence

12 1. INTRODUCTION

13 Intestinal parasites cause significant morbidity and mortality in the world, especially in low-income
14 countries in the tropic and sub-tropical regions due to persistent shortage of clean drinking water, lack of
15 proper sewage system and other unhygienic and poor living condition [1]. Despite their wide occurrence,
16 some intestinal parasitic diseases are considered neglected by the World Health Organization, largely
17 due to inadequate studies in many countries [2].

18 Globally, it is estimated that 3.5 billion people are infected and 450 million are ill as a result of these
19 infections with the majority being children. These may include: *Ascaris lumbricoides*, *Blastocystis hominis*,
20 *Entamoeba coli*, *Entamoeba histolytica*, Hookworm, Flagellates, *Schistosoma mansoni* and *Strongyloides*
21 *stercoralis* [3]. The diseases are also common in poor countries and accounts for approximately 200,000
22 deaths per year [4]. In sub-Saharan Africa, estimates show that about 31.4% of the population in West
23 Africa, are affected [5]. In Ghana, a spatio-temporal analysis of small area with intestinal parasite
24 infection conducted between 2010 and 2014 showed an annual incident rate of 1.55% to 3.30% with an
25 average annual incident rate of 2.53% [6].

26 Locally, a cross sectional study conducted in Volta Region among 5 primary schools in 3 of its districts
27 revealed a low prevalence of helminth infection with *A. lumbricoides* (1.27%) as the prevailing parasite
28 [7]. Moreover, intestinal parasite infections (IPIs) is a major problem, especially in children and pregnant
29 women from developing countries [8]. The morbidity of IPIs is greatest among school going children and
30 may have adverse effect on their growth [9]. It causes nutritional deficiencies, growth retardation, low
31 pregnancy weight, intra uterine weight gain, and anemia among the population infected [9]. The most
32 common effect of IPIs on the health of people is their normal physical development that is, the failure to
33 achieve genetic potential for growth especially in children and having clinical consequences of iron
34 deficiency anemia and other nutritional deficiencies also among pregnant women [10]. The health
35 problems associated with IPIs suggests the need for more research to be done. The study aimed to
36 assess the prevalence of intestinal parasite infection among patients who visit the Ho Teaching Hospital's
37 laboratory for routine stool examination from 2012 to 2016.

38 2. MATERIALS AND METHODS

39 2.1. Study design and setting

40 The study was a retrospective cross-sectional study. Data was reviewed from the routine stool
41 examination record books from 2012 to 2016 at the Ho Teaching Hospital's laboratory based on prior
42 permission from the administration officials of the hospital. The study was conducted from August 2017 to
43 January 2018.

44 2.2. Data Analysis

45 The data obtained from the stool examination record books were entered into Microsoft Excel 2016
46 version and validated for double entry errors. The data were then exported to Statistical Package for
47 Social Sciences (SPSS) version 20.0 to determine the frequency, percentages and rate of infection with
48 respect to the intestinal parasite infection among age and sex. However, the data were graphically
49 presented using the Microsoft Excel 2016 version. Chi-square test was used to find the association
50 between intestinal parasite infection and patient's demographic characteristics (age and sex).

51

52 3. RESULTS

53 3.1 Distribution of Intestinal Parasite Infection

54 As shown in Table 1, there were about 7045 patients tested for intestinal parasite infection at the Ho
55 Teaching Hospital from 2012 to 2016. Seven hundred and three (703) out of the 7045 patients were
56 infected with at least one of the intestinal parasites. The overall prevalence of intestinal parasites was
57 (10.0%). Highest infection was recorded in 2013 with prevalence of (16.2%) and lowest infection rate was
58 in 2015 (7.2%). Also, infection was prevalent in females than in males with a total rate of 8.9% and 1.1%
59 respectively. There was no significant relation between the sex of patients and intestinal parasite infection
60 (P -value=0.22; CI = 95%). Thus, being a male or female had no influence on the risk of infection. In
61 Figure 1, about 8 categories of intestinal parasites were found in the stool examination record books. The
62 most prevalent intestinal parasites within the five-year period were intestinal flagellates (90.0%) and the
63 least intestinal parasites recorded were *A. lumbricoides* (0.1%) and *S. mansoni* (0.1%).

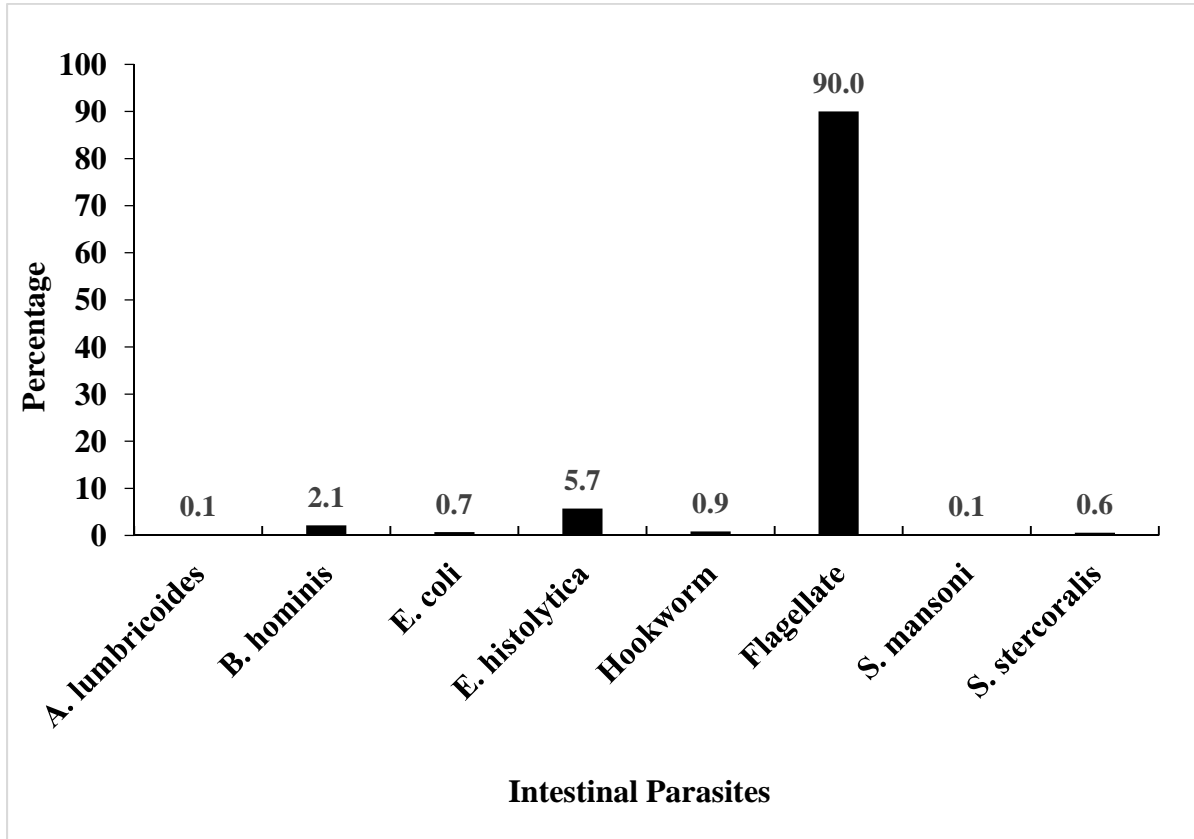
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65 **Table 1: Distribution of Intestinal Parasite Infection by sex from 2012 to 2016**

Year	Number Tested (%)		Total Tested (%)	Number Infected		Total Infected (%)
	F	M		F (%)	M (%)	
2012	1397	384	1781 (25.3)	181 (10.2)	48 (2.7)	229 (12.9)
2013	896	64	960 (13.6)	150 (15.6)	6 (0.6)	156 (16.2)
2014	1252	168	1420 (20.2)	89 (6.3)	4 (0.3)	93 (6.5)
2015	1309	119	1428 (20.3)	95 (6.7)	8 (0.6)	103 (7.2)

2016	1348	108	1456 (20.7)	114 (7.8)	8 (0.5)	122 (8.4)
Total	6202 (88.0)	843 (12.0)	7045 (100.0)	629 (8.9)	74 (1.1)	703 (10.0)

66 *Chi-square (χ^2) = 1.536, P-value=0.22, M = Males, F = Females

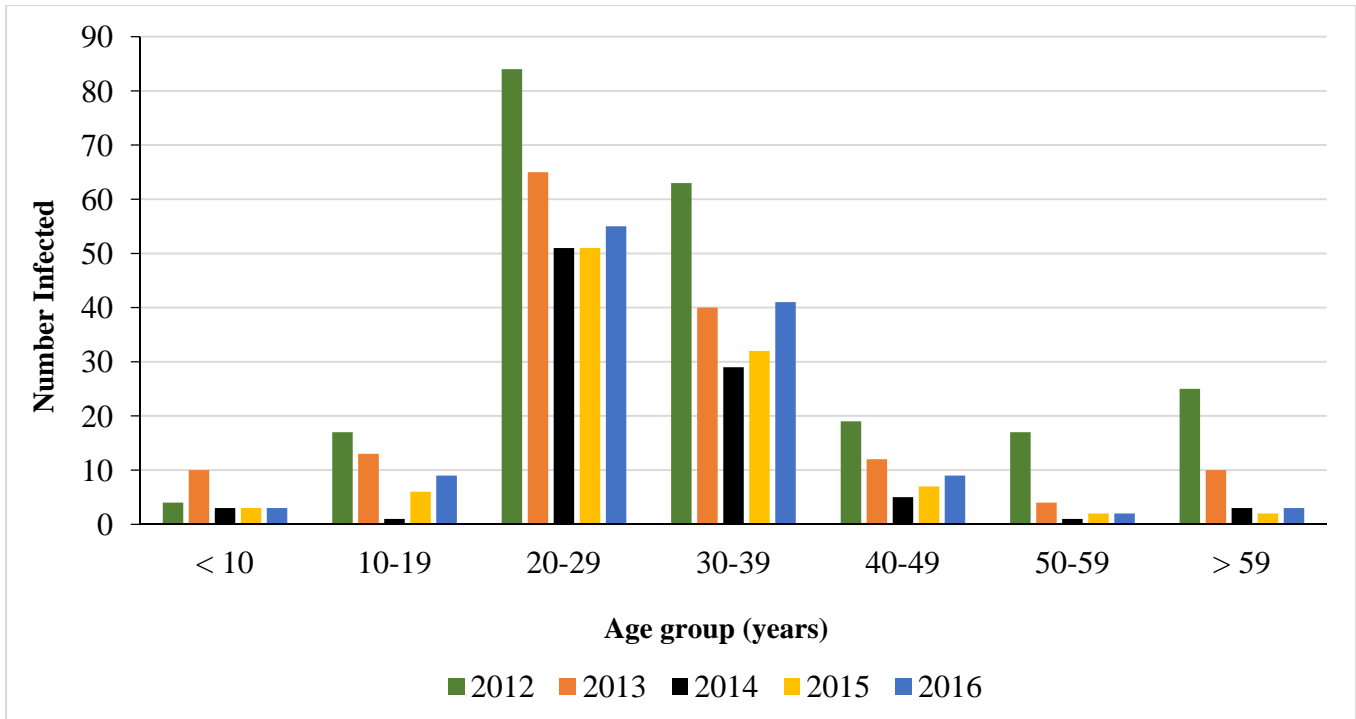


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68 **Figure 1: Percentage Distribution of Intestinal Parasites from 2012 to 2016.**

69 **3.2 Distribution of Intestinal Parasite by Age group**

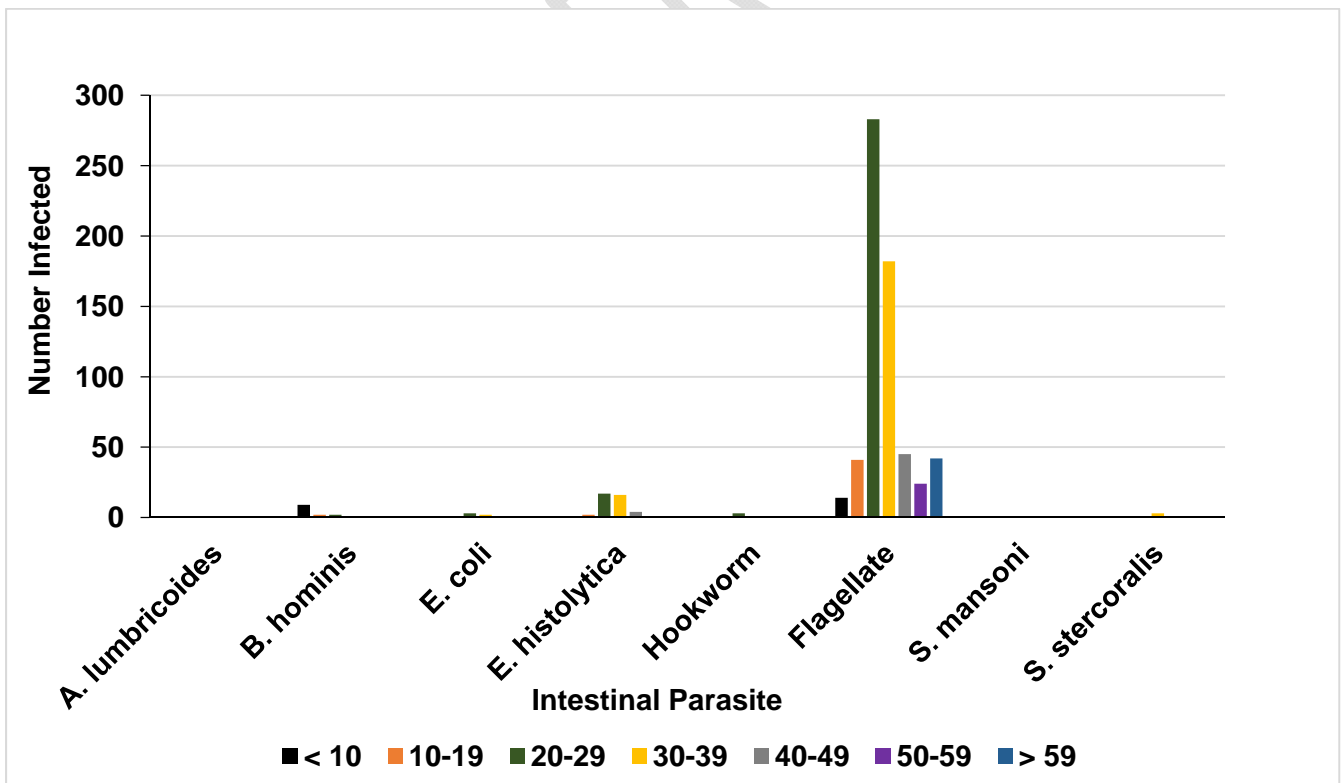
70 As presented in Figure 2, the affected age range was from 1 month to 87 years with a median age 29
71 years, mean 30.11 years and standard deviation 13.54 years. Patients within age group 20 to 29 years
72 (43.81%) recorded the highest infection followed by 30 to 39 years (29.24%) in each of the years.
73 However, patients within age group below 10 years (3.28%) recorded the lowest infection. In Figure 3,
74 intestinal flagellates were the highest intestinal parasites recorded among all age groups followed by *E.*
75 *histolytica*. However, age group 20 to 29 years had the highest recorded intestinal flagellates followed by
76 age group 30 to 39 years and 40 to 49 years.

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78

79 **Figure 2: Distribution of Intestinal Parasite Infection by Age Group, 2012 to 2016**



80

81 **Figure 3: Distribution of Each Intestinal Parasites by Age Group**

82

83 3.3 Association between Intestinal Parasite Infection and Patients Age group

84 As shown in Table 2, the association between intestinal parasite infections and patient's age yielded a
85 significant difference ($P \leq 0.001$). Therefore, intestinal parasite infection is dependent on the age of
86 patients.

87

88

89 **Table 2: Association between Intestinal Parasite Infection and Age group**

Age Group (Years)	Presence of Intestinal Parasite		Total Tested
	No (%)	Yes (%)	
< 10	452 (95.2)	23 (4.8)	475
10 to 19	411 (89.9)	46 (10.1)	457
20 to 29	2446 (88.8)	308 (11.2)	2754
30 to 39	2114 (91.2)	205 (8.8)	2319
40 to 49	433 (89.27)	52 (10.7)	485
50 to 59	230 (89.8)	26 (10.2)	256
> 59	256 (85.6)	43 (14.4)	299
Total	6342 (90.0)	703 (10.0)	7045

90 *Chi-square (χ^2) = 28.513; $P \leq 0.001$*

91

92 4. DISCUSSION

93 This study reviewed laboratory records within a five-year period (2012-2016) in a Teaching Hospital of the
94 Volta Region of Ghana. The current study revealed that 10.0% of examined patients were infected with
95 intestinal parasites. This finding is consistent with the findings of studies done in other countries such as
96 in Saudi Arabia, 6.2% [11], 6.23% in Ethiopia [12] and 10.7% in Iran [13]. Other studies have shown a
97 wide range of variation in the prevalence of intestinal parasites. For example, findings of a study
98 conducted in Vietnam, 88.0% [14] and 52% in Nigeria [15]. In comparison, the low prevalence of infection

99 in this current study could be attributed to the fact that most of the examined patients at the Ho Teaching
100 Hospital were urban dwellers with a high socioeconomic status.

101 Intestinal protozoa infections (*B. hominis*, *E. histolytica*, *E. coli* and intestinal flagellates were prevalent
102 than soil-transmitted helminth infection (*A. lumbricoides*, *S. stercoralis*, Hookworm and *S. mansoni*). This
103 finding is in contrast with the findings of a study conducted in Nepal [16] and Saudi Arabia [17] which
104 revealed soil-transmitted helminth as the most predominant intestinal parasite. The low prevalence of soil-
105 transmitted helminth infection in this study could be due to the periodic deworming exercise initiated by
106 the regional School Health and Education Programme (SHEP) of Ghana Education Service / Ministry of
107 Education and the Neglected Tropical Disease Control Programme (NTDCP) of the Ghana Health Service
108 [18].

109 The predominant intestinal protozoa parasites were intestinal flagellates (90.0%), followed by *E.*
110 *histolytica* (5.7%). This could be due to poor sanitation conditions, contamination of water and improper
111 hygiene [17]. This finding is contrary to studies conducted in Rwanda [19] and Egypt [20] where *E.*
112 *histolytica* was the most prevailing intestinal protozoa parasite.

113 Hookworm infection was low (0.9%). However, it was the predominant intestinal helminth infection in the
114 study. This finding agrees with the study conducted in Cape Coast Metropolis, Ghana which revealed
115 hookworm as the most common prevailing helminth [21]. On the other hand, the prevalence of *A.*
116 *lumbricoides* (0.1%), *S. stercoralis* (0.1%) and *S. mansoni* (0.6%) were low compared to the study
117 conducted in Cape Coast Metropolis, Ghana with prevalence of *A. lumbricoides* (3.0%), *S. mansoni*
118 (1.7%) and *S. stercoralis* (1.7%) [21]. This variation could be due to the different geographical location of
119 the study sites and also techniques used in the laboratory to detect these parasites. Although the
120 prevalence of these intestinal parasites was very low, their detection in the study population indicates
121 they are still being transmitted and the prevalence could surge under suitable conditions.

122 Regarding distribution of the intestinal parasites among various age groups, individuals in the age group
123 20-29 were most infected throughout the five-year period. Moreso, individuals in the age group below 10
124 recorded low infections. This is consistent with a similar finding in Nepal where most infection was among
125 age group 20-50 years [22]. The reason for the higher prevalence of the infection among individuals aged
126 20-29 years could be due their frequent exposure to the environment as majority of them are energetic,
127 hence they strive for their livelihood, and by doing so they do various types of works including farming,
128 sewage cleaning and many more. The probability of them eating and drinking improper food and water
129 during their working hours is high which could make them vulnerable to infection [22].

130 The study revealed higher rate of infection in females (9.11%) than in males (1.09%). This account is
131 similar to the findings of a study conducted in Ethiopia [23]. Moreover, females have high intestinal
132 protozoa and helminth infection, except for hookworm and *A. lumbricoides* infection that were
133 predominant in males. Such sex predominance in infections rates is likely to be a reflection of different

134 behaviour between the two groups [24]. The prevalence of intestinal parasite infection is dependent on
135 the age of the patient ($P \leq 0.001$). In contrast, intestinal parasite infection is independent of sex of an
136 individual ($P\text{-value}=0.215$). Therefore, age was a risk factor for acquiring these infections.

137 Implementation of laboratory quality management systems in the Ho Teaching Hospital Laboratory could
138 lead to the reducing prevalence of intestinal parasites from 2013. This facility was graded three-star level
139 by African Society for Laboratory Medicine (ASLM) after going through Strengthening Laboratory
140 Management Toward Accreditation (SLMTA) programme [25].

141 **5. CONCLUSION**

142 The overall prevalence of parasitic infections could be classified as low compared to other reports.
143 Among the intestinal parasites, intestinal flagellates and *Entamoeba histolytica* were found to be the most
144 prevalent during the five-year period (2012–2016). Most intestinal parasites were more prevalent among
145 individuals 20-29 years and the least infection was seen in individuals below 10 years. Although the
146 overall burden of parasites was low, the increasing trend of some parasites in the study indicates the
147 failure of maintaining good sanitation, personal hygiene, and provision of safe drinking water and health
148 education in the Ho municipality. It is recommended that, various stakeholders should provide advance
149 techniques in laboratory investigation of stool samples to enhance accurate diagnosis. Also, the provision
150 of hygienic toilet facilities, water supply, education and regular deworming should be promoted in other to
151 help control the transmission of these parasites among the population.

152 **CONFLICTS OF INTEREST**

153 The authors declare that they have no competing interests.

154 **CONSENT**

155 Written consent and approval for the study was obtained from the Ho Teaching Hospital management to
156 use the laboratory records. The names of the individual patients were not recorded during the data
157 collection; therefore, the patients' confidentiality were kept.

158 **ETHICAL APPROVAL**

159 Ethical approval for the study was sought from the Dodowa Health Research Centre Institutional Review
160 Board [Ethic identification number: DHRC/IRB/1/09/17].

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164 **REFERENCES**

- 165 1. Lobo ML, Augusto J, Antunes F, Ceita J, Xiao L, Codices V, et al. *Cryptosporidium* spp., *Giardia*
166 *duodenalis*, *Enterocytozoon bieneusi* and other intestinal parasites in young children in Lobata
167 province, Democratic Republic of São Tomé and Príncipe. *PLoS One*. 2014;9(5):e97708.
168
- 169 2. Savioli L, Smith H, Thompson A. *Giardia* and *Cryptosporidium* join the 'neglected diseases
170 initiative'. *Trends in parasitology*. 2006;2(5):203-8.
171
- 172 3. Fan CK, Liao CW, Lyu SY, Sukati H, Ji DD, Cho CM, et al. Prevalence of intestinal parasitic
173 infections among primary schoolchildren in areas devoid of sanitation in northwestern Kingdom of
174 Swaziland, Southern Africa. *Pathogens and global health*. 2012;106(1):60-2.
175
- 176 4. Duedu KO, Karikari YA, Attah SK, Ayeh-Kumi PF. Prevalence of intestinal parasites among
177 patients of a Ghanaian psychiatry hospital. *BMC research notes*. 2015;8(1):651.
178
- 179 5. Pullan RL, Smith JL, Jasrasaria R, Brooker SJ. Global numbers of infection and disease burden
180 of soil transmitted helminth infections in 2010. *Parasites & vectors*. 2014;7(1):37.
181
- 182 6. Osei FB, Stein A. Spatial variation and hot-spots of district level diarrhea incidences in Ghana:
183 2010–2014. *BMC public health*. 2017;17(1):617.
184
- 185 7. Orish VN, Ofori-Amoah J, Amegan-Aho KH, Mac-Ankrah L, Jamfaru I, Afeke I, et al. Low
186 Prevalence of Helminth Infections among Primary School Children in the Volta Region of Ghana.
187 *Asian Journal of Medicine and Health*. 2017;5(3):1-9.
188
- 189 8. Agboli E, Tay SC, Obirikorang C, Aidoo EY. Malaria and intestinal parasites in pregnant and non-
190 pregnant women: a comparative study at the University Hospital, Kumasi, Ghana. *Journal of*
191 *Medical and Biomedical Sciences*. 2015;4(3):31-5.
192
- 193 9. Kotian S, Sharma M, Juyal D, Sharma N. Intestinal parasitic infection-intensity, prevalence and
194 associated risk factors, a study in the general population from the Uttarakhand hills. *International*
195 *Journal of Medicine and Public Health*. 2014;4(4).
196
- 197 10. Brooker S, Hotez PJ, Bundy DA. Hookworm-related anaemia among pregnant women: a
198 systematic review. *PLoS neglected tropical diseases*. 2008;2(9):e291.
199

- 200 11. Zaglool DA, Khodari YA, Gazzaz ZJ, Dhafar KO, Shaker HA, Farooq MU. Prevalence of intestinal
201 parasites among patients of Al-Noor specialist hospital, Makkah, Saudi Arabia. *Oman medical*
202 *journal*. 2011;26(3):182.
203
- 204 12. Chala B. A retrospective analysis of the results of a five-year (2005–2009) parasitological
205 examination for common intestinal parasites from bale-Robe Health Center, Robe Town,
206 Southeastern Ethiopia. *ISRN parasitology*. 2012;2013.
207
- 208 13. Arani AS, Alaghebandan R, Akhlaghi L, Shahi M, Lari AR. Prevalence of intestinal parasites in a
209 population in south of Tehran, Iran. *Revista do Instituto de Medicina Tropical de São Paulo*.
210 2008;50(3):145-9.
211
- 212 14. Verle P, Kongs A, De NV, Thieu NQ, Depraetere K, Kim HT, et al. Prevalence of intestinal
213 parasitic infections in northern Vietnam. *Tropical Medicine & International Health*. 2003;8(10):961-
214 4.
215
- 216 15. Morenikeji OA, Azubike NC, Ige AO. Prevalence of intestinal and vector-borne urinary parasites
217 in communities in south-west Nigeria. *Journal of vector borne diseases*. 2009;46(2):164.
218
- 219 16. Shrestha A, Schindler C, Odermatt P, Gerold J, Erismann S, Sharma S, et al. Intestinal parasite
220 infections and associated risk factors among schoolchildren in Dolakha and Ramechhap districts,
221 Nepal: a cross-sectional study. *Parasites & vectors*. 2018;11(1):532.
222
- 223 18. Amer OS, Al-Malki ES, Waly MI, AlAgeel A, Lubbad MY. Prevalence of Intestinal Parasitic
224 Infections among Patients of King Fahd Medical City in Riyadh Region, Saudi Arabia: A 5-Year
225 Retrospective Study. *Journal of parasitology research*. 2018.
226
- 227 19. Abdul-Rahman L, Agble R. Review of School Health and Nutrition Interventions and Mapping of
228 Existing Programmes in Ghana. London UK partnership for child development. 2012.
229
- 230 20. Emile N, Bosco NJ, Karine B. Prevalence of intestinal parasitic infections and associated risk
231 factors among Kigali Institute of Education students in Kigali, Rwanda. *Tropical biomedicine*.
232 2013;30(4):718-26.
233
- 234 21. Hegazy AM, Younis NT, Aminou HA, Badr AM. Prevalence of intestinal parasites and its impact
235 on nutritional status among preschool children living in Damanhur City, El-Behera Governorate,
236 Egypt. *Journal of the Egyptian Society of Parasitology*. 2014;240(1416):1-8.

- 237
238 22. Dankwa K, Kumi RO, Ephraim RK, Adams L, Amoako-Sakyi D, Essien-Baidoo S, Nuvor SV.
239 Intestinal parasitosis among primary school pupils in coastal areas of the Cape Coast Metropolis,
240 Ghana. children. 2015;4:5.
241
- 242 23. Baral R, Jha P, Amatya R, Khanal B. Prevalence of intestinal parasitic infections among patients
243 attending in a tertiary care hospital of eastern region of Nepal–A retrospective, laboratory based
244 study. Asian Journal of Medical Sciences. 2017;8(3):55-9.
245
- 246 24. Tefera G. Prevalence of intestinal parasitic infections among patients with diarrhea at Wonago
247 health center, Southern Ethiopia: a retrospective study. Immunology and Infectious Diseases.
248 2015;3(1):1-6.
249
- 250 25. Hotez PJ, Bundy DA, Beegle K, Brooker S, Drake L, de Silva N, Montresor A, Engels D, Jukes M,
251 Chitsulo L, Chow J. Helminth infections: soil-transmitted helminth infections and schistosomiasis.
252 Oxford University Press and World Bank. 2006.
253
- 254 26. Agboli E, Kye-Duodu G, Quaye L, Adeze-Kpodo R, Lokpo SY, Atadja P, Binka F. Gaps
255 Laboratory Quality Management Systems in the Volta Region of Ghana. Asian Journal of
256 Medicine and Health. 2018:1-9.