International Journal of Community Medicine and Public Health
Arwa SO et al. Int J Community Med Public Health. 2020 Jul;7(7):2455-2461
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20202965

Original Research Article

Correlation between prevalence and socio-demographic, knowledge and risk factors of soil transmitted helminthiases: cross-sectional study among primary school-going children in Rarieda, Kenya

Stephen Onyango Arwa[1]*, Dominic Mogere[1], David Musoke[2]

[1]Department of Epidemiology and Biostatistics, Mount Kenya University College of Health Sciences, Thika, Kenya
[2]Department of Disease Control and Environmental Health, Makerere University College of Health Sciences, Kampala, Uganda

Received: 30 September 2019
Revised: 31 May 2020
Accepted: 02 June 2020

***Correspondence:**
Dr. Stephen Onyango Arwa,
E-mail: stevearwa@gmail.com

ABSTRACT

Background: Soil transmitted helminthiasis, classified as neglected tropical diseases are among the most common infections worldwide with greatest numbers occurring in Sub-Saharan Africa, Americas, China and East Asia. Globally, over two billion people are infected with school-age children bearing the greatest burdens. Transmission is through eggs present in human faeces. They are infections of public health importance as they cause among others, nutritional impairment, diarrhoea and intestinal obstruction. Prevention involves deworming, health education and sanitation.
Methods: The study was carried out in Rarieda, Kenya in 2018. Study participants were primary school children of ages seven to fifteen. Cross sectional study design was used and the data was analyzed using Statistical Package for Social Sciences. All the ethical issues were adhered to as per the International standards.
Results: The study established that prevalence of soil transmitted helminthiasis was high in areas where the risk factors associated with the infections were high. Pupils who were more knowledgeable on soil transmitted helminthiases were less infected. Younger pupils were more infected than older pupils. Lastly, the prevalence of these infections varied with gender of the pupils, and geographical location from where the pupils came from.
Conclusions: Correlation between prevalence of soil transmitted helminthiases and risk factors, and between presence of toilets and level of hygiene practice were positive, r=0.90 and 0.93 respectively; while correlation between prevalence of soil transmitted helminthiases and knowledge was negative, r=-0.75. Values of the correlations were of statistical significance at $p<0.05$.

Keywords: Correlation, Kenya, Prevalence, Risk factors, Soil transmitted helminthiases

INTRODUCTION

Soil transmitted helminthiases (STH) are among the common infections all over the world, and they mostly affect deprived and poor communities.[1] They are caused by different species of parasitic worms with the main species infecting human beings being roundworm (*Ascaris lumbricoides*), whipworm (*Trichuris trichiura*) and hookworms (*Necator americanus* and *Ancylostoma duodenale*).[1] STH are classified as neglected tropical diseases (NTD).[1]

Globally, approximately 2 billion people are infected with these worms.[2] This number represents close to a quarter

of the world's population. High infections occur in Sub-Saharan Africa, the Americas, China and East Asia; they are widely distributed in tropical and subtropical areas.[1] It is estimated that over 267 million preschool-age children and over 568 million school-age children are at risk of STH infections.[1] According to a research done in Indonesia, on the prevalence and risk factors of STH, it was found that the prevalence of STH was 57.4% while prevalence in Ethiopia was reported as 12.6 percent.[2,3] In Kenya, the prevalence of STH was reported as 27.3 percent in Rarieda.[4,5]

SHT are transmitted by eggs present in human faeces, in normally contaminated soil in places where sanitation and hygiene are inadequate.[1] Adult worms reside in human intestine where they continue to reproduce every day. There is however, no direct person-to-person transmission of these worms.[1] STH impair the nutritional status of the infected people. They cause abdominal pain, diarrhoea, physical and cognitive growth impairment, and protein loss to the infected. Very high infections may cause intestinal obstruction.[6,7]

Prevention and control of STH mainly involves periodic deworming, health education, and improved sanitation.[1] Deworming can be integrated with child health days or supplementation programs for pre-school children. The World Health Organization (WHO) recommends albendazole 400 mg and mebendazole 500 mg medicines.[1] Morbidity is related to the number of worms harboured.[1] Among the six 2030 global targets for the WHO, there is need to achieve and maintain elimination of STH morbidity in pre-school and school age children, and also need to ensure universal access to at least basic sanitation and hygiene by the year 2030.[1,8]

This study was necessitated by high prevalence of STH among the primary school going children, and the public health burden caused by these worms among the school-age going children.[1,5] The study, was not only to provide statistical and epidemiological understanding of the prevalence and risk factors of soil transmitted helminthiases in Rarieda, a Sub-County in Kenya, but it also helped in better understanding of the correlations between prevalence of STH and the knowledge, risk factors and socio-demographic parameters of STH among the school-age going children. There was a dire need to carry out this study with the primary school going children as the study population because of the public health effects associated with these infections among the age groups, the susceptibility of pupils to STH infections, and also because of the fact that these infections have been neglected (NTD).[1,2,5]

In this study, new data were generated on the correlation of the prevalence and risk factors of STH. This ultimately helped in better understating and decision making on the most appropriate prevention and control strategies of soil transmitted helminthiases.

Operational definition of terms

Correlation

Refers to the degree to which a variable, factor or an event, is associated or related to, or can be predicted from another; the degree to which a linear relationship or association exits between variables, measured by a correlation coefficient.[9]

Prevalence

Refers to the total number of persons with a given condition, or disease, or attribute at a specified time divided by the total number of persons in the population at that particular time.[9]

Risk factors

An aspect of a personal behaviour or lifestyle, an environmental exposure or an inborn/inherited characteristic associated with an increased likelihood of disease or other health related event or condition.[9]

METHODS

Study population and area

This study was carried out in Rarieda Sub-County of the larger Siaya County. Rarieda Sub-County is an area, known as "constituency" under the Kenya Constitution promulgated in 2010. It is one of six constituencies in Siaya County, and one of two constituencies in the former Bondo District. The sub-county has a total of five wards namely West Uyoma, South Uyoma, North Uyoma, West Asembo, and East Asembo. Rarieda Sub-County has an average of 140,000 people and most of Rarieda constituents live below the poverty line. This is due to minimal economic activities within the constituency. Main economic activities in Rarieda include farming mainly on small scale, fishing and trading. Though Rarieda is one of those constituencies closest to Lake Victoria, the second largest fresh water lake in the world, there has been constant drought in Asembo and Uyoma, the main regions that make up the constituency. The sub-county is located in the Kenya plateaus with mild to pleasant warm temperatures, and receives two rainy seasons per year.

The study participants were primary school going children. At the time of the study, Rarieda had approximately 130 primary schools with about 34,000 pupils' population. Primary school children bear the heaviest burden of STH hence they were considered more appropriate for the study. The sampled pupils were from classes three to seven, and as such between the ages of 7 to 15.

Data collection for the study was carried out from October 2018 to November 2018. The duration of data collection was five weeks.

Study design and sample collection

Cross sectional study design was used during this study. All the sampled pupils were included in the study. The research employed a three-step sampling process. First, cluster sampling was used in which the study area was divided into five clusters (wards) and a school was randomly sampled from each of the five clusters. The second step involved purposive sampling in which the pupils in the sampled schools were divided into five groups based on classes (class three to seven), and then into two groups based on gender. Lastly, simple random sampling was used to sample twelve pupils per class, six boys and six girls. In total 60 pupils were sampled in each of the five schools giving a total sample size of 300 pupils. Fisher's formula (1998) was used to determine the total sample size.

Data was collected using structured questionnaires and interviews. Pre-testing of the data collection tools was done at Ruma primary school, located in West Uyoma. Morning stool samples were collected using capped plastic sterile containers. The samples were analyzed for STH eggs and larvae by wet mounts and Kato-Katz technique.

Data analysis and presentation

The collected data were coded, and entered into Microsoft excel software and cleaned for any errors. The data was then analyzed using the Statistical Package for Social Sciences (SPSS-Version 20). Results on the correlations were calculated and analyzed by the use of the Pearson correlation coefficient formula. The Pearson correlation coefficient is used to measure the strength of a linear association between two variables, where the value r=1 means a perfect positive correlation and the value r=-1 means a perfect negative correlation.[10,11]

The Pearson Correlation equation:[11]

$$r = \frac{\sum_i (x_i - \overline{x})(y_i - \overline{y})}{\sqrt{\sum_i (x_i - \overline{x})^2} \sqrt{\sum_i (y_i - \overline{y})^2}}$$

where,

X: X values
Y: Y values
Mx: Mean of X values
My: Mean of Y values
X - Mx and Y - My: deviation scores
$(X - Mx)^2$ *and* $(Y - My)^2$: deviation squared
(X - Mx) (Y - My): product of deviation scores

Data was then finally presented using charts, graphs, and scatter diagrams. Chi-square test was used to test for the associations and correlations between the study variables.

Assent forms and ethical approvals

Since the study involved minors (below 18 years of age), assent forms were administered to the sampled pupils, and they signed them with assistance from their teachers and/or parents. This study was approved by the Mount Kenya University Ethical and Research Committee (MKU-ERC), the National Commission for Science, Technology and Innovation (NACOSTI), and the County Government of Siaya.

RESULTS

286 out of the 300 sampled pupils were aged between 9 and 14 years old, representing about 95.3%. Only 4 (1.3%) pupils were aged 7 to 8 years whereas 10 pupils (3.3%) were above 15 years old.

Table 1: Data on prevalence, knowledge, RF, presence of toilets, and hygiene practice.

School (primary)	Ward (region)	Prevalence (%)	Knowledge (%)	Risk factor (%)	Presence of toilets	Hygiene practice
Ramoya	South Uyoma	38.3	30.4	55.0	30.0	28.3
Akuom	West Uyoma	33.3	37.3	50.6	38.3	33.3
Ong'ielo	East Asembo	25.0	34.6	45.3	45.0	35.0
Ochieng'a	North Uyoma	23.3	48.2	37.8	50.0	41.7
Mabinju	West Asembo	16.7	43.9	40.9	43.3	33.3

Table 1 above summarizes the data collected on the prevalence of STH among the pupils across the sampled schools. The prevalence of STH among the pupils was recorded as 38.3% for the pupils in Ramoya Primary school, this being the highest. Pupils at Mabinju primary school had the lowest prevalence at 16.7%. Prevalence of STH among the pupils of Akuom, Ong'ielo and Ochieng'a primary schools were recorded as 33.3%, 25.0% and 23.3% respectively.

In terms on knowledge on STH, the pupils at Ochieng'a primary school were the most knowledgeable at 48.2%. The knowledge areas that were asked during the data collection included whether the pupils had heard of STH,

and whether they could tell of the signs and symptoms, mode of transmission, risk factors associated with STH, and means of control and prevention.

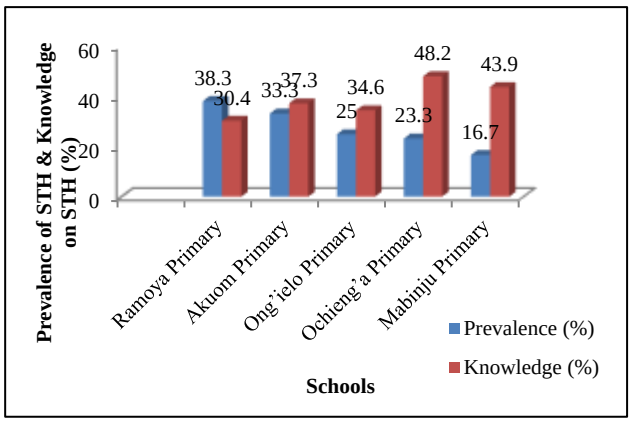

Figure 1: Correlation between prevalence of STH and knowledge on STH.

The risk factors associated with STH that were considered during the data collection included the lack of toilets especially at homes, inadequate hygiene and sanitation practices either at school or at homes, lack of health education and promotion programs, and lack of regular deworming. Pupils at Ramoya primary school were the most at risk of STH infections (55.0%) whereas the pupils at Ochieng'a primary school were the least at risk at 37.8%. The school going children from Akuom, Ong'ielo and Mabinju primary schools were at 50.6%, 45.3% and 40.9% at risk respectively.

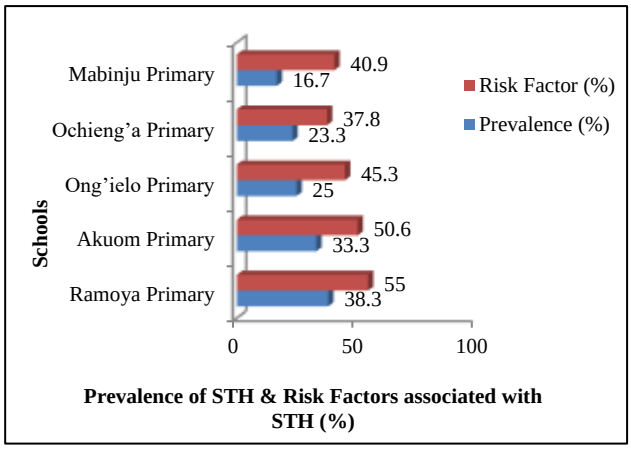

Figure 2: Correlation between prevalence and Risk Factors associated with STH.

It was noted during the data collection exercise that there was generally poor toilets coverage in Rarieda. On average, only 41.3% of the pupils reported to have toilets in their homes. North Uyoma ward (Ochieng'a) had the highest toilets coverage at 50% followed by East Asembo ward (Ong'ielo) at 45%. In terms of hygiene practice, only 34.2% of the pupils adhered to hygiene practices such as washing of hands regularly before eating or after visiting toilets. The pupils at Ochieng'a school were the most disciplined in terms of hygiene practice. However, they only scored 41.7% on the same, which was below average.

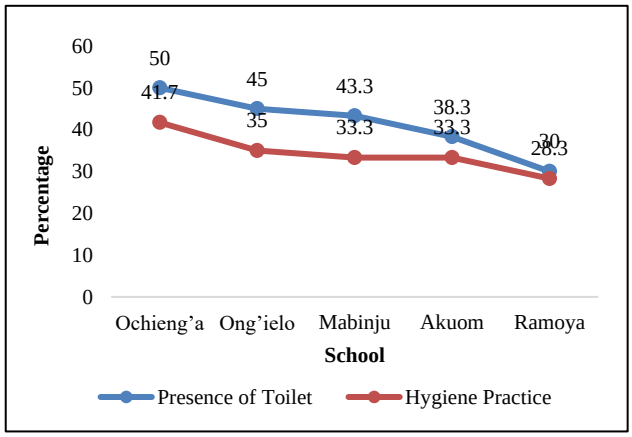

Figure 3: Correlation between prevalence of toilets and hygiene practice.

Table 2: Correlation between prevalence of STH and class, gender, and ward of the pupils.

Variables	Frequency (f)	Percentage (%)	Chi-square (χ^2)	p-values
Class (n=60)				
Class 3	20	33.3	-0.8919	0.4249
Class 4	17	28.3		
Class 5	16	26.7		
Class 6	14	23.3		
Class 7	15	25.0		
Gender (n=150)				
Boys	44	29.3	0.439	0.50759
Girls	38	25.3		
Community				
Uyoma	57/180	31.7	3.091	0.0787
Asembo	25/120	20.8		

As shown in the Table 2 above, it was observed that the pupils of lower classes were more infected with STH infections than those pupils of upper classes. 20 out of the 60 (33.3%) sampled pupils in class three were tested positive of STH. In class four, 17 pupils (28.3%) were infected, while 16 pupils (26.7%) of the pupils in class five were infected. The pupils of class six were the least infected at only 23.3 percent.

In terms of gender, boys were more infected than girls. Of all the 82 infected pupils, 44 of them were boys while only 38 of them were girls. It was also observed that the pupils from the larger Uyoma community were generally more infected with STH than the pupils from Asembo community. STH infection rate in Uyoma was 31.7 percent whereas the infection rate in Asembo was 20.8 percent. In terms of wards, the STH prevalence was high

in South Uyoma (Ramoya) at 38.3 percent. The lowest rate of STH was recorded in West Asembo ward (Mabinju) at only 16.7 percent. Prevalence in West Uyoma (Akuom), East Asembo (Ong'ielo), and North Uyoma (Ochieng'a), were 33.3%, 25.0%, and 23.3% respectively (Table 1).

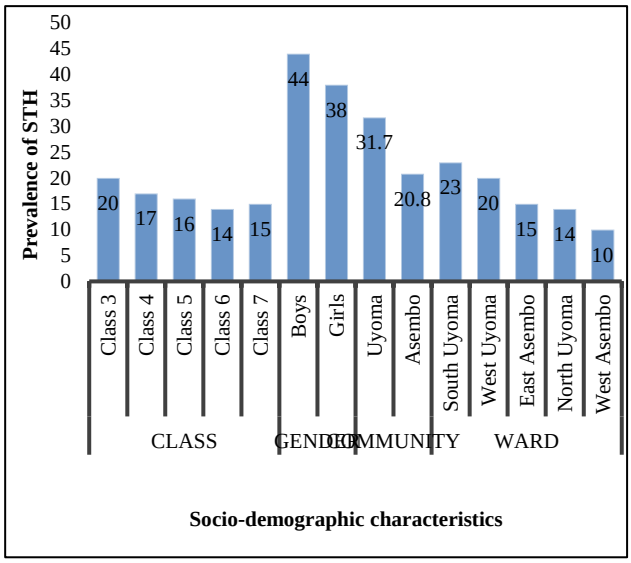

Figure 4: Correlation between prevalence of STH and socio-demographic factors.

DISCUSSION

Based on the results, correlations between prevalence of STH and knowledge on STH, between prevalence of STH and risk factors associated with STH, between prevalence of toilets and hygiene practice, and between prevalence of STH and socio-demographic factors were discussed in details.

First, in correlation between prevalence of STH and knowledge on STH, the calculated value of R was -0.75. This implied a strong negative correlation between prevalence of STH and knowledge on STH. It therefore meant that as the knowledge on STH among the pupils increased, prevalence of STH is reduced. For instance, the pupils of Ramoya primary school, who had the highest prevalence on STH (38.3%), demonstrated least knowledge (30.4%) on STH. On the other hand, the pupils who had highest knowledge on STH, were least infected with STH. For instance, pupils of Mabinju primary school, with a highest knowledge on STH at 43.9% were the least infected (16.7%). Ong'ielo primary school pupils with an average knowledge on STH was averagely infected (Figure 1).

These results were in agreement with a study done in Indonesia on the prevalence and risk factors of soil-transmitted helminthiasis among school children living in an agricultural area of North Sumatera. In that particular study, education (knowledge) played a vital role to reduce rates of STH prevalence.[2,7]

There is therefore, a need for public health action, to create and increase awareness and knowledge among the pupils and the community at large on STH. This is true because it is believed that if the pupils know how the worms are transmitted; their signs and symptoms, and their modes of prevention and control, then pupils and the community at large would be more careful and take appropriate health actions and health behaviours that would help in reducing the rate of STH in the community.

Second, as far as correlation between prevalence and risk factors was concerned, the value of R was calculated as 0.90. There was therefore an established strong positive correlation between the prevalence of STH and risk factors associated with STH. This means that when the risk factors associated with STH in a community are low or reduced, then prevalence of STH would be low, whereas where the risks factors are high, the resultant prevalence of STH would be higher. Ramoya primary school pupils who were at higher risk of STH (55.0%), were the most infected with STH (38.3%). The pupils of Ochieng'a primary school with 37.8% risk of infections, were only 23.3% infected. Similarly, the pupils of Ong'ielo primary school who had an average risk of being infected (45.3%) were averagely infected of STH (Figure 2).

The calculated p value was 0.036. The result was therefore statistically significant at $p<0.05$. Where the risk factors are significantly reduced, there is reduced rate of reproduction of the helminths, and the life cycle of the helminths are also discontinued, in which case they cannot survive. These findings were in agreement with other studies done in different parts of the world. The WHO, had listed poor sanitation and poverty (deprived communities) as being risk factors.[1] Studies done separately in Indonesia and Ethiopia had shown that playing with soil/dirt increased the risk of STH infections while hand washing habits and latrine usage decreased the risk of STH infections.[2,3,6]

The public health implication for this is that the government, both the county and national governments, should ensure that the communities are assisted and empowered as much as possible to reduce the risk factors associated with STH in the community. This would include the empowerment of the parents and the community at large to ensure that every home has a functional toilet, ensuring clean and constant supply of water in the community, and empowering and assisting the less unfortunate to ensure that every pupil wear shoes always. Open defecation should be discouraged as much as possible and positive health behaviours such as hand washing after visiting of toilets or before any meal, and wearing of shoes encouraged.

Thirdly, in analyzing the correlation between prevalence of toilets and hygiene practice, researcher considered presence of toilets at homes from where the pupils come from. However, in the case of hygiene practice, the

average levels of hygiene practice whether the pupils were at home or at school were considered. It was found that most pupils who had toilets at their homes were keen to observe hygiene practices such as washing of hands after visiting toilets. The vice versa was noted to be true. For instance, half of pupils from Ochieng'a reported to have had toilets in their homes. They also reported the highest rate of observance of hygiene practices (41.7 percent). Pupils from Ong'ielo reported the second highest number of toilets in their homes, and in terms of hygiene observance, they were similarly the second best. The correlation coefficient, R, was calculated as 0.93 indicating a strong positive correlation between presence of toilets and level of hygiene practice among the pupils. Further to this correlation, the p value was calculated 0.023 indicating that the result was significant at $p<0.05$. The level of hygiene practice therefore linearly reduced among the pupils as the presence of toilets reduced (Figure 3).

This was a clear indication that the best public health practices could be acquired rather than just learned. The pupils who had toilets in their homes could not only have learned from their parents, but could have also acquired the traits. Even though, hygiene observance was taught in schools as one of the subjects, pupils who never practiced the same at their homes (due to lack of toilets), were reluctant to adopt the best practices as their way of daily lives.

Lastly, in analyzing correlation between prevalence of STH and Socio-demographic factors, it was noted that prevalence of STH was higher in lower classes and reduced progressively as the pupils progressed to upper classes (Table 2). Prevalence was high in class three with 20 out of 60 pupils infected with STH. Number of pupils with STH in class four, five and seven were 17, 16 and 15 respectively (Figure 4). The value of R was calculated as -0.89 thus indicating a strong negative correlation between class (and thus age) of pupil and prevalence of STH. The older the pupils, the less are the rate of STH infections. The p value was calculated as 0.042 meaning the result was significant at $p<0.05$. Similarly, prevalence of STH also varied across the wards (geographical regions) with pupils of South Uyoma ward being most infected (38.3%) while the pupils from West Asembo were least affected (16.7%) (Table 1). In overall, STH infections in Uyoma was higher (31.7%) than infections in Asembo ward (20.8%). In terms of gender, boys were more infected (29.3%) than girls (25.3%) (Table 2, Figure 4).

The findings were similar to study done in Ethiopia, which showed that prevalence of STH varied with age, and sex.[3,12] Prevalence of STH infections were also closely linked to environmental factors and socioeconomic conditions.[12] Different studies done in China, Nigeria, and Nepal, Malaysia and India indicated that prevalence of STH varied across different regions, and that younger age groups were more infected by STH than older age groups.[13-15] However, the results did not corroborate to the study done in Nepal in which it was found that the prevalence of STH in females was higher than the prevalence in males.[16] The difference was attributed to the fact that the study in Nepal included females and males of all age groups. It attributed the high prevalence of STH to be higher in females than in boys due to the high roles played by females in the fields and gardens compared to males. In Rarieda, only boys and girls of ages 7 to 15 years old were included.

This implies that even though public health promotion and education, and deworming programs should not be discriminative in terms of regional coverage, gender nor age, the most susceptible groups could be accorded extra assistance as far as prevention and control of STH is concerned.

CONCLUSION

From the study, three conclusions were made. First, there was positive correlations between prevalence of Soil-Transmitted Helminthiasis and the risk factors associated with STH ($r=0.90$, $p=0.36$); and between presence of toilets and level of hygiene practice ($r=0.93$, $p=0.23$). Both the corrections were statistically significant at $p<0.05$. Second, there was negative correlation between the prevalence of soil-transmitted helminthiasis and knowledge on STH ($r=-0.75$, $p=0.14$); and between prevalence of STH and class of pupils ($r=-0.89$, $p=0.42$), with the latter relationship being statistically significant at $p<0.05$. Lastly, male pupils were more likely to be infected with STH than girls with a percentage difference of 4%; while those residing in Uyoma (geographical region) were also more susceptible to STH than those residing in Asembo with a percentage difference of 10.9%.

Recommendations

The researcher recommended an integrated approach measure in controlling STH. Besides regular deworming, health education and promotion, and maintenance of adequate hygiene, the communities should also be empowered, assisted, and actively be involved to reduce the risk factors associated with STH. This calls for multi-disciplinary approach that goes beyond just the public health sector.

ACKNOWLEDGEMENTS

Special thanks to all the pupils who agreed to take part in this study. I extend my gratitude to all the teachers, and parents of the pupils for allowing them to take part in this study. Lastly but not least, to the Mount Kenya University (MKU) Foundation for the financial support.

Funding: Research grant for this study was provided by the Mount Kenya University and Makerere University Colleges of Health Sciences through the Mount Kenya

University (MKU) Foundation joint research grant number MaKMKUCHS FY18-013
Conflict of interest: None declared
Ethical approval: Ethical approvals and clearances were obtained from The Mount Kenya University Ethical and Research Committee, The National Commission for Science and Technology, and the County Government of Siaya

REFERENCES

1. World Health Organization. Soil-transmitted helminthiases: eliminating soil-transmitted helmnthiases as a public health problem in children. Prog Rep. 2012; 19-29.
2. Pasaribu AP, Alam A, Sembiring K, Pasaribu S, Setiabudi D. Prevalence and risk factors of soil-transmitted helminthiasis among school children living in an agricultural area of North Sumatera, Indonesia. BMC Public Health. 2019;19(1):1066.
3. Samuel F, Demsew A, Alem Y, Hailesilassie Y. Soil transmitted Helminthiasis and associated risk factors among elementary school children in ambo town, western Ethiopia. BMC Public Health. 2017;17(1):791.
4. Arwa SO, Mogere D, Musoke D. Prevalence and associated risk factors of soil-transmitted helminthiases among primary school-going children in Rarieda, Siaya County-Kenya. Int J Trop Dis Health. 2019;38(2):1-12.
5. Onkanga IO, Mwinzi PN, Muchiri G, Andiego K, Omedo M, Karanja DM, et al. Impact of two rounds of praziquantel mass drug administration on Schistosoma mansoni infection prevalence and intensity: a comparison between community wide treatment and school based treatment in western Kenya. Int J Parasitol. 2016;46(7):439-45.
6. Menzies SK, Rodriguez A, Chico M, Sandoval C, Broncano N, Guadalupe I, et al. Risk factors for soil-transmitted helminth infections during the first 3 years of life in the tropics; findings from a birth cohort. PLoS Neglected Trop Dis. 2014;8(2).
7. Moncayo AL, Vaca M, Amorim L, Rodriguez A, Erazo S, Oviedo G, et al. Impact of long-term treatment with ivermectin on the prevalence and intensity of soil-transmitted helminth infections. PLoS Neglected Trop Dis. 2008;2(9).
8. Li XX, Chen JX, Wang LX, Tian LG, Zhang YP, Dong SP, et al. Prevalence and risk factors of intestinal protozoan and helminth infections among pulmonary tuberculosis patients without HIV infection in a rural county in PR China. Acta Tropica. 2015;149:19-26.
9. Online Medical Dictionary. 2019. Available at: https://medical-dictionary. the free dictionary.com/ correlation ">correlation https://medical-dictionary.thefreedictionary.com/. Accessed on 22 February 2019.
10. Gebrehiwet MG, Medhaniye AA, Alema HB. Prevalence and associated factors of soil transmitted helminthes among pregnant women attending antenatal care in Maytsebri primary hospital, North Ethiopia. BMC Res Notes. 2019;12(1):644.
11. Opie C, Brown D, Using excel/spss in your research. In: Getting Started in Your Educational Research: Design, Data Production and Analysis. SAGE Publications Limited; 2019.
12. Creswell JW, Creswell JD. Research design: Qualitative, quantitative, and mixed methods approaches: Sage publications; 2017.
13. Rajendran R, Sunish IP, Mani TR, Munirathinam A, Arunachalam N, Satyanarayana K, et al. Community-based study to assess the efficacy of DEC plus ALB against DEC alone on bancroftian filarial infection in endemic areas in Tamil Nadu, south India. Trop Med Int Health. 2006;11(6):851-61.
14. Wang X, Zhang L, Luo R, Wang G, Chen Y, Medina A, et al. Soil-transmitted helminth infections and correlated risk factors in preschool and school-aged children in rural southwest China. PLoS One. 2012;7(9).
15. Oluwole AS, Adeniran AA, Mogaji HO, Olabinke DB, Abe EM, Bankole SO, et al. Prevalence, intensity and spatial co-distribution of schistosomiasis and soil transmitted helminths infections in Ogun state, Nigeria. Parasitology Open. 2018;4.
16. Kunwar R, Acharya L, Karki S. Trends in prevalence of soil-transmitted helminth and major intestinal protozoan infections among school-aged children in Nepal. Trop Med Int Health. 2016;21(6):703-19.

Cite this article as: Arwa SO, Mogere D, Musoke D. Correlation between prevalence and socio-demographic, knowledge and risk factors of soil transmitted helminthiases: cross-sectional study among primary school-going children in Rarieda, Kenya. Int J Community Med Public Health 2020;7:2455-61.