International Journal of Community Medicine and Public Health
Ratemo GG et al. Int J Community Med Public Health. 2026 Feb;13(2):609-616
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20260284

Original Research Article

Prevalence and sociodemographic risk factors of soil-transmitted helminth infections in pregnant women, Kisii County, Kenya

Geoffrey G. Ratemo[1]*, Stanslaus K. Musyoki[2], Benson O. Nyanchongi[1], Julius S. Otwabe[3]

[1]Department of Biomedical Sciences, Kisii University, Kisii Kenya
[2]Department of Medical Laboratory Sciences, South Eastern Kenya University, Kenya
[3]Kisii Teaching and Referral Hospital (KTRH), Kenya

Received: 02 September 2025
Accepted: 06 January 2026

***Correspondence:**
Dr. Geoffrey G. Ratemo,
E-mail: geffgekonde@gmail.com

ABSTRACT

Background: Soil-transmitted helminths (STH) are the most prevalent parasitic infections affecting humans worldwide. However, the levels of infection in pregnant women and the information on risk factors in Kisii County is not known. The aim of this study was to determine the prevalence of STH in pregnant women and the influence of sociodemographic factors.

Methods: A cross-sectional study of 384 pregnant women, selected through random sampling. A questionnaire was used to collect sociodemographic data. Faecal samples were examined microscopically with saline and formal-ether concentration techniques to identify helminth species. Data analysis involved proportions, logistic regression and Chi-square, with $p<0.05$ deemed significant.

Results: Results indicated that the prevalence of STH among pregnant women was 144 (37.5%) where *A. lumbricoides* was 94 (24.5%), Hookworm 21 (5.5%), *S. stercolaris* 5 (1.3%), *T. trichiura* 1 (0.3%) and *E. vermicularis* 1 (0.3%). Additionally, mixed infections were observed; *A. lumbricoides* and Hookworm 16 (4.2%), *A. lumbricoides* and *T. trichiura* 2 (0.5%), *T. trichiura* and *E. vermicularis* 1 (0.3%) and *A. lumbricoides* and *E. vermicularis* 1 (0.3%). Economic activity was significantly associated with STH infections ($\chi2=63.485$, $p=0.01$). Subsistence farming in particular was significantly associated with STH infections ($\chi2=4.580$, $p=0.03$The income levels had a significant association with STH infections ($\chi2=16.833$, $p< 0.01$). Lower levels of income were significantly associated with STH infections ($\chi2=10.96$, $p<0.01$).

Conclusions: STH infections are common in pregnant women at KTRH, especially subsistence farmers. Routine diagnosis, health education and treatment during antenatal care are critical. These findings could guide healthcare workers in eliminating STH infections in pregnancy.

Keywords: Prevalence, Risk factors, Soil-transmitted helminths, Sociodemographic factors

INTRODUCTION

STH infections is reportedly the commonest cause of human parasitic infections among the poor and most deprived communities worldwide.[1] It is estimated that over 4.5 billion are at risk globally.[2] And over 1.5 billion suffer from soil-transmitted helminth infections.[3] The most prevalent soil-transmitted helminth species responsible for morbidity across the world includes *A. lumbricoides*, *T. trichuria* and hookworm.[4] Soil-transmitted helminth infections occur particularly within the developing countries and greatly infect women of the reproductive age (WRA).[5] Millions of affected pregnant women are consequently predisposed to undesirable maternal and prenatal outcomes.[6] Soil-transmitted helminth infections during pregnancy may lead to stunted growth, increased anaemia and wasting in infants.[7] Additionally, soil-transmitted helminth infections may be responsible for adverse consequences that may hamper

the cognitive development of the child, malnutrition and reduced haemoglobin levels.[7] Other consequences include low birth weight and in extreme circumstances may result to fatalities.[8]

There could be several factors that contributes to the transmission of soil-helminths and these include poor personal hygiene, lack of adequate sanitation and lack of clean water for drinking.[9] Age might as well influence transmission of soil helminths, in North Ethiopia in particular, individuals of ages of 15-19 years were more prone.[9,11] Advanced maternal age may hamper production of B and T cells in bone marrow and thymus respectively thus diminishing mature lymphocyte function as compared to younger individuals.[12] Pregnant women over 35 years (advanced maternal age) besides having a higher risk of birth complications may result to increased chance of offspring morbidity including infections with soil helminths due to alteration in the infants T cell repertoire.[13]

The level of education attained by an individual is also a significant determinant in contracting soil-transmitted helminths.[14,15] In addition, the environment within which an individual plies in her occupation may vary the exposure levels to soil-transmitted helminths and thus influence the prevalence of soil-transmitted helminths.[11,15] Moreover, in rural areas and areas of low socio-economic status, lack of appropriate footwear may facilitate the transmission of soil-transmitted helminths particularly the hookworms.[14]

This study determined the prevalence of soil-transmitted helminth infections and the associated risk factors in pregnant women seeking antenatal care in Kisii Teaching and Referral Hospital, Kisii County, Kenya.

METHODS

The study was conducted at the antenatal care (ANC) clinics of Kisii Teaching and Referral Hospital (KTRH) in Kisii County, Kenya. Kisii County borders Nyamira, Narok, Homabay and Migori Counties. The county's population in 2022 was approximately 1,494,429, with Kisii town hosting major facilities. KTRH is the only level 6 hospital among 123 health facilities in the county. The doctor-to-patient ratio is 1:7,000, with a morbidity rate of 22.7% for men and 27.4% for women.

The study employed a descriptive cross-sectional, hospital-based design. Target Population included pregnant women attending ANC at KTRH. Pregnant women at KTRH, including emancipated minors, who had not received anti-helminth treatment in the prior three months were included. Women who did not consent, were not residents of Kisii County for the past year or had recent anti-helminth treatment were excluded. Sample size of 384 pregnant women was calculated using Fisher's (1998) formula.[15] Simple random sampling was used, selecting every 9th mother from approximately 3,600 ANC attendees every three months. A random number (1–10) determined the starting point each day. A pilot study was conducted with 10% of the sample size (38 women) to test study tools and procedures. Study tools were established to be reliable and independent slide examinations was done for quality control purposes. Trained research assistants fluent in Ekegusii, Kiswahili and English were recruited to explain to the study participants in order to obtain informed consent, from the participants.

A questionnaire was administered to collect bio-data that included age, education, income, economic activities. The participants provided 5g of fresh stool in coded, sterilized containers, stored in biosafety bags and transported in cool boxes for laboratory analysis within a period of 24 hours. Stool samples were processed using the formal-ether concentration (FEC) technique and examined microscopically for presence of soil-transmitted helminths.

Data was recorded in Excel, stored securely and analysed using STATA Version 15. Descriptive statistics (proportions, bar graphs) summarized data, while Chi-square tests assessed associations between risk factors and STH infections ($p<0.05$). Simple logistic regression modelled socio-demographic influences on infections (OR>1 significant). Approval was obtained from the University of Eastern Africa (Baraton) Ethical review Board, Research permit was obtained from The National Commission for Science Technology and innovation (NACOSTI). Informed consent was obtained from the participants; confidentiality of data was achieved through coding.

RESULTS

The socio-demographic factors of the pregnant women were described to provide the study context. At least half of the women interviewed 213 (55.5%) were aged between 20-29 years, 22 (5.7%) were adolescents (10-19 years), 100 (26%) women were aged 30-39 years, while 49 (12.8%) of the women were aged 40 years and above (Figure 1).

Majority 351 (91.4%) of the pregnant women were reported to have attained some level of formal education with 117 (30.5%) having attained at least secondary level education. A total of 154 (40.1%) of the women had attained college level education, while 80 (20.8%) had attained only primary level of education. While 33 (8.6%) had no formal education at all (Figure 2).

Almost half 187 (48.7%) of the women were low-income earners, making an average of less than Kshs 10,000 per month. Twenty-seven (7.0%) earned between Kshs 30,001-40,000 monthly while 69 (18%) earned between Kshs. 20,001-30,000 and only 27 (7.0%) earned between Kshs. 30,001-40,00. Only 12(3.1%) earned Kshs >40,000 (Figure 3).

Pregnant women rely on various sources of income to sustain their livelihood. Majority were running own business 103 (26.8%), 88 (22.9% were in formal employment, while another 92 (24.0%) were engaged in other unspecified economic activities, 64 (16.7%) of the women were subsistence farmers and 37 (9.6%) were engaged in casual labor (Figure 4).

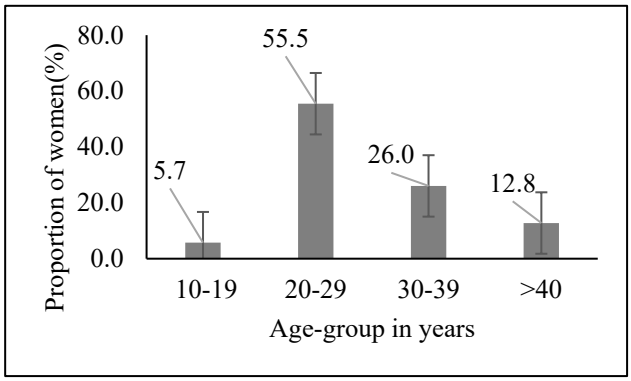

Figure 1: Distribution of pregnant women's age in years.

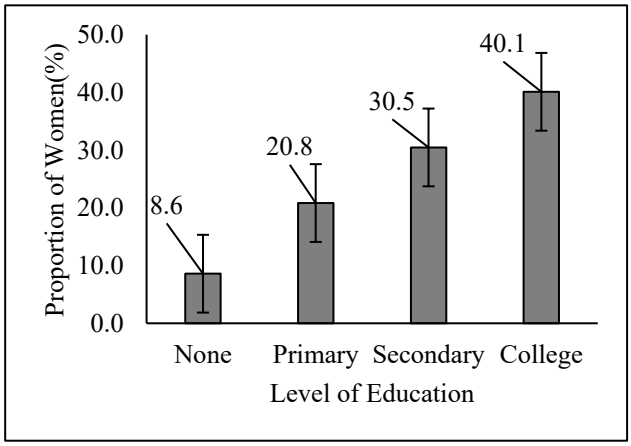

Figure 2: Distribution of the women's highest level of education.

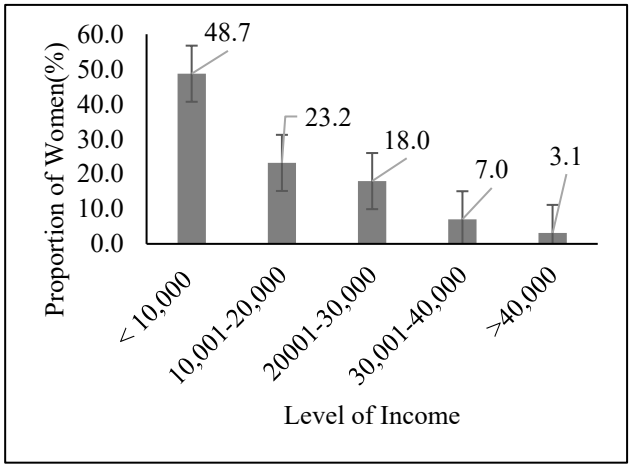

Figure 3: Distribution of women's average monthly income in Kenyan Shillings.

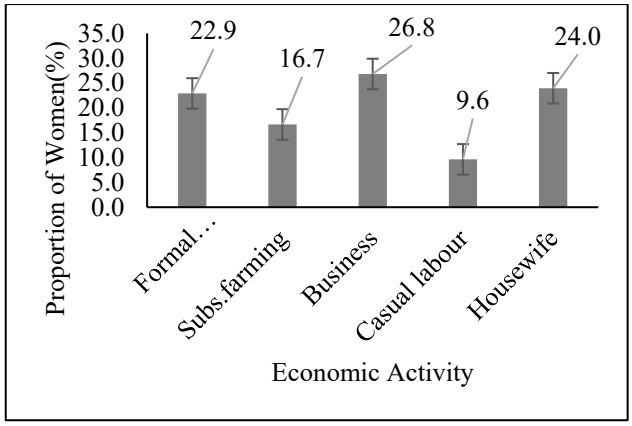

Figure 4: Economic activities relied upon by pregnant women for income.

Figure 5: Ascaris lumbricoides ova.

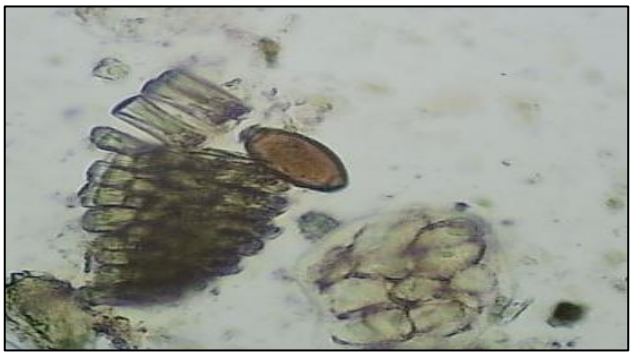

Figure 6: Trichuris trichiura ova.

Figure 7: Enterobius vermicularis ova.

Figure 8: Hookworm (Ancylostoma duodenale) ova.

The prevalence of soil-transmitted helminths among pregnant women in Kisii County was 144 (37.50%). Five different species of helminths were observed with Asaris lumbricoides 94 (24.5%) being the dominant species, followed by hookworm 21 (5.5%), *S. stercolaris* 5 (1.3%) while *T. trichiura* and *E. vermicularis* were the least common with a prevalence of 1 (0.3%). Twenty-two co-infections were also noted and they included A. lumbricoides and hook worms 16 (4.2%), A. lumbricoides and *T. trichuria* 2 (0.5%), *T. trichuria* and E. vermicularis 2 (0.5%), hook worms and *S. stercolaris* 1 (0.3%) and A. lumbricoides and *E. vermicularis* 1 (0.3%). A total of 240 (62.5%) had no helminth infection.

The following soil-transmitted helminth species were detected in the stool samples of pregnant women. The helminthic infections were identified based on morphological characteristics of the infective stage. The characteristic features of *A. lumbricoides* fertilized eggs included oval or rounded shape with either a thick shell with an external mamillated or decorticated layer that is often stained brown due to bile (embryonated). It has a S-like larvae when mature (later stage) (Figure 5).

T. trichiura eggs are barrel-shaped, thick-shelled and possess a pair of polar "plugs" at each end. The eggs are when passed in stool in iodine-stained wet mount (Figure 6). *E. vermicularis* eggs are transparent, elongated, oval and slightly flattened on one side. Partially embryonated when shed (Figure 7). Hookworm (*A. duodenale*) eggs appear oval thin shelled. Fresh excreted eggs have developing embryo in early stages of cleavage (2-8) cells (morula) A. duodenale is small, cylindrical, grey-white in colour. The larvae mature into a form that can penetrate the human skin (Figure 8). The study sought to find out whether there exists a relationship between the socio-demographic factors and occurrence of helminthic infections among pregnant women. As shown in (Table 1), analysis showed a significant association between economic activity of the pregnant women and soil-transmitted helminth species ($\chi2=63.485$, df (40), $p=0.01$).

There exists a statistically significant association between women engaged in subsistence farming and contraction of soil-transmitted helminthic infection ($\chi2=4.580(1)$, $p=0.03$). Women who engaged in other economic activities such as business ($\chi2=0.001$, df (1), $p=0.97$), formal employment ($\chi2=1.01$, df (1), $p=0.31$), casual laborer ($\chi2=0.298$, df (1), $p=0.58$) had no significant association with the contraction of soil-transmitted helminthic infections.

There is a statistically significant association between income level and soil-transmitted helminth infection ($\chi2=16.833$, df (4), $p<0.01$). Women earning 20,001-30,000 were significantly associated with helminthic infections ($\chi2=10.96$, df (1), $p<0.01$). Women earning Kshs. 30,001-40,000 ($\chi2=0.518$, df (1), $p=0.47$) and those earning > Kshs. 40,000 ($\chi2=3.323$, df (1), $p=0.06$) were negatively associated with soil-transmitted helminths. However, there was no significant association between age and helminthic infection ($\chi2=6.871$, df (3), $p=0.07$). There was no association between education level of pregnant women and soil-transmitted helminth infections ($\chi2=2.708$, df (3), $p=0.43$).

Further analysis on simple logistic regression analysis showed that economic activity by pregnant woman influenced the contraction of soil-transmitted helminths (OR=1.020). In particular, women who engaged in subsistence farming had a higher likelihood of contracting soil transmitted helminths. Additionally, the level of income influenced the contraction of soil-transmitted helminths (OR1.149). Pregnant women earning Kshs 20,001-30,000 were more likely to contract soil-transmitted helminths. However, age group and education level did not influence the contraction of soil-transmitted helminth infection (Table 2).

Table 1: Chi-square analysis for the socio-demographic factors and helminthic infections.

Factor	Helminth negative (%)	Helminth positive (%)	Total sample count (%)	Chi-square	P value
Age (in years)				6.871 (3)	0.07
10-19	17 (4.4)	5 (1.3)	22 (5.7)	Ref.	
20-29	126 (32.8)	87 (22.7)	213 (55.5)	2.748 (1)	0.09
30-39	60 (15.6)	40 (10.4)	80 (26.0)	2.311 (1)	0.12
≥40	37 (9.6)	12 (3.1)	49 (12.8)	0.026 (1)	0.87
Education				2.708 (3)	0.43
None	21 (5.5)	12 (3.1)	33 (8.6)	Ref.	

Continued.

Factor	Helminth negative (%)	Helminth positive (%)	Total sample count (%)	Chi-square	P value
Primary	52 (13.5)	28 (7.3)	80 (20.8)	0.019 (1)	0.89
Secondary	66 (17.2)	51 (13.3)	117 (30.5)	0.552 (1)	0.45
College	101 (26.3)	53 (13.8)	154 (40.1)	0.045 (1)	0.83
Economic activity				9.581 (4)	0.04*
House wife	57 (14.8)	35 (9.1)	92 (24.0)	Ref.	
Employed	48 (12.5)	40 (10.4)	88 (22.9)	1.016 (1)	0.31
Subsistence farming	50 (13.0)	14 (3.6)	64 (16.7)	4.580 (1)	0.03*
Business	64 (16.7)	39 (10.2)	103 (26.8)	0.001 (1)	0.97
Casual labour	21 (5.5)	16 (4.2)	37 (9.6)	0.298 (1)	0.58
Income (Kshs)				16.83 (4)	<0.01*
<10,000	124 (32.3)	63 (16.4)	187 (48.7)	Ref.	
10,001-20,000	59 (15.4)	30 (7.8)	89 (23.2)	0.00 (1)	0.99
20,001-30,000	30 (7.8)	39 (10.2)	69 (18.0)	10.962 (1)	<0.01*
30,00-40,000	16 (4.2)	11 (2.9)	27 (7.0)	0.518 (1)	0.47
>40,000	11 (2.9)	1 (0.3)	12 (3.1)	3.323 (1)	0.06

*Statistically significant.

Table 2: Simple logistic regression analysis for socio-demographic factors and soil-transmitted helminth infections.

Factor	B	SE	WALD	df	Exp (B)
Age	-0.150	0.142	1.106	1	0.861
Education level	-0.025	0.115	0.046	1	0.976
Economic activity	0.019	0.088	0.049	1	1.020*
Income level	0.139	0.109	1.642	1	1.149*

*Statistically significant.

DISCUSSION

At least half of the women interviewed 213 (55.5%) were aged between 20-29 years while only 49 (12.8%) were aged <40 years. Majority 351 (91.4%) of the pregnant women were reported to have attained some level of formal education while 33 (8.6%) had no formal education at all. Almost half 187 (48.7%) of the women earned less than Kshs 10,000 per month and only 12 (3.1%) earned Kshs >40,000. Pregnant women engaged in various activities to generate their income with majority being self-employed. Running own businesses was the most common 103 (26.8%) economic activity, while 37 (9.6%) were engaged in casual labour.

The prevalence of soil-transmitted helminths among pregnant women in Kisii County was 37.50%. The prevalence of soil-transmitted helminths was higher compared with an estimated prevalence of 30% recorded in Sub-Saharan Africa among pregnant women.[16] The overall prevalence of soil-transmitted helminths in Kisii was increased compared to findings from other studies in which prevalence of 8.34% among 2,206 pregnant women was reported in Maharashtra and Rajasthan States of India.[17] In related studies, a prevalence of 12.4% among 250 pregnant women was reported in Vihiga County.[18] Similarly, the prevalence of soil-transmitted helminths was 12.4% among 500 pregnant women by the department of obstetrics and gynecology at the Bangalore medical college.[19] The prevalence of soil-transmitted helminths in Oromia and Amhara regions in Ethiopia was 29.78% and 29.63% respectively. The prevalence of soil-transmitted helminths in Kisii Teaching and referral hospital is consistent with the findings of a similar study in West Gojjam zone, North west Ethiopia where prevalence was 37.3% among 743 pregnant women.[20] However, the prevalence of soil-transmitted helminths was 70.6% among 783 pregnant women in Mecha district, Northwest Ethiopia.[13] The variation in the prevalence rates could be attributed to differences in sample size and geographic area of study.

Five different species of helminths were observed with Ascaris lumbricoides being the dominant species. The prevalence of Ascariasis in the current study is lower than the prevalence in Maharashtra and Rajasthan State of India where prevalence of Ascariasis was elevated at 34.7%.[17] These results compare with findings of another study in Mecha, Ethiopia where Ascariasis was the most dominant helminth infection at 32.7%. These results also compare with the findings in Southern India where 650 pregnant women were predominantly infected with Ascariasis whose prevalence was 5.4%.[17] In another study conducted in Vihiga County, Western Kenya, Ascariasis was the most predominant although at a lower rate of 9.6% compared with the current study.[18] The prevalence of Ascariasis may be attributable to other factors such as poor personal hygiene and low socio-economic status.

Additionally, ova of A. lumbricoides are known to adhere to surfaces including soil and poor observance of personal hygiene coupled with sewerage overflow into drinking water sources and gardens is likely to exacerbate the prevalence of Ascariasis.[21,22]

Hookworm infection particularly (*A. duodenale*) was the second most occurring helminth infection. The high prevalence of Hookworm as compared to other areas including Vihiga County.[18,20] Soil-transmitted helminth infection is a major concern among pregnant women in West Gojjam, North West Ethiopia with a prevalence of STH at 37.4% due to poor hygiene and sanitation.[20] *S. stercolaris, T. trichiura* and *E. vermicularis* were the least commonly occurring soil-transmitted helminth infections. Soil-transmitted co-infections were also noted and they included A. lumbricoides and hook worms, *A. lumbricoides* and *T. trichuria*, *T. trichuria* and *E. vermicular*, hook worms and *S. stercolaris* and A. *lumbricoides* and *E. vermicularis*. Generally, there was a significant association between pregnant women's economic activity and contraction of soil-transmitted helminth infections. Women in subsistence farming had increased likelihood of contracting helminthic infections. This is because farming expose women to soil-transmitted helminth due to increased likelihood of consuming ant hill soil. Moreover, subsistence farming could expose pregnant women to poor hygienic conditions thus may lead to contraction of soil-transmitted helminth infection.[23] These results compare with findings of a similar study in Philippines, where women who engaged in farming were significantly associated with helminth infection.[14] The same scenario was replicated in Ethiopia, where it was found that pregnant women who practiced farming were more likely to contract soil transmitted helminth infections.[10]

These results of the current study agree with findings of a similar study in Philippines, where women who engaged in farming were significantly associated with soil-transmitted helminth infection.[14] The same results were realized in Ethiopia, where it was found that pregnant women who practiced farming were associated significantly with transmission of soil transmitted helminths.[10] Infections usually occur through ingestion of infective ova on contaminated substances including soil. Transmission of soil helminths occurs through poor sanitary habits of indiscriminate defecation. Women of low income have low ability to purchase sterile soil substances that have been processed such as purchased stones but are more likely to consume ant hill soils.

Findings of the current study indicated that income level influenced soil-transmitted helminth infection. These findings however contrasts with a study in the area surrounding Maranhao State, Northeastern Brazil where women with low-income levels were infected more with soil-transmitted helminths than those with higher income levels.[24] Low-income earners do not sufficiently access the necessary resources and materials to sustain their hygienic standards. The results of the current study did not establish an association between age and soil-transmitted helminth infection. These results are in resonance with those of another study in Kassena-Nankana, North of Ghana, where the occurrence of intestinal helminths in pregnant women was not associated with age.[25] Additionally, the current results contrast with those of another study in Dessie referral hospital where it was established that children or infants had a high likelihood of contracting helminths infections.[27] The results of this study differ from those of Hoima, Uganda which disabused the believe that variation in age was responsible for contraction of helminth infections.[28]

However, these results also contrast with the findings in Ethiopia where increase in age had a significant association with soil transmitted helminths.[10] The same scenario was earlier established in Butajira, Ethiopia where the occurrence of soil transmitted helminths was higher in older individuals as compared to infants. It was therefore believed that increase in age contributed significantly to contraction of soil transmitted helminths.[29] In Isiala, Mbano South East Nigeria, hookworm infection was associated with increase in age.[30] The current results differ with those of another study in Amhara, Ethiopia whereby Ascariasis lumbricoides infection was associated with decreased age groups.[31] Additionally, in Mecha district of North West Ethiopia, Ascariasis was particularly associated with young age.[13] Similarly, in Gamo, South Ethiopia, intestinal helminth infection was significantly higher within the reproductive-age.[32]

CONCLUSION

In the current study, the level of education has no association with the contraction of soil-transmitted helminth infections among the pregnant women at Kisii Teaching and Referral hospital. These findings differ with another study in Mecha, Ethiopia, where attainment of higher education level was not associated with soil transmitted helminths. Similarly, in Hannoi, Vietnam, higher education level was negatively associated with helminth infections. In Chencha town, Southern Ethiopia, education level influenced the prevalence of soil-transmitted helminth infections. This occurrence could be attributed to difference in the level of awareness in prevention of soil-transmitted helminths.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bieri FA, Gray DJ, Williams GM, Raso G, Li YS, Yuan L. Health-education package to prevent worm

infections in Chinese schoolchildren. New England J Med. 2013;368(17):1603-12.
2. Sundaraneedi M, Eichenberger RM, Al-Hallaf R, Yang D, Sotillo J, Rajan S, Wangchuk P, Giacomin PR, Keene FR, Loukas A, Collins JG. Polypyridylruthenium (II) complexes exert in vitro and in vivo nematocidal activity and show significant inhibition of parasite acetylcholinesterases. Int J Parasitol Drugs Drug Resis. 2018;8(1):1-7.
3. Steinbaum L, Mboya J, Mahoney R, Njenga SM, Null C, Pickering AJ. Effect of a sanitation intervention on soil-transmitted helminth prevalence and concentration in household soil: A cluster-randomized controlled trial and risk factor analysis. PLOS Negl Trop Dis. 2019;13(2):7180.
4. Oyebamiji DA, Ebisike AN, Egede JO, Hassan AA. Knowledge, attitude and practice with respect to soil contamination by soil-transmitted helminths in Ibadan, Southwestern Nigeria. Parasite Epidemiology and Control. 2018;3(4):809.
5. Mupfasoni D, Mikhailov A, Mbabazi P, King J, Gyorkos TW, Montresor A. Estimation of the number of women of reproductive age in need of preventive chemotherapy for soil-transmitted helminth infections. PLoS Negl Trop Dis. 2018;12(2):865.
6. Derso A, Nibret E, Munshea A. Prevalence of intestinal parasitic infections and associated risk factors among pregnant women attending antenatal care center at Felege Hiwot Referral Hospital, northwest Ethiopia. BMC Infect Dis. 2016;16(1):986.
7. Freeman MC, Chard AN, Nikolay B, Garn J V., Okoyo C, Kihara J, et al. Associations between school- and household-level water, sanitation and hygiene conditions and soil-transmitted helminth infection among Kenyan school children. Parasites and Vectors. 2015;8(1):685.
8. Wekesa AW, Mulambalah CS, Muleke CI, Odhiambo R. Intestinal Helminth Infections in Pregnant Women Attending Antenatal Clinic at Kitale District Hospital, Kenya. J Parasitol Res. 2014;1:823923.
9. Gelaw A, Anagaw B, Nigussie B, Silesh B, Yirga A, Alem M. Prevalence of intestinal parasitic infections and risk factors among schoolchildren at the University of Gondar Community School, Northwest Ethiopia: a cross-sectional study. BMC Publ Heal. 2013;13(1):304.
10. Alemu M, Kinfe B, Tadesse D, Mulu W, Hailu T, Yizengaw E. Intestinal parasitosis and anaemia among patients in a Health Center, North Ethiopia. BMC Res Notes. 2017;10(1):129.
11. Montecino-Rodriguez E, Berent-Maoz B, Dorshkind K. Causes, consequences and reversal of immune system aging. J Clin Invest. 2013;3(3):958.
12. Levenson D, Romero R, Garcia-Flores V, Miller D, Xu Y, Sahi A, et al. The effects of advanced maternal age on T-cell subsets at the maternal–fetal interface prior to term labor and in the offspring: a mouse study. Clin Exp Immunol. 2020;201(1):58.
13. Feleke BE, Jember TH. Prevalence of helminthic infections and determinant factors among pregnant women in Mecha district, Northwest Ethiopia: A cross sectional study. BMC Infect Dis. 2018;6;18(1):1–6.
14. Ross AG, Olveda RM, McManus DP, Harn DA, Chy D, Li Y, et al. Risk factors for human helminthiases in rural Philippines. Int J Infect Dis. 2017;54:150-5.
15. Fisher AA, Laing JE, Stoeckel JE, Townsend TJ. Handbook for Family Planning Operations Research Design. 2nd Ed. Population Council, New York. 1998.
16. Garrison A, Boivin M, Khoshnood B, Courtin D, Alao J, Mireku M, et al. Soil-transmitted helminth infection in pregnancy and long-term child neurocognitive and behavioral development: A prospective mother-child cohort in Benin. PLoS Negl Trop Dis. 2021;15(3):683.
17. Ulaganeethi R, Saya GK, Rajkumari N, Kumar SS, Ganapathy K, Dorairajan G. Soil-Transmitted Helminth Infections among Antenatal Women in Primary Care Settings in Southern India: Prevalence, Associated Factors and Effect of Anti-Helminthic Treatment. Trop Med Infect Dis. 2023;8(1):48.
18. Araka S, Masaku J, Kimani B, Simiyu E, Matendechero S, Okoyo C, et al. Assessment of Soil-Transmitted Helminth Infections among Pregnant Women in Western Kenya: A Cross-Sectional Study. East African J Heal Sci. 2022;20;5(1):105–18.
19. Shrinivas K, Radhika, Sreelatha R, Kavitha K. Study of Helminthiasis in Pregnancy and its Correlation with Haemoglobin Level. J Clin Diagnos Res. 2014;8(10):37.
20. Hailu T, Abera B, Mulu W, Kassa S, Genanew A, Amor A. Prevalence and Factors Associated with Intestinal Parasitic Infections among Pregnant Women in West Gojjam Zone, Northwest Ethiopia. J Paras Res. 2020;2:492.
21. Yang D, Yang Y, Wang Y, Yang Y, Dong S, Chen Y, et al. Prevalence and Risk Factors of Ascaris lumbricoides, Trichuris trichiura and Cryptosporidium Infections in Elementary School Children in Southwestern China: A School-Based Cross-Sectional Study. Int J Env Res Publ Heal. 2018;15(9):342.
22. Kobayashi Y, Tsuyuzaki J. Ascaris lumbricoides Discharge from the Mouth. Case Rep Gastroenterol. 2018;12(1):153.
23. Latunji OO, Akinyemi OO. Factors influencing health-seeking behaviour among civil servants in Ibadan, Nigeria. Ann Ibadan Postgrad Med. 2018;16(1):52–60.
24. Almeida MM, Monteiro KJL, Bacelar PAA, Dos Santos JP, de Freitas SPC, Evangelista BBC, et al. Interactions between malnutrition, soil-transmitted

helminthiasis and poverty among children living in periurban communities in Maranhao State, Northeastern Brazil. Revista do Instituto de Medicina Tropical de São Paulo. 2020;30;62:1–9.
25. Godwin DE, Kalifa, Bugre Gumah, Knight D. Plasmodium and intestinal helminths distribution among pregnant women in the Kassena-Nankana District of Northern Ghana. Int J Nematol Entomol. 2013;1(3):37–41.
26. Gebretsadik D, Metaferia Y, Seid A, Fenta GM, Gedefie A. Prevalence of intestinal parasitic infection among children under 5 years of age at Dessie Referral Hospital: Cross sectional study. BMC Res Notes. 2018;11(1):97.
27. Ojja S, Kisaka S, Ediau M, Tuhebwe D, Kisakye AN, Halage AA, et al. Prevalence, intensity and factors associated with soil-transmitted helminths infections among preschool-age children in Hoima district, rural western Uganda. BMC Infect Dis. 2018;18(1):8649.
28. Belyhun Y, Medhin G, Amberbir A, Erko B, Hanlon C, Alem A, et al. Prevalence and risk factors for soil-transmitted helminth infection in mothers and their infants in Butajira, Ethiopia: a population-based study. BMC Publ Heal. 2010;10:21.
29. Obiezue NR, Okoye IC, Ivoke N, Okorie JN. Gastrointestinal helminth infection in pregnancy: Disease incidence and hematological alterations. Iranian J Pub Heal. 2013;42(5):497–503.
30. Nute AW, Endeshaw T, Stewart AEP, Sata E, Bayissasse B, Zerihun M, et al. Prevalence of soil-transmitted helminths and Schistosoma mansoni among a population-based sample of school-age children in Amhara region, Ethiopia. Para Vect. 2018;11(1):34.
31. Wegayehu T, Tsalla T, Seifu B, Teklu T. Prevalence of intestinal parasitic infections among highland and lowland dwellers in Gamo area, South Ethiopia. BMC Pub Heal. 2013;13(1):151.
32. Fuhrimann S, Winkler MS, Pham-Duc P, Do-Trung D, Schindler C, Utzinger J, et al. Intestinal parasite infections and associated risk factors in communities exposed to wastewater in urban and peri-urban transition zones in Hanoi, Vietnam. Para Vect. 2016;9(1):934.
33. Abossie A, Seid M. Assessment of the prevalence of intestinal parasitosis and associated risk factors among primary school children in Chencha town, Southern Ethiopia. BMC Pub Heal. 2014;14(1):365.

Cite this article as: Ratemo GG, Musyoki SK, Nyanchongi BO, Otwabe JS, et al. Prevalence and sociodemographic risk factors of soil-transmitted helminth infections in pregnant women, Kisii County, Kenya. Int J Community Med Public Health 2026;13:609-16.