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Correlation between Socioeconomic Level and Nutritional Status with The Incidence of Helminthiasis in Elementary Students

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Abstract

Purpose: To examine the relationship between socioeconomic status and nutritional condition with the prevalence of helminthiasis among students at SDN 02 Selokaton.
Methodology: This research employs a quantitative observational analytic approach with a cross-sectional design. A total of 130 fifth- and sixth-grade students were selected using total sampling. The independent variables (socioeconomic status and nutritional status) were assessed through questionnaires and anthropometric measurements, respectively. The dependent variable, helminth infection incidence, was determined through microscopic stool analysis. Data were analyzed using Spearman's test.
Results: Among the 65 students who met the inclusion criteria, 20% (13 students) tested positive for helminth infections. Poor nutritional status was found in 6.2% of students, while 43.1% had low nutritional status. Most students came from families with a middle socioeconomic status (78.5%). No significant correlation was found between socioeconomic status or nutritional status and the incidence of helminth infections ($p > 0.05$).
Applications/Originality/Value: Despite the lack of a significant correlation, the high prevalence of helminth infections suggests that factors like environmental hygiene and hygienic behaviors may play a more influential role. Health education and improved sanitation are needed to reduce the prevalence of helminth infections in the area.

Introduction

Soil-Transmitted Helminths (STH) infections are parasitic diseases caused by helminths that infect the human body and are transmitted through soil contaminated with fecal matter. These helminths are worms that undergo part of their development in the soil before infecting humans and completing their life cycle in the intestines, where they reside and reproduce. The most common types of STHs that infect humans include roundworms (Ascaris lumbricoides), hookworms (Ancylostoma duodenale and Necator americanus), and whipworms (Trichuris trichiura), which are widespread in tropical and subtropical regions with poor sanitation and hygiene practices (Halleyantoro et al., 2019). Infections caused by these parasites can lead to a range of adverse health outcomes, including malnutrition, stunted growth, reduced cognitive ability, and decreased productivity, particularly in children and economically disadvantaged populations. One of the key mechanisms through which helminth infections cause harm is by impairing nutrient absorption in the intestines, leading to deficiencies in essential nutrients, which can subsequently result in anemia or reduced blood levels in the body, further exacerbating the overall health and well-being of affected individuals (Susilowati and Quyumi, 2019). The impact of STH infections is not limited to individual health but extends to societal consequences, as they contribute to a cycle of poverty and illness by diminishing the productivity and learning capacity of affected populations.

The spread of Soil-Transmitted Helminths (STH) infections is widespread, particularly in tropical and subtropical regions where warm and humid climates, coupled with inadequate sanitation and hygiene, create ideal conditions for these parasites to thrive. Regions such as sub-Saharan Africa, the Americas, China, and East Asia are among the most

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affected, with transmission rates reaching alarming levels. According to data, more than 267 million preschool-aged children and approximately 568 million school-aged children reside in areas where these parasites are intensely transmitted, emphasizing the urgent need for effective treatment and preventive measures to protect vulnerable populations (WHO, 2023). In 2023, the World Health Organization (WHO) highlighted the global burden of helminth infections, reporting that over 1.5 billion individuals—representing nearly 24% of the global population—are affected by these parasitic diseases. This staggering number underscores the importance of coordinated global health initiatives to mitigate the impact of helminth infections, which disproportionately affect impoverished communities, perpetuate cycles of poverty, and hinder economic and social development. Comprehensive efforts, including mass drug administration, health education, and improved sanitation infrastructure, are essential to reduce the prevalence of these infections and improve the quality of life for affected populations.

In Indonesia, the prevalence of helminth infections remains relatively high and is widespread across various regions, making it a significant public health concern (Annida et al., 2018). This high prevalence is largely attributed to the country's tropical climate and high levels of humidity, which create an ideal environment for the development and survival of helminth larvae. Compounding these environmental factors are challenges related to poor hygiene practices and inadequate sanitation infrastructure, which facilitate the transmission of these parasites, particularly in rural and densely populated areas (Idayani et al., 2022). Moreover, socioeconomic disparities play a critical role in sustaining this issue, as communities with lower socioeconomic status often face poor environmental sanitation and limited access to clean water and health services, increasing their vulnerability to infections (Ahzan, 2023). Helminth infections are endemic in Indonesia, with children being among the most affected demographic due to their frequent exposure to contaminated soil during outdoor activities. Data from the Ministry of Health of the Republic of Indonesia in 2015 revealed that the prevalence of helminth infections among children aged 1–12 years in several provinces ranged from 30% to an alarming 90%, highlighting the urgent need for comprehensive intervention strategies (Kemenkes, 2022).

Inadequate nutritional intake is a critical factor that can delay children's growth and development, affecting both their physical and cognitive abilities. This issue becomes even more pronounced in the presence of helminth infections, which further impair nutrient absorption and exacerbate the problem. A study conducted by Amalia et al. (2021) identified a significant correlation between helminth infections and the nutritional status of elementary school students, indicating that these infections contribute to malnutrition and hinder optimal development. Beyond nutritional status, socioeconomic conditions play a pivotal role in the prevalence of helminth infections among children. Low socioeconomic status is often associated with limited access to proper sanitation and hygiene facilities, as well as a lack of awareness and education about healthy living behaviors (Agustina et al., 2021). These factors create an environment where helminth infections thrive, particularly in underprivileged communities where children are more likely to be exposed to contaminated soil and water. Addressing this multifaceted issue requires an integrated approach that combines improved access to nutrition, enhanced sanitation infrastructure, health education, and targeted deworming initiatives to break the cycle of infection and support the overall well-being and development of children (Agustina et al., 2021).

SDN 02 Selokaton, located in a rural area, faces specific challenges related to socioeconomic conditions and nutritional status. The socioeconomic status of students' parents may affect the incidence of helminth infections. Furthermore, nutritional status plays a crucial role in determining children's immunity, as children with poor nutritional status are more susceptible to infections (Annida et al., 2018).

Based on the above considerations, the researchers aim to conduct a study focusing on students at SDN 02 Selokaton to examine "Correlation Between Socioeconomic Status and Nutritional Status with the Incidence of Helminthiasis in Elemantary Students". The novelty of this study lies in the selected sample population and the integration of two independent variables and one dependent variable in analyzing the incidence of helminth infections.

Method

This study employed a quantitative observational analytic method with a cross-sectional design to explore the factors influencing helminth infections. The research was carried out at SDN 02 Selokaton, Gondangrejo, Karanganyar, from October to November 2024, with fecal examinations conducted at the Parasitology Laboratory of the Faculty of Medicine, Universitas Muhammadiyah Surakarta. The study population consisted of all students enrolled at SDN 02 Selokaton, while the accessible population included fifth and sixth-grade students. Using a total sampling technique, all 130 students from these grades were involved in the study. Inclusion criteria for participants

were students who regularly attended class, provided fecal samples, and consented to participate in the research, while exclusion criteria included students who either refused to participate or lacked parental permission.

This study examined socioeconomic level and nutritional status as the independent variables, with the incidence of helminth infections being the dependent variable. Socioeconomic level was assessed using a detailed questionnaire that evaluated parents' income, educational background, and occupation, providing a comprehensive view of the participants' economic context. Nutritional status was determined through anthropometric measurements, including weight and height, analyzed according to the CDC Growth Chart 2000 to ensure accurate classification. The incidence of helminth infections was identified through microscopic examination of fecal samples using a 2% eosin solution to detect Soil-Transmitted Helminth (STH) eggs and larvae.

Data analysis was performed using SPSS version 27 to ensure robust statistical evaluation. The Kolmogorov-Smirnov test was used to check the normality of the data distribution. Bivariate analysis was conducted using the Spearman test to explore potential correlations between variables. Multivariate analysis, employing multiple logistic regression, was utilized to identify simultaneous relationships between independent variables and the dependent variable, as well as to determine the dominant factors influencing the incidence of helminth infections. This comprehensive methodology provided a rigorous framework for understanding the interplay between socioeconomic factors, nutritional status, and helminth infections in the study population.

Result and Discussion

In this study, a total of 65 samples were obtained, all of which met the predetermined inclusion and exclusion criteria, ensuring that the data collected were relevant and reliable for analysis. Before proceeding with statistical tests, a normality test was conducted to determine whether the data followed a normal distribution. The results of this test revealed that the data were not normally distributed, as indicated by a p-value of less than 0.05, which is the threshold for statistical significance in this context. Given these results, the Spearman test was chosen for data analysis, as it is a non-parametric method well-suited for analyzing relationships between variables when the data are not normally distributed.

Table 1. Univariate Test Results

No.	Variables	Frequency (N)	Percentage (%)
	Total sample (n = 65)		
1.	Helminthiasis (n=65)		
	Positive	13	20.0
	Negative	52	80.0
2.	Nutritional Status (n=65)		
	Bad	4	6.2
	Low	28	43.1
	Normal	14	21.5
	Overweight	11	16.9
	Obesity	8	12.3
3.	Socioeconomic Level (n=65)		
	High	7	10.8
	Mid	51	78.5
	Low	7	10.8

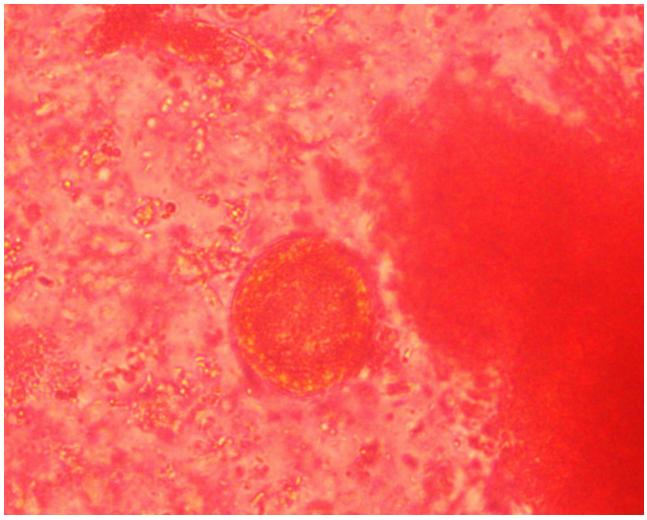

Figure 1. Ascaris egg in a positive student

Table 1 provides a detailed overview of the number of samples analyzed in this study, categorizing the dependent and independent variables. A total of 65 samples were obtained, with 20% of the students (13 individuals) testing positive for worm infection, while the remaining 80% (52 individuals) tested negative, highlighting the extent of the issue within the study population. The nutritional status of the students varied, with 6.2% (4 students) classified as having poor nutritional status, 43.1% (28 students) falling into the low category, 21.5% (14 students) categorized as normal, 16.9% (11 students) classified as overweight, and 12.3% (8 students) classified as obese. This distribution underscores the diverse nutritional conditions present among the students and points to potential vulnerabilities in those with poor or low nutritional status.

Socioeconomic levels were also examined, revealing that 10.8% of the students (7 individuals) belonged to families with a high socioeconomic status, 78.5% (51 students) came from families with a moderate socioeconomic status, and another 10.8% (7 individuals) were from families with a low socioeconomic status. The data indicate that the majority of students, 78.5%, were from families with middle economic status, which may reflect the broader socioeconomic conditions of the community in the study area.

The worm infection rate of 20% is noteworthy and suggests significant public health implications, particularly as it may be linked to factors such as low nutritional status and socioeconomic level. These findings emphasize the importance of addressing both nutritional and socioeconomic factors as part of strategies to reduce the prevalence of helminth infections in similar populations. The data in Table 1 provide a critical foundation for understanding the interplay of these variables and their impact on the health of school-aged children in the study location.

Table 2. Correlation Test Results

Correlation	p-value
Helminthiasis - Socioeconomic level	0.512
Helminthiasis – Nutritional status	0.973

Based on the Spearman correlation test conducted in this study, the analysis yielded a p-value of 0.512, as displayed in Table 2. This result indicates that there is no statistically significant correlation between socioeconomic level and the occurrence of helminth infections among elementary school students in the study population. Such findings suggest that socioeconomic level, as measured in this context, does not have a direct or measurable impact on the likelihood of helminth infections among the students examined. These results are consistent with those reported by Mahmudah et al. (2017), who also found no significant association between socioeconomic level and the prevalence of helminth infections in their research. In Mahmudah et al.'s study (2017), socioeconomic level was evaluated through a set of indicators that included the education levels of the father and mother, as well as the income levels of both parents, providing a comprehensive assessment of the family's economic standing. The alignment of these findings highlights the possibility that while socioeconomic factors might play a role in creating conditions that could influence helminth infections, they may not act as direct determinants in all cases. Instead, other environmental, behavioral, or regional factors might overshadow the influence of socioeconomic level, particularly in settings where poverty is widespread and the baseline risk for infections is high across all socioeconomic strata. This suggests the

need for further studies to explore additional variables or mediating factors that could clarify the relationship between socioeconomic conditions and helminth infections, particularly in diverse and resource-limited settings (Mahmudah et al., 2017).

Broadly speaking, a range of factors can influence the occurrence of helminth infections, including the presence of a tropical climate, low levels of hygiene awareness among the population, inadequate sanitation systems, poor socioeconomic conditions, and high population density in certain areas (Agustina et al., 2022). Among these factors, low socioeconomic level is often highlighted as one of the primary contributors to the high prevalence of helminth infections in specific regions. Helminth infections are closely linked to poverty, with communities experiencing lower economic conditions being at greater risk of suffering from these infections due to limited resources and poorer living conditions (Mahmudah et al., 2017).

However, the findings of this study diverge from those reported by Agustina et al. (2021), who concluded that there is a significant correlation between socioeconomic factors and the incidence of helminth infections. Specifically, their study emphasized the role of family income, the educational attainment of mothers, and the occupations of mothers as key determinants in influencing the prevalence of helminth infections among children. These factors were identified as critical components of socioeconomic status, and Agustina et al. (2021) highlighted that families with higher income levels and better-educated mothers were more likely to adopt preventive measures, maintain proper sanitation, and access healthcare services, which collectively contributed to a reduced risk of infection. On the other hand, lower family income and limited maternal education were associated with poor living conditions and limited awareness of hygiene practices, increasing the likelihood of helminth infections among children in these households. Moreover, Armajin et al. (2023) supported this perspective by emphasizing that communities with better economic conditions are generally able to achieve improved sanitation infrastructure and practices, which play a critical role in preventing the transmission of helminth infections. These communities benefit from resources that allow them to build and maintain sanitary facilities, ensure the availability of clean water, and promote hygiene education, creating an environment less conducive to the spread of infections. Conversely, communities with lower economic conditions often face significant challenges in accessing adequate healthcare services and effective treatments for helminth infections. These challenges include limited availability of medical facilities, insufficient resources to purchase deworming medications, and a lack of health education programs targeted at preventing infections. Armajin et al. (2023) pointed out that these disparities exacerbate the prevalence and impact of helminth infections in economically disadvantaged areas, highlighting the interplay between poverty and the burden of parasitic diseases.

Based on the Spearman correlation test, the results of this study indicated that there was no significant correlation between nutritional status and the incidence of helminth infections among students at SDN 02 Selokaton. Nutritional status is typically classified into five categories: bad, low, normal, overweight, and obesity, and this classification is determined through specific anthropometric measurements, such as weight-for-height, to assess the overall health and development of the students. Despite the varying nutritional statuses observed in the study, no direct relationship between these categories and the occurrence of helminth infections was identified. This finding is consistent with the study by Ramadhani et al. (2022), which also reported no significant association between nutritional status and the prevalence of helminth infections, suggesting that in certain populations or settings, other factors may play a more prominent role in influencing infection rates.

However, while this study did not find a significant correlation, it is important to acknowledge that in general, numerous other studies have demonstrated that helminth infections can contribute to nutritional problems, particularly in children. These infections can impair nutrient absorption in the intestines, leading to deficiencies in vital nutrients such as vitamins and minerals. As a result, children with helminth infections often experience weakened immune systems, stunted growth and development, and increased susceptibility to malnutrition. Furthermore, helminth infections are closely associated with iron deficiency, which can lead to anemia, exacerbating the overall health burden in affected populations (Fauziah et al., 2022). Thus, while this study did not observe a direct link, the broader body of research underscores the potential for helminth infections to disrupt nutritional status and contribute to a cycle of poor health outcomes in children.

Children with severe soil-transmitted helminth (STH) infections often exhibit poor nutritional status, but even those with milder infections may experience a gradual decline in health over time (Ramadhani et al., 2022). According to research by Rodiyah et al. (2023), there is a reciprocal correlation between poor nutritional status and infectious diseases, making it challenging to determine the primary cause. Factors influencing the nutritional status of school-aged children can be classified as direct and indirect. The direct factors contributing to malnutrition include infections

and inadequate dietary intake. Meanwhile, the indirect factors encompass parental care practices and children's behavior related to personal hygiene (Rodiyah et al., 2023).

Helminth infections are among the infectious diseases with chronic impacts on nutritional status. The effects of helminth infections on nutritional status are closely related to the level of worm infestation. Intestinal worm infestations are influenced by age, with infestation levels generally decreasing as children grow older. This is attributed to changes in their play patterns, activities, hygiene habits, and immune system development (Rodiyah et al., 2023). Students infected with helminths often appear weak and fatigued. Helminth infections can compromise the body's immune system and hinder children's growth and development because the worms consume essential nutrients such as proteins, carbohydrates, and iron, potentially leading to anemia (Toemon et al., 2023).

Conclusions

The results of this study showed that there was no significant correlation between socioeconomic level or nutritional status with the incidence of helminth infection in students of SDN 02 Selokaton ($p > 0.05$). However, the prevalence of worm infection among students remained high at 20%. The majority of students came from middle socioeconomic level families, and most had low to normal nutritional status. These findings suggest that other factors, such as environmental hygiene, hygiene behavior, and sanitation, may have a more dominant role in influencing the incidence of worm infections. Therefore, intervention efforts that focus on health education and improved environmental sanitation are needed to reduce the prevalence of worm infections in the area.

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