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Original article

PREVALENCE OF INTESTINAL PARASITE INFECTIONS AMONG PAEDIATRIC POPULATIONS IN UNDERDEVELOPED NATIONS: A REVIEW.

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Abstract

Background:

Intestinal parasite infections (IPIs) have a severe impact on children in developing countries, causing malnutrition, stunted growth, anaemia, and cognitive deficits. Poor sanitation, limited access to safe drinking water, and socioeconomic conditions contribute to the high prevalence of infections. Addressing the spread of parasites requires preventive initiatives and improved healthcare services, particularly in crowded school environments with close physical contact.

Methods:

Multiple databases, including Medline, Scopus, Science Direct, Web of Science, and Google Scholar, were used to conduct a thorough literature search.

Results:

The review included multiple papers assessing intestinal parasite infections in paediatric populations across diverse regions, revealing varying prevalence rates ranging from 6.63% to 86% due to factors like study population, design, and diagnostic methods used. Nonetheless, the findings indicated a high burden of IPIs among children in underdeveloped countries.

Discussion:

There was a variation in prevalence rates reported across the research analyzed. It stressed the importance of using context-specific ways to address the problem of IPIs in diverse regions. The discussion also emphasized the impact of socioeconomic issues, sanitation conditions, and limited access to clean water on the occurrence of IPIs. Furthermore, the discussion emphasized the importance of school environments in encouraging the transmission of intestinal parasites among children.

Conclusion:

The review provides insights on intestinal parasites in children from developing nations, emphasizing the need for targeted interventions, improved health education, and evidence-based legislation. Conclusions highlight the importance of public health planning, resource allocation, and coordination among policymakers and healthcare professionals to reduce the burden of these infections and improve children's health outcomes.

Recommendation:

Implement targeted interventions, enhanced health education, evidence-based legislation, public health planning, and stakeholder coordination to reduce the burden of intestinal parasite infections in children from developing nations.

Keywords: Intestinal Parasite Infections, Children, Developing Countries, Poor Sanitation, Health Education, Submitted: 2023-06-11 Accepted: 2023-06-17

1. Introduction:

Intestinal parasite infections (IPIs) have a significant impact on paediatric populations in underdeveloped nations, contributing to high morbidity and mortality rates. Approximately 50% of children in these countries are affected by IPIs, leading to malnutrition, stunted growth, anaemia, and cognitive impairments. Chronic IPIs result in nutrient malabsorption, physical health problems, and cognitive difficulties. One of the top ten health issues in underdeveloped nations, including Africa, has been intestinal parasite infections (IPIs), which mostly affect paediatric patients (Hajissa et al., 2022). This includes protozoan illnesses that severely afflict paediatrics in sub-Saharan Africa, such as Entamoeba histolytica, Giardia duodenalis, and Cryptosporidium species (Chelkeba et al., 2020). Globally the epidemiological evidence suggests that approximately 80% of IPI occur amongst children, while in Europe 2%; Asia 20%; Americas 7% and Africa over 50% (Feleke et al., 2019). In Africa, particularly, the following factors have been associated with the increasing number of IPIs. These included socioeconomic factors (Suliman et al., 2019), substandard sanitation (Zerdo et al., 2020), limited access to clean water, and a shortage of basic healthcare (Udeh et al., 2019). Specifically, economically disadvantaged children living in tropical and subtropical regions with limited or no access to safe drinking water, inadequate sanitation, and substandard housing are the most affected (Suliman et al., 2019).

1.1. Background:

It has been previously demonstrated that parasite infections have a considerable effect on nutritional status, cognitive function, absenteeism in school-aged children, and school dropout rates (Adewole and Hassan, 2021). In addition to the aforementioned, IPIs among paediatric patients led to significant illnesses such as acute infections and chronic infections (Bakarman et al., 2019). According to Alemu et al. (2019), lack of knowledge, attitudes, and practises regarding the infection cycle and the health effects of parasites were risk factors among paediatric patients. However, to reduce parasitic intestinal infections, scholars like Marami et al. (2018) have recommended that prevention programmes be strengthened to raise awareness of infectious diseases and improve sanitation and environmental hygiene. Despite improvements in the quality of healthcare services related to diagnosing infections, most infections were still seen as a major challenge for medical centers and staff in many developing countries, such as Ethiopia and South Africa (Sitotaw et al., 2019). Even though the standard of health services had been upgraded in sub-Saharan Africa, such as the diagnosis of parasitic infections, parasitic infections were still considered a high challenge in health care (Sitotaw et al., 2019).

School-grade children are more susceptible to IPIs due to several reasons, including their behaviours, limited immunity, and close contact in school environments. The understanding and practice of good hygiene, such as washing one's hands with soap before eating, may be lacking among school-grade children (Chelkeba et al., 2020). Additionally, school environments sometimes involve close physical contact between kids, which makes it easier for intestinal parasites to spread. The chance of parasite transmission, both directly and indirectly, is increased by crowded classrooms, common play spaces, and a lack of personal space (Al-Haidari et al., 2021). In Ghana, intestinal parasite illnesses were more common among school-grade children than children who were not enrolled in school, suggesting that school environments may contribute to IPIs (Forson et al., 2017). In a study conducted in Nepal, the prevalence was highest among children under the age of 15 and the elderly (Nepali et al., 2023). A considerable number of research studies have been conducted to investigate the occurrence of intestinal parasite infections (IPIs) among preschool and school-age children in underdeveloped countries. However, these were conducted in silos - a notable gap exists in terms of

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gathering and analyzing information specifically relevant to policymakers in these countries.

The primary objective of this review is to investigate the prevalence, geographical distribution, and trends of intestinal parasite infections (IPIs) among preschool and school-age children in underdeveloped countries. Thus, the research question is: What is the current prevalence of intestinal parasite infections (IPIs) among paediatric populations in underdeveloped nations? By answering this question, the review could provide valuable insights into the burden of IPIs in paediatric populations and identify potential areas for intervention and control strategies. The review's findings hold significant implications for policymakers and healthcare professionals in underdeveloped countries. They can inform public health planning and resource allocation, enabling targeted intervention strategies to combat intestinal parasite infections (IPIs) among children. The findings also emphasize the importance of health education and awareness, facilitating early detection and management of IPIs. Policymakers can use the results to develop evidence-based policies while identifying research gaps to foster collaboration and innovation in addressing IPI challenges. Ultimately, the review's findings aim to reduce the burden of IPIs and improve the health outcomes of paediatric populations in underdeveloped countries.

2. Methodology:

2.1. Study design:

The study design used in this research is a rapid literature review. The authors conducted a search strategy using multiple databases and specific search terms.

2.2. Search strategy and data extraction:

The search strategy involved searching multiple databases including Medline via PubMed, Scopus, Science Direct, Web of Science, and Google Scholar. The search terms used were "intestinal parasite infection" OR "helminths" OR "protozoa" AND "Underdeveloped countries".

2.3. Setting:

The search of the databases was conducted between January 2023 and May 2023. This timeframe was chosen to ensure the inclusion of relevant research findings and provide an up-to-date understanding of the topic and minimize the risk of omitting recent information related to intestinal parasite infections in the targeted population.

2.4. Bias:

To control bias in the study, researchers employed strategies such as establishing clear inclusion and exclusion criteria, conducting a comprehensive search, independent screening, and data extraction, and seeking peer review.

2.5. Inclusion and exclusion criteria:

The search was limited to articles published from 2000 to 2023 and restricted to human studies in the English language. The review focused on studies conducted among paediatric populations (children aged 0-18 years) in underdeveloped countries. Both quantitative and qualitative study designs were considered, including observational studies (cross-sectional, cohort, case-control), intervention studies, surveys, and qualitative studies (interviews, focus groups). Studies published in English were included to ensure accessibility and comprehension. Studies conducted in underdeveloped countries were included, with a specific emphasis on regions facing significant challenges in healthcare and development. To complement the database search, a manual search of the references from the retrieved articles was conducted to identify any additional relevant studies that might have been missed. Conference abstracts and unpublished studies were excluded from the review. This comprehensive search strategy aimed to capture relevant articles that investigate intestinal parasite infections in underdeveloped countries. Thus, providing a wide range of literature for inclusion in the review. The inclusion of multiple databases and the manual search of references increases the likelihood of identifying relevant studies and minimizing the risk of omitting valuable information. Additionally, the restriction to human studies in

English ensured that the included studies align with the review's objectives and can be readily understood by the reviewers. Tables 1, 2, and 3 supply a summarized narrative of many studies investigating the prevalence of intestinal parasite infections (IPIs) among paediatric populations in various locations

3. Results:

Table 1

STUDY AUTHOR(S)	STUDY DESIGN	POPULATION	STUDY LOCATION	METHODS OF ANALYSIS	NO OF SAMPLES	POSITIVES (%)	ORGANISMS ISOLATED
Siwila et al., 2009	Cross sectional	children in pre-schools	Kafue District, Zambia.	A commercial immunofluorescence kit, Kato–Katz thick smears.	403	17.9 Helminth, 28.0 Cryptosporidium, 29.0 Giardia	*Ascaris lumbricoides, Taenia spp, Hymenolepis nana, Schistosoma mansoni*
Nepali et al., 2023	Cross sectional	Children and Adults	Nepal	Microscopic examination of samples (blood, urine, and stools)	700	46.67	*Entamoeba histolytica, Giardia lamblia, Balantidium coli, Plasmodium vivax, Leishmania donovani, Ascaris lumbricoides, Enterobius vermicularis, Ancyclostoma duodenalis, Hymenolepsis nana, Taenia saginata, Wuchereria bancofti*
Ngojo et al., 2012	Cross sectional	Children	Burkina Faso	Kato-Katz and a formalin-ether concentration method	385	84.7 Protozoa, 10.7 Helminth	*Entamoeba histolytica, Giardia intestinalis, S. haematobium*
Palmeirim et al, 2021	Cross sectional	School children	Kilombero district, Tanzania	Kato-Katz and a formalin-ether concentration method	427	39	*Entamoeba histolytica Schistosoma mansoni, Plasmodium falciparum. Trichuris trichiura Strongyloides stercoralis, Schistosoma haematobium, Giardia intestinalis and lymphatic filariasis*
Dorkenoo et al., 2021	Cross sectional	Children	Lome, Togo	Kato-Katz method	746	52.2	Protozoa and STH
Aher & Kulkarni, 2011	Cross sectional	School children	Western Maharashtra	Direct smear using Normal saline and Lugol's iodine	624	30.4	*Giardia lamblia, Hymenolepis nana*
Belyhun et al., 2010	Cross sectional	Infants	Ethiopia	Qualitative & Questionnaire	908	43.5	Soil-transmitted helminths (STHs)
Dumba et al., 2008	Cross sectional	Children	Luweero district, Uganda	Kato-Katz technique	727	-	Helminth ova
Mwale & Siziya, 2015	Cross sectional	Children	Zambia	direct techniques.	148	19.6	Helminth - *Ascaris lumbricoides*
Ullah et al., 2009	Cross sectional	School children	Pakistan, Peshawar	Modified Ziehl-Neelsen	200	66	*Ascaris lumbricoides, Hymenolepis nana, Enterobious Vermicularis,* Hookworm, Whipworm, Tapeworm
Khanal et al., 2011	Cross sectional	School children	Nepal, Kathmandu	Formal-ether concentration	142	17.6	*Trichuris trichiura, Ascaris lumbricoides, Hymenolepis nana,* Hook worm, *Giardia lamblia, Entamoeba histolytica*
Awasthi et al., 2008	Cross sectional	Pre-School children	India	Formol-ether concentration	909	51	
Wani et al., 2007	Cross sectional	School children	Kashmir valley, Kupwara district	Direct smear and zinc sulphate floatation concentration	312	71.15	*Ascaris lumbricoides, Trichuris trichiura, Enterobius vermicularis, Taenia saginata*
Mwanthi et al., 2008	Cross sectional	School children	Nairobi	Kato-Katz	2250	12.9	*Ascaris lumbricoides, Trichuris trichiura,* Hookworm, *Schistosoma mansoni*
Ahsan-ul-Wadood et al., 2005	Cross sectional	School children	Northern Balochistan, Quetta	Direct wet smears in normal saline and Lugol's iodine.	220	31	*Hymenolepis nana, Giardia lamblia, Entamoeba histolytica, Ascaris lumbricoides, Ankylostoma duodenale*
Trönnberg et al., 2010	Cross sectional	Adults and children	KwaZulu-Natal, South Africa	Immunomagnetic separation and ammonium bicarbonate protocol	120	86	*Ascaris lumbricoides, Giardia intestinalis, Trichuris trichiura, Cryptosporidium spp, Taenia spp.*
Ragunathan et al., 2010	Cross sectional	School children	South India, Puducherry	Formol-ether concentration	1172	34.56	*Ascaris lumbricoides, Ancylostoma duodenale* (hookworm), *Trichuris trichiura, Hymenolepis nana, Taenia spp., Enterobius vermicularis*

Table 2

STUDY AUTHOR(S)	STUDY DESIGN	POPULATION	STUDY LOCATION	METHODS OF ANALYSIS	NO OF SAMPLES	POSITIVES (%)	ORGANISMS ISOLATED
Chaudhry et al., 2004	Cross sectional	School children	Azad Kashmir, Muzaffarabad	Direct smear, microscopy.	287	17.7 Protoza 11.4 Helminth	*Giardia lamblia, Entamoeba histolytica, Ascaris lumbricoides,* Hookworm *Enterobius vermicularis, Trichuris trichiura, Hymenolepis nana, Taenia saginata*
Kumar et al., 2017	Cross sectional	School children	India	Modified D. S. Ridley and B. C. Haw	300	55	*Ascaris lumbricoides,* Hookworm, *Trichus trichuria, Hymenolepis nana, Taenia saginata*
Shrestha et al., 2007	Cross sectional	School children	Kathmandu, Nepal	Formal-ether concentration and direct smear techniques.	1,504	42.5	*Ascaris lumbricoides, Trichus trichuria,* Hookworm, *Strongyloides spp*
Gurung et al., 2019	Cross sectional	School children	Manamaiju, Kathmandu, Nepal	direct smear method and concentration method	160	40	*Ascaris lumbricoides, Trichuris trichiura,* Hookworms, *Taenia sp., Entamoeba coli, Enterobius vermicularis*
Afroz et al., 2019	Cross sectional	School children	Sreepur Upazilla	Direct microscopy of faecal smear and floatation concentration	204	39.2	*Ascaris lumbricoides, Trichuris trichiura*
Yami et al., 2011	Cross sectional	School children	Jimma zone	Formol-ether concentration	855	47.1	*Ascaris lumbricoides, Trichuris trichiura,* Hookworms, *Schistosoma mansoni*
Ijagbone & Olagunju, 2006	Cross sectional	School children	Iragbiji, Nigeria	Direct smear and egg floatation	933	72	*Ascaris lumbricoides,* Hookworm, *Strongyloides stercolalis, Fasciola hepatic, Trichuris trichuria*
Shrestha et al., 2012	Cross sectional	School children	Baglung District of Western Nepal	Formal ether sedimentation	260	21.05	*Entamoeba histolytica, Giardia lamblia, Trichuris trichuria, Ancylostoma duodenale, Ascaris lumbricoides*
Dada, 2016	Cross sectional	School children	Ipogun, Nigeria	Formal ether sedimentation	350	64	*Ascaris lumbricoides, Trichuris trichiura,* Hookworm, *Taenia spp*
Nwaneri & Omuemu 2012	Cross sectional	School children	Benin city, Nigeria	Kato-Katz	140	20.7	*Ascaris lumbricoides, Trichuris trichiura*
Kosar et al., 2017	Cross sectional	School children	Punjab, Pakistan	Kato-Katz/ 10% formalin solution for iodine/ haematoxylin stain and formalin-ether concentration	1434	33.3	*Ascaris lumbricoides, Giardia lamblia, Entamoeba histolytica, Hymenolepis nana, Trichuris trichiura, Taenia saginata*
Ullah et al., 2014	Cross sectional	School children	District Upper Dir, Khyber Pakhtunkhwa Pakistan	Direct smear method and iodine staining	222	73.87	*Ascaris lumbricoides, Hymenolepis nana, Taenia species, Trichuris trichiura, Giardia lamblia, Entamoeba histolytica, Enterobius vermicularis,* Hookworm
Auta, 2013	Cross sectional	School children	Gwagwada, Kaduna, North-western Nigeria	Formaldehyde-ether concentration	285	67.1	*Ascaris lumbricoides, Taenia spp, Schistosoma mansoni,* Hookworm, *Trichuris trichiura, Enterobius vermicularis, Strongyloides stercoralis, Hymenolepis nana*
Kiran et al., 2016	Cross sectional	School children	Bhopal	Saline and iodine wet mount	600	40.7	*Ascaris lumbricoides, Entamoeba histolytica, Giardia intestinalis, Ancylostoma duodenale*

Table 3

STUDY AUTHOR(S)	STUDY DESIGN	POPULATION	STUDY LOCATION	METHODS OF ANALYSIS	NO OF SAMPLES	POSITIVES (%)	ORGANISMS ISOLATED
Nxasana et al., 2013	Cross sectional	School children	Mthatha, South Africa	Formalin ethyl-acetate concentration	162	64.8	*Ascaris lumbricoides, Giardia lamblia, Entamoeba histolytica, Hymenolepis nana, Iodamoeba butschlii, Trichuris trichiura, Taenia spp, Chilomastix mesnili, Fasciola spp, Entamoeba coli, Endolimax nana, Blastocystis hominis, Schistosoma haematobium*
Chirdan et al., 2010	Cross sectional	School children	Jos, Central Nigeria	Thick smears, iodine and saline preparations	384	57.8	*Ascaris lumbricoides, Ancylostoma duodenale, Trichuris trihcuria, Ascaris lumbricoides, Ancylostoma duodenale, Entamoeba coli, Taenia spp, Entamoeba histolytica, Schistosoma mansoni*
Kabatereine et al., 2001	Cross sectional	School children	Sourthen Uganda	Kato-Katz	2004	55.9	*Ascaris lumbricoides, Trichuris trichuria, Enterobius vermicularis, Hymenolepis nana, Taenia spp, Schistosoma, Strongyloides stercoralis*
Masoumeh et al., 2012	Cross sectional	School children	Golestan province	Formal-ether concentration	800	28.8	*Giardia lamblia, Hymenolepis nana*
Rai et al., 2017	Cross sectional	School children	Lokhim VDC	Direct smear using Normal saline and Lugol's Iodine	359	30.92	*Giardia lamblia, Entamoeba histolytica, Hymenolepis nana, Ascaris lumbricoides, Trichuris trichuria, Enterobius vermicularis*
Davami et al., 2022	Cross sectional	School children	Jahrom, Iran	Formal-ether concentration	410	13.6	*Giardia lamblia*
Davane et al., 2012	Cross sectional	School children	India	Direct smear using Normal saline and Lugol's Iodine	211	6.63	*Ascaris lumbricoides, Hymenolepis nana, Ancylostoma duodenale, Entamoeba histolytica, Giardia lamblia*
Pradhan et al., 2014	Cross sectional	School children	Azad Kashmir, Neelum Valley	Direct smear using Normal saline and Lugol's Iodine	194	18.5 Helminth 6.1 Protozoa	*Hymenolepis nana, Trichuris trichuria, Ascaris lumbricoides, Giardia lamblia, Entamoeba histolytica*
Ojurongbe et al., 2014	Cross sectional	School children	Ile-Ife Southwest, Nigeria	Direct smear and formol-ether concentration	162	46.3	*Ascaris lumbricoides, Strongyloides stercoralis, Taenia spp, Schistosoma mansoni, Hymenolepis nana,* Hookworm

4. Discussion:

Several studies have been conducted to investigate the prevalence of intestinal parasite infections (IPIs) in different populations and regions. The results from these studies provide valuable insights into the extent of IPIs and their impact on public health. Among the studies reviewed, the prevalence of IPIs varied across different populations and locations. For instance, in Ethiopia, Belyhun et al. (2010) found that 43.5% of 908 infants were positive for IPIs. Similarly, Siwila et al. (2010) reported an IPI prevalence of 17.9% among 403 children in pre-schools in Kafue District, Zambia. In Nepal, Nepali et al. (2023) observed a higher prevalence, with 46.67% of 700 children and adults testing positive for IPIs. The prevalence rates varied further across different regions within a country. For example, in Pakistan, Ullah et al. (2009) found a high prevalence of 66% among 200 school children in Peshawar, while Khanal et al. (2011) reported a lower prevalence of 17.6% among 142 school children in Kathmandu, Nepal. The findings from the studies included in **Table 1** provide valuable insights into the prevalence of intestinal parasite infections (IPIs) among paediatric populations in different regions. The prevalence rates varied across the studies, ranging from as low as 6.63% (Davane et al., 2012) to as high as 86% (Trönnberg et al., 2010). These variations highlight the significant burden of IPIs among children in underdeveloped nations and emphasize the need for effective intervention strategies. Helminths and protozoa are mentioned multiple times in the provided text. Among the helminths, *Ascaris lumbricoides*, *Trichuris trichiura*, *Hymenolepis nana*, Hookworm, Taenia spp, and *Schistosoma spp*, including *Schistosoma mansoni,* are frequently referenced. *Enterobius vermicularis* and *Strongyloides stercoralis* are mentioned a few times as well. *Fasciola hepatica*, a parasitic liver fluke, is mentioned once. In terms of protozoa, Entamoeba histolytica and Giardia lamblia are mentioned a few times, while *Balantidium coli*, *Cryptosporidium spp, Plasmodium spp* (including *Plasmodium falciparum* and *Plasmodium vivax*), and

Blastocystis hominis are mentioned once. These mentions provide insight into the presence and potential impact of helminths and protozoa in the described contexts. However, it is important to consider that the frequency of mentions does not directly reflect their prevalence or significance in broader populations or specific regions, as further data and context would be required for a comprehensive analysis.

4.1. Implications of helminths and protozoa in paediatric samples:

The presence of helminths and protozoa in pediatric samples can have significant implications for the health and well-being of children. These organisms are known to cause various parasitic infections that can lead to a range of clinical symptoms and complications.

Firstly, helminth infections, such as those caused by Ascaris lumbricoides, Trichuris trichiura, and Hookworm, can impair a child's growth and development. These infections can result in malnutrition, anaemia, and stunted growth, which can have long-term effects on physical and cognitive development. In severe cases, helminth infections may cause intestinal obstruction or other complications that require medical intervention. Protozoa, such as Entamoeba histolytica and Giardia lamblia, can cause diarrheal illnesses in children. Persistent or chronic diarrhoea can lead to dehydration, malabsorption of nutrients, and impaired growth. Additionally, some protozoan infections may cause more severe conditions, such as amoebic dysentery or giardiasis, which can be associated with abdominal pain, cramping, and weight loss. The implications of finding these organisms in paediatric samples extend beyond the immediate health effects. These infections can disrupt children's daily activities, including school attendance and performance.Chronic illnesses can lead to prolonged absences, affecting a child's educational progress and overall quality of life. Moreover, the presence of helminths and protozoa in paediatric samples may indicate poor sanitation and hygiene practices in the child's environment. Inadequate sanitation facilities, contaminated water sources, and lack of proper hygiene practices can contribute to the transmission of these parasites. This highlights the importance of addressing broader social and environmental factors to prevent and control these infections effectively.

To mitigate the implications of finding helminths and protozoa in paediatric samples, comprehensive strategies are needed. These include improved sanitation and hygiene practices, access to clean water sources, deworming programs, and health education for children and their caregivers. Early detection and appropriate treatment are crucial to prevent complications and minimize the long-term effects on a child's growth and development. In conclusion, the finding of helminths and protozoa in paediatric samples underscores the importance of addressing parasitic infections among children. Efforts should focus on preventive measures, early diagnosis, and effective treatment to safeguard children's health, promote their growth and development, and improve overall well-being.

4.2. Sample analysis techniques for the studies reported:

Sample analysis techniques play a vital role in research and clinical settings for detecting diseases, identifying pathogens, and evaluating treatment efficacy. This discussion explores various methods used for sample examination, including qualitative methods, questionnaires, direct techniques, and concentration methods. The Kato-Katz technique, formalin-ether concentration, direct smear techniques, and modified Ziehl-Neelsen staining were demonstrated as commonly employed methods. The Kato-Katz technique provides quantitative data on helminth infections, while direct smear techniques allow for quick observations. Concentration methods aid in separating and enriching target organisms or substances, and staining methods facilitate the visualization of specific pathogens. Researchers and clinicians choose these methods based on their study objectives, ensuring accurate diagnoses and effective treatments.

4.3. *Factors Contributing to IPI Prevalence:*

Several factors contribute to the high prevalence rates of IPIs. Poor sanitation and limited access to clean water are major risk factors, as indicated by studies conducted in Ethiopia (Belyhun et al., 2010), Zambia (Siwila et al., 2009), and Nepal (Khanal et al., 2011). Inadequate sanitation facilities increase the likelihood of faecal-oral transmission of parasites, while contaminated water sources serve as a medium for infection. Socioeconomic factors, such as poverty and substandard living conditions, further exacerbate the risk of IPIs, as demonstrated in studies conducted in Nigeria (Adefioye et al., 2011) and South Africa (Trönnberg et al., 2010).

4.4. *Implications of the study:*

Additionally, the prevalence rates also highlight the need for improved health education and awareness. Many studies showed a lack of knowledge and poor hygiene practices among children, contributing to the transmission of parasites (Alemu et al., 2019; Chirdan et al., 2010). Promoting proper hygiene practices, such as handwashing with soap, can significantly reduce the risk of IPIs. Furthermore, the differences in prevalence rates across regions may be attributed to variations in diagnostic methods and sample sizes. Studies that utilized more sensitive diagnostic techniques, such as immunofluorescence kits or microscopic examination, reported higher prevalence rates (Siwila et al., 2009; Trönnberg et al., 2010). Additionally, larger sample sizes provide a more representative picture of the population and can yield more accurate prevalence estimates. The implications of these findings are significant for policymakers and healthcare professionals in underdeveloped countries. The high prevalence rates of IPIs among paediatric populations indicate the urgent need for comprehensive public health interventions. These interventions should focus on improving sanitation infrastructure, ensuring access to clean water, and implementing regular deworming programs in schools and communities. Health education campaigns should be prioritized to raise awareness about the transmission and prevention of IPIs. Additionally, targeted interventions should be designed to address the specific challenges faced by each region, considering socioeconomic factors and local contextsAdditionally, the prevalence rates also highlight the need for improved health education and awareness. Many studies showed a lack of knowledge and poor hygiene practices among children, contributing to the transmission of parasites (Alemu et al., 2019; Chirdan et al., 2010). Promoting proper hygiene practices, such as handwashing with soap, can significantly reduce the risk of IPIs. Furthermore, the differences in prevalence rates across regions may be attributed to variations in diagnostic methods and sample sizes. Studies that utilized more sensitive diagnostic techniques, such as immunofluorescence kits or microscopic examination, reported higher prevalence rates (Siwila et al., 2009; Trönnberg et al., 2010). Additionally, larger sample sizes provide a more representative picture of the population and can yield more accurate prevalence estimates. The implications of these findings are significant for policymakers and healthcare professionals in underdeveloped countries. The high prevalence rates of IPIs among paediatric populations indicate the urgent need for comprehensive public health interventions. These interventions should focus on improving sanitation infrastructure, ensuring access to clean water, and implementing regular deworming programs in schools and communities. Health education campaigns should be prioritized to raise awareness about the transmission and prevention of IPIs. Additionally, targeted interventions should be designed to address the specific challenges faced by each region, considering socioeconomic factors and local contexts.

5. Conclusion:

The findings from the studies reviewed highlight the considerable burden of IPIs among paediatric populations in underdeveloped countries. The high prevalence rates underscore the need for comprehensive strategies that address factors such as poor sanitation, limited access to clean water, and inadequate health education. By implementing effective interventions and prioritizing public health measures, policymakers and healthcare professionals can significantly reduce the impact of IPIs on the well-being and prospects of children in underdeveloped nations. These findings highlight the need for targeted interventions and preventive measures to reduce the burden of IPIs, especially in regions with higher prevalence rates. Further research is needed to understand the underlying factors contributing to the variations in prevalence and to develop effective strategies for IPI control and prevention. Addressing IPIs needs comprehensive public health interventions, including access to clean water, improved sanitation, health education, and regular deworming programs. Urgent attention from policymakers and healthcare professionals is needed to improve the well-being and prospects of children in underdeveloped countries.

6. Study Limitations:

Limitations of the studies include varying sample sizes, geographical restrictions, different diagnostic methods, lack of longitudinal data, potential selection bias, and insufficient demographic information.

7. Recommendations for future studies:

Future research should aim for larger-scale studies with consistent methods, longitudinal designs, and comprehensive demographic data to address these limitations. Understanding the underlying factors contributing to variations in prevalence and developing effective strategies for IPI control and prevention are key areas for further investigation. Longitudinal studies capturing the dynamics of IPIs over time would provide insights into persistence, recurrence, and long-term consequences. Standardization and validation of diagnostic techniques are crucial for accurate assessment of infection burden. Knowledge of transmission dynamics, including direct and indirect modes, can inform targeted interventions and control strategies. Economic impact assessment and cost-effectiveness analyses of preventive measures would support policy development and resource allocation. In conclusion, addressing IPIs in underdeveloped economies necessitates a comprehensive, multi-faceted approach. Further research is crucial to refine preventive strategies, enhance diagnostic accuracy, understand long-term consequences, and guide evidence-based policies for effective control and management.

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References

[1] M. A. Dorkenoo, F. Agbeko, H. Dokoto, D. Plate, M. Fiawoo, K. Yakpa, E. Sossou, S. K. Sognikin, A. D. Gbadoe, R. Bronzan, Prevalence of Soil-Transmitted Helminths and Intestinal Protozoa among School Children in Lome, Togo. OJPed 11 (2021) 313–328.

[2] M. H. Davami, R. Roohi, A. R. Sadeghi (2008). [link]. URL https://doi.org/10.29252/jmj.6.1.2.49

[3] P. Pradhan, S. Bhandary, P. Shakya, T. Acharya, A. Shrestha, Prevalence of intestinal parasitic infections among public school children in a rural village of Kathmandu Valley, Nepal Med Coll J 16 (2014) 50–53.

[4] F. Samuel, A. Demsew, Y. Alem, Y. Hailesilassie, Soil transmitted Helminthiasis and associated risk factors among elementary school children in ambo town, western Ethiopia, BMC Public Health 17 (2017) 1–7.

[5] S. Kosar, K. Afshan, M. Salman, S. Rizvi, A. Naseem, S. Firasat, S. Jahan, J. Miller, M. Qayyum, Prevalence and risk factors associated with intestinal parasitic infections among schoolchildren in, Trop Biomed 34 (2017) 770–80.

[6] Y. Belyhun, G. Medhin, A. Amberbir, B. Erko, C. Hanlon, A. Alem, A. Venn, J. Britton, G. Davey, Prevalence and risk factors for soil-transmitted helminth infection in mothers and their infants in Butajira, Ethiopia: a population-based study, BMC Public Health 10 (2010).

[7] K. Mwale, S. Siziya, Intestinal infestations in underfive children in Zambia, International Journal of MCH and AIDS 4 (2015) 40–40.

[8] S. Awasthi, T. Verma, P. Kotecha, V. Venkatesh, V. Joshi, S. Roy, Prevalence and risk factors associated with worm infestation in pre-school children (6-23 months) in selected blocks of Uttar Pradesh and Jharkhand, India. Indian journal of medical sciences 62 (2008) 484–491.

[9] A. Aher, S. Kulkarni, Prevalence of intestinal parasites in school going children in a rural community, Int J Biomed Res 2 (2011) 605–607.

[10] A. Shrestha, K. Narayan, R. Sharma, Prevalence of intestinal parasitosis among school children in Baglung District of Western Nepal, Kathmandu university medical journal 10 (2012) 62–65.

[11] N. Nxasana, K. Baba, V. Bhat, S. Vasaikar, Prevalence of intestinal parasites in primary school children of Mthatha, Annals of medical and health sciences Research 3 (2013) 511–516.

[12] R. Dumba, J. B. Kaddu, F. W. Mangen, Intestinal helminths in Luweero district, Uganda. Afr Health Sci 8 (2008) 90–96.

[13] A. Shrestha, S. K. Rai, S. R. Basnyat, C. K. Rai, B. Shakya, Nepal Med Coll J 9 (2007) 166–169.

[14] N. Kabatereine, E. Tukahebwa, S. Brooker, H. Alderman, A. Hall, Epidemiology of intestinal helminth infestations among school children in southern Uganda, East African Medical Journal 78 (2001) 283–286.

[15] M. S. Davane, N. M. Suryawanshi, K. D. Deshpande, A prevalence study of intestinal parasitic infections in a rural hospital, Int J Recent Trends Sci Technol 2 1–3.

[16] J. Siwila, I. G. K. Phiri, H. L. Enemark, M. Nchito, A. Olsen, Intestinal helminths and protozoa in children in pre-schools in Kafue district, Zambia, Transactions of the Royal Society of Tropical Medicine and Hygiene 104 (2010) 122–128.

[17] W. Ullah, A. Shah, Q. Jamal, S. Ullah, I. Muhammad, H. Ullah, Prevalence of intestinal parasites among school children in District Upper Dir, Khyber Pakhtunkhwa Pakistan. IJB 5 (2014) 1–8.

[18] S. A. Wani, F. Ahmad, S. A. Zargar, B. A. Fomda, Z. Ahmad, P. Ahmad, Helminthic infestation in children of Kupwara district: a prospective study, Indian Journal of Medical Microbiology 25 (2007) 398–400.

[19] T. Auta, E. Kogi, K. A. Oricha, Studies on the intestinal helminth's infestation among primary school children in Gwagwada, Studies 3 (2013).

[20] S. Kumar, J. Singh, A. Kumar, Prevalence and correlation of soil transmitted helminth infection to the degree of anemia and nutritional status among pediatric patients of age group 6-14 years in Kishanganj, Int J Contemporary Pediatr 4 (2017) 83–89.

[21] Z. H. Chaudhry, M. Afzal, M. A. Malik, Epidemiological factors affecting prevalence of intestinal parasites in children of Muzaffarabad district, Pakistan Journal of Zoology 36 (2004) 267–271.

[22] M. A. Mwanthi, M. K. Kinoti, A. W. Wamae, M. Ndonga, P. S. Migiro, Prevalence of intestinal worm infections among primary school children in Nairobi City, Kenya. East Afr J Public Health 5 (2008) 86–89.

[23] T. Kiran, N. Shashwati, B. Vishal, D. A. Kumar, Intestinal Parasitic infections and Demographic status of school children in Bhopal region of Central India, IOSR J Pharm Biol Sci (2014) 83–90.

[24] R. Masoumeh, T. Farideh, S. Mitra, T. Heshmatollah, Intestinal parasitic infection among school children in Golestan province, Iran. Pakistan Journal of Biological Sciences 15 (2012) 1119–1125.

[25] A. Yami, Y. Mamo, S. Kebede (2011).

[26] M. A. Bakarman, M. A. Hegazi, N. S. Butt (2019). [link]. URL https://doi.org/10.2991/jegh.k.190219.001

[27] E. Dada, Prevalence Of Human Intestinal Helminth Parasites Among Prymary School Children In Ipogun, Ifedore Local Government Area, Nigeria. Journal of Global Biosciences 5 (2016) 3401–3407.

[28] I. Ijagbone, T. Olagunju, Intestinal helminth parasites in school children in Iragbiji, boripe local government, African Journal of Biomedical Research 9 (2006).

[29] D. Nwaneri, V. Omuemu, Risks of intestinal helminthiasis in children living in orphanages in Benin city, Nigeria. Nigerian Journal of Paediatrics 39 (2012) 118–123.
[30] T. Ngonjo, J. H. Kihara, M. M. Gicheru, P. Wanzala, S. Njenga, C. Mwandawiro, Prevalence and intensity of intestinal parasites in school age children in Thika District, Kenya, 2012.
[31] L. Trönnberg, D. Hawksworth, A. Hansen, C. Archer, T. A. Stenström, Household-based prevalence of helminths and parasitic protozoa in rural KwaZulu-Natal, South Africa, assessed from faecal vault sampling, Transactions of the Royal Society of Tropical Medicine and Hygiene 104 (2010) 646–652.
[32] L. Ragunathan, S. K. Kalivaradhan, S. Ramadass, M. Nagaraj, K. Ramesh, Helminthic infections in school children in Puducherry, South India, Immunology and Infection 43 (2010) 228–232.
[33] B. Gurung, J. R. Subedi, Kirtipur, N. Kathmandu, B. Chhetri, Prevalence of Intestinal Parasites among Public and Private School Children below 10 years' at Tarakeswor-10 Manamaiju, Natl. j. health sci 4 (2019) 97–102.
[34] P. B. Nepali, S. Shrestha, H. B. Rana, Prevalence of Protozoan and Helminths Parasitic Infection in Palpa, Nepal. Tribhuvan J 1 (2023) 85–92.
[35] L. Rai, B. Saud, G. Paudel, G. Dhungana, Prevalence of intestinal parasitic infection among rural area school children of Lokhim VDC, Nepal. Journal of Microbiology & Experimentation 4 (2017) 102–102.
[36] F. Samuel, A. Demsew, Y. Alem, Y. Hailesilassie, Soil transmitted Helminthiasis and associated risk factors among elementary school children in ambo town, western Ethiopia, BMC Public Health 17 (2017).
[37] O. Ojurongbe, K. Oyesiji, J. Ojo, G. Odewale, O. Adefioye, A. Olowe, O. Opaleye, O. Bolaji, T. Ojurongbe, Soil transmitted helminth infections among primary school children in Ile-Ife Southwest, Nigeria: A cross-sectional study, Int Res J Med Sci 2 (2014) 6–10.
[38] M. S. Palmeirim, E. C. Mrimi, E. G. Minja, A. J. Samson, J. Keiser, A cross-sectional survey on parasitic infections in schoolchildren in a rural Tanzanian community, Acta tropica 213 (2021).
[39] B. A. Ahsan-Ul-Wadood, A. Rhman, K. Qasim, Frequency of intestinal parasite infestation in Children Hospital Quetta, Pakistan Journal of Medical Research 44 (2005) 87–88.
[40] S. Afroz, S. Debsarma, S. Dutta, M. M. Rhaman, M. Mohsena, Prevalence of helminthic infestations among Bangladeshi rural children and its trend since mid-seventies, IMC Journal of Medical Science 13 (2019) 4–004.

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