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Spring 2020

STUNTING AND INFECTIOUS DISEASE IN ETHIOPIAN AND ZAMBIAN CHILDREN

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Figure 1: Map of Africa with Study Areas Denoted by a Star

Abstract

PURPOSE: To evaluate whether children who are malnourished/stunted are more likely to have experienced infectious disease.

METHODS: 6th and 7th students (n=546) were interviewed about health history and assessed using anthropometry.

RESULTS: Children who are short for their age also have higher rates of stunting. Malaria is the most experienced infectious disease.

CONCLUSIONS: Given that malaria was the most common infectious disease experience listed among middle school children, and that those who have experienced disease are more likely to be stunted, increased malaria prevention methods may improve the long-term health of Ethiopian and Zambian school children.



Introduction

- Malnutrition negatively impacts health status, causing stunting, mental and physical limitations, and increased rates of infectious disease¹.
- Children who are malnourished have weaker immune systems and higher rates of infectious disease³.
- Correlations between severity of infectious disease and lack of preventive methods have been established for African populations.⁵
- Approximately 40-50% of children in Ethiopia and Zambia are stunted, malnourished, and have cognitive deficits⁴.
- To date, we know little about the correlation between infectious disease and stunting among middle school children in Ethiopia and Zambia².

Purpose

To examine whether primary school children in regions where growth stunting is common also have more types and higher rates of infectious disease.

Methods

Subjects:

- 6th and 7th grade students from 4 schools in southern Ethiopia, 5 schools in southern Zambia

Environment:

- Research was conducted in (1) Ethiopia's Southern Nations Nationalities and Peoples' Region, within one hour of Hawassa Town, and (2) Zambia's Southern Province, within one hour of Livingstone (Figure 1).

Experimental Design:

- Data were collected in May and June of 2019.
- Anthropometric data, including height, weight, and mid-upper arm circumference, were taken from each student (Figure 3).
- Interviews were conducted to establish medical history, including infectious disease experience and preventive strategies (Figure 3).
- The project was conducted under IRB 20150515251 EP and schools and parents provided permission for their children's participation. Students could opt out of participation at any time.

Statistical Analyses:

- Data were entered into Excel and uploaded to *Statistica*.
- Statistica* was used to conduct descriptive and correlational analyses, and t-test of independent variables.



Figure 3: (a) Measuring Height and (b) Conducting an Interview

Results

- Data were taken from 546 students, 181 in Ethiopia and 365 in Zambia, ranging in age from 10 ± 19 years.
- Height, Weight, and MUAC ranged from (1) 114 to 185 cm, (2) 20.1 to 73.8 kg, and (3) 15.1 to 32.8 cm, respectively.
- Middle school students mentioned 10 distinct parasitic or infectious diseases that they had experienced (Table 1).
- Another 7 students in Ethiopia, and 27 in Zambia, had experienced a disease; however, they could not name the specific type that had affected them (Table 1).
- Malaria was the most common parasitic disease experienced by children in both countries (Table 1).
- Mosquito nets were the most common mechanism for malaria prophylaxis used in both countries (Table 2).
- There are statistically significant differences in height-for-age among children who have experienced disease versus those who have not ($p < .05$); stunted children are more likely to have experienced one or more disease types (Figures 2-3a).

Table 1 : Disease Experience Types

	Ethiopia n= 181	Zambia n= 365
Diarrhea	16	40
Malaria	46	116
Parasite	6	0
Scabies	1	0
Stomach Infection	0	2
Tuberculosis	5	5
Typhoid	20	0
Typhus	1	0
Urinary Tract Infection	1	0
Upper Respiratory	1	0
Other	7	27
No Known Disease(s)	100	192

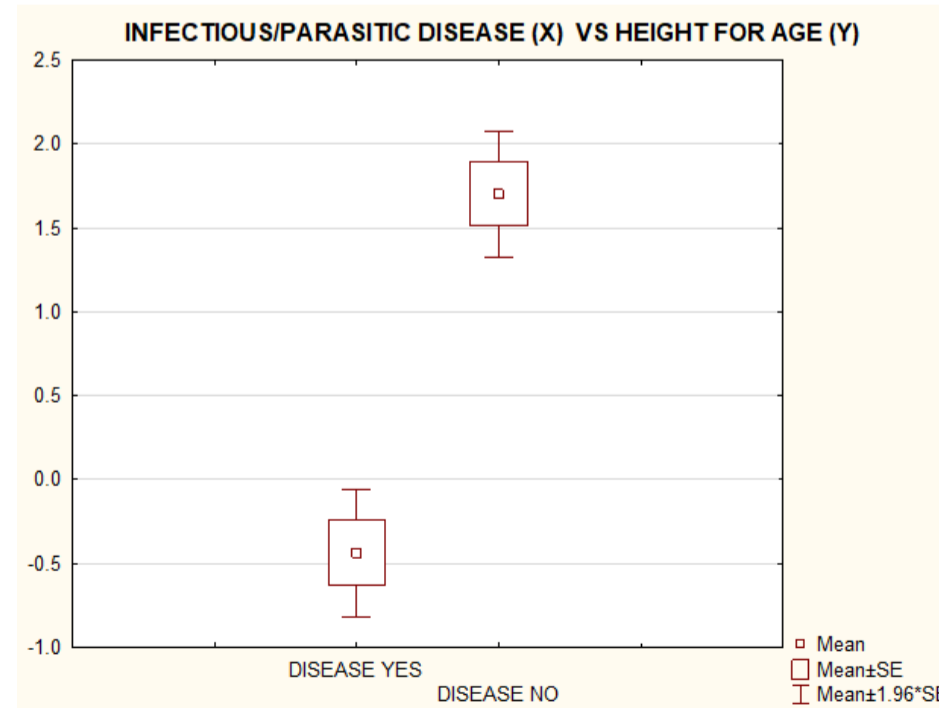


Figure 2: Box Plot of Students With and Without Parasitic Disease and Height for Age

Table 2: Malaria Prevention Mechanisms

Mechanisms	Ethiopia n=181	Zambia n=365
Environmental/ Personal Hygiene	26	0
Insect Repellent	9	27
Mosquito Net	100	282
No Protection	1	1
No Response	48	63
Smoke	8	0
Other	9	2

Discussion

- As previously noted, results demonstrate that malnutrition and stunting are correlated with poor health status, e.g., higher rates of infectious/parasitic disease^{1,2}.
- Among 6th and 7th graders in southern Ethiopia and Zambia, there are significant differences in height for age based on disease experience(s). Although correlation does not mean causation, children who have had one or more disease experiences are also shorter in stature based on their age.
- Although four distinct malaria prevention strategies were mentioned by participants, malaria infection rates were cited as the most common disease experience.
- Despite the use of malaria prevention techniques, it is unclear if each was applied appropriately and consistently.
- Future research could include the analysis of health records, coupled with interviews of parents, for a more accurate depiction of disease types and prevalence.
- Investment in malaria prevention techniques and training would be beneficial regardless of the impact on long-term health status.

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Acknowledgements

This research was supported by the University of Nebraska UCARE program. This research would have not been possible without the financial support of UCARE, Dr. Natalie Hahn Global Fellowship, CYFS Ambassador Program, and CEHS. I would also like to thank Dr. Mary Willis for her support and insightful suggestions throughout this process. Finally, thank you to Alazar Kirubel, Hawassa University graduate students, and my fellow research team members their help and support throughout the program.