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Dental Health Factors among Primary School Children in Southern Regions of Ethiopia and Zambia

Gisselle Hernandez

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Figure 1: Africa Map with Study Sites Marked <http://www.freeworldmap.net>

Abstract

Purpose: Assess oral health status, and factors affecting oral health, among primary schoolchildren in southern Ethiopia and Zambia.
Methods: Visual dental assessments, anthropometric measurements, and questionnaires used to collect data among 6th and 7th grade students.
Results: Although stunting rates were nearly equal, decay rates were not; 17.51% of Zambian students and 47.27% of Ethiopian students had one or more decayed teeth. Ethiopian students with dental fluorosis (74.55%) had higher rates of decay than those without the condition ($p < .05$). There were also significant differences between Ethiopians and Zambians regarding use of dental hygiene tools: Ethiopians were more likely to use dental sticks, while Zambians employed toothbrushes for cleaning.
Conclusions: Dental health and hygiene education, focused on unique socioecological settings, could improve the oral health status of Ethiopian and Zambian children.

Introduction

- Worldwide, dental caries remain the most common disease of childhood.¹
- Ethiopia and Zambia have high rates of childhood malnutrition and dental caries are more common among those who are malnourished.³
- However, there are limited data on oral health and factors affecting dental health among children in African countries.²
- High levels of naturally-occurring fluoride have been correlated with dental fluorosis and Ethiopia is known to have high fluoride rates in or near the Great Rift Valley.⁴
- Hygiene practices affect dental health and Zambian adults in Southern Province reportedly use toothbrushes for cleaning their teeth.⁵
- By contrast, dental sticks from the toothbrush tree are the most frequently used for dental hygiene among Ethiopian adults.⁶

Purpose

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Figure 2: (a, d) Research Team Conducting Interviews (b) Visual Exams to Assess Dental Health and (c) Taking Anthropometric Measurements

Methods

Subjects:

- 6th - 7th graders from 4 schools in Ethiopia and 5 schools in Zambia (Figure 2)

Environment:

- Ethiopia's Sidama Region (formerly SNNPR), within 1 hour of Hawassa Town
- Zambia's Southern Province, within 1 hour of Livingstone

Experimental Design:

- Data were collected in May-June 2019
- Students were measured for height using a stadiometer (Figure 2c) and assessed for dental health with a visual exam (Figure 2b)
- Interviews were conducted to establish dental hygiene practices (Figure 2a,d)
- Project was conducted under IRB 20150515251 EP and permissions were granted by schools, parents, and participants before data were collected

Statistical Analyses:

- Data were entered into Excel and uploaded to *Statistica*
- Descriptive and correlational analyses, and t-test of independent variables, were conducted

Results

Although schoolchildren in Ethiopia (n=167) and Zambia (n=353) have similar rates of stunting (55.62% and 55.52% respectively), Ethiopian children have significantly higher rates of decay, $p = .000$ (Table 1: Figure 3). Nearly half of the Ethiopian students assessed, 47.27%, had one or more caries while just 17.51% of Zambian students had decayed teeth (Table 1).

Table 1: Rates of Stunting and Decay in Ethiopian and Zambian Schoolchildren

Country	Stunting	No Stunting	Decay	No Decay
Ethiopia	55.62%	44.38%	47.27%	52.73%
Zambia	55.52%	44.48%	17.51%	82.49%

None of the 353 Zambian school children showed evidence of dental fluorosis, however, nearly 3/4 or 74.55% of the 167 Ethiopian 6th and 7th graders who participated in this study had the condition (Figures 4a-c). Tooth decay was more common among students with dental fluorosis, versus those without the condition, and statistically significant as well ($p < .05$).



Figure 4: (a) Ethiopian Boy with Decay and Fluorosis; (b) Girls With and Without Fluorosis; and (c) Boy with Calculus and Dental Fluorosis

Among Ethiopian students, 53.29% of 167 students reported using dental sticks to clean their teeth, while 32.34% listed the toothbrush as the tool most often used for dental hygiene (Figure 2). By contrast, among 363 Zambian schoolchildren, 86.23% used toothbrushes while only 11.02% used dental sticks for cleaning the teeth (Figure 4).

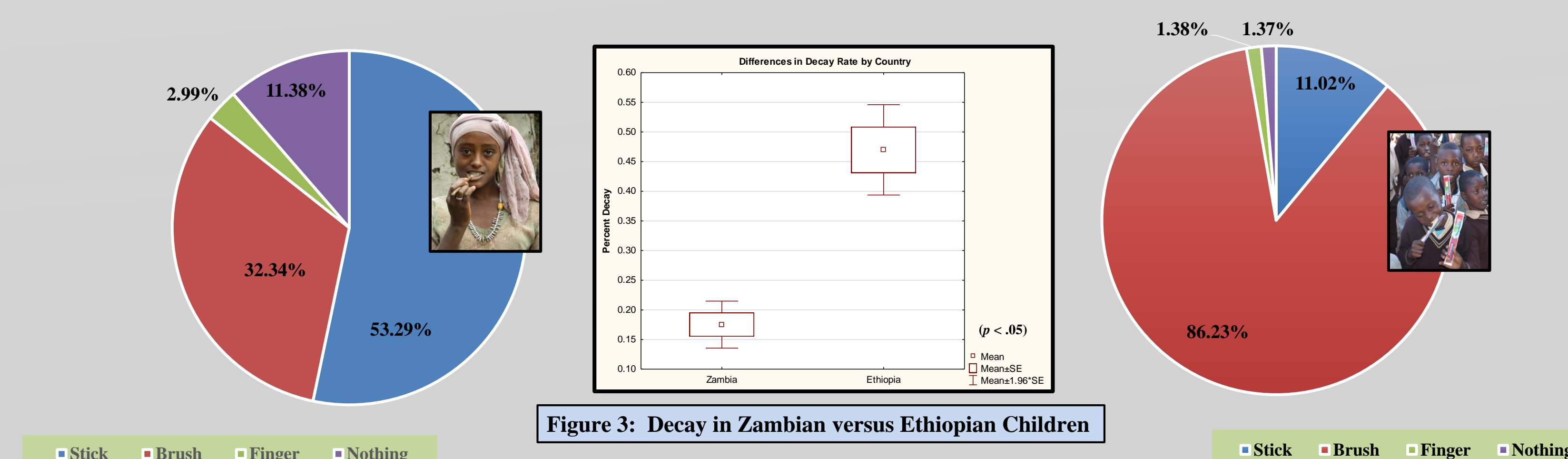


Figure 2: Ethiopian Student Dental Hygiene Tools by Type

Figure 4: Zambian Student Dental Hygiene Tools by Type

Discussion

- Although 6th - 7th graders in southern Zambia and Ethiopia have similar stunting rates, Ethiopian children have more dental caries with nearly 50% having one or more decayed teeth. By contrast, Zambian students in this study, and American children of similar age, have less than half this amount of decay; 18% and 21% respectively.⁷
- Malnutrition, dietary intake, and dental hygiene patterns impact dental health status and these factors likely had an affect on Ethiopian and Zambian students too. However, we found no differences in height-for-age (stunting) between populations. Because we could not collect data on daily intake, the impact of diet on dental health is unknown. Although participants in this study cleaned their teeth as adults have been reported to do, e.g., using toothbrushes in Zambia and dental sticks in Ethiopia, we were unable to examine basic hygiene practice and knowledge to see if they impact decay rates.⁵⁻⁶
- Dental fluorosis is common in students from Hawassa, Ethiopia, but absent in those living near Livingstone, Zambia. Thus fluorosis might contribute to differences in decay rates between the two populations. High fluoride concentrations are present throughout the Great Rift Valley and dental and bone fluorosis may contribute to lowered health status.⁴
- Future research should include a comprehensive assessment of dental hygiene practice and daily dietary intake to understand dental health status. This information could be used to inform future education and intervention programs.

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