

# Prevalence of Soil-Transmitted Helminths (STH) in Nursery, Primary and Secondary Schools in Nkondjock Sub-division: A School Level-Based Cross-Sectional Study

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**Abstract:** Parasitic infections due to Soil-Transmitted Helminths (STH) represent an actual public health problem over the world and mostly in developing countries. The present study aimed at assessing the extent of geohelminths infections among school age children of Nkondjock Council in Cameroon, and to make recommendations for control. Eight public and private schools of four villages were sampled and grouped into Nursery, Primary and Secondary schools. A total of 417 stools were sampled from 103 children in Nursery, 118 in Primary and 196 in Secondary schools and examined in the Laboratory of Medical Analysis of the Integrated Health Centre of Ndock-Samba, following physical flotation method (Willis's technique) and direct examination for qualitative analysis. Three species of geohelminths was identified, particularly *Ascaris lumbricoides*, *Trichuris trichiura* and Hookworm (*Ancylostoma duodenale* and *Necator americanus*). The results showed an overall prevalence of 24.5% of infection where the highest prevalence of this infection was 28.5% in Secondary schools and the lowest was 13.6% in Nursery schools. *Ascaris lumbricoides* and *Trichuris trichiura* were the most prevalent respectively in Nursery and Secondary schools with 6.8% and 13.6% while, Hookworm was most prevalent in Primary school with 15.3%. Data obtained suggest that STH are important public health problems hence actions is imperative against deficiencies in sanitary facilities, improper disposal of human faeces, insufficient supplies of potable water, poor personal hygiene and substandard housing.

**Keywords:** Prevalence, Soil-Transmitted Helminths, School Age Children, Nkondjock, Cameroon

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## 1. Introduction

Infection by soil transmitted helminths (STH) has been increasingly recognized as an important public health concern, particularly in developing countries [1]. Due to this significance, there have been regular endeavours to determine and present figures of soil transmitted helminth (STH) infections in various places such as Vietnam, Southern and Northern Cameroon, Zanzibar, Ethiopia, Tajikistan and Nigeria [2, 3, 4, 5, 6, 7]. Typically the helminths involved include *Ascaris lumbricoides*, *Trichuris trichiura*, Hookworm, *Enterobius vermicularis* and *Strongyloides stercoralis* [8]. Worm transmission is enhanced by poor socio

economic conditions, deficiencies in sanitary facilities, improper disposal of human faeces, and insufficient supply of potable water, poor personal hygiene, substandard housing and lack of education [9]. In Cameroon, studies on the evaluation of STH infections in different localities [10, 11, 12]. Nkengazong *et al* [13] noted that 64.1% of infections in South-West Cameroon are due to hookworm, while about 4.5% are due to *Ascaris lumbricoides* in Adamaoua. Brief, the prevalence of infection by different parasite is disparate from community to another [13].

## 2. Materials and Methods

### 2.1. Study Area

It is a cross-sectional study which was carried out in Nkondjock Sub-Division, area located in the rain forest zone with distinct rainy and dry season. It is predominantly a rural setting with several schools and rivers. The area is rural and lack basic amenities such as good roads, standard hospitals and adequate facilities for refuse and sewage disposal. There are many streams which serve as a source of water for bathing and other domestic activities. Members of the community are predominantly farmers where some engage in fishing, and poultry.

### 2.2. Study Population

The sample size was calculated using the Yamane Taro formula and, the total of four hundred and seventeen school children from eight private and public schools of four villages were recruited randomly for the study. Their age ranges from 1-25 years old. Their parents were informed and briefed on the aim of the study under presentation of many authorization signed by Cameroon Bioethics Initiative (CAMBIN), Sub-Divisional Officer and Sub-Divisional Inspector of Basic Education. One hundred and three of them were from Nursery schools, One hundred and eighteen from Primary schools and One hundred and ninety six from Secondary schools.

### 2.3. Sample Collection

This study, which lasted for seven months, was conducted from October 2012 to May 2013. The stools were collected in sterile containers and transported to the laboratory for processing and to be analyzed or, conserved in the refrigerator in 2 to 8°C [14].

### 2.4. Examination

Four hundred and seventeen stools samples were examined in the Laboratory of Medical Analysis of the Integrated Health Centre of Ndock-Samba, using direct Willis's technique [15, 16, 17] and identification was based on photography's board proposed by Thienpont *et al* [18].

Approximately 2g of faecal sample was put into a beaker containing 60 ml of floatation fluid and stirred thoroughly. The resulting faecal suspension was strained in another beaker and then poured into labelled test tubes arranged in a rack, ensuring that it was filled to the brim. A cover slip was placed over each tube for about 20 min, then lifted and immediately placed on a glass slide, after which it was examined in the microscope.

### 2.5. Statistical Analysis

The data collected were recorded in Microsoft Excel 2007. Analysis of data was done with SPSS (Statistical Package for Social Science) version 19.0. The level of significance was tested at 5% and, Chi-square test was used to compare

prevalence between different schools. P value less than 0.05 ( $P < 0.05$ ) was considered significant.

## 3. Results

A total number of 417 children were sampled in four villages and grouped into Nursery, Primary and Secondary schools. No discrimination of schools was done because the possibilities of infection were the same everywhere in all these villages which constitute the Sub-Division. Table 1 shows the prevalence of parasitic infections in different schools and it emerges from this that, in each school, at least one child was infected by one geohelminth. The highest prevalence was noted in Secondary school with 28.5% and the lowest in Nursery school with 13.6% of infected children. In all the examined participants, the prevalence of the total number of infected children was high and amounted to 24.5%. However, no difference statistically significant has been observed between the prevalence of different schools ( $p > 0.05$ ).

The results of the examination shows that, three species of soil transmitted helminths have been identified in all schools as shows in Table 2. These three species of geohelminths was *Ascaris lumbricoides*, *Trichuris trichiura* and Hookworm. In the entire population, *Ascaris lumbricoides* was the most prevalent with 12.0% and *Trichuris trichiura* was the less prevalent with 4.1%. Comparing the specific prevalence between each school, we observed that *Ascaris lumbricoides* and *Trichuris trichiura* were the most prevalent respectively in Nursery and Secondary schools with 6.8% and 13.6% while, Hookworm was most prevalent in Primary schools with 15.3%. No difference statistically significant has been noted between the specific prevalence of each school ( $p > 0.05$ ).

Table 1. Prevalence of parasitic infections in different schools.

Schools	Number of children		Prevalence
	Examined	Infected	
Nursery	103	14	13.6 %
Primary	118	32	27.1 %
Secondary	196	56	28.5%
Total	417	102	24.5%

Table 2. Specific prevalence according to schools.

Parasites	Different schools			
	Nursery N=103	Primary N=118	Secondary N=196	Total N=417
<i>Ascaris lumbricoides</i>	7 (6.8%)	13 (11.0%)	30 (15.3%)	50 (12.0%)
<i>Trichuris trichiura</i>	1 (1.0%)	4 (3.4%)	12 (6.1%)	17 (4.1%)
Hookworm	6 (5.8%)	16 (13.6%)	17 (8.7%)	39 (9.4 %)

## 4. Discussion

The results of this study showing the highest prevalence and the presence of soil transmitted helminths in each school corroborate those obtained in Nigeria by Babatunde *et al* [19]. This presence of parasite would be probably direct consequences of the poor hygienic condition in the school as in the family [20]. They could also note a demographic boom

and the multiplication of schools without an adequate system of waste disposal and non availability of water supply [21, 22]. In Nursery schools, the lowest prevalence which has been observed was small in relation to the one obtained in Haiti by Charpetier *et al* [23]. This could be due to a permanent watch on children and the prevention on geophagy. Always like in Cape Verde, the prevalence in Secondary schools was highest [24] and could be due to the fact that, children would have failed to the responsibility to assume their own hygiene. These consequences have an important impact on the general prevalence drawing to those of Matthys *et al* [7] in Tajikistan and Brooker *et al* [11] in Cameroon. Geohelminths encountered were triad *Ascaris lumbricoides* the most frequent followed by Hookworm and lastly *Trichuris trichiura*. These results corroborate those of Ibidapo *et al* [5] in Nigeria but not of those of Brooker *et al* [11] in Cameroon and those of Seleshi *et al* [25] in Ethiopia. These differences in order to prevalence could be due to different methods used to examine the stools sampled [26]. Nevertheless, as these authors, we have found the same species of soil transmitted helminths, evidence that they are cosmopolitan, mostly in school aged children [27].

Brief, the highest prevalence of infection in the entire population study corroborate the observations of Chartier *et al* [28] who show that, the risk of infection from one individual to another increases when these individuals are together in the during the years.

## 5. Conclusion

Results obtained suggest that STH are important public health problems in the Nkondjock Sub-Division and especially in school-aged children and, actions are imperative against deficiencies in sanitary facilities, improper disposal of human faeces, insufficient supplies of potable water, poor personal hygiene and substandard housing. Furthermore, the improvement of these risk factors, constant sensitization and de-worming campaign supported by the authorities might be benefit for the population and emphasize the decrease of prevalence of STH in the Sub-Division.

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