

## Prevalence of Intestinal Parasitic Infections among Maids in Abidjan, Côte d'Ivoire

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### Abstract

Many different types of intestinal helminthes and protozoa infect man worldwide. Because of inadequate sanitary conditions, enteroparasitic infections constitute a serious public health problem in Côte d'Ivoire where infants are most concerned. Low-income populations, such girls or maids of households, which combine an important illiteracy rate, are especially vulnerable.

**Objective:** This study was conducted to determine the prevalence of intestinal parasites among maids in Abidjan, Côte d'Ivoire.

**Materials and methods:** A cross sectional community study was conducted among 88 households in a residential area of Abidjan, the main city of Côte d'Ivoire. Data from maids were collected by the use of a questionnaire. Stool of these workers were collected and examined for intestinal parasites by using simple smear and Ritchie's technical method.

**Results:** The overall prevalence of intestinal parasitic infections was 19.3%. Protozoa (14.7%) were more commonly found than Helminthes (4.5%). The maids were mainly infected with the fecal-oral transmitted parasites, with *Entamoeba coli* (13.6%). *Necator americanus* (2.3%) were the soil-transmitted helminthes frequently encountered. No multiple infections were noted.

**Conclusion:** These results challenge the authorities on the necessity to improve the poor sanitary conditions of the maids, revealed by the importance of their infestations.

**Keywords:** Prevalence; Parasites; Maids; Stools; Côte d'Ivoire

### Introduction

Diseases are prevalent in countries with limited resources and intestinal parasitic infections are a real public health problem worldwide especially in developing countries. Globally, due to intestinal parasitic infections, some 3.5 billion people are affected; 450 million are symptomatic and yearly more than 200,000 deaths are reported [1].

According to the World Health Organization (WHO) since 1990, almost 1.9 billion people gained access to improved sanitation facilities [2] and in 2011, almost two thirds (64%) of the world's population used improved sanitation facilities while 15% continued to defecate in the open. Because of these inadequate sanitary conditions, enteroparasitic infections constitute a serious public health problem in developing countries where infants are most concerned. Many different types of intestinal helminthes and protozoa infect man, provoking a wide range of symptoms but all etiologic agents are not easily diagnosed in Africa on routine basis because of limited diagnostic facilities and trained personnel [3].

Côte d'Ivoire, like many African countries, is no exception to this global context. Indeed, nearly an Ivorian in two (48%) lives below the poverty and basic infrastructure remain insufficient threshold. The poverty rate is 62.45% in rural areas against 29.45% in urban areas [4]. Furthermore, the policy of health education of the population is still improving, especially among low-income populations, which combine an important illiteracy rate [5]. This is the case of girls or maids of households who are vulnerable to infection because they often live in townships with poor level hygiene. Indeed, the maids are a vital human resource for the operation of households, especially in urban areas. Unfortunately, there is not yet a national plan in order to organize this trade policy, and little information on their health status is available [6].

The prevalence of intestinal parasitic infections among maids in Côte d'Ivoire has never been reported. Infection of asymptomatic persons, especially workers dealing with food (food handlers), could become a potential cause of dissemination of variety of pathogens including intestinal parasites in the surrounding community [7].

This study was to determine the prevalence of intestinal parasites among maids in Abidjan, Côte d'Ivoire.

## Materials

### Study area and sampling

This study was carried out at the mainly maids of the city dormitory "Les Sommets de la Palmeraie, Rosiers 5 A". It is a recent district of 350 households, located in the town of Cocody, Riviera Palmeraie, in Abidjan, the economical capital of Côte d'Ivoire. Hygiene and sanitation within the district is adequate.

Sample size calculation:

$$SS = \frac{z^2 * (p) * (1 - p)}{c^2}$$

Z=1.96 for 95% confidence level

p=0.5 (Prevalence of intestinal parasite)

c=0.04 (confidence interval)

**Ss = 222**

For a large representation of the results, all maids and managers of households were fully informed of the nature and modalities of the study for their maximum co-operation and completed consent forms. An individual interview with a constructed questionnaire was performed to collect socio-demographic data including age, experience, and origin. After receiving information on what participation entailed, those who freely accepted to donate questionnaire and stool samples for the study were the effective study participants.

### Study design and ethical considerations

The study was a cross-sectional, community based study in which participants were volunteer and supposed healthy subjects. The study was approved by the Medical Ethics Committee of the Faculty of Medical Teaching, Félix Houphouët-Boigny University, Côte d'Ivoire and the Regional Delegation of Public Health for Cocody and Bingerville respectively prior to sample collection. The samples collected from participants were identified and processed using codes. Names were not used throughout the study. The samples collected were solely used for the defined purpose. This ensured individual confidentiality.

## Methods

### Specimen collection

Stool samples were collected into clean wide mouth specimen containers. A single freshly voided stool sample was collected from participants per day over three days. Each specimen of stool was brought back in a freezer box to the laboratory at the Faculty of Medical Teaching, Félix Houphouët-Boigny University.

### Fecal examination

Stool specimens were processed with saline wet mount (direct simple smear examination) and examined microscopically using 10X and 40X objectives to detect motile trophozoites. Formalin-ether concentration technique for stool parasites was also used and the sediment examined as iodine wet mounts to detect ova, larvae and cysts of intestinal tract parasites. Attempt was made to go through all

the fields of the preparation before samples were reported negative of parasites. Stool samples were independently examined using a light microscope by two trained technicians.

### Data analysis

The prevalence of intestinal parasites was stratified according to age, experience and origin. Demographic data and prevalence were reported using descriptive statistics. Chi-square or Fisher's exact tests was used for hypothesis testing; to determine whether different groups of maids were infected from intestinal parasites at the same prevalence. The p-values were considered statistically significant at  $p < 0.05$ .

## Results

There were a total of 88 maids from the 350 households who agreed to be enrolled in the study, giving a participating rate of 25.1%. The age range was 16-48 years old (mean=26 years). Data from the questionnaire showed they were majority Ivorian (94.3%) and they lived in their employer's houses in the city. They worked as cooks and half of them had 3 to 5 years of experience. Table 1 shows the socio-economic characteristics of household daughters. Some of them (38.6%) took a deworming drug in the past year.

Characteristics	No.	(%)
<b>Sex</b>		
Male	0	0
Female	88	100
<b>Age</b>		
Mediane age to26 years	44	50
<b>Nationality</b>		
Ivorian	83	94.3
Burkinabeen	3	3.4
Guinean	1	1.1
Malian	1	1.1
<b>School Level</b>		
No	46	52.3
Primary	26	29.6
Secondary	15	17.0
Undergraduate	1	1.1
<b>Motivation for the work</b>		
Voluntary work	60	68.2
Influence of parents	14	15.9
Influence of aunts	12	13.6
Influence of Friends	2	2.3
<b>Culinary Responsibilities</b>		
Both	48	54.5
Herself	24	27.3

Colleague	16	18.2
<b>Duration in the work</b>		
<3 years	45	51.2
3-5 years	22	25.0
6-9 years	14	15.9
>9 years	7	7.9

**Table 1:** Socio-demographic characteristics of the studied population.

The overall prevalence of intestinal parasite infections detected by simple smear or formalin ether concentration methods was 19.3%. The highest prevalence was 30.0% in the group from 31 to 35 years of age followed by 25.0% in the group under 20 years of age (Table 2). In the studied population, all infections were single.

Age (years)	Examined cases	Infected cases	Prevalence* (%)
≤ 20	16	4	25
21-25	24	1	4.2
26-30	30	7	23.3
31-35	10	3	30.0
36-40	7	1	14.3
>40	1	1	100
Total	88	17	19.3

\*No statistically significant difference (p>0.05).

**Table 2:** Age prevalence of intestinal parasites found in home workers in Abidjan.

Table 3 shows that intestinal protozoa (14.8%) were the dominant infection in these workers, as compared to intestinal helminthes (4.5%). Among the intestinal parasite infections, *Entamoeba coli* (13.6%) was the most common protozoa, found, whereas hookworm infection (2.3%) was the predominated intestinal helminth in these subjects. These intestinal parasites are mainly transmitted by the fecal-oral route.

Parasites	Positive cases	
	No	% of total infections
<b>Protozoa</b>		
<i>Entamoeba coli</i>	12	13.6
<i>Endolimax nana</i>	1	1.1
<b>Helminthes</b>		
Hookworm	2	2.3
<i>Schistosoma mansoni</i>	1	1.1
<i>Strongyloides stercoralis</i>	1	1.1

Total	17	19.3
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**Table 3:** Prevalence of common intestinal parasites among 88 home workers in Abidjan.

## Discussion

We did not have the number of responses expected so we considered the result as preliminary. In this cross-sectional study the overall prevalence of intestinal parasites from stool samples was 19.3% in maids working in Abidjan Cocody, Riviera Palmeraie. The majority of household's activity is generally to monitor children, clean the house and cook. This practice has its roots in cultural practices, religious, traditional and the lack of educational. As this is the first study on this category of workers in our country, no comparison with local data could be made. While this finding shows some degree of similarity with that obtained by Traoré et al. (20.5%) in 122 female patients with chronic cough in the two tuberculosis centres of Abidjan [8]. The prevalence was lower than that found in 45 adults from a rural population (29.0%) by Danesco et al. [9].

The prevalence of intestinal parasitic infections varies from one area to another [10,11]. The significant difference in the prevalence depends on personal and community hygiene, sanitation, class of parasite, and climatic factors [12-14]. The relatively lower prevalence in this study could also be attributed to the young ages of participants. Indeed, from other studies, the prevalence in this study drops from teenagers to 41 or 50 years age group, before increasing in ≥ 51 years [15].

Data from interviews showed that domestic women usually had low socioeconomic status and insufficient hygienic conditions, while they live in modern houses depending on their origin and social education. Also, they have had poor access to health care services. This fact could be surprising for non-Ivorian but the reality is that the maids of households had no insurance and could not have good care because of their low income. The prevalence of intestinal parasites could have been more important if they have not taken deworming themselves. A same study in rural area would give more comparison data.

The prevalence of intestinal parasites is usually high in illiterates and persons who had only attained primary education and less in those who had attained university or other higher education level of studies [15-17]. That related the prevalence of parasitic infections to the knowledge of the transmission pattern of the causative organism and the level of education of the respondents.

The relatively high prevalence of parasites transmitted by the fecal oral route recorded in this study (14.8%) is indicative of a level of fecal contamination of the home environment and their low level of sanitation, unless that it does whether accidental consumption of parasite cysts.

Among intestinal parasitic infections, protozoa predominated (14.8%) as compared to helminthes (4.5%). These results are similar to those of Traoré et al. [8]. Oral-fecal transmitted parasite (*E. coli*) was commonly found in house workers. This parasite is considered no pathogens but a mark of hygiene conditions. The prevalence of the nonpathogenic amoebae was not explored further. Parasites transmitted as larvae (hookworm, *S. mansoni* and *Stercoralis*) were the only helminthes diagnosed. Considering the transmission pattern of these helminthes, we can say that the contamination had not occurred in Abidjan for there is no source of these organisms in this area. Regardless of diarrheal outbreaks that may occur; these parasites can

cause various important clinical symptoms, especially amongst HIV/AIDS patients, including malnutrition, iron-deficiency anemia, and malabsorption syndrome. In this study, soil transmitted helminthes (*A. lumbricoides* and *T. trichiura*) were not found probably because 38.6% of the women took a deworming drug in the last year consisting in one tablet of Albendazole (400 mg) which is the drug used for its efficacy.

The facts that these food handlers are asymptomatic make them cysts passers and are unaware that they are possible transmitters of parasitic infections/diseases. So, in addition to the risk of illness to the food handler's themselves [7,18], infection of food handlers with intestinal pathogens, including parasites could be a potential cause for the spreading of these pathogens to the people or the surrounding community. Therefore, several authors from all over the world studied the prevalence of intestinal parasites among food handlers.

It was found in Accra (Ghana) food handlers an overall prevalence of parasitic infection of 21.6%, with helminthic (15.2%) predominating over protozoan (6.4%) infections and parasites species were *Ascaris lumbricoides* (5.0%), *Strongyloides stercoralis* (4.4%), *Enterobius vermicularis* (4.1%) [19]. In the same country, Tay et al. reported a prevalence rate of 19.10% with 11.30% for protozoa and 7.80% for helminths and the common parasites were Intestinal flagellates (59%), *Strongyloides stercoralis* (21%) and Hookworm (7%) [20].

It was found in Nigeria that the most common intestinal parasites affecting the food handlers were *Entamoeba histolytica* with a prevalence of 72%, *Ascaris lumbricoides* (54%), *Enterobius vermicularis* (27%), *Trichuris trichiura* (24%) and *Giardia duodenalis* (13%) [21]. One study in Jos reported also high prevalence of intestinal parasites and the most common detected were *Entamoeba histolytica* (34.7%), *Giardia lamblia* (21.2%), *Ascaris lumbricoides* (26.3%), *Trichuris trichiura* (25.4%), Hookworm (17.8%), *Schistosoma mansoni* (13.6%) and *Hymenolepis nana* (6.8%) [22].

Mengistu et al. [23] in Ethiopia detected a polyparasitism in 56.7% of the dwellers with single infection of *T. trichiura*, *A. lumbricoides* and *S. mansoni* in 16.4%, 5.8% and 1.5% of the infected subjects respectively when *Ascaris lumbricoides* (18.11%), *Strongyloides stercoralis* (5.5%) and *Entamoeba histolytica/dispar* (1.6%) were reported by Andargie et al. [24] and Tefera et al. [25] *Ascaris lumbricoides* and hookworm spp as the predominant parasites. On the other hand, Aklilu et al. observed that *Entamoeba histolytica/dispar* (70.8%) followed by *Giardia lamblia* (18.8%) and *Taenia* species 5 (5.2%) were the most abundant parasite [26].

One study in Makkah during Hajj season reported low prevalence of intestinal parasites and the most common detected pathogenic protozoa were *E. histolytica* (2.78%) and *G. lamblia* (1.98%) [27]. In this study, the prevalence of intestinal parasites was 32.43% in Egyptians.

Siala et al. in Tunisia reported *Dientamoeba fragilis* (15.5%) and *Giardia intestinalis* (7.6%) as the most frequently parasites encountered and *Hymenolepis nana* was the most frequent helminth (4.5% of the whole parasites) [28].

For Zagloul et al. 23% of food handlers were positive for intestinal parasites, *Giardia lamblia* (9%) being the most frequent parasite detected followed by *Entamoeba histolytica* (4.5%) [29]. Also *Entamoeba histolytica/dispar* (3.8%), was the most frequent parasites in Myanmar workers in Thailand followed by *Ascaris lumbricoides* (3.3%), and *Trichuris trichiura* (2.3%) [30]. Another study in Iran

revealed *Entamoeba coli* (4.3%) and *Giardia lamblia* (2.9%) as the important intestinal parasites [31].

In Saudi Arabia, studies conducted with expatriates working there showed high prevalence rates of intestinal parasites varying from 40.3% in Jeddah [32], 41.4% in Riyadh [33], 46.5% in Abha [34].

Overall, a meta-analysis of the prevalence of *Ascaris lumbricoides*, *Entamoeba coli*, *Entamoeba histolytica*, and *Giardia lamblia* among the food staff from 1970 to October 2013 reported a relatively low prevalence in the food-handlers in Asian and African countries compared to the previous studies and a high heterogeneity regarding the prevalence rate in these countries [35].

In our study, the majority of house workers were illiterates or had only attained primary education and were young adults (mean age=26 years) that agreed with previous studies [29,36,37]. Indeed, in Zagloul study's, 80% of the food handlers were young adults from 22 to 42 years, where Abrea found 97% of young from 12 to 40 years and a median of 22 years for Zeru.

But we did not find a statistically significant difference in the occurrence of intestinal parasitic infection between levels of education or age groups ( $p>0.05$ ) as reported by Kheirandish et al. [31]. The prevalence rate obtained (19.3%) agreed with those of Ayeh-Kumi et al. (21.6%) [19] and Tay K (19.10%) [20] in Ghana; near this of Zagloul et al. (23%) [29] but lower than that of Mengistu et al. (56.7%) [23].

Our study did not show a multiple infection, however this situation is frequently encountered in Côte d'Ivoire [8,9]. Indeed, this phenomenon was observed by Nada et al. in Saudi Arabia, where two-thirds of the positive cases were singly infected and the other third with multiple infections including double, triple and quadruple infections [38]. This may involve mixed infection with Helminths and Protozoa, infection with two species of helminths or infection with two species of Protozoa [30,39].

## Conclusion

The present study highlights poor conditions of life and intestinal parasitic infection of maids in Abidjan. It is important for employers to improve health status of Maids by carrying out a medical examination prior to employment or a minimum of stool examination and periodic screening of food handlers for parasites and prompt treatment. Social protection and legal decisions should be one of the state's priorities.

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