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# Profile of intestinal parasites among nomadic Fulani in Kwara State, Nigeria

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**Abstract**

Parasitic infections are endemic worldwide and have been described as constituting the greatest single cause of illness and disease especially in the tropics. Fulani herdsmen belong to a tribe that lives a secluded life style with little information on their intestinal parasitic infections status. This study aimed at assessing the burden of intestinal parasites and risk factors associated with intestinal parasites transmission among Fulani herdsmen in Kwara State. Stool samples were collected from patients that attended three primary healthcare facilities in Ifelodun Local Government Area and one hospital in Moro Local Government Area. The 505 stool samples were collected and examined by both wet mount preparation and formol-ether concentration methods. Questionnaire on bio-data and other information on factors associated with transmission of intestinal parasitic infections was administered on the patients. Prevalence of intestinal parasitic infections was 60.4% among the Fulani. High proportion of the patients had coccidian parasites such as *Cryptosporidium, Cyclospora* and *Isospora*, than other protozoan and helminthic parasites. Factors like unsafe water sources, improper disposal of human and animal wastes, drinking unpasteurized fresh milk and poor personal hygiene were considered contributing factors to the high prevalence of intestinal parasites among the nomad Fulani. The study provided a new insight into burden of intestinal parasites among Fulani herdsmen and factors associated with their transmission and spread.

**Keywords:** Nomadic Fulani; faecal samples; intestinal parasite; coccidian parasites; Kwara State.

## Introduction

Intestinal parasitic infections are consequence of infection by protozoan or helminthic pathogens in human or animal transmitted through faecal-oral route or skin penetration by infective stages. These are responsible for considerable intestinal symptoms leading to morbidity and occasional mortality among infected populations throughout the world [1]. Though the prevalence differ in many regions, it is estimated that around two billion people are infected with intestinal parasites globally [2]. Most of intestinal infections are in infants and school age children in low and middle-income in tropical countries [3]. Contributing factors to transmission and distribution of these parasites in tropical countries include poverty, illiteracy and lack of safe drinking water, poor personal hygiene and inappropriate disposal of human wastes [4]. Environmental factors also play a role in the incidence of intestinal infections, as hot and humid tropical climate favour parasitic survival, multiplication, egg hatching and maturation to infective stages of parasites [2].

Fulanis are mainly herdsmen or pastoralists by occupation and are nomadic or semi-nomadic tribe found in various regions or states in Nigeria. The Fulani herdsmen are largely located in the Sahel and semi-arid parts of West Africa but due to changes in the climate patterns many herdsmen have moved further south into

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savannah and tropical forest belts of West Africa. In Nigeria, their livestock supplied bulk of the beef consumption in the country [5].

They are prominently present in middle belt zone of Nigeria because of vegetation that provides pasture for their herds. Kwara, Niger, Benue, Nassarawa, Kogi, Plateau and Kaduna and FCT are among the States in the middle belt zone of Nigeria that Fulanis predominates. The Fulani in Kwara State engages in open grazing (random movement of their cattle from place to place) but returns to their camps/settlements called Gaa, Suudu hudo or Bukkaru [5]. They have their daily tasks divided by gender and age among the members of the family. The men and young boys manage the herds, field graze, build tents/camps and provide security while the women and young girls take on the traditional roles of sourcing food in the markets, milking the cattle, raising poultry and marketing nunu and fura [6].

The Fulanis in Nigeria are usually neglected and disadvantaged in terms of provision of social amenities such as education, provision of safe public water system, electricity and healthcare facilities. There are no provisions of human waste disposal system and the main sources of drinking and domestic water are stream, river or stagnant body of water, while some occasionally dig shallow well water. Very scanty information is available about their health status in term of prevalence of intestinal parasites mainly because of their herding occupation. Previous studies on intestinal parasitic infections in Kwara State were either hospital-based or communities-based that unintentionally excluded the nomadic Fulani. This study therefore, aimed at assessing the burden of intestinal parasites and risk factors associated with intestinal parasites transmission among nomadic Fulani in Moro and Ifelodun Local Government Areas of Kwara State, Nigeria.

## Methods

*Study sites*

Moro Local Government Area site: Bode Saadu is the headquarters of Moro Local Government that is within Kwara North Senatorial District of Kwara State. Bode Saadu has a number of Fulani Gaas (settlements), common among them are Gaa Saadu and Gaa Abdullahi. Samples were collected through Shekinnah Hospital, a private health facility patronized by the Fulani.

Ifelodun Local Government Area site: Share is the headquarters of Ifelodun Local Government situated within Kwara South Senatorial District of Kwara State. Samples were collected through three government health facilities in Iyanna, Alabe and Idofian were many Fulani Gaas are located.

*Study populations*

The samples were collected from only Fulani tribe who are easily distinguished from other native and indigenous tribes that host the Fulani because they speak native languages (Yoruba or Nupe) poorly but their languages-Fulfulde and Hausa fluently. Institutional ethical clearance to conduct the study was obtained after submission of the proposal protocol to Kwara State University (KWASU) Ethical Committee, under the Director, Community Development Centre.

Heads of Health Departments of Ifelodun and Moro Local Governments considered and approved the proposal protocol and assigned a social mobilization officer of the Local Government to our team to facilitate samples and biodata collection from the health facilities. Fulani Gaa/settlements near each hospital and healthcare centre used for the study were visited and oral/verbal consent was obtained from the Fulani head called 'Sheriki'. The patients that reported to the healthcare center/hospital for whatsoever ailment, stool samples were included among investigation requests from patients or relation that gave consent.

*Sample collection*

All Fulani patients admitted or visiting healthcare center or hospital that consented to participation in the study were enrolled within the months of June 2016 and January 2017. A sterile universal plastic bottle was given to each subject with instruction to use the spoon attached to the bottle lid to collect small amount of freshly passed faecal sample. The samples were received labeled and bio-data collected on the spot. An interpreter in Fulfulde/Hausa language was employed at each center. Collected samples were transported to the laboratory as soon as received. Items on the questionnaire used in the study include: name, age, sex, name of the Gaa (settlements), availability and type of toilet in the Gaa, methods defecation, information on hands-wash after defecation, sources of drinking water (stream, pond, well, borehole), and drinking of fresh milk.

*Sample analysis*

Macroscopic examination of each sample was done as soon as samples were received and registered in the laboratory. Microscopic preparation was done in fresh physiologic saline, in a wet mount preparation and examined for motile flagellates, ova of helminthes and cysts of protozoans. A drop of Dobell's iodine was used in addition to saline preparation to assist in differentiating cysts of *E. histolytica/dispar* from *E. coli* [7].

Ridley modified formal ether concentration technique [8] was used to improve the recovery of cysts and oocysts of protozoan parasites and ova of helminthes from

samples that were missed in wet preparation. The sediments produced from formol-ether concentration technique were prepared by placing one drop each on the left and another on the right of the slide. A drop of Dobell's iodine was added to the left preparation. Both preparations were covered with coverslip and several fields examined. This was examined again for cysts and ova of parasites. Another drop of the sediment was placed at the center of second slide, allowed to air dry and stained by modified Ziehl-Neelsen method for the detection of *Cryptosporidium*, *Isospora* and *Cyclospora* [9]. Oocysts of *Cyclospora cayetanensis* after staining, were pinkish red with green background and were slightly bigger (8 to 10 $\mu$m) in diameter than oocysts of *Cryptosporidium* (6 to 7 $\mu$m) with same green background as previously [10]. Oocysts of *Isospora belli* are oval and 20 to 33 $\mu$m with a hyaline cell wall. Results of stool parasites and biodata were compared by *chi*-square and Fisher exact tests.

## Results

A total of 505 samples were collected from the three healthcare clinics and one privately owned hospital in the two senatorial districts of Kwara State, 270(53.47%) were males while 235(46.53%) were females. The age structures of the participants were 1-65 years and were exclusively Fulani by tribe.

The prevalence of intestinal parasitic infections was 60.4%. The profile of parasites detected among the sexes was as presented in Table 1. The prevalence was slightly higher among the female (30.7%) than the male (29.7%) patients, but the difference was not significant.

The parasites detected can be categorized into three groups: protozoan parasites – *Entamoeba histolytica/ dispar*, *E. coli* and *G. lamblia*; helminthic parasites – hookworm (*Ancylostoma sp/Necter* sp), *A. lumbricoides, S. mansoni,* and *S. stercolaris*; Coccidian parasites- *Crytosporidium* spp, *Cyclospora cayetanensis* and *Isospora* spp as presented in Table 2. The highest prevalent parasite among the Fulani in this study was *Cryptosporidium* spp. (30%).

There are no public water supplies in all the Fulani settlements (Gaas), they relied on other alternative sources of water supply for drinking and domestic use. Most of them depended on shallow well water (50.9%) while other got water supply from streams or brooks (Table 3).

Questionnaires administered assessed personal hygiene of the Fulani. Majority of Fulamis do not wash their hands after use of toilet (58.4%) while (64.4%) do not wash hands before meals. However, few of them walk bare foot (24.7%). Majority of Fulanis in this study drink fresh unpasteurized milk daily (63.1%) while others consume fresh milk at least once a week (47.1%) as presented in Table 3.

**Table 1.** Prevalence of intestinal parasites among Fulani in parts of Kwara State.

| Clinics $n$=505 | Total $n$ (%) | Male $n$ (%) | Female $n$ (%) | $x^2$ | $p$-value |
|---|---|---|---|---|---|
| Alabe | 120 (23.7) | 75(62.5) | 45(37.5) | | |
| Iyanna | 275(54.5) | 135(49.1) | 140(50.9) | | |
| Gommo | 30(5.9) | 10(33.3) | 20(66.7) | | |
| Saadu | 80(15.8) | 50(62.5) | 30(37.5) | 13.564 | 0.003563 |
| **Total No Infected $n$=305** | Total $n$ (%) | Male $n$ (%) | Female $n$ (%) | | |
| Alabe | 85(70.9) | 45(52.9) | 40(47.1) | | |
| Iyanna | 160(58.2) | 80(50.0) | 80(50) | | |
| Gommo | 15(50.0) | 0(0.0) | 15(100) | | |
| Saadu | 45(56.3) | 25(55.6) | 20(44.4) | 15.772 | 0.001263 |

**Table 2.** A checklist of intestinal parasites detected among Fulanis in Kwara State.

| Parasites Detected $n$ =505 | Total $n$ (%) | Male $n$ (%) | Female $n$ (%) | $x^2$ | $p$-value |
|---|---|---|---|---|---|
| *E. histolytica* | 71(14.1) | 43(60.6) | 28(39.4) | | |
| *E. coli* | 30(5.9) | 21(70.0) | 9(30.0) | | |
| *G. lamblia* | 30(5.9) | 13(43.3) | 17(56.7) | | |
| *Ancylostoma/Nectar* sp | 70(13.9) | 33(47.1) | 37(52.9) | | |
| *A. lumbricoides* | 56(11.1) | 31(55.4) | 25(44.6) | | |
| *S. mansoni* | 5(0.99) | 5(100.0) | 0(0.0) | | |
| *S. stercoralis* | 10(1.98) | 8(80.0) | 2(20) | | |
| *Cryptosporidium* spp | 155(30.7) | 75(48.4) | 80(51.6) | | |
| *C. cayetanensis* | 55(10.8) | 26(47.3) | 29(52.7) | 18.227 | 0.04926 |
| *I. belli* | 35(6.9) | 22(62.8) | 13(37.2 | | |

**Table 3.** Factors associated with transmission of intestinal parasites among Fulanis.

| Water sources $n$ =505 | Total $n$ (%) | Male $n$ (%) | Female $n$ (%) | $x^2$ | $p$-value |
|---|---|---|---|---|---|
| Well water | 257(50.9) | 120(46.7) | 137(53.3) | | |
| River/ Brook | 248(49.1) | 140(52.1) | 129(47.9) | 1.2996 | 0.2543 |
| **Fresh Milk Consumption *n*=505** | | | | | |
| Daily | 319(63.1) | 132(41.4) | 187(58.6) | | |
| Once weekly | 238(47.1) | 81(34.1) | 157(65.9) | | |
| Don't drink Milk | 112(22.2) | 61(54.5) | 51(45.5) | 13.191 | 0.001366 |
| **Level of Personal hygiene *n*-505** | | | | | |
| Wash hands after use of Toilet (Yes) | 210(41.6) | 82(39.0) | 128(61.0) | | |
| Wash hands before meals (Yes) | 180(35.6) | 73(40.6) | 107(59.4) | | |
| Walk bare foot (Yes) | 125(24.7) | 83(66.4) | 42(33.6) | 27.149 | 0.000001 |

## Discussion

Parasitic infections are endemic worldwide and have been described as constituting the greatest single causes of illness and disease especially in tropical countries [4]. The findings of the present study among the Fulani tribe in two senatorial districts of Kwara State was conducted between June, 2016 and January 2017. About 60.4% of the participating individual aged 1-65 years harboured at least one species of intestinal parasite. This is higher than previous study with a prevalence of 41.9% among Yoruba tribe in one of the senatorial districts of Kwara State that was conducted among the school aged children [11]. This however differs from high prevalence of 86.2 and 80.9% obtained among the school children in Burkina-Faso [12] and in the rural north-eastern Nigeria [13] respectively, these differences may be attributed to level of environmental and personal hygiene, and that children are more likely to be infected than adults.

Intestinal coccidian parasites were more commonly found; the three predominant pathogenic intestinal coccidian parasites among the Fulani were: *Cryptosporidium* species, *Cyclspora cayetanensis* and *Isospora* species. Other studies have demonstrated *Cryptosporidium* species as a zoonotic disease that is transmitted from infected cattle through unpasteurized milk and animal wastes to humans [14, 15]. Majority of the nomad Fulani consumed unpasteurized fresh milk daily while only a small proportion of the respondents do not drink fresh unpasteurized milk. Other factors that may contribute to high prevalence of the coccidian parasites among the studied group included non-availability of safe methods of disposing human and animal wastes, poor personal hygiene, lack of safe water and lack of health education. The major sources of drinking water by nomad Fulani are shallow wells and streams/brooks water shared with their animals.

The pathogenic intestinal protozoans detected in this study were *E. histolytica/dispar* and *G. lamblia* which were low prevalence. A relatively higher prevalence of *E. histolytica/dispar* (66.5%) and *G. lamblia* (28.1%) was obtained by Erismann and colleagues [12] at Plateau Central and Centre-Ouest regions of Burkina Faso. Breeding and raising cattle by Fulani exposed them to hazard of acquiring infectious agents from the animal and the environment. The detection of *E. histolytica/ dispar* is of particular significance among the Fulani herdsmen that live in familiar settlements far from healthcare facilities and easy of dissemination of the cysts from an asymptomatic carrier to member of nuclear family that may not be immunocompetent and to the environment [16].

Four helminthic parasites were detected in this study, they were hookworm, *A. lumbricoides* and *S. stercoralis* (1.9%). In a similar study by Babatunde and others [11] that obtained a lower prevalence of *A. lumbricoides* (4.7%) and hookworm (8.8%), but a higher prevalence of *S. stercoralis* (2.9%). The occurrence of these soil-transmitted helminthic parasites among Fulanis is lower than the occurrence of protozoan and Coccidian parasites as revealed in this study.

One water-based helminthic parasites were also detected among the patients in this was *S. mansoni,* as did by Erismann and colleagues [12]. Schistostomiasis constitute a serious health hazard to nomad herdsmen who would have to rear the animals across streams and rivers while finding suitable pasture for the animals without possibility of visiting health care centre for investigation and treatment.

There were three main limitations encountered in this study. Firstly, Fulanis are generally suspicious of other tribes and are afraid to hand over their faecal wastes. Though we got consent from Sherikis of each settlement/ Gaa and used Fulfude interpreter, out of one thousand five hundred universal plastic bottles issued to Fulani recruited for this study, only five hundred and five were returned with faecal specimen. For this reason we had a lower sample size, only a single stool sample was collected from each patient, this may cause under estimation of the true intestinal parasitic prevalence in

this result. Secondly, the finding presented here represented far below our projected estimate of eight hundred to nine hundred stool samples. Thirdly, follow-up treatment of infected Fulanis in this study was difficult, but it was accomplished.

## Conclusion

This study provides an insight into the burden of intestinal parasite among the Fulani herdsmen and its association with personal hygiene, water sources and the consumption of milk. We reported that there was high prevalence of intestinal coccidian parasites among the Fulani herdsmen than other intestinal protozoan and helminthic parasites.

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**Ethical approval and consent**

Institutional ethical approval for this study was obtained from KWASU Community Development Centre (CDC). Health based ethical approval was obtained from Heads of Department of Health, from where letters were issued and taken to Health facilities used in Moro and Ifelodun LGA. Oral informed consent was obtained from the Sherikin settlements/Gaas and from individual patients before samples were collected.

**References**

1. World Health Organization; Tropical Disease. 1990. *Am. Soc. Microbiology* (ASM), *News, 56:* 358-359
2. WHO. 2010. *Prevention and control of intestinal parasitic infections: WHO Technical Report Series No. 749*; Report of a WHO expert committee. WHO/Department of communicable disease, prevention, control and eradication; Geneva.
3. Adedoyin, M. A., Awogun, I. A., Luergensen, T. 1990. Prevalence of intestinal parasitoses in relationship to diarrhea among children in Ilorin, *West Afri. J. Med., 9:* 83-88.
4. Strunz, E. C., Addiss, D. G., Stocks, M. E., Ogden, S, Utzingerd, D., Freeman, M. C. 2014. Water, sanitation, hygiene and soil-transmitted helminth infections: a systemic review and meta-analysis. *Plos Negl. Trop. Dis., 8:* e3296. View article PubMed Central Google Scholar
5. Abbass, M. 2012. No retreat no surrender conflict for survival between Fulani pastoralists and farmers in Northen Nigeria: *European Scientific Journal, 8(1):* 335-339.
6. Iro, I. 1994. From nomadism to sedentarism: An analysis of development constraints and public policy issues in socioeconomic transformation of the pastoral Fulani of Nigeria (Thesis), Howard University.
7. WHO. 1994. *Bench aids for diagnosis of intestinal parasites.* World Health Organization, Geneva.
8. Ridley, D. S., Hawgood, B. C. 1965. The value of Formol-etherconcentration in faecal cysts and ova. *J. Clin. Pathol., 9:* 74-76.
9. Cheesbrough, M. 2005. *District Laboratory Practice in Tropical Countries, Part 1*. Cambridge University Press, pp. 86-100.
10. Connie, R. M. and George, M. Jr. 1995. In: *Text book of diagnostic Microbiology*. WB. Saunders Company, Philadelphia, pp. 762-765.
11. Babatunde, S. K., Adedayo, M. R., Ajiboye, A. E., Sunday, O. and Ameen, N. 2013. Soil-transmitted helminth infections among school children in rural communities of Moro Local Government Area of Kwara State, Nigeria. *African Journal of Microbiology Research, 7(45):* 5148-5153.
12. Erismann, S., Diagboug, S., Odermatt, P., Knoblauch, A. M., Gerold, J., Shresttha, A., Grissoum, T., Kabore, A., Schindler, C., Utzinger, J. and Gueladio, C. 2016. Prevalence of intestinal parasitic infections and associated risk factors among school children in the Plateau Central and Centre – Ouest regions of Burkina Faso; *Parasites and Vectors, 9:* 554-559.
13. Damen, J. G., Luka, J. and Lugos, M. 2011. Prevalence of intestinal parasites among pupils in rural North Eastern Nigeria. *Niger. Med. J., 52(1):* 4-6.
14. Largberge, I., Ibrahim, A., Barta, J. R. and Griftiths, M. W. 1996. Detection of Cryptosporidium parvum in raw milk by PCR and oligonucleotide Probe Hybridization. *Applied Environmental Microbiology,* 3259-3264
15. Center for Disease Control. 2015. Cryptosporidiosis, Cryptosporidium. Morbidity and Mortality Weekly Report (MMWR) 1: New Mexico Raw Milk.
16. Roches, J. and Benito, A. 1999. Prevalence of intestinal parasitic infections with special reference to Entamoeba histolytica on the Island of Bioko (Equatorial Guinea). *Am. J. Trop. Med and Hygiene, 60 (20):* 257-262.

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