

(RESEARCH ARTICLE)



OCCURRENCE OF ASCARIDIOSIS AND RISK FACTORS IN GUINEA FOWL () IN THE URBAN COMMUNE OF KINDIA, REPUBLIC OF GUINEA

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ABSTRACT

In the Republic of Guinea, epidemiological data on *Numida meleagris* ascaridiosis remain virtually non-existent, despite the growing role of this smallholder production system in household food security. This study determined the prevalence of *Ascaridia* infection in guinea fowl in the Urban Commune of Kindia and identified the associated risk factors. A cross-sectional study was conducted between October 2023 and April 2024 in 366 guinea fowl across 10 localities of the commune. Parasitological status was assessed by coproscopic examination, combining direct wet-mount and flotation methods, with eggs identified using classical morphological criteria for the genus *Ascaridia*. A structured questionnaire and clinical examination assessed farmers' knowledge, attitudes, and practices regarding parasite control. Overall ascaridiosis prevalence was estimated at 46.72% and increased significantly with decreasing age, rising from 18.18% in birds older than 2 years to 63.95% in keets aged 0-1 year ($P < 0.0001$). Prevalence was also significantly higher in extensively raised birds than in those under semi-intensive management, in flocks with poor hygiene than in those with good hygiene, and in birds fed exclusively by free-range foraging than in those receiving supplementary feed ($P < 0.0001$), whereas sex and locality had no significant effect ($P > 0.05$). The survey revealed that 60.87% of farmers were unaware of ascaridiosis, alongside insufficient prophylactic coverage and systematic cohabitation between treated and untreated animals. These findings confirm active circulation of ascaridiosis in smallholder guinea fowl flocks in Kindia, driven mainly by young age and by husbandry practices exposing birds to contaminated ground, and support targeted awareness and deworming programmes prioritising young birds and extensive production systems.

Keywords: Prevalence; Ascariidiosis; *Numida meleagris*; Risk factors; Kindia; Guinea

1 INTRODUCTION

Family poultry farming occupies a predominant place in livestock production systems in West Africa. It accounts for more than 80% of the continent's poultry population [1]. This extensive, low-input production system is based on free-range scavenging [2]. It is managed mainly by women and children in rural areas and contributes significantly to food security, income diversification, and the economic resilience of family farms [3]. In the Republic of Guinea, the national poultry population is currently estimated at more than 25 million birds. Only about 7% belong to modern semi-intensive systems [4]. Most production relies on traditional village poultry farming, which is highly exposed to avian diseases [3, 5]. The guinea fowl (*Numida meleagris*) occupies a special place among the poultry species raised in sub-Saharan Africa. It stands out for its hardiness, its relative resistance to the major diseases of local chickens, and its high value [6, 7]. This hardiness has long been regarded as a major zootechnical advantage for resource-limited farmers. It does not rule out a genuine susceptibility to gastrointestinal helminthiases, particularly ascariidiosis [6, 8]. This disease is caused by nematodes of the genus *Ascaridia*. *Ascaridia galli* is the most common and most pathogenic species [9, 10]. In Nigeria, a review covering the period 1980–2022 confirms that *Ascaridia galli* remains the most frequently reported gastrointestinal nematode in poultry [11]. Recent studies show that co-infection with *A. galli* and *Eimeria* spp. can cause severe enteritis in guinea fowl [12]. This parasitic association is also documented in sub-Saharan Africa under extensive husbandry [13].

Ascaridia galli is transmitted via the faecal–oral route, through ingestion of embryonated eggs that persist in the external environment [14]. It causes digestive disturbances, inappetence, and, in cases of massive infestation, intestinal obstruction that can be fatal in young birds [10, 15]. It reduces growth performance and impairs feed conversion [12], leading to economic losses estimated at up to 20% in affected flocks [15, 16].

Several surveys confirm the wide distribution of ascariidiosis in West and Central Africa. Prevalence varies considerably by area and season [16, 17]. In Nigeria, overall helminth prevalence reaches 54.8% in chickens [18]. Age, sex, and the rainy season are associated factors. In Maiduguri, guinea fowl are nearly 14 times more infested than local chickens [8]. Prevalence there reaches 84.5% in guinea fowl, versus 25.7% in chickens, with infestation significantly more pronounced in females. This pattern is also documented in Niger, Chad, Cameroon, and Benin, under extensive husbandry systems comparable to those in Guinea [13, 19, 20].

In Guinea, studies on the epidemiology of ascariidiosis in guinea fowl remain virtually non-existent. This infestation has never been the subject of a dedicated study, including in the Urban Commune of Kindia. This contrasts with the data available for other avian diseases of local chickens [21, 22]. This gap is concerning: parasitoses such as ascariidiosis develop insidiously and non-specifically. They therefore frequently escape diagnosis and are neglected in animal health programmes, even though their impact on the growth, reproduction, and survival of guinea fowl keets is far from negligible. In Kindia, local farmers and veterinarians report increasing mortality among guinea fowl keets, with no causal diagnosis established to date. This situation is compounded by the Sudano-Guinean tropical climatic conditions of the Kindia region. This area is characterised by abundant rainfall and high relative humidity for several months of the year [23]. These conditions are thought to favour the development and spread of nematodes of the genus *Ascaridia* [24]. The present study aimed to determine the prevalence of ascariidiosis and the associated risk factors (age, sex, locality) in guinea fowl in this area, with a view to proposing control measures suited to Guinean family poultry farming. Egg identification, based on morphological criteria, places the causative agent at the genus level (*Ascaridia* sp.), consistent with the regional literature indicating that *Ascaridia galli* is the predominant species in guinea fowl in West Africa [11, 14].

2 MATERIALS AND METHODS

2.1 Study area

This study was conducted from October 2023 to April 2024 in the urban commune of Kindia, the administrative seat of the eponymous prefecture and region, located 135 km north-east of Conakry. It covers an area of 9,115 km² with an estimated population of 438,315 inhabitants, corresponding to a density of 48 inhabitants/km². The urban commune of Kindia comprises 31 quarters and 15 rural districts, ten (10) of which were selected for this study: Fréfou, Dadia, Sarakoléa, Manquepa, Tapioka, Wondy, Sambaya, Gare, Kassia, and Banlieue (Fig. 1). The climate is of the Sudano-Guinean tropical type, with alternating dry (November to April) and rainy (May to October) seasons. Mean annual rainfall is close to 2,120 mm, and relative humidity remains high for several months of the year [23]. These conditions of prolonged heat and humidity are particularly favourable for the embryonation and survival of *Ascaridia* eggs in the external environment [24]. The area is drained by the Konkouré River, which rises in the neighbouring region of Mamou.

Farming, livestock rearing, and trade are the main income-generating activities. Livestock production is predominantly family-based, practised as free-range scavenging year-round, with frequent cohabitation between guinea fowl, local chickens, and other species within the same household compounds. This extensive husbandry system, combined with persistent soil moisture around water points and the absence of hygiene measures or grazing-area rotation, creates conditions that are particularly conducive to contamination and re-contamination of poultry by environmental *Ascaridia* eggs.

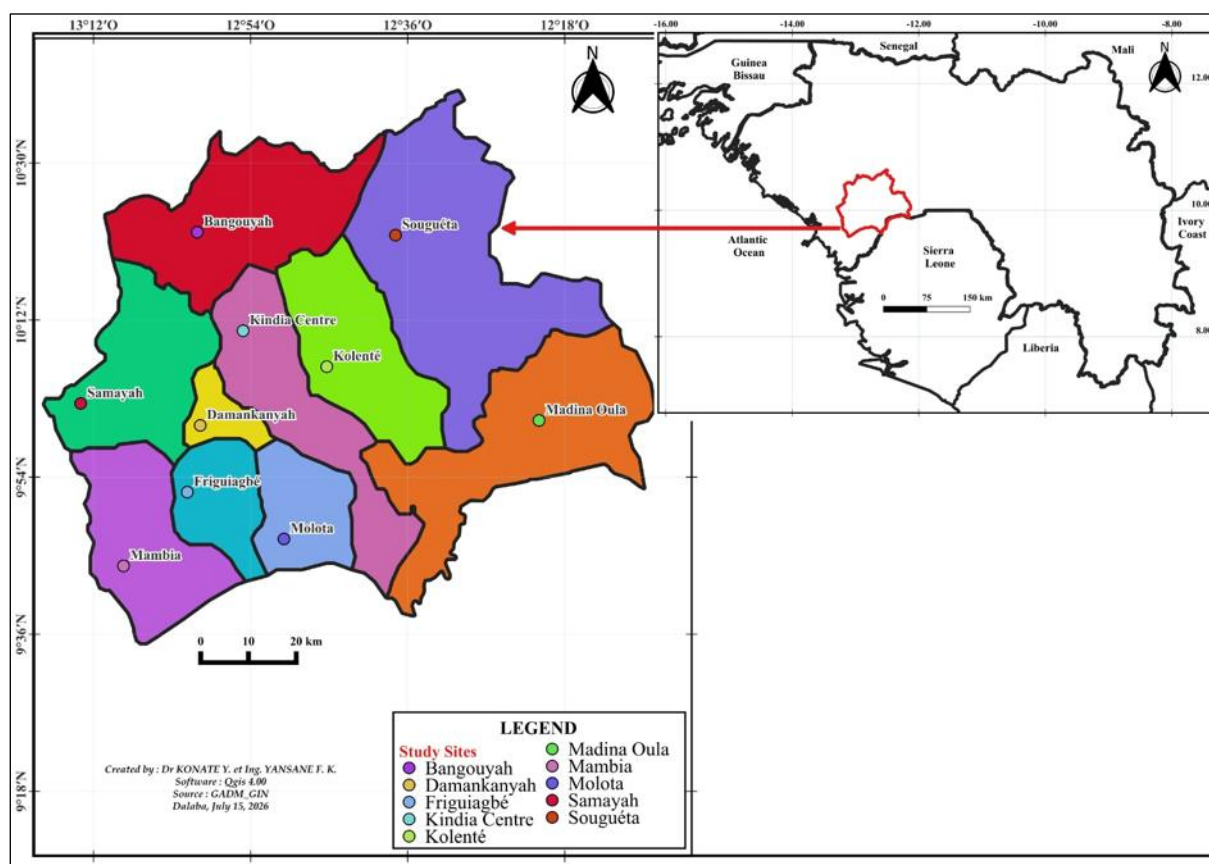


Figure 1: Map showing the guinea fowl faecal sampling sites in the study area

2.2 Ethical considerations

Prior authorisation was obtained from the prefectural and communal livestock authorities of Kindia before the start of field investigations. In each locality, quarter and district chiefs were informed of the study objectives and procedures before any contact was made with farmers. Free and informed verbal consent was systematically obtained from each farmer before any faecal sampling of their flock. No animal was handled without the owner's consent. Faecal sampling was carried out non-invasively, without stress or prolonged restraint of the animals. Farmer anonymity was strictly preserved: questionnaires did not include any nominal identifiers, only a locality code and a sequential number.

2.3 Study population and survey design

This was a descriptive and analytical cross-sectional study conducted between October 2023 and April 2024, combining a socio-epidemiological survey using a structured questionnaire, an individual clinical examination, and coproscopic analysis. The study population comprised all guinea fowl (*Numida meleagris*) raised under the extensive family free-range system by households in the Urban Commune of Kindia.

2.4 Guinea fowl sampling

The sample size for this study was determined using the formula proposed by Pourhoseingholi [25]:

$$n = \frac{Z^2 \times P(1 - P)}{d^2}$$

where n = sample size; $Z = 1.96$ (95% confidence level); d = absolute precision (5%); and the expected prevalence, based on an earlier study conducted in the Mamou region, was 22.40% [26].

Using the formula above, a minimum sample size of 366 guinea fowl was determined, distributed across 10 localities of the Urban Commune of Kindia: Fréfou, Dadia, Sarakoléa, Manquepa, Tapioka, Wondy, Sambaya, Gare, Kassia, and Banlieue. These localities were selected based on accessibility and the availability of guinea fowl required for the study. Sampled animals were divided into three age classes (0-1 year, 1-2 years, >2 years), reconstructed from information provided by the farmers (Table 1).

2.5 Farmer survey

A structured, pre-tested questionnaire was administered to 46 volunteer farmers from the study area. It addressed general knowledge of ascaridiosis, flock characteristics and size, and the origin of the guinea fowl. It also covered health management practices (deworming, vaccination, and use of veterinary care) and any cohabitation with other poultry species, particularly local chickens.

2.6 Clinical examination of the flock

An individual clinical examination of the general condition of each sampled guinea fowl was performed in the field. It aimed to detect clinical signs suggestive of avian parasitoses in general, and of ascaridiosis in particular: ruffled feathers, diarrhoea, lethargy, depression, feather loss, and pallor of the comb and wattles. This examination allowed animals to be classified as suspected of coccidiosis, ascaridiosis, or cestodiasis, based on the observed symptomatology.

2.7 Sample collection, transport, and analysis

Faecal samples were collected individually from the 366 study animals using single-use gloves to ensure asepsis and prevent cross-contamination between samples. Each sample was immediately placed in an empty sterile vial, pre-labelled with a code corresponding to the animal's information (locality, age, sex), allowing rigorous traceability throughout the study. To preserve the biological integrity of the samples and limit degradation of parasitic elements (eggs, cysts, oocysts) before analysis, the cold chain was maintained using dry ice in an insulated cooler box. The samples were transported to the parasitology laboratory of the Institut Supérieur des Sciences et de Médecine Vétérinaire de Dalaba within a maximum of 24 hours after collection, in accordance with standard parasitological recommendations to limit morphological alteration of the parasitic forms.

2.8 Laboratory analysis

In the laboratory, *Ascaridia* eggs in faecal samples were identified using two complementary parasitological methods widely described in the veterinary literature: the direct wet-mount examination and the Willis flotation technique [27].

2.8.1 Direct wet-mount examination

This method involved using a Pasteur pipette to collect a small amount of faecal matter, which was homogenised in a drop of distilled water placed on a microscope slide. After homogenisation with a glass rod, the preparation was covered with a coverslip and examined directly under a light microscope, allowing rapid, qualitative detection of parasite eggs, larvae, or vegetative forms.

2.8.2 Flotation method

The flotation method, as described by [27], allowed the concentration of light parasitic elements by density difference. Faecal samples were homogenised using glass rods in a saturated sodium chloride solution (NaCl, density approximately 1.20), used as the flotation medium owing to its density being higher than that of helminth eggs. The resulting mixture was filtered through sieves to remove coarse debris and then transferred into Erlenmeyer flasks. Centrifugation was subsequently performed to promote the rise of parasitic elements to the surface. The supernatant was collected with a Pasteur pipette, placed on a microscope slide, covered with a coverslip, and examined under a light microscope for the identification and enumeration of *Ascaridia* eggs. Methylated alcohol and distilled water were used, respectively, for occasional fixation of preparations and for rinsing steps.

2.8.3 Microscopic reading and identification

All slides from both techniques were examined under a light microscope ($\times 100$ and $\times 400$ magnification) by the same experienced laboratory technician, to minimise inter-observer variability. Identification of *Ascaridia* eggs was based on their classical morphological features: an ovoid shape, a thick, smooth shell, and unsegmented granular content.

2.9 Statistical analysis

Data were entered in Microsoft Excel, then exported and analysed using the R statistical software (version R 2.13.0). Categorical variables were expressed as proportions with their 95% confidence intervals (95% CI), calculated using the Wilson method. Prevalence was compared between age classes, sexes, and localities using Pearson's chi-squared test, or Fisher's exact test when expected theoretical frequencies were below 5. For the chi-squared test, results are presented as $\chi^2(df) = \text{value}$, $p = \text{value}$; for Fisher's exact test, only the p-value is reported. This comparison was supplemented by calculation of the odds ratio (OR), together with its 95% confidence interval, as a measure of association between the study variables and infection status. A p-value < 0.05 was considered statistically significant.

3 RESULTS

3.1 Characteristics of the surveyed flocks and farmers' knowledge of the parasitosis

The local breed was the only guinea fowl breed recorded in the Urban Commune of Kindia, raised exclusively under an extensive free-range system. Of the 366 sampled birds, the 0-1-year age class was the most represented (46.99%; $n = 172$), followed by the 1-2-year class (31.97%; $n = 117$) and the >2-year class (21.04%; $n = 77$), with a statistically significant difference ($p < 0.001$) (Table 1). The sex ratio was significantly skewed towards females (67.21%; $n = 246$) compared with males (32.79%; $n = 120$) ($p < 0.001$). The average size of family flocks ranged from 50 to 100 birds per household (Table 1).

Table 1: Distribution of sampled guinea fowl by locality, sex, and age class

Localities	Number of guinea fowl	Age classes			Sex	
		0–1 year	1–2 years	>2 years	Males	Females
Fréfou	50	24	18	8	16	34
Dadia	30	16	10	4	10	20
Sarakoléa	40	21	12	7	13	27
Manquepa	44	23	13	8	14	30
Tapioka	28	13	10	5	9	19
Wondy	39	16	12	11	13	26
Sambaya	18	7	6	5	6	12
Gare	27	13	8	6	9	18
Kassia	52	23	18	11	17	35
Banlieue	38	16	10	12	13	25
Total	366	172	117	77	120	246
Proportion (%)	-	46.99	31.97	21.04	32.79	67.21
p-value		-	0.00042	<0.001	<0.001	

p-value: p-value for comparison of the proportions of sampled birds by age class or sex.

The KAP survey revealed that 84.78% [95% CI: 70.51-93.15] ($n = 39$) of the farmers interviewed had observed, at least once, symptoms suggestive of viral or parasitic disease within their flock. Nevertheless, a majority (60.87% [95% CI: 45.39-74.54]; $n = 28$) reported not recognising ascaridiosis as a distinct disease entity, even though the symptoms spontaneously described (diarrhoea, weight loss, depression) were strongly suggestive of this helminthiasis (Table 2). Regarding deworming practices, 63.04% [95% CI: 47.52-76.40] ($n = 29$) of farmers reported deworming occasionally, whereas 36.96% [95% CI: 23.59-52.47] ($n = 17$) were unaware of the value of this prophylactic practice. In all reported cases, dewormed and non-dewormed birds cohabited within the same flock managed under an extensive system, a practice that represents a major risk factor for recontamination through faecal–oral transmission between treated and untreated animals. Regarding health care, 89.13% [95% CI: 75.63-95.92] ($n = 41$) of farmers did not use any specialised veterinary service to identify the diseases affecting their flock. Among the 29 farmers who nonetheless sought care for their sick animals, only 17.24% [95% CI: 6.52-36.48] ($n = 5$) consulted a veterinarian, whereas 82.76% [95% CI: 63.51-93.47] ($n = 24$) resorted to self-medication (Table 2).

Table 2: Knowledge, attitudes, and practices (KAP) of guinea fowl farmers in the urban commune of Kindia regarding parasitic diseases

Variable	Category	Nb	Percentage (%)	95% CI
Observed suggestive symptoms	Yes (at least once)	39	84.78	[70.51-93.15]
	No	7	15.22	[06.83-29.48]
Knowledge of ascaridiosis	Do not know the disease entity	28	60.87	[45.39-74.54]
	Know the disease entity	18	39.13	[25.45-54.60]
Deworming practice	Occasional deworming	29	63.04	[47.52-76.40]
	Unaware of the value of deworming	17	36.96	[23.59-52.47]
Use of veterinary services	No use of veterinary services	41	89.13	[75.63-95.92]
	Uses veterinary services	5	10.87	[04.07-24.36]
Management of sick animals	Veterinary consultation	5	17.24	[06.52-36.48]
	Self-medication	24	82.76	[63.51-93.47]

Nb: number; CI: confidence interval

3.2 Clinical examination of the flock

Clinical examination of the 366 guinea fowl allowed coccidiosis, ascaridiosis, and cestodiasis to be suspected on the basis of non-specific clinical signs, including ruffled feathers, diarrhoea, lethargy, depression, feather loss, and pallor of the comb and wattles. Overall, 63.38% of examined birds (n = 232) presented at least one clinical sign suggestive of digestive parasitism. Stratified analysis by age class showed a decrease in the clinical suspicion rate with increasing age. The suspicion rate was 81.97% (95% CI: 75.23-87.25) in guinea fowl keets aged 0-1 year, 59.82% (95% CI: 50.34-68.66) in birds aged 1-2 years, and 27.27% (95% CI: 18.03-38.80) in birds older than 2 years (Table 3).

Table 3: Clinical examination of guinea fowl by age class

Age class	Number examined	Number suspected	Suspicion rate (%)	95% CI
>2 years	77	21	27.27	[18.03-38.80]
1-2 years	117	70	59.82	[50.34-68.66]
0-1 year	172	141	81.97	[75.23-87.25]
Total	366	232	63.38	-

3.3 Overall prevalence of ascaridiosis and morphometric identification

Of the 366 faecal samples analysed, 171 were positive on coproscopic examination, corresponding to an overall ascaridiosis prevalence of 46.72% (Fig. 2C). The flotation method detected almost all positive cases, whereas direct wet-mount examination revealed only a marginal number of eggs. Morphometric identification confirmed the nature of the parasitic elements detected. Eggs observed under light microscopy showed a smooth shell and an ovoid shape characteristic of the genus *Ascaridia* (Fig. 2A). In addition, post-mortem examination of a subsample of animals allowed the isolation of adult worms displaying the typical morphology of *Ascaridia galli* (Fig. 2B).

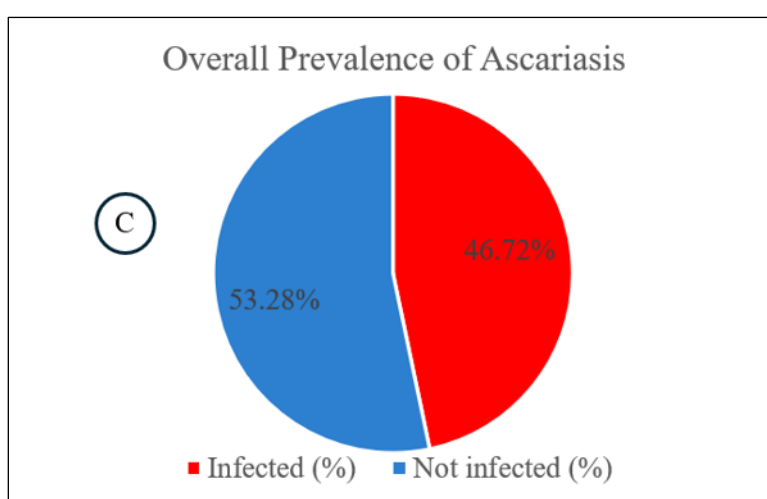
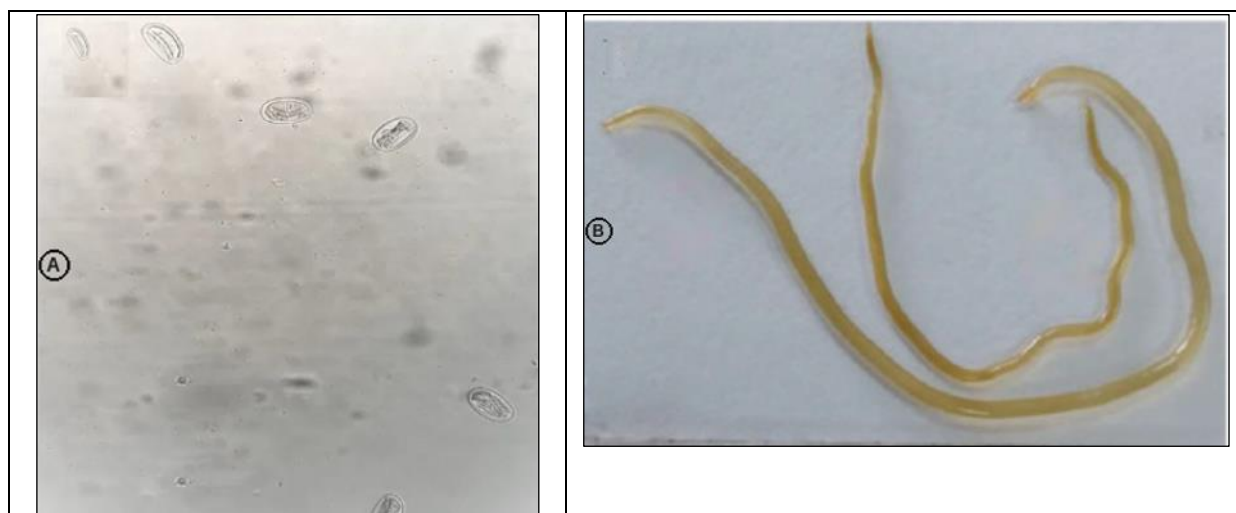


Figure 2: Prevalence and morphology of *Ascaridia* spp. A total of 366 guinea fowl were sampled and examined. Parasites were identified by morphology and morphometry. (A) Several *Ascaridia* spp. eggs in a flotation preparation; (B) Adult *Ascaridia* spp. worms isolated from the guinea fowl intestine ; (C) Prevalence of *Ascaridia* spp.

3.4 Prevalence of ascariidiosis by locality

The prevalence of ascariidiosis did not vary significantly between localities ($p > 0.05$). It was 44.44% in Sambaya and Gare, compared with 48.08% in Kassia (Table 4).

Table 4: Prevalence of ascariidiosis in guinea fowl by locality

Locality	Number examined	Number positive	Prevalence (%)	χ^2	p-value
Fréfou	50	24	48	-	-
Dadia	30	14	46.67	0.013	0.908
Sarakoléa	40	19	47.5	0.002	0.962
Manquepa	44	21	47.73	0.001	0.979
Tapioka	28	13	46.43	0.018	0.894
Wondy	39	18	46.15	0.03	0.863
Sambaya	18	8	44.44	0.067	0.796
Gare	27	12	44.44	0.089	0.765

Kassia	52	25	48.08	0.0001	0.994
Banlieue	38	17	44.74	0.092	0.761
Total	366	171	46.72	-	-

3.5 Prevalence of ascaridiosis according to age, sex, and body condition of the animals

Analysis of ascaridiosis prevalence according to individual variables revealed associations within the categories studied. Age was significantly associated with prevalence ($\chi^2 = 47.73$, $p < 0.0001$), which increased progressively from the oldest to the youngest birds: 18.18% [95% CI: 11.15-28.24] in birds older than 2 years, versus 40.17% [31.74-49.23] in birds aged 1-2 years and 63.95% [56.55-70.75] in birds aged 0-1 year. The risk of infestation was significantly higher in birds aged 1-2 years (OR = 3.02; 95% CI: 1.52-6.01; $p = 0.0012$) compared with birds older than 2 years (reference class) (Table 5), and even more pronounced in birds aged 0-1 year (OR = 7.98; 95% CI: 4.14-15.41; $p < 0.0001$). Sex was not significantly associated with prevalence ($\chi^2 = 1.28$, $p = 0.258$): females showed a prevalence of 48.78% [42.60-55.00] versus 42.50% [34.02-51.44] in males, and the odds ratio did not differ significantly from 1 (OR = 1.29; 95% CI: 0.83-2.00) (Table 5).

Body condition was the factor most strongly associated with infestation ($\chi^2 = 85.86$, $p < 0.0001$). Animals in poor body condition had a prevalence of 65.09% [58.75-70.93], compared with only 14.93% [9.87-21.93] in animals in good body condition. The risk of infestation was thus more than ten times higher in animals in poor body condition (OR = 10.63; 95% CI: 6.15-18.35).

Table 5: Prevalence of *Ascaridia* infection in guinea fowl according to host-related factors in the urban commune of Kindia

Variables	Categori es	No. examined	No. positive	Prevalence (%) [95% CI]	χ^2	p- value	OR [95% CI]
Age	>2 years	77	14	18.18 [11.15-28.24]	-	-	1
	1-2 years	117	47	40.17 [31.74-49.23]	10.4 2	0.0012	3.02 [1.52-6.01]
	0-1 year	172	110	63.95 [56.55-70.75]	44.5 7	<0.000 1	7.98 [4.14- 15.41]
Sex	Male	120	51	42.50 [34.02-51.44]	-	-	1
	Female	246	120	48.78 [42.60-55.00]	1.28	0.258	1.29 [0.83-2.00]
Body condition	Good	134	20	14.93 [9.87-21.93]	-	-	1
	Poor	232	151	65.09 [58.75-70.93]	85.8 6	<0.000 1	10.63 [6.15- 18.35]

3.6 Prevalence of *Ascaridia* infection in guinea fowl according to husbandry-related factors

The husbandry system was significantly associated with prevalence ($\chi^2 = 63.20$, $p < 0.0001$). Animals raised under the extensive system had a prevalence of 59.70% [95% CI: 53.67-65.44], compared with 13.59% [8.27-21.53] in those raised under the semi-intensive system; the risk of infestation was significantly reduced under the semi-intensive system relative to the reference (OR = 0.11; 95% CI: 0.06-0.20) (Table 6). Hygiene was significantly associated with positivity ($\chi^2 = 48.72$, $p < 0.0001$): animals raised under good hygienic conditions had a prevalence of 14.61% [8.74-23.40], compared with 57.04% [51.15-62.73] in those raised under poor hygienic conditions, corresponding to an approximately eightfold higher risk (OR = 7.76; 95% CI: 4.12-14.64). Feeding mode was also significantly associated with prevalence ($\chi^2 = 17.93$, $p < 0.0001$): animals fed exclusively by free-range foraging had a prevalence of 56.13% [49.40-62.64], whereas those receiving supplementary feed showed a significantly lower prevalence of 33.77% [26.77-41.55], corresponding to an approximately 60% reduction in infestation risk (OR = 0.40; 95% CI: 0.26-0.61). The availability of anthelmintics to the owner was not significantly associated with prevalence (Fisher's exact test; $p = 0.064$).

Table 6: Prevalence of *Ascaridia* infection in guinea fowl according to husbandry-related factors in the urban commune of Kindia

Variables	Categories	No. examined	No. positive	Prevalence (%) [95% CI]	χ^2	p-value	OR [95% CI]
Husbandry system	Extensive	263	157	59.70 [53.67-65.44]	-	-	1
	Semi-intensive	103	14	13.59 [8.27-21.53]	63.2	<0.0001	0.11 [0.06-0.20]
Hygiene	Good	89	13	14.61 [8.74-23.40]	-	-	1
	Poor	277	158	57.04 [51.15-62.73]	48.72	<0.0001	7.76 [4.12-14.64]
Feeding	Free-range foraging	212	119	56.13 [49.40-62.64]	-	-	1
	Supplemented	154	52	33.77 [26.77-41.55]	17.93	<0.0001	0.40 [0.26-0.61]
Anthelmintic availability	Available	5	0	0.00 [0.00-43.45]	-	-	1
	Not available	361	171	47.37 [42.27-52.52]	Fisher	0.064	9.90 [0.54-180.42]

4 DISCUSSION

This study provides the first data on ascaridiosis in guinea fowl in the Urban Commune of Kindia, a parasitosis previously documented only in chickens in Guinea. The prevalence observed confirms active circulation of this helminthiasis in family flocks in the region, within the range of values reported in West Africa. [16] reported a prevalence of 68% in dewormed guinea fowl in Benin. This prevalence remains lower than the 84.5% reported by [8] in Maiduguri, Nigeria, where guinea fowl were considerably more infested than local chickens. These discrepancies are not surprising; the review by [11], covering forty years of Nigerian data, confirms that *Ascaridia galli* remains the most common gastrointestinal nematode in poultry, with prevalence varying considerably across zones. This variability extends well beyond West Africa. In Ethiopia, [24] reported a prevalence of 55.26%, higher than ours, whereas [28] observed a comparable rate of 38% in the same country. This contrast within a single country illustrates how much prevalence varies according to the management system and agroecological conditions [16, 29]. Such variability was not observed among our ten study localities, probably because they belong to the same commune, with broadly similar climatic conditions and husbandry practices. In indigenous chickens in Bangladesh, [30] report a rate of 45.6%, close to ours, markedly lower than the 87.5% observed a decade earlier in the same country by [31], and the 70-85% range reported by [32], suggesting a gradual improvement in disease control. [33] report a value close to ours in Tanzania, at 32.3%, as do [34] in South Africa, at 22.2–43.8%. Our rate, however, exceeds the 32.97% reported in India by [35] and the 24.5% observed in Pakistan by [36], but remains well below the levels observed in Europe, where free-range farming has driven prevalence up to 88% in Germany [37] and 77.1% in Sweden [38]. This high positivity rate may be explained by a lack of knowledge among farmers, despite their observation of suggestive clinical signs. Deworming remained occasional, and the cohabitation of treated and untreated animals probably limited the effectiveness of the measures already undertaken. This finding is consistent with that of [3], for whom farmers' lack of knowledge hinders the control of avian parasitoses in West Africa.

This regional heterogeneity illustrates an essential point. Ascaridiosis prevalence varies less according to the avian species affected than according to husbandry and study conditions. Several factors contribute to this, including geographical location, the detection method used, sample size, animal age, and, above all, the production system. A recent review confirms the worldwide diversity of the genus *Ascaridia*, with six *Ascaridia* species and five *Heterakis* species identified in chickens, and overall median prevalences of 28.75% for *A. galli* and 17.20% for *H. gallinarum* [9].

All eggs identified in our study were attributed to the genus *Ascaridia*, consistent with the classical literature [14]. Molecular confirmation would nevertheless be valuable, as the morphology of *Ascaridia* eggs can resemble that of the genus *Heterakis*. This point echoes the work of [12], who used molecular biology to characterise co-infection with *A. galli* and *Eimeria tenella* in guinea fowl.

Age proved to be one of the major determinants of infestation, with a marked prevalence gradient increasing towards the youngest age classes, consistent with the observations of [11] in Nigeria. This increased susceptibility of young birds

is probably explained by two complementary mechanisms. On the one hand, their immune system, still immature, provides limited protection. On the other hand, their feeding behaviour, more strongly oriented towards ground foraging, increases their exposure to infective eggs. Prolonged contact with the ground, more frequent in young, growing birds, thus constitutes a major route of exposure, independently of the effect of age itself.

With age, the acquisition of partial resistance and reduced environmental exposure probably contribute to the progressive decline in prevalence observed in adults. Sex, by contrast, was not significantly associated with infestation in our study, although females showed a numerically higher prevalence than males. This result contrasts with those of [39] in Zambia and [8] in Nigeria, who both reported a significantly higher parasite burden in females. This difference has been attributed to the energetic demands of egg-laying and brooding, as well as to the longer caeca and small intestines of females, which provide a larger habitat for helminths. The absence of a significant association in our study could be explained by the smaller and less representative number of males, rather than by a genuine absence of biological difference between sexes. Husbandry-related factors proved more discriminating, with the extensive system, inadequate hygiene, and a diet based solely on free-range foraging all associated with increased risk. These findings converge on a single interpretation. Contact with a contaminated environment is the principal determinant of infestation risk. This observation is consistent with the conclusions of [3] on West African village poultry farming, where structural sanitary constraints weigh heavily on the performance of family flocks. The availability of anthelmintics to the owner was not significantly associated with prevalence, a result that should be interpreted with caution given the small size of the group concerned.

5 CONCLUSION

This study provides, for the first time in the Republic of Guinea, an estimate of the prevalence of ascariidiosis in guinea fowl (*Numida meleagris*) raised under an extensive family system in the Urban Commune of Kindia. The overall prevalence observed confirms active circulation of this helminthiasis within village flocks in the region. Risk-factor analysis identified age as the principal individual determinant of infestation, with a significant and increasing prevalence gradient towards the youngest age classes. The extensive system, inadequate hygiene, and a diet based exclusively on free-range foraging were all significantly associated with high prevalence, confirming the central role of environmental exposure in parasite transmission. In contrast, no significant association was found with sex or with locality. The survey on farmers' knowledge, attitudes, and practices also revealed a substantial lack of awareness of this parasitosis, limited prophylactic coverage, and systematic cohabitation between treated and untreated animals, which may compromise the effectiveness of existing control measures.

These findings highlight the need for targeted awareness and deworming programmes, prioritising young birds and flocks managed under extensive systems, together with strengthened technical and veterinary support for family guinea fowl farming in Guinea. Further work, including longitudinal monitoring and molecular characterisation of *Ascaridia* isolates, would help to consolidate these findings and guide sustainable control strategies adapted to the national epidemiological context.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

The authors declare that they have no competing or conflicting interests.

Statement of ethical approval

This study was approved by the Institutional Ethics Committee of ISSMV (No. 24/2023/ISSMV/D/DG). Prior authorisation was also obtained from the heads of the Kindia prefectural livestock directorates. Following approval from the local authorities, farmers were contacted and the objectives and scope of the study were clearly explained to them. They were free to accept or decline participation, with no negative consequences for their activities. Verbal consent was obtained from each farmer before questionnaire administration and faecal sample collection.

Statement of informed consent

This study involved human participants in the form of a survey administered to local farmers. Verbal informed consent was obtained from each participant prior to questionnaire administration and faecal sample collection. Farmers were informed of the objectives and scope of the study beforehand and were free to accept or decline participation.

Authors' contributions

The original study was conducted by YK, ASS and YS who also supplied the data. The idea for the study was conceptualised and generated by YK and ASS. Data were collected by GM, ASS, NK and MFC. Laboratory analyses were performed by YK, GM and NK. YK and ASS drafted the manuscript. Statistical data analysis was performed by ASS. YS and ASS provided intellectual criticism on the content of the manuscript. All authors have read and approved the final submitted manuscript.

Availability of data

All relevant data generated during the study are included in this article and are available upon reasonable request to the corresponding author.

REFERENCES

- [1] Guèye E. Méthodes et stratégies de formation et de vulgarisation en aviculture familiale. Livestock Research for Rural Development. 2003; 15. <http://www.lrrd.org/lrrd15/12/guey1512.htm>
- [2] Sonaiya EB, Swan S. Production en aviculture familiale / un manuel technique [Internet]. Rome: FAO; 2004. Available from: <https://www.fao.org/4/y5169f/y5169f00.htm>
- [3] Ouedraogo B, Bale B, Zoundi SJ, Sawadogo L. Caractéristiques de l'aviculture villageoise et influence des techniques d'amélioration sur ses performances zootechniques dans la province du Sourou, région Nord-Ouest Burkinabè. International Journal of Biological and Chemical Sciences. 2015; 9: 1528-1543.
- [4] GuinéeNews. Aviculture : une stratégie de 140 millions de dollars pour transformer la filière [Internet]. 2026. Available from: <https://guineenews.org/2026/06/29/>
- [5] Ayssiwede SB, Dieng A, Houinato MRB, Chrysostome CAAM, Issay I, Hornick JL, Missohou A. Elevage des poulets traditionnels ou indigènes au Sénégal et en Afrique subsaharienne : état des lieux et contraintes. Annales de Médecine Vétérinaire. 2013; 158.
- [6] Abdallah N, Oyebamiji OA. Guinea Fowl Production in Africa: Economic Importance and Constraints. Egyptian Journal of Veterinary Sciences. 2026.
- [7] Orounladji BM, Soara AE, Tokofai BM, Chrysostome CAAM, Tozo SK, Dayo GK, Dossa LH. Advances in the genetic characterization of guinea fowl in Africa: a comprehensive overview of the current status, progress of genome genotyping, and future perspectives. Poultry Science. 2025; 104: 105363.
- [8] Elijah BK, Onyiche ET, Midala C, Luka J, Biu AA. Gastrointestinal Helminths of Local Chickens (*Gallus gallus domesticus* Linnaeus) and Guinea Fowls (*Numida meleagris galeata* Pallas) Slaughtered in Maiduguri, Nigeria. Sahel Journal of Veterinary Sciences. 2022; 19: 1-5.
- [9] Pathak C, Pandey D, Khanal P. Species Diversity and Geographical Distribution of Poultry Ascaridids: A Scoping Review. Journal of Parasitology Research. 2026.
- [10] Singh R, Gupta I, Patil RD. Ascariasis in poultry: A comprehensive review. Pharma Innovation. 2023; 12: 699-704.
- [11] Midala CA, Kyari F, Thekisoe O, Onyiche TE. Parasites of poultry in Nigeria from 1980 to 2022: a review. Journal of Parasitic Diseases. 2025; 49: 523-547.
- [12] Attia MM, Mahmoud MA, Abdelsalam M, Almutairi LA, Alqahtani MA, Areshi SM, El-Saadony MT, El-Tarabily KA, Salem HM. Molecular and histopathological characterization of *Ascaridia galli* and *Eimeria tenella* co-infection in *Numida meleagris*. Frontiers in Veterinary Science. 2025; 12: 1622170.

- [13] Makouloutou-Nzassi P, Longo-Pendy NM, Nguema LKA, Lendzele SS, Banguéboussa F, Bouchedi B, Maganga GD, Boundenga L. Prevalence of gastrointestinal parasites in chickens (*Gallus gallus domesticus*) and associated risk factors in M'passa department, Southeast Gabon. *Open Veterinary Journal*. 2024; 14: 3232-3240.
- [14] Troncy PM, Itard J, Morel PC. Précis de parasitologie vétérinaire tropicale. Paris: Ministère de la Coopération et du Développement; 1981.
- [15] Sharma NK, Wu SB, Morgan NK, Crowley TM. Artificial gut and the applications in poultry: A review. *Animal Nutrition*. 2022; 10: 156-166.
- [16] Dahouda M, Sènou M, Toleba SS, Boko C, Adandédjan JC, Hornick J. Comparaison des caractéristiques de production de la pintade locale (*Meleagris numida*) en station et dans le milieu villageois en zone soudano-guinéenne du Bénin. *Livestock Research for Rural Development*. 2008.
- [17] Hien, Ouedraogo C, Diarra B, Traoré B. Effet du parasitisme interne sur la productivité des pintades locales au Burkina Faso. *Tropicicultura*. 2009; 27: 184-190.
- [18] Lawal JR, Jajere SM, Ibrahim UI, Biu AA, Jonathan D. Epidemiology of gastrointestinal helminths among chickens (*Gallus domesticus*) from Borno State, Northeastern Nigeria: prevalence, helminth burden and associated risk factors. *Revue d'élevage et de médecine vétérinaire des pays tropicaux*. 2023; 76: 1-9.
- [19] Dossa S, Salifou S, Dossou-Gbete GSO, Mensah SE. Helminthes et arthropodes parasites du poulet local de basse cour au Bénin. 2009.
- [20] Iya SB, Mamoudou A, Ibrahim BM, Gbambie AC, Abah S, Oumarou F, Mohaman B, Awé C, Mbassi LS, Lontsi-Demano M. Parasites digestifs des poules villageoises vendues à Ngaoundéré (Cameroun). *Revue d'élevage et de médecine vétérinaire des pays tropicaux*. 2021; 74: 231-235.
- [21] Food and Agriculture Organization of the United Nations (FAO). Sub-Saharan Africa HPAI [Internet]. *Animal Health*. 2026. Available from: <https://www.fao.org/animal-health/situation-updates/sub-saharan-africa-hpai/en>
- [22] Mourad M, Bah AS, Gbanamou G. Evaluation de la productivité et de la mortalité de la poule locale sur le plateau du Sankaran, Faranah, Guinée, en 1993-1994. *Revue d'élevage et de médecine vétérinaire des pays tropicaux*. 1997; 50: 343-349.
- [23] Ministère de l'Agriculture, de l'Elevage, de l'Environnement, des Eaux et Forêts de la République de Guinée (MAEEF). Plan d'Action National d'Adaptation aux Changements Climatiques de la Guinée (PANA). Conakry: Ministère de l'Environnement, des Eaux et Forêts; 2007.
- [24] Tarbiat B, Jansson DS, Höglund J. Environmental tolerance of free-living stages of the poultry roundworm *Ascaridia galli*. *Veterinary Parasitology*. 2015; 209: 101-107.
- [25] Pourhoseingholi MA, Baghestani AR. When calculation of minimum sample size is not justified. *Hepatitis Monthly*. 2011; 11: 208-209.
- [26] Muñoz-Gómez V, Ma T, Li Y, Rasmussen P, Torgerson PR. Global and regional prediction of coccidiosis and ascaridiosis prevalence in extensive backyard chickens in low-income and middle-income countries. *Veterinary Parasitology*. 2024; 331: 110268.
- [27] Willis HH. A simple levitation method for the detection of hookworm ova. *Medical Journal of Australia*. 1921; 2: 375-376.
- [28] Beyene K, Bogale B, Chanie M. Study on effects and occurrence of nematodes in local and exotic chickens in and around Bahir Dar, Northwest Ethiopia. *American-Eurasian Journal of Sustainable Agriculture*. 2014.
- [29] Ashenafi H, Eshetu Y. Study on Gastrointestinal Helminths of Local Chickens in Central Ethiopia. *Revue de Médecine Vétérinaire*. 2004.
- [30] Ritu SN, Labony SS, Hossain MS, Ali MH, Hasan MM, Nadia N, Shirin A, Islam A, Shohana NN, Alam MM, Dey AR, Alim MA, Anisuzzaman. *Ascaridia galli*, a common nematode in semiscavenging indigenous chickens in Bangladesh: epidemiology, genetic diversity, pathobiology, ex vivo culture, and anthelmintic efficacy. *Poultry Science*. 2024; 103: 103405.
- [31] Rabbi A, Islam A, Majumder S, Anisuzzaman A, Rahman MH. Gastrointestinal Helminths Infection in Different Types of Poultry. *Bangladesh Journal of Veterinary Medicine*. 2006; 4: 13-18.
- [32] Ferdushy T, Hasan MT, Golam Kadir AKM. Cross sectional epidemiological investigation on the prevalence of gastrointestinal helminths in free range chickens in Narsingdi district, Bangladesh. *Journal of Parasitic Diseases*. 2016; 40: 818-822.

- [33] Permin A, Christensen J, Bisgaard M. Consequences of concurrent *Ascaridia galli* and *Escherichia coli* infections in chickens. *Acta Veterinaria Scandinavica*. 2006; 47: 43-54.
- [34] Mukaratirwa S, Khumalo MP. Prevalence of helminth parasites in free-range chickens from selected rural communities in KwaZulu-Natal province of South Africa. *Journal of the South African Veterinary Association*. 2010; 81: 97-101.
- [35] Ara I, Khan H, Syed T, Bhat B. Prevalence and seasonal dynamics of gastrointestinal nematodes of domestic fowls (*Gallus gallus domesticus*) in Kashmir, India. *Journal of Advanced Veterinary and Animal Research*. 2021; 8: 448-453.
- [36] Hafiz AB, Muhammad AR, Muhammad AA, Imran AK, Abdul A, Zahid M, Shaukat HM. Prevalence of *Ascaridia galli* in white leghorn layers and Fayoumi-Rhode Island red crossbred flock at government poultry farm Dina, Punjab, Pakistan. *Tropical Biomedicine*. 2015; 32: 11-16.
- [37] Shifaw A, Feyera T, Walkden-Brown SW, Sharpe B, Elliott T, Ruhnke I. Global and regional prevalence of helminth infection in chickens over time: a systematic review and meta-analysis. *Poultry Science*. 2021; 100: 101082.
- [38] Jansson DS, Nyman A, Vågsholm I, Christensson D, Göransson M, Fossum O, Höglund J. Ascarid infections in laying hens kept in different housing systems. *Avian Pathology*. 2010; 39: 525-532.
- [39] Nalubamba KS, Bwalya EC, Mudenda NB, Munangandu HM, Munyeme M, Squarre D. Prevalence and burden of gastrointestinal helminths in wild and domestic guineafowls (*Numida meleagris*) in the Southern Province of Zambia. *Asian Pacific Journal of Tropical Biomedicine*. 2015; 5: 663-670.