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Research Article

Prevalence and Identification of Gastrointestinal Parasites in Chicken Fecal Samples in General Santos City, Philippines

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Abstract | Gastrointestinal parasites (GIP) are common issues in backyard chicken that affect flock health and productivity. This study was conducted to determine the prevalence and intensity of GIP infection in backyard chickens within selected barangays of General Santos City, Philippines. Fecal samples were collected from 9 identified agricultural barangays. A total of 147 out of 172 samples tested positive for GIP, giving a total prevalence value of 85.47%. Prevalence appeared to vary numerically among barangays, although differences were not statistically significant ($x^2 = 7.644$, df = 8, p = 0.469). A total count of 5 parasite species were identified and the most frequently observed was *Eimeria* spp., followed by *Ascaridia galli*, *Capillaria* spp., *Choanotaenia infundibulum* and *Heterakis gallinarum.* Across parasite-barangay combinations, low-intensity infections were observed in all 30/30 combinations, while moderate and high intensity infections were observed in 15/30 and 11/30 combinations, respectively. Although prevalence was high, most infections were low intensity. These findings highlight the widespread exposure of backyard chickens to GIP and underscore the importance of routine parasite control and improved management practices.

Keywords | *Eimeria* spp., *Ascaridia galli, Capillaria* spp., *Heterakis gallinarum, Choanotaenia infundibulum*, Backyard chickens, General Santos City

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INTRODUCTION

In the Philippines, chicken (*Gallus gallus*) inventory reached 212.83 million birds as of June 2025, of which 38.7% were classified as native/improved chickens. In Region 12, where General Santos City is located, a total of 11.27 million birds were recorded (PSA, 2025). Chickens are widely accepted across different cultures and religions, with fewer restrictions than other animals (Lawal and Hanotte, 2021). In the Philippines, chickens play an important role in food security and also provide extra income for many households (Tangalin and Medalla, 2025). Backyard chicken farming is common in the country and is often done on a small scale with minimal inputs (Enario, 2025). However, chickens raised in free-range systems tend to have greater exposure to parasitic infections (Coroian *et al*., 2024).

Gastrointestinal parasites (GIP) are among the most common parasites affecting poultry and can cause both health problems and economic losses (Shifaw *et al*., 2021; Lozano *et al*., 2019). These infections are not always obvious, but they can still affect chickens by lowering disease resistance and making existing conditions worse

(Belete *et al*., 2016). Infected chickens may show signs such as poor appetite, weight loss, dehydration, and general weakness, which can reduce their overall productivity (Ybañez *et al*., 2018).

Despite these known effects, information on gastrointestinal parasites in backyard chickens is still limited. Previous studies have been reported in other parts of the Philippines, including the study of Ybañez *et al*. (2018), which involved small-scale layer farms in Leyte. However, no published study has surveyed gastrointestinal parasites among free-range backyard chickens across multiple barangays in General Santos City. Therefore, the present study was conducted to identify the parasites present and determine their prevalence among free-range backyard chickens in selected barangays of General Santos City. Infection intensity was also assessed for parasites with established thresholds.

MATERIALS AND METHODS

Sampling design and sample collection

Nine (9) agricultural barangays within General Santos City were selected for sampling, namely: Conel, Katangawan, Ligaya, Mabuhay, Olympog, San Jose, Siguel, Sinawal, and Upper Labay. Fecal samples were collected from households raising five (5) or more chickens. This was done to ensure adequate sample collection and representation of actively maintained backyard flocks. The inclusion criterion of at least five chickens per household may limit the applicability of the findings to households maintaining smaller flock sizes (1–4 chickens).

The distance between households was considered. A minimum distance of approximately 100 meters between households was observed during sampling to reduce repeated sampling from closely associated flocks with similar management conditions. Distance was assessed using mobile Google Maps during field sampling. In addition, only free-range chickens without a reported history of deworming within the previous six months, based on owner information, were included in the study. Five (5) eligible households declined participation during the sampling period and were replaced with other households meeting the inclusion criteria to achieve the target sample size. The replacement of non-participating households may have introduced some degree of selection bias.

A smaller number of samples was obtained from Upper Labay due to the application of the study inclusion criteria and field sampling conditions, including the required distance between households and the limited number of eligible backyard chicken raisers available during sample collection. Backyard chicken flock sizes among sampled households varied and were categorized as follows: 10–20 heads (n= 94 households), 21–30 heads (n= 44), 31–40 heads (n= 18), 41–50 heads (n= 11), and 51 heads and above (n= 5).

Fecal samples were collected by placing elevated catching platforms beneath the roosting areas to prevent soil contamination. Samples from each household were pooled in a sealed container to represent one sampling unit (Carrisosa *et al*., 2021). Each container was properly labeled for easy identification (Ybañez *et al*., 2018). Pooling of fecal samples at the household level may have reduced the ability to detect individual-level variation in parasite burden and may have underestimated infection intensity in heavily infected chickens.

Sample storage and preservation

Collected samples were placed inside a sealed container with 10% formaldehyde solution and stored at 4–8 °C to preserve parasite eggs. The samples were then transported to the laboratory for microscopic examination (Ybañez *et al*., 2018). All fecal samples were processed and examined within 32 hours after collection to minimize potential distortion of parasitic structures during preservation.

Flotation solution (Sheather's Sugar) preparation

The flotation solution was prepared by mixing 454 g of granulated sugar with 355 ml of water over low heat. After the sugar was completely dissolved, the solution was allowed to cool. To inhibit the growth of microorganisms in the solution, 6 ml of formaldehyde was added. A specific gravity of 1.27 was maintained and the value was checked using a hydrometer (Stice *et al*., 2024). To ensure consistency during examination, the specific gravity of the flotation solution was checked prior to each sample processing session.

Fecal sample preparation

In a beaker, 4 g of fecal samples and 56 ml of Sheather solution were combined. The solution was mixed thoroughly until it became homogeneous. The mixture was then filtered using a cheesecloth to remove debris and transferred into a test tube, where it was allowed to stand for at least 10 minutes to facilitate flotation of parasitic eggs. Using a pipette, both chambers of McMaster slide were filled with the filtered mixture (Zajac and Conboy, 2012). The loaded McMaster slide was then allowed to stand for approximately 3–5 minutes prior to microscopic examination to allow parasitic eggs to rise within the chamber grid (Abdisa, 2018).

Identification of parasites

Fecal samples were examined under a microscope using the McMaster technique (Ybañez *et al*., 2018). Parasite identification was performed through comparative morphological examination using published identification keys and reference images by Zajac and Conboy (2012), Tiersch *et al.* (2013), Premaalatha *et al.* (2014), He *et al.* (2023), and Silva *et al.* (2022). Microscopic identification of parasite eggs and oocysts was performed by multiple individuals through comparative morphological examination and cross-verification using published references.

EPG and OPG counting and infection intensity

Eggs per gram (EPG) and oocyst per gram (OPG) were calculated by counting the eggs within the counting grid area of both McMaster chambers, excluding those outside the grid. The total count from both chambers was multiplied by 50, as described by Zajac and Conboy (2012).

Infection intensity was classified into low, moderate, and high categories based on established EPG or OPG thresholds for each parasite. *Eimeria* spp. was classified as low (1–1799 OPG), moderate (1800–6000 OPG), and high (>6000 OPG) (Tomazic *et al*., 2025). For *Ascaridia galli, Capillaria spp.*, and *Heterakis gallinarum*, infection intensity was categorized as low (1–499 EPG), moderate (500–2000 EPG), and high (>2000 EPG) (Cantin-Rosas *et al*., 2025). In the absence of locally established thresholds, these published reference values were used as comparative guides for interpretation. These thresholds were used for comparative interpretation of egg burden and do not necessarily reflect equivalent pathogenicity among parasite species. The present study evaluated infection intensity for individual parasite taxa and did not assess the potential combined effects of co-infections.

For *Choanotaenia infundibulum* which do not have an established EPG threshold, infection intensity was not classified. Instead, EPG values were summarized.

Statistical analysis

Prevalence was calculated as percentages with 95% confidence intervals. The confidence interval was calculated using Wilson score method. A single overall chi-square analysis was performed using the observed frequencies of positive and negative samples across barangays. Due to variation in sample size among barangays, some expected cell frequencies were below 5; therefore, chi-square results were interpreted with caution. Infection intensity for parasites with established EPG/OPG thresholds was classified as low, moderate, or high. Parasites without an established threshold were summarized descriptively using EPG values.

RESULTS AND DISCUSSION

Prevalence of gastrointestinal parasites

The occurrence of GIP in backyard chickens differed across the 9 sampled barangays in General Santos City. Katangawan and Ligaya both showed 95% prevalence, followed by Upper Labay at 91.67%. Sinawal had a 90% prevalence rate. Conel and Mabuhay both had a prevalence rate of 85%. Siguel had a prevalence rate of 80%. Olympog and San Jose had the lowest prevalence at 75%. In total, the prevalence was 85.47%. Prevalence appeared to vary across barangays; however, these differences were not statistically significant (χ^2 = 7.644, df = 8, p = 0.469). The relatively wide confidence intervals observed in some barangays indicate limited precision in the estimated prevalence values and should therefore be interpreted cautiously. Table 1 shows these results.

Table 1: Prevalence of gastrointestinal parasites in backyard chickens across selected barangays in General Santos City, Philippines.

Barangay	Number of samples	Positive samples	Prevalence (%)	Confidence Interval (95%)
Conel	20	17	85	69.4 – 100
Katangawan	20	19	95	85.4 – 100
Ligaya	20	19	95	85.4 – 100
Mabuhay	20	17	85	69.4 – 100
Olympog	20	15	75	56.1 – 93.9
San Jose	20	15	75	56.1 – 93.9
Siguel	20	16	80	62.5 – 97.5
Sinawal	20	18	90	76.9 – 100
Upper Labay	12	11	91.67	76.1 – 100
TOTAL	172	147	85.47	80.2 – 90.7

Confidence intervals were calculated using the Wilson score method. No significant difference was observed among barangays (x^2 = 7.644, df = 8, p = 0.469). Total prevalence was calculated using the overall number of positive samples (147/172 × 100) rather than the average of barangay prevalence values.

Out of 172 fecal samples, 147 tested positive for GIP. Five (5) species were identified through microscopic examination. The prevalence of GIP parasites varied considerably, with *Eimeria* spp. showing the highest prevalence at 62.21 %, followed by *Ascaridia galli* (45.35%), *Capillaria* spp. (26.74 %), *Choanotaenia infundibulum* (3.49%), and *Heterakis gallinarum* (1.74 %). Parasites detected at low frequencies should be interpreted cautiously, as the limited number of positive samples may affect the precision of prevalence estimates. A summary of these findings is presented in Table 2.

Cantin-Rosas *et al.* (2025) reported similar findings in Central Chile, where *Eimeria* spp., *Capillaria* spp., *Ascaridia galli*, and *Heterakis gallinarum* were among the most frequent parasites affecting backyard-raised chickens. The similarity in findings suggests that backyard poultry systems across different geographical locations are contributing factors to parasitic infections.

Table 2: Prevalence of identified gastrointestinal parasites in chicken samples from General Santos City, Philippines (n= 172).

Gastrointestinal parasite	Number of positive samples	Prevalence (%)	Confidence interval (95%)
Eimeria spp.	107	62.21	54.8 – 69.1
Ascaridia galli	78	45.35	38.1 – 52.8
Capillaria spp.	46	26.74	20.7 – 33.8
Choanotaenia infundibulum	6	3.49	1.6 – 7.4
Heterakis gallinarum	3	1.74	0.6 – 5.0

Confidence intervals were calculated using the Wilson score method.

According to Badri *et al.* (2024), *Eimeria* spp. oocysts can thrive in a tropical country like in the Philippines because of the high temperature and high humidity. These factors can create a favorable environment for the parasite. Vergara *et al.* (2021) added that backyard systems of raising chickens often lack strict biosecurity measures and regular parasite control programs. In free-range conditions, chickens are constantly exposed to contaminated soil, water, and fecal matter, increasing their susceptibility to parasitic infections. However, despite these favorable environmental conditions, most infections observed in the present study were of low intensity. Badri *et al.* (2024) explained that the prevalence and severity of *Eimeria* spp. infections may be affected by several factors such as immune status, nutrition, age, population density, and management practices.

Infection intensity

Infection intensity varied across parasite–barangay combinations (Figure 1). The distribution is illustrated using green, yellow, and red colors to represent low, moderate, and high infection levels, respectively. The infection intensity categories were based on published EPG/OPG threshold ranges; however, EPG/OPG values may still vary within each category.

Low-intensity infections accounted for the majority of parasite–barangay combinations (30/30 combinations), followed by moderate-intensity infections (15/30 combinations), while high-intensity infections were least observed (11/30 combinations). Simultaneous occurrence of low-, moderate-, and high-intensity infections was primarily observed in several *Eimeria* spp. and *Ascaridia galli* combinations across selected barangays.

Among the *Eimeria* spp. parasite–barangay combinations, low-, moderate-, and high-intensity infections were observed in 9/9, 7/9, and 6/9 combinations, respectively. For *Ascaridia galli*, low-, moderate-, and high-intensity

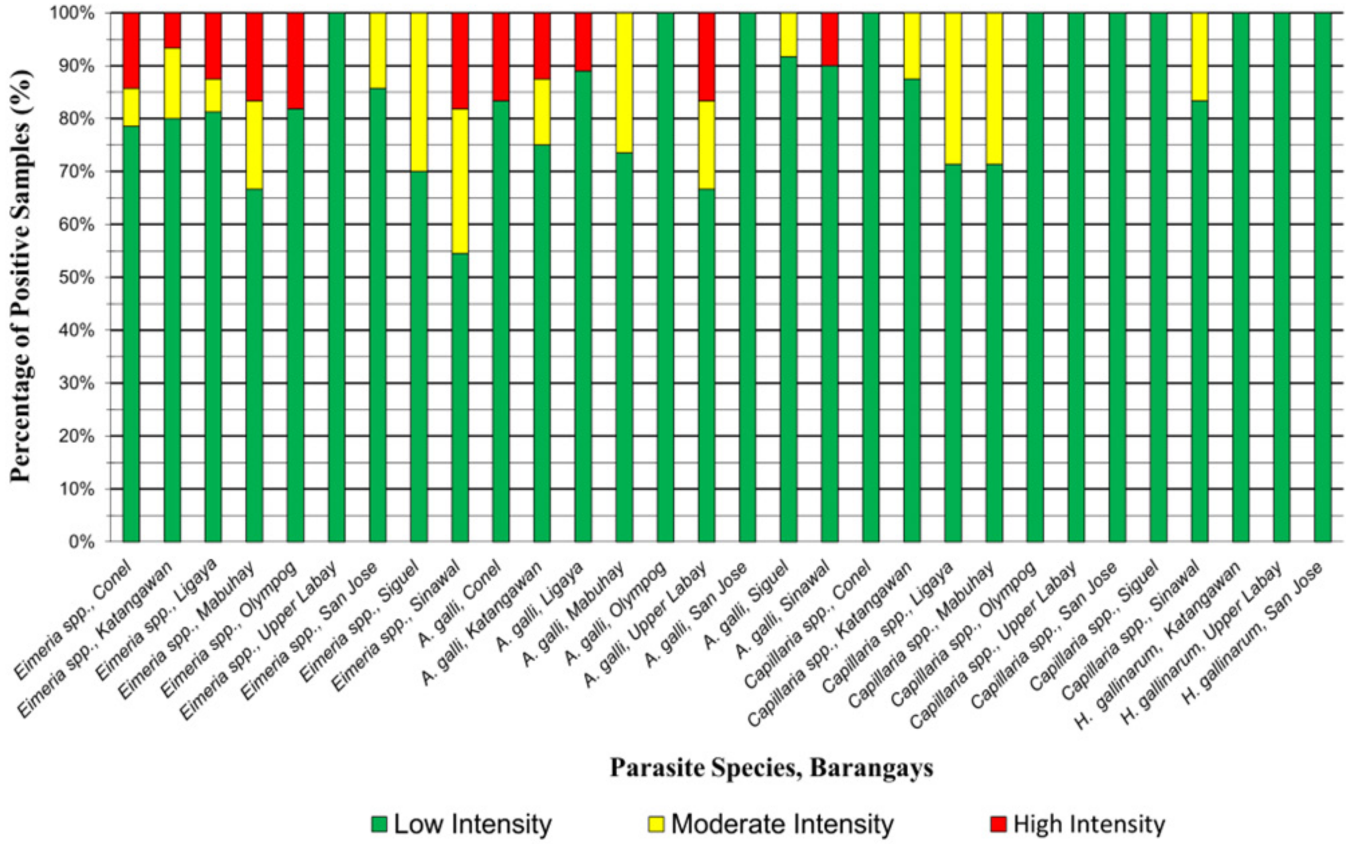

Figure 1: Distribution of Infection Intensity Levels of Gastrointestinal Parasites in Chickens Across Selected Barangays in General Santos City, Philippines

infections were observed in 9/9, 4/9, and 5/9 combinations, respectively. In contrast, *Capillaria* spp. showed only low- to moderate-intensity infections, with low-intensity infections observed in all 9 combinations and moderate-intensity infections observed in 4/9 combinations. *Heterakis gallinarum* was only detected in 3 barangays, all of which with low levels of infection. Since the parasite was detected only in a limited number of samples, findings should therefore be interpreted cautiously. The present study evaluated infection intensity individually for each parasite and did not assess the potential cumulative burden of co-infections within individual chickens.

These findings are consistent with the study conducted by Cantin-Rosas *et al.* (2025), where the majority of the samples showed low infection intensity. This pattern suggests that low-intensity infections are commonly observed in poultry populations, particularly in backyard production systems.

However, according to Lozano *et al.* (2019), even in low intensity infections should not be disregarded, as gastrointestinal parasites may still contribute to reduced nutrient absorption, weakening the immune response, and increased susceptibility to secondary infections in poultry.

Since no established infection intensity thresholds are currently available for *Choanotaenia infundibulum*, infection intensity could not be categorized into defined levels. Therefore, the occurrence and corresponding EPG values were presented descriptively only to show the presence of egg shedding and parasite occurrence in the sampled barangays, and not to indicate the severity of infection. *Choanotaenia infundibulum* was detected in only three barangays. However, this finding should be interpreted carefully because of the low number of positive samples. Findings are presented in Table 3.

Table 3: Egg per gram (EPG) values of *Choanotaenia infundibulum* by barangay in General Santos City, Philippines.

Parasite, Barangay	Positive samples/ Total samples examined	EPG value per positive sample
Choanotaenia infundibulum, Ligaya	1/20	100
Choanotaenia infundibulum, Olympog	2/20	100, 100
Choanotaenia infundibulum, Upper Labay	1/12	100

The low number of positive samples for *Choanotaenia infundibulum* may possibly be associated with its indirect life cycle, which requires intermediate hosts for transmission, potentially limiting infection opportunities (Butboonchoo *et al.*, 2016; Premaalatha *et al.*, 2014). However, the presence of intermediate hosts was not investigated in the present study.

Representative photomicrographs of the gastrointestinal parasites identified in this study are presented in Figure 2, namely: (A) *Eimeria* spp.; (B) *Ascaridia galli*; (C) *Capillaria* spp.; (D) *Choanotaenia infundibulum;* and (E) *Heterakis gallinarum*. Due to the thickness of the McMaster slide chambers, parasite eggs were primarily examined at 100× total magnification. Photomicrographs were captured during examination, and the images were digitally enlarged to facilitate closer observation of morphological characteristics during parasite identification.

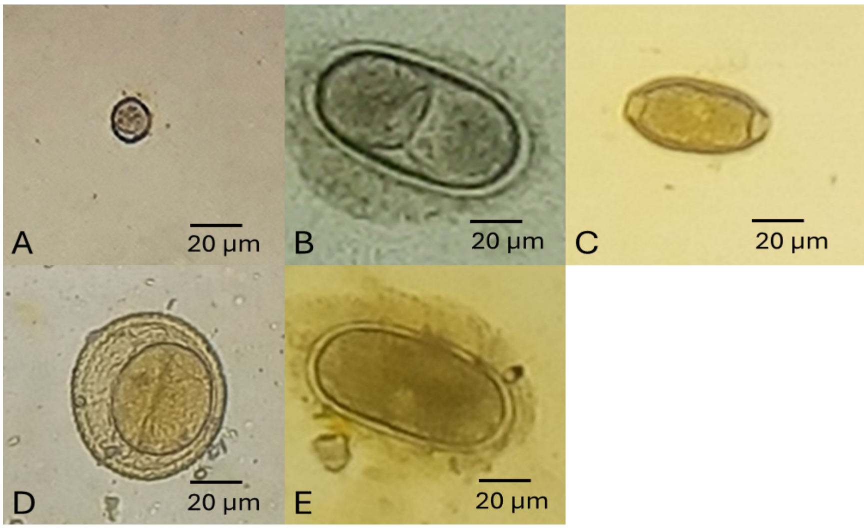

Figure 2: Representative photomicrographs of gastrointestinal parasite eggs identified in chickens: (A) *Eimeria* spp.; (B) *Ascaridia galli*; (C) *Capillaria* spp.; (D) *Choanotaenia infundibulum*; and (E) *Heterakis gallinarum*. Images were obtained using light microscopy at 100× total magnification with a McMaster slide. Photomicrographs were digitally enlarged to facilitate clearer observation of morphological characteristics.

CONCLUSION AND RECOMMENDATION

This study revealed an overall prevalence of 85.47% among backyard chickens in selected barangays of General Santos City, with 5 parasites identified. Infection intensity was predominantly low across most parasite–barangay combinations, indicating generally low levels of parasite burden within the sampled population. The present study evaluated infection intensity individually for each parasite and did not assess the potential cumulative burden of co-infections within individual chickens.

Regular parasite control and improved sanitation practices are recommended to reduce parasite transmission. Proper waste management and maintaining cleaner feeding and housing areas may further help reduce environmental exposure to parasites. Further studies evaluating possible co-infections and associations among gastrointestinal parasites are recommended.

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NOVELTY STATEMENT

To the best of the researchers' knowledge, no published studies specifically investigating gastrointestinal parasites in backyard chickens from General Santos City, Region XII, or other parts of Mindanao were identified at the time of writing. Most comparable Philippine studies identified in the literature were conducted in Luzon and Visayas, including reports from Leyte, Philippines (Ybañez *et al*., 2018). Hence, this study provides baseline epidemiological information on gastrointestinal parasite occurrence, prevalence, and infection intensity among backyard chickens in selected barangays of General Santos City.

AUTHOR'S CONTRIBUTION

VLM, JMS, SDL: Contributed to laboratory works, analysis of the data, and manuscript writing. ARLA, MGMC, JERO, FAMS and ANM: contributed to conceptualization, reviewed protocols, supervised the study, data analysis and revised the manuscript.

Generative AI and AI-assisted Technology Statement

The authors declare that the AI-assisted tool (ChatGPT) was used solely to improve English language quality and grammar.

Ethical approval

Only freshly voided fecal samples were collected in the study. No animals were handled, restrained, or subjected to invasive procedures during sample collection. The study was conducted in accordance with the Animal Welfare Act of the Philippines (RA 8485, as amended by RA 10631). Human ethics clearance was obtained from Mindanao State University - General Santos for coordination and interaction with chicken owners, including the securing of informed consent prior to sample collection.

Conflict of interest

The authors have declared no conflict of interest.

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