

## Flea Infestation of *Ctenocephalides felis* in Stray Cats In Bogor and Its Impact on Humans

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### Abstract

**Background:** Infestation by *Ctenocephalides felis* is a common parasitic problem affecting both stray and domestic cats worldwide with potential zoonotic impacts on humans. This flea infestation not only affects cats but also poses health risks to humans who come into contact with infested animals. This study aims to investigate the prevalence of *C. felis* infestation in stray and owned cats in Bogor and its impact on humans and assessed its impact on humans. **Methodology:** The study was conducted on 20 cats consisting of 9 stray cats and 11 owned cats, were examined using purposive sampling. Physical examinations were performed to detect flea infestation. Fleas were collected and morphologically identified under microscopy. **Findings:** Results showed an overall prevalence of 90% with details 100% in stray cats and 82% in domestic cats. Clinical signs in cats included symmetrical alopecia, anemia, dull coat, and low body condition score. Human cases associated with flea infestation presented red papules, itching, and discomfort. **Contributions:** This study represents the first documented prevalence of *C. felis* in cats and associated human impacts in Bogor, highlighting its veterinary and public health importance.

**Keywords:** Alopecia; *Ctenocephalides felis*; Flea; Zoonosis; Stray Cat



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## INTRODUCTION

Cat flea (*Ctenocephalides felis*) infestation is a global concern, not only for companion animals but also for humans as incidental hosts. Infestations have been reported in multiple regions including Korea (Ahn et al., 2018), Iran (Youssefi & Rahimi, 2014), and Egypt (Attia et al., 2019), highlighting its zoonotic importance. Cat fleas act as vectors of pathogens such as *Bartonella henselae* and *Rickettsia felis* and as intermediate hosts for *Dipylidium caninum*. Beyond health effects, infestations may also cause psychological stress and economic losses.

The increasing population of stray cats has become a growing concern in Indonesia, particularly in residential areas around Bogor City. This rise in population is largely attributed to improper cat-rearing practices, the abundance of stray cats, and the species' high reproductive capability (Kennedy et al., 2020). Many cat owners allow their pets to roam freely outdoors without confinement, which leads to interaction with stray cats and, eventually, reproduction (Rahmiati et al., 2020; Siagian et al., 2023). Siagian et al., (2023) further highlighted that allowing cats to roam outside significantly contributes to the growing population and increases the risk of disease transmission. These cats often mate with strays and produce offspring within two months, exacerbating the population surge. This growth not only impacts urban wildlife but also raises the risk of disease transmission between stray and free-roaming domestic cats.

One of the significant health threats among cats is ectoparasite infestation, particularly by cat fleas (Abdilah et al., 2024). Fleas are insect parasites belonging to the order *Siphonaptera*, and the species commonly found on cats is *Ctenocephalides felis* (Peterson et al., 2024). These fleas infest not only cats but also other animals such as dogs and ruminants (Ashwini et al., 2017), and they can even infest humans. In Indonesia, flea infestations are prevalent in both stray and domestic cats, ranging from mild to severe (Sari et al., 2024). Previous studies reported varying prevalence: 55% at IPB Gunung Gede Campus (Siagian, 2022), 24.13% at IPB Teaching Animal Hospital (Siagian & Siregar, 2022), 14.3–17.1% in Pandeglang (Abdilah et al., 2024), and 2% at a veterinary clinic in Bogor Regency (Siagian & Fikri, 2019). Additionally, a study on stray cats at a traditional market in Surabaya found flea infestations to be significantly higher compared to other ectoparasites (Fauziyah et al., 2020). However, little is known about its direct impact on humans.

Infestation by *Ctenocephalides felis* in cats is associated with dermatological damage, anemia, dull fur, hair loss, and dandruff. Fleas can also transmit bacterial and rickettsial infections (Azami, 2025) as well as filarial nematodes (Attia et al., 2019). According to Gunawan et al., (2024), *C. felis* infestation is one of the major causes of skin disorders in cats in Yogyakarta. Additionally, *C. felis* serves as the intermediate host for the tapeworm *Dipylidium caninum*, causing *dipylidiasis* in both companion animals (Bashofi et al., 2015; Jiang et al., 2017) and humans (Herliana et al., 2024). Despite these risks, the impact of *Ctenocephalides felis* infestation on humans in Indonesia remains poorly reported, necessitating further research. This study aims to investigate the prevalence of *C. felis* infestation in stray and domestic cats in Bogor, Indonesia, and assessed its impact on humans. This study addresses this gap by investigating *C. felis* infestation in stray and domestic cats in Bogor, Indonesia, and its

zoonotic consequences. To our knowledge, this is the first local prevalence report from Bogor, thus providing new scientific contributions to veterinary parasitology and zoonotic disease awareness.

## **METHOD**

### ***Study Area and Sample Collection***

This study was conducted in the Taman Sari Persada Residential Area, Bogor City. A total of 20 cats were sampled, consisting of 9 stray cats and 11 owned cats were examined using purposive sampling to represent both populations. Stray cats were captured and briefly restrained for examination, while domestic cats were examined with owner consent. Cats studied belonged to the species *Felis catus* Linnaeus, 1758.

### ***Physical Examination of Animals and Flea Collection***

The physical examination was carried out systematically from head to tail to detect the presence of *Ctenocephalides felis* flea infestation and associated clinical symptoms. Fleas found on the cats were immobilized using 70% alcohol applied via cotton swabs and then collected into vials containing 70% alcohol. The alcohol served to sedate the fleas, making collection easier. Stray cats that had been examined were marked with spray paint to indicate that an ectoparasite assessment had been performed.

### ***Flea Identification***

Fleas were identified morphologically following standard keys (Wall & Shearer, 2001; Ashwini et al., 2017). Flea samples collected from the cats were examined microscopically in the laboratory. Each sample was placed on a glass slide, treated with 10% potassium hydroxide (KOH) solution, and covered with a cover slip. Observations were made under a microscope at 400x magnification (Siagian, 2022). Diagnostic features included elongated head, genal and pronotal ctenidia, and laterally flattened body.

### ***Assessment of Flea Infestation in Humans***

Assessment of infestation in humans was performed using structured questionnaires and clinical evaluation. Respondents (n = 5), reported symptoms consistent with flea bites, including papules and itching.

### ***Data Analysis***

Data from the physical examinations and microscopic identification of ectoparasite samples were analyzed both quantitatively and qualitatively. Results were analyzed descriptively and supported with graphical visualization. Quantitative analysis was performed using prevalence calculations. Prevalence formula refers to Njogela et al., (2025), was calculated as:

$$\text{Prevalence (\%)} = \left( \frac{\text{Number of positive cats}}{\text{Total examined cats}} \right) \times 100 \dots\dots\dots (1)$$

## RESULT AND DISCUSSION

### Flea Infestation in Cats

Out of 20 cats examined, 18 were infested with *C. felis*, giving an overall prevalence of 90%. All stray cats (100%) were positive (Table 1), while 9/11 domestic cats (82%) were positive (Table 2). More than one *C. felis* individual was found on each infested cat. More than one *C. felis* individual was found on each infested cat. Indoor-only cats remained negative. This suggests that roaming and semi-outdoor management increase flea exposure risk.

The ectoparasite identified on fleas found in cats was *Ctenocephalides felis*. This identification was based on morphological characteristics, including an elongated and pointed head, hind legs longer than the forelegs, and the presence of genal ctenidia (combs). These findings are consistent with those reported by [Ashwini et al., \(2017\)](#), who described *C. felis* as possessing a distinctly elongated and tapering head, with the metepisternum or lateral metanotal area (LMA) bearing one or two setae. The first and second combs (ctenidia) are of equal length; the genal ctenidium typically consists of 7–8 pairs of spines, while the pronotal ctenidium contains 15–16 spines. The head length is approximately twice its height. The dorsal margin of the hind tibia has six notches, with a single robust seta present at the fifth notch. Fleas measure approximately 1–2 mm in length and exhibit a bilaterally symmetrical, laterally flattened body shape ([Siagian & Fikri, 2019](#)). These insects are wingless and possess three pairs of legs covered in fine setae, with the third pair significantly longer than the first two, enabling the fleas to jump from one host to another ([Wall & Shearer, 2021](#); [Hadi & Soviana, 2010](#); [Bashofi et al., 2015](#)).



**Figure 1.** Flea Examination Results *Ctenocephalides felis* (4 x 10 magnification).  
\*Note: a. The first and second genal ctenidium sisir; b. lateral metanotal area (LMA) bearing one or two setae; c. Notch. Documentation: by Author

**Table 1.** Prevalence of Flea Infestation in Stray Cats in Taman Sari Persada

<b>Cat</b>	<b>Sex</b>	<b>Age (Year)</b>	<b>Cat-Rearing Practices</b>	<b>Examination Result</b>
1	Female	1	Outdoor	Positive
2	Male	2	Outdoor	Positive
3	Female	1	Outdoor	Positive
4	Male	2	Outdoor	Positive
5	Female	2	Outdoor	Positive
6	Female	1	Outdoor	Positive
7	Male	2	Outdoor	Positive
8	Male	3	Outdoor	Positive
9	Female	1	Outdoor	Positive

**Table 2.** Prevalence of Flea Infestation in Owned Cats in Taman Sari Persada

<b>Cat</b>	<b>Sex</b>	<b>Age (Year)</b>	<b>Cat-Rearing Practices</b>	<b>Examination Result</b>
1	Female	2	Semi outdoor	Positive
2	Female	1	Semi outdoor	Positive
3	Male	2	Semi outdoor	Positive
4	Male	2	Semi outdoor	Positive
5	Female	2	Semi outdoor	Positive
6	Female	1	Semi outdoor	Positive
7	Male	3	Indoor	Negative
8	Male	3	Indoor	Negative
9	Female	1	Semi outdoor	Positive
10	Male	2	Semi outdoor	Positive

According to Table 1 and 2, stray cats living in outdoor environments were infested with *Ctenocephalides felis*. Conversely, indoor cats that were exclusively kept inside did not show signs of flea infestation. However, pet cats with semi-outdoor lifestyles were also found to be infested with *C. felis*. This indicates that improper care practices, such as allowing domestic cats to roam outdoors, increase their exposure to ectoparasites and associated diseases. Fleas naturally transfer between cats through direct contact, infesting healthy individuals when they encounter infested animals. Thus, infested cats with outdoor access pose a risk of transmitting *C. felis* to strictly indoor cats upon contact. In contrast, cats maintained entirely indoors with no outdoor exposure remain flea-free. These findings are in agreement with [Rust \(2017\)](#) and [Slapeta et al., \(2018\)](#). Semi-outdoor management practices and environmental

contamination (e.g., flea eggs in the environment) facilitate infestation, consistent with flea biology and lifecycle (Rust, 2017).

Female cats are more high to be infested with fleas than male cats. This is because female cats often congregate with other cats compared to male cats, which are more solitary and explore their surroundings. Consequently, fleas are more easily transferred from one cat to another in female cats, which frequently congregate, especially when feeding. Two-year-old cats are more likely to be infested with fleas than cats aged one and three. This is because cats at this age are more likely to go outside to mate, forage, and socialize with other cats. This makes it easier for fleas to spread from one cat to another. This is in line with the opinion of Nguyen et al., (2025); Slapeta et al., (2018) who stated that adult fleas find their hosts using chemical and physical cues. Adult fleas in a host will jump to another nearby host to begin parasitism. Cats that frequently congregate or are mating will make it easier for adult fleas to jump to other hosts to infest new ones.

Adult *C. felis* begin feeding by sucking blood once a suitable host is found and remain on the host throughout their adult life. After mating, the female lays eggs which then fall off the host and scatter into the surrounding environment. The eggs hatch into larvae within 2–10 days, depending on ambient temperature, with warmer conditions accelerating development. Larvae feed on a variety of organic debris, including pet hair, dried adult flea feces, and other detritus. Under optimal conditions, larvae pupate within three weeks, although they may remain in the silk cocoon for several months before emerging as adults. Adult fleas locate hosts using chemical and physical cues and jump onto the host to begin parasitism. Adults remain active on the host year-round (Nguyen et al., 2025; Slapeta et al., 2018). According to Attia et al., (2019), flea populations thrive under warm conditions that are optimal for their development. *C. felis* undergoes complete metamorphosis, with a life cycle of approximately 14 days at 32°C, and up to 140 days at lower temperatures (~13°C) with relative humidity above 50%. *C. felis* is globally distributed and infests a wide range of animal species, including humans (Ahn et al., 2018). Attia et al., (2019) also reported isolation of *C. felis* from humans in Egypt. This adaptability contributes to the rapid spread of fleas among cats.

### **Clinical Findings in Cats**

Infestation by *C. felis* negatively impacts its host. Infested cats displayed symmetrical alopecia, pale mucous membranes, dull coats, low body condition scores, and dandruff. These align with previous studies (Azami, 2025; Attia et al., 2019). Diagnostic criteria followed Wall & Shearer (2001). Anemia in infested cats is attributed to chronic blood loss caused by flea feeding, and *C. felis* also acts as a vector for *Bartonella henselae*, *Bartonella clarridgeiae*, and *Rickettsia felis* (Ali, 2019).

### **Impact on Humans: Case Observation**

One woman in the Taman Sari Persada residential area presented papular rashes, pruritus, itching, and psychological discomfort, despite not owning cats, confirming zoonotic risk from nearby stray cats. A stray lactating female cat was observed in the vicinity, and upon medical consultation with doctor, the woman was diagnosed with flea infestation. This observation aligns with findings by

Youssefi & Rahmini (2014), who reported *C. felis* infestation in a 28-year-old woman from Mazandaran Province, Iran. Clinical manifestations included urticarial papules with erythema on the back and hips (3–20 mm), pruritus, nighttime anxiety, and psychological stress. Minahan et al., (2023) Flea bites were often grouped in linear patterns and elicited hypersensitivity reactions, dermatitis, allergies, and severe discomfort.

Menard et al., (2017) noted an increase in human infestations during spring and summer. An additional case was reported in Cangkurawok Village, Bogor Regency, where a family exhibited maculopapular rashes at bite sites and allergic reactions (flea allergic dermatitis). Saputra (2013) These clinical symptoms indicate that humans can act as incidental hosts and flea infestation poses not only clinical and psychological burdens but also economic impacts. These findings illustrate that flea infestation extends beyond animal health, affecting humans as incidental hosts. Although based on limited cases, this suggests relative risk associated with cat infestation in residential settings.

## CONCLUSION

This study documented a high prevalence of 90% of *Ctenocephalides felis* infestation in stray and domestic cats in Bogor, Indonesia. Clinical signs in cats included alopecia, anemia, and dull coat. Human cases confirmed zoonotic transmission risk, with clinical symptoms including papules and dermatitis. This is the first report from Bogor highlighting local prevalence and human impact. The findings have implications for public health awareness, emphasizing the need for proper cat management, flea control, and education of communities to prevent zoonotic risks.

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