



**UNIVERSITI PUTRA MALAYSIA**

**PREVALENCE OF SOIL TRANSMITTED HELMINTHS (STHS) IN  
FAECES COLLECTED IN GREEN PUBLIC AREAS IN KUALA LUMPUR  
AND SELANGOR, MALAYSIA**

**GUN SZE KEE**

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**PREVALENCE OF SOIL TRANSMITTED HELMINTHS (STHS) IN  
FAECES COLLECTED IN GREEN PUBLIC AREAS IN KUALA LUMPUR  
AND SELANGOR, MALAYSIA**



**FACULTY OF VETERINARY MEDICINE**

**UNIVERSITI PUTRA MALAYSIA**

**SERDANG, SELANGOR**

**2023/2024**

**CERTIFICATION**

It is hereby certified that we have read this project paper entitled “Prevalence of Soil Transmitted Helminth (STHs) eggs excreted in the faeces of dogs and cats shed in public areas in Kuala Lumpur And Selangor, Malaysia”, by Gun Sze Kee and in our opinion it is satisfactory in terms of scope, quality, and presentation as partial fulfilment of the requirement for the course VPD4999 – Final Year Project.

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## **DEDICATION**

I extend my sincere appreciation to my supervisor and co-supervisor, who have served as invaluable academic mentors and sources of motivation throughout my fyp journey. Additionally, I am deeply grateful to my family for their support and belief in my capabilities, as their encouragement has been instrumental in reaching this milestone of my life.

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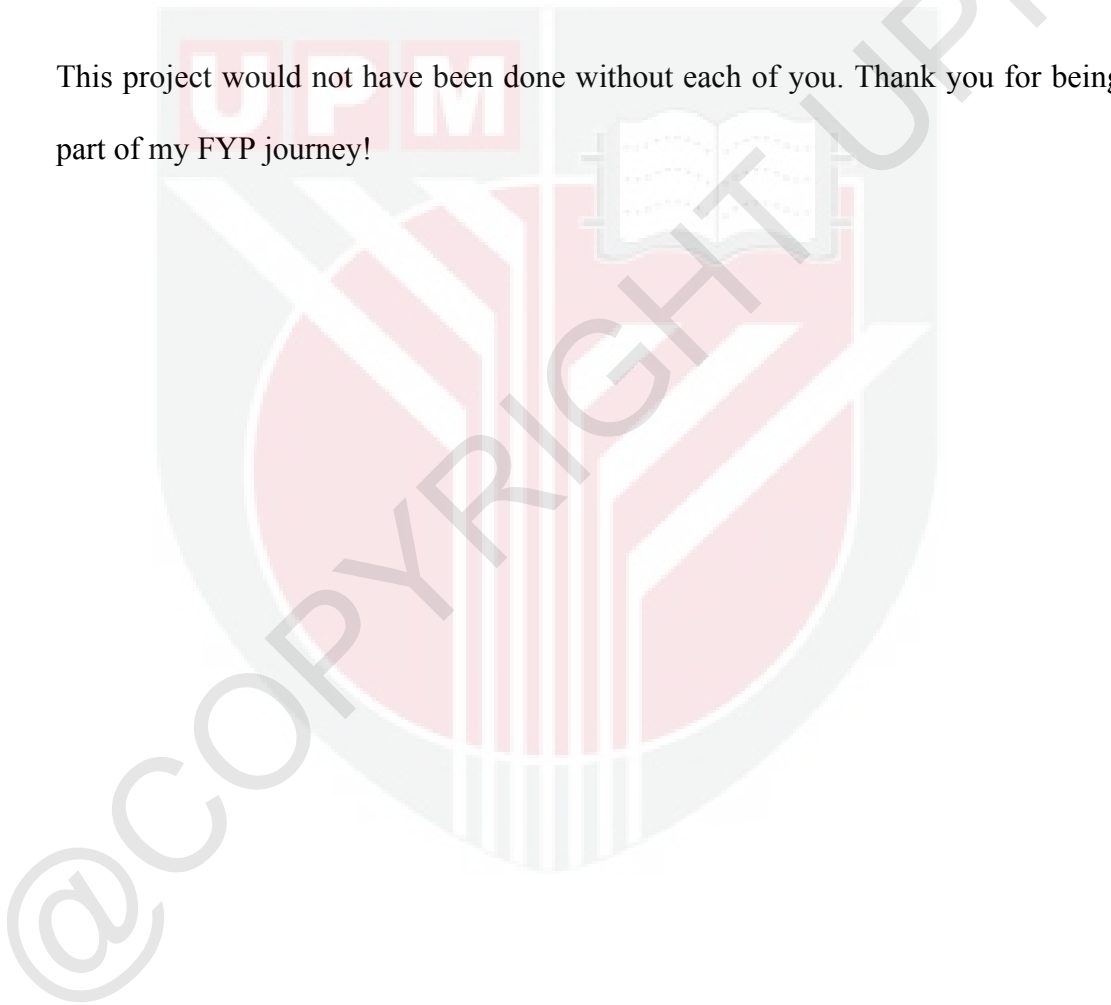
I wish to acknowledge the invaluable contributions of those who made this thesis possible through their encouragement and support. Upon the completion of my academic journey. My sincere appreciation goes out to Dr. Nor Azlina Abdul Aziz, who supervised my FYP who generously shared her knowledge and patiently assisted throughout the study. Every phase of my final year project benefited greatly from her dedicated guidance, encouragement, kindness, and positive influence.

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Following that, I want to sincerely thank my family for everything. Their encouragement and support have been instrumental in my academic pursuits, and I am truly appreciative. My dedication to achieving the best results has always been driven by the desire to give back to my beloved family.

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**LIST OF ABBREVIATIONS**

<b>%</b>	Percentage
<b>°C</b>	Degree Celsius
<b>STHs</b>	Soil transmitted helminths
<b>L1</b>	First stage larvae
<b>L2</b>	Second stage larvae
<b>L3</b>	Third stage larvae
<b>CI</b>	Confidence interval
<b>N</b>	Sample size
<b>gm-1</b>	gram per milliliter
<b>VLM</b>	Visceral Larva Migrans
<b>OLM</b>	Ocular Larva Migrans
<b>NLM</b>	Neural Larva Migrans

**ABSTRAK**

Abstrak kertas projek yang dikemukakan kepada Fakulti Perubatan Veterinar untuk memenuhi sebahagian daripada kursus VPD 4999 - Projek Tahun Akhir.

**PREVALENS CACING TAMBALANG TANAH (STH) DALAM TINJA  
YANG DIKUMPUL DI KAWASAN AWAM HIJAU DI KUALA LUMPUR  
DAN SELANGOR, MALAYSIA**

Oleh

**Gun Sze Kee**

2023

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Penularan jangkitan cacing tambahan di tanah (STH) seringkali difasilitasi oleh kehadiran najis yang tercemar dengan telur STH dalam tanah. Kajian ini menentukan prevalens telur Soil Transmitted Helminth (STH) yang dilepaskan dalam najis anjing dan kucing yang ditemui di kawasan awam dari Kuala Lumpur dan Selangor kerana mereka merupakan penyumbang utama dalam penularan jangkitan helminthik kepada manusia dan haiwan. Sejumlah 91 sampel najis anjing dan kucing telah dikumpul dari kawasan awam seperti taman, ruang rekreasi, taman permainan haiwan peliharaan, dan taman permainan dengan menggunakan kaedah kumpulan biasa di Kuala Lumpur dan Selangor. Sampel telah disaring menggunakan teknik pengapungan mudah, dan kehadiran telur STH telah dicatat serta jumlah telur per bidang slide pemeriksaan telah dikira. Sampel dianalisis menggunakan ujian statistik chi-square. Analisis mikroskopik menunjukkan prevalens telur STH adalah 40.66% (95% CI: 30.64-51.48) di mana sekurang-kurangnya satu agen parasit hadir dalam 28.3% sampel najis anjing dan 57.89% sampel najis kucing. Hanya tiga genus telur STH yang dikenalpasti dalam sampel najis termasuk telur cacing *Ansylostoma* (40.65%), *Toxocara* spp. (2.19%), dan *Trichuris* spp. (1.10%). Mengambil kira prevalens yang signifikan telur STH yang ditemui dalam sampel najis, ini menunjukkan bahawa anjing dan kucing berpotensi sebagai penyumbang utama dalam pencemaran alam sekitar dan jangkitan helminth kepada manusia.

Kata Kunci: Soil Transmitted Helminth, sampel najis, pengapungan mudah

**ABSTRACT**

An abstract of the project paper presented to Faculty of Veterinary Medicine in partial fulfilment of the course VPD 4999 - Final Year Project.

**PREVALENCE OF SOIL TRANSMITTED HELMINTHS (STHS) IN  
FAECES COLLECTED IN GREEN PUBLIC AREAS IN KUALA  
LUMPUR AND SELANGOR, MALAYSIA**

**By**

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**2023**

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The transmission of soil-transmitted helminth (STH) infections is possible due to the presence of contaminated faecal matter with STHs eggs in the soil. The present study determines the prevalence of Soil Transmitted Helminth (STHs) eggs released in the faeces of dogs and cats shed in public areas as cats and dogs are the main contributors in transmitting helminthic infections to both humans and animals. 91 dogs and cats faecal samples in total were collected from green common public areas such as parks, recreational spaces, gardens, pet friendly parks, playground by conventional sampling in Kuala Lumpur and Selangor. The faecal samples were screened using simple flotation technique, the presence of STHs eggs and the number of eggs per field of slide examination were recorded. Samples were analysed using Chi-square statistical test. Microscopic analysis revealed that the prevalence of STHs eggs was 40.66% (95% CI: 30.64-51.48) in which at least one parasite agent was present in 28.3% of dogs and 57.89% of cat's faecal samples. Only three genera of STHs eggs were identified in the faeces samples consisting of eggs of *Ancylostoma* (40.65 %), *Toxocara* spp. (2.19 %), and *Trichuris* spp. (1.10 %). Considering the prevalence of STHs eggs found in the faecal samples, it suggests that dogs and cats are potentially the main contributors of environmental contamination and human helminths infections.

**Keywords:** Soil Transmitted Helminth, faecal sample, simple floatation

## 1.0 INTRODUCTION

### 1.1 BACKGROUND

Green public spaces are open space areas that are designed for parks for human recreational activity and are also a home to a large number of strays and domestic pets. Green public spaces are a cool spot for leisure and it includes public parks, recreational playgrounds, gardens, and pet friendly parks. However, behind these green public spaces lies a potential public health concern- Soil transmitted helminths (STHs), a parasitic worm that is able to infect human hosts via contaminated soil and faeces.

In tropical areas STHs are frequently regarded among the most commonly neglected parasites (Molyneux et al., 2005). The parasites are able to infect humans by unintentionally ingesting eggs shed by the definitive hosts or eating L3 larvae in undercooked or raw paratenic hosts (Calum N.L. Macpherson *et al.*, 2013). The presence of these parasites are of concern to the public, particularly young children because of a lack of hygiene practices and their playing habits (Woodhall *et al.*, 2014).

Up until 2015, STHs were responsible for over 1.5 billion illnesses globally in accordance with the World Health Organization's (WHO; 2005) report. These parasitic worms are able to cause a range of serious health issues in humans and animals, from mild discomfort to severe life threatening

complications. For instance, it is highly associated with impacting the community's nutritional absorption as well as physical and mental development in children. The control of such illnesses appeared highly difficult in most developing countries due to inadequate funding, which might be a key contributor to the infection's prevalence.

The majority of the STHs in pets that are most frequently identified have zoonotic potential and are distributed globally. STHs affecting our companion animals such as roundworms, whipworm and hookworm pose a serious hazard to the health of both animals and humans. The infected dogs or cats shed their faeces containing STHs eggs into the environment, and the eggs become infectious and larvae will develop within 2-4 weeks if conditions are favourable. Then, humans can contract the infection by ingesting contaminated soil or food with STHs eggs or stepping barefoot on contaminated soil.

Public areas serve as a source of helminth infection for humans. According to prior research conducted at several animal shelters located in Kuala Lumpur, Malaysia, it revealed that STH parasites were found in 48.4 % of the faecal samples analysed in dogs and cats. However, there has been limited data regarding the detection of STHs and the contamination in common public areas in Kuala Lumpur and Selangor despite the potential health risks associated with helminth infection.

Given that the high population density and fast growing urbanisation of Kuala Lumpur and Selangor, it is important to understand the prevalence of STHs found in the faeces of both dogs and cats shed in the common public areas, to assess the risk of infection to park visitors and also to promote the implementation of precautionary steps aimed at reducing helminthiasis in Malaysia.

## **1.2 PROBLEM STATEMENT**

This study will examine the presence of Soil transmitted helminths (STHs) eggs in faeces of dogs and cats collected from green public spaces in Kuala Lumpur and Selangor, Malaysia. In addition to determining the risk factors causing STHs to spread in these green public areas to allow early preparedness and response measures to address STHs infections.

## **1.3 RESEARCH OBJECTIVES**

The focus of this study is to detect prevalence of STHs in the faeces of dogs and cats shed in public parks and risk factors causing the transmission in Kuala Lumpur and Selangor, Malaysia.

## 1.4 HYPOTHESIS

I Ho: There is no detection of STHs eggs shed by dogs and cats in green public areas in Kuala Lumpur and Selangor, Malaysia.

H1: There is presence of STHs eggs shed by dogs and cats in green public areas in Kuala Lumpur and Selangor, Malaysia.

II. Ho: There is no correlation between the risk factors and the prevalence of STHs eggs found in faeces of dogs and cats.

H1: There is a correlation between the risk factors and the prevalence of STHs eggs found in faeces of dogs and cats.

## 2.0 LITERATURE REVIEW

Helminthiasis is an infection caused by the intestinal parasites that could be transmitted by helminths eggs in contaminated soil or larvae that grow in warm and humid soil. It is classified as Neglected Tropical Diseases (NTDs) and it affects an estimated 24 percent of the world's population and untold numbers of animals globally. (WHO; 2005).

### 2.1. STHS AND TRANSMISSION

A key feature shared by all soil-transmitted helminths (STHs) is their reliance on a specific period spent in the environment, commonly in the soil, before they will be able to infect their next host. The development could vary, spanning from 1 to 14 weeks, contingent upon environmental conditions (Bethony *et al.*, 2006). STHs infection typically follow a distinct pattern in which adult worms inhabit the host's intestines, producing eggs that are excreted in faeces. Over time, the surroundings are contaminated with STHs eggs shed in the faeces by infected dogs or cats, and within 2-4 weeks, under favourable conditions, these eggs will develop into infectious larvae.

The transmission of *Ascaris* and *Toxocara* eggs to humans or other animals are via faecal-oral route in which it could be transmitted through the consumption of improperly cooked, washed, or unpeeled food that contains the infectious eggs. Additionally, transmission could occur when hands, contaminated with soil, encounter the mouth. The kids are especially more

vulnerable because of their playing habits and proclivity to place their hands in their mouths (Ondriska *et al.*, 2013). On the other hand, the main method for Hookworm infection is through walking barefoot on contaminated ground. This is because hookworm eggs are non-infectious, however the hatched third stage larvae are capable of penetrating into the skin of animals and humans.

## 2.2 ZOONOTIC POTENTIAL OF STHS

Most of the commonly detected STHs seen in dog and cats have zoonotic potential, among them that can endanger the health of human and animal's health are roundworm (i.e., *Toxocara* spp.), Hookworm (i.e., *Ancylostoma* spp., *Uncinaria* spp.), and Whipworm (*Trichuris* spp.) According to a study by WHO, over 2 billion people are negatively affected by STHs globally, and they have a detrimental impact on pregnant women as well as causing physical and cognitive damage in children. (WHO; 2005). Additionally, Soil-transmitted helminths could cause many health problems, including diarrhoea, anaemia, gastrointestinal discomfort, loss of protein and growth retardation both physically and mentally. (Centers for Disease Control and Prevention, 2022). Another work showed the likelihood of growth stunting and anaemia in children with helminth infections was shown to be 3.6 and 2 times, respectively (Hughes *et al.*, 2004).

Among the common zoonotic parasites, *Toxocara* spp. are responsible for inducing gastrointestinal disturbances in dogs and cats (Okulewicz *et al.*, 2012). Toxocariasis caused by *Toxocara* spp. are often overlooked but have a relatively high prevalence, affecting up to 16% of humans, 40% of dogs and 76% of cats on a global scale. Common species of *Toxocara* in cats is *Toxocara cati* while in dogs it is called *Toxocara canis*. Contamination occurs once an infected dog or cat sheds their faeces containing the *Toxocara* eggs into the surroundings; eggs become infectious and the larvae will develop within 2-4 weeks if conditions are optimal (Rubinsky-Elefant *et al.*, 2010). Toxocariasis could spread to people by unintentionally ingesting the eggs released by the definitive hosts or eating L3 larvae in either undercooked or raw paratenic hosts ( Macpherson *et al.*, 2013). In humans, the symptoms are usually asymptomatic, but it could lead to conditions like Visceral Larva Migrans (VLM), Ocular Larva Migrans (OLM), latent toxocariasis, and Neural Larva Migrans (NLM). (Macpherson, 2013).

Secondly, Hookworm also known as *Ancylostoma* spp., and *Uncinaria* spp., belonging to the Strongylida group are the cause of migration of cutaneous larva in dogs and cats as well as in humans (Bowman *et al.*, 2010). Nearly half a billion people are infected with hookworms alone, which could result in haemorrhagic diarrhoea, chronic iron-deficiency anaemia, impaired growth, and malnutrition (Loukas *et al.*, 2016). *Ancylostoma* spp. and *Uncinaria* spp. are typically spread by direct skin contact via the percutaneous route or by oral intake of third stage larvae found in the environment (Masseti *et al.*, 2022). According to Traub *et al.* (2021) these

parasites could cause intestinal symptoms that lead to cutaneous larva migrans in people.

On top of that, STHs infections deteriorate the nutritional status of the host they infect by competing for vitamin A in the intestines. Individuals infected with *Toxocara* spp., *Ancylostoma* spp., or *Trichuris* spp. may suffer from iron and protein depletion, intestinal bleeding, anaemia, and malabsorption of nutrients (WHO; 2005). This is why the One Health concept and awareness in Malaysia and in-depth knowledge of the life cycle and transmission dynamics of STH species is crucial to develop efficient methods for diagnosis, treatment, and control measures.

### **2.3 PREVALENCE OF STHS INFECTION IN HUMAN**

Previous studies conducted in Malaysia have concentrated on the prevalence of STHs in rural regions and study involving Orang Asli is unreliable to be compared with other Malaysians in general. Orang Asli in Malaysia are unable to access clean water and their life-style is low in hygiene, with low medical prevention access as well as their low education level might increase the risk of infection significantly from other Malaysians. The reported prevalence of STH has varied widely, ranging between 14.1% to as high as 98.4%. The greatest prevalence, 98.4%, was in a study involving of aboriginal people belonging to 7 tribes located in the states of Johor, Perak, Pahang, and Selangor. This study used real-time PCR for diagnosis, which

proved a more robust technique than the microscopy, detecting only 63.1% of STH infections (Ahmed *et al.*, 2011). Meanwhile, the study of 71 aboriginal young children in Pos Lenjang, Pahang had the lowest prevalence of only 14.1%. STH infection (Adli *et al.*, 2019).

Most STH studies reported infestation prevalence of over 70% (Al-Mekhlafi *et al.*, 2006; Rajeswari *et al.*, 1994). It's important to highlight that the Orang Asli community has a higher prevalence of diseases compared to the general population, specifically in the cases of STH and malnutrition.

Even though there is abundant information regarding the prevalence of STH infection in Malaysian Orang Asli, limited studies of prevalence of STHs could be found in urban green areas particularly In Kuala Lumpur and Selangor. It is crucial for Malaysian communities to gain knowledge of the STHs that are dangerous to humans and other potential hosts, like dogs and cats, especially in the states of Kuala Lumpur and Selangor which have had the highest population density and the most rapid growth in socioeconomic and infrastructure development.

## **2.4 POTENTIAL SPREAD OF STHS IN MALAYSIA**

In recent years, there has been an observable inclination among people to engage in pet ownership. A recent data from Mordor Intelligence (2021) shows that Malaysia ranks among the top 10 nations where pet ownership

rate has significantly increased in 2020 compared to the previous five years. This trend coincides with a noticeable uptake in people bringing their pets to various public spaces, including public parks, recreational playgrounds, gardens, and pet-friendly parks. Consequently, the growing presence of pets in these public spaces has raised concerns about the potential spread of STH infections.

Additionally, extrinsic factors such as urbanisation, habitat fragmentation, and changes to environment and climate could promote the trophic transmission of parasites (Wells et al., 2018). Understanding the epidemiology of STHs and the environment elements that might facilitate the transmission is crucial for the public health authorities. This allows them to evaluate the infection risk comprehensively and develop more specialised control strategies to combat helminth infections effectively in Malaysia.

### **3.0 MATERIALS AND METHODS**

#### **3.1 STUDY DESIGN AND SAMPLING AREA**

This study was conducted by convenience sampling in eight green common public areas which includes five dog friendly parks and three residential playgrounds in Kuala Lumpur and Selangor. (as listed from A to H) (Fig. 1).

The selection of sites was based on their popularity as frequented locations where people commonly bring their pets within Kuala Lumpur and Selangor.

Presence of pets, strays, fence, and disposable bins around the park were recorded during sampling and considered as risk factors. These factors will

be used to examine correlation between risk factor and presence of the STHs egg.



Figure 1 Sites of Sampling in Kuala Lumpur and Selangor

### 3.2 SAMPLING METHOD

Before the collection of faecal samples, the required number of samples could be estimated using formula by Naing (2003):

$$n = (Z/d)^2 \times P(1-P),$$

Sample size of faecal samples needed for this study was calculated based on previous research on detection of helminth eggs in free roaming dogs and cats Klang Valley region of Malaysia (75.7%). by (Tun., *et al.* 2016),

$$n = (Z/d)^2 \times P(1-P),$$

$$Z = 1.96 \text{ (for alpha level of 0.05),}$$

$$P = 0.757 \text{ (expected prevalence),}$$

$$d = 0.05 \text{ (desired level of precision)}$$

Substituting the given values:

$$n = (Z/d)^2 \times P(1-P),$$

$$n = (1.96/0.05)^2 \times (0.757)(1-0.757),$$

$$n \approx 283$$

To determine the prevalence of STHs eggs with 5% precision and 95% confidence level, given an estimated prevalence of 0.757, a sample size of 283 samples from common green public areas in Kuala Lumpur and Selangor would be required. However due to the 5-week length of the final year

assignment and the limited time available, the sample size has been limited to a maximum of 91 samples only.

### **3.3 FAECAL SAMPLES COLLECTION & SIMPLE FLOATATION TECHNIQUE**

91 stool samples from dogs and cats were gathered from the eight sampling sites listed in Fig. 1 in September 2023. The samples are collected and packed in a polyethylene sealed bag and are transported back to Faculty of Veterinary Medicine, UPM to analyse for Soil Transmitted Helminths (STHs) Eggs.

1. A simple flotation technique was used to detect STHs eggs in the faecal samples using saturated sucrose salt solution (specific density: 1.3 g ml<sup>-1</sup>).
2. Each sample is ground and homogenised in 1ml distilled water, mixed thoroughly.
3. 40 ml sucrose-salt solution is added to the homogenised faecal samples.
4. The content is then filtered and poured to fill the vial to the top
5. A coverslip is positioned on the tube in contact with the sucrose and left there for 25-30 minutes.
6. Place the coverslip over a glass slide and inspect it with a light microscope. The presence of STHs eggs were recorded and the number of eggs per field of slide examination were counted. Identification of eggs were

performed microscopically based on previous references. (Taylor et al., 2015).



Figure 2 faecal samples collected from 8 sampling sites (A), Samples packed in a polyethylene sealed bag (B), Simple flotation using saturated sugar-salt solution (specific density:  $1.28 \text{ g ml}^{-1}$ ) (C), Light microscope examination & the presence of STHs eggs were recorded. (D)

### 3.4 DATA ANALYSIS

The prevalence of the STHs eggs in the faecal samples of dogs and cats is calculated as below:

$$\text{Prevalence} = \frac{\text{(Samples detected positive of Soil Helminth Eggs)}}{\text{(Total Faecal Sample collected)}} \times 100\%$$

The descriptive analyses are analysed using SPSS and relationship between risk factor (Presence of fences and disposable bins) and detection of STHs eggs observed in the faecal samples using Chi-square test in Microsoft excel.

#### 4.0 RESULTS

From all the collected samples, three genera of soil-transmitted helminths (STHs) have been discovered., namely *Ancylostoma* spp., *Toxocara* spp., and *Trichuris* spp. (Figure 4.1)

Based on microscopic observations, *Toxocara* spp. eggs have a distinct trait including brownish in colour, spherical to slightly pear shape, thick shelled composition, and a pitted surface. Meanwhile, the eggs of *Ancylostoma* spp. are characterised by their thin-shelled structure, clear colour, oval in shape, a considerable gap separating the outer and inner shell, and the outer shell appear as a singular, thin, black line. And for *Trichuris* spp., the egg displays a yellow to brownish coloration with transparent mucoid plugs. It has a shape of lemon, with curved edges and mucoid plugs that are round and symmetrical.



Figure 3 showed morphology of each STHs eggs under light microscope at 40x

A total prevalence of STHs eggs in the excrement collected from both dog parks and residential playgrounds is 40.66% (95% CI: 30.64-51.48) with dog parks exhibit a prevalence of 19.15%, while residential playgrounds show a higher prevalence of 63.64%.

The table below shows the overall prevalence of various parasites in the faecal samples from different parks. Among all, *Ancylostoma* spp. were the most common group of parasites discovered in six sampling sites. (40.65%), and *Toxocara* spp. were found in two sampling sites (2.19%), and lastly, *Trichuris* spp. were only detected in one sampling site (1.099%)

In dog parks, the samples revealed the presence of only *Ancylostoma* spp. eggs, whereas in residential playgrounds, three different types of soil-transmitted helminths eggs were identified which include *Ancylostoma* spp., *Toxocara* spp., and *Trichuris* spp.

Sampling Site	Detection of STHs egg	Detection of <i>Toxocara</i> spp. egg	Detection of <i>Ancylostoma</i> spp. egg	Detection of <i>Trichuris</i> spp. egg
<b>Dog park (47 samples)</b>				
Site A	-	-	-	-
Site B	11.11% (4/36)	-	11.11% (4/36)	-
Site C	80.00% (4/5)	-	80.00% (4/5)	-
Site D	-	-	-	-
Site E	33.33% (1/3)	-	33.33% (1/3)	-
<b>Dog Park Total</b>	<b>19.15% (9/47)</b>	<b>0%</b>	<b>19.15 % (9/47)</b>	<b>0%</b>
<b>Residential playground (44 samples)</b>				
Site F	38.89% (7/18)	-	38.89% (7/18)	-
Site G	80.00% (16/20)	10% (2/20)	80.00% (16/20)	-
Site H	83.33% (5/6)	-	83.33% (5/6)	16.67% (1/6)
<b>Residential playground Total</b>	<b>63.64% (28/44)</b>	<b>4.55% (2/44)</b>	<b>63.64 % (28/44)</b>	<b>2.27% (1/44)</b>

Table 1 showed detection of different parasites in the faeces from dogs and cats from various parks

The risk factors associated with the occurrence of STHs eggs observed in the dog and recreational parks are listed in Table 4.2 and the correlation between them are being studied. Factors that influence the prevalence of STHs in individual sampling sites include the type of sampling sites (i.e., Dog parks and residential playgrounds), the presence of a fence, and the availability of disposable bins in each respective site.

The chi-square analysis (Table 4.2) revealed that the prevalence of STH eggs is influenced by the sampling site. The findings show that residential playgrounds exhibit a notably higher prevalence of STH eggs in faecal samples compared to dog parks. Besides, the presence of a fence is identified as a significant risk factor, with locations without fencing showing a higher prevalence of STH eggs in the samples examined. Moreover, the availability of disposable bins turned out to be an important variable influencing the prevalence of STH eggs, with locations lacking such bins exhibiting a higher presence of STH eggs in faecal matter.

Variable	n	Prevalence (%)	X <sup>2</sup>	df	p-value
<b>Factors</b>					
<b>Sampling Site</b>			18.68	1	0.000*
Dog Park	47	19.15			
Residential Playground	44	63.64			
<b>Other Risk Factors</b>					
<b>Fence</b>			22.023	1	0.000*
With Fence	39	12.82			
Without Fence	52	61.54			
<b>Disposable Bin</b>			18.6753	1	0.000*
With Disposable Bin	47	19.15			
Without Disposable Bin	44	63.63			

\*Significant (p<0.05)

Table 2 showed potential risk factors contributing to presence of STHs eggs

## 5.0 DISCUSSION

The current study, revealed a prevalence of 40.66% of STHs eggs in faeces collected from dogs and cats in green public areas of Kuala Lumpur and Selangor, Malaysia. *Ancylostoma* spp. emerged as the most prevalent group of parasites, with a prevalence of 40.65%, followed by *Toxocara* spp. at 2.19%, and *Trichuris* with the lowest prevalence at 1.099%. These findings are consistent with previous study in animal shelters in Kuala Lumpur with the highest prevalence of hookworm infections (48.4%), followed by *Toxocara* spp. and *Trichuris* spp. in dogs and cats (Jia-Chi *et al.*, 2016). Similarly, another work revealed a comparable prevalence of soil-transmitted helminths (STHs) in dogs that roamed freely in Bali, Indonesia, with *Ancylostoma* spp. being the most common, followed by *Ascaris* spp. and *Trichuris* spp. (Agustina *et al.*, 2021). In contrast, previous study performed in Malaysia has a different finding, which discovered a slightly greater prevalence of 55.5% of STHs eggs found in soil in playgrounds of Peninsular Malaysia (Zain *et al.*, 2015). While another study reported a notably high prevalence of 75.7%. of STHs found in the faeces of cats and dogs, as well as soil samples in Klang Valley, Malaysia (Tun *et al.*, 2016). Furthermore, a recent study in the northwest area of Mexico has an intriguing finding. The study found that *Toxocara* spp. was the most common STHs, and there were no hookworms detected (Trasviña-Muñoz *et al.*, 2017).

These varying outcomes show that STHs can vary in different places, and factors like location, climate play a role in the prevalence of helminth infections in Malaysia. This highlights the importance of tailoring strategies

specifically to each region for effectively preventing and managing these infections.

In the current study, the STHs infection was single STH infection mainly with the infection with hookworms, while multiple infections with other helminths were less frequently encountered. Our study observed lower prevalence of *Toxocara* spp. (2.19%). This result suggests that *Toxocara* spp. were less common in cats and dogs in the current research than the previously documented prevalence found in Thailand (3.5) [24], India (4%) [25], and Brazil (5.5%) [26]. With regard to *Trichuris* (1.099%), our findings demonstrate that the prevalence of *Trichuris* infection in dogs and cats was lower than previously documented [19]. Even though the prevalence of *Toxocara* spp. and *Trichuris* spp. are low, there is still potential threat to public health and human transmission. As a result, comprehensive management and prevention approaches against such parasites are critical.

In this study, we observed that residential playgrounds exhibit a higher prevalence of STHs eggs in the faecal sample. Our finding is consistent with previous work from Frankfurt, Germany which observed that residential playgrounds tend to have a higher concentration of dogs and cats due to their location in residential areas, where people live with their pets. (Däwel, 1984). The increase in pet presence can result in a higher prevalence of STHs eggs. Moreover, the residential playgrounds often lack sufficient space for pets to roam and play, leading to a denser accumulation of faeces in a smaller area, which raises the risk of STHs contamination. (Däwel, 1984). In contrast, dog

parks often have stricter rules and regulations compared to residential playgrounds. This can result in a cleaner environment with reduced faecal contamination. Based on our study, the risk ratio of 0.3 indicates that Residential Playgrounds are significantly three times more likely to have STHs eggs in the faecal samples compared to those collected from the dog parks.

Additionally, when comparing locations with and without fences, our findings revealed a higher prevalence of STH eggs in places without fences. Places without fences are significantly two times more likely to have STH eggs in the faecal samples compared to those with fences (Relative risk: 0.2). This disparity may be linked to, places without fences might not receive the same level of regular cleaning and maintenance which could contribute to a higher persistence of STH eggs presence in the environment (Zain, et al., 2015). Moreover, places without fences have higher accessibility of the strays compared to places with fences, and stray animals have a higher likelihood of contracting STHs, which leads to a higher prevalence of eggs in the environment.

Furthermore, the presence of disposable bins at sampling sites significantly influences the prevalence of STHs. Our observations indicate places without disposable bins have a higher prevalence rate. Statistical results demonstrate that places without disposable bins are significantly three times more likely to have STHs eggs in the faecal samples compared to places with disposable bins (Relative risk: 0.3). This could be attributed to a lack of access to

disposable bins contributing to a higher accumulation of faeces in the environment (WHO; 2005). The availability of disposable bins also promotes awareness of proper hygiene and responsible pet ownership, encouraging individuals to clean up after their pets business. In addition, Areas with accessible disposable bins most likely to have established community health measures that emphasise on waste management and cleanliness, further reducing the risk of STHs transmission.

In an overarching perspective, the implementation of comprehensive control measures becomes imperative to effectively eradicate the parasite burden and mitigate the risk of zoonotic transmission. This is particularly crucial, especially in environments where cats and dogs coexist closely with humans. Measures by enhancing the availability of essential sanitation facilities and ensuring appropriate waste disposal practices can lower the likelihood of STHs transmission (Mascarini-Serra, 2011).

Based on the high prevalence rate of STHs found, a few recommendations should be considered, by implementing regular deworming programs for pets, increasing public awareness regarding the potential health risks associated with STHs infections and enhancing sanitation and hygiene practices in public areas to minimise environmental contamination, and reducing the transmission of soil-transmitted infections from stray animals by a multi-pronged approach that combines population control, responsible ownership, and environmental management.

Finally, veterinary authorities must play important roles in educating and raising public knowledge about the zoonotic potentials of animals, particularly pets. In addition, pet owners and veterinary officials, and municipal authorities must collaborate to address roaming animal concerns in order to safeguard the safety of both animals and humans in Selangor and Kuala Lumpur.



## 6.0 CONCLUSION AND RECOMMENDATION

The study has highlighted a high prevalence of 40.66% of Soil Transmitted Helminth (STHs) eggs in dogs' and cats' faecal samples in public spaces of Kuala Lumpur and Selangor. Risk factors affecting this prevalence include Sampling location, Presences of Fences, and Disposable bins. In conclusion, this underscores the need for measures to stop spreading of STH transmission. The soil transmitted helminths found in this study has a zoonotic potential. Hence, programs designed to educate pet owners on how to avoid these hazardous parasite infections will be needed. In addition, campaigns to educate pet owners on how to avoid certain parasite illnesses will be necessary. A high prevalence of STHs, in conjunction with inadequate hygiene practices and malnutrition, serves as an indicator of prospective challenges for a country. This emphasises the necessity of prioritising global efforts to eradicate STHs.

While the main objective of the research was to offer dependable findings for future reference, certain limitations have been acknowledged. Firstly, the study focused exclusively on Kuala Lumpur, Malaysia. Additionally, the sample size was constrained due to the 5-week duration allocated for the final year assignment, which imposed limitations on the time available for data collection.

To address the study's limitations arising from its exclusive focus on Kuala Lumpur and Selangor, Malaysia, and the restricted sample size due to the 5-week duration of the final year assignment, it is recommended to diversify study locations by expanding to additional areas like other states in Malaysia. Besides, extending the allocated time for data collection beyond the 5-week timeframe would enable a

larger sample size and a more comprehensive understanding of the variables under investigation. By implementing these recommendations, the study can potentially overcome its current limitations, offering a more comprehensive and reliable foundation for future reference.



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