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Knowledge, Attitude and Practices of Cat Deworming Among Cat Owners in Malaysia

By

Nurul Jannah Binti Abdul Halim

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Dr. Abubakar Muhammad Wakil
DVM, MSc. (University of Maiduguri, Nigeria),
PhD (Lala lajpat Rai University of Veterinary and Animal Sciences, Hisar, India)
Senior Lecturer
Faculty of Veterinary Medicine
Universiti Malaysia Kelantan
(Supervisor)

Dr. Mohammed Dauda Goni
DVM (University of Maiduguri, Nigeria), MSc (Universiti Putra Malaysia),
PhD (Universiti Sains Malaysia)
Senior Lecturer
Faculty of Veterinary Medicine
Universiti Malaysia Kelantan
(Co-supervisor)

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KNOWLEDGE, ATTITUDE AND PRACTICES OF CAT DEWORMING AMONG CAT OWNERS IN MALAYSIA

ABSTRACT

Helminths are a prevalent health issue in cats that cause a range of symptoms, including vomiting, diarrhea, anemia, dehydration, and weight loss. Regular deworming is important to safeguard the well-being of cats and to prevent the spread of zoonotic infections. However, the current level of cat owners' knowledge, attitude and practice (KAP) toward cat deworming is not well understood in this country. This study aims to investigate cat owners' knowledge, attitude and practice (KAP) related to cat deworming in Malaysia via a cross-sectional study. A total of one hundred and eight cat owners were recruited by convenience sampling through an online self-administered questionnaire. The questionnaires consisted of closed-ended questions on demographic information, pet information and owners' KAP towards deworming. Statistical tests including the chi-square test and Pearson correlation test will be used. The Chi-square test will be used to determine the association between demographic variables and knowledge, attitude, and practice (KAP) level, while the Pearson correlation test will evaluate the correlations between knowledge, attitudes, and practices. Results from the current study showed the cat owners had good knowledge (61.1%, n=66), good attitude (84.2%, n=91) and moderate practices (49.2%, n=53) towards cat deworming. This study will provide valuable insights for authorities to enhance veterinary treatment efficacy and achieve optimal cat health.

Keywords: Knowledge; Attitude; Practice; Deworming; Cat Owner; Malaysia

KNOWLEDGE, ATTITUDE AND PRACTICES OF CAT DEWORMING AMONG CAT OWNERS IN MALAYSIA

ABSTRAK

Cacing adalah isu kesihatan yang meluas dalam kalangan kucing yang menyebabkan pelbagai simptom, termasuk muntah, cirit-birit, anemia, dehidrasi, dan kehilangan berat badan. Rawatan penyahcacingan secara berkala adalah penting untuk melindungi kesejahteraan kucing dan mencegah penularan jangkitan zoonotik. Walau bagaimanapun, tahap pengetahuan, sikap, dan amalan (KAP) pemilik kucing terhadap rawatan cacing kepada kucing tidak difahami dengan baik di negara ini. Kajian ini bertujuan untuk menyelidiki pengetahuan, sikap, dan amalan (KAP) pemilik kucing berkaitan dengan rawatan cacing kucing di Malaysia melalui satu kajian keratan rentas. Seramai seratus lapan pemilik kucing telah dipilih melalui persampelan keselesaan melalui soal selidik atas talian yang diisi sendiri. Soal selidik ini terdiri daripada soalan tertutup mengenai maklumat demografi, maklumat haiwan kesayangan, dan KAP pemilik terhadap rawatan cacing. Ujian statistik termasuk ujian Chi-square dan ujian korelasi Pearson akan digunakan. Ujian Chi-square akan digunakan untuk menentukan hubungan antara pembolehubah demografi dan tahap pengetahuan, sikap, dan amalan (KAP), manakala ujian korelasi Pearson akan menilai korelasi antara pengetahuan, sikap, dan amalan. Hasil daripada kajian ini menunjukkan pemilik kucing mempunyai pengetahuan yang baik (61.1%, n=66), sikap yang baik (84.2%, n=91), dan amalan sederhana (49.2%, n=53) terhadap rawatan cacing kucing. Kajian ini akan memberikan pandangan yang berharga untuk pihak berkuasa meningkatkan keberkesanan rawatan veterinar dan mencapai kesihatan optimal bagi kucing.

Kata Kunci: Pengetahuan; Sikap; Amalan; Pemberian Ubat Cacing; Pemilik Kucing; Malaysia

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LIST OF ABBREVIATIONS

CDC	Centers for Disease Control and Prevention
ESCCAP	European Scientific Counsel Companion Animal Parasites
KAP	Knowledge, Attitude, Practice
SPSS	Statistical Package for Social Sciences
VRI	Veterinary Research Institute

LIST OF SYMBOLS

%	Percentage
>	Greater Than
<	Less Than
\geq	Greater Than or Equal To
\leq	Less Than or Equal To

CHAPTER 1

INTRODUCTION

Over the years, pet ownership has grown in popularity in Malaysia, as more and more people welcome furry families into their households. Pets, including cats, dogs, birds, fish, rabbits, guinea pigs, not only bring comfort and happiness, but also serve as a source of amusement to their owners. According to the latest Consumer Report Malaysia 2023 by Standard Insights, 51.1% of Malaysians own pets and within this group, 77.7% of respondents who owned pets have at least one feline companion. Based on presented statistics, it is clear that cats are the primary choice of pets in Malaysian households (A Closer Look at Pet Ownership in Malaysia, 2023). While owning pet brings joy and companionship, it also comes with the responsibility of ensuring the pet's health and well-being. This includes regular veterinary check-ups, adequate care and nutrition, and compliance with a consistent deworming schedule.

Nevertheless, some cat owners failed to comply with the prescribed deworming frequencies. A study in France revealed only 6% of cats in the highest risk category (D) were dewormed monthly as advised (Roussel *et al.*, 2019). The failure to comply with prescribed deworming regimes raises serious concerns due to potential consequences for both feline and human health. Range of symptoms such as vomiting, diarrhea, anemia, dehydration and weight loss are a prevalent health issue in felines caused by endoparasitic infections (Tishyn *et al.*, 2023). A study conducted in Malaysia from 2014 to 2018 tested 58 cat samples for parasitic infections. It was found that 24 of these samples were positive for various parasites, including helminths, protozoa, and ectoparasites (Munira *et al.*, 2019).

Therefore, regular deworming is imperative to safeguard the well-being of cats and prevent the spread of zoonotic infection (Centers for Disease Control and Prevention (CDC), 2019). However, the extent of cat owners' knowledge, practices, and attitudes toward cat deworming in Malaysia remains unexplored. Hence, this study aims to assess the owner's understanding as well as their perceptions towards feline deworming in Malaysia. The findings will provide helpful insights for targeted educational programs and

enhanced veterinary care, with the goal to encourage responsible pet ownership and alleviate the burden of parasitic illnesses.

1.1 Problem Statement

Globally, there is existing research on the knowledge, attitude and practice of cat owners towards deworming their cats. For instance, a study conducted in the Netherlands explored the cat owner's attitude towards routine deworming (Nijssse *et al.*, 2016). In contrast, there is a significant gap in research on this topic in Malaysia, despite the potential health risks posed by parasites in cats, including dehydration, weight loss, vomiting, diarrhea, and anemia. One of the reasons for not deworming cats is often attributed to a lack of knowledge required for making informed decisions on routine deworming (Nijssse *et al.*, 2016).

1.2 Research Questions

- a. What is the level of knowledge among cat owners in Malaysia towards deworming?
- b. What is the level of attitudes and views of cat owners in Malaysia towards deworming, including importance, concerns, and hindrances to regular deworming?
- c. What is the level of practice among cat owners in Malaysia towards deworming?

1.3 Research Hypothesis

- a. Hypothesis 1: Cat owners in Malaysia have poor knowledge regarding the importance of deworming their cats.
- b. Hypothesis 2: Cat owners in Malaysia have a poor attitude to deworm their cats.
- c. Hypothesis 3: Cat owners in Malaysia do not routinely deworming their cats.

1.4 Research Objectives

- a. To assess the level of knowledge among cat owners in Malaysia about deworming.
- b. To explore the attitudes of cat owners in Malaysia towards deworming.
- c. To investigate the current deworming practices among cat owners in Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Pet Cat's Ownership in Malaysia

As of 2023, data from sources such as Statista, PetSecure, Growth from Knowledge, and Simply Insurance indicate that around 370 million cats are kept as pets globally (Pet Ownership Statistics in 2023 | The Zebra, 2023). While in Malaysia, approximately 51.1% of the population identifies as pet owners, with a significant 77.7% of respondents within this group having at least one feline companion, as reported in the latest Consumer Report Malaysia 2023 by Standard Insights (A Closer Look at Pet Ownership in Malaysia, 2023). These figures highlight the substantial role that cats play in the lives of Malaysians, solidifying their status as the preferred choice of pets in households across the country (A Closer Look at Pet Ownership in Malaysia, 2023).

2.2 Endoparasites

Parasites, defined as organisms that live symbiotically within or upon other organisms, strategically extract nutrients from their hosts to their benefit (Centers for Disease Control and Prevention (CDC), 2022). This complex relationship manifests in two different forms; endoparasites, which intricately reside within the host's body and ectoparasites, which strategically inhabit the external surface of the host (CDC, 2022). Endoparasites can be categorically into two primary groups: helminths and protozoa. Helminths are macroscopic, multicellular organisms that are typically discernible to the naked eye during their adult stage. In contrast, protozoa are microscopic, unicellular entities. Both categories encompass species that can exist either independently or in parasitic associations. Examples of helminths comprise nematodes (roundworms), cestodes (tapeworms), and trematodes (fluke worms) (CDC, 2022).

2.3 Common Endoparasites in Feline

Cats serve as reservoir hosts for various species of helminths and protozoa. These parasites include *Toxocara cati*, *Schistosoma mansoni*, *Platynosomum fastosum*, *Strongyloides sp.*, *Echinostoma sp.*, *Isospora sp.*, *Giardia duodenalis*, *Ancylostoma sp.*, *Taenia taeniaeformis*, and *Dipylidium caninum* (Wichit et al., 2014; Masrin et al., 2019; Wierzbowska, Kornaś, Piontek & Rola, 2020). As per Annual Reports of the Veterinary

Research Institute, cats commonly harbor various types of endoparasites, such as *Dirofilaria immitis*, *Toxoplasma gondii*, and *Ancylostoma sp.*

2.4 Route of Transmission

The transmission routes of parasites exhibit variability upon the specific type of parasites involved. Typically, transmission takes place via the fecal-oral route, facilitated by the consumption of infected rodents or birds, or through ingesting eggs or larvae found in the environment as described by European Scientific Counsel Companion Animal Parasites (ESCCAP). Furthermore, transmission can occur through transmammary or transplacental means (Mugnaini *et al.*, 2012), where certain parasites, such as roundworms, may be transmitted from a mother to her offspring during lactation or through the placenta (Fisher, 2001). Another mode of transmission involves direct penetration, in which roundworms breach the skin and migrate to the intestine (Fisher, 2001). Lastly, vector-borne transmission is observed in cases where parasites require an intermediate host or vector (World Health Organization, 2020). An example is the prevalent tapeworm species in cats, which requires fleas as an intermediate host.

2.5 Common Feline Dewormer in Malaysia

In the battle against worm infestation in felines, a variety of dewormers is available in different formulations such as spot-on or tablet. These dewormers often contain active ingredients such as Imidacloprid and Moxidectin, which provide protection against fleas, heartworm, intestinal worms, lungworms, and more (Ritma Pres n.d.). Similarly, other products contain a combination of active ingredients like Fipronil, (S)-methoprene, Eprinomectin, and Praziquantel, or Pyrantel Embonate and Praziquantel (Ritma Pres n.d.).

Recently, there have been advancements in endoparasite treatment. One such advancement is a first-in-class broad-spectrum topical parasite treatment for cats. This treatment addresses fleas, ticks, ear mites, hookworms, roundworms, vesicle worms, lungworms, tapeworms, and offers prevention against heartworm disease. It is distinguished as the initial and sole feline broad-spectrum topical parasite protection capable of effectively eliminating tapeworms (New Straits Times, 2023).

2.6 Feline Endoparasitism Cases in Malaysia

Currently, there is limited data available regarding the prevalence of endoparasites in cats in Malaysia. Veterinary Research Institute (VRI) in Ipoh, Perak, published a recent epidemiological study on internal parasites in cats in 2019 (Munira *et al.*, 2019). The reported cases of positive various parasites in cats and dogs, including helminths, protozoa, and ectoparasites, between 2014 and 2018 accounted for 37.63% (Munira *et al.*, 2019). Notably, in 2014, 89.3% of cats in the Selangor and Pahang states were found to be infected with at least one gastrointestinal parasite (Ngui *et al.*, 2014). While these studies have been conducted, shedding light on the prevalence of endoparasites in feline populations, comprehensive data is still scarce.

2.7 Knowledge of Internal Parasites and Deworming

Several studies have emphasized the awareness of internal parasites and deworming practices among cat owners in Malaysia. Cat owners who were more knowledgeable about internal parasites were more likely to deworm their cats on a regular basis. According to Matos *et al.* (2015), the majority of cat owners recognized the necessity of parasite management by deworming; yet a significant percentage did not follow the prescribed deworming and flea or tick treatment regimens. The study also discovered a number of cat

owners were unconcerned of the hazards that parasite infections posed to their cats and themselves Matos *et al.* (2015). Furthermore, according to Nijse *et al.* (2016), there is currently inadequate understanding among cat owners to expect them to make educated judgements about routine deworming. Most cat owners, for example, believed that their current deworming routine of cats once a year was sufficient, regardless of the fact that cats should ideally be dewormed at least four times a year (Nijse *et al.*, 2016)

2.8 Attitudes Towards Deworming

There has been a limited study into the attitudes of cat owners in Malaysia towards deworming. Results from a study conducted by Elsheitka (2016) indicated that cat owners generally acknowledged the crucial importance of deworming. However, non-compliance was attributed to concerns regarding misconceptions about the benefits of deworming, such as potential adverse effects or perceived lack of effectiveness, as well as inconvenience. In addition, variables such as limited understanding, the cost of medication, and consultation fees were identified as influential factors affecting deworming practices among cat owners.

2.9 Deworming Practices

Effective deworming practices among cat owners play a crucial role in maintaining the health and well-being of feline companions. Knowledgeable owners are more likely to comply with the guidelines recommended by the manufacturers (McNamara *et.al.*, 2018; Pennelegion *et.al.*, 2020). Nevertheless, despite the significance of proper deworming, there is a subset of cat owners who fail to comply with the correct rules, which results in irregular or inconsistent deworming practices. For instance, only 24.5% of cats received the recommended four-times-a-year deworming treatment, indicating a notable deviation from the suggested guideline (Nijse *et al.*, 2016). Moreover, as reported by Matos *et al.* (2015), a majority of pet owners neglect the manufacturer recommendations, leading to inefficient deworming at irregular intervals. Additionally, Salgado-Caxito *et al.* (2009) point out, cat owners with better socioeconomic status are more prone to participate in preventive healthcare for their pets, such as deworming.

CHAPTER 3

METHODOLOGY

3.1 Study Design

This study was conducted using a cross-sectional study design with a convenience sampling method to gather data among cat owners in Malaysia.

3.2 Study Population

The study was conducted among cat owners in Malaysia.

3.3 Selection Criteria

The respondents included in this study were exclusively cat owners from Malaysia who willingly consented to participate. Additionally, respondents were required to have the ability to access the self-administered online questionnaire.

3.3.1 Inclusion Criteria

To be eligible for participation, respondents must currently or previously have owned one or more cats as pets and be aged 18 years or above. Furthermore, the respondents were required to be residents of Malaysia.

3.3.2 Exclusion Criteria

Respondents were ineligible if they did not meet the criteria of being cat owners, were under the age of eighteen, or were non-residents in Malaysia.

3.4 Study Questionnaire

The questionnaire was developed following extensive literature search related to cat owners' knowledge, attitudes and practice towards deworming (Nijse *et al.*, 2016). The items in the questionnaire were generated based on information and guidelines for the diagnosis, treatment, and control of feline endoparasites in the tropics (Tropical Council for Companion Animal Parasites, 2019). The content of the items included in the questionnaire were validated by a panel of experts in Public Health. The final questionnaire consisted of five sections of closed-ended questions with response options.

3.4.1 Section 1: Demographic Information

In this section, information about the respondents was collected, including questions about age, gender, state, educational level, salary and type of residential area.

3.4.2 Section 2: Pet's Information

Information about the cats was gathered, such as the living management whether they were kept indoors or outdoors, the deworming status, the frequency of deworming and any previous or existing medical conditions.

3.4.3 Section 3: Knowledge Questions

This section comprised six statements that assessed the respondents' knowledge of cat deworming. Participants responded to these statements by selecting from multiple-choice options, which included "yes," "no," or "I don't know." Incorrect (No) or uncertain (I don't know) responses received a score of 0, while 1 point was assigned for choosing the correct answer (Yes). The anticipated maximum total score was 5.

3.4.4 Section 4: Attitude Statements

Consisting of five statements about the respondent's attitude towards cat deworming, this section utilized a 5-point Likert scale. Response options ranged from "strongly agree" to "strongly disagree." Respondents selected the option that best represented their agreement or disagreement with each statement. A correct statement with options "strongly agree", "agree", "neutral", "disagree", and "strongly disagree" are scored 5, 4, 3, 2, and 1, respectively. The expected maximum total score was 25 and the minimum was 5.

3.4.5 Section 5: Practice Statements

This section included five statements about the respondent's practices concerning cat deworming, utilizing a 4-point Likert scale. Response options ranged from "never" to "always." Respondents chose the option that corresponded to their practices. Practices are scored 4, 3, 2 and 1 for "always", "often", "rarely" and "never" respectively. The maximum total score was 20 and the minimum was 4.

3.5 Data Collection

Information was gathered from cat owners in Malaysia through questionnaires from October 29th to November 9th, 2023, covering a period of 11 days. The questionnaire was developed, distributed and collected through Google Forms. The study utilized a convenience sampling method to enlist participants. The online questionnaire link was distributed through various platforms, including social media channels such as WhatsApp, Instagram, Twitter, and Facebook. The questionnaires were also shared in online communities and forums dedicated to cat owners to establish connections and recruit participants.

At the outset of the questionnaires, participants were briefed on the study's context and objectives. Additionally, each participant received a consent form outlining their voluntary participation, and information concerning the utilization of data obtained from the questionnaires. Furthermore, participants were assured that their responses would be kept entirely confidential and used exclusively for academic purposes.

3.6 Data Analysis

The initial data collected through Google Form were initially transferred to Microsoft Excel. Subsequent analysis of this data was performed by using Statistical Package for Social Sciences (SPSS) version 26.0, with a significance level set at $\alpha < 0.05$. This involved calculating frequencies, percentages, means, medians, and standard deviations to describe categorical and numerical variables. Statistical tests, including the Chi-square test and Pearson correlation test, were used. The chi-square test was used to determine the association between demographic variables and knowledge, attitude, and practice (KAP) level, while the Pearson correlation test was used to evaluate the correlations between knowledge, attitudes, and practices. Proportions were calculated to determine the proportion of cat owners with different levels of KAP.

The total score for each section was calculated by adding up the points earned for each response. KAP levels were categorized as “Good,” “Moderate,” or “Poor” based on Bloom’s cut-off point. The overall score was classified as “Good” if the score was $\geq 80\%$. Meanwhile, scores were defined as “Moderate” if they fell between 50% and 79%. Lastly, scores 40% were classified as “Poor.”



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CHAPTER 4

RESULT

4.1 Respondents Socio-demographic

A total of 108 respondents' data of cat owners in Malaysia during this study period were collected. As depicted in Table 4.1.1 below, the major portion of respondents comprised females (n=82, 75.9%). A predominant percentage of respondents fell within the age of 18 to 25 years old (n=82, 75.9%), followed by those in the age ranges of 26 to 39 (n=14, 13%), 40 to 59 (n=7, 6.5%), and 60 to 70 (n=5, 4.6%). The majority of respondents held a degree as their highest educational level (n=79, 73.1%), followed by those with STPM, matrices, foundation, or diploma qualifications (n=19, 17.6%). Others were at the secondary level (n=4, 3.7%), pursued a Master's degree (n=4, 3.7%), and pursued a Ph.D. at the lowest frequency (n=2, 1.9%). A significant proportion of respondents did not report any salary (n=62, 57.4%). Over half of the respondents characterized their residential type as urban (n=66, 61.1%).

Table 4.1.1 Respondent's Demographic

Variables	Frequency	Percentage (%)
Gender		
Female	82	75.9
Male	26	24.1
Age		
18 - 25	82	75.9
26 - 39	15	13.9
40 - 59	7	6.5
60 - 70	4	3.7

Educational Level		
Secondary	4	3.7
STPM / Matrics / Foundation / Diploma	19	17.6
Degree	79	73.1
Master	4	3.7
PHD	2	1.9
Salary		
< RM2500	27	25
RM2500 - RM5000	11	10.2
RM5000 - RM11000	6	5.6
> RM11000	2	1.9
Type of Residential Area		
Rural	42	38.9
Urban	66	61.1

4.2 Pet's Information

According to the data presented in **Table 4.2.1**, a majority of respondents (62%, n=67) reported that their feline companions have a combination of indoor and outdoor living arrangements. A substantial number (24.1%, n=26) reported keeping their cats exclusively indoors, while a smaller percentage (13.9%, n=15) opted for outdoor living. A significant majority (64.8%, n=70) of respondents affirmed that their cats had undergone deworming in the past year, while 35.2% (n=38) indicated otherwise. Among the participants who reported deworming their cats, the frequency varied. The majority (56.4%, n=44) adhered to an annual deworming regimen, while 25.6% (n=20) opted for a

semi-annual schedule. A smaller proportion (17.9%, n=14) indicated deworming their cats more than twice a year. For the health history of cats, the majority of respondents (70.4%, n=76) asserted that their cats did not have any previous or existing medical conditions. In contrast, 29.6% (n=32) acknowledged that their cats did have such conditions.

Table 4.2.1 Pet's Information

Questions	Frequency	Percentages (%)
Do you primarily keep your cat(s) indoors, outdoors or a combination of both?		
Indoor	26	24.1
Outdoor	15	13.9
Both	67	62
Has your cat(s) been dewormed in the past year?		
Yes	71	65.7
No	37	34.3
If yes, how often do you typically deworm your cat(s) within a year?		
Once a year	44	40.7
Twice a year	20	18.5
More than twice	14	13
Does your cat(s) have any previous or existing medical conditions?		
Yes	76	70.4

4.3 Respondent's Knowledge Towards Deworming in Cat

As tabulated in **Table 4.3.1**, among the 108 respondents, a staggering 92.6% (n=100) of respondents demonstrated a clear understanding of deworming as a process of eliminating worms by giving medications or treatments, while 7.4% (n=8) acknowledged uncertainty. Expanding on the significance of this practice, the majority, encompassing 95.4% (n=103), recognized its importance for reducing parasites and enhancing feline health. In contrast, 3.7% (n=4) remained uncertain, and a mere 0.9% (n=1) expressed skepticism. Exploring the identification of common signs of worm infestations in cats, including weight loss, diarrhea, vomiting, a dull coat, and dragging their bottom along the floor, 81.5% (n=88) of participants demonstrated awareness, while 18.5% (n=20) were uncertain about these clinical signs. In investigating the potential sources of cat worm infestations, such as the consumption of uncooked meat, drinking contaminated water, or self-grooming, the majority (81.5%, n=88) acknowledged these transmission pathways. However, 16.7% (n=18) remained uncertain, and a marginal 1.9% (n=2) dismissed these possibilities. Examining the potential transmission of worms from cats to humans through direct contact with cat feces and contaminated soil, 59.3% (n=64) recognized this risk, 29.6% (n=32) remained uncertain, and 11.1% (n=12) rejected the notion. Finally, when queried about awareness of routine deworming schedules for cats, 57% (n=61) of respondents confirmed their knowledge, while 43% (n=46) expressed a lack of familiarity with such schedules.

Table 4.3.1 Respondent’s Knowledge Towards Deworming in Cat

	Statements	Responses n (%)	
		Correct Answers	Wrong Answers
1	Deworming is a process of eliminating worms by giving medications or treatments.	100 (92.6)	8 (7.4)
2	Deworming is important for reducing parasites and improving your cat(s) health.	103 (95.4)	5 (4.6)
3	The common signs of worm infestations in cat(s) may include weight loss, diarrhea, vomiting, a dull coat and dragging their bottom along the floor.	88 (81.5)	20 (18.5)
4	Cat(s) can get worm infestations by eating uncooked meat, drinking contaminated water or grooming themselves.	88 (81.5)	10 (18.6)
5	People can get worms infestations from direct contact with cat poop and dirty soil.	64 (59.3)	44 (40.7)
6	Are you aware of the routine deworming schedule in cats?	61 (57)	46 (43)

Table 4.3.2 Comparison of Demographic Characteristics and KAP Scores of Knowledges

Variables	Good (%)	Moderate (%)	Poor (%)	P value
Gender				0.995
Female	61	31.7	7.3	

	Male	61.5	30.8	7.7	
Age					0.126
	18 - 25	57.3	35.4	7.3	
	26 - 39	86.7	13.3	0	
	40 - 59	42.9	28.6	28.6	
	60 - 70	75	25	0	
Educational Level					0.018*
	Secondary	50	25	25	
	STPM / Matrics / Foundation / Diploma	73.7	10.5	15.8	
	Degree	60.8	36.7	2.5	
	Master	25	50	25	
	PHD	50	0	50	
Salary					0.297
	< RM2500	63	33.3	3.7	
	RM2500 - RM5000	54.5	45.5	0	
	RM5000 - RM11000	16.7	66.7	16.7	
	> RM11000	100	0	0	
	None	64.5	25.8	9.7	
Type of Residential Area					0.586
	Rural	59.5	35.7	4.8	

Urban 62.1 28.8 9.1

*Statistically significant

4.4 Respondent's Attitudes Towards Deworming in Cat

A significant majority of respondents, 74.1% (n=80), expressed a strong belief in the necessity of deworming to prevent health problems. Furthermore, a substantial proportion, 70.4% (n=76), strongly agreed that deworming is an integral aspect of responsible pet ownership. This highlights the link between responsible pet care and preventive healthcare practices. While 50.9% (n=55) strongly agreed to follow a regular deworming schedule as recommended by veterinarians, a notable 20.4% (n=22) expressed neutrality. Additionally, nearly half of the respondents (46.3%, n=50) strongly agreed that deworming is more crucial for outdoor cats. Regarding the timing of deworming, based on observable signs, it revealed diverse attitudes. While 21.3% (n=23) strongly agreed with this approach, 22.2% (n=24) strongly disagreed, indicating a split among respondents regarding proactive versus reactive deworming practices.

Table 4.4.1 Respondent's Attitudes Towards Deworming in Cat

Statements	Responses n (%)				
	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1 I believe that deworming my cat(s) is necessary to prevent certain health problems.	80 (74.1)	17 (15.7)	5 (4.6)	1 (0.9)	5 (4.6)
2 I believe that deworming my cat(s) is an important part of responsible pet ownership.	76 (70.4)	20 (18.5)	5 (4.6)	2 (1.9)	5 (4.6)
3 I am committed to follow a	55 (50.9)	24 (20.4)	22 (20.4)	3 (2.8)	4 (3.7)

regular deworming schedule
for my cat(s) as
recommended by the
veterinarian.

4	I believe that deworming is more important for outdoor cats than indoor cats.	50 (46.3)	21 (20.4)	22 (20.4)	3 (2.8)	12 (11.1)
5	I deworm my cat(s) only when I notice signs of worm infestations or other health problems.	23 (21.3)	26 (24.1)	17 (15.7)	18 (16.7)	24 (22.2)

Table 4.4.2 Comparison of Demographic Characteristics and KAP Scores of Attitudes

Variables	Good (%)	Moderate (%)	Poor (%)	P value
Gender				0.302
Female	82.9	13.4	3.7	
Male	88.5	3.8	7.7	
Age				0.328
18 - 25	84.1	11	4.9	
26 - 39	86.7	13.3	0	
40 - 59	100	0	0	
60 - 70	50	25	25	
Educational Level				0.939
Secondary	75	25	0	

	STPM / Matrics / Foundation / Diploma	89.5	5.3	5.3	
	Degree	83.5	11.4	5.1	
	Master	75	25	0	
	PHD	100	0	0	
Salary					0.235
	< RM2500	96.3	0	3.7	
	RM2500 - RM5000	72.7	27.3	0	
	RM5000 - RM11000	83.3	0	16.7	
	> RM11000	100	0	0	
	None	80.6	14.5	4.8	
Type of Residential Area					0.024*
	Rural	73.8	21.4	4.8	
	Urban	90.9	4.5	4.5	

*Statistically significant

4.5 Respondent's Practices Towards Deworming in Cat

Table 4.5.1 presents the respondent's responses regarding various practices related to cat deworming. An analysis of the data reveals that a notable percentage, 35.2% (n=38), demonstrated poor practices in actively engaging in deworming activities. In contrast, a smaller proportion, 15.8% (n=17), exhibited good practices in this regard. Notably, respondents rarely administered deworming treatments to their cats, even if they seemed healthy (40.7%, n=44), while 25.9% (n=28) and 14.8% (n=16) of the respondents often and always practiced, respectively. Approximately half of the respondents rarely followed the regular deworming schedule recommended by veterinarians (38.9%, n=42), while 20.4%

(n=22) never complied with the schedule. Some engaged in inconsistent monitoring of their cat's litter for signs of worm infestation (19.4%), while others did so often (18.5%), rarely (37%), or never (25%). However, only half of the respondents never administered deworming treatment to their cats at home without consulting the veterinarian.

Table 4.5.1 Respondent’s Practices Towards Deworming in Cat

Statements	Responses n (%)			
	Always	Often	Rarely	Never
1 I have actively practiced deworming my cat(s).	19 (17.6)	24 (22.2)	45 (41.7)	20 (18.5)
2 I administer deworming treatments to my cat(s), even if they seem healthy.	16 (14.8)	28 (25.9)	44 (40.7)	20 (18.5)
3 I follow a regular deworming schedule for my cat(s) as recommended by the veterinarian.	28 (25.9)	16 (14.8)	42 (38.9)	22 (20.4)
4 I regularly check my cat's litter for signs of worm infestations.	21 (19.4)	20 (18.5)	40 (37)	27 (25)
5 I administer deworming treatment to my cat(s) at home without consulting the veterinarian.	12 (11.1)	16 (14.8)	26 (24.1)	54 (50)

Table 4.5.2 Comparison of Demographic Characteristics and KAP Scores of Practices

Variables	Good (%)	Moderate (%)	Poor (%)	P value
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Gender				0.566
	Female	11	51.2	37.8
	Male	15.4	57.7	26.9
Age				0.307
	18 - 25	11	47.6	41.5
	26 - 39	13.3	73.3	13.3
	40 - 59	14.3	57.1	28.6
	60 - 70	25	75	0
Educational Level				0.073
	Secondary	25	0	75
	STPM / Matrics / Foundation / Diploma	31.6	47.4	21.1
	Degree	7.6	57	35.4
	Master	0	50	50
	PHD	0	50	50
Salary				0.102
	< RM2500	25.9	33.3	40.7
	RM2500 - RM5000	0	63.3	36.4
	RM5000 - RM11000	0	66.7	33.3
	> RM11000	50	50	0
	None	8.1	58.1	33.9

Type of Residential Area				0.179
Rural	4.8	57.1	38.1	
Urban	16.7	50	33.3	

4.6 Association of Demographic Characteristics and KAP Scores

The relationship between demographic characteristics and KAP scores of respondents are shown in **Table 4.3.2**, **Table 4.4.2** and **Table 4.5.2**. Among the demographic variables, only the educational level for knowledge and type of residential area for attitude shows significant value, ($p < 0.05$).

4.7 Correlation between KAP Scores

The correlation revealed significant positive linear correlations between knowledge and attitude ($r = 0.082$, $p = 0.399$), correlation between knowledge and practice ($r = 0.487$, $p < 0.001$), and attitude and practice ($r = 0.54$, $p = 0.578$). The result suggests a moderate correlation between knowledge and practice, but weak correlations between knowledge and attitude, and attitude and practice. However, only the correlation between knowledge and practice is statistically significant.

CHAPTER 5

5.0 DISCUSSION

This present study was conducted among 108 cat owners in Malaysia, aimed to evaluate the Knowledge, Attitudes and Practices (KAP) regarding cat deworming among cat owners in Malaysia. While studies have explored the KAP of cat deworming, there remains a gap in understanding the specific knowledge, attitudes, and practices of cat owners in this context (Nijse *et al.*, 2016). With an increasing prevalence of endoparasitic infections in felines, it is crucial to collect essential data to inform effective control and strategies.

The findings of this study revealed that educational level emerged as the sole significant predictor influencing the knowledge of the cat deworming among owners ($p = 0.018$). Respondents holding qualifications such as STPM, Matrics, Foundation, and Diploma exhibited a good level of knowledge (73.7%, $n=14$), surpassing those with either high school education or advanced degrees (Master and Ph.D.). This disparity may be attributed to the demographic composition, as a considerable portion of respondents with STPM, Matrics, Foundation, and Diploma qualifications fall within the age of 18 to 25 and 26 to 39. According to the 2023 Digital Yearly Report, individuals aged 25 to 34 were identified as the most active Internet users, utilizing platforms like Facebook, Instagram, and TikTok to access information and stay abreast of current events (Sinar Daily, 2023). This aligns with insights from an American survey, which reported that younger participants were more inclined to utilize the Internet for pet health education compared to other age groups (Kogan *et al.*, 2012). This suggests that the higher level of knowledge about cat deworming among these respondents could be due to their active use of the Internet for information, rather than their level of education alone.

Meanwhile, the results showed that other sociodemographic characteristics, including gender, age, salary and type of residential area did not emerge as significant predictors of the owner's knowledge on cat deworming. This could be attributed to the limited sample size in this study. The results of this study revealed 61.1% ($n=66$) of respondents had moderate knowledge towards feline deworming regardless of their gender. These outcomes align with a study conducted among Spanish pet owners about endoparasite infection risk and deworming frequencies in regard to their sources of

information on deworming (Miró *et al.*, 2020). Moreover, almost all owners were aware of the importance of deworming 94.4% (n=103). However, only 57% (n=61) of owners demonstrated awareness of the routine deworming schedule for cats. This finding echoes a French national survey, which highlighted poor deworming compliance for cats in the high-risk category (Category D) at 6% (Roussel *et al.*, 2019). This suggests that while cat owners in Malaysia understand the importance of deworming, there may be a gap in their understanding of how often deworming should occur.

Concerning cat owners' awareness of deworming, the majority of the participants believed that deworming is an integral aspect of responsible pet ownership 70.4% (n=76). However, despite this recognition, only 50.9% (n=55) of respondents were committed to follow a regular deworming schedule as recommended by the veterinarian. This discrepancy between knowledge and practice suggests potential barriers to regular deworming. Economic constraints and lack of awareness may impact the ability of cat owners to provide necessary care, including deworming for their pets (Ismail Munir, Mokhtar & Arham, 2023; Pet Care in Malaysia by Euromonitor, 2023).

The findings also revealed the type of residential area had significant differences in owners' awareness of cat deworming ($p = 0.024$), with 38.9% (n=42) from rural areas and 61.1% (n=66) from urban areas. This is believed likely due to the substantial influence of residential areas on cat's exposure to potential sources of parasites. For instance, cats in rural areas may have more opportunities to hunt and consume prey infected with parasites, increasing their risk of worm infestations. Cats with both indoor and outdoor or outdoor living management have a greater amount of tendency to bring hunted "gifts" to their owners, such as small mammals, reptiles, and birds (Mendoza Roldan and Otranto, 2023). Conversely, cats in urban areas may face fewer exposure to such risks due to a more controlled environment. Statistical analysis from Estonia has revealed that urban cats have lower prevalence of parasite infection than rural cats (Tull *et.al.*, 2021). However, a recent study from the University of California Davis mentioned that even in densely populated human areas, wild, stray and feral cats can still pose a risk of spreading parasites by shedding them through feces (Zhu *et.al.*, 2023).

In addition, the availability and accessibility of veterinary services for regular deworming treatments may also vary between different residential areas. A study from

Hong Kong found that the different distribution of veterinary clinics across different districts can influence the frequency of pet owners bringing their pets for regular treatments like deworming (Ng *et.al.*, 2022). For example, a pet owner living in a rural area might find it more challenging to regularly deworm their pet where veterinary clinics are scarce compared to a pet owner in an urban area with a nearby veterinary clinic.

Despite this, from the findings, there were no significant differences between socio demographic characteristics and owners' awareness on cat deworming except for the type of residential area.

In analyzing the socio-demographic variables and practices of cat owners in cat deworming, it was observed that none of the p-values reached statistical significance ($p > 0.05$). This lack of statistical significance demands a closer look at the patterns emerging from data. Based on gender, 57.7% of male and 51.2% of females exhibit moderate practices in cat deworming. The absence of a significant difference ($p = 0.566$) does not align with findings from Herzog (2007) study, which suggested that women generally have higher levels of positive behavior and attitudes towards animals, including pet care. This study by Herzog proves that gender may be the determining factor in the adoption of effective deworming practices.

Similarly, this study found no significant association between educational level and deworming practices, as indicated by a p-value 0.073. This suggests that proper practices in cat deworming are not limited to a specific educational background. Nevertheless, there is a subset of cat owners who fail to comply with the correct rules, which results in irregular or inconsistent deworming practices. As reported by Matos *et al.* (2015), a majority of pet owners neglect the manufacturer recommendations, leading to inefficient deworming at irregular intervals. Therefore, more educated pet owners may possess better access to information about the importance of regular deworming and may be more inclined to follow recommended deworming schedules (McNamara *et.al.*, 2018; Pennelegion *et.al.*, 2020). Despite the lack of statistically significant differences in deworming practices across various sociodemographic groups, this uniformity holds significant implications for public health campaigns. It emphasizes the need for educational efforts that resonate with a diverse audience, ensuring that cat owners from different socio demographic backgrounds receive essential information for effective cat deworming practices.

CHAPTER 6

CONCLUSION

In conclusion, this study demonstrated a moderate level of knowledge, attitudes and practice of cat deworming among the cat owners in Malaysia. The outcomes of this study hold promise in identifying knowledge gaps and misconceptions about deworming among cat owners. These findings may then be utilized to develop targeted educational interventions and public awareness campaigns. In addition, veterinarians in Malaysia are able to address certain issues or difficulties found in the study, offer cat owners with accurate information, and provide appropriate deworming regimens. This discovery has the potential to improve the efficacy of veterinary treatment and to achieve the highest possible level of health among cats.



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CHAPTER 7

RECOMMENDATION

This study has some limitations. The relatively small sample size restricts the extent to which the findings can be generalized to the broader population of cat owners in Malaysia. Hence, future research should aim for a larger and more diverse sample size to enhance the representativeness of the study. For instance, collaborate with veterinary clinics, cat organizations and communities across the country to access a broader range of cat owners.

Additionally, the reliance on self-reporting introduces the possibility of bias, as respondents may offer socially desirable responses rather than providing accurate information about their practices. Therefore, employ a combination of self-reporting and objective measures, such as veterinary records or direct observations to triangulate data. This can ensure the validation of information provided by cat owners and minimize the impact of social desirability bias.

Lastly, future research should conduct longitudinal studies to observe changes in knowledge, attitudes, and practices over an extended period. This approach can provide more robust and reliable data, capturing variations and trends in deworming behaviors among cat owners.

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Assalamualaikum and good day. I am Nurul Jannah Binti Abdul Halim, a fourth-year student from Faculty of Veterinary Medicine, Universiti Malaysia Kelantan. I am currently conducting a study focused on deworming for cats in Malaysia. The primary objective of this study is to investigate the level of knowledge, attitude and practices of deworming pet cats in Malaysia. This study is exclusively intended for individuals who own cats.

This questionnaire will take about 5 to 10 minutes of your valuable time. Please rest assured that your responses will remain completely confidential and will be used solely for academic purposes. We encourage you to provide open and honest answers without any concerns about your identity being revealed. Your participation in this study is greatly appreciated. Thank you!

If you have any questions regarding this questionnaire, please contact:

1. Nurul Jannah Bt Abdul Halim (jannah.d19a0022@siswa.umk.edu.my)
2. Dr. Mohammed Dauda Goni (dauda.g@umk.edu.my)

Consent Form / Borang Persetujuan

I do understand the purpose of the survey and agree to participate in this study.

Saya memahami tujuan kajian ini dan bersetuju untuk mengambil bahagian dalam penyelidikan ini.

I agree / Saya setuju

Section A: Cat Owner's Demographic

Gender	Female
	Male

Age	18 - 25
	26 - 39
	40 - 59
	60 - 70
State	Johor
	Melaka
	Negeri Sembilan
	Wilayah Persekutuan Kuala Lumpur
	Wilayah Persekutuan Putrajaya
	Selangor
	Perak
	Penang
	Kedah
	Perlis
	Kelantan
	Terengganu
	Pahang
	Sabah
Sarawak	
Wilayah Persekutuan Labuan	
Educational Level	Secondary

	STPM / Matrics / Foundation / Diploma
	Degree
	Master
	PHD
Salary	< RM2500
	RM2500 - RM5000
	RM5000 - RM11000
	> RM11000
Type of Residential Area	Rural
	Urban

Section B: Pet's Information

Question	Answer	
How many cats do you currently own?		
Do you primarily keep your cat(s) indoors, outdoors or a combination of both?	Indoor	
	Outdoor	
	Both	
Has your cat(s) been dewormed in the past year?	Yes	
	No	
If yes, how often do you typically deworm your cat(s) within a year?	Once a year	
	Twice a year	
	More than twice	
Does your cat(s) have any previous or existing medical conditions?	Yes	
	No	

Section C : Knowledge Towards Deworming In Cat(s)

Statement	Yes (1)	No (0)	I don't know (0)
Deworming is a process of eliminating worms by giving medications or treatments.			
Deworming is important for reducing parasites and improving your cat(s) health.			
The common signs of worm infestations in cat(s) may include weight loss, diarrhea, vomiting, a dull coat and dragging their bottom along the			

floor.			
Cat(s) can get worm infestations by eating uncooked meat, drinking contaminated water or grooming themselves.			
People can get worms infestations from direct contact with cat poop and dirty soil.			
Are you aware of the routine deworming schedule in cats?			

Section D: Attitudes Towards Deworming In Cat(s)

Indication:

- 1 - Strongly disagree
- 2 - Disagree
- 3 - Neutral
- 4 - Agree
- 5 - Strongly agree

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I believe that deworming my cat(s) is necessary to prevent certain health problems.					
I believe that deworming my cat(s) is an important part of responsible pet ownership					
I am committed to follow a regular deworming schedule for my cat(s) as recommended by the					

veterinarian.					
I believe that deworming is more important for outdoor cats than indoor cats.					
I deworm my cat(s) only when I noticed signs of worm infestations or other health problems.					

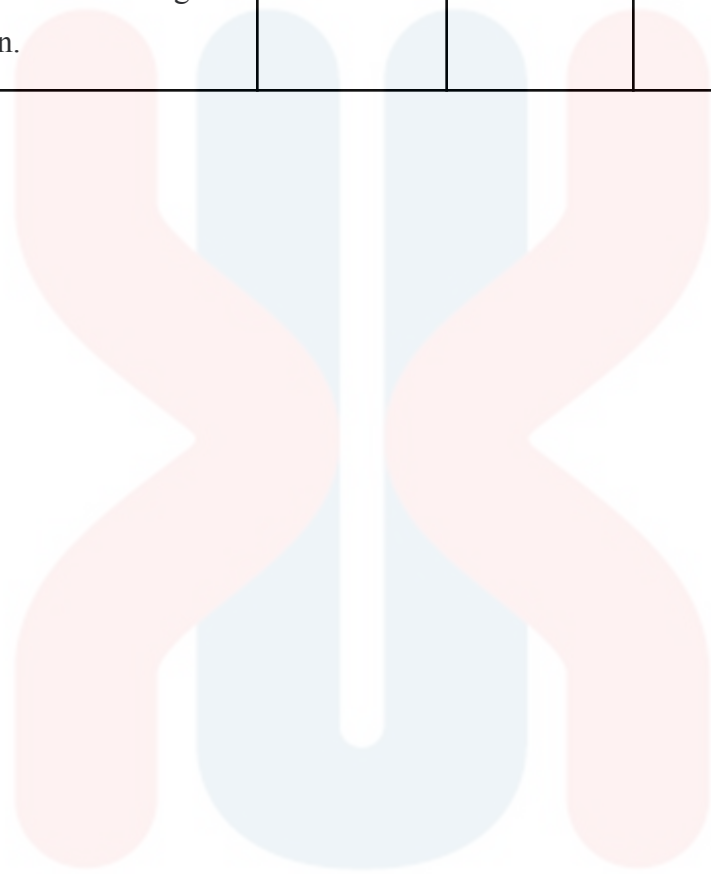
Section E: Level Of Practices Towards Deworming In Cat(s)

Indication:

- 0 - Never
- 1 - Rarely
- 2 - Often
- 3 - Always

Statement	Never	Rarely	Often	Always
I have actively practiced deworming my cat(s).				
I administer deworming treatments to my cat(s), even if they seem healthy.				
I follow a regular deworming schedule for my cat(s) as recommended by the veterinarian.				
I regularly check my cat's litter for signs of worm infestations.				

I administer deworming treatment to my cat(s) at home without consulting the veterinarian.				
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