



**UNIVERSITI PUTRA MALAYSIA**

**KNOWLEDGE AND PERCEPTION OF MALAYSIAN PUBLIC  
TOWARDS BRACHYCEPHALIC BREEDS OF CATS AND DOGS**

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FPV 2023 77**

**KNOWLEDGE AND PERCEPTION OF MALAYSIAN PUBLIC TOWARDS  
BRACHYCEPHALIC BREEDS OF CATS AND DOGS**

**MUHAMAD TAUFIQ BIN SHAHARANI**

A project paper submitted to the  
Faculty of Veterinary Medicine, Universiti Putra Malaysia

In partial fulfillment of the requirement for the  
DEGREE OF DOCTOR OF VETERINARY MEDICINE

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CERTIFICATION

It is hereby certified that we have read this project paper entitled “Knowledge and Perception of Malaysian public towards brachycephalic breeds of cats and dogs”, by Muhamad Taufiq Bin Shahrani and in our opinion, it is satisfactory in terms of scope, quality, and presentation as partial fulfillment of the requirement for the course VPD 4999 – Final Year Project.



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**DEDICATION**

I owe so much of who I am today to my parents, and I thank them from the bottom of my heart for that with this thesis. Also, affectionate thanks to my supervisors and friends. May Allah (SWT) shower His mercy upon them and give them eternal rest in the paradise of Jannatul Firdaus.

## ACKNOWLEDGEMENTS

I extend profound gratitude to my parents, whose unwavering support, guidance, and love have significantly contributed to shaping the person I have become. Their continuous encouragement and invaluable life lessons have been instrumental in my personal and academic journey. In expressing my heartfelt appreciation within the pages of this thesis, I acknowledge with deep reverence the profound impact they've had on my character and aspirations.

Furthermore, I would like to extend my sincere thanks to my dedicated supervisors, Dr. Syamira Syazuana Binti Zaini, as well as Dr. Khor Kuan Hua, and my cherished friends who have been steadfast companions throughout this academic endeavor. Their encouragement, constructive feedback, and shared insights have been indispensable in navigating the complexities of this research journey.

In addition, I'd like to express my deepest gratitude to Dr. Raja Aiman Hakim Raja Mahmood and the rest of the team at the 7th Avenue Veterinary Clinic for all the help, guidance, and technical support they provided me with during the questionnaire distribution. I'd also like to express my appreciation to the questionnaire participants, who were cooperative and helpful throughout the entire survey and for agreeing to take part in the study.

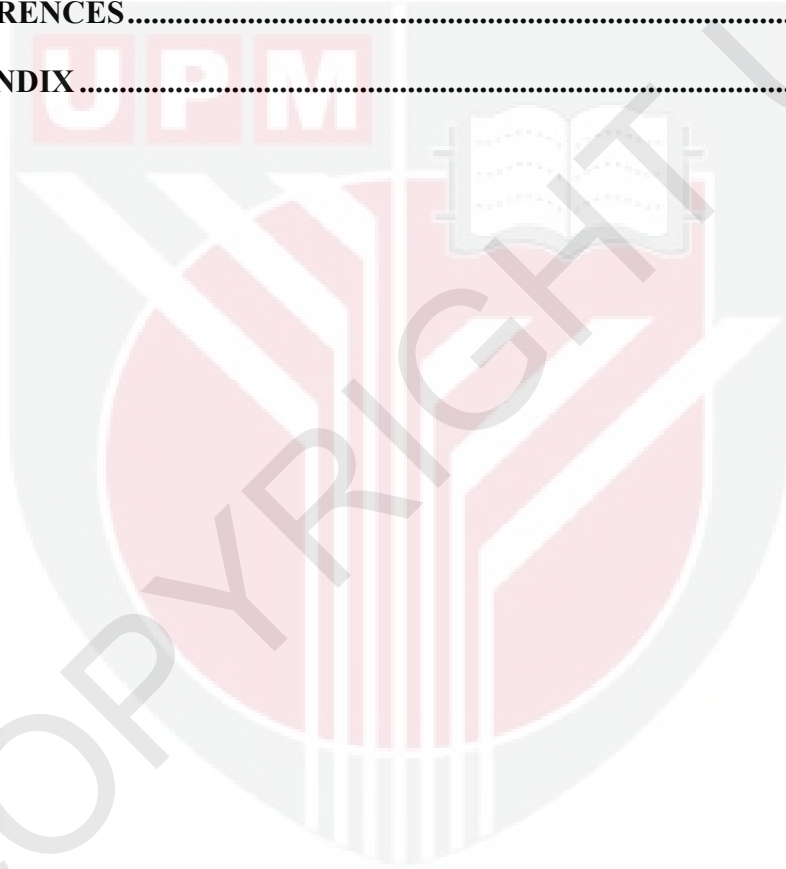
In conclusion, I humbly acknowledge the role I have played in my own growth and development, recognizing the determination, resilience, and hard work that have been integral to reaching this point. This thesis stands not only as a testament to external support but also as a reflection of my personal commitment and dedication to academic and personal growth.

May Allah (SWT) shower His boundless mercy upon my parents, supervisors, and friends, and may He grant them eternal peace and tranquility in the sublime paradise of Jannatul Firdaus.

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## ABSTRAK

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

### **PENGETAHUAN DAN PERSEPSI MASYARAKAT MALAYSIA TERHADAP BAKA BRAKISEFALIK KUCING DAN ANJING**

Oleh

**Muhamad Taufiq Bin Shahrani**

2023

**Penyelia: Dr. Syamira Syazuana Binti Zaini**

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Populariti baka kucing dan anjing brakisefalik telah menyaksikan lonjakan yang luar biasa dalam kalangan pemilik haiwan peliharaan. Walau bagaimanapun, peningkatan populariti baka ini telah membawa perhatian kepada potensi isu kesihatan, termasuk masalah pernafasan, intoleransi haba, dan masalah mata, mendorong pemilik haiwan untuk menjadi lebih cakna tentang penjagaan khusus dan keperluan haiwan peliharaan ini. Justeru, kajian ini bertujuan untuk menyiasat pengetahuan dan persepsi masyarakat Malaysia mengenai baka brakisefalik kucing dan anjing. Soal selidik dalam talian (*Google form*) terdiri daripada 4 bahagian yang berbeza telah dibangunkan dan disahkan; (i) demografi responden, (ii) persepsi terhadap baka brakisefalik kucing dan anjing, (iii) pengetahuan terhadap baka brakisefalik kucing dan anjing dan (iv) intervensi pendidikan. Sebanyak 401 responden telah melengkapkan borang kaji selidik ini dan lebih separuh daripada responden (N= 216, 54.%) melaporkan bahawa mereka sedar tentang masalah yang berkaitan dengan baka brakisefalik. Mereka juga sedar bahawa masalah ini disebabkan oleh faktor genetik dan bukannya jangkitan bakteria atau virus (N= 228, 57%). Apabila ditanya tentang kriteria pemilihan haiwan peliharaan, tingkah laku, penampilan umum dan tahap kecergasan adalah tiga faktor penting

yang akan mereka pilih. Secara keseluruhan, kira-kira 57.3% (N= 229) responden menunjukkan sikap positif terhadap baka brakisefalik kucing dan anjing, bersama-sama dengan pemahaman tentang keperluan penjagaan khusus mereka. Secara amnya, intervensi pendidikan berterusan dan kesedaran tentang impak kebajikan baka brakisefalik ini perlu dipertingkatkan bagi penambahbaikan kebajikan haiwan di Malaysia.

Kata kunci: Baka brakisefalik, kebajikan, pengetahuan, persepsi, Malaysia



**ABSTRACT**

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

**KNOWLEDGE AND PERCEPTION OF MALAYSIAN PUBLIC TOWARDS  
BRACHYCEPHALIC BREEDS OF CATS AND DOGS**

By

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**2023**

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**Co-supervisor: Dr. Khor Kuan Hua**

Over the past year, the popularity of brachycephalic cat and dog breeds has seen a remarkable surge among pet owners. However, the growing popularity of these breeds has brought attention to potential health issues, including respiratory issues, heat and exercise intolerance, and eye problems, prompting owners to become more informed about the specific care and needs of these pets. Thus, this study aims to investigate the knowledge and perception of the Malaysian public regarding brachycephalic breeds of cats and dogs. An online questionnaire (Google form) with 4 different sections in the survey was developed and validated; (i) respondent demographic, (ii) attitude level towards brachycephalic breeds of cats and dogs, (iii) knowledge towards brachycephalic breeds of cats and dogs and (iv) education intervention. A total of 401 respondents completed the questionnaire and over half of respondents (N= 216, 54.0%) reported that they were aware about the problems associated with these brachycephalic breeds. They were also aware that these problems are primarily attributed to genetic factors rather than bacterial or viral infections (N= 228, 57%). When asked about the pet selection criteria, both cat and dog owners stated that temperament, general appearance and fitness level were three important factors. Overall, about 57.3% (N= 229) of respondents showed a strong positive attitude toward brachycephalic breeds of cats and dogs,

along with an understanding of their specific care requirements. In general, to improve animal welfare in Malaysia, education and awareness on the welfare impacts of these brachycephalic breeds should be conducted continuously.

Keywords: Brachycephalic breed, welfare, knowledge, perception, Malaysia



## CHAPTER 1

### INTRODUCTION

Over the past year, the popularity of brachycephalic cat and dog breeds among pet owners has seen a remarkable surge. Social media influencers, celebrities or even pet breeders showcasing their adorable brachycephalic pets have played a significant role in driving this newfound interest. Brachycephalic cat and dog breeds are known for their distinctive and unique features (Rowena et al., 2015). Over recent years, brachycephalic dog breeds such as the English Bulldog, French Bulldog, Boston Bull Terrier, Pug, Pekingese, and Boxer, along with cat breeds like the Persian, British Shorthair, Himalayan, Ragdoll, Scottish Fold, Exotic Shorthair, and Burmese, have gained significant popularity.

The rising demand for these breeds has had economic implications, benefiting breeders, pet stores, and the pet industry as a whole. Brachycephalic breeds are being recognized for their affectionate and loyal personalities (Vet Rec, 2020), making them ideal companions for families and individuals alike. Brachycephalic breeds in the feline and canine world share a common trait of having shortened noses, unique flat-faced appearance and shortened skulls (Schlueter et al., 2009). However, it's widely recognized that these brachycephalic breeds exhibit respiratory issues linked to their skull structure, known as Brachycephalic Obstructive Airway Syndrome (BOAS) (Igna et al., 2021).

The term BOAS is often used in veterinary medicine to describe a respiratory condition seen in certain dog breeds with short noses and flat faces. The impacts of BOAS can range from noisy breathing and snoring to more severe respiratory distress, especially during exercise or in warm weather. In extreme cases, surgery may be required to alleviate the obstruction (Mitze et al., 2022). This condition highlights the health challenges associated with selective breeding for certain physical traits in dogs and emphasizes the importance of responsible breeding practices to prioritize the well-being of animals (Wykes, 1991). In the midst of discussions about the problem associated with brachycephalic breeds, the enigmatic merle gene takes centre stage, influencing not only the conformation, coloration but also the overall aesthetic appeal of specific breed's coat patterns (Rizk, 2012).

The growing popularity trend has also brought attention to the potential health issues associated such in BOAS and the health challenges associated with selective breeding for certain physical traits in dogs. BOAS emphasizes the importance of responsible breeding practices to prioritize the well-being of animals. with brachycephalic breeds (O'Neill et al., 2020), prompting owners to become more informed about the specific care and needs of these pets (Katrin et al., 2020). Nevertheless, still many breeders and sellers even owners undoubtedly care for the welfare of this breed in their care (Holland, 2019). The surge in popularity has led to more veterinary research and awareness campaigns about the potential health issues associated with brachycephalic breeds, promoting responsible ownership.

One example of an awareness study conducted previously on brachycephalic breeds in the UK is "Unravelling the health status of brachycephalic dogs in the UK using multivariable analysis" (O'Neill et al., 2020). This study provides evidence that brachycephalic breeds are generally less healthy than their non-brachycephalic counterparts. The study highlights the health challenges associated with selective breeding for certain physical traits in dogs and emphasizes the importance of responsible breeding practices to prioritize the well-being of animals.

At the moment, there are no research studies conducted within Malaysian communities addressing concerns associated with brachycephalic cat and dog breeds. In-depth investigations into the knowledge, attitudes, and perceptions of Malaysian communities concerning brachycephalic breeds have been lacking, particularly in assessing their awareness of the issues related to these breeds in the context of proper disease and welfare management. In this context, the present research offers foundational information regarding the extent of awareness, perceptions, and behavioural attitudes among Malaysians. This study will also provide future education intervention suggestions that effectively addresses the identified gap in the current situation.

The primary objective for this research was to determine and evaluate the knowledge, attitude and perception of Malaysian on issues of brachycephalic breeds of cats and dogs.

The specific objectives were:

- i. To determine the level of knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs.
- ii. To determine the general and demographic characteristics among Malaysian regarding this issue.
- iii. To determine the association of general and demographic characteristics and knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs.
- iv. To compare the level knowledge and perception between cat owners and dog owners regarding on issues of brachycephalic breeds of cats and dogs.

Research hypotheses:

H<sub>01</sub>: The level of knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs is good.

H<sub>a1</sub>: The level of knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs is poor.

H<sub>02</sub>: There is significant association between general and demographic characteristics and knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs.

H<sub>a2</sub>: There is no significant difference association between general and demographic characteristics and knowledge and perception of Malaysian on issues of brachycephalic breeds of cats and dogs.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Brachycephalic popularity

Over the past year, the popularity of brachycephalic cat and dog breeds among pet owners has seen a remarkable surge. Social media influencers, celebrities or even pet breeders showcasing their adorable brachycephalic pets have played a significant role in driving this newfound interest. The rising demand for these breeds has had economic implications, benefiting breeders, pet stores, and the pet industry as a whole. Popularity has grown so rapidly that there are now dedicated online communities and forums for brachycephalic pet enthusiasts to share tips and stories. With their charming looks and endearing personalities, brachycephalic cats and dogs are undoubtedly enjoying a moment in the spotlight as beloved pets across the globe. The global popularity of brachycephalic (flat-faced) dogs is increasing, even though they commonly experience a range of health issues (Zsófia et al., 2023). According to the American Kennel Club (March, 2023), breeds like Bulldogs, Pugs, and Yorkshire Terriers were the top 15 popular dog breeds in the United States.

#### 2.2 People behaviour towards these breed

Individuals have diverse preferences when it comes to choosing a dog for their homes, and they employ various factors to make their selections. These factors may be influenced by aspects such as personal lifestyle, cultural influences, exposure to media, and educational background (Teng et al., 2016). It was also suggested that the primary factor influencing the popularity of companion brachycephalic breeds is

social influence, often associated with fashion trends, and this is closely tied to media exposure (Ghirlanda et al., 2014). Nevertheless, while the physical appearance and size of the dog or cat are commonly taken into account during the selection of a companion animal, there is no current research carried out in Malaysia to reveal the possible trends of this popularity.

### **2.3 Why Brachycephalic breed alarming and concerning**

Brachycephalic breeds, characterized by their short skull shape, often suffer from a range of health issues, including breathing problems, digestive issues, eye diseases, and anatomical defects of the upper airway causing breathing difficulties, such as Brachycephalic Obstructive Airway Syndrome (BOAS) (Lackmann et al., 2022). These health conditions can be attributed to the changes in anatomy and genetics associated with brachycephalic breeds. For example, one study showed that spinal malformations can be found in up to 83% of some brachycephalic breeds, such as British and French Bulldogs, which can potentially cause severe neurological defects (Gutierrez-Quintana et al., 2021). Additionally, the genetic basis of craniofacial morphological variation in brachycephalic breeds has been studied, and it has been suggested that distinctions within the brachycephalic category may correspond to different genetic mechanisms which is known as merle gene (Rizk, 2012). The rapid rise in the number of brachycephalic dogs has led to a population-based health and welfare crisis, and there is a growing body of evidence to suggest that brachycephalic breeds are generally less healthy than their non-brachycephalic counterparts (Roedler et al., 2013).

## **2.4 Growth of pet ownership in Malaysia**

The companionship and joy that pets bring into our lives have made them increasingly popular among households in many countries, including Malaysia. Over the years, the relationship between humans and animals has evolved from one of necessity to one of emotional connection and mutual affection. This shift in perspective has not only altered our perception of how we view our animal companions but has also led to a surge in pet ownership and a thriving pet industry. This can be clearly seen in the proliferation of pet events and exhibitions within Malaysia every year (Oh, 2018). Numerous individuals who have a deep affection for animals regard their pets as part of their families. Moreover, many of these pet owners consider that their animals have had a beneficial influence on their emotional state and overall well-being (Scoresby et al., 2021).

## **2.5 Growth of pet breeders, pet stores, and the pet industry**

The expansion of the market primarily depends on the rate of urbanization, and the infrastructure developments over the last two decades indicate a highly favourable and fast growth of pet breeders, pet stores, and the pet industry. Research has indicated that even in periods of economic hardship, individuals consistently prioritize their pets and continue to invest substantial resources in their care (Amiot et al., 2021). While certain pet-related products, like various supplies, may experience fluctuations, the industry as a whole tends to remain robust (Priya et al., 2019). However, in the breeding industry, many of these poor breeding practices have been done for decades

resulting in profoundly detrimental effects on cats' and dogs' welfare as well as on their well-being. The consequences of poor breeding practices can result in a lifetime of suffering for the cats or dogs. An example of poor breeding practice is breeding cats that are closely related, such as siblings, parent and offspring, or even grandparents and grandchildren, increases the likelihood of genetic issues or birth defects (Mansour et al., 2018).

## **2.6 Ways to control and improve the welfare of the Brachycephalic breeds**

One fundamental aspect of improving the welfare of brachycephalic breeds involves promoting responsible breeding practices. This includes advocating for breeding standards that prioritize health over exaggerated physical traits. Breeders should focus and practice on selecting mates based on overall health and genetic diversity, avoiding pairings that exacerbate brachycephalic-related health problems (American Kennel Club, 2022). Enhancing public awareness and education is also a crucial aspect to curb the demand for extreme brachycephalic features (Kenny et al., 2022). Educational campaigns can inform prospective pet owners about the potential health issues associated with these breeds. By fostering awareness, individuals can make informed decisions when choosing a pet, considering factors beyond aesthetic appeal. According to Kenny in his study conducted in 2022 about "Impact of an educational intervention on public perception of brachycephalic obstructive airway syndrome in brachycephalic dogs", 587 individuals who took part in the study, the majority of participants viewed traits associated with Brachycephalic Obstructive Airway Syndrome (BOAS) as typical for brachycephalic dogs. Post-intervention from that

study, this perception experienced a moderate decrease. Responses underscored the challenge of establishing a clear definition of 'normal' for a specific breed. Labelling a trait as 'normal,' even when framed negatively, contributes to the normalization of such characteristics (Kenny, 2022).



## **CHAPTER 3**

### **METHODOLOGY**

The materials and methods used to conduct the study are described in this chapter, such as the study location, design, sampling method, data collection and statistical analysis.

#### **3.1 Study design**

A quantitative, cross-sectional study design was used by distributing a structured questionnaire to gather data from Malaysian participants, allowing us to assess the current perceptions, attitudes and knowledges related to brachycephalic breeds cats and dogs.

#### **3.2 Study location**

The study was conducted online and distributed through various channels, including online platforms, and several veterinary clinics in Setia Alam, Selangor and Bukit Kiara, Kuala Lumpur.

#### **3.3 Study duration**

The study was conducted for 2 weeks, from the 21st of August 2023 to the 5th of September 2023.

### **3.4 Study population**

This study was carried out among Malaysians regardless of whether they owned cats or dogs.

#### **3.4.1 Inclusion criteria**

The respondent must be Malaysian, residing in Malaysia and 18 years old above.

#### **3.4.2 Exclusion Criteria**

Veterinary personnel such as veterinarians, veterinary staff and veterinary students, and participants under 18 years old and those who do not reside in Malaysia should not participate in this study.

#### **3.4.3 Sampling Method**

A total of 400 of Malaysian participated in this study. The questionnaire was distributed through various channels such as social media (e.g., Facebook, Instagram, Twitter and WhatsApp).

#### **3.4.4 Sample size**

Due to the time frame allocated for the final year project being only five (5) weeks, approximately 384 respondents were included in this study.

### **3.5 Study Instruments**

A structured and close-ended, self-administered questionnaire was employed to gather information from respondents regarding general and demographics (i.e. gender, age, ethnicity, education level, state, occupation, and marital status). The questionnaire was adapted from one study conducted in the UK and the questionnaire aimed to collect data on respondents' knowledge, attitudes, and practices related to brachycephalic breeds of cats and dogs.

#### **3.5.1 Components of the Questionnaire**

The questionnaire was divided into the following components; general and demographics factors of the participants, attitude, knowledge and perception on the brachycephalic breeds of cats and dogs (refer Appendix I).

##### **Section A: General and demographic**

The questions in this section include gender, age, ethnicity, education level, state, occupation, and marital status.

##### **Section B: Attitude Level towards Brachycephalic Breeds of Cats and Dogs**

The ten questions in the attitude section were designed based on the 5-point Likert Scale, "1= strongly disagree", "2= disagree", "3= neutral", "4= agree", and "5= strongly agree" were used in response to the questions. The responses were graded 1 to 5 for negative and positive attitude responses, respectively. Scale 1-3 were labelled as a negative attitude with a given score of 0, while scale 4-5 were labelled as a positive attitude with a given score of 1. The total score for the attitude section was 10.

Respondents were classified as having a negative attitude when the total score was  $<5$ . In contrast, they were classified as having a positive attitude when the total score was  $\geq 5$ .

### **Section C (i): Knowledge towards Brachycephalic Breeds of Cats and Dogs**

This section consists of 4 questions. Respondents' knowledge was assessed using questions related to Brachycephalic breeds. The knowledge questions were designed to give two options "yes" and "no".

### **Section C(ii): Respondent's perception with Brachycephalic Breed Cats and Dogs**

Three questions in the section are aimed to gain insights into society's perception of brachycephalic breeds of cats and dogs consisting of their perception on various aspects of the topic. Then followed by 2 questions that were designed based on the 5-point Likert Scale about health association of the breeds and personal preferences to buy these breeds. 5-point Likert Scale, "1= strongly disagree", "2= disagree", "3= neutral", "4= agree", and "5= strongly agree" were used in response to the questions

### **Section D: Educational intervention**

In this study, we implemented a section of education intervention aimed to determine the preferable mode of intervention that Malaysian would like to use in future at improving the knowledge and perception of Malaysian about Brachycephalic breeds of cats and dogs.

### 3.6 Variables

#### 3.6.1 Dependent Variable

Knowledge, attitude and perception of Malaysian about Brachycephalic breeds of cats and dogs.

#### 3.6.2 Independent Variable

General and demography

- i. Gender
- ii. Age
- iii. Ethnicity
- iv. State
- v. Education level
- vi. Occupation
- vii. Marital status

### **3.7 Quality Control**

#### **3.7.1 Validity**

##### **Content Validity**

Content validity refers to the suitability of the material within an instrument. The study instrument was reviewed by the supervisory committee, and their feedback and suggested improvements were noted and appropriated.

##### **Face Validity**

Comprehension of instructions and questions from the survey and issues raised during the pre-test were identified. Respondents were asked if the questionnaire appeared suitable for the study's title. The feedback provided by respondents was evaluated and addressed accordingly.

##### **Pilot study**

The questionnaire underwent a thorough pilot testing phase, involving a few academicians and researchers, aimed at meticulously scrutinizing aspects such as grammar, time requirements, and other pertinent factors. For instance, the definition of brachycephalic breed was prepared in order to improve the understanding of the word use in the study.

### **3.8 Data Analysis**

The data analysis was conducted using Statistical Package for Social Sciences (SPSS) software version 29.0. Initial data entry and exploratory data analysis were performed. Descriptive analysis for general and demographic characteristics were carried out using Microsoft Excel, presenting frequencies and percentages. Continuous variables were expressed as medians. To examine the association between general and demographic factors and the knowledge and perception of Malaysians toward brachycephalic breeds of cats and dogs, the Chi-square test was employed, with a significance level set at 0.05. Spearman correlation was used to determine the association between non-normally distributed variables. The interpretation of correlation coefficients was as follows: 0.00 – 0.25 = weak correlation, 0.25 – 0.50 = fair correlation, 0.50 – 0.75 = good correlation and > 0.75 = excellent correlation (Haq et al., 2012). A P-value < 0.01 was taken as significant for correlation analysis.

### **3.9 Study Ethics**

The research proposal received approval from the Ethics Committee on Human Research at Universiti Putra Malaysia (JKEUPM) with reference number JKEUPM-2023-464. The research committee approved the proposal study at the faculty level (Faculty of Veterinary Medicine, UPM).

## CHAPTER 4

### RESULTS

#### 4.1 Descriptive and association

##### 4.1.1 Response Rate

Data was collected from 394 out of 400 eligible respondents, giving response rate of 98.25%. In this study, non-respondents partake in the survey but submit the form with incomplete responses.

$$\begin{aligned} \text{Response rate} &= \frac{\text{Number of completed questionnaires}}{\text{Number of eligible respondents}} \times 100 \\ &= 393/400 \times 100 \\ &= 98.25\% \end{aligned}$$

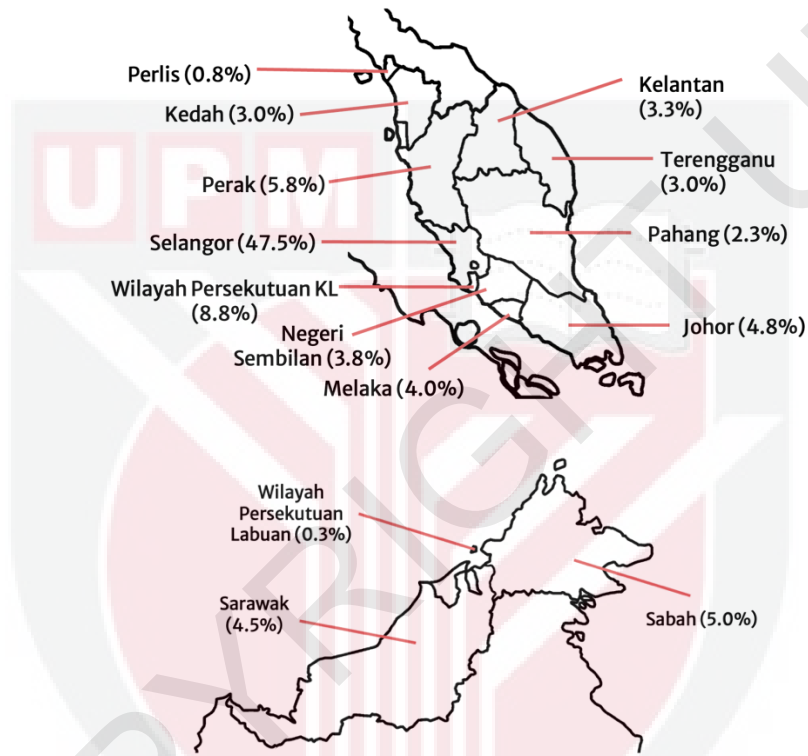
##### 4.1.2 General and demographic characteristics

Table 4.1 shows the general and demographic characteristics of the respondents. Most of the respondents [N= 256 (64%)] were females and [144 (36%)] were males. Most of the respondents [281 (70.3%)] were between the age of 21-30 years old and most of them were Malays. Majority of the respondents were students [198 (49.5%)] and attended of tertiary level of education [361 (90.3%)]. Most of the respondents came from Selangor area [190 (47.5%)] (Figure 4.1) and single [308 (77.0%)] (Table 4.1).

**Table 4.1: General and demographic characteristics of the respondents**

<b>Variable</b>	<b>Frequency (%)</b>
Gender	
Female	256(64.0%)
Male	144(36.0%)
Age	
21- 30	281(70.3%)
31- 40	49(12.3%)
18-20	31(7.8%)
41-50	24(6.0%)
More than 50	12(3.0%)
Below 18	3(0.8%)
Ethnicity	
Malay	251(62.7%)
Chinese	74(18.5%)
Indian	45(11.3%)
Others	30(7.5%)
Education Level	
Tertiary	361(90.3%)
Secondary	31(7.8%)
Non-formal	4(1.0%)
Primary	3(0.8%)
Certificate	1(0.3%)
Occupation	
Student	198(49.5%)
Private company staff	96(24.0%)
Self-employed	38(9.5%)
Government	36(9.0%)
Unemployed	22(5.5%)
Prefer not to say	10(2.5%)

Marital Status	
Single	308(77.0%)
Married	92(23.0%)



**Figure 4.1: Tabulation of respondents based on state in Malaysia**

#### 4.1.2 Perception Level towards Brachycephalic Breeds of Cats and Dogs

Table 4.2 shows the perception level of the respondents towards brachycephalic breeds of cats and dogs. The result of the study shows that the majority of respondents [N= 300 (75.0%)] were strongly agree that “*their cat’s and dog’s medical history is important for them*” as well bringing their pet to veterinarian to get treatment for ocular disorders [N= 281 (70.3%)] and respiratory problems [N= 300 (75.0%)]. Half of the respondents felt that it is important for them to acknowledge

their pet's breed [N= 210 (52.5%)] and to know the problems associated with the breed [N= 254 (63.5%)] as well as bringing their cats or dogs for a regular check up at the veterinary clinic is a necessity [N= 233 (58.3%)]. A lower proportion [N= 104 (26.0%)] of the respondents were strongly agree that “*appearance of a cat or dog is important to be a good pet*” and “*they are willing to adopt brachycephalic breed cats or dogs despite knowing problems associated with the breed*” [N= 70 (17.5%)]. There was less than half of them were strongly agreed that “*cat or dog behaviors is important to be a good pet*” [N= 176 (44.0%)] and “*depending on supportive treatment is beneficial for their cat's or dog's life*” [N= 145 (36.3%)].

**Table 4.2: Perception level towards brachycephalic breeds of cats and dogs**

Variables	Type of responses				
	1= Strongly disagree N(%)	2= Disagree N(%)	3= Neutral N(%)	4= Agree N(%)	5= Strongly agree N(%)
I think it is important to know my cat's/dog's medical history	4(1.0%)	2(0.5%)	20(5.0%)	70(17.5%)	300(75.0%)
I feel that it is important for me to know my cat's or dog's breed	15(3.8%)	11(2.8%)	59(14.8%)	100(25.0%)	210(52.5%)
I feel that it is important for me to know the problems associated with the breed	6(1.5%)	4(1.0%)	33(8.3%)	103(25.8%)	254(63.5%)

I think bringing my cat or dog for a regular check up at the vet is necessary	3(0.8%)	10(2.5%)	50(12.5%)	104(26.0%)	233(58.3%)
If my cat or dog has respiratory disorders, I will bring them to get treatment	3(0.8%)	2(0.5%)	18(4.5%)	77(19.3%)	300(75.0%)
If my cat or dog has ocular disorders (eye problem), I bring them to get treatment	3(0.8%)	1(0.3%)	38(9.5)	77(19.3%)	281(70.3%)
Cat/dog appearance is important to be a good pet	71(17.8%)	68(17.0%)	110(27.5%)	47(11.8%)	104(26.0%)
Cat/dog behaviour is important to be a good pet	25(6.3%)	21(5.3%)	61(15.3%)	117(29.3%)	176(44.0%)
I think that depending on supportive treatment is beneficial for my cat's or dog's life	12(3.0%)	15(3.8%)	103(25.8%)	145(31.3%)	145(36.3%)
I am willing to adopt brachycephalic breed cats or dogs despite knowing problems associated with the breed	56(14.0%)	79(19.8%)	118(29.5%)	77(19.3%)	70(17.5%)

#### 4.1.3 Knowledge level towards brachycephalic breeds of cats and dogs

Table 4.3 shows the perception level of the respondents towards brachycephalic breeds of cats and dogs. There was a total of 164 out of 400 (41.0%) were agreed that it is very likely for brachycephalic breeds to have problems associated with their health. Almost half of the respondents [N= 186 (46.5%)] said they are very unlikely to buy a brachycephalic breed but less than one-third [N= 118 (29.5%)] were neutral to adopt brachycephalic breed cats or dogs despite knowing problems associated with the breed.

**Table 4.3: Knowledge level towards brachycephalic breeds of cats and dogs**

Variables	Type of responses				
	1= Very Unlikely N(%)	2= Unlikely N(%)	3= Neutral N(%)	4= Likely N(%)	5= Very Likely N(%)
Do you think there are health problems associated with brachycephalic breeds	15(3.8%)	20(5.0%)	114(28.5%)	87(21.8%)	164(41.0%)
How likely are you to buy a brachycephalic breed	186(46.5%)	69(17.3%)	101(25.3%)	21(5.3%)	23(5.8%)
I am willing to adopt brachycephalic breed cats or dogs despite knowing problems associated with the breed	56 (14.0%)	79(19.8%)	118(29.5%)	77(19.3%)	70(17.5%)

#### 4.1.4 Pet selection criteria

Table 4.4 shows that 303 respondents (36.7%) were agreed that temperament is the most important aspect about a cat or dog, followed by general appearance [N= 200 (24.2%)], fitness level [N= 197 (23.9%)], size [N= 111 (13.5%)] and health status [N= 11 (1.3%)]. Minority of the respondents [N= 3 (0.4%)] were agreed that good companionships is really important for them about a cat or dog.

**Table 4.4: Most important aspect of a cat or dog**

<b>Variable</b>	<b>Frequency (%)</b>
Temperament	303(36.7%)
General appearance (colour, facial features, etc)	200(24.2%)
Fitness level	197(23.9%)
Size	111(13.5%)
Health status	11(1.3%)
Good companionships	3(0.4%)

#### 4.1.5 First time hear about brachycephalic breeds of cats and dogs

Table 4.5 shows that the first time the respondents hear about brachycephalic breeds of cats and dogs. Most of the respondents agreed that social media [N= 193 (38.1%)], veterinarians [N=146 (28.9%)] and posters [N= 52 (10.3%)] were the top three channel when they first time hearing about brachycephalic breeds of cats and dogs. The other options were based on experiences [N= 2 (0.6%)], friends [N= 90

(1.3%), “Potong-Royong” events [N= 2 (0.4%)] and some of them never heard before [N= 20 (4.0%)].

**Table 4.5: First time hear about brachycephalic breeds of cats and dogs**

<b>Variable</b>	<b>Frequency (%)</b>
Social media	193(38.1%)
Veterinarians	146(28.9%)
Posters	52(10.3%)
Based on experiences	3(0.6%)
Friends	90(1.3%)
“Potong-Royong” events <i>(Event endorsed by University Putra Malaysia (UPM) to neuter strays population in the Klang Valley)</i>	2(0.4%)
Never heard before	20(4.0%)

#### 4.1.6 Awareness of Merle gene

Table 4.6 shows that the awareness of respondents towards Merle gene. Majority of the respondents never heard of Merle gene before [N= 310 (73.3%)]. Some of the respondents heard of Merle gene but unaware of its implications [N= 59 (14.0%)], knew the Merle gene affects the cat’s and dog's appearance [N= 17 (4.0%)], Merle gene causes minor health issues [N= 10 (2.4%)]. Only small portion of respondents were aware that Merle gene causes significant health issues [N= 11 (2.6%)] and it can only cause health issues when double gene is present [N= 16 (3.8%)].

**Table 4.6: Awareness of Merle gene**

<b>Variables</b>	<b>Frequency (%)</b>
Never heard of Merle gene before	310(73.3%)
Heard of Merle gene but unaware of its implications	59(14.0%)
Merle gene affects the cat's and dog's appearance	17(4.0%)
Merle gene causes minor health issues	10(2.4%)
Merle gene causes significant health issues	11(2.6%)
Merle gene only causes health issues when double gene is present	16(3.8%)

#### 4.1.7 Why brachycephalic breed became popular in the recent years

Table 4.7 shows that public opinion why they think brachycephalic breeds of cats and dogs became popular in the past few years. Most of the respondents agreed that social media [N= 193 (38.1%)], appearance [N= 188 (23.0%)] and trends [N= 200 (24.5%)] were the main cause of the surge in this trend. The other possible cause they think were because of the temperament [N= 76 (2.6%)], and good companionships [N= 69 (3.8%)].

**Table 4.7: Why brachycephalic breed became popular in the recent years**

<b>Variables</b>	<b>Frequency (%)</b>
Social media	195(23.9%)
Appearance	188(23.0%)
Trends	200(24.5%)
Unsure	89(2.4%)
Temperament	76(2.6%)
Good companionships	69(3.8%)

#### 4.1.8: Knowledge regarding problems associated with brachycephalic breeds

Table 4.8 shows that respondents' knowledge about problems associated with brachycephalic breeds of cats and dogs. Almost half of them know [N= 216 (54.0%)] about issues regarding with these breeds. More than half of respondents [N= 243 (60.8%)] said they were aware of problem of respiratory disorder, epiphora, noisy breathing, heat intolerance and others associated with this breed, knew these problems due to genetic factors and not viral or bacterial infection [N= 228 (57.0%)] and have knowledge that brachycephalic syndrome in cats or dogs and human are different [N= 262 (65.5%)].

**Table 4.8: Knowledge regarding problems associated with Brachycephalic breeds**

Description	Response	
	Yes	No
Do you know about problem associated with Brachycephalic breed cats and dogs	216(54.0%)	184(46.0%)
Are you aware of problem of respiratory disorder, epiphora, noisy breathing, heat intolerance and others associated with this breed?	243(60.8%)	157(39.3%)
Do you know that problems listed are due to genetic factors and not viral or bacterial infection	228(57.0%)	172(43.0%)
Do you know that brachycephalic syndrome in cats or dogs and human are different	262(65.5%)	138(34.5%)

#### 4.9.1 Association between general demographic factors and perception of the respondents

In this study, there was a significant relationship between gender (P-value = 0.023), and occupation (P-value = 0.038) with the level of knowledge as shown on Table 4.9.

**Table 4.9: Association between general demographic factors and perception of the respondents**

Variables	Knowledge
	<i>P</i> -value
Gender	*0.023
Age	0.867
Ethnicity	0.620
Education	0.315
State	0.564
Occupation	*0.038
Marital status	1.432

Notes: \* *P*-value < 0.05

#### 4.1.10 Association between general demographic factors and perception of the respondents

In this study, there was no significant relationship between gender (P-value = 0.358), age (P-value = 0.879), ethnicity (P-value = 0.421), education (P-value = 0.753), state (P-value = 0.187), occupation (P-value = 0.512) and marital status (P-value = 0.648) with the level of perception as shown on Table 4.10.

**Table 4.10: Association between general demographic factors and perception of the respondents**

Variables	Perception
	<i>P</i> -value
Gender	0.358
Age	0.879
Ethnicity	0.421
Education	0.753
State	0.187
Occupation	0.512
Marital status	0.648

#### **4.11 Correlation between knowledge and perception towards brachycephalic breeds of cats and dogs**

Table 4.11 shows statistical analysis of the Spearman correlation test between knowledge and perception obtained correlation coefficient ( $r = -0.056$ ,  $P$ -value = 0.694). There was no statistically significant correlation between knowledge and perception.

**Table 4.11 Correlation between knowledge and perception towards brachycephalic breeds of cats and dogs**

Variables	Correlation coefficient	<i>P</i> -value
Knowledge & perception	-0.056	0.694

## CHAPTER 5

### DISCUSSION

#### 5.1 Introduction

The results of the study will be discussed along the following lines.

- i. General and demographic characteristics
- ii. Knowledge of Malaysian public with regard to brachycephalic
- iii. Perception of Malaysian public with regard to brachycephalic
- iv. Association between knowledge and perception with general demographic factors
- v. Correlation between knowledge and perception of respondents towards brachycephalic breeds of cats and dogs
- vi. Characteristics in selecting cat or dog as pet by Malaysian
- vii. Merle gene knowledge by Malaysian
- viii. Preferable educational intervention by Malaysian about this issue

#### 5.2 General and demographic characteristic

Most of the respondents (64.0%) were females, while (36.0%) were males. In this study, a greater proportion of cat or dog owners are female, leading to female dominance in the overall cat and dog owner population. According to Brian et al., (2001) women attributed higher preservation value to nonhuman species than men did, opting for ecological importance as the primary factor when prioritizing species. Majority of the respondents (70.3%) were aged between 21-30 years old, followed by those above 30 years old. In Malaysia, the predominant age group among internet users

is between 18 and 29 years old, and on average, they spend approximately 7 hours and 57 minutes online each day (Rosmah et al., 2021). Majority of the respondents were Malays (62.7%). The results align with an earlier study that examined the status of pet ownership within the Putrajaya community (Debbra, 2019). Only small portions had their education at the level of non-formal (1.3%) and primary (0.8%). Most of the participants attended tertiary level (90.3%) followed by secondary level at 7.8%. For occupation of the respondents, most of them were students (49.5%) and private company staffs (24.0%). This finding were tally with a study done by Vance, (2001) stating that student and employee populations are more likely to respond to surveys than the general population.

### **5.3 Knowledge of Malaysian public with regard to brachycephalic**

Over half of the respondents [N=216 (54.0%)] answered they know the problem associated with brachycephalic breeds of cats and dogs and most of them [N=243 (60.8%)] were aware of issues such as respiratory disorders, epiphora, noisy breathing, heat intolerance, and others linked to this breed. Majority of the respondents [N=228 (57.0%)] were alert that the problems listed with brachycephalic breeds throughout this survey are due to genetic factors and not viral or bacterial infection.

According to research, SMOC2 gene was closely associated with the length of the dog's facial structure. Dogs carrying this mutation exhibited notably flatter faces (Marchant et al., 2017).

#### **5.4 Perception of Malaysian public with regard to brachycephalic**

In this study, most of the respondents [N=210 (53.2%)] felt that it is important for them to know their cat's or dog's breed. This is because according to Hirschman, (1994), many of people choose purebreds or specific breeds as symbols of status. A significant portion of the survey participants [N=254 (63.5%)] felt that it is important for them to know the problems associated with the breed. According to them from this questionnaire, temperament [N=303 (36.7%)], general appearance [N=200 (24.2%)] and fitness level [N=197 (23.9%)] were the most important aspects for them about a cat or dog. This supported by the choice to own a brachycephalic breed is driven by its appearance, which is often prioritized above breed health (Mark et al., 2018).

#### **5.5 Association between knowledge and perception with general demographic factors**

The result of this study indicates that a significant relationship between perception with the general demographic factors was not found among the respondents and shows no significant influence on their level of perception (P-value > 0.05). Their age, gender, race, ethnicity, education level, occupation, state and marital status were not associated with the level of perception towards this issue. These findings may be due to the small sample size of the respondents. Hence, further study need to be conducted with larger sample size and better variety of questions for a better result. However, for knowledge, a significant relationship with general demographic factors was found among the participants. Significant relationships were found between age (P-value = 0.023) and level of knowledge. This study also found significant association between occupation (P-value = 0.038) and knowledge level of the participants. According to Bognár et al., (2023), attitudes toward brachycephalic dogs

are influenced by demographic features such as age, sex, parenthood, education, and personality.

### **5.6 Correlation between knowledge and perception of respondents towards brachycephalic breeds of cats and dogs**

The relationship between the respondents' perception and knowledge towards brachycephalic breeds of cats and dogs has yet to be critically significant examined, documented, or practiced. This study concluded that there was no statistically significant correlation between knowledge and perception towards brachycephalic breeds of cats and dogs. Other factors not analyzed further in this study can influence the findings. One study in Germany evaluated the perception and knowledge of people on brachycephalic breeds and on breed-related animal welfare problems in Germany (Steinert et al., 2019). This finding from the questionnaire is consistent with the previous study in Germany stated that is no significant correlation between the knowledge and perception of the respondents but the best predictors of participants' knowledge about breed-related welfare issues were found to be dog ownership, as well as the age and gender of the participants (Steinert et al., 2019).

### **5.7 Characteristics in selecting cat or dog as pet by Malaysian**

Most of the respondents [N= 303 (36.7%)] agreed that temperament was the most aspect in owning cat or dog. These results followed by general appearance (24.2%) and fitness level (23.9%). The choice to own a brachycephalic breed is driven by its appearance, which is often prioritized above breed health, reflecting a prevalent trend where aesthetic preferences overshadow considerations for the well-being and potential health challenges associated with these distinctive physical features (Mark et

al., 2018). Size of a cat or dog was chosen as the next aspect by (13.5%) respondents. Small portion of participants agreed that health status (1.3%) and good companionships (0.4%) were the least aspect in selecting cat or dog as pet.

### **5.8 Merle gene knowledge by Malaysian**

The Merle gene is defined as a distinctive factor influencing coat patterns and give unique features in various dog breeds, plays a significant role in the aesthetics of these beloved companions (Ballif et al., 2018). In Malaysia, where diverse cultures converge, the knowledge and awareness of the Merle gene may vary. There is no recent studies that were addressing merle gene especially in companion animals in Malaysia. Hence, this result showed that majority of Malaysian respondents that participate in this study, (73.3%) said they never heard about Merle gene before. Only small fraction of Malaysian ever heard about Merle gene but unaware of its implications (14.0%), Merle gene affects the cat's and dog's appearance [N=17 (4.0%)], Merle gene causes minor health issues [N=10 (2.4%)], Merle gene causes significant health issues [N=11 (2.6%)] and Merle gene only causes health issues when double gene is present [N=16 (3.8%)]. By acknowledging cultural nuances, addressing misconceptions, and implementing targeted educational initiatives, we can empower Malaysians to make informed decisions about their companions.

### **5.9 Preferable educational intervention by Malaysian about this issue**

A significant majority expressed their interest in social media platforms [N=297 (31.2%)], highlighting the appeal of these online channels for disseminating information and that information were often acquired by the general public through social media and personal experiences rather than directly from scientists (Zhang et

al., 2022). Additionally, a substantial portion of respondents [N=255 (26.8%)] indicated a preference for internet-based educational interventions, underlining the importance of web-based resources in meeting their informational needs. Another noteworthy preference was observed for pet expos and exhibitions [N=229 (24.1%)], favoring these events as a valuable means of acquiring educational insights into pet-related topics. A minority [N=115 (12.1%)], expressed an interest in television-based educational content, signaling that this conventional medium holds a limited appeal for this study. Similarly, a smaller subset [N=55 (5.8%)], indicated a preference for educational interventions through magazines, suggesting that print media were least type of educational intervention that they want in meeting their informational needs. Magazines are selected based on their readability for the company's target customer segment. Advertisements are strategically designed to occupy a full page within the magazine, aiming to optimize the positive impact of educational intervention initiatives (Finch et al., 2004).

## CHAPTER 6

### CONCLUSION

#### 6.1 Conclusion

In summary, this research determined that the Malaysian public's knowledge and perception of brachycephalic breeds of cats and dogs were at a moderate level. The study revealed that there was an association between perception in terms of gender and occupation towards the brachycephalic breeds of cats and dogs. However, it was observed that there were some domains where knowledge and perception of Malaysian towards this issue were lacking, especially in terms of bringing their pets into regular checkups to veterinarian, giving supportive treatment for cats and dogs that are in need, and criteria in selecting their pet – the respondents' score was found to be lower than half. There was also no significant correlation between knowledge and perception of the respondents towards brachycephalic breeds of cats and dogs. In short, continuing education should be implemented to raise the Malaysian' awareness and knowledge with regards to the brachycephalic breeds.

#### 6.2 Limitations and recommendation

The primary limitation of this research pertained to its study design. The cross-sectional nature of the study rendered it challenging to discern temporal relationships and establish causality definitively. Additionally, the study utilized a self-administered, close-ended questionnaire as its instrument, introducing the possibility of respondent bias, particularly in terms of information bias, which cannot be disregarded. This study might have only explored into certain areas that respondents were familiar with, potentially affecting their responses and scores across different

domains. Also, most of the respondents came from Selangor community. Therefore, the results cannot be generalized to other locations and the data represented have limit of representativeness. One of the suggestions for this study is to collect respondents from bigger and different geographical areas and demographic backgrounds to better compare the factors influencing the scores and responses the knowledge and perception towards this issue. Further research needs to be done to facilitate the identification and comprehension of areas where crucial information is lacking and to uncover additional significant predictors that may not have been identified in the current study.

## REFERENCES

- Amiot, C. E., & Santerre-Bélec, L. (2022). Toward more equal and mutual human-pet relations: Insights and possible solutions based on social psychological theories. *Frontiers in veterinary science*, 9, 1009267.  
<https://doi.org/10.3389/fvets.2022.1009267>
- Ballif, B. C., Ramirez, C. J., Carl, C. R., Sundin, K., Krug, M., Zahand, A., ... & Flores-Smith, H. (2018). The PMEL gene and merle in the domestic dog: A continuum of insertion lengths leads to a spectrum of coat color variations in Australian shepherds and related breeds. *Cytogenetic and Genome Research*, 156(1), 22-34.
- Beverland, M. B., Farrelly, F., & Lim, E. A. C. (2008). Exploring the dark side of pet ownership: Status-and control-based pet consumption. *Journal of Business Research*, 61(5), 490-496.
- Bognár, Z., & Kubinyi, E. (2023). The Brachycephalic Paradox: The Relationship Between Attitudes, Personality, Knowledge of Health Problems, and Dog-Human Eye Contact.
- Debbra, M., Mastura, Y., Shariffah, N., Muhammad, N. K., & Azjeemah, B. (2019). Assessing the status of pet ownership in the community of Putrajaya. *Malays. J. Vet. Res*, 10, 61-71.

Fall, T., Kuja-Halkola, R., Dobney, K., Westgarth, C., & Magnusson, P. K. (2019). Evidence of large genetic influences on dog ownership in the Swedish Twin Registry has implications for understanding domestication and health associations. *Scientific reports*, 9(1), 7554.

Fawcett, A., Barrs, V., Awad, M., Child, G., Brunel, L., Mooney, E., ... & McGreevy, P. (2018). Consequences and management of canine brachycephaly in veterinary practice: perspectives from Australian veterinarians and veterinary specialists. *Animals*, 9(1), 3.

Finch, R. G., Metlay, J. P., Davey, P. G., & Baker, L. J. (2004). Educational interventions to improve antibiotic use in the community: report from the International Forum on Antibiotic Resistance (IFAR) colloquium, 2002. *The Lancet infectious diseases*, 4(1), 44-53.

Ghirlanda S, Acerbi A, Herzog H. Dog movie stars and dog breed popularity: a case study in media influence on choice. *PLoS One*. 2014 Sep 10;9(9):e106565. doi: 10.1371/journal.pone.0106565. PMID: 25208271; PMCID: PMC4160180.

Lackmann, F., Forterre, F., Brunnberg, L., & Loderstedt, S. (2022). Epidemiological study of congenital malformations of the vertebral column in French bulldogs, English bulldogs and pugs. *Veterinary record*, 190(1), no-no.

Ladlow, J., Liu, N. C., Kalmar, L., & Sargan, D. (2018). Brachycephalic obstructive airway syndrome. *The Veterinary Record*, 182(13), 375.

Mansour, T. A., Lucot, K., Konopelski, S. E., Dickinson, P. J., Sturges, B. K., Vernau, K. L., ... & Bannasch, D. L. (2018). Whole genome variant association across 100 dogs identifies a frame shift mutation in DISHEVELLED 2 which contributes to Robinow-like syndrome in Bulldogs and related screw tail dog breeds. *PLoS genetics*, 14(12), e1007850.

Mitze, S., Barrs, V. R., Beatty, J. A., Hobi, S., & Bęczkowski, P. M. (2022). Brachycephalic obstructive airway syndrome: much more than a surgical problem. *The veterinary quarterly*, 42(1), 213–223.  
<https://doi.org/10.1080/01652176.2022.2145621>

O'Neill, D.G., Skipper, A., Packer, R.M.A. et al. English Bulldogs in the UK: a VetCompass study of their disorder predispositions and protections. *Canine Med Genet* 9, 5 (2022). <https://doi.org/10.1186/s40575-022-00118-5>

Packer, R. M., Hendricks, A., Tivers, M. S., & Burn, C. C. (2015). Impact of Facial Conformation on Canine Health: Brachycephalic Obstructive Airway Syndrome. *PloS one*, 10(10), e0137496.  
<https://doi.org/10.1371/journal.pone.0137496>

Priya, R & Muniappan, Nandhini. (2019). Evolving opportunities and trends

In the pet industry -an analytical study on pet products and services.

Roedler, F. S., Pohl, S., & Oechtering, G. U. (2013). How does severe brachycephaly affect dog's lives? Results of a structured preoperative owner questionnaire.

The Veterinary Journal, 198(3), 606-610.

Scoresby, K. J., Strand, E. B., Ng, Z., Brown, K. C., Stiliz, C. R., Strobel, K., Barroso, C. S., & Souza, M. (2021). Pet Ownership and Quality of Life: A Systematic Review of the Literature. *Veterinary sciences*, 8(12), 332.

<https://doi.org/10.3390/vetsci8120332>

Teng, K.T., McGreevy, P.D., Toribio, JA.L.M.L. et al. Trends in popularity of some morphological traits of purebred dogs in Australia. *Canine Genet Epidemiol* 3,

2 (2016). <https://doi.org/10.1186/s40575-016-0032-2>

Wykes P. M. (1991). Brachycephalic airway obstructive syndrome. *Problems in*

*veterinary medicine*, 3(2), 188–197.

## APPENDIX

## Section A: General and Demographic

*Bahagian A: Latar Belakang dan Demografi*

1	Gender <i>Jantina</i>	Male / Lelaki	
		Female / Perempuan	
2	Age <i>Umur</i>	Below 18 <i>Bawah 18</i>	
		18-20	
		21- 30	
		31- 40	
		41-50	
		More than 50 <i>Lebih 50</i>	
		3	Ethnicity <i>Kaum</i>
Chinese <i>Cina</i>			
Indian <i>India</i>			
Others <i>Lain-lain</i>			
4	Education Level <i>Tahap Pendidikan</i>	Non-formal <i>Bukan formal</i>	
		Primary <i>Rendah</i>	
		Secondary <i>Menengah</i>	
		Tertiary <i>Tinggi</i>	
		Others <i>Lain-lain</i>	
5	State <i>Negeri</i>		
6	Occupation <i>Pekerjaan</i>	Student <i>Pelajar</i>	
		Government servant <i>Penjawat awam</i>	
		Private company staff <i>Penjawat swasta</i>	
		Self-employed <i>Bekerja sendiri</i>	
		Unemployed <i>Tidak bekerja</i>	
		Prefer not to say <i>Tidak berkaitan</i>	
		Others <i>Lain-lain</i>	
7	Marital Status <i>Status Perkahwinan</i>	Single <i>Bujang</i>	

		Married Berkahwin	
8	What best to describe you <i>Apa yang terbaik untuk menggambarkan anda?</i>	No cat or dog knowledge <i>Tiada pengetahuan tentang anjing atau kucing</i>	
		Currently own cat or dog <i>Sedang memelihara kucing atau anjing</i>	
		Previously own a cat or dog <i>Memelihara kucing atau anjing sebelum ini</i>	
		Experience with cat or dog e.g. through friends/family. <i>Berpengalaman dengan kucing atau anjing e.g. melalui rakan-rakan/keluarga</i>	
		Professional (cat/dog breeder, veterinary, etc) <i>Profesional (Pembiak baka bagi kucing/anjing, veterinar, etc.)</i>	
		Others <i>Lain-lain</i>	
9	Do you have cat <i>Adakah anda mempunyai kucing?</i>	Yes <i>Ya</i>	
		No <i>Tidak</i>	
10	Do you have dog / Adakah anda mempunyai anjing?	Yes <i>Ya</i>	
		No <i>Tidak</i>	
11	What is the breed of your cat <i>Apakah baka kucing anda?</i>	European	
		Maine coon	
		Mixed-breed <i>Baka campuran</i>	
		Persian <i>Parsi</i>	
		Domestic Shorthair <i>Rambut pendek domestik</i>	
		Not related <i>Tidak berkaitan</i>	
		Others <i>Lain-lain</i>	
12	What is breed of your dog <i>Apakah baka anjing anda?</i>	French bulldog <i>Bulldog Perancis</i>	
		Pomeranian	
		Poodle	
		Pug	
		Rottweiler	
		Not related <i>Tidak berkaitan</i>	
		Others <i>Lain-lain</i>	

**Section B: Attitude Level towards Brachycephalic Breeds of Cats and Dogs**

**Bahagian B: Sikap Terhadap Baka Brakisefalik Kucing Dan Anjing**

1	I think it is important to know my cat's/dog's medical history <i>Saya rasa ianya penting untuk mengetahui akan sejarah perubatan kucing/anjing saya.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
2.	I feel that it is important for me to know my cat's or dog's breed <i>Saya rasa ianya penting bagi saya untuk mengetahui baka kucing atau anjing saya.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
3	I feel that it is important for me to know the problems associated with the breed <i>Saya rasa ianya penting bagi saya untuk mengetahui masalah yang berkaitan dengan baka.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
4	I think bringing my cat or dog for a regular check up at the vet is necessary <i>Saya rasa membawa kucing atau anjing saya untuk pemeriksaan berkala kepada doktor haiwan adalah perlu.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
5	If my cat or dog has respiratory disorders, I will bring them to get treatment <i>Jika kucing atau anjing saya mempunyai gangguan pernafasan, saya akan membawa mereka untuk rawatan.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
6	If my cat or dog has ocular disorders (eye problem), I bring them to get treatment <i>Jika kucing atau anjing saya mempunyai masalah mata, saya akan membawa mereka untuk rawatan.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
7	Cat/dog appearance is important to be a good pet <i>Rupa kucing/anjing sangat penting sebagai haiwan peliharaan.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

8	Cat/dog behaviour is important to be a good pet <i>Perwatakan kucing/anjing sangat penting sebagai haiwan peliharaan.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
9	I think that depending on supportive treatment is beneficial for my cat's or dog's life <i>Saya rasa dengan hanya bersandarkan pada rawatan sokongan bermanfaat demi kelangsungan hayat kucing atau anjing saya.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
10	I am willing to adopt brachycephalic breed cats or dogs despite knowing problems associated with the breed <i>Saya sanggup mengambil dan menjaga baka kucing atau anjing brakisefalik ini walaupun mengetahui masalah yang berkaitan dengan baka ini.</i>	1. Strongly Disagree / <i>Sangat Tidak setuju</i> 2. Disagree / <i>Tidak bersetuju</i> 3. Neutral 4. Agree / <i>Bersetuju</i> 5. Strongly Agree / <i>Sangat bersetuju</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

**Section C: Knowledge towards Brachycephalic Breeds of Cats and Dogs**  
**Bahagian C: Pengetahuan Terhadap Baka Brakisefalik Kucing Dan Anjing**

1	Where did you first hear about Brachycephalic breeds of cats and dogs Di manakah pertama kali and mendengar mengenai baka Brakisefalik kucing dan anjing?	Based on experiences <i>Pengalaman sendiri</i>	<input type="checkbox"/>
		Veterinarians <i>Doktor Veterinar</i>	<input type="checkbox"/>
		Posters <i>Poster</i>	<input type="checkbox"/>
		Friends <i>Kawan-kawan</i>	<input type="checkbox"/>
		Social Media (Facebook, Twitter, etc) <i>Laman Sosial (Facebook, Twitter, dan lain-lain)</i>	<input type="checkbox"/>
2	1. Do you know about problem associated with Brachycephalic breed cats and dogs? <i>Adakah anda mengetahui tentang masalah berkaitan baka Brakisefalik kucing dan anjing?</i>	Yes / <i>Ya</i> No / <i>Tidak</i>	<input type="checkbox"/> <input type="checkbox"/>
	2. Are you aware of problem of respiratory disorder, epiphora, noisy breathing, heat intolerance and others associated with this breed? <i>Adakah anda sedar masalah gangguan pernafasan, epifora (mata berair) dan pernafasan yang bising, tidak tahan haba dan lain-lain pada baka ini?</i>	Yes / <i>Ya</i> No / <i>Tidak</i>	<input type="checkbox"/> <input type="checkbox"/>

	<p>3. Do you know that problems listed (Question 2) above are due to genetic factors and not viral or bacterial infection?</p> <p><i>Adakah anda mengetahui bahawa masalah yang disebutkan pada (No. 2) di atas disebabkan faktor genetik dan bukan jangkitan virus atau bakteria?</i></p>	<p>Yes / Ya No / Tidak</p>	<input type="checkbox"/> <input type="checkbox"/>
	<p>4. Do you know that brachycephalic syndrome in cats or dogs and human are different?</p> <p><i>Adakah anda mengetahui akan perbezaan Brakisefalik sindrom antara kucing atau anjing dan manusia?</i></p>	<p>Yes / Ya No / Tidak</p>	<input type="checkbox"/> <input type="checkbox"/>
3	<p>What is the most important aspect to you about a cat or dog</p> <p><i>Apakah aspek yang paling penting kepada anda tentang seekor kucing atau anjing?</i></p>	<p>General appearance (colour, facial features, etc)</p> <p><i>Penampilan umum (warna, ciri muka etc.)</i></p>	
		<p>Temperament</p> <p><i>Tingkah laku</i></p>	
		<p>Size</p> <p><i>Saiz</i></p>	
		<p>Fitness level</p> <p><i>Tahap kecergasan</i></p>	
		<p>Others</p> <p><i>Lain-lain</i></p>	
4	<p>Brachycephalic breeds have become increasingly popular over the last few years. In your opinion, why do you think this might be?</p> <p><i>Baka Brakisefalik telah menjadi semakin popular sejak beberapa tahun kebelakangan ini. Pada pendapat anda, mengapa perkara ini terjadi?</i></p>	<p>Social media</p> <p><i>Media sosial</i></p>	
		<p>Appearance</p> <p><i>Penampilan</i></p>	
		<p>Good companionships</p> <p><i>Peneman yang setia</i></p>	
		<p>Temperament</p> <p><i>Tingkah laku</i></p>	
		<p>Trends</p> <p><i>Trend</i></p>	
		<p>Unsure</p> <p><i>Tidak pasti</i></p>	
		<p>Others</p> <p><i>Lain-lain</i></p>	
5	<p>Are you aware of the Merle gene</p> <p><i>Adakah anda tahu tentang gen Merle?</i></p>	<p>Never heard of Merle gene before</p> <p><i>Tidak pernah mendengar tentang gen Merle sebelum ini</i></p>	
		<p>Heard of Merle gene but unaware of its implications</p> <p><i>Pernah mendengar tentang gen Merle tetapi tidak mengetahui implikasinya</i></p>	
		<p>Merle gene affects the cat's and dog's appearance</p> <p><i>Gen Merle menjejaskan penampilan anjing dan kucing</i></p>	
		<p>Merle gene causes minor health issues</p> <p><i>Gen Merle menyebabkan masalah kesihatan kecil</i></p>	

		Merle gene causes significant health issues <i>Gen Merle menyebabkan masalah kesihatan yang ketara</i>	
		Merle gene only causes health issues when double gene is present <i>Gen Merle hanya menyebabkan masalah kesihatan apabila terdapat gen berganda (double gene)</i>	
6	Do you think there are health problems associated with brachycephalic breeds (e.g. Persian cat, French bulldog, Pug, English bulldog) <i>Adakah anda fikir terdapat masalah kesihatan yang berkaitan dengan baka Brakisefalik (Contoh, kucing Parsi, bulldog Perancis, Pugs, bulldog Inggeris)?</i>	1. Very unlikely / <i>Sangat tidak mungkin</i> 2. Unlikely / <i>Tidak mungkin</i> 3. Neutral 4. Likely / <i>Mungkin</i> 5. Very likely / <i>Sangat berkemungkinan</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
7	How likely are you to buy a brachycephalic breed <i>Adakah anda akan membeli baka Brakisefalik?</i>	1. Very unlikely / <i>Sangat tidak mungkin</i> 2. Unlikely / <i>Tidak mungkin</i> 3. Neutral 4. Likely / <i>Mungkin</i> 5. Very likely / <i>Sangat berkemungkinan</i>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

**Section D: Education Intervention**

***Bahagian D: Intervensi Pendidikan***

1	How do you obtain information about Brachycephalic breeds cats and dogs <i>Bagaimana anda mendapat maklumat tentang baka Brakisefalik anjing dan kucing?</i>	Social media <i>Laman sosial</i>	
		Magazine <i>Majalah</i>	
		Television <i>Televisyen</i>	
		Pet expo/exhibition <i>Ekspo haiwan/pameran</i>	
		Internet	
		Others <i>Lain-lain</i>	
2	Which type of educational intervention that you prefer to have in future? <i>Apakah jenis intervensi pendidikan yang anda gemar untuk ada pada masa hadapan?</i>	Social media <i>Laman sosial</i>	
		Magazine <i>Majalah</i>	
		Television <i>Televisyen</i>	
		Pet expo/exhibition <i>Ekspo haiwan/pameran</i>	
		Internet	
		Others <i>Lain-lain</i>	

**End of Questions**

***Tamat Soalan***

**Thank You**

***Terima kasih***