

Identifying Distinct Antibiotic Behavioural Profiles Amongst Singapore Cat and Dog Owners: A Latent Class Analysis



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BACKGROUND

Whilst it is known that pet owners who misuse antibiotics for themselves also misuse them for their pets, little is known about behavioural heterogeneity amongst owners in both areas. This study aims to identify and characterise distinct owner antibiotic behavioural profiles to inform targeted interventions.

METHODS



Cross-sectional study on **N=1080 cat/dog owners** aged ≥ 21 years
Purposively sampled from 16 veterinary clinics across Singapore
Self-administered online survey



Latent class analysis to classify owners into distinct profiles, using:

- 6 survey items on antibiotic use for pets
- 6 survey items on antibiotic use for self
- 7 survey items on engagement in pet antibiotic use



Conducted **between March and December 2023**



Multinomial logistic regression to characterise each profile using: (i) knowledge of antibiotic use in pets, (ii) knowledge of antibiotic use in humans, (iii) knowledge of antimicrobial resistance (AMR) in humans, (iv) years as pet owner, (v) pet's previous use of antibiotics and (vi) basic demographic data



RESULTS



Table 1: Basic characteristics of respondents (N=1080)

Characteristics	N (%)
Age group	
21-34 years old	399 (36.9)
35-49 years old	382 (35.4)
≥ 50 years old	299 (27.7)
Gender	
Male	390 (36.1)
Ethnicity	
Chinese	798 (73.9)
Malay	91 (8.4)
Indian	70 (6.5)
Others	121 (11.2)
Education level	
Lower educated (i.e. Post-Secondary and below)	141 (13.1)
Years as pet owner	
< 10 years	535 (49.5)
Pet ever taken antibiotics	
Yes	844 (78.2)
Knowledge of antibiotic use in pets	
Poor	500 (46.3)
Knowledge of antibiotic use in humans	
Poor	358 (33.2)
Knowledge of AMR in humans	
Poor	1041 (96.4)

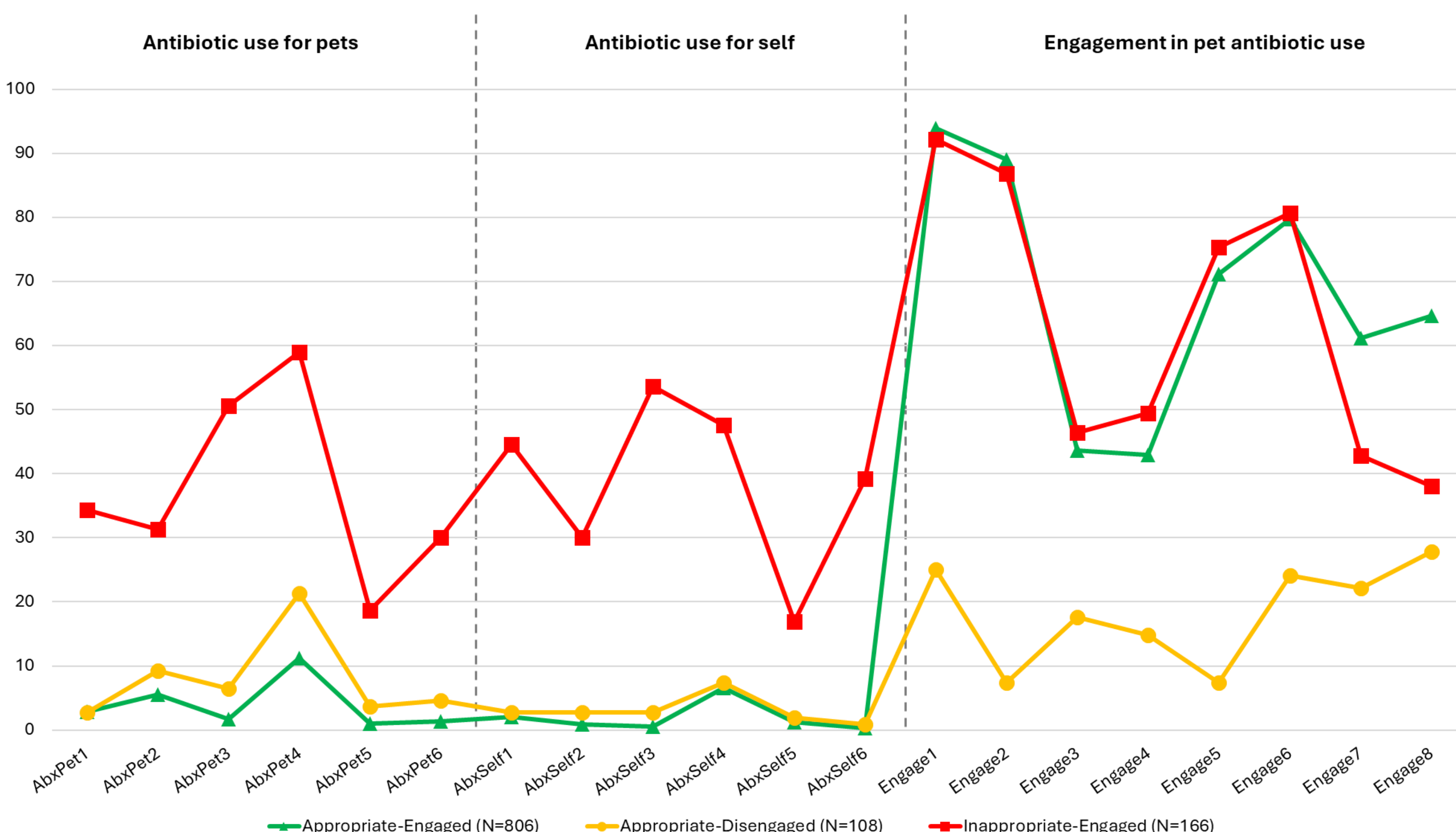
Table 2: Survey items used for latent class analysis

Antibiotic use for pets
AbxPet1: I normally keep antibiotic stocks for my pet at home in case of emergency
AbxPet2: If my pet is sick, I will usually give my antibiotics to it
AbxPet3: I will save leftover antibiotics for future use for my pet
AbxPet4: I normally stop giving my pet antibiotics when it starts feeling better or when symptom(s) subside
AbxPet5: I will see another veterinary practitioner (vet) if my pet's vet does not give it antibiotics
AbxPet6: I will give my pet leftover antibiotics when I think it needs them
Antibiotic use for self
AbxSelf1: I normally keep antibiotic stocks at home in case of emergency
AbxSelf2: If my family member is sick, I will usually give my antibiotics to them
AbxSelf3: I will save leftover antibiotics for future use
AbxSelf4: I normally stop taking antibiotics when I start feeling better
AbxSelf5: I will see another doctor if my doctor does not give me antibiotics
AbxSelf6: I will take leftover antibiotics when I think I need them
Engagement in pet antibiotic use
Engage1: It is more important to me that the veterinary practitioner (vet) prescribes the most appropriate antibiotic for my pet cat/dog, rather than one with an easy method of administration
Engage2: I would be willing to give antibiotic tablets to my pet cat/dog twice daily for 2 weeks if required
Engage3: Giving fewer antibiotic tablets to my pet cat/dog is important to me
Engage4: I would prefer to have a single long-acting injection of antibiotic, rather than tablets or liquid, even if a longer course of antibiotics is not needed
Engage5: I would be prepared to pay for additional diagnostic tests to choose the most appropriate antibiotic(s) for my pet cat/dog
Engage6: I would like my veterinary practitioner (vet) to give me more training/advice on how to best medicate my pet cat/dog (e.g. demonstrating tablet administration)
Engage7: I would probably (NOT) choose a cheaper antibiotic treatment option, over a proven and more effective option that is more expensive
Engage8: If my pet dog/cat is sick and the veterinary practitioner (vet) says antibiotics "probably" won't help, I would (NOT) still want my pet cat/dog to get antibiotics just in case

The respondents were classified into three main profiles: **Appropriate-Engaged (74.6%)**, **Appropriate-Disengaged (10.0%)** and **Inappropriate-Engaged (15.4%)**.

Appropriate-Engaged owners demonstrated good antibiotic practices for both pets and self, and high engagement in appropriate antibiotic use for their pets. **Inappropriate-Engaged** owners showed similar high engagement in the appropriate use of antibiotics for their pets, but misused antibiotics for both pets and themselves. **Appropriate-Disengaged** owners displayed good antibiotic practices for both pets and themselves but low engagement in optimising pet antibiotic use.

Figure 1: Frequency of Table 2 items (%) represented across profiles



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Table 3: Characteristics associated with pet owner profiles (N=1080)

(Reference: **Appropriate-Engaged**)

Characteristics	 Appropriate-Disengaged		 Inappropriate-Engaged	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Aged 21-34 years (ref: ≥ 50 years)	0.68 (0.39-1.19)	0.177	2.06 (1.25-3.42)	0.005
Aged 35-49 years (ref: ≥ 50 years)	0.72 (0.42-1.23)	0.231	1.31 (0.78-2.19)	0.303
Male	1.09 (0.70-1.69)	0.707	1.50 (1.03-2.19)	0.034
Lower educated	1.14 (0.63-2.07)	0.611	1.78 (1.07-2.94)	0.026
Pet ever taken antibiotics	0.55 (0.35-0.87)	0.010	1.95 (1.20-3.16)	0.007
Poor knowledge of antibiotic use in pets	1.53 (0.96-2.44)	0.072	2.57 (1.69-3.92)	<0.001
Poor knowledge of antibiotic use in humans	2.25 (1.43-3.55)	<0.001	3.18 (2.14-4.73)	<0.001
Poor knowledge of AMR in humans	2.69 (0.35-20.49)	0.340	0.36 (0.16-0.86)	0.021

Also adjusted for ethnicity and years as pet owner (not shown in this table)

Owners aged 21-34 years, males, lower educated, with pets ever taken antibiotics, and with poor knowledge of antibiotic use in pets and humans were more likely to be **Inappropriate-Engaged** owners.

CONCLUSION

- One-in-six cat/dog owners in Singapore misused antibiotics despite being engaged in appropriate use for their pets.
- To improve behaviours, awareness campaigns should incorporate messages addressing both human and pet antibiotic use, supplemented by targeted education for young owners of pets with prior antibiotic use while tapping on their valuing of appropriate antibiotics for their pets.