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Research article

Cat vaccination in Bangladesh: different aspects and owners' attitudes to vaccination

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ABSTRACT

This study surveyed cat owners in Bangladesh to evaluate vaccination coverage and owner attitudes toward cat vaccination. Data were collected via a survey conducted both in person at veterinary hospitals, university campus area and through an online questionnaire. Out of 1,025 responses, 843 valid questionnaires were analyzed. Although 89% of owners recognized their cats' susceptibility to infectious disease, only 54% reported their cats were vaccinated. The study identified major obstacles to vaccination, including high cost, long travel times, transportation difficulties, inconvenient clinic hours, and long waiting times. These barriers contribute to inadequate protection against disease. Enhancing owner awareness and improving vaccine availability and affordability are crucial to increase vaccination coverage and better protect Bangladesh's cat population from common infectious diseases.

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1.INTRODUCTION

Vaccination serves as a cornerstone in preventing and controlling infectious diseases among both humans and animals, including cats. It plays a vital role in public and veterinary health strategies (Gaskell et al., 2002; Habacher et al., 2010). Its significance becomes particularly pronounced when addressing epidemic outbreaks, where immunizing over 70% of a feline population becomes imperative to halt the spread of specific infectious diseases (Stuetzer & Hartmann, 2014; Day et al., 2016).Guided by recommendations from esteemed pet veterinary affiliations such as the World Small Animal Veterinary Association (WSAVA), American Association of Feline Practitioners (AAFP), and Advisory Board on Cat Diseases (ABCD), universal consensus exists that all cats, regardless of their circumstances or geographic location, should be protected against feline parvovirus (FPV), feline calicivirus (FCV), and feline herpesvirus-1 (FHV-1) through vaccination (Day et al., 2016; AAFP, 2013; AAFP, 2020; ABCD, 2020).

Termed "core vaccines," these immunizations play an instrumental role in feline health. In regions with endemic rabies virus infections, vaccination against rabies is equally indispensable and classified as a core measure. Conversely, vaccination against feline infectious peritonitis (FIP) is not advised due to uncertainties surrounding its efficacy (Day et al., 2016; AAFP, 2013; AAFP, 2020; ABCD, 2020). Global guidelines for feline vaccination, as advocated by experts from WSAVA, AAFP, and ABCD, emphasize vaccinating all felines whenever possible. This collective approach not only safeguards individual cats but also contributes to 'herd immunity,' significantly reducing the likelihood of infectious disease outbreaks (Day et al., 2016; AAFP, 2013; ABCD, 2020). To ensure optimal protection, core vaccines require revaccination every three years, particularly in low-risk environments such as indoor cats (Hosie et al., 2015; Day et al., 2016; Scherk et al., 2013). In instances of certain non-core vaccines like Chlamydia felis and *Bordetella bronchiseptica*, as well as specific core vaccines under high-risk conditions, annual revaccination is recommended to sustain immunity (Gehrig et al., 2019). The challenge of vaccine hesitancy extends beyond human medicine to pet owners, who harbor concerns about vaccine-associated adverse effects (VAAEs) (Guerra et al., 2017). This hesitancy has led the World Health Organization (WHO) to categorize vaccine hesitancy as a significant global health threat. Similarly, many pet owners exhibit hesitation towards vaccinating their pets, driven by doubts about the necessity of vaccinations and fears of potential VAAEs (Kitala et al., 2002; Day, 2006; Gehrig et al., 2019). Research from the United Kingdom (UK) underscores the role of external factors in shaping vaccination compliance. Cats that visit catteries or attend cat shows are significantly more likely to maintain up-to-date vaccination statuses compared to others. Additionally, vaccinating kittens has a lasting impact, positively influencing the vaccination status of adult cats (Habacher et al., 2010). Recognizing the critical role of vaccination in feline health, it is essential to understand the prevailing attitudes of cat owners toward cat vaccination. Evaluations of cat owners' vaccination compliance have been undertaken in various regions, including the UK, Germany, and Italy (Habacher et al., 2010; Gehrig et al., 2019; Filipe et al., 2021).

Consequently, this study aims to assess respondents' attitudes towards vaccination guidelines and identify factors associated with the vaccination status of cats in Bangladesh. By focusing on the unique context of Bangladesh, our study contributes to a comprehensive understanding of vaccination challenges and opportunities, shedding light on strategies to enhance feline health and well-being. In the subsequent chapters, we delve into the methodological framework, present our findings and engage in a comprehensive discussion of the implications and significance of our research. This exploration aims to pave the way for informed interventions that address vaccine hesitancy and promote preventive pet healthcare in Bangladesh.

2.MATERIALS AND METHODS

Study area and period

Data were collected face-to-face from cat owners at the Teaching and Training Pet Hospital and Research Center (TTPHRC) in Dhaka under Chattogram Veterinary and Animal Sciences University (CVASU),S. A. Quadery Teaching Veterinary Hospital (SAQTVH) of CVASU, the Upazila Veterinary Hospital (UVH) in Patiya. The face-to-face survey was conducted between 17 April and 28 September 2022, yielding 371 responses. An online survey, available from 28 February to 1 October 2022, received 654 responses. Owners with cats below 8 weeks of age (n = 2), respondents under 16 years (n = 2), and veterinarians were excluded to avoid bias. Each questionnaire required approximately 10 minutes to complete.

Study design

A questionnaire similar to the one used in Italy was adapted (Filipe, et al., 2021). Cat owners were surveyed to assess their attitudes toward recommended feline vaccinations. The questionnaire consisted of four sections: (1) general information about owners, (2) information about cats including vaccination

history, (3) factors influencing the decision on cat vaccination, and (4) owner-veterinarian relationship and veterinary recommendations. Some questions included an open-text option, allowing owners to provide additional information. These questions covered living area, owner age, occupation, number of children in the household, age of first vaccination, factors influencing vaccination choice, reasons for not visiting a veterinarian, and owners' profession if not among the proposed answers. For owners with multiple cats, data for the first-listed cat in alphabetical order and aged over 8 weeks were used.

Owners' ages were grouped into 17–20 years (categorized as 'young'), 21–29 years ('middle-aged'), and 30+ years ('adult') based on the natural distribution observed in our sample. Most respondents were in their twenties, a large portion in their late teens, and relatively few above 30 years. These cut-off points were chosen to reflect the most prominent clusters in our data rather than any external demographic standard. This sample-driven categorization allowed us to better examine trends in vaccination behavior across the most represented owner age groups.

The age categories for cats in this study-kittens (6 weeks to 6 months), young cats (>6 months to 1 year), and adults (>1 to 4 years)-were defined based on both international guidelines and field observations. The AAHA/AAFP Feline Life Stage Guidelines classify kittens as from birth up to 1 year old and young adults as 1-6 years old (AAHA, 2021). Royal Canin's Veterinary Focus notes that the juvenile period in cats starts at around 9 weeks and lasts until sexual maturity (approximately 4-10 months of age). Similarly, the MSD Veterinary Manual indicates that cats generally reach adult status by 9-12 months. In addition, Filipe et al. (2021) grouped cats aged 8 weeks to 1 year as "young" in a vaccination survey of Italian cat owners. We found many owners in our study delayed vaccinating their kittens until 5–6 months of age, believing that younger kittens were "too small" for vaccines. Therefore, the under-1-year category was subdivided into "kittens" and "young cats" to accommodate both biologically relevant life stages and the local pattern of delayed vaccination.

Although annual revaccination after the first-year booster is the predominant practice among veterinarians in Bangladesh, some owners reported a "revaccination every two to three years" schedule. This reflects owner-driven decisions informed by international standards, particularly for low-risk adult cats. According to global vaccination guidelines-including WSAVA and AAFP-core vaccines in adult cats should not be administered more frequently than every three years, following the initial kitten series and booster. We included this category in our study to accurately report owner-reported practices, acknowledging that although not routine locally, some veterinarians support extended intervals consistent with modern recommendations.

Data collection

The questionnaire underwent a pilot phase with 10 volunteers, refining questions for clarity and relevance. The final version was then organized using Google Forms for online distribution. The survey link was widely shared through social networks such as WhatsApp, Facebook, Messenger, and cat forums, as well as distributed via email and promotional leaflets. Specific cat-related pages on social networks were targeted for promotion. Additionally, face-to-face data collection was conducted at UVH-Patiya, TTPHRC, SAQTVH (CVASU), and its surrounding area. The survey queried owners about their cats' vaccination status. Cats that had never been vaccinated were classified as "unvaccinated." Information about the age of first vaccination, vaccination intervals, veterinarian recommendations, and whether the cat received core vaccinations (FPV, FHV-1, and FCV) was collected. Owners whose age was undisclosed, those under 17 years old, cats younger than 8 weeks, veterinarians, and owners outside Bangladesh were excluded from further analysis. A total of 975 questionnaires were evaluated descriptively. Not all participants answered all questions; responses that answered all questions were included in the study. In total, 843 questionnaires were subjected to statistical analysis.

Statistical analysis

All compiled data were imported into Microsoft Excel 2019 and subsequently transferred to STATA version 3.5.1 for statistical analysis. This analysis aimed to demonstrate the frequency and percentages of various variables related to cat owners' information, cat information, attitudes toward vaccination, owner-veterinarian relationship, and veterinary recommendations in relation to the cats' vaccination status.

3. RESULTSAND DISCUSSION

Information about Cat Owners

In this study, approximately 56% (n=470/843) of the owners were in the middle age range (20-29 years), 40% (n=334/843) were young (17-20 years), and only 4% (n=39/843) were adults (>30 years). Of the total participants, 70% (n=592/843) were female, while the remaining 30% (n=251/843) were male. In terms of the highest educational degree, 42% (n=355/843) of the owners held a bachelor's degree, 31% (n=258/843) had an HSC (Higher Secondary Certificate) degree, 18% (n = 146/843) had an SSC (Secondary School Certificate) degree, and only 10% (n=84/843) possessed a Master's degree. Regarding occupation, 71% (n=602/843) of the cat owners were students, 15% (n=126/843) were job holders, 7% (n=62/843) were housewives, 4% (n=35/843) were businessmen, 2% (n=14/843) were unemployed, and approximately 1% (n=3/843) had various other occupations. General information about the owners is summarized in Table 1.

Information about cats

In our study, we found that 36% (n=300/843) of the cats were kittens (aged 6 weeks to 6 months), 38% (n=321/843) were young cats (over 6 months to 1 year), and 26% (n=222/843) were adult cats (over 1 to 4 years). Among the cat owners, 75% (n=633/843) had multiple cats, but less than five; 22% (n=184/843) owned between 5 to 10 cats, and only 3% (n=26/843) had more than 10 cats. Of these cats, 44% (n=368/843) were adopted, 22% (n=182/843) were obtained from animal shelters or charities, 13% (n=111/843) were acquired from relatives or friends, 11% (n=95/843) were purchased directly from breeders or shops, and 10% (n=87/843) were bought online. In terms of breed distribution, 64% (n=540/843) of the cats were of Deshi (Local) breed. Persian breed cats comprised the second largest category, accounting for around 20% (n=172/843) of the sample. Additionally, 15% (n=129/843) of the cats were crossbreeds, and less than 1% (n=2/843) were of other pure breeds. Regarding vaccination status, 36% (n=301/843) had received all core vaccines along with rabies, 5% (n=45/843) were vaccinated against core diseases except rabies, and 14% (n=122/843) had received only the rabies vaccine. Most cats, approximately 71% (n=602/843), were kept indoors, while 28% (n=240/843) had mixed indoor and outdoor access.The detailed information about cats, including their history of vaccinations, is summarized in Table 2.

Owners' attitudes towards vaccination

We found that 76% (n=644/843) of owners said cost was an important factor for vaccination. Also 92% (n=777/843) of owners said veterinarian advice was also important for proper vaccination. The infectious disease level of danger was known by 91% (n=771/843) owners and 89% (n=754/843) owners thought their cats were susceptible to infectious disease. Among them 22% (n=163/843) were vaccinated their cats within 3 months, 21% (n=156/843) were vaccinated between 3 to 6 months, and 15% (n=112/843) were vaccinated their cats after 6 months of age. Whereas 43% (n=323/843) of them did not vaccinate their cats even though they knew that their cats were susceptible to infectious diseases. This result showed a significant value (p=0.006). 93% (n=786/843) of cats' owners reported that cats age was important for proper vaccination. 89% (n=749/843) owners said the effectiveness of vaccination and time necessary to vaccinate the cats were also important factors for vaccinating the cats. Relation with current cats' disease/therapy with vaccination was known by 73% (n=617/843) of cats' owners. The important factors related to owners' decisionsto vaccinate their cats are summarized in Table3.

Table 1.Frequency and Percentages of Cat Owners' Information Variables by Vaccination Status.

Variable	**Co-variable**	**Total (%)**	**No. (%) Vaccinated at (≤ 3 months)**	**No. (%) Vaccinated at (> 3 to ≤ 6 months)**	**No. (%) Vaccinated at (> 6 months)**	**No. (%) unvaccinated**	**P-value**
Age of respondent	Young	334(40)	33(10)	88(26)	53(16)	160(48)	
	Middle age	470(56)	126(26)	82(17)	57(12)	205(44)	0.00
	Adult	39(4)	20(51)	4(10)	5(13)	10(25)	
	Total	843	179	174	115	375	
Gender	Female	592(70)	143(24)	123(21)	105(18)	221(37)	
	Male	251(30)	36(14)	51(20)	10(4)	154(61)	0.00
	Total	843	179	174	115	375	
Level of Education	SSC	146(18)	20(14)	47(32)	6(4)	73(50)	
	HSC	258(31)	49(19)	66(26)	19(7)	124(48)	
	Bachelor’s degree	355(42)	77(22)	60(17)	70(20)	148(42)	
	Master’s degree	84(10)	33(39)	1(1)	20(24)	30(36)	0.00
	Total	843	179	174	115	375	
Occupation	Artist	2(1)	0(0)	0(0)	1(50)	1(50)	
	Defense	1(1)	0(0)	0(0)	1(100)	0(0)	
	Business	35(4)	3(9)	3(9)	2(6)	27(77)	
	Job	126(15)	63(50)	19(15)	16(13)	28(22)	0.00
	Housewife	62(7)	33(53)	3(5)	5(8)	21(34)	
	Students	602(71)	80(13)	148(25)	89(15)	285(47)	
	Unemployed	14(2)	0(0)	0(0)	1(7)	13(93)	
	Others	1(1)	0(0)	1(100)	0(0)	0(0)	
	Total	843	179	174	115	375	

SSC: Secondary School Certificate; HSC: Higher Secondary School Certificate

Table 2. Frequency and percentages of different variables related to cats' information with vaccination status.

Variable	**Co-variable**	**Total (%)**	**No. (%) Vaccinated at (≤ 3 months)**	**No. (%) Vaccinated at (> 3 months to ≤ 6 months)**	**No. (%) Vaccinated at (> 6 months)**	**No. (%) unvaccinated**	**P-value**
Age of this cat	Kitten	300(36)	61(20)	4(1)	1(1)	234(78)	
	Young	321(38)	64(20)	93(29)	47(15)	117(36)	0.00
	Adult	222(26)	54(24)	77(35)	67(30)	24(11)	
	Total	843	179	174	115	375	
Number of total cats in the house	≤ 5	633(75)	117(18)	86(14)	78(12)	352(56)	
	> 5 to ≤ 10	184(22)	55(30)	79(43)	28(15)	22(12)	0.00
	> 10	26(3)	7(27)	9(35)	9(35)	1(4)	
	Total	843	179	174	115	375	
Origin of this cat	Adoption	368(44)	79(21)	96(26)	53(14)	140(38)	
	Animal shelter/Charity/Stray	182(22)	16(9)	29(16)	20(11)	117(64)	
	Breeder/Shop	95(11)	23(24)	42(44)	21(22)	9(9)	
	Internet	87(10)	28(32)	0(0)	15(17)	44(51)	
	Relatives/Friends	111(13)	33(30)	7(6)	6(5)	65(59)	
	Total	843	179	174	115	375	0.00
Breed of this cat	Deshi Cat	540(64)	140(26)	84(16)	60(11)	256(47)	
	Persian	172(20)	37(22)	41(24)	40(23)	54(31)	
	Egyptian	1(1)	0(0)	0(0)	1(100)	0(0)	0.00
	Bengal	1(1)	0(0)	0(0)	0(0)	1(100)	
	Cross	129(15)	2(2)	49(38)	14(11)	64(50)	
	Total	843	179	174	115	375	
Name of the vaccine	Rabies	122(14)	31(25)	17(14)	74(61)	0(0)	
	Combined PCH	45(5)	30(67)	15(33)	0(0)	0(0)	
	Both	301(36)	118(39)	142(47)	41(14)	0(0)	0.00
	N/A	375(44)	0(0)	0(0)	0(0)	375(100)	
	Total	843	179	174	115	375	
Indoor/ Outdoor access	Indoor only	602(71)	121(20)	129(21)	95(16)	257(43)	
	Indoor and outdoor	240(28)	58(24)	45(19)	20(8)	117(49)	
	Outdoor only	1(1)	0(0)	0(0)	0(0)	1(100)	
	Total	843	179	174	115	375	0.072

Table 3. Frequency and percentages of different variables related to owners' attitudes towards vaccination with the cat's vaccination status.

Variable	**Co-variable**	**Total (%)**	**No. (%) Vaccinated at (≤ 3 months**	**No. (%) Vaccinated at (> 3 months to ≤ 6 months)**	**No. (%) Vaccinated at (> 6 months)**	**No. (%) unvaccinated**	**P-value**
Cost	Important	644(76)	158(25)	140(22)	42(7)	304(47)	
	Unimportant	199(24)	21(11)	34(17)	73(37)	71(36)	0.00
	Total	843	179	174	115	375	
Veterinarian's advice	Important	777(92)	162(21)	155(20)	105(14)	355(46)	
	Unimportant	66(8)	17(26)	19(29)	10(15)	20(30)	0.096
	Total	843	179	174	115	375	
Cat's susceptibility to infectious diseases	Susceptible	754(89)	163(22)	156(21)	112(15)	323(43)	
	Unsusceptible	89(11)	16(18)	18(20)	3(3)	52(58)	0.006
	Total	843	179	174	115	375	
Infectious diseases' level of danger	Known	771(91)	149(19)	171(22)	113(15)	338(44)	
	Unknown	72(9)	30(42)	3(4)	2(3)	37(51)	0.00
	Total	843	179	174	115	375	
Effectiveness of vaccination	Important	749(89)	176(24)	154(21)	95(13)	324(43)	
	Unimportant	94(11)	3(3)	20(21)	20(21)	51(54)	0.00
	Total	843	179	174	115	375	
Time necessary to vaccinate the cat	Known	749(89)	163(22)	170(23)	92(12)	324(43)	
	Unknown	94(11)	16(17)	4(4)	23(24)	51(54)	0.00
	Total	843	179	174	115	375	
Cat's age	Important	786(93)	150(19)	174(22)	109(14)	353(45)	
	Unimportant	57(7)	29(51)	0(0)	6(11)	22(39)	0.00
	Total	843	179	174	115	375	
Current cat's disease/therapy	Known	617(73)	106(17)	142(23)	78(13)	291(47)	
	Unknown	226(27)	73(32)	32(14)	37(16)	84(37)	0.00
	Total	843	179	174	115	375	

Owner-veterinarian relationship and veterinarian recommendations

In this section, we delve into the dynamics of the owner-veterinarian relationship and explore the sources from which cat owners receive vaccination information. Out of the surveyed cat owners, 70% (n=586/843) reported that they believed revaccination should take place every year. A mere 7% (n=56/843) of owners indicated a preference for revaccination every two to three years, while 24% (n=201/843) were uncertain about the optimal revaccination interval.When it comes to the origins of vaccination information, only 24% (n=206/843) of owners stated that they received advice from veterinarians. A significant majority, approximately 59% (n=500/843), obtained vaccination information from the internet.

A smaller proportion, 8% (n=66/843), relied on pet shops for this information. Additionally, 6% of owners gleaned insights from friends or relatives, 2% (n=16/843) received recommendations from acquaintances, and an inconspicuous minority, less than 1% (n=1/843), acquired knowledge from books. Regarding veterinary visits, 41% (n=349/843) of respondents frequently took their cats for regular veterinary check-ups. On the other hand, 32% (n=273/843) expressed that they did not frequent veterinary clinics primarily due to cost constraints. Furthermore, 15% (n=130/843) of owners revealed that they didn't visit veterinarians because their cats had not experienced any serious health issues. Another 7% (n=60/843) cited unsuitable clinic hours and lengthy waiting times as reasons for their infrequent visits. Four percent (n=30/843) stated that the distance to the clinic and lack of convenient transportation were deterrents. Finally, a negligible fraction, less than 1% (n=1/843), mentioned that they avoided veterinary visits due to concerns about causing stress to their cats.The intricate interplay between cat owners and veterinarians, as well as the recommendations made by veterinarians concerning vaccination, are summarized in Table 4.

DISCUSSION

Vaccination stands as a pivotal measure in the prevention of infectious diseases, forming a significant component of pet healthcare. International guidelines developed by prominent pet veterinary associations (e.g., WSAVA, AAFP, and ABCD) underscore the importance of vaccinating all cats against feline parvovirus (FPV), feline calicivirus (FCV), and feline herpesvirus-1 (FHV-1), categorizing these vaccinations as "core vaccines" (Day, et al., 2016; AAFP, 2013; AAFP, 2020; ABCD, 2020). For areas with rampant rabies virus infections, immunization against rabies is also essential.

The utilization of a web-based questionnaire, a common approach in studies of similar nature (Gehrig, et al., 2019; Habacher, et al., 2010), was pivotal in this research. This method facilitated the inclusion of unvaccinated cats and those not registered with veterinary clinics. Moreover, its cost-effectiveness and swiftness enabled the collection of a substantial sample size from diverse regions in Bangladesh. To minimize bias, the questionnaire was discreetly named the "Cat Information Questionnaire" and not shared on websites dedicated to cat health or vaccination topics, thus mitigating selection bias risks. For effective epidemic prevention, a population should possess over 70% protection (Day, et al., 2016; Stuetzer& Hartmann, 2014). However, this study revealed a vaccination rate of only 54% among cats. Within this group, 36% received all core vaccines including rabies, 5% lacked rabies vaccination, and 14% were solely rabies vaccinated. These figures diverge notably from studies in Germany (77.9% recently vaccinated) and Italy (80% vaccinated) (Gehrig, et al., 2019; Filipe, et al., 2021). This marked disparity indicates that Bangladesh's cat population is inadequately shielded from infectious diseases. Factors contributing to this disparity may include the economic aftermath of the COVID-19 pandemic and the predominantly young and middle-aged owner demographic, with 71% being students. These circumstances, often linked to limited financial resources, exert significant influence on vaccination decisions. Notably, 32% of owners cited vaccination costs as a barrier.

Table 4. Frequency and percentages of different variables related to the owner-veterinarian relationship and veterinarian recommendations towards vaccination with the cat's vaccination status.

Variable	Co-variable	Total (%)	No. (%) Vaccinated at (≤ 3 months)	No. (%) Vaccinated at (> 3 months to ≤ 6 months)	No. (%) Vaccinated at (> 6 months)	No. (%) unvaccinated	P-value
Revaccination recommendation by the veterinarian	Every year	586(70)	101(17)	125(21)	110(19)	250(43)	0.00
	Every two/three year	56(7)	31(55)	4(7)	2(4)	19(34)	
	Unknown	201(24)	47(23)	45(22)	3(1)	106(53)	
	Total	843	179	174	115	375	
Main factors for not making an appointment with the veterinarian	Cost	273(32)	32(12)	49(18)	21(8)	171(63)	0.00
	Distance to clinic & transport	30(4)	1(3)	2(7)	2(7)	25(83)	
	Clinic opening hours & waiting time	60(7)	30(50)	0(0)	30(50)	0(0)	
	Finding and catching the cat (Cat's stress)	1(1)	0(0)	0(0)	0(0)	1(100)	
	None (I go to veterinarian)	349(41)	100(29)	94(27)	47(13)	108(31)	
	The cat has never had health problem	130(15)	16(12)	29(22)	15(12)	70(54)	
	Total	843	179	174	115	375	
Source of information about vaccination	Books	1(1)	0(0)	1(100)	0(0)	0(0)	0.00
	Breeder	16(2)	1(6)	0(0)	2(13)	13(81)	
	Internet	500(59)	95(19)	83(17)	57(11)	265(53)	
	Pet shop	66(8)	1(2)	36(55)	17(26)	12(19)	
	Relatives/friends	54(6)	2(4)	18(33)	4(7)	30(56)	
	Veterinarian	206(24)	80(39)	36(17)	35(17)	55(27)	
	Total	843	179	174	115	375	

Thus, increasing vaccination rates necessitates comprehensive awareness campaigns, coupled with accessible and affordable vaccines. Core vaccines, which include the FPV, FCV, and FHV-1 vaccines, should be administered as frequently as every three years, according to current recommendations for vaccination(Hosie, et al., 2015; Day, et al., 2016; Scherk, et al., 2013).

Following basic immunization, it is advised to revaccinate for FPV every three years and for FHV-1 and FCV every year to every three years, depending on the recommendations and the individual cat's circumstances(Hosie, et al., 2015; Day, et al., 2016; Scherk, et al., 2013). In this study it was found that revaccination time known by 70% owners for all kind of vaccine was every year. The reason might be more than half of them got source of vaccination information from internet/social media which was about 59%. So, proper information should be provided to cat owners and should be discouraged them not to take all information as correct from social media. Key core vaccines, like FPV, FCV, and FHV-1, are recommended every three years (Hosie, et al., 2015; Day, et al., 2016; Scherk, et al., 2013). Despite this, 70% of owners in this study endorsed annual revaccination. A prominent source of information, the internet and social media, could be contributing to this misconception, highlighting the significance of promoting reliable sources. Early kitten vaccinations are vital, with booster shots at 3-4-week intervals until 16 weeks, followed by a subsequent booster 11-13 months later to ensure robust immunity (Hosie, et al., 2015; Day, et al., 2016; Scherk, et al., 2013). "Recent vaccination" records were more frequent in cats without health treatments, aligning with guidelines to vaccinate only healthy cats for optimal safety and efficacy (Day, et al., 2016; Truyen, et al., 2009). Interestingly, senior cats (>10 years) exhibited lower "recent vaccination" prevalence compared to younger counterparts. This stems from an inclination among senior cat owners to believe that their pets possess stronger immunity due to historical vaccinations. However, all cats, regardless of age, require regular boosters (Hosie, et al., 2015; Day, et al., 2016; Scherk, et al., 2013). While no specific guidelines exist for senior cats, research is needed to establish appropriate vaccination protocols. Females constituted most questionnaire respondents (70%), mirroring similar trends in the UK and Italy (Habacher, et al., 2010; Filipe, et al., 2021). Reasons behind this skew could be multifaceted, potentially reflecting a greater number of female cat owners and their heightened empathy towards animals. Such inclinations could contribute to higher vaccination rates among female-owned cats. Indoor cats constituted 71%, while 28% enjoyed both indoor and outdoor access. Comparing these figures with studies from Italy, Germany, and the UK reveals varied patterns in cat housing preferences. However, the prevalent ownership of indoor-only cats in Bangladesh might diminish the perceived urgency of vaccination, especially as indoor cats have limited interaction with other pets. It's critical that veterinarians educate owners on the importance of vaccination, even for indoor-only cats, as per global recommendations (Day, et al., 2016; AAFP, 2013; ABCD, 2020; Dall'ara, 2020; Hosie, et al., 2015). Multiple-cat households (75%) predominated, with 44% of cats being adopted and 64% belonging to domestic breeds. Notably, purebred cats exhibited higher "recent vaccination" rates, possibly due to heightened owner awareness and concern for infectious diseases. An overwhelming 92% emphasized the significance of veterinarian advice for proper vaccination. Given the growing pet population in Bangladesh and the prevalence of misinformation, enhancing veterinary services is crucial to cater to this burgeoning need. Owners' perception of vaccination effectiveness (89%) underscores the need for meticulous vaccine transportation and administration to maintain efficacy. An obstacle cited by 7% of owners was extended waiting times, while 4% cited distance and transportation challenges as barriers to clinic visits. To overcome these barriers, veterinarians should reduce wait times and consider alternative measures, including home visits.

In conclusion, this study exposes the vulnerability of Bangladesh's cat population to infectious diseases due to low vaccination rates and prevailing negative attitudes toward vaccination. Enhancing vaccination coverage requires a multifaceted approach involving

affordable vaccines, increased awareness campaigns, and the dissemination of reliable information. By addressing these challenges, the veterinary community can contribute to safeguarding feline health and mitigating infectious disease risks.

5. CONCLUSION

This study highlights the vulnerability of Bangladesh's cat population to infectious diseases due to low vaccination rates and negative owner attitudes. With only 54% of cats receiving recommended vaccinations, a significant gap in disease prevention exists. Misinformation, economic barriers, and limited access to veterinary care contribute to this issue. To address these challenges, a multifaceted approach is crucial, including targeted awareness campaigns, accessible and affordable vaccination options, and accurate information dissemination by veterinarians. By implementing these measures, the health and immunity of the country's feline population can be enhanced. Future research should expand to encompass broader geographic regions and diverse demographic groups, and should investigate the effectiveness of intervention strategies aimed at improving vaccination uptake.

LIMITATIONS

This study's reliance on web-based data collection may introduce bias by excluding segments of the population without computer access. To counter this, face-to-face surveys were conducted in urban areas. However, self-selection bias could still influence results, especially in web-based surveys. Additionally, while the web survey had broad geographical coverage, face-to-face collection was limited to certain regions, potentially skewing findings. Future research should aim for broader geographical coverage to improve generalizability.

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