

Characteristics of clients and animals served by high-volume, stationary, nonprofit spay-neuter clinics

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OBJECTIVE

To characterize the clients served by and the cats and dogs admitted to nonprofit spay-neuter clinics.

DESIGN

Cross-sectional survey.

SAMPLE

2,154 dogs and 1,902 cats that were owned by 3,768 survey respondents and admitted to 22 nonprofit spay-neuter clinics across the United States between April 29, 2013, and January 24, 2014.

PROCEDURES

Participating clinics distributed surveys to clients during each of 4 quarterly study weeks. The survey collected descriptive information about clients' pets and households as well as their decision-making regarding sterilization of their pets. For each of the study weeks, clinics reported the total number of surgeries, including those involving shelter animals, feral cats, and other owned animals.

RESULTS

Respondents indicated that 49% of dogs and 77% of cats had not been examined previously by a veterinarian, except during vaccine clinics. Among animals ≥ 4 months of age, 1,144 of 1,416 (81%) cats and 572 of 1,794 (32%) dogs had not received a rabies vaccination. Previous litters were reported for 204 of 716 (28%) queens and 153 of 904 (17%) bitches. Most clients' (53%) household income was $< \$30,000$ annually. Common reasons for clinic choice included cost; friend, neighbor, or family recommendation; and good reputation.

CONCLUSIONS AND CLINICAL RELEVANCE

Nonprofit spay-neuter clinics predominantly served low-income clients and animals lacking regular veterinary care, in addition to animals from shelters and community cats. These clinics increase access to services needed for animal population control and public health. (*J Am Vet Med Assoc* 2018;253:737–745)

Approximately 7.6 million cats and dogs enter animal shelters each year, and of these, approximately 2.7 million are euthanized.¹ Surgical sterilization has long been a major approach to this problem and is credited as a key influence in reducing the annual number of cats and dogs euthanized from approximately 13.5 million in 1973.² Spay-neuter clinics operate throughout the United States to reduce overpopulation and euthanasia of companion animals.³ In targeted areas, programs for owned pets^{4–8} and free-roaming cats^{9,10} have been associated with decreased cat intake into shelters.

Nonprofit spay-neuter clinics are established to increase pet owners' access to services for surgical sterilization of cats and dogs, especially for pets that would not be sterilized otherwise by private practitioners or by shelter practitioners before adoption.

ABBREVIATIONS

TNR Trap-neuter-return

Despite successful neutering of over a million^a pets annually, the impact of nonprofit spay-neuter clinics has been questioned by some who believe that the availability of these subsidized services displaces business from practices where these surgeries might be performed otherwise or competes unfairly with the for-profit sector for clients.

The cost of ovariohysterectomy or castration is an important barrier to service access for many pet owners. People with lower incomes are nearly as likely to own cats or dogs as are people with higher incomes^{11,12}; however, a 2011 survey¹³ found that 32% of 1,000 respondents with recently acquired, sexually intact pets stated that neutering was too expensive. In addition, a survey¹² of cat owners found that cats from households with annual earnings $< \$35,000$ were significantly less likely to be surgically sterilized than cats from higher-income households and that cost was a commonly cited reason. A different study¹⁴ found that pet owners from households with unplanned litters cited cost of sterilization surgery

and failure to recognize signs of estrus as the top 2 reasons for not having their dog or cat spayed before pregnancy.

Similarly, 44% (526/1,188) of owners who had taken their cats to a subsidized, reduced-cost spay-neuter clinic in Massachusetts reported that they had not had their cats sterilized previously because the surgery was too expensive, and less than half (44/99) of owners stated that they likely would have used a private veterinarian if the low-cost clinic had not been available.¹⁵ Some conveyed delaying the procedure to save up sufficient funds, which potentially could have resulted in unwanted litters. Still, controversy exists as to whether nonprofit spay-neuter clinics reach owners that would not have sterilized their animals otherwise, or whether the clinics divert surgeries from private veterinary hospitals.^{16,17}

Some nonprofit spay-neuter clinics restrict clientele by screening for income, but many do not.¹⁸ To the authors' knowledge, there has been no nationwide survey of nonprofit spay-neuter clinics that describes the clients served by and the animals admitted to stationary, nonprofit spay-neuter clinics; however, information for a single program for sterilization of cats in Massachusetts has been reported.¹⁵ The purpose of the study reported here was to characterize the clients served by and the dogs and cats admitted to stationary, nonprofit spay-neuter clinics and thereby enhance the veterinary profession's understanding of the human and animal demographics involved.

Materials and Methods

Selection of clinics

No national directory of spay-neuter clinics existed; therefore, an online survey seeking identification and characteristics of potential clinic participants was directed to parties on the electronic mailing lists for the Association of Shelter Veterinarians, the High Quality High Volume Spay-Neuter Veterinarians, and the National Spay/Neuter Response Team clinic directors as well as of clinics in the spay-neuter clinic databases of the American Society for the Prevention of Cruelty to Animals and PetSmart Charities. The objectives were to identify as many spay-neuter clinics as possible and to characterize them in terms of clinic type (eg, stationary, mobile, and voucher), numbers and species of animals sterilized, and admission policies. The survey generated 455 responses and identified 324 separate clinics, of which were 120 stationary, nonprofit clinics that surgically sterilized $\geq 1,000$ client-owned animals annually. Because no previous data were available to support a statistical power analysis for a study of this nature, the investigators selected multiple clinics in each region of the country, with a goal of enrolling a total of 25 clinics. To select the 25 clinics for the study, the 120 stationary clinics initially identified were first stratified by region (Midwest, Northeast, South, and West [**Appendix 1**] as defined by the US Census Bureau¹⁹), then proportionally retained

by region on the basis of the percentage of the US population that resided in each region as reported in the 2013 Census. For example, 37% (118,487,418/316,427,395) of the US population resided in the South region in 2013; therefore, 36% (9/25) of the clinics for inclusion in the study were sought from the South region. Simple random sampling with a random number table identified the clinics in each regional stratum.

Clinics that declined to participate or failed to submit data were replaced with another eligible facility from the same region. Each clinic was invited to participate with the promise from the investigators that the clinic would receive its summarized data at the completion of the study's data collection.

Data collection

A survey (**Supplementary Appendix S1**, available at avmajournals.avma.org/doi/suppl/10.2460/javma.253.6.737) for pet owners was developed, and participating clinics were asked to distribute the survey to English-speaking pet owners who could read and write and who had their cats or dogs admitted for sterilization surgery. No standardized assistance with survey completion was provided by the clinics to their clients. Pet owners could participate in the survey only once and were ineligible for participation in a second survey. Animals admitted in conjunction with rescue services, animal control services, or TNR programs or that were brought to the clinic in clinic transport vehicles were enumerated and reported in the total numbers of dogs and cats (from all sources) sterilized during each study week, but were excluded from the pet owner surveys. Dogs and cats that were transported in clinic vehicles and underwent surgical sterilization included those that were owned by clients living at a distance from the clinic. To control for seasonal effects, clinic data and pet owner surveys were collected for 1 week during each quarter of the year from April 29, 2013, to January 24, 2014 (specifically the weeks of April 29, July 15, and October 7, 2013, and January 13, 2014).

During each quarterly data collection week, owners who had their pets admitted for sterilization surgery received a 2-page, self-administered survey in the packet of materials routinely distributed to all clinic clients at the time of pet admission. Each pet owner was invited to participate in the study by completing 1 survey form for each of their 1 or 2 pets admitted for surgery that day. Respondents who brought > 2 pets were allowed to choose 2 pets for which the forms would be completed. Owners of a litter were asked to complete a survey for only 1 puppy or kitten from the litter.

The survey sought information regarding the total number of dogs or cats that the owner brought to the clinic on the day of the survey. For the 1 or 2 animals that respondents selected, data collected for each pet included sex, age, duration of ownership, rabies vaccination status, and whether the animal had

been examined previously by a veterinarian other than during a rabies vaccination clinic. The number of previous litters for all adult female pets admitted was recorded.

At the time of their visit, respondents were asked to identify the reason or reasons they sought spay-neuter services and why they had selected a spay-neuter clinic rather than a private veterinary practice. A list of common reasons was provided along with an open field box in which respondents could enter other reasons. Respondents were also asked to identify their gender, residential zip code, number of household members, and household income. Regardless of whether a respondent provided information for 1 or 2 pets, his or her personal information was used once in the analyses.

Data management and analysis

The response rate for each clinic was calculated by dividing the total number of surveys completed during all 4 weeks combined by the total number of

owned pets admitted for surgical sterilization combined during the same 4 weeks. Because these rates varied by clinic, and the clinic medians were not normally distributed, the overall median response rates among clinics was calculated.

Respondent households were categorized as above or below the poverty line on the basis of the US Department of Health and Human Services 2014 Poverty Guidelines for the 48 contiguous states and the District of Columbia,²⁰ which applies the federal thresholds for poverty and incorporates region, household income, and number of household members. For example, for a household of 4, the poverty threshold is \$23,850 annual income. Respondents were grouped according to whether they brought 1 or 2 cats, 1 or 2 dogs, or 1 cat and 1 dog on the day they completed the survey. Quarters were defined as winter (January through March), spring (April through June), summer (July through September), and fall (October through December).

Table 1—Regional distribution of 22 US nonprofit spay-neuter clinics and 3,768 pet owners who used the clinics for surgical sterilization of their pets and who completed a survey for up to 2 of those pets, contrasted with regional distribution of the population of the United States.

Region	No. of nonprofit clinics (%)	No. of surveys completed (%)	No. of pet owners (%)	US population* (No. of persons [%])
South	8 (36)	1,323 (33)	1,223 (33)	118,487,418 (37)
West	4 (18)	889 (22)	839 (22)	74,354,836 (24)
Midwest	5 (23)	1,071 (26)	991 (26)	67,565,788 (21)
Northeast	5 (23)	773 (19)	715 (19)	56,019,353 (18)

Data were collected by means of a 2-page survey completed by owners of pets at the time of admission of the pets to the participating clinics for surgical sterilization. Surveys were collected during 4 weeks (1 wk/quarter) from April 29, 2013, to January 24, 2014. Of 34 clinics invited to participate, 22 contributed data for analysis. A total of 3,768 survey respondents had 4,446 pets (2,266 [51%] cats and 2,180 [49%] dogs) admitted to the participating clinics; however, because owners had the option of completing surveys for up to 2 of their animals brought to the clinic for surgical sterilization, surveys were completed for 4,056 pets.

*Data were obtained from the 2013 US Census data, at which time the US population comprised 316,427,395 people.²⁸

Table 2—Regionally stratified results of χ^2 tests of independence to compare household income characteristics reported by the pet owners in Table 1 who brought their pets to participating nonprofit spay-neuter clinics for surgical sterilization during the 4 study weeks.

Characteristics	All regions	South	West	Midwest	Northeast	P value*
Respondents providing household income data	2,933 (78)	931 (76)	643 (77)	780 (79)	579 (81)	< 0.001
Household income						
< \$10,000	549 (19)	176 (19)	111 (17)	143 (18)	119 (21)	
\$10,000–\$29,999†	1,009 (34)	294 (32)	199 (31)	276 (35)	240 (41)	
\$30,000–\$49,999‡	655 (22)	220 (24)	140 (22)	180 (23)	115 (20)	
\$50,000–\$69,999	362 (12)	134 (14)	80 (12)	100 (13)	48 (8)	
≥ \$70,000	358 (12)	107 (11)	113 (18)	81 (10)	57 (10)	
Respondents for whom poverty status could be determined§	2,765 (73)	884 (72)	603 (72)	748 (75)	530 (74)	0.03
At or below poverty line	686 (25)	210 (24)	130 (22)	194 (26)	152 (29)	
Above poverty line	2,079 (75)	674 (76)	473 (78)	554 (74)	378 (71)	

Data are reported as number (%) of respondents. The values of P were obtained with a χ^2 test of independence and were adjusted with a Bonferroni correction.

*The value of P pertains to comparison across regions. †Median household income category for study participants in all regions and the South, Midwest, and Northeast regions. ‡Median household income category for study participants in West region. §Only households reporting both income and family size were used in calculations of poverty rate. The US poverty guideline in 2014 was \$11,880 for a single-person household and \$28,440 for a 5-person household.²⁰

See Table 1 for remainder of key.

Associations between categorical variables were evaluated with the χ^2 test of independence. The poverty rate for respondents was compared with the poverty rate reported by the US Census Bureau for their respective regions by use of a *z* test.²¹ When multiple comparisons were made (eg, across regions), the value of *P* was adjusted with the Bonferroni correction.²¹ For associations between 2 dichotomous variables where data cells contained expected values < 5, Fisher exact tests were used.²¹ Values of *P* ≤ 0.05 (for a priori comparisons) were considered significant.

Results

A total of 34 clinics were invited to participate; however, 6 declined, 3 did not submit data, and 3 dropped out having provided data for < 2 quarterly data collection weeks, leaving 22 participating clinics (Table 1). In the 4 weeks (1 wk/quarter) during which the surveys were conducted, the participating clinics surgically sterilized 12,901 animals. Of these 12,901 animals, 6,515 (50%) were brought to the clinics by their owners, 3,107 (24%) were from shelter or rescue programs, 2,274 (18%) were from TNR programs, and 1,005 (8%) were transported from other referring communities and arrived in clinic transport vehicles.

A total of 3,768 survey respondents had 4,446 pets (2,266 [51%] cats and 2,180 [49%] dogs) admitted to the participating clinics; however, because owners had the option of completing surveys for up to 2 of the animals they admitted, surveys were completed for 4,056 pets (1,902 [47%] cats) and 2,154 [53%] dogs). Additionally, because some respondents failed to answer all questions, the number of observations for each question varied.

Clinic characteristics

Participating clinics surgically sterilized a total of 167,344 animals (101,571 cats and 65,773 dogs) in the calendar year 2013. The median number of cats was 3,808 (range, 756 to 20,030), and the median number

of dogs was 2,138 (range, 691 to 7,972). Clinics were open for business a median of 5 d/wk (range, 3 to 6 d/wk) and 51.5 wk/y (range, 48 to 52 wk/y).

Nineteen of the 22 (86%) clinics worked with all clients, whereas 3 (14%) clinics worked only with income-qualified clients. All 22 clinics offered additional discounts to low-income owners of cats, and 19 (86%) clinics offered additional discounts on spay and neuter services to low-income owners of dogs. Some discounts were offered throughout the year, whereas others were offered intermittently. Many clinics offered additional discounts for surgery on certain breeds of dogs perceived to be overly popu-

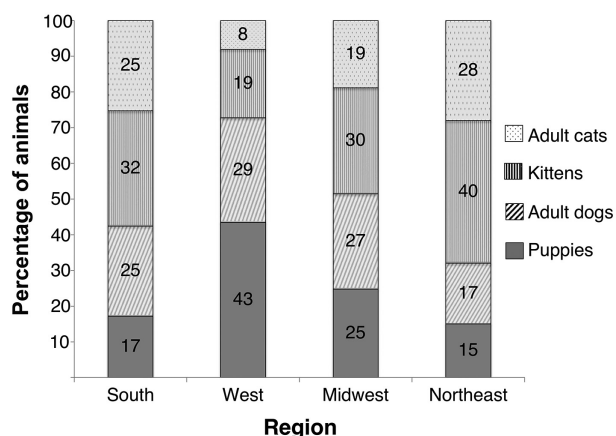


Figure 1—Proportional distribution by geographic region of the United States and owner-defined age groups of 4,056 owned pets surgically sterilized at 22 nonprofit spay-neuter clinics during 4 weeks (1 wk/quarter) from April 29, 2013, to January 24, 2014. Data were collected by means of a 2-page survey completed by pet owners. Of 34 clinics invited to participate, 22 contributed data for analysis. A total of 3,768 survey respondents had 4,446 pets (2,266 [51%] cats and 2,180 [49%] dogs) admitted to the participating clinics; however, because owners had the option of completing surveys for up to 2 of their animals brought to the clinic for surgical sterilization, surveys were completed for 4,056 pets (1,902 [47%] cats and 2,154 [53%] dogs). Number in each box of the bars represents percentage of each type of animal admitted by clients within each region.

Table 3—Results of χ^2 tests of independence to compare household income characteristics reported by the pet owners in Table 1 who brought only cats or only dogs to participating nonprofit spay-neuter clinics for surgical sterilization during the 4 study weeks.

Characteristic	Cats only	Dogs only	<i>P</i> value
Respondents providing household income data	1,289 (88)	1,550 (90)	
Income			< 0.001
< \$10,000	252 (20)	274 (18)	
\$10,000–\$29,999	455 (35)	511 (33)	
\$30,000–\$49,999	288 (22)	354 (23)	
\$50,000–\$69,999	170 (13)	183 (12)	
≥ \$70,000	124 (10)	228 (15)	
Respondents for whom poverty status could be determined	1,213 (83)	1,470 (85)	NS
At or below poverty line	305 (25)	352 (24)	
Above poverty line	908 (75)	1,118 (76)	

Data are reported as number (%) of respondents. The values of *P* were obtained with a χ^2 test of independence and adjusted with a Bonferroni correction.

NS = Not significant.

See Table 2 for key.

lous, including pit bull-type dogs ($n = 14$ [64%] clinics) and Chihuahua-type dogs (4 [18%]). Clinics also offered discounted prices on the basis of animal or client characteristics, including feral or community cats ($n = 22$ [100%] clinics), residents of target zip codes or locations (6 [27%]), juvenile animals (5 [23%]), bitches or queens with litters (4 [18%]), large dogs (2 [9%]), multipet households (2 [9%]), and senior citizens (2 [9%]).

One clinic was omitted from calculation of the overall percentage of animals included in the study by clinic and the proportion of clinic patients brought in by their owners because that clinic had incomplete data regarding the number of surgeries per week. Nonetheless, the median response rate to the survey for the remaining 21 clinics was 65% (range, 29% to 90%), and the overall response rate for the survey

was 62%. The continuous variables (eg, survey return rates for all clinics) had non-Gaussian distributions and were summarized as medians and ranges.

Pet owner characteristics

Because some respondents failed to answer all questions, the number of observations for each question varied. More surveys were completed by women (2,320/3,249 [71%]) than by men (929/3,249 [29%]). The median household income category of respondents was \$10,000 to \$29,999, with 53% of annual household incomes < \$30,000, and 12% of annual household incomes \geq \$70,000 (**Table 2**).

Differences in participant income distribution among regions were significant ($P < 0.001$) in that the median household income category for participants in the South, Midwest, and Northeast regions

Table 4—Results of χ^2 tests of independence to compare characteristics of cats and dogs reported by 3,768 survey respondents in Table 1 who brought a total of 4,056 pets to participating nonprofit spay-neuter clinics for surgical sterilization during the 4 study weeks.

Characteristic	Cats	Dogs	P value
Sex			NS
Female	995 (53)	1,078 (50)	
Male	881 (47)	1,070 (50)	
Total No. of animals for which data were available	1,876	2,148	
Age group (mo)			< 0.001
< 4	186 (10)	78 (4)	
4–5	321 (18)	257 (12)	
6–11	882 (48)	865 (41)	
12–17	151 (8)	218 (10)	
> 17	280 (15)	692 (33)	
Total No. of animals for which data were available	1,820	2,110	
Duration of ownership (mo)			< 0.001
< 1	121 (7)	113 (5)	
1–5	841 (46)	786 (38)	
6–11	442 (24)	465 (22)	
> 11	410 (23)	722 (35)	
Total No. of animals for which data were available	1,814	2,086	
First time examined by veterinarian			< 0.001
Yes	1,423 (77)	1,026 (49)	
No	417 (23)	1,066 (51)	
Total No. of animals for which data were available	1,840	2,092	
Previous rabies vaccination*			< 0.001
Yes	272 (19)	1,222 (68)	
No	1,144 (81)	572 (32)	
Total No. of animals for which data were available	1,416	1,794	
Had previous litter†			< 0.001
Yes	204 (28)	153 (17)	
No	512 (72)	751 (83)	
Total No. of animals for which data were available	716	904	
No. of previous litters†			0.01
1	114 (66)	59 (49)	
2	34 (19)	30 (25)	
≥ 3	26 (15)	31 (26)	
Total No. of animals for which data were available	174	120	

With the exception of total numbers of animals, data are reported as number (%) of respondents.

Variability in total numbers of animals in each category reflect incomplete information provided by pet owners for some questions.

*Data are applicable to animals ≥ 4 months of age. †Data are applicable to female animals ≥ 6 months of age.

NS = Not significant.

was \$10,000 to \$29,999, yet was \$30,000 to \$49,999 in the West region (Table 2). The median incomes for households reported by the US Census for those regions in 2013 were \$48,128 (South region), \$52,082 (Midwest region), \$56,775 (Northeast region), and \$56,181 (West region),²² each of which was greater than the median household income category of respondents in the present study.

A total of 2,765 respondents provided adequate information for determination of poverty status (\$11,880 for a single-person household; \$28,440 for a 5-person household) as described in federal guidelines,²⁰ and 686 (25%) of those respondents lived below the poverty line (Table 2). Compared with regional poverty rates reported by the US Census for 2013 (South region, 16%; West region, 15%; Midwest region, 13%; and Northeast region, 13%), the poverty rates of respondents in those respective regions were significantly ($P = 0.03$) greater. In addition, the percentage of respondents who lived at or below the poverty line in the Northeast region (29%) was significantly ($P = 0.006$) higher than that in the West region (22%). Further, a significantly ($P < 0.001$) higher proportion of owners who had only cats undergoing surgical sterilization were in lower household income categories, compared with the proportion of owners who had only dogs undergoing surgery, although the difference was small (Table 3). Overall, 1,468 of 3,249 (45%) respondents brought only cats for surgical sterilization, 1,725 (53%) brought only dogs, and 56 (2%) brought dogs and cats.

Animal characteristics

Species and age profiles of pets ($n = 4,446$) brought by respondents to the clinics for surgical sterilization varied by region (Figure 1). Compared with the other regions, the proportion of cats and kittens admitted for surgical sterilization was highest in the Northeast region, and the proportion of dogs and puppies admitted for surgical sterilization was highest in the West. The distributions of sexes among cats and dogs did not differ significantly; however, compared with dogs, cats were significantly ($P < 0.001$) younger, had been owned for a shorter period, were less likely to have ever been examined by a veterinarian, and were less likely to have been vaccinated for rabies (Table 4). Cats were also more likely than dogs to have had a previous litter; 204 of the 716 (28%) queens and 153 of the 904 (17%) bitches were reported to have already had at least 1 litter. However, dogs were more likely than cats to have already had ≥ 2 litters; 61 of 120 (51%) bitches and 60 of 174 (34%) queens were reported to have had ≥ 2 litters. The percentage of multiparous animals differed significantly ($P = 0.005$) between species.

Prior to admission at the participating nonprofit spay-neuter clinic, 1,026 of 2,092 (49%) dogs and 1,423 of 1,840 (77%) cats for which owner surveys were completed had not been examined previously by a veterinarian. Further, respondents reported that

among pets ≥ 4 months of age, 1,144 of the 1,416 (81%) cats and 572 of the 1,794 (32%) dogs had not received a previous rabies vaccination (Table 4).

Respondents' reasons for surgical sterilization of a pet

At the time pets were brought to a participating clinic for surgical sterilization, respondents indicated that the most common reason was to prevent overpopulation. Other common reasons were to avoid development of estrus, to reduce sexual behaviors, and because the pet was recently obtained (Figure 2).

Respondents' reasons for selection of a nonprofit spay-neuter clinic rather than a private veterinary practice

Cost of surgery was the most common reason cited by respondents for selection of a nonprofit spay-neuter clinic and not a private veterinary practice. The next most common reasons were recommendations for the clinic by a friend, neighbor, or family member and the clinic's reputation (Figure 3).

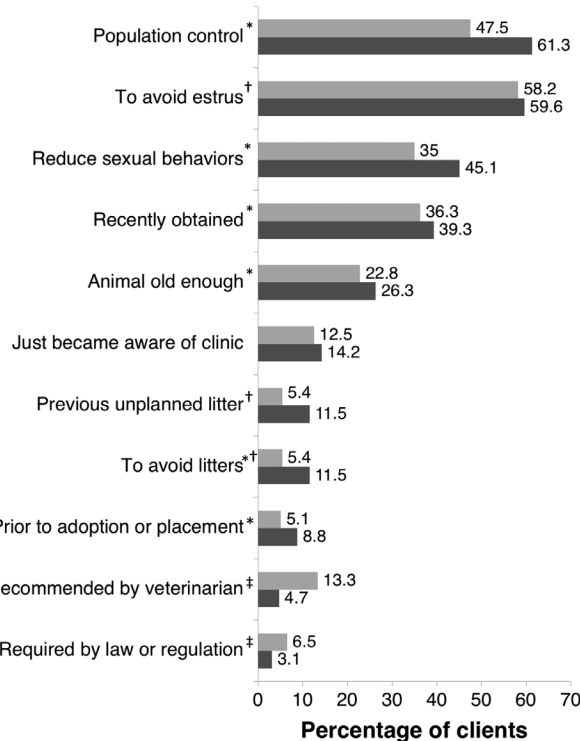


Figure 2—Reasons cited by the 3,768 (100%) survey respondents in Figure 1 for choosing to have their dogs (light gray bars) and cats (dark gray bars) surgically sterilized at that time. Respondents completed a survey for up to 2 pets undergoing surgical sterilization at 1 of 22 participating nonprofit spay-neuter clinics. The number at the end of each bar is the percentage of clients who selected the reason. Clients could have selected ≥ 1 reason. *The percentage of cats was significantly ($P \leq 0.05$) greater than the percentage of dogs. †Reason was applicable to female animals only. ‡The percentage of dogs was significantly ($P \leq 0.05$) greater than the percentage of cats.

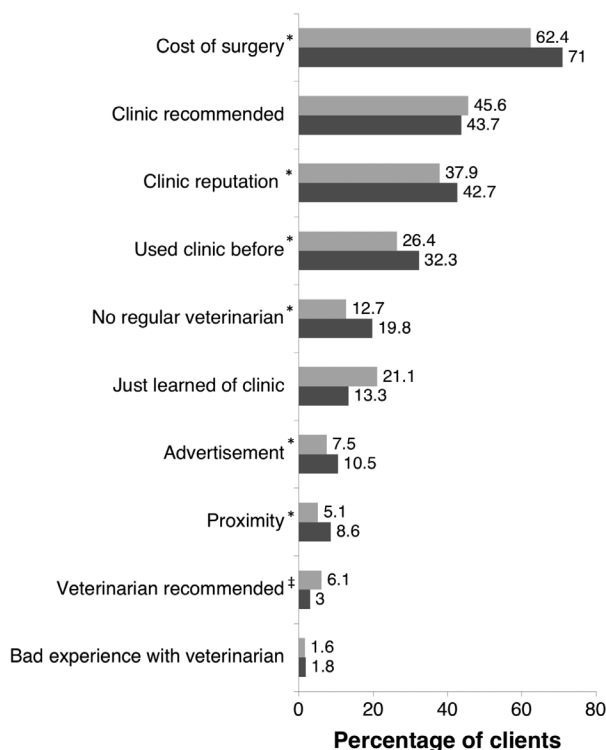


Figure 3—Reasons cited by 1,643 of 2,049 (80.2%) dog owners and 1,395 of 1,717 (81.2%) cat owners for their selection of a nonprofit spay-neuter clinic for surgical sterilization of their pets. See Figure 2 for key.

Discussion

In the present study, half of the cats and dogs admitted for surgical sterilization in nonprofit spay-neuter clinics belonged to shelters and rescue groups, were unowned community cats enrolled in TNR programs, or were transported from other communities by clinic personnel. The other half of the animals admitted for surgical sterilization were owned pets. In addition, pet owners who used nonprofit spay-neuter clinics in the present study had significantly lower median household incomes and were more likely to live in poverty, compared with the general population of the United States.²² These results suggested that the availability of nonprofit spay-neuter services primarily attracted clients seeking services for homeless animals and clients with low levels of financial resources, even when income screening was not included in the admission process.

Not surprisingly, results of the present study confirmed those of previous investigations,^{13,15} in that most pet owners seeking surgical sterilization of their pet cited cost as a reason for selection of a nonprofit spay-neuter clinic rather than a private veterinary practice. Cost of services has been an increasing consideration for pet owners seeking veterinary care. In a 2012 national AVMA survey of over 50,000 households,²³ 21.5% of cat owners and 29.3% of dog owners who had not sought veterinary care in the past year

reported that they could not afford it. Similarly, the percentage of American households that did not take a pet to a veterinarian in the past year increased 8% for dog-owning households and 24% for cat-owning households between 2006 and 2011.²³

Many clients of the nonprofit spay-neuter clinics in the present study had not taken their pet to a veterinarian previously. Among respondents who owned cats, only 23% previously had sought veterinary care for their cats, and only 19% previously had their cat vaccinated against rabies. In contrast, surveys representative of the general public indicate that 55%²³ to 64%²⁴ of cat owners had taken their cats to veterinarians within the past year; neither survey reports prevalence of previous rabies vaccination in cats.

Pet dogs brought to the nonprofit spay-neuter clinics in the present study were more likely than pet cats to have been to a veterinarian; however, as with participating cat owners, dog owners in the study reported here accessed veterinary care less frequently than did dog owners among the general public. Only approximately half of the dog owners participating in the present study had taken their dogs to veterinarians previously, whereas 81%²³ to 84%²⁴ of dog owners among the general public had taken their dogs to veterinarians within the past year. Despite the low-level use of veterinary care, 68% of the dogs ≥ 4 months of age in the present study had been vaccinated against rabies, a discrepancy that was attributed to client use of rabies vaccination clinics and compliance with local regulations that require dogs to be vaccinated against rabies.

As a group, pets brought to the participating nonprofit spay-neuter clinics during the study weeks were younger and more recently acquired than were pets owned by the general population, and many had been recently added to the household. Seventy-six percent of cats and 57% of dogs in the present study were < 1 year of age. In contrast, 12% of owned cats and 11% of owned dogs were < 1 year of age in the 2012 AVMA survey.²³ Despite the young age of the pets in the population of the present study, 28% of queens and 17% of bitches had already produced at least 1 litter. Although reproduction among cats was more likely than among dogs, dogs that reproduced were more likely to have had multiple litters. These findings indicated that the participating clinics served a patient population at higher risk for reproduction.

In the present study, clinic reputation was cited by 595 of the 1,393 (42.7%) cat-owner respondents and 623 of the 1,643 (37.9%) dog-owner respondents as a reason for selection of a spay-neuter clinic. In addition, 609 (43.7%) of the cat owners and 749 (45.6%) of the dog owners reported that the clinic had been recommended to them by a friend, neighbor, or family member. Recommendations were similarly important in the previously cited study,¹³ in which 15 of 61 (25%) of clients cited the spay-neuter clinic's reputation, and 21 (34%) stated that the clinic had been recommended. In that same study, 145 of 214

(68%) clients who used a private veterinary practice for surgical sterilization of their pet reported that the practice was where they always went for pet care.¹³ Because most of the participants in our survey had not taken their pet to a veterinarian previously, they had no such bond with a private practice.

Most of the nonprofit spay-neuter clinics in the present study did not require verification of financial need for clients to receive services; however, income and poverty alone are not the only factors that limit access to veterinary services. Location, cultural norms, personal values, previous experiences, or a complicated mix of all of these factors can influence whether clients seek veterinary care in a private clinic for their pets. Therefore, restriction of clientele of nonprofit spay-neuter clinics solely on the basis of income or poverty is likely to miss important population segments of pet owners who are not accessing veterinary care for their pets and may be contributing to pet overpopulation.

There are multiple reasons why spay-neuter clinics may choose not to qualify clients on the basis of income. The process may be perceived as invasive to clients and could complicate access to a service that is already limited in underserved communities. Some potential clients may not have documentation of their poverty, and requests for personal information can be frightening to vulnerable people such as those living in the country illegally. In addition, when affordability of a service is determined only on the basis of income, financial strains that individual families may experience are not addressed. Income screening of clients also adds an administrative burden to clinic operations that may increase operational costs and staffing requirements.

Although client income screening was uncommon in the present study, many of the participating spay-neuter clinics offered periodic or year-round additional subsidies or free surgeries for certain targeted populations of animals. For example, all clinics offered discounted or free surgeries for free-roaming community cats. Cats in this population often have no owners and are likely the single largest source of cat reproduction.²⁵ In addition, some participating clinics offered discounted prices for pit bull-type and Chihuahua-type dogs. These 2 types of dogs were targeted because they were among the least likely to have been neutered²⁶ and, along with Labrador Retrievers, represented the most common dogs in many animal shelters.²⁷

The present study was confined to stationary, nonprofit spay-neuter clinics serving a large volume of pet owners. The results may not have been representative of smaller or mobile spay-neuter clinics, or spay-neuter clinics with a for-profit structure. Similarly, only clients who brought their pets to the participating clinics were surveyed; thus, clients whose animals were transported by clinic personnel were not included. Respondents were also limited to those who spoke English and could read and write. These

limitations may have prevented data collection from clientele that should be included in future research. Response rates of clinics and pet owners were both approximately 65%, and it was unknown whether the clinics and clients that responded were representative of those that did not. In addition, because pet owners who brought multiple animals to the clinics for surgical sterilization were allowed to choose up to 2 pets for inclusion in the survey, there may have been some unknown bias in selection of animals for which surveys were completed.

To keep the survey short and facilitate its completion within the check-in period of the spay-neuter clinics, information collected regarding factors affecting decisions to use spay-neuter clinics was limited and did not include other factors, such as cultural determinants or proximity to veterinary clinics. More research is needed to extend understanding of other factors that may influence pet owners' selection of veterinary service providers.

In the present study, dog and cat owners who brought their pets to nonprofit spay-neuter clinics for surgical sterilization had lower household income levels and higher poverty rates, compared with those reported for the general population of the United States. Results indicated that the cost of surgery was a major consideration for pet owners when choosing to use a subsidized clinic in lieu of a private veterinary practice. Findings also suggested that clients of spay-neuter clinics were less likely to have sought any previous veterinary care for their pet, including rabies vaccinations, when compared with pet owners in the general population.

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Footnotes

- a. Aimee St. Arnaud, ASPCA Spay/Neuter Alliance, Asheville, NC: Personal communication, 2018.

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Appendix

Regional divisions used by the United States Census Bureau.

Region 1: Northeast	Region 2: Midwest	Region 3: South	Region 4: West
Connecticut	Illinois	Alabama	Alaska
Maine	Indiana	Arkansas	Arizona
Massachusetts	Iowa	Delaware	California
New Hampshire	Kansas	District of Columbia	Colorado
New Jersey	Michigan	Florida	Hawaii
New York	Minnesota	Georgia	Idaho
Pennsylvania	Missouri	Kentucky	Montana
Rhode Island	Nebraska	Louisiana	Nevada
Vermont	North Dakota	Maryland	New Mexico
	Ohio	Mississippi	Oregon
	South Dakota	North Carolina	Utah
	Wisconsin	Oklahoma	Washington
	South Carolina	Wyoming	
	Tennessee		
	Texas		
	Virginia		
	West Virginia		