

## Exploring the Bond

# Characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program in Massachusetts and of owners who had cats sterilized through this program

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### OBJECTIVE

To determine characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program in Massachusetts and of owners who had their cats sterilized through this program.

### DESIGN

Cross-sectional anonymous survey and telephone interviews.

### SAMPLE

1,188 (anonymous surveys) and 99 (telephone interviews) cat owners.

### PROCEDURES

Owners who had a cat sterilized at clinics held between January 2006 and December 2008 were invited to complete anonymous surveys. Semistructured telephone interviews were conducted with owners who had a cat sterilized during clinics held in 2009.

### RESULTS

Most cats had never been seen by a veterinarian previously; "too expensive" was the most common reason for this. Total annual household income was significantly associated with the number of times the cat had been examined by a veterinarian and reason why the cat had not been spayed or neutered previously. Most cats were acquired through informal means and without actively being sought, and there was often a time lag between acquisition and sterilization. Undesirable behavior and avoiding pregnancy were primary motivations for neutering and spaying, respectively. Nearly half of owners who indicated they would have had their cat sterilized through a private veterinarian if the clinic had not been available stated that the surgery would have been delayed because of cost.

### CONCLUSIONS AND CLINICAL RELEVANCE

Findings suggested that spay-neuter decisions were related to owner income and procedure cost, that elimination of the reduced-cost spay-neuter program would likely have exacerbated the spay-delay problem, and that gradations of financial need should be considered when evaluating relationships between income and spay-neuter decisions. (*J Am Vet Med Assoc* 2016;249:490–498)

Subsidized and reduced-cost spay-neuter programs to sterilize owned cats and dogs are central components of efforts to reduce the numbers of homeless and euthanized companion animals in the United States. However, data on the effect of these programs are relatively limited, and only in the past 15 years has their impact undergone quantitative analysis.<sup>1–5</sup> Methods for evaluating the impact of spay-neuter programs have included counting the number of surgeries performed,<sup>1,2,4,5</sup> estimating the percentage of sterilized pets in the community,<sup>3</sup> evaluating changes in shelter intake numbers<sup>2,4,5</sup> or numbers of animal control service and complaint calls,<sup>4</sup> calculating percentages of impounded animals that are euthanized,<sup>4,5</sup> and determining the cost

of providing such services.<sup>1</sup> As several authors have acknowledged, these quantitative analyses often do not take into account the effects of confounding variables, such as marketing to encourage owners to have their pets spayed and neutered, demographic changes, substitution of sources, and contemporaneous legislation.<sup>2,4–6</sup> Quantitative analyses may also fail to confirm the extent to which cost impacts owners' decisions to have their pets sterilized.

As more data have emerged on the impacts of reduced-cost spay-neuter programs, researchers have also increasingly focused on the role of human behavior in pet sterilization and, by extension, companion animal homelessness and shelter euthanasia. Studies have focused on why owners fail to have their pets

spayed or neutered or why they surrender them to a shelter.<sup>6-16</sup> Less attention has been given to the characteristics of individuals who actually do have their pets spayed or neutered,<sup>7,16,17</sup> particularly those who do so through a reduced-cost spay-neuter program. Thus, information is lacking on why owners choose to sterilize their pets through a reduced-cost spay-neuter program, what determines the timing of when owners choose to sterilize their pets, and what would happen if a reduced-cost spay-neuter program were not available. In addition, there is relatively little information available on the characteristics of dogs and cats sterilized through reduced-cost spay-neuter programs, such as how these animals were acquired by their owners, what were their veterinary histories prior to surgery, and how long they had been in their present home before being sterilized.

The present study was designed to elicit information on the characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program and the owners who used such a program to have their cats sterilized.

## Materials and Methods

The study involved owners and cats seen at monthly Quick Fix Clinics operated by the not-for-profit Second Chance Fund for Animal Welfare (now part of the Merrimack River Feline Rescue Society) and hosted at veterinary practices in multiple cities and towns throughout Worcester County, Mass. The Quick Fix Clinic represented 1 of 2 primary programs offering reduced-cost sterilization, vaccination, and FIV and FeLV testing in Worcester County and 1 of several such programs in Massachusetts at the time of the study. Clinics were need based and targeted economically disadvantaged pet owners. However, there were no residence-based requirements. For these clinics, prices charged for spaying (\$60), neutering (\$45), and vaccinating (\$15 each for rabies vaccination and feline rhinotracheitis virus, calicivirus, and panleukopenia virus vaccination) cats were substantially lower than prices charged by private practices and near the median prices charged by all reduced-cost spay-neuter programs in Massachusetts.

The study consisted of 2 parts. The first part was a cross-sectional survey of owners who had a cat sterilized at a Quick Fix Clinic held between January 1, 2006, and December 31, 2008. Surveys were completed on-site and consisted mainly of multiple-choice questions that elicited information about the owner and cat. Owners were asked to indicate their hometown and annual household income, the age of their cat, how they had heard about the clinic, the number of times the cat had been examined by a veterinarian prior to the clinic, and why the cat had not been spayed or neutered prior to the clinic.

The second part of the study consisted of semi-structured telephone interviews with owners who had a cat sterilized during Quick Fix Clinics held at 6 veterinary offices in April, May, and June 2009. All

interviews were conducted within 4 months after the clinic. Questions focused on 3 broad topics: characteristics of cats sterilized during the clinics (sex, age at acquisition, age at sterilization, veterinary care prior to the clinic, indoor-outdoor status, source, and reproductive history [female cats only]); the owner's reasons for having the cat sterilized and, specifically, for doing so at this clinic; and the owner's alternatives if sterilization through the Quick Fix Clinic had not been an option. Owners from each clinic were selected for participation with the objective of ensuring a representative sample of clinic locations and days of the week. Each owner selected to participate was contacted up to 3 times on weekdays and weekends and at different times of the day.

## Statistical analysis

For both parts of the study, survey responses were tabulated and descriptive statistics were calculated. For the first part of the study, a  $\chi^2$  test was used to determine whether annual total household income (< \$25,000, \$25,000 to \$50,000, > \$50,000, or other or no answer) was associated with number of previous veterinary visits (never, once, 2 or 3 times, > 3 times, or other or no answer) or with why the cat had not been sterilized prior to the clinic (inside-only cat, new cat, too young, too busy, too expensive, or other or no answer). Analyses were performed with standard software<sup>a</sup>; values of  $P < 0.05$  were considered significant.

Because time spans for the 2 parts of the study did not overlap, no cat was represented more than once in the study. However, owners who had multiple cats sterilized at a Quick Fix Clinic may have been represented more than once.

## Results

### Part I

A total of 1,807 owners had a cat sterilized at clinics held between January 1, 2006, and December 31, 2008. Of these, 1,188 (65.7%) completed the survey.

Of the 1,188 survey respondents, 905 (76.2%) lived in Worcester County, with respondents listing 100 Massachusetts towns and cities as their hometowns. There were 689 (58.0%) respondents with total annual household income < \$25,000, 382 (32.2%) with total annual household income between \$25,000 and \$50,000, and 85 (7.2%) with total annual household income > \$50,000. The remaining 32 (2.7%) respondents did not answer the question or answered "other." There were insufficient explanations associated with "other" responses to draw conclusions about what was indicated by this answer.

When asked to indicate the number of times the cat had been examined by a veterinarian prior to the clinic, 728 of 1,188 (61.3%) owners reported that the cat had never been seen previously, 239 (20.1%) reported that the cat had been seen once previously, 148 (12.5%) reported that the cat had been seen 2 or

3 times previously, and 24 (2.0%) reported that the cat had been seen > 3 times previously. Twenty-nine (2.4%) respondents answered “other,” and 20 (1.7%) did not answer the question. Twenty-six of the 29 owners who responded “other” indicated that they chose this answer because they did not know about previous veterinary care, noting that they had adopted or rescued the cat. In many instances, it was a cat they found outdoors and identified as a “stray.”

When asked to choose from a list of reasons why the cat had not been spayed or neutered prior to the clinic, 526 of the 1,188 (44.3%) respondents selected “too expensive,” 299 (25.2%) selected “too young,” 211 (17.8%) selected “new cat,” 80 (6.7%) selected “indoors only,” and 13 (1.1%) selected “too busy.” Forty-eight (4.0%) respondents selected “other,” and 11 (1.0%) did not answer the question. Explanations provided by owners who responded “other” varied widely (eg, was searching to find a lower-cost option, sterilization was delayed because the cat was pregnant or had a litter of kittens, the cat had been acquired as a stray or abandoned animal, or the cat had come from a previous owner who had not had the cat sterilized).

There was a significant ( $P < 0.001$ ) association between total annual household income and number of times the cat had been examined by a veterinarian prior to the clinic (**Figure 1**). The percentage of owners whose cats had been seen 1 to 3 times previously increased as total annual household income increased, with 25.1% of owners with total annual household income < \$25,000, 41.1% of owners with total annual household income between \$25,000 and \$50,000, and 50.6% of owners with total annual household income > \$50,000 reporting that the cat had been seen by a veterinarian this number of times. Conversely, the percentage of owners whose cat had never been seen previously decreased as total annual household income increased, with 68.5% of owners with total annual household income < \$25,000, 53.1% of owners with total annual household income between \$25,000 and \$50,000, and 45.9% of owners with total annual household income > \$50,000 reporting that the cat had never been seen previously.

There was also a significant ( $P < 0.001$ ) association between total annual household income and reason why the cat had not been spayed or neutered prior to the clinic (**Figure 2**). “Too expensive” was the most frequently given response for owners with total annual household income < \$25,000 (48.3% of owners) and for owners with total annual household income between \$25,000 and \$50,000 (40.8% of owners). For owners with total annual household income > \$50,000, “too expensive” was

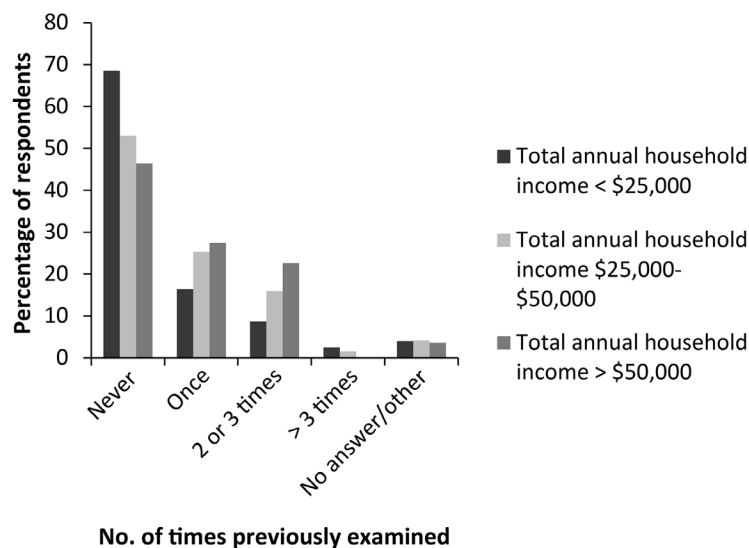
the second most frequently given response (28.2% of owners), and “too young” (36.5% of owners) was the most frequently given response.

## Part 2

Two hundred fourteen owners who brought cats to be sterilized at clinics held in April, May, or June 2009 were contacted, and 99 interviews were completed (46.3% response rate). These 99 owners had had 116 cats (61 female and 55 male) sterilized. Single clinics were sometimes skewed toward 1 sex; however, no location or month consistently sterilized higher numbers of males or females.

**Cat characteristics**—Most owners (71/99 [71.7%]) had obtained their cat through rehoming, rescued their cat as a stray, or adopted their cat as a kitten from a litter produced by another owner’s cat. Twenty-nine of the 99 (29.3%) owners had acquired their cat from a relative, friend, neighbor, or acquaintance. Clients who had obtained their cat through rehoming reported various reasons for why the cat was placed, including behavioral challenges, the previous owner having too many animals or moving, or the previous owner threatening to abandon the cat.

In total, 32 of the 116 (27.6%) cats had been acquired through rehoming, 26 (22.4%) had been acquired as strays, and 20 (17.2%) had been obtained as a kitten from a litter produced by another owner’s cat. Twelve (10.3%) cats were offspring of another cat in the owner’s household. Nine (7.8%) cats had been purchased, with costs ranging from \$25 to \$300. Sources of these purchased cats included a breeder, foster home, Craigslist, a newspaper advertisement, a flea market, and, in 1



**Figure 1**—Association between total annual household income and number of times cats had been examined by a veterinarian prior to being brought to a reduced-cost spay-neuter clinic for sterilization; data represent responses for 1,156 owners who completed an anonymous survey and reported an annual household income < \$25,000, between \$25,000 and \$50,000, or > \$50,000.

instance, an abusive home, with the former owners threatening to abandon the cat if the present owner did not purchase the cat for \$100. The remaining 17 (16.2%) cats were acquired through a variety of means that did not fit into the aforementioned categories, including having received a kitten as a gift, responding to an advertisement of free kittens, inheriting a cat from a roommate, and keeping a kitten originally intended for a friend or family member.

Although owners did not always know the exact age of the cat when it had been acquired, most cats had been acquired as juveniles, with 76 of 99 (76.8%) owners indicating that they obtained the cat as a kitten or adolescent (ie, < 6 months old). Twenty-four (24.2%) owners reported obtaining the cat before it was 8 weeks old, and 8 (8.1%) owners specifically reported that the cat was between 2 and 6 months of age. Twelve (12.1%) owners reported that they obtained the cat when it was ≥ 6 months old, and 11 (11.1%) owners reported that they were unsure how old the cat was when they had obtained it, although they indicated it was no longer a kitten.

Of the 76 owners who had obtained their cat when it was < 6 months old, only 11 (14.5%) had the cat spayed or neutered before it turned 6 months of age. Thirty-nine of the 76 (51.3%) had the cat sterilized when it was between 6 and 12 months old, and the remaining 26 (34.2%) had the cat sterilized

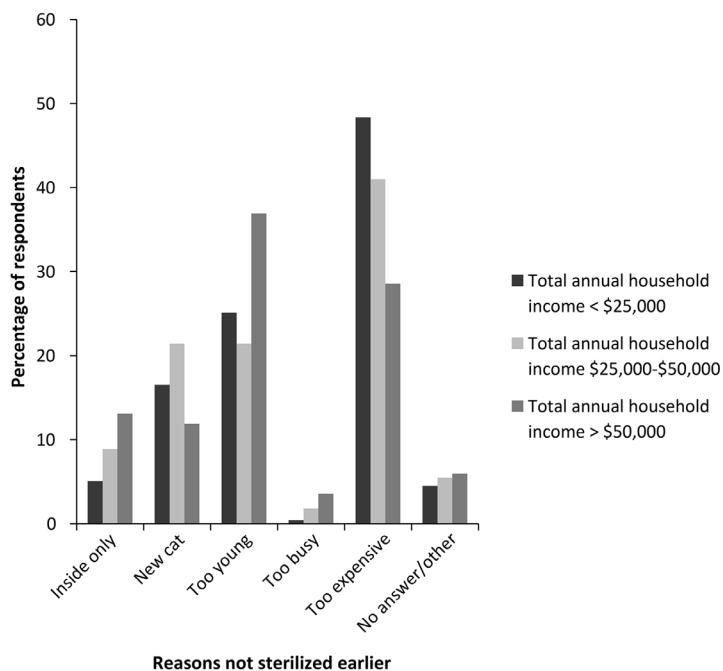
when it was > 1 year old. Of the latter 26 owners, 11 brought 1 or more male cats to the clinic for neutering, 12 brought 1 or more female cats to the clinic for spaying, and 3 brought 1 cat of each sex to the clinic for sterilization.

For the 23 owners who had obtained their cat when it was ≥ 6 months old or who did not know how old the cat was when they acquired it (but indicated that it was not a kitten), there was often a time lag between acquisition and sterilization, with only 3 of the 23 having their cat sterilized within 3 months after adoption, rescue, or purchase. For the remaining owners, the lapse between acquisition and sterilization ranged from several months to several years.

Of the 61 female cats represented in the study sample, 49 (80.3%) had not reproduced, and 12 (19.7%) had previously given birth. Ten of the 12 cats that had reproduced had delivered 1 to 3 litters. One cat, estimated by the owner to be 6 or 7 years old, reportedly had produced many litters, and the fact that all kittens in the most recent litter had been stillborn prompted the owner to pursue spaying the cat. Another cat was spayed to terminate an eighth litter.

Sixty-eight of the 99 (68.7%) owners reported that the clinic was the first time they had brought their cat to a veterinarian. An additional 19 (19.2%) owners reported that they had previously brought their cat to a private veterinary practice prior to the clinic, 6 (6.1%) reported that they had previously brought their cat to a vaccination clinic, and 2 (2.0%) reported that they had brought their cat both to a private veterinary practice and to a vaccination clinic. The remaining 4 (4.0%) owners indicated that their cat had received veterinary care but could not provide details.

Fifty-three of the 99 (53.5%) owners reported that their cats lived indoors exclusively, and 41 (41.4%) reported that their cats were indoor-outdoor cats. The remaining 5 (5.1%) owners reported some variant. For example, 1 owner reported that her male cat had previously spent time outside, but she hoped for the cat to live exclusively indoors if castration stopped what she described as the cat's spraying. Another owner reported that her female cat lived exclusively inside until the cat was spayed, after which the cat was allowed outdoors. An owner of 2 kittens and an adult female cat stated that she had allowed the kittens outdoors, but not the adult cat. The numbers of female cats that were indoors exclusively versus indoor-outdoor were approximately equal (27 and 29, respectively); 29 male cats were indoors exclusively, whereas 20 were indoor-outdoor.



**Figure 2**—Association between total annual household income and reason why the cat had not been spayed or neutered prior to being brought to a reduced-cost spay-neuter clinic for sterilization; data represent responses for 1,156 owners who completed an anonymous survey and reported an annual household income < \$25,000, between \$25,000 and \$50,000, or > \$50,000.

**Owner reasons for having the cat sterilized and for using the clinic**—When asked to indicate their reasons for having their cats sterilized, owners overwhelmingly provided reasons related to preventing reproduction or addressing behavioral problems. Twenty-four of 55 (43.6%) owners with a female cat specified wanting to prevent reproduction, with several also indicating that they wanted to let their cat outdoors without fearing pregnancy. Preventing reproduction was a consideration for 15 of 50 (30.0%) owners who brought a male cat to the clinic, with some specifically referencing sexually intact female cats in their home or neighborhood. In 2 instances, owners' answers suggested a broader scope of consideration. One mentioned that she lived in an area with "lots of feral cats that are totally neglected and starve or get hit by cars"; the other mentioned that she "works at a cat shelter on weekends, and there are plenty of cats out there."

Nineteen of the 55 (34.5%) owners who brought a female cat to the clinic reported that behaviors associated with estrus, including sneaking outdoors, intercat aggression, inappropriate urination (often described as "spraying"), whining, hyperactivity, and meowing, contributed to the decision to have the cat spayed. Twenty-five of the 50 (50.0%) owners who brought a male cat to the clinic reported that behavior factored into their decision to have the cat neutered. Concerns related to inappropriate urination were mentioned most often, but numerous other undesirable behaviors, including straying far from home, interfering with the owner's sleep, crying to go outdoors, intercat aggression, "humping" inanimate objects, and biting, were also reported to be concerns.

With few exceptions, owners of female cats who mentioned behavior as a factor in their decision to have their cat spayed indicated that they were responding to an issue that existed rather than trying to avoid a future problem, with only 2 of 55 (3.6%) owners of female cats stating that they had the cat spayed to prevent future unwanted behavior. Ten of the 50 (20.0%) owners of male cats had their cat neutered to prevent future problems with inappropriate urination. In some cases, these individuals had owned other male cats that exhibited this behavior; in others, the individual had heard stories and did not want to risk it happening.

Nine of the 55 (16.4%) owners who brought a female cat to the clinic alluded to the benefits of spaying for the cat's own health or welfare, albeit sometimes hesitantly or in the form of a question. Two owners, both of whose cats had reproduced multiple times, discussed health implications. Still others perceived their cat to be in distress during estrus and wanted to ameliorate this. In contrast, none of the owners who brought a male cat to the clinic discussed neutering in terms of its benefits to the animal's physical or emotional well-being. Those who discussed behavior problems as a reason for neutering most frequently mentioned inappropriate urination, trying to get outside, and aggression, but they did not connect these actions to the welfare of the cat itself.

Owners of 3 female cats indicated that they reluctantly had the cats spayed. One owner of purebred cats stated that her cats were "great mothers," but that after this cat escaped from the home and twice had unplanned litters, the owner chose to avoid future unplanned pregnancies. Another owner welcomed the idea of kittens but had had another cat develop pyometra and require emergency ovariohysterectomy, and she wanted to avoid this possibility with this cat.

**Owner alternatives if the clinic were not available**—When asked what they would have done if this reduced-cost spay-neuter clinic had not been available, 44 of 99 (44.4%) owners responded that they likely would have used a private veterinarian. However, only a small number of these owners expressed confidence that they would have promptly sought veterinary care—often in response to inappropriate urination. Clients more often qualified the assertion that they would have used a private practice, with 20 of the 44 (45.5%) indicating that he or she would have delayed surgery while saving money to pay for the procedure. Owners who had researched the cost of surgery at a private veterinary practice in the area reported quotes ranging from \$150 to \$750. As 1 respondent described it, she "would have eventually found a way, but it's one of those cases where it can continue to get pushed back and back and back." Others were more specific in the anticipated delays and compromises. One client, who had received a quote of \$270 from his veterinarian, said that he would have needed 6 to 8 months to save this amount. Another said that she would have been unable to have the surgery performed before her cat's first estrus. An owner of multiple cats said that she would have delayed the surgery to save money and would likely not have sterilized her 2-year-old female cat because it did not go outside.

Eighteen of the 99 (18.2%) owners were noncommittal when asked what they would have done if a reduced-cost spay-neuter clinic had not been available, saying that they would have researched veterinarians willing to lower their price or agree to a payment plan or that they would have researched alternative subsidized clinics. Six of these 18 owners had previously brought their cat to a veterinarian, demonstrating that the relationship was not strong enough to maintain their business for sterilization surgery when a lower-cost option was available.

Twenty-four of the 99 (24.2%) owners, when asked what they would have done if the Quick Fix Clinic had not been available, responded that they would not have used a private veterinarian or looked for an alternative reduced-cost clinic. Seventeen of these individuals indicated they would have kept their cats without sterilizing them and instead lived with the inappropriate elimination, kept the cat exclusively indoors or outdoors, or sequestered the cat from other animals in the home. The remaining 7 reported that without the clinic, they would not have kept the cat, with some indicating they would have surrendered the cat to a

shelter or humane society or sought a new home and others simply stating that they would have had to get rid of the cat. The remaining 13 (13.1%) owners, when asked what they would have done if a reduced-cost spay-neuter clinic had not been available, stated they did not know what they would have done.

## Discussion

Results of the present study shed light on the impact of a reduced-cost spay-neuter clinic for cats, owners, and their community. Responses to the anonymous on-site surveys indicated that most (728/1,188 [61.3%]) cats sterilized through the Quick Fix clinics had never been seen by a veterinarian previously and that “too expensive” was the most common (526/1,188 [44.3%]) reason the cat had not been spayed or neutered previously. Importantly, however, there were significant associations between total annual household income and number of times the cat had been examined by a veterinarian previously and between total annual household income and reason why the cat had not been spayed or neutered prior to the clinic. This suggests that even within a cohort of cat owners with demonstrable financial need, the degree of financial limitation had an impact on owner behavior and decision making. In telephone interviews, we found that there was often a time lag between acquisition and sterilization of the cats. The most common reasons owners provided for having their cats sterilized related to preventing reproduction or addressing behavioral problems, but reasons differed between male and female cats. Finally, while many owners indicated they would have had their cat sterilized through a private veterinarian if a reduced-cost spay-neuter clinic had not been available, nearly half of these owners stated that the surgery would have been delayed because of cost.

In our telephone interviews, we found that most cats (78/116 [67.2%]) had been acquired from informal sources (ie, rehomed, acquired as a stray, or obtained as a kitten from a litter produced by another owner's cat). None of the owners reported having adopted a cat from an animal shelter or rescue organization, but this was not surprising given that cats sourced from formal adoption programs in Massachusetts are most often sterilized prior to adoption. Our findings were consistent with results of other surveys performed in Massachusetts, other states, and across the nation, which also have noted that relatively high proportions of cats are acquired through informal sources rather than formal adoption programs.<sup>4,13,15,16,18</sup>

More noteworthy is the fact that most owners who were interviewed did not actively seek out the cats they brought to the Quick Fix Clinic, and acquisition of these cats was typically unplanned, the product of an impulse purchase or act of good will or compassion. For example, of the 29 owners who

reported acquiring their cats through rehoming, only 1 had actively sought the animal. Lack of planning for a cat could impact budgeting for veterinary care, and the fact that many owners were not looking for a cat could potentially impact the relative value placed on the animal. As 1 respondent noted, she did not want to spend money on a stray cat that she fed but that did not belong to her.

In the past 2 decades, several studies<sup>7,9,10,12-16</sup> have investigated reasons that owners delay or avoid sterilization by interviewing individuals who have not had their cats sterilized. Studies of individuals who actually have made the decision and financial investment to have their pet spayed or neutered are less common, and studies surveying decision-making among cat owners specifically are more limited still. The most comprehensive study findings related to cats specifically come from Chu et al,<sup>16</sup> who surveyed cat owners across the United States and found that “to avoid unwanted litters” was the predominant reason for sterilizing, reported by 68.3% of respondents. Health of the animal (“it's healthier for my cat”) and prevention or cessation of inappropriate urination (“to eliminate spraying”) were each reported by approximately one-quarter of respondents.

Clients of the Quick Fix Clinic similarly cited preventing unwanted litters and unwanted behaviors as key reasons for sterilizing their cat, although there were notable differences according to the cat's sex. Owners of female cats prioritized preventing reproduction, with 24 of 55 (43.6%) owners citing this as the reason for having their cats sterilized, whereas only 15 of 50 (30.0%) owners who brought male cats to the clinic cited this as the reason for having their cats neutered. By contrast, 25 of 50 (50.0%) owners who brought male cats to the clinic, but only 19 of 55 (34.5%) owners who brought female cats to the clinic, reported that behavior factored into their decision to have the cat sterilized.

Owner responses regarding reasons for sterilizing their cats and timing of sterilization in the present study aligned with the oft-cited beliefs about so-called “spay delay.” In our telephone interviews, it appeared that many cats could have been sterilized at an earlier date, with delays in spaying contributing to the number of cats that became pregnant prior to being brought to the clinic. Overall, 12 of 61 (19.7%) female cats had given birth at least once before being brought to the clinic, and an additional cat was reported to be pregnant with its first litter when spayed (the number may have been greater, as owners were not asked about pregnant spays). In addition, 12 of 116 (10.3%) cats were offspring of another cat in the owner's household, the consequence of an earlier failure to spay. Litters prior to sterilization are noted in other studies at both the state and national levels.<sup>4,7,10,13,16,18</sup>

A delay in sterilization likely also played a role in the development of undesirable behaviors reported by 25 of 50 (50%) owners of male cats as a primary

reason for having their cats neutered. For both male and female cats whose owners reported behavioral problems as a primary reason for having their cats sterilized, the concern most often was addressing an existing problem rather than preventing problems from developing in the future. This may help explain why individuals who acquired kittens frequently waited to have them sterilized until they were  $\geq 6$  months old, in that objectionable behaviors would have been less pronounced or nonexistent before this age. It is also possible that emergence of undesirable behaviors could have been a motivating factor for owners who responded in the anonymous survey that they had delayed surgery because the cat was "too young." Conceivably, these owners were implying that the cat had not yet developed nuisance behaviors, in addition to—or even instead of—expressing a belief that surgery was not possible at an earlier age. The way in which cats were obtained, including the absence of contact with an animal shelter or rescue organization, limits the possibilities for education regarding the age at which surgery can be performed, the age at which cats can become sexually mature, and the behaviors that owners might expect from sexually intact male and female cats.

In the present study, owner responses regarding the source of their cats and when and why they had them sterilized offered insight into owner motivations to spay or neuter their pets. With both the anonymous surveys and telephone interviews, most owners (728/1,188 [61.3%] and 68/99 [68.7%], respectively) reported that the clinic was the first time they had brought their cat to a veterinarian. Interviews also revealed the high frequency of a time lapse between acquisition of the cat and sterilization. These findings raise the question of whether the lack of previous veterinary care was due to the cost of these services or other factors and, by extension, whether reduced-cost options substitute for a private veterinary practice for preventive care and sterilization.

Research to date has been inconclusive on the importance of cost relative to other factors on cat owners' veterinary care decisions. Specific to sterilization, a national study<sup>13</sup> found that among households in which a cat had given birth in the past year, cost was the most frequent reason given for failing to spay the cat prior to pregnancy. Other explanations (not knowing that the cat was in heat, considering the procedure to be inconvenient, objecting to sterilizing animals, thinking the cat was too young, and "other" reasons) were also provided in relatively large numbers. However, the study did not discuss whether reasons for not sterilizing were related to annual income. A 2006 study<sup>18</sup> commissioned by the Massachusetts Society for the Prevention of Cruelty to Animals found that the cost of surgery was the second most important factor in whether an owner sterilized his or her cat (31%), behind thinking the cat was too young (38%). In contrast, except for low-income owners, cost was not a factor in deciding whether to

sterilize one's dog. However, the study did not define the criteria used for defining owners as low-income. Another national study<sup>15</sup> combined results for cat and dog owners, thus potentially disregarding owners' reported willingness to pay more to sterilize their dog (\$144) than their cat (\$109).

In a 1992 study of Massachusetts dog and cat owners, Manning and Rowan<sup>7</sup> obtained results substantially different from those reported for other studies. In that study,  $< 6\%$  of respondents cited cost as a factor in the decision not to spay or neuter, and sterilization rates in a so-called blue collar community matched those in higher-income study areas. However, the authors noted that spay-neuter vouchers were available and widely used during the study period, which could have concealed financial barriers as a limiting factor in the decision to sterilize.

In the present study, among those clients who completed anonymous surveys, the largest proportion (526/1,188 [44.3%]) stated that they had delayed surgery because it was "too expensive." Although 25.2% of respondents (299/1,188) indicated "too young" and 17.8% (211/1,188) indicated "new cat" as the reason why the cat had not been spayed or neutered prior to the clinic, the fact that the most commonly mentioned limiting factor was expense deserves consideration. Respondents to the telephone survey referenced fixed incomes, recent job layoffs, and struggles to care for large numbers of pets as compromising their ability to sterilize their cat. When asked what they would have done if a reduced-cost spay-neuter clinic had not been available, they reported a variety of strategies, such as using a private veterinarian, researching alternative reduced-cost options at either private veterinary practices or other spay-neuter clinics, not having the surgery performed at all, sterilizing only some animals, seeking to rehome the cat, or surrendering the cat to a shelter or humane society.

We found that even when the Quick Fix Clinic was a likely substitute for having the surgery done at a private veterinary practice, the substitution tended not to be straightforward. Twenty of the 44 (45.5%) clients who stated they would have used a private veterinary practice if a reduced-cost clinic had not been available also stated that surgery would have been delayed because of cost and the time it would have taken to collect the money. This indicated that assessments of such substitution of sources need to account for the timeframe in which sterilization would take place at a private veterinary practice versus a subsidized clinic.

Our findings substantiated previous suggestions that human behaviors regarding veterinary care, specifically feline sterilization, are related to procedure cost and owner income and speak to the need to account for income when querying cat owners about why they did or did not have their cats sterilized. More specifically, our data speak to the value of considering degree of financial limitations when evaluating the behavior and decision making of cat owners

and the importance of cost as a reason for not having a cat sterilized. All clients of the Quick Fix Clinic demonstrated financial need, yet owners in the various annual household income categories (< \$25,000, \$25,000 to \$50,000, and > \$50,000) demonstrated different behaviors. For the 2 lower household income categories, expense was the most commonly given reason for why the cat had not been spayed or neutered prior to the clinic, but was only the second most common reason for the highest income category.

Results of the anonymous surveys in the present study also revealed a significant association between total annual household income and number of times the cat had been examined by a veterinarian prior to the clinic, with 68.5% of owners in the lowest income category indicating the cat had never been examined by a veterinarian prior to the clinic, compared with 45.9% of owners in the highest income category. Note that results for owners with total annual household income > \$50,000 should not be viewed as a reason to lower the maximum income eligibility for subsidized veterinary care, particularly given that a high percentage of respondents in the highest income category cited expense as the factor precluding prior sterilization. Instead, it speaks to the need to consider more subtle trends related to income within the broader population determined to have financial need.

Although the present study considered a single cat-specific reduced-cost spay-neuter program in 1 county (albeit available to anyone meeting the clinic's financial requirements, regardless of their place of residence), we believe that these findings likely reflect the experiences of subsidized spay-neuter programs, economically struggling cat owners, and cat populations across broader geographic regions. This and other studies, including those conducted on a national scale, did not contradict one another in terms of findings regarding owner motivations for and decisions about sterilization and suggested that certain behaviors associated with spay delay exist across economic strata. Instead, the present study provided new insights and nuances, including into the ways owner behavior and use of veterinary care can differ on the basis of degree of financial need. We do not believe that these findings regarding cats and cat owners can be generalized to dogs or dog owners, as the willingness to pay for sterilization,<sup>15</sup> common means of animal acquisition (especially, comparative percentages of each species acquired as strays vs purchased from breeders), ease of access to and cost of kittens and puppies, and physical and behavioral manifestations in sexually intact animals are known to differ between the 2 species.

In considering the generalizability of these findings, however, it is worth considering that feline spay-neuter rates in Massachusetts have been found to be high (94% in 2006).<sup>18</sup> The state's comparatively high spay-neuter rates and the relatively high median household income may influence the numbers and

demographics of clients who are potential candidates for reduced-cost spay-neuter programs. Specifically, the volume of reduced-cost services and associated outreach required to achieve the objective of reducing the population of unwanted or homeless kittens and cats may be lower in Massachusetts than in other areas of the country. It is also notable that fees charged by the Quick Fix Clinic at the time of the study (\$60 for a spay, \$45 for a neuter, and \$15 each for rabies vaccination and feline rhinotracheitis virus, calicivirus, and panleukopenia virus vaccination) were lower than prices charged by private practices but were still likely high enough to preclude use by the community's most economically disadvantaged pet owners. We anticipate that decisions and motivations of cat owners who used the Quick Fix Clinic may have differed from those of persons who choose more heavily subsidized or even free feline spay-neuter resources.

The present study moved beyond traditional quantitative analyses of the impact of reduced-cost spay-neuter programs and, in doing so, offered a more nuanced picture of the Quick Fix Clinic as well as the decisions, knowledge, and resources of those who used it. Our findings strongly suggested that spay-neuter decisions are related to owner income and procedure cost, which was consistent with findings of previous studies. Study findings also suggested that elimination of the Quick Fix Clinic would likely have exacerbated the problem of spay delay and indicated that there may be value in looking at gradations of financial need when evaluating relationships between income and spay-neuter decisions. In addition, our data revealed several factors that likely influenced spay-neuter decisions without being directly tied to the owner's financial well-being. These include beliefs about the appropriate age for sterilization, emergence of undesirable pubertal behaviors, and acquisition of cats that had not been actively sought but instead were taken in through an act of compassion. These nonfinancial variables also warrant attention when considering ways to encourage sterilization of pet cats.

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## Footnotes

- a. SPSS Statistics for Windows, version 19.0, IBM Corp, Armonk, NY.

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