

Aguascalientes Municipality, Mexico: Dog and cat population survey

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Photo Credit – Dr. Amit Chaudhari

Report prepared by Indira Chakravarti, Anju Murali, George Brill, and Dr. Amit Chaudhari

Data Analysis – Dr. Amit Chaudhari

Monitoring, Evaluation, and Impact Assessment - MEIA

Contents

Acknowledgements	3
Summary	3
Background.....	4
Domestic Dog Populations in Mexico.....	4
Animal Welfare Concerns and Zoonotic Disease Risk.....	4
Animal Control Center of Aguascalientes	5
Interventions Used for Dog/Cat Population Management.....	5
Animal Welfare Laws.....	6
Survey Site: Aguascalientes Municipality, Mexico	7
Survey Goals and Objectives.....	7
Survey Design.....	8
Pre-survey Training.....	8
Household Survey Sampling and Protocol.....	8
Street Count Methodology	10
Metrics.....	12
Results	13
Participant Demographics and Household Characteristics.....	13
Owned Dog Demography.....	14
Dog and Cat Ownership	16
Veterinary Care, Sterilization and Vaccination Practices.....	20
Confinement Practices of Dogs and Cats.....	23
Dog Bites.....	25
Pet Surrender.....	27
Discussion	28
Summary and Recommendations	30
Improving spay/neuter accessibility and services	30
Humane Education.....	30
Affordable veterinary care.....	31
Collaboration, Training and Capacity Building.....	31
Volunteer, Foster and Adoption Network.....	32
References	33



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Summary

In August 2022, Humane Society International (HSI) was invited by local stakeholders in Aguascalientes, Mexico to assess the dog and cat population, and conduct surveys to better understand knowledge, attitudes and practices associated with pet ownership in the city. The findings of this survey can be used to guide the implementation of interventions to improve companion animal welfare in the city.

For this survey, Aguascalientes was divided into four socio-economic zones (high-, medium- and low income, and rural zones). A total of 1238 people were interviewed at their homes across all four zones, with a participation rate of 79%. The majority of the participants were male (68%), and all age groups were represented. Approximately 60% of households owned dogs and 15% owned cats, with some owning both. Based on available household data obtained from the 2020 human municipal population census, we estimated a total of 309,462 dogs and 77,366 owned cats in the city. Most pet owners acquired their animals through adoption and gifting.

Approximately 32% of dogs and 40% of cats are sterilized (i.e., spayed and neutered), as reported by their owners—the majority were sterilized at a private veterinary practice, with the exception of those living in rural areas. In rural areas, pet owners were more likely to have their pets sterilized through government- organized clinics. About 50% of pet owners reported that they would be willing to pay for sterilization, if it was made affordable for them. The vaccination rate (rabies, parvovirus and/or canine distemper) was very high across all zones for both dogs and cats, potentially due to the availability of free vaccination services provided by the municipal government. Issues specifically affecting low-income communities include the high incidence of dog bites and the relinquishment of dogs to the local shelter.



Background

Mexico is home to millions of free-roaming dogs and cats, which are both owned and unowned. The numbers of dogs and cats varies dramatically from city to city, largely due to a lack of spay/neuter accessibility, and stray animal control practices, which often involve sheltering and euthanasia. In this report, we define “stray” as an animal found to be free-roaming without supervision. Similarly, in Aguascalientes Municipality, different areas of the city are home to varying numbers of free-roaming dogs and cats. The Animal Control department of the city of Aguascalientes admits several hundred dogs each month—a mix of free-roaming dogs caught on the street and surrendered pets. Aside from being at-risk of shelter euthanasia, free-roaming dogs and cats are subject to a myriad of possible welfare issues including road traffic accidents, infectious disease and malnutrition. As free-roaming dog and cat density increases, resources become scarcer, and a greater proportion of animals are unable to meet their basic needs. Poor health and diseases become more prevalent, posing risks to both the animals themselves and other species they interact with, including humans. This survey aimed to investigate the composition of and cultural norms surrounding free-roaming and owned dog and cat populations in the city of Aguascalientes, Mexico.

DOMESTIC DOG POPULATIONS IN MEXICO

Mexico reports high numbers of free-roaming dogs across the country. In 2015, the Mexican Camara de Diputados (Chamber of Deputies) estimated there to be 23 million dogs and cats in the country, of which 70% were unowned and free-roaming and 10 million unsterilized (“Boletin No. 5146” 2015). There has not, however, been a recent, accurate and methodologically rigorous estimate of the free-roaming dog and cat population, thus preventing effective dog and cat population management.

ANIMAL WELFARE CONCERNS AND ZONOTIC DISEASE RISK

Free-roaming animals typically receive little to no veterinary care and are at a constant, high risk of parasitic infections, infected wounds, broken or fractured bones and viral diseases. Road accidents are a commonplace threat. Culling is also an ever-present risk in some parts of the country where it is used in population control. The municipality of Aguascalientes does employ a system of shelter euthanasia, similar to that in the US. Non-aggressive free-roaming dogs are reportedly held for a mandatory stray holding period of 10 days before being euthanized, should no one claim them, while aggressive dogs are euthanized after being held for 72 hours. However, due to lack of space and limited adoptions at the shelter, most dogs are euthanized within 3 days following intake.

There are hundreds of possible zoonoses that may be transmitted between dogs or cats and humans (Garde, Acosta-Jamett, and Bronsvort 2013; Kravetz and Federman 2002). Rabies, a fatal neurological infection, is a disease of particular concern with regards to free-roaming dogs, with the species a primary reservoir for the virus. Rabies is transmitted via direct contact with the saliva or brain/nervous system tissue of an infected animal. In many parts of the world, dog-to-human transmission happens most frequently via the bites of infected dogs. It should be noted that cats too have the potential to transmit rabies, but this is a less frequent occurrence (Kravetz and Federman 2002). Mexico has not had a case of human rabies transmitted by a dog since before 2006, however, and in 2019 was the first country in the world to receive validation from the World

Health Organization and Pan-American Health Organization (WHO/PAHO) for elimination of dog-transmitted rabies (Mitchell 2019). In order to preserve this status, rabies vaccinations for dogs and cats remain a government priority (“How Mexico Achieved Rabies-Free Status” 2022). Though the threat of rabies is reduced, the dog bite incidence remains high, and research identifies free-roaming dogs as the cause of a significant proportion of dog bites (Jimenez-Coello et al. 2012).

ANIMAL CONTROL CENTER OF AGUASCALIENTES

Animal welfare legislation in each state of Mexico appoints a responsible body for lost and stray animals and mandates holding periods for such animals. All states allow stray animals, here defined as animals found to be free-roaming without supervision, to be euthanized and most include provisions that suggest the euthanasia of stray populations is permitted. In accordance with Animal Protection Act (2019), Aguascalientes state established a Center for Control, Attention and Animal Welfare in each municipality. Each center is required to offer free vaccinations (including for rabies) and sterilizations and must allow animal welfare organizations to inspect facilities to ensure that high welfare standards are maintained.

Animal control requires that attention be given to public concerns regarding stray dogs and cats. This typically involves the pick-up, transport and holding of stray animals at a designated facility. Additionally, pet owners are permitted to visit the center for free vaccinations and to surrender their pets (dog and cat) with the proper documentation if they wish to do so. In 2018, a total of 5110 (4755 dogs and 355 cats) were surrendered; in 2019, 4721 (4222 dogs and 499 cats); in 2020, 5231 (4573 dogs and 658 cats); and in 2021, 4867 (4320 dogs and 547 cats). Almost all surrendered dogs and cats are euthanized in three to ten days due to a lack of space and a low adoption rate. Some of the specific neighborhoods in middle- and low-income zones are responsible for more than 80% of animal surrenders. According to animal control office data, Centro Poniente (Jesus Tehran), Morelos, Insurgentes and Centro zones are among those with the highest animal surrender numbers.

INTERVENTIONS USED FOR DOG/CAT POPULATION MANAGEMENT

Surgical sterilization programs are a preferred method of dog and cat population control but can bring no noticeable results if poorly implemented—effective programs require demographically informed and systematic implementation. Inhumane methods, such as killing, poisoning or relocating street animals have been proven to be less effective and could even act to increase rabies prevalence in an area (Moreira et al. 2004; Cleaveland et al. 2014)

Data suggest that sterilization of at least 83% of fertile female dogs is needed in order to successfully interrupt the breeding cycle of free-roaming dogs and significantly reduce the population (Fielding and Plumridge 2005).

Long-term, sustainable Dog and/or Cat Population Management (D/CPM) programs should include several programmatic goals, such as improving the welfare of dogs and cats, creating community participation and considering the health and wellbeing of the community. However, when resources are scarce, some of these goals can be attempted on their own, though the D/CPM will be less effective. When planning an effective and sustainable D/CPM program, particular consideration should be given to regions of the targeted area where systemic poverty and inequality prevent animals and people from accessing services and education. Community engagement efforts should be included as well as school-based animal welfare education to increase awareness and access to services prior to the implementation of sterilization programs.

ANIMAL WELFARE LAWS

In Mexico, at a national level, Article 21 of the Federal Animal Health Act (2007) states that the owners or keepers of domestic animals must provide an adequate quantity and quality of food and water, veterinarian supervision and immediate attention in case of illness or injury.

State level general anti-cruelty provisions also apply to companion animals and, in most states, include companion animal-specific provisions. However, the scope of such protection varies. Some states have provisions on responsible pet ownership that may have welfare implications. For example, in San Luis de Potosi (Article 76 Law on the Protection of Animals) and Durango (Article 21 Law on the Protection of Animals) pets cannot be sold to children under 12 without an adult taking responsibility for the animal, and in Quintana Roo microchipping is required (Article 35 Law on the Protection and Well-being of Animals). Others have specific welfare considerations; for example, in Morelos and Guerrero breeders must allow animals to express normal behaviors.

Most states place a duty of care on animal owners and custodians and provide guidance on when the euthanasia of companion animals is permitted. Breeders of companion animals are required to be registered with state authorities and most states hold a register of companion animals. Animal welfare legislation in each state appoints a responsible body for lost and stray animals as well as mandating holding periods for such animals. All states allow stray animals to be euthanized and most include provisions that suggest culling of stray populations would be allowed. However, there is no evidence that culling of stray dog populations has taken place in recent years.

While the Ministry of Health; in conjunction with the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food; is responsible for implementation of the Federal Animal Health Act (2007), and the Ministry of Environment and Natural Resources is responsible for the implementation of the General Wildlife Law (2000), there is no government ministry assigned overall responsibility for animal welfare. At a state level, responsibility for different aspects of animal welfare is assigned to the appropriate department; for example, the Department of Health may be responsible for provisions regarding rabies, while the Department for Education may be responsible for promoting and disseminating humane education.

Dog fighting is prohibited in all states of Mexico.

Under the Animal Protection Act (2019), pets are defined as those animals that depend on human beings to survive without lucrative activity involvement and include cats, dogs and other animals, including wildlife species that serve as company or recreation for humans. Breeders and pet shops are required to obtain a permit from the local government to operate. Such establishments must also issue a certificate of sale to new owners including owner details. Certificates of sale must be submitted to local authorities on a quarterly basis. Municipalities within the state are responsible for investigating any complaints of noise, overcrowding or lack of hygiene at any facility breeding animals. Sellers and breeders are required to provide buyers with a manual that includes information regarding the health, care, food, shelter, hygiene, precautions and other relevant considerations for the animal.

Survey Site: Aguascalientes Municipality, Mexico

The city of Aguascalientes was chosen for our monitoring, evaluation and impact assessment (MEIA) survey based on its proximity to current HSI programs and staff, existing relationships between HSI and local governments and non-governmental organizations and support from local government.

There are multiple stakeholders involved in animal welfare in the city of Aguascalientes. When funds are available, the state government and Aguascalientes municipality offer free spay/neuter and vaccination services to the community. The State Attorney for Environmental Protection (PROESPA) focuses on combating and preventing animal cruelty. Local organizations assist the community with rescue and rehoming of sick and injured animals, and sterilization (i.e., spay/neuter) of dogs and cats.

Survey Goals and Objectives

The overarching goal of this survey was to better understand the culture of pet ownership and attitudes towards free-roaming animals in Aguascalientes, Mexico, in order to better inform programmatic interventions to address issues of free-roaming animal population management and responsible pet ownership. Specifically, our objectives were as follows:

- i. Establish a baseline count of free-roaming dogs and cats in survey sites, in order to determine the following metrics: animal density (animals/km); animal welfare as measured by body condition score (BCS), and visible disease conditions (e.g., transmissible venereal tumour or TVT); sex ratio; breeding indicators (e.g., lactating females and pups); and a population estimate.
- ii. Assess pet ownership knowledge, attitudes and practices among survey participants. This includes practices and attitudes regarding animal welfare, preventative animal health care (including rabies vaccination) and sterilization of companion animals. We also wanted to assess the barriers to responsible pet ownership that pet owners in Aguascalientes face, to inform programmatic interventions targeting these barriers.
- iii. Establish a count of owned dogs and cats among participants in survey sites, in order to estimate the size of the entire owned dog and cat population.

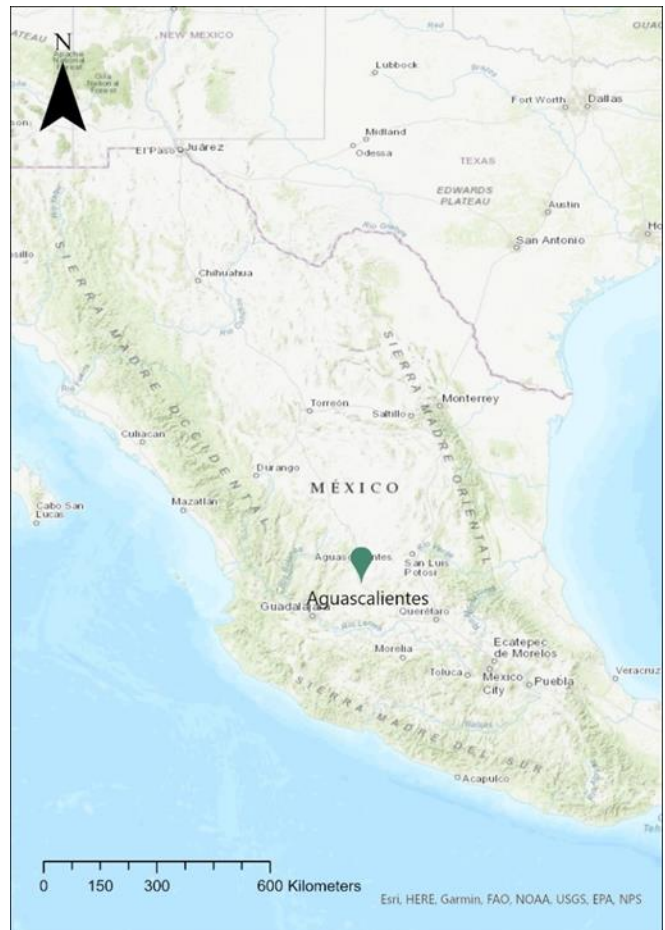


Figure 1. Location of Aguascalientes Municipality, Mexico.

Survey Design

We conducted two types of surveys in Aguascalientes: a household (HH) survey of the owned dog and cat population combined with a Knowledge, Attitude and Practices (KAP) questionnaire and a street count of free-roaming dogs and cats.

PRE-SURVEY TRAINING

All survey volunteers and other surveyors were trained to ensure data quality, reliability and systematic collection. Training was led by the MEIA team and consisted of two days of indoor presentations as well as on-the-ground outdoor practice. Training covered survey methodology, survey protocols, use of Epicollect5 and Google Maps, and how to ask questions appropriately and neutrally, without introducing judgement or bias.

HOUSEHOLD SURVEY SAMPLING AND PROTOCOL

For KAP surveys, households were selected by a systematic random sampling method to obtain a representative sample of each site. Surveyors were provided with pinned locations within each site using Google Maps and were responsible for randomly selecting households to survey around each pinned location. To randomly select households, surveyors were trained to approach every third occupied household on either the left or right side of the street. If participation was declined, surveyors would move on to the next house; and following either

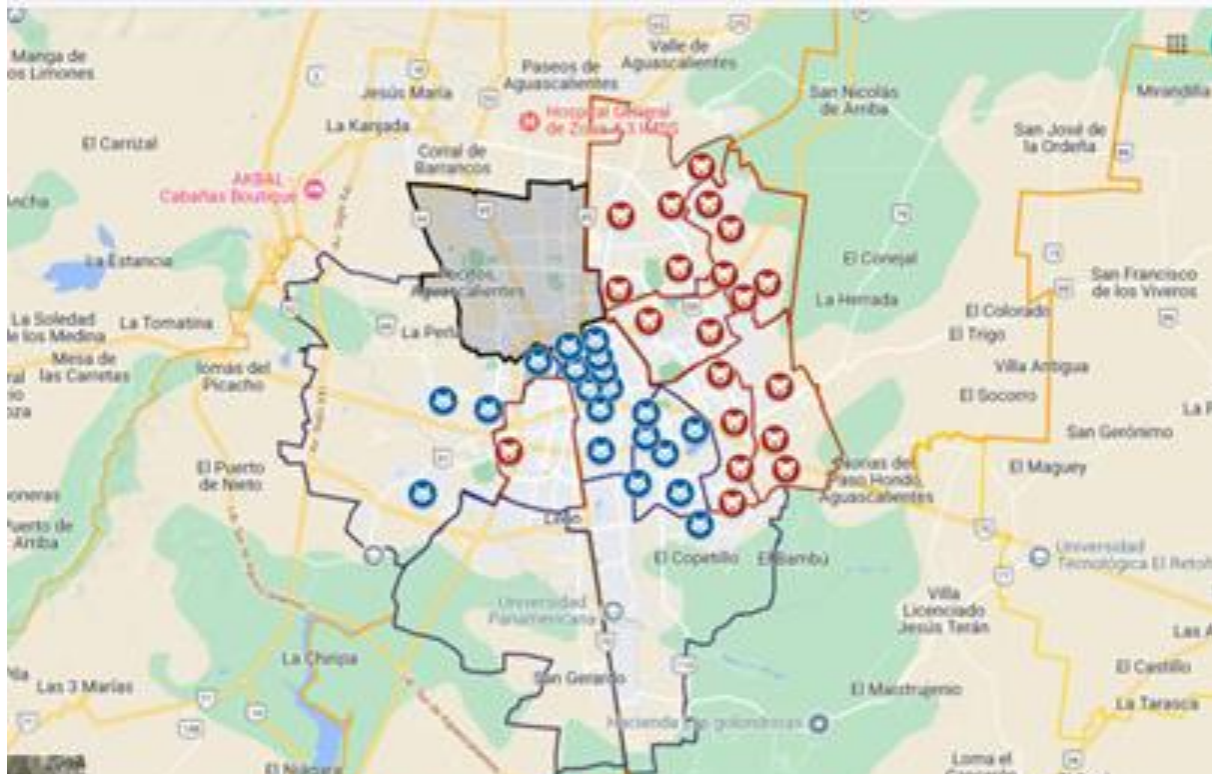


Figure 2. Google Maps generated map of Aguascalientes, showing icons (pins) used to guide surveyor for household sampling in a particular zone.

participation or its decline, surveyors would then move on to the next third house on the same side of the street. Surveyors switched street side once a row or lane of houses had been completed.

EpiCollect5, an online data capturing software that can be used as a smartphone application, was used to collect survey responses. Our pre-prepared survey was loaded into EpiCollect5 and administered to households in-person by the trained surveyors.

In order to participate in the survey, individuals were required to live in that particular household, be over the age of 18 and be able to provide consent. Households were approached using this sampling framework and, if the inclusion criteria were met, the surveyor read a pre-written consent paragraph to obtain verbal consent from the household member. Participants were advised that there were no incorrect answers, they could skip any question they wished and they could end the survey at any time. After consent was obtained, the trained surveyor administered the questionnaire, which was designed to take 15-20 minutes to complete. Once complete, the surveyor uploaded the results to a cloud-based database.

We used existing administrative zones and grouped them into four categories based on their socio-economic status (see Table 1). Based on the

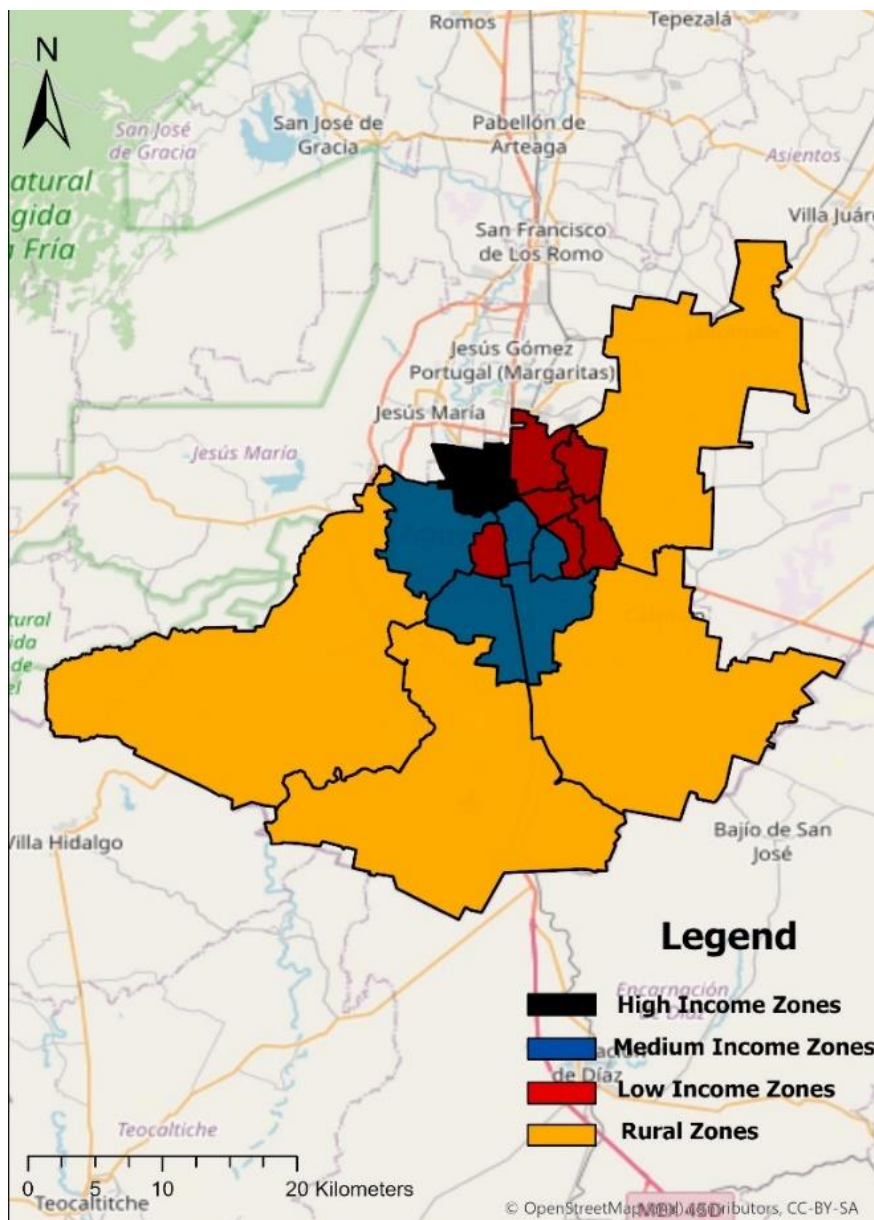


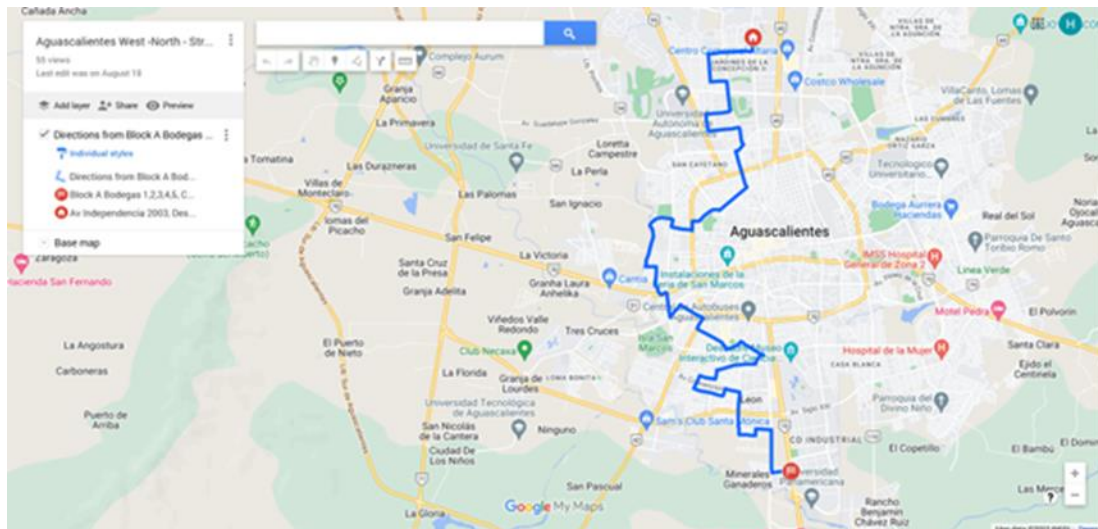
Figure 3. Aguascalientes Municipality administrative zones grouped by socio-economic status.

populations and density of homes, a goal sample size was set for each site. We attempted to reach 400 consenting households in low- and medium-income zones, and 200 in high-income and rural zones. These target sample sizes were chosen to meet a confidence interval of 95% with an acceptable margin of error of 5% for low- and medium-income zones, and confidence interval of 90% with a margin of error of 6% for high-income and rural zones using the online tool raosoft (<http://www.raosoft.com/samplesize.html>).

Table 1. Grouping of administrative zones based on socio-economic categorization in Aguascalientes.	
Socio-economic Categories	Zones
High-Income Zones	Pocitos
Medium-Income Zones	San Marcos, Centro Oriente, Morelos, Mujeres Ilustres, Insurgentes
Low-Income Zones	Pozo Bravo, Villas, Santa Anita, Guadalupe Peralta, Osocaliente, Centro Poniente
Rural Zones	Salto de los Salado, Penuelas, Calvillito, Cañada Honda

STREET COUNT METHODOLOGY

Street counts of free-roaming dogs were carried out by first determining set routes within the towns, on which the counts would be conducted. These set routes, also referred to as “index” or “standard” routes, were drawn in Google Maps along residential roads and highways (avoiding expressways, since dogs tend to avoid expressways). Survey routes averaging 20-30 km in distance were drawn in each of the areas using the “draw a line along roads” option in Google Maps. This allowed routes to be followed easily and in the correct direction using the Maps app on a GPS-enabled mobile phone. Routes were marked with a starting point (Flag) and end point (House). For easy access, the routes were saved as KML files and stored in Google My Places, which could be accessed from smartphones both online and offline.



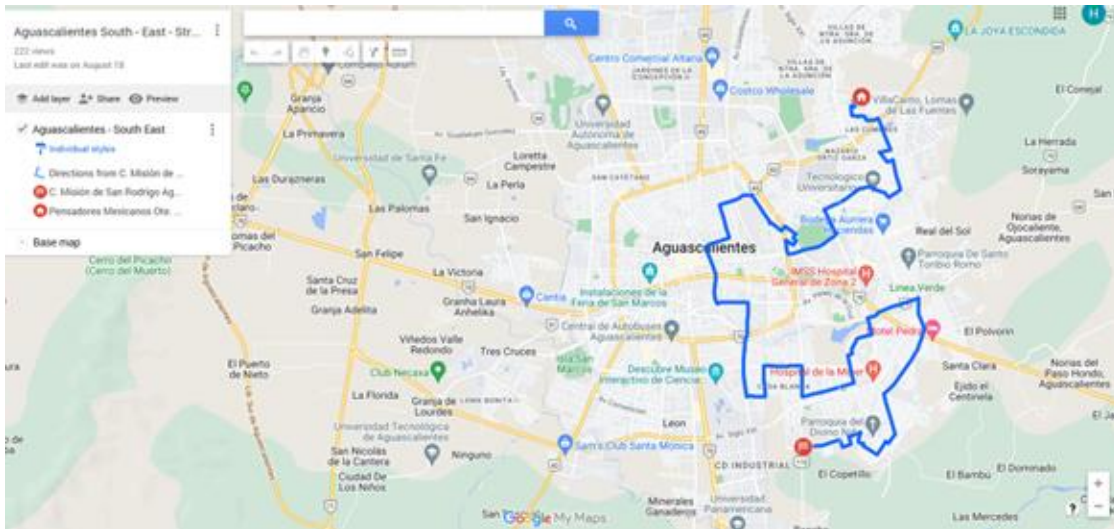


Figure 4a, 4b. Examples of street count survey routes drawn for Aguascalientes using Google Maps.

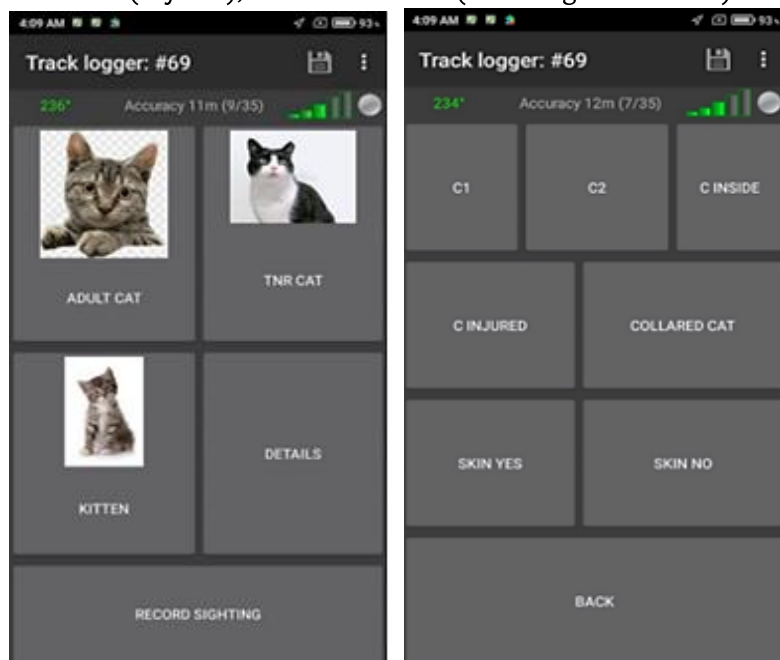
Surveys were conducted in the early morning (beginning at 5:20am) by survey teams that included a driver and 1-2 data collectors in a car. The driver used Google Maps to follow the set route, maintaining an average speed of approximately 10-15 km/hr. Meanwhile, a data collector used the OSM Tracker app to record observed dogs and cats and the animals' GPS coordinates. The button layout of the app had been customized for the survey to allow the data collector to record specific categories. For dogs, these categories were:



sterilized female, unsterilized female, lactating female, sterilized male, unsterilized male and unknown adult dog (dog of unknown sex). Pups were also recorded and are defined as dogs that would not be old enough to be sterilized; the sex of pups was not recorded. Welfare indicators—skin problems and poor body condition scores (BCS)—were also recorded.

Figure 5. OSM Tracker mobile application home screen (left) and dog counting options (right).

Concurrently, the same protocol was completed for a count of free-roaming cats, though on a different device with a modified OSM Tracker app. This modified version included the following obligatory categories for cats: adult cat (any sex); ear-notched cat (indicating sterilization) or kitten. Optional characteristics included



whether the cat was sighted on the street (“outdoor”) or within a yard, patio or other place clearly associated with a home (“indoor”); or whether the cat was wearing a collar. A cat was considered “indoor” even if it was in an unenclosed area associated with a home. This option was included as a rough proxy for ownership, as formative research found it very common for pet cats to stay near their home but not be enclosed in any way. Finally, for each cat the presence of a collar, injury or skin condition was also recorded, as well as whether the cat displayed an emaciated body condition score (C1 and C2).

Figure 6. OSM Tracker screen with cat counting options.

METRICS

Some of the key quantitative metrics we aimed to calculate from our data collection included the following.

Dog and Cat Density: Dividing the total number of recorded dogs by the number of households surveyed yielded a density of dogs per household (dogs/HH). An estimate of the entire dog population in the region could also be calculated by first obtaining the density of dogs per 100 humans in the region, and multiplying that by the human population, as per the census. Similarly, these methods are used to calculate a cat density (cats per household, or cat/HH). Of interest as well is the dogs per dog-owning household (dogs/DOHH) and cats per cat-owning household (cats/COHH).

Canine Age and Sex: The age structure of a population reflects the level of turnover and, consequently, the stability of a population. A lower turnover rate (individuals are spread evenly across age groups) in the population is generally indicative of better health and welfare, as sterilized and vaccinated dogs remain longer in the population and reach older age, instead of being replaced quickly by new, intact and unvaccinated dogs. Knowing the sex ratio of male to female dogs is also important, as it helps in understanding dog keeping practices, predict future population growth and guide interventions.

We also included survey questions meant to assess **knowledge, attitudes, and practices** related to pet ownership; including those related to sterilization, vaccination and acquisition of dogs.

Results

PARTICIPANT DEMOGRAPHICS AND HOUSEHOLD CHARACTERISTICS

A total of 1238 households participated in this survey, and 328 households declined to participate (see Table 2).

Table 2. Number of interview participants from each zone type.			
Zone Category	Participated	Declined	Total
High-Income Zones	216 (78.0 %)	61 (22.0%)	277
Medium-Income Zones	383 (75.7%)	123 (24.3%)	506
Low-Income Zones	421 (75.4%)	137 (24.6%)	558
Rural Zones	218 (96.9%)	7 (3.1%)	225
Total	1238 (79.1%)	328 (20.9%)	1566

In all zones, participation exceeded our target sample sizes and an average of 79% of individuals approached by surveyors volunteered to participate. The survey had higher representation of participants from low- and medium- income zones than from rural or high-income zones; though, rural sites had proportionally high response rates.

Table 3. Gender of participants by zone type.			
Zones	Female	Male	Grand Total
High-Income Zones	70 (32.4%)	146 (67.6%)	216
Medium-Income Zones	137 (35.8%)	246 (64.2%)	383
Low-Income Zones	133 (31.6%)	288 (68.4%)	421
Rural Zones	57 (26.1%)	161 (73.9%)	218
Total	397 (32.1%)	841 (67.9%)	1238

In all zone types, the number of male participants was approximately double that of female participants (see Table 3). Participant age was equally distributed across all age groups (see Table 4).

Table 4. Age distribution of survey participants.	
Age group	Number of participants
18 to 24 years	153 (12.4%)
25 to 30 years	112 (9.0%)
31 to 35 years	119 (9.6%)
36 to 40 years	117 (9.5%)
41 to 45 years	111 (9.0%)
46 to 50 years	132 (10.7%)
51 to 55 years	111 (9.0%)
56 to 60 years	94 (7.6%)
61 to 65 years	86 (6.9%)
More than 65 years	173 (14.0%)
Preferred not to answer	30 (2.4%)
Total	1238

In all of the zones, most residences had either open or fenced yards. A fenced yard was defined as one from which an animal could not freely leave; a semi-fenced yard was a yard with a fence, but one that still allowed the dog to come and go at will; and an open yard was a plot of land with no fencing to enclose animals. Residences with semi-fenced yards or no yards were proportionately lower across all zone types. Rural residences were notably less likely to possess fenced yards than residences in other zone types (see Table 5).

OWNED DOG DEMOGRAPHY

Average age pyramids show how the dog population is distributed by age and sex and at what rate owners acquire puppies. They help us understand if population turnover is healthy and stable or unbalanced at any particular age (younger or older). In addition to population health and turnover, biased pyramids may indicate that dog owners are surrendering older/younger dogs, because they are not willing or able to provide the increased care needed by old/very young animals or are selling puppies (which is why they possess several puppies). However, if we assume such practices are performed at equal rates among all the socio-economic zones; the age pyramid remains an opportunity for comparison of population health and turnover among the different zones, as well as an indicator (and long-term monitoring tool) relating to health and veterinary care.

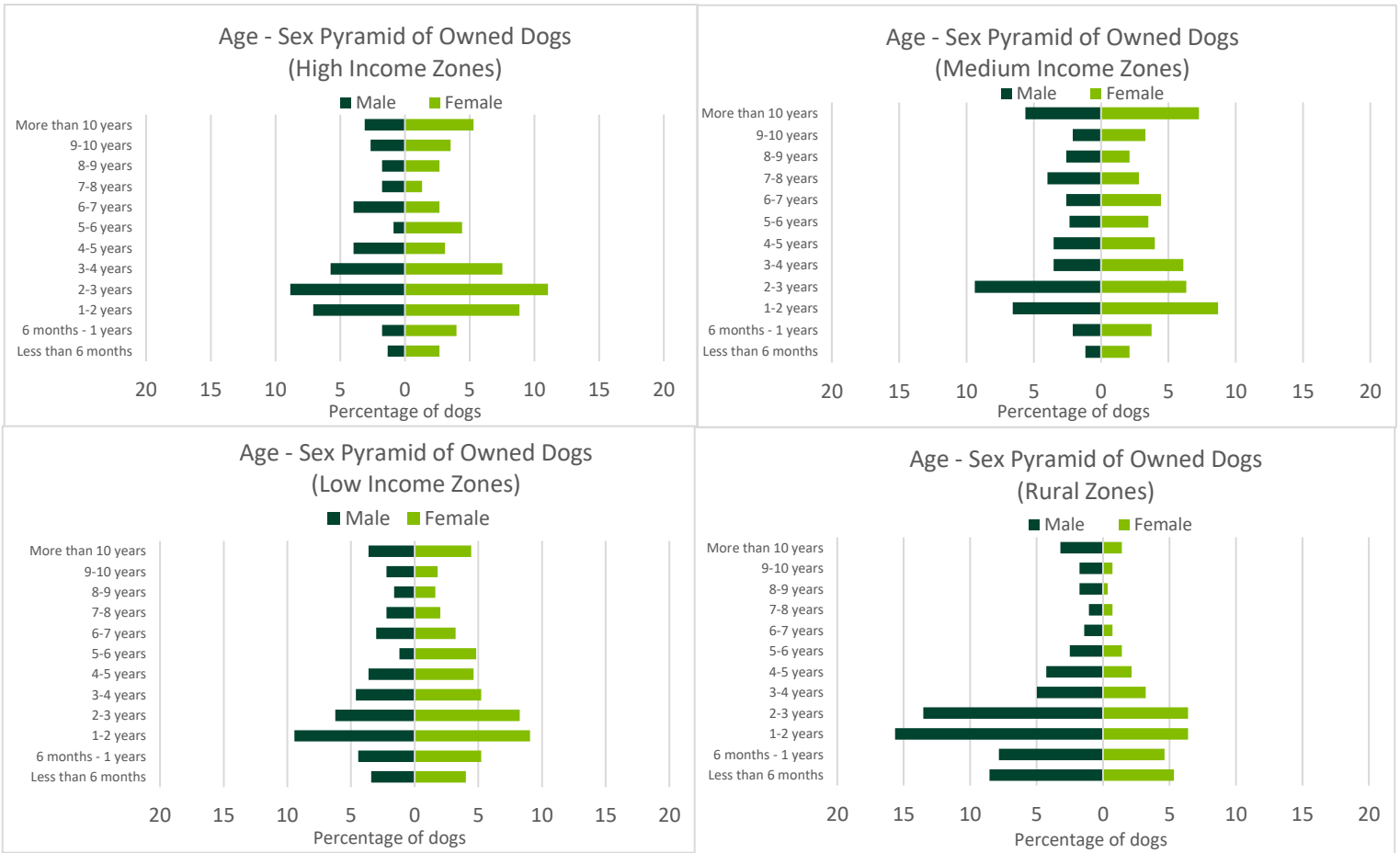


Figure 7a,b,c and d. Percentage of dogs by age and sex between zone types.

Average dog age was calculated from age group frequencies and mid-points (in months) of each age group. The reference point for ‘more than 10 years’ was derived under assumption that average oldest dogs would be of 13 years old. For all the zones of Aguascalientes, the average dog age is 4.2 years: 4.1 years for male dogs and 4.3 years for female dogs. Generally, the average age of dogs is lower in low-income and rural zones, potentially indicative of a lack of access to veterinary care (see also Table 21).

Table 5. Average age of owned dogs in Aguascalientes by zone type.				
	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Average age	4.5 Years	5.0 Years	4.1 Years	3.0 Years

Dog Sex	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Male	42.9%	44.8%	45.6%	66.5%
Female	57.1%	53.6%	54.2%	33.5%
I don't know	0.0%	1.6%	0.2%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

DOG AND CAT OWNERSHIP

The likelihood of owning a dog does not vary significantly across the different income zone types, with approximately 60% of households in each owning dogs. There are an average of 1.91 dogs per dog-owning household (1.16 dogs per all households). There is a notably higher number of dogs per dog-owning households in rural zones compared to other zone types. It may be that this is due to rural residences having more space or rather that rural households keep dogs for security reasons (Table 7). Dog ownership is slightly higher in households that have children: 64.7% of households with children owned a dog, while 57.2% of households without children owned a dog.

Zones	Yes	No
High-Income Zones	126 (58.3%)	90 (41.7%)
Medium-Income Zones	232 (60.6%)	151 (39.4%)
Low-Income Zones	265 (63.0%)	156 (37.1%)
Rural Zones	131 (60.1%)	87 (39.9%)
Total	754 (60.9%)	484 (39.1%)

Zones	Total dogs	DOHH*	HH** Surveyed	Dogs per HH	Dogs per DOHH
High-Income Zones	238	126	216	1.10	1.89
Medium-Income Zones	420	232	383	1.10	1.81
Low-Income Zones	501	265	421	1.19	1.89
Rural Zones	280	131	218	1.28	2.14
Total	1439	754	1238	1.16	1.91

*DOHH refers to dog-owning households; **HH refers to households.

Estimates of owned dog and cat populations are based on human census data from the year 2020 as well as data obtained for this survey. The average number of dogs and cats per household was used to estimate the dog and cat population in Aguascalientes Municipality. Due to the lack of household data for each zone separately, our population estimates are confined to the city level. The estimated population of owned dogs and cats is presented in Table 9.

Table 9. Owned dog and cat population estimates.						
2020 census data	Human Population	Households	Total dog population	Total cat population	Dogs per 100 humans	Cats per 100 humans
Aguascalientes	948,990	266,778	309,462	77,366	32.6	8.2

Across all zone types, the number of dogs owned per dog-owning household declines rapidly after two dogs, with only very small numbers of residences owning more than five dogs.

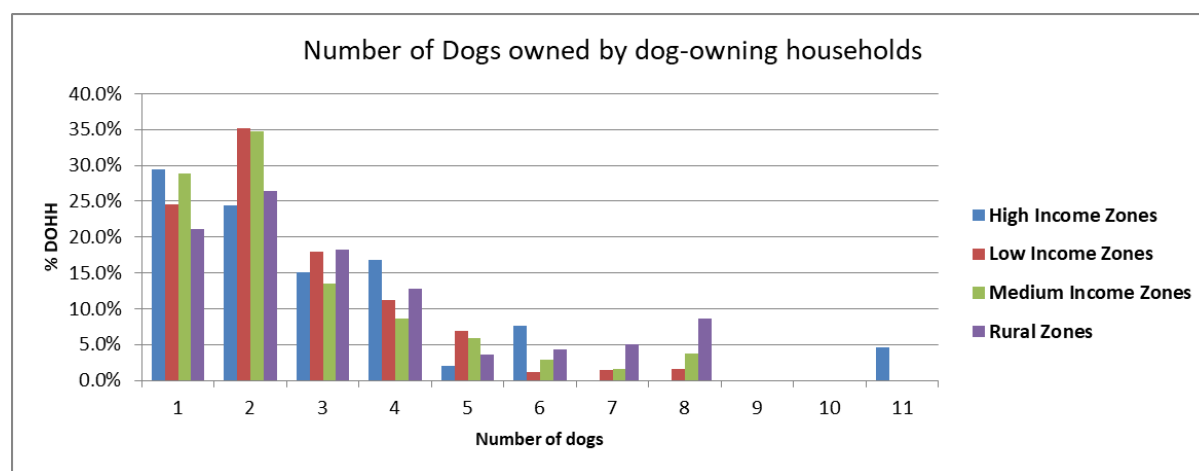


Figure 8. Number of dogs owned by dog-owning households by zone type.

Cat ownership is less common than dog ownership overall; notable, however, was the high proportion of rural homes owning cats. Similar to dog ownership, most cat-owning households only have 1-2 cats. Ownership is, again, slightly higher in households with children: Approximately 17.7% of households with children own a cat, while 12.5% of households without children own a cat.

Table 10. Cat ownership by zone type.		
Zone Category	Yes	No
High-Income Zones	10.6%	89.4%
Medium-Income Zones	14.1%	85.9%
Low-Income Zones	12.8%	87.2%

Rural Zones	25.7%	74.3%
Total	15.1%	84.9%

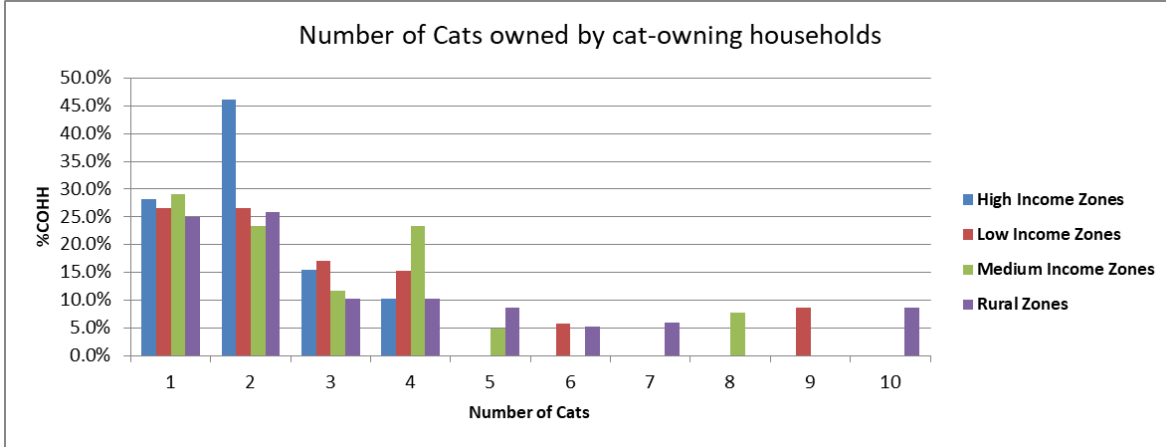


Figure 9. Number of cats per cat-owning households.

Most dog owners reported owning dogs for the purpose of companionship. Owning dogs for hunting or herding was reported less frequently and found entirely in low-income or rural zones.

Table 11. Reasons for dog ownership.	
Reason for household to own dog	Count
Pet/companionship	686 (79.8%)
Protection	119 (13.8%)
Herding	5 (0.6%)
It belongs to someone in my family, but I take care of it	41 (4.8%)
I am an animal rescuer	8 (0.9%)
Hunting	1 (0.1%)

*Respondents were able to choose multiple responses to the question.

In Aguascalientes, dogs are primarily acquired via adoption, which may include getting an animal from the street, friends, family members or the shelter. Acquisition from family or friends specifically is high in all zone types. Purchasing dogs (from various sources) is more frequent in high-income areas, while rescuing dogs from the street is comparatively more frequent in the other three zones. Gifting dogs appears to be more popular in low-income and middle-income areas, whereas rescuing from the street or keeping puppies born within the household accounts for a higher proportion comparatively in rural and middle-income zones (Table 12).

Table 12. Source of dog by zone type.				
Source of dog	High-Income Zones	Medium- Income Zones	Low-Income Zones	Rural Zones
Adopted it	34.0%	37.0%	35.4%	32.0%
Rescued it from the street	6.0%	12.1%	12.2%	11.6%
It was born in my house	3.3%	2.8%	4.7%	6.8%
Got it from my family/friend	20.7%	20.6%	20.4%	30.6%
Got as a gift (Christmas or Birthday)	6.7%	11.0%	12.5%	4.1%
Purchased it in a street	5.3%	4.3%	4.7%	2.0%
Purchased it at a market	3.3%	2.1%	2.5%	4.1%
Purchased it from a breeder	10.7%	5.0%	2.2%	6.1%
Purchased it from a vet	10.0%	5.0%	5.3%	2.7%
Total	100.0%	100.0%	100.0%	100.0%

Across all zone types, the majority of cat owners own cats for pet/companion purposes. Pest control as a reason to own a cat is greater in rural zones compared to other zones, presumably representative of living conditions and environmental context. Reasons for cat ownership are more varied in low-income zones than in those of high and medium income.

Table 13. Reasons for cat ownership by zone type.				
Reason for owning a cat	High-Income Zones	Medium- Income Zones	Low-Income Zones	Rural Zones
Pet/companionship	88.5%	90.4%	79.7%	70.1%
Pest control/killing mice/rats	11.5%	3.8%	5.1%	17.9%
It came to my home by itself	0.0%	5.8%	6.8%	9.0%
I am an animal rescuer	0.0%	0.0%	5.1%	1.5%
It belongs to a member of my family	0.0%	0.0%	3.4%	1.5%

*Respondents were able to choose multiple responses to the question.

VETERINARY CARE, STERILIZATION AND VACCINATION PRACTICES

The proportion of owners reporting that they have had their dogs sterilized decreases from high- to medium- to low-income to rural zones (Table 14). This is to be expected considering likely access to veterinary infrastructure—supported by the high proportion of sterilization campaign sterilizations and ‘*I don’t know*’ responses concerning sterilization source (Table 16). Sterilized dogs are, on average, older than non-sterilized dogs (5.3 years vs 4.1 years).

Table 14. Sterilization status of owned dogs in Aguascalientes by zone type.			
Zones	Sterilized dogs	Unsterilized dogs	Status known
High-Income Zones	48.8%	49.8%	1.4%
Medium-Income Zones	40.4%	58.6%	1.0%
Low-Income Zones	27.3%	71.8%	0.9%
Rural Zones	10.8%	88.4%	0.8%
Total	31.9%	67.2%	1.0%

The percent of cats sterilized also decreases from high- to medium- to low-income to rural zones. Again, this is most likely indicative of the fact that those in higher- income communities have both the financial means and access to veterinary services to get their pets sterilized (Table 15).

Table. 15. Cat sterilization status by zone type.			
Zones	All sterilized	Some sterilized	None sterilized
High-Income Zones	78.26%	4.35%	17.39%
Medium-Income Zones	52.83%	18.87%	28.30%
Low-Income Zones	25.93%	14.81%	59.26%
Rural Zones	8.93%	5.36%	85.71%
Total	34.95%	11.83%	53.23%

**Response options refer to whether all the cats in a household are sterilized or not. This includes all households with at least 1 cat. If there was only 1 cat in the household, participants would not choose the “some” option.*



Table 16. Sterilization sites by zone type.				
Sterilization Site	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Private veterinary clinic	76.9%	69.9%	48.8%	36.0%
Government-organized clinic	9.2%	16.5%	20.2%	36.0%
Sterilization campaign (NGO)	6.2%	9.7%	16.7%	4.0%
I don't know	3.1%	1.9%	13.1%	24.0%
Multiple answers	4.6%	1.9%	1.2%	0.0%

The reasons owners gave for not sterilizing their dogs are similar across all zone types. Table 17 demonstrates that the number one reason for people not getting their dog spayed or neutered is because they don't think it's necessary, don't want to or don't feel that they have the time to do it. The cost of the sterilization procedure itself is a more prohibitory factor in middle-income and rural zones. The issue of access, in terms of location and travel, was not more prevalent in rural areas, perhaps due to the accessibility of government-run sterilization programs and private clinics—the two sites responsible for the majority of sterilizations done in the rural areas.

Table 17. Reasons for not sterilizing owned dogs by zone type.				
Reason for not sterilizing the dog	High-Income Zones	Medium-Income Zone	Low-Income Zones	Rural Zones
Reluctant to do sterilization (Not necessary/I don't want to/don't have time/	59.0 %	56.6 %	66.1%	73.3 %
Because it is expensive as primary reason along with other reasons	3.3 %	10.8 %	3.3 %	6.7 %
Not aware about where to get sterilized	6.5 %	4.6 %	0.6 %	1.9 %
No travel facility/ Difficult to transport the dog	1.6 %	4.6 %	6.1 %	5.7 %
Consider it is dangerous/ not good for the dogs / change dog behavior	1.6 %	4.6 %	2.2 %	0 %
Plan to sterilize but could not do yet	27.9 %	15.5 %	21.7 %	12.4 %
Because dog is too sick	0 %	3.1 %	0 %	0 %

As may be expected, dog owners in high-income zones are willing to pay more for sterilizations. However, a large proportion of owners in all zones reported that they are only likely to sterilize their pet if the service is free. This is particularly true in rural zones, where this response accounted for over 75%.

Table 18. Preferred cost of sterilization by zone type.				
Preferred cost of sterilization	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Nothing – I'll only do it if it's free	26 (43.33%)	57 (44.19%)	75 (43.10%)	80 (76.19%)
Less than 300 pesos	6 (10%)	16 (12.40%)	37 (21.26%)	13 (12.38%)
300-500 pesos	10 (16.67%)	28 (21.71%)	31 (17.82%)	7 (6.67%)
500-1000 pesos	13 (21.67%)	13 (10.08%)	16 (9.20%)	5 (4.76%)
1000-2000 pesos	5 (8.33%)	13 (10.08%)	11 (6.32%)	0 (0%)
More than 2000 pesos	0 (0%)	2 (1.55%)	4 (2.30%)	0 (0%)

The accessibility and/or affordability of veterinary care clearly reduces from high- to low-income and finally rural areas, as was suggested by the percentage of animals sterilized in each zone (Table 14, Table 15). Only half as many dogs in rural zones have seen a vet as compared with those living in high-income zones (Table 19).

Table 19. Dog veterinary visits in the last 12 months by zone type.				
Dog visited veterinarian in last 12 months?	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Yes	90%	78%	69%	46%
No	9%	22%	31%	53%
I don't know	1%	1%	0%	1%

The main reason dogs and cats are brought to local veterinary care providers in Aguascalientes is for preventative care services (such as vaccination and deworming), across all zone types. Government interventions are better represented in rural areas, while the dog owners in other zone types typically access private clinics.

The percentage of dogs vaccinated is high across all zone types. As with sterilization efforts, government interventions appear to have addressed the lack of private care in rural areas. Only 9% of owners from rural zones report not having had their dogs vaccinated; cost was the most cited reason, followed by a lack of awareness and/or logistical barriers to vaccination.

Table 20. Vaccination status and vaccination provider for owned dogs by zone type.				
Vaccination status (any vaccine)	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Vaccinated	99%	95%	91%	87%
Private veterinarian (in private clinic)	81%	68%	59%	31%
Government vaccination program	16%	26%	27%	54%
Sterilization campaign by non-governmental organization	3%	6%	11%	14%
Vaccination status unknown	0%	0%	2%	1%
Not vaccinated	1%	4%	6%	9%

CONFINEMENT PRACTICES OF DOGS AND CATS

Confinement practices are similar across high- to low- income zones, with the majority of dogs kept inside the house during the day and night (Table 21 and 22). Pet owners living in rural areas tend to confine dogs during the night, with most dogs kept in closed courtyards as opposed to within the house. A higher proportion of dogs roaming during the day (27%) are living in rural zones. Very few dogs are reported to be actively tied up or chained in any zone, although a slightly greater proportion of these came from rural zones. Tethering or chaining may be used to keep dogs from roaming when the property is less secure (i.e., lack of fencing). Owners who did report chaining or tying up their dogs said it was to prevent the dog from escaping and/or to prevent aggression or nuisance behavior towards humans (Table 24).

Table 21. Dog location during the daytime, by zone type.*				
Dog Location	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Inside the house	61.4%	68.6%	53.7%	31.4%
Inside a closed courtyard	34.5%	23.3%	36.0%	38.0%
Roaming/loose on the street	2.1%	0.4%	2.5%	27.0%
On a terrace/rooftop	2.1%	7.3%	7.1%	1.5%



In a daycare	0.0%	0.0%	0.4%	0.0%
Confined or in a cage	0.0%	0.4	0.0%	0.0%
With someone	0.0%	0.0%	0.0%	0.7%
Chained/Tied up	0.0%	0.0%	0.4%	1.5%

*Note that respondents were allowed to select more than one response to this question.

Table 22. Dog location during the nighttime, by zone type.				
Dog Location	High Income Zones	Medium Income Zones	Low Income Zones	Rural Zones
Inside the house	66%	68%	58%	23%
Inside a closed courtyard	33%	28%	38%	65%
Roaming/loose on the street	2%	0%	0%	8%
Chained/Tied up	0.0%	0.0%	0.8%	3.1%
Confined or in a cage	0.0%	3.5%	2.6%	0.0%

Table 23. Owner-reported chaining practices by zone type.				
Practices	High-Income Zones	Medium- Income Zones	Low- Income Zones	Rural Zones
Dog is never chained	96%	94%	92%	86%
Dog is always chained	0%	0%	2%	5%
Dog is sometimes chained	4%	6%	6%	9%

Table 24. Reasons for chaining dogs, by zone type.				
Reasons for chaining	High Income Zones	Medium Income Zones	Low Income Zones	Rural Zones
To avoid roaming and escape	40%	33%	43%	28%
To avoid bothering people/guests at my home	40%	60%	24%	28%
To avoid bothering neighbors/other people	20%	7%	19%	17%

To protect property	0%	0%	5%	6%
Dog aggression	0%	0%	10%	22%

In rural areas, the majority of owned cats are considered outdoor cats in that they are allowed out of the house as they wished (Table 25). In all other zones, the proportion of indoor versus outdoor cats sat at about a 1:1 ratio.

Table 25. Allowance of cat roaming by zone type.		
Zones	Yes (outdoor cat)	No (indoor cat)
High-Income Zones	52.17%	47.83%
Medium-Income Zones	46.30%	53.70%
Low-Income Zones	50.00%	50.00%
Rural Zones	80.36%	19.64%
Total	58.29%	41.71%

DOG BITES

Table 26. Dog bite incidents by zone type.			
Zones	Adult	Child	Proportion of Respondents
High-Income Zones	7 (70.0%)	3 (30.0%)	4.6%
Medium-Income Zones	29 (82.9%)	6 (17.1%)	9.1%
Low-Income Zones	31 (67.4%)	15 (32.6%)	10.9%
Rural Zones	8 (53.3%)	7 (46.7%)	6.9%
Total	75 (70.8%)	31 (29.2%)	(8.6%)

Among the dog bites cases reported, most were by dogs owned by neighbors or friends. Bites from stray dogs are highest in low-income and rural zones, while bites from one's own dog are comparatively high in medium-income zones. Only in low-income zones are (still very few) unknown sources of dog bite reported. Medium- and low-income zones reported more dog bites than high-income and rural zones.

Table 27. Dog bite causes.					
Which dog bit person	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones	Total
A neighbor or friend's dog	70.0%	54.3%	39.1%	60.0%	50.0%
A stray dog, roaming freely on the street	20.0%	22.9%	37.0%	33.3%	30.2%
Person's own dog	10.0%	22.9%	15.2%	6.7%	16.0%
Unknown	0.0%	0.0%	8.7%	0.0%	3.8%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

Table 28. Care-seeking behavior after dog bite.		
	Hospital care was sought	Hospital care was not sought
High-Income Zones	80.00%	20.00%
Medium-Income Zones	45.71%	54.29%
Low-Income Zones	48.84%	51.16%
Rural Zones	53.33%	46.67%
Total	51.46%	48.54%

Post-bite hospital visits were much more common in high-income zones than low- and medium-income and rural zones, with rural zones, perhaps surprisingly, exhibiting a higher proportion than the former two.

PET SURRENDER

Pet surrender—which we are defining as the act of removing a pet from the household and placing the animal somewhere else, including in the street—is infrequent across all zone types. Those living in low-income areas tend to surrender animals more often than those living in other zones. (Table 29). The means by which pets are surrendered are reported in Table 30, and the species surrendered detailed in Table 31.

Table 29. Proportion of respondents that have surrendered* a pet in the past.			
Zone type	Yes	No	Total Count
High-Income Zones	18 (8.3%)	198 (91.7%)	216
Medium-Income Zones	52 (13.6%)	331 (86.4%)	383
Low-Income Zones	83 (19.7%)	338 (80.3%)	421
Rural Zones	27 (12.4%)	191 (87.6%)	218
Total	180 (14.5%)	1058 (85.5%)	

*Here, “surrender” is defined as any action taken to permanently remove a pet from the home, including abandonment, rehoming and surrender to authorities or shelter. It does not include euthanasia.

Table 30. Way by which owner surrendered a pet in the past.				
Gave up how or where?	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
I gave it to someone	15	42	64	21
I left it somewhere	1	3	6	3
I took him to the vet to put them to sleep.	1	1	1	0
I took it to animal control center	0	3	11	2
It escaped/got lost	1	2	0	1
It was stolen from me	0	0	1	0
Total	18	51	83	27

Table 31. Pet species surrendered in each zone.				
Surrendered pet	High-Income Zones	Medium-Income Zones	Low-Income Zones	Rural Zones
Dog	6.9%	12.3%	18.3%	11.0%
Cat	0.5%	2.3%	3.6%	2.3%
Rabbit	0.5%	0.3%	0.2%	0.0%
Singing bird	0.0%	0.0%	0.0%	0.9%
Parakeet	0.5%	0.0%	0.0%	0.0%
Tortoise	0.0%	0.3%	0.0%	0.0%
Total	8.3%	13.6%	19.7%	12.4%

Discussion

As is the case around the world, local resources to improve companion animal welfare are often limited and must be used as judiciously as possible. Program design, efficacy and targeting are critical to achieve the desired animal welfare outcomes—which include humane management of roaming dogs and cats, reduction in the number of dog bites and lower shelter euthanasia rates. In order to craft an effective intervention, one must start with a sound understanding of the real-time dynamics of not only the animal populations in question, their numbers, demographics and composition, but also the local communities they live alongside, and the interaction between the two. Only a strategy that accounts for and engages with the animal population, the local community and government organizations and/or initiatives can be effective.

Spay/neuter programs are most effective when targeted. When resources are limited, there should be a focus on delivering services to animal populations most at-risk of shelter intake and euthanasia, abandonment, and those contributing to the birth of unwanted litters.

In this study, most owned dogs across all zone types are confined, which helps control the birth of unwanted litters since dogs are not allowed to roam freely. In rural areas, however, dogs are more likely to be allowed to roam freely, with >20% of dogs allowed to do so during the day and ~8% at night. If unsterilized, these free-roaming dogs can breed and contribute to the birth of unwanted litters.

The majority of owned cats are allowed to roam freely. In rural areas, the percentage is as high as 80%. To effectively reduce the number of free-roaming cats, both owned and free-roaming cats need to be targeted and included in spay/neuter programs.

For both cats and dogs, the percentage of animals sterilized decreases from high-income to rural zones (35-50% dropping to 10-20% in dogs, and ~80% to ~10% in cats). Since dogs and cats can migrate between high-

and low-income zones, sterilization efforts must be targeted in areas with lower spay/neuter percentages (i.e., in lower-income zones). That said, the percentage of dogs sterilized should ideally be increased across all zones; sterilization rates of 35-50% in high-income zones is too low to have an effect on the population size over time or produce even temporary reproductive control at a population level.

The high proportion of spay/neuter surgeries conducted by the government in low-income and rural zones should be applauded, particularly given that these communities tend to have less access and fewer resources for private veterinary care. Interestingly, although lower-income zones do report only being able to spay and neuter their pet if the surgery is very affordable or free, cost accounts for only 3% and 7% of the decisions not to sterilize animals in low-income and rural zones respectively. The largest barrier to spay/neuter services is access: only 40% of dogs living in rural areas have previously seen a vet compared to 90% of those living in high-income zones, again highlighting the importance of the government-funded clinics focused in rural areas. There is also a surprisingly high reluctance from the public to sterilize dogs (75% in rural zones; and <50% in all others also), suggesting that educational initiatives promoting the benefits of spay/neuter are needed.

The percentage of dogs vaccinated for rabies, parvovirus and/or canine distemper is high across all zones, again highlighting the success of government programs providing vaccination services. Government-sponsored programs are responsible for 54% of dog and cat sterilizations in rural areas versus 16% in high-income areas. The public's understanding of the importance of rabies vaccination appears sufficient, with very few respondents reporting that there is no need for dogs and cats to be vaccinated against rabies. The largest barrier regarding why dogs are not vaccinated appears to be accessibility.

Human dog bite cases are fairly high, with 8.6% of all respondents reporting incidents involving previous dog bites. Reports of dog bites tend to be lower in rural zones, presumably due to greater space availability, and in high-income zones, possibly due to greater separation between people and dogs. Most dog bites originated from neighbors' or their own dogs. Dog bites originating from roaming dogs are more frequently reported in low- and rural-income areas. Post-bite hospitalization is much more frequent in high-income zones—presumably due to greater access to healthcare services.

Households with children are more likely to own dogs and cats than those without—the reasons for this are not clear. The percentage of people owning dogs (~60%) is similar across zone types, with more dogs per household in rural areas, possibly due to having more space available. The percentage of people owning cats is generally much lower (~10-15%), although this increased to ~25% in rural areas. Pet owners tend to care for multiple dogs and/or cats at a time, and most acquire their animals through adoption and gifting.

The most widely cited reason for owning a pet is companionship (~80% of responses for both dogs and cats). The people of Aguascalientes clearly care about their animals and better public outreach regarding the health benefits of spay/neuter might encourage more pet owners to seek such services.

One of the important findings from this survey is that most unwanted pets are gifted/given away. In low-income areas, although sample sizes are small, about six times as many pets are given away than are relinquished to the animal shelter. The results of this survey and the annual shelter intake data indicate that most surrendered dogs and cats come from low-income areas.

Summary and Recommendations

The large size of the dog and cat population in Aguascalientes is one of the greatest obstacles to operating a subsidized or free spay/neuter program that reaches a percentage high enough (above 85% sterilization rate) to effectively manage the population. Current sterilization rates (~40% for cats and 32% for dogs) indicate that only a small segment of the pet population are currently accessing spay/neuter services— particularly in low-income and rural populations—despite municipal and state efforts and the presence of private veterinary clinics. Given that many dogs in Aguascalientes are allowed to roam freely, for effective population control, a much higher percentage of the population must be spayed/neutered. There is also a clear cultural practice of gifting puppies, which are born as a result of unintentional breeding and a lack of pet sterilization.

A major unintended consequence of low dog sterilization rates coupled with a culture of gifting unwanted animals is the surrender and subsequent euthanasia of animals at the local shelter. Based on data obtained from 2018 through 2021, the animal shelter in Aguascalientes reported an average annual intake of approximately 5,000 animals (4,468 dogs and 515 cats). Most of the dogs and cats surrendered to the shelter are euthanized; this represents a significant companion animal welfare issue. In the city, dogs are more likely than cats to be surrendered to the shelter.

To manage the companion animal population and improve animal welfare in Aguascalientes, based on the findings of this survey, possible interventions could include:

IMPROVING SPAY/NEUTER ACCESSIBILITY AND SERVICES

According to the survey, the current dog and cat population in Aguascalientes is approximately 400,000, of which less than 50% of dogs in high- and medium-income areas and even less in low-income areas are sterilized. Most pet owners acquire their pets from gifting, rescuing, purchasing and adopting. By reducing the number of dogs and cats born from unwanted pregnancies, we can reduce the need to gift unwanted animals. Furthermore, preventing the birth of unwanted litters will reduce the burden on the animal shelter, allowing it to devote greater resources to adoption and pet reunification programs.

A targeted sterilization program would be most beneficial if done in conjunction with other interventions, such as humane education, shelter adoption programs and the provision of affordable veterinary services. Ideally, municipalities should aim to sterilize more than 85% of dogs and cats over a duration of three to four years to humanely reduce the population over time. If current resources do not allow for this, communities with higher percentages of roaming, intact dogs and those most at-risk for shelter intake should be targeted for subsidized veterinary services.

HUMANE EDUCATION

There is increasing recognition of the roles public awareness and humane education play in improving animal welfare. Pet owners and the general public would benefit from information on what veterinary services are available to them, the importance of spaying and neutering, dog bite prevention and dog and cat behavior. Humane education can be delivered through a variety of means, including but not limited to:

1. **Schools:** Humane education programs are increasingly becoming incorporated into school curriculums. These programs give students hands-on learning opportunities and a better understanding of what it means to care for a pet, as well as stay safe around free-roaming animals.

2. Community Workshops: Workshops and seminars can be held in community centers, libraries and other public places to provide information on caring for pets, being a responsible pet owner and why spaying and neutering pets is important.

3. Outreach programs: Educators and volunteers can go to schools, community centers and local events in low-income areas to provide information on how to care for pets and be a responsible pet owner.

4. Online Resources: Online resources, including videos, tutorials and educational materials can give pet owners easy access to information about pet care and responsible pet ownership. Social media platforms, which are generally accessible to pet owners in all income groups, can also be a vehicle for disseminating this type of information.

5. Working with veterinarians: Humane education programs can be combined with veterinary services to engage pet owners in caring for their pets.

6. Media: Working with local media to create both online and offline assets can be one of the most effective tools to reach community members.

AFFORDABLE VETERINARY CARE

Most pet owners in Aguascalientes visit private veterinary clinics to get their animals sterilized, which indicates a significant presence of veterinary clinics in metropolitan areas. This is not the case, however, in rural and low-income areas. Due to a lack of accessible and affordable veterinary care in these areas, there is a low level of dog and cat sterilization. This lack of available services contributes to the birth of unwanted litters, and increased shelter relinquishment and euthanasia. Affordable veterinary services, that include spay/neuter services and preventative care, are key to improving animal welfare and, more specifically, keeping animals healthy and in their homes. A few options that may be considered:

Establishment of non-profit/low-cost clinics: An initiative, such as seed grants, to incentivize local non-profit organizations to operate veterinary clinics that offer reduced-cost services to low-income families would help expand access to veterinary care.

Community outreach programs: Stakeholders, including the veterinary school and local animal welfare organizations, may consider outreach programs that offer free or low-cost veterinary services to low-income families. These programs could be operated on weekends and involve both veterinary students and licensed veterinarians.

State and local programs: Aguascalientes state and local government agencies offer varied assistance to low-income communities for spay/neuter; this could be extended to veterinary care.

COLLABORATION, TRAINING AND CAPACITY BUILDING

Improving companion animal welfare in Aguascalientes requires collaboration between multiple stakeholders including government agencies, non-government organizations (NGOs) and veterinarians. Opportunities for collaboration include:

Partnerships between government agencies and local animal welfare charities: Government agencies and NGOs can collaborate to provide access to veterinary services, including spay/neuter, with a focus on serving low-income communities.

Veterinary training: High-volume, high-quality spay/neuter surgery requires veterinarians trained in providing humane spay/neuter surgery. This includes training in anaesthesia, surgical techniques and pain management. Providing training and capacity-building opportunities for veterinarians serving low-income communities can help to improve the quality of care and increase access to services. This can include training on best practices for dog and cat sterilization, preventive care, treating common illnesses and injuries, as well as training on effective communication and engagement with low-income communities.

Shelter engagement and pet surrender prevention: Animal shelters play a vital role in communities as they work to reunite pets with their owners, help homeless animals and find new homes for animals. They also play a critical role in keeping pets in their homes. Innovative programs can focus on providing services to pet owners who might otherwise be forced to surrender or rehome their pet. Services that can help keep more pets in homes include providing pet food and supplies, community vaccination clinics, spay/neuter services, flea and tick treatment, temporary housing for animals and pet help lines. To prevent shelter euthanasia, spay/neuter services should be focused on communities with the largest rates of pet surrenders. A partnership between the shelter and the municipality could help deliver targeted services in a way that minimizes shelter intake over time.

VOLUNTEER, FOSTER AND ADOPTION NETWORK

A volunteer, foster and adoption network can play a critical role in improving animal welfare and reducing the number of animals surrendered to shelters from low-income communities. Volunteers can be recruited from the local community to help the shelter with fostering litters of puppies and kittens and animals that otherwise wouldn't thrive in a shelter environment. This helps not only the animals requiring fostering, but also frees up valuable space in the shelter. Volunteers can also be tasked with other duties related to spay/neuter and adoption, such as transporting animals to veterinary clinics and on-site support with adoption and outreach events.



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