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ORIGINAL RESEARCH ARTICLE

A Survey-Based Descriptive Study of Practices and Challenges in Animal Shelter Data Collection and Utilization in the United States

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Abstract

***Introduction*:** Effective data collection and use are critical to advancing animal welfare. However, the field still lacks universally accepted, standardized systems for data collection and management. Shelter Animals Count (SAC)-reporting shelters were surveyed to (1) learn more about national practices in data collection, analysis, and utilization; and (2) identify key barriers, which impede effective data management and use that could inform improvements in software platforms and data management in animal shelters.

***Methods*:** In this descriptive study, SAC distributed a 7-part online survey to SAC-participating shelters between February 26 and March 31, 2025. Questions covered shelter characteristics, respondent roles, and data management practices both for in-shelter animal data and community-facing services.

***Results*:** A total of 258 shelters contributed survey data. All study shelters collected animal intake and outcome data, but less than half used that data to target areas for improvement suggested by the data (e.g. rising intake of dogs). While most shelters collected non-intake, non-outcome data for individual animals, fewer (85.2%) summarized that data. Dedicated software was the most common collection method (88.9%) and was associated with budget. Only 50.8% of shelters provided specialized staff training for data entry. The most represented barriers to optimal non-intake, non-outcome data collection and utilization were staff resources, including expertise, training, and time. Only 21.4% of shelters were pleased with their current use of non-intake, non-outcome data and were not facing barriers. Despite widespread use of dedicated software, more than 60% of shelters wished for software that collected *all* the data they wanted and easily produced reports. Forty-nine percent wanted better training to use their software.

***Conclusion*:** Although shelter intake and outcome metrics are widely adopted and aligned with industry best practices, many shelters do not fully use these baseline measures for performance assessment, goal-setting, budgeting, or process improvement. The industry would benefit from baseline, shared definitions and metrics for key shelter functions beyond intake and outcome and easily produced standardized reports. Software companies, and AI tools, could be leveraged to help train and support shelters in collecting and managing their data. Data can also be organizational tools for enhancing transparency, celebrating wins, and identifying areas needing improvement.

Keywords: *Shelter Animals Count*; *metrics*; *statistics*; *software*; *population management*; *record-keeping*; *key performance indicators*

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The importance of collecting, analyzing and using quality data in animal shelters to improve local and national efforts to reduce animal homelessness and improve companion animal welfare is well-recognized in the literature.[1–5] Effective data collection, management, and analysis in shelters can enhance operational efficiency and resource allocation, and contribute to better outcomes for both animals and organizations.[5]

Despite the importance of quality data and a long-standing concern for shelter animal welfare in the

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United States, the field lacks standardized systems for data collection, analysis, and reporting – referred to as data management in this report.[1,3–5] National data reporting is not mandatory, making it difficult to establish comprehensive datasets and understand national trends. Shelter Animals Count (SAC) is the most widespread, voluntary reporting system of intake and outcome data.[6] As of the end of 2023, 2,599 shelters reported to SAC, representing approximately 50% of the estimated 4,900 shelters in the United States.[7] Only a few US states require shelter data reporting, limiting community efforts to monitor their progress.[5,6]

Shelters need to manage their data accurately and reliably to effectively care for animals, run a business, and serve their communities.[6] Reported barriers to data management have included poor record keeping, lack of training, limited resources,[3,4,5] and differences in prioritization or perceived importance of data collection by leadership versus frontline staff.[4,6]

Previous studies have used intake and outcome data to identify shelter trends – at local,[8] regional,[9,10] and national[1,11] levels. Also, shelter-level intake or outcome data have been used to demonstrate the effectiveness of a particular type of program, and/or quantify the program's impact on shelter operations as described in several studies of the impact of targeted trap-neuter-return programs on shelter intakes.[12–14] Other studies have investigated the challenges of inconsistent shelter data collection and entry,[15,16] which can have implications for animal health, length of stay (LOS), and outcome. For example, one study illustrated the inconsistency in data entry around surrender reasons, and visual identification of breed and color,[15] while another illustrated how inconsistent data entry made infectious disease tracking difficult and unreliable.[16]

The Massachusetts Animal Coalition (MAC) is a statewide tax-exempt, not-for-profit organization, which formed to promote collaborations among those who work across all sectors of animal welfare, including government and non-profit organizations, and professional staff as well as volunteers. In 2015, MAC commissioned a Shelter Statistics Task Force to survey Massachusetts' shelters to determine their data collection practices, uses, aspirations for data-related improvements, and constraints to effective data management.[5] Our study builds on their efforts, extending results to a larger geographic area and collecting additional information. SAC-reporting shelters were surveyed to (1) learn more about national practices in data collection, analysis and utilization within animal shelters, and (2) identify key barriers which impede effective management and use of information that could inform improvements in software platforms and data management practices in animal shelters, emphasizing accuracy, efficiency, and collaboration.

Materials and methods

This project was reviewed by Cornell University's Institutional Review Board (IRB) and was determined to be exempt from requiring IRB approval (Protocol IRB0148718).

A 7-part, online survey was created using Qualtrics® (December 2024) and incorporated a combination of multiple choice, multiple select, and short answer questions. Section 1 asked questions about shelter characteristics (e.g. source of funding, location(s), length of operation, intake, budget) and the position of the respondent (e.g. data manager, executive director). Section 2 asked questions regarding data collection about animals in care (e.g. software platforms or other methods, staff involved, and staff training). Sections 3 and 4 covered how intake and outcome data were used by the organization, both internally and externally. Section 5 asked about other types of in-shelter data, including medical and behavioral data. Section 6 was an optional component for organizations also performing Community Services (e.g. medical care for owned pets, TNR, pet food bank, field services) for which they were collecting and utilizing data. Section 7 primarily captured barriers to and aspirations for data collection and utilization. A copy of the survey is included in Supplemental Data. The survey was pilot tested with 23 respondents known to the authors, some of whom work in SAC reporting shelters and some of whom are in the field of academic shelter medicine. The survey was revised before distribution.

Between February 26 and March 31, 2025, SAC distributed electronically an online survey to 2,599 organizations with a physical facility participating with SAC during 2023. Rescues and organizations without physical facilities were excluded. Shelters were asked to designate 'a person with significant knowledge of data collection and usage within the organization' to complete the questionnaire and the request specified one response per organization. SAC promoted the study during animal welfare conferences to encourage participation. Two email reminders were sent at 2 and 4 weeks after the initial contact, for a total of 3 promotions before the survey was closed. Participating shelters were offered a chance to register for a drawing for 1 of 10 $50 Amazon gift cards. All responses were anonymous; the identity of organizations participating in the drawing was not linked to their survey responses.

Definitions

Organizational type (e.g. municipal, private shelters with or without animal control contracts) and other descriptive organizational information (e.g. intake size, budget, regional location) were self-reported. The term shelter(s) refers to organizations with one or more locations. In this manuscript, the terminology 'private shelters', when

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used, refers to both types of private shelters combined. Data types were defined at the start of each section to standardize respondents' understanding when responding to questions. *Animal-related data* were defined as information related to intake, outcome, preventive healthcare, and surgical, medical, and behavioral care and conditions. *Intake data* included animal characteristics (e.g. species, breed, color, age, sex, alter status, size), identifications (e.g. microchip), intake types (e.g. stray, owner surrender, transfer in, seizure, born in care), and intake reasons (e.g. animal behavior, animal medical, owner moving). *Outcome data* were described as including outcome types (e.g. return to owner, transfer out, adoption, return to field, lost in care, died in care, or euthanasia). *Non-intake and non-outcome data* definitions included in-shelter medical care, surgeries performed, and behavior observations.

The definition of data utilization was divided into *internal*-and *external-facing* uses. *Internal-facing* uses included sharing summarized data within the shelter to inform operational and programmatic decisions, and to inform shelter personnel (staff and volunteers). *External-facing* uses included using summarized data in communications to people and organizations outside of the shelter.

Statistical analysis

Data were downloaded from Qualtrics® to Microsoft Excel®. The data were cleaned and coded or categorized (e.g. 'other' answers were categorized) in Excel and uploaded into Statistix®[17]and OpenEpi[18] for analysis. Since this was a descriptive study, emphasis was put on summarizing data rather than performing comparisons within the dataset. Ninety-five percent confidence intervals were not added to estimates because the responding shelters were a self-selected group of SAC-reporting shelters and were not representative of even all SAC-participating shelters (see data in the Results section). When made, any comparisons between categorical variables were evaluated with the Chi Square Test of Independence.[19] When at least one expected value was <5 in a 2X2 table, Fisher's exact test was used.[19] If at least one cell contained an expected value of <1, or more than 20% of expected values were less than 5, Fisher-Freeman-Halton exact test for RXC tables was used.[20] When comparing the expected distribution of a categorical variable to the observed distribution, the Multinomial test was used.

Since this was an exploratory and hypothesis generating study, no corrections for multiple comparisons were made. Values of $P \leq 0.05$ were considered statistically significant. Number (n) values provided at the top of tables represent the number of shelters responding to that inquiry. Some shelters did not respond to all questions, and missing data were handled by pairwise deletion. Many of the individual survey questions were multiple-response questions where respondents could choose more than one answer. For these questions, percentages for individual responses do not sum to 100%.

The Community Service data are not included in this manuscript but will be presented in a subsequent article.

Results

Three hundred five responses were received; 47 were eliminated with <15% of the questionnaire completed, leaving 258 shelters that contributed survey data. Shelters completing less than 15% of the questionnaire were excluded because they provided only data describing their shelter (e.g. intake, budget, age, location) and answered no questions regarding their data collection or usage. One foster-based shelter with a physical adoption facility was included in most analyses except those broken down by shelter type (i.e. municipal, private no contracts, private with contracts). Twenty-four organizations (24/258; 9.3%) had more than one location (Table 1).

In 2023, SAC had 637/2,599 (24.5%) private shelters with animal control contracts, 1,166/2,599 (44.9%) without contracts, and 796/2,599 (30.6%) government shelters (Samantha Hill, e-mail communication, March 2026). The overall response rate was 9.9% (258/2,599). Only 21/257 (8.2%) of shelters in this study were private shelters with animal control contracts and more were private without contracts 138/257 (53.7%) and municipal shelters 98/257 (38.1%). Using the SAC distribution of shelter types as the expected distribution, the distribution of the 257 shelters by type in this study differed from the SAC distribution χ^2 (2, N = 257) = 37.17, $P < 0.001$. The regional and geographic location/population density distributions are in Supplementary Tables 1 and 2.

Municipal shelters were more likely to be open admission shelters and less likely to manage admissions. Intake numbers were smaller in private compared to municipal shelters. Among the 243 shelters responding to the question of size of budget, private shelters with animal control contracts had lower budgets than organizations, which were only private χ^2 (2, N = 152) = 11.47, P = 0.003 or municipally supported χ^2 (2, N = 111) = 7.27, P = 0.026. No significant difference in size of budget between private without contracts and municipal shelters was found χ^2 (2, N = 223) = 2.14, P = 0.344. The budget categories greater than $1,000,000 were collapsed into one category (>1,000,000) because of the small numbers of shelters with budgets above one million dollars (Table 1).

Respondents held various positions within participating shelters. The most common positions held by respondents (n = 257) were executive leadership (51.8%), department head (29.2%) or data management (27.6%). Other respondents were on the medical (9.7%), behavioral (3.1%) or animal care teams (13.6%), or in development (11.3%). Some respondents held more than one position.

Table 1. Descriptive characteristics of 257[a] participating shelters

Characteristic	Response	All types of shelters (*n* = 257)[a]		Private with animal control contracts (*n* = 21)		Private: without animal control contracts (*n* = 138)		Municipal (*n* = 98)	
		No.	%	No.	%	No.	%	No.	%
Admission type	Open	50	19.5	1	4.8	11	8.0	38	38.8
	Limited	42	16.3	2	9.5	28	20.3	12	12.2
	Managed	165	64.2	18	85.7	99	71.7	48	49.0
Organization Age (years)	<1	-		-		-		-	
	1–10	28	10.9	7	33.3	10	7.2	11	11.2
	>10	212	82.5	12	57.1	121	87.7	79	80.6
	Unsure/no answer	17	6.6	2	9.5	7	5.1	8	8.2
2023 Intake	≤1,000	127	49.4	15	71.4	73	52.9	39	39.8
	1,001–5,000	99	38.5	5	23.8	51	37.0	43	43.9
	5,001–10,000	19	7.4	-		11	8.0	8	8.2
	>10,000	12	4.7	1	4.8	3	2.2	8	8.2
2023 Budget ($)	≤500,000	100	38.9	13	61.9	49	35.5	38	38.8
	500,001 – 1,000,000	51	19.8	6	28.6	24	17.4	21	21.4
	1,000,001 – 10,000,000	82	31.9	-		54	39.1	28	28.6
	>10,000,000	10	3.9	1	4.8	5	3.6	4	4.1
	No answer	14	5.4	1	4.8	6	4.3	7	7.1
More than 1 location	Yes	24	9.3	4	19	18	13	2	2
	No	233	90.7	17	81	120	87	96	98

[a]One responding shelter has an adoption center but is foster based. Data are not shown for this shelter.

Methods of data collection regarding animals in a shelter's care

Shelters could identify more than one method of data collection. Of the 252 shelters responding to this question, dedicated software (88.9%) was the most common method for collecting at least some data; many shelters continued to collect data on paper (21.4%), and some (15.1%) used a self-designed electronic database using programs such as Excel, Numbers, or Google Sheets. Of those using dedicated software, 80.8% used it exclusively; 9.8% used it with paper and 3.6% used it with an electronic program; 5.8% used all three methods. A small percentage of responding shelters used paper only (4.4%) or used only a self-designed electronic database (3.6%). Only 10 of 245 shelters (4.1%) had used their method(s) of data collection for <1 year, and most (66.8%) had used their method(s) for >5 years.

Budget size was associated with a shelter's use of dedicated software. The Fisher's exact test indicated that shelters with a budget of ≤$500,000 were significantly less likely to use dedicated software than those with budgets $500,001–1,000,000 ($P = 0.011$) or > $1,000,000 ($P < 0.001$). Of the 27 shelters not using dedicated software, 48.1% cited cost, and 37.0% responded it was not necessary. Other reasons included lack of hardware/internet access (7.4%), lack of technology savvy staff (29.6%), lack of awareness that software exists (7.4%), incompatibility with other software used (3.7%), data security concerns (3.7%) and no time (7.4%) to learn. One shelter was currently transitioning to dedicated software.

While 224 shelters reported using dedicated software, only 222 shelters answered the question about what dedicated software they used. Three of these could not name the program. Among shelters reporting a name the most frequently used software programs in this sample were PetPoint (32.0%), ShelterLuv (27.9%) and Chameleon (12.3%). Other shelters used one of a myriad of shelter programs. See Supplementary Table 3.

Staff training

Only 124 of 244 (50.8%) participating shelters provided specialized staff training for data entry. The percentages by type of shelter were 55% (for both private shelters with [11/20] and without animal control contracts [72/131]), and 43.5% (40/92) for municipal shelters; these differences were not statistically significant χ^2 (2, $N = 243$) = 3.02, $P = 0.221$. Similarly, size of budget was not associated with whether or not staff were trained to collect or enter data χ^2 (2, $N = 205$) = 2.45, $P = 0.294$.

Intake and outcome data

All study shelters collected animal intake and outcome data for varied use across shelters.

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Table 2. Uses of animal INTAKE data for internal- and external-facing activities among shelters summarizing data

Uses for *summarized* intake data	Internally (n = 232)[b]		Externally (n = 234)[b]	
	No.	%	No.	%
Track shelter trends	157	67.7	NC[a]	
Report to leadership, staff, board members	207	89.2	NC	
Report to government, public	NC		205	87.6
Calculate/share statistics	195	84.1	191	81.6
Help formulate budgets	134	57.8	NC	
Track animal inventory	188	81.0	NC	
Set goals, assess program performance	125	53.9	NC	
Target areas for improvement	99	42.7	NC	
Compare to other organizations	NC		110	47.0
Request funding (grants, government support)	NC		194	82.9
Encourage collaborations	NC		127	54.3
Other	5	2.2	2	0.9

[a]NC: Not Collected (Data were not collected in survey/question not asked for group).
[b]Number (n) values provided at the top of columns represent the number of shelters responding to that multiple-response question. The number values vary since some shelters did not respond to all questions in the survey.

Table 3. Uses of animal OUTCOME data for internal- and external-facing activities among shelters summarizing data

Uses for *summarized* outcome data	Internally (n = 231)[b]		Externally (n = 236)[b]	
	No.	%	No.	%
Track shelter trends	202	87.4	NC[a]	
Calculate/share statistics	205	88.7	206	87.3
Help formulate budgets	143	61.9	NC	
Set goals, assess program performance	155	67.1	NC	
Target areas for improvement	104	45.0	NC	
Compare to other organizations	NC		112	47.5
Request funding/justify expenses (grants, government support)	NC		189	80.1
Fundraising (solicit donations)	NC		161	68.2
Encourage community collaborations	NC		130	55.1
Report to government, potential adopters, public	NC		214	90.7
Other	2	0.9	1	0.4

[a]NC: Not Collected (Data were not collected in survey/question not asked for group).
[b]Number (n) values provided at the top of columns represent the number of shelters responding to that multiple-response question. The number values vary since some shelters did not respond to all questions in the survey.

Uses of intake data (Table 2)

Few shelters (of the 240 shelters responding) did not use their summarized intake data to help inform internal (3.3%: 8/240) or external (2.5%: 6/240) activities. Of the eight shelters not using their summarized intake data for internal operations, all handled ≤1,000 animals and had budgets ≤$500,000. Of the six shelters not using their data for external purposes, five (83.3%) had intake ≤1,000 animals and budgets ≤$500,000. Among the shelters using summarized intake data, over 80% used it for reporting to staff and board members, to government and/or the public, to request support (e.g. grants, government), to calculate statistics (e.g. LOS, live release rate) or to track animal inventory shared internally and/or externally. Only 53.9% used intake data to set goals or assess program performance and 42.7% used these data to improve intake issues. Other uses for intake data (either for internal or external purposes) are detailed in Table 2. Denominators are provided in Table 2.

Uses of outcome data (Table 3)

Similar to intake data, only a few shelters did not use their summarized outcome data for internal (2.1%: 5/236) or external (0.4%: 1/237) uses. Of the five shelters not using their summarized outcome data for internal purposes, 80% (4/5) had intake ≤1,000 animals and budgets ≤$500,000.

Tracking trends and calculating statistics were the most common uses of outcome data for internal purposes. Only 45% of 231 shelters used their outcome data to target areas for improvement. Almost 70% of 236 responding shelters reported using their outcome data for soliciting donations. When these data were broken down by type of shelter, this percentage was 86.6% among private shelters with no contracts, 65% of private organizations with control contracts and 43.2% among municipal shelters. All other uses were similar between private and municipal shelters.

Non-intake, non-outcome animal-related data

Of the 235 shelters responding, 227 (96.6%) collected non-intake, non-outcome data regarding individual animals. Of the 223 shelters responding to the question about summarizing non-intake, non-outcome data, 190/223 (85.2%) summarized that data – for either internal or external use. Six of eight shelters not collecting non-intake, non-outcome data were municipal, and five of eight had both intake of <1,000 animals and budgets <$500,000. The collection and summarization uses of non-intake, non-outcome data are reported in Fig. 1. A few shelters collected other information, including animal stage/location, weight over time, previous owner, special pleas for rescue/transfer, cruelty, a doggy-day-out program, and treatment expenses.

Spay/neuter surgery data overall (92.6%) and by species (80.0%) (data not in Fig. 1) were the most frequently summarized non-intake, non-outcome data. Medical and behavioral data were much less frequently summarized (Fig. 1).

Uses of and barriers to using non-intake, non-outcome data (Tables 4 & 5)

Reporting to shelter leadership and staff (91.3%) and to government or the public (90.6%) were the most frequent uses of data internally and externally, respectively. Only 1/185 shelter (0.5%) failed to use summarized non-intake, non-outcome data internally and only 4/185 (2.2%) externally. Internally, formulating budgets, tracking trends, and informing staff and board members were common uses; around two-thirds of shelters used the data to set goals, while less than 50% used them to target areas for improvement. Of shelters that summarized non-intake, non-outcome data for internal purposes, 54.9% reported using them to boost staff and volunteer morale. External uses, besides those mentioned above, included requesting funding as part of organizational budget requests, fundraising from donors, and encouraging collaboration (Table 4). Denominators are shown in Table 4.

Overall, only 21.4% of 224 shelters were pleased with the current use of their non-intake, non-outcome data

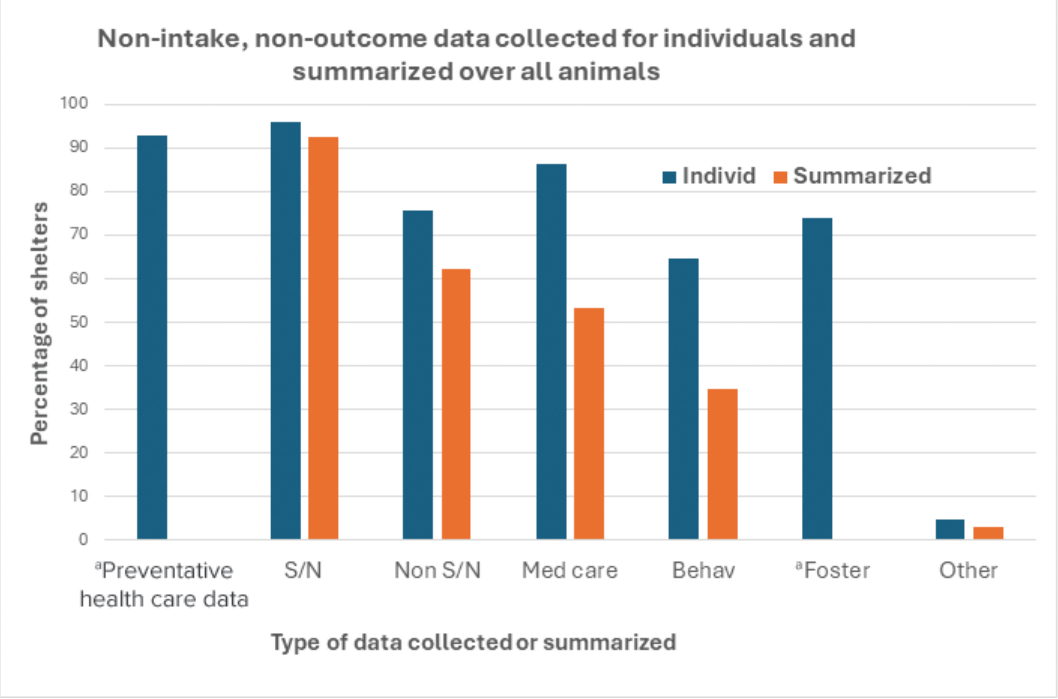

Fig. 1. Non-intake, Non-outcome Data Among Shelters Collecting Individual Animal Data (N = 227) and Summarizing that Data Over All Animals (N = 190). [a]NC: Not Collected (Data were not collected in survey/question not asked for group).

1. Preventative health care data (e.g., vaccines, deworming, daily monitoring); 2. S/N = Spay/neuter surgery data (e.g., type of surgery and date); 3. Non S/N = Non spay/neuter surgery data (e.g., type of surgery and date); 4. Med care = Veterinary care data (e.g., medical diagnoses, treatments beyond preventative care and spay/neuter); 5. Behav = Behavior data (e.g., behavioral diagnoses, behavior plans, exercise notes); 6. Foster = Foster Information.

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Table 4. Uses of non-intake, non-outcome summarized data for internal- and external-facing activities among shelters summarizing data

Uses for summarized non-intake, non-outcome data	Internally (n = 184)[b]		Externally (n = 181)[b]	
	No.	%	No.	%
Track trends	136	73.9	NC[a]	
Report to leadership, staff, board members	168	91.3	NC	
Report to government, public	NC		164	90.6
Help formulate budgets, funding needs (government, grants)	138	75.0	154	85.1
Set goals, assess program performance	119	64.7	NC	
To fundraise	NC		130	71.8
Target areas for improvement	91	49.5	NC	
Compare to other organizations	NC		85	47.0
Encourage/establish community collaborations	NC		107	59.1
Boost staff and volunteer morale	101	54.9	NC	
Other	0	-	0	-

[a]NC: Not Collected (Data were not collected in survey/question not asked for group).
[b]Number (n) values provided at the top of columns represent the number of shelters responding to that multiple-response question. The number values vary since some shelters did not respond to all questions in the survey.

Table 5. Barriers to Using Non-intake, Non-outcome Data[b]

Barriers	All Types of Shelters (n = 223)[a,b]		Private With Animal Control Contracts (n = 19)[a]		Private Without Animal Control Contracts (n = 118)[a]		Municipal (n = 86)[a]	
	No.	%	No.	%	No.	%	No.	%
Lack of personnel to enter data	68	30.5	6	31.6	37	31.4	25	29.1
Lack of time to enter data	92	41.3	6	31.6	51	43.2	35	40.7
Software challenges (e.g., insufficient data entry options, poor reporting capability)	74	33.2	3	15.8	41	34.7	30	34.9
Hardware/equipment limitations	33	14.8	4	21.1	20	16.9	9	10.5
Lack of staff training	84	37.7	10	52.6	43	36.4	31	36.0
Lack of personnel/expertise to manage/analyze data	103	46.2	7	36.8	55	46.6	41	47.7
Lack of time to analyze data	99	44.4	5	26.3	54	45.8	40	46.5
Happy with current data use: no barriers	47[a]	21.1	3	15.8	21	17.8	23	26.7
Other	7	3.1	2	10.5	3	2.5	2	2.3

[a]Number (n) values provided at the top of columns represent the number of shelters responding to that multiple-response question.
[b]One responding shelter has an adoption center but is foster based. Data are not shown for this shelter in this Table.

and were not facing barriers. For the shelters reporting barriers to using these data, lack of personnel/expertise to analyze the data and lack of time to enter or to analyze data were the most frequent barriers (Table 5). The frequency of barriers was similar across types of shelter.

What shelters wanted

In an open-ended question, shelters reported numerous questions they wished to answer. Answers varied widely, as did their method(s) of collecting data. Broadly grouped, responses reflected key desires: to track animal -specific information such as behavioral issues, foster care use and infectious diseases; to do more granular analyses (e.g. euthanasia by reason, LOS by size or age or by various periods of time); to analyze medical costs; to visualize animal movement within the shelter; and to enhance compatibility of data reporting across granting agencies.

When asked what might help them use their data more extensively, more than 60% (among 159 shelters responding) wanted to learn more about how data could improve animal and shelter management (Table 6). Over 50% needed more staff and training in data management. Despite widespread use of dedicated software, more than 60% of shelters wished for software that collected *all* the data they wanted and easily produced the reports they desired. Forty-nine percent wanted better training to use their software (Table 6).

Discussion

Animal shelters face the complex challenge of reducing pet homelessness, ensuring optimal welfare for animals in

Table 6. What shelters believe would help them do more with their data

Assistance needed	(*n* = 159)[a]	
	No.	%
Learning more about how data:		
Could enhance animal care	103	64.8
Could facilitate shelter management	102	64.2
Having more:		
Staff for data collection	80	50.3
Staff for data management/analysis	88	55.3
Software to collect ALL the data wanted	98	61.6
Software that easily produces all the reports we want	109	68.6
And better training to use our software	78	49.1
And better training around data management	93	58.5
And better hardware and technology resources	53	33.3
Other	9	5.7

[a] Number (*n*) values provided at the top of the column represent the number of shelters responding to the multiple-response question. Some shelters did not respond to all questions in the survey.

their care and maximizing live release rates, often while operating with highly constrained budgets. Collecting, analyzing, and applying high-quality data is essential to achieving these goals. However, many shelters lack the resources, expertise, or infrastructure needed to use data effectively.[4,5,6]

Over time, the ease of data collection and analysis has improved through the efforts of SAC, software companies, animal welfare organizations, and other initiatives. SAC has (and is continuing) to address many of the challenges to reliable data collection, analysis, and interpretation, particularly with regard to intake and outcome data. Work includes standardization of common statistics and definitions of intake and outcome categories, expansion of data collection for community services and multiple species, incentivization for data collection/reporting, facilitation of analyses, and more. Several animal welfare organizations offer resources (e.g. training modules) to assist individual shelters with data management and collect data themselves as part of targeted dashboards or projects, but procedures and findings are not applicable to many other shelters. Additional research on what kinds of support and tools are currently available to organizations and how organizations engage with these resources is required.

Collection

As participants in SAC, the shelters in this study all collected data regarding their intakes and outcomes. They had made hardware, software (dedicated and self-designed), time, and personnel investments in data collection. These shelters used a variety of methods to collect their data. Many more shelters in this study used dedicated software (88.9%) than those studied in Massachusetts in 2015 (32.7%),[5] and about the same percentage used a self-designed database (e.g. Excel). Only 4.4% used only paper, considerably fewer than the 36.4% of shelters in the Massachusetts study.[5] These differences likely represent changes in data collection methods over time (e.g. software availability), as well as sampling differences between studies and shelter characteristics.

The use of software facilitates data collection, but software platforms don't all collect or define the same data fields and vary in their data management and reporting capabilities. Standardization of variable collection and definition across platforms would help address this issue. Forty-nine percent of shelters in this study reported better training to use their software would help them use their data more extensively. Shelter software is a competitive market, and software providers could better leverage comprehensive, responsive training and support for shelters rather than responding to ad hoc questions from individuals.

Relatively few shelters cited hardware or other equipment limitations, but one-third thought better hardware and technology resources would help them make better use of their data (Table 6). Perhaps, focused granting opportunities and government investments could minimize this issue, especially targeting small shelters. Unfortunately, research suggests that in some areas retrieving data from public shelters is difficult,[21] and that improving shelter data is a low priority for fully or partially funded public shelters.[5]

Valid and reliable shelter data, coupled with consistent and complete collection, affect the usefulness of data (both internally and externally). Studies in shelters have revealed multiple challenges to achieving reliable data collection, including several captured in this study. For example, among the SAC participants in this study, almost 50% failed to train staff in data collection, regardless of type of shelter or size of budget. Ly & Protopopova demonstrated that reasons for owner surrender, coat color & breed were not reliably entered using shelter software in an online experiment involving 81 shelter staff responding to fictional surrender scenarios. That study suggested clear operational definitions and consolidation of categories for data fields such as breed might increase reliability but would require staff training.[15] In another study, disease surveillance and identification of cats at risk for respiratory infections were not possible in a shelter employing a popular dedicated shelter program due to poor data quality and incomplete capture.[16] Among other approaches, quality training of those collecting data would help address these issues. Historically, the burden has been placed on individual shelters to provide such training, but

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more efforts could be assumed by a third party, such as software management companies or large, well-resourced animal welfare organizations, to more effectively accomplish this task. Such an effort would also benefit standardization of data collection.

Analysis and interpretation

To incentivize shelter personnel to collect data, they must see the value, particularly in comparison to other priorities competing for limited resources. Despite the availability of computers and software, many shelters collected data they underutilized. Lack of knowledge regarding use or retrieval from software, lack of time or expertise or insufficient staff, and inability to produce needed reports were cited by many shelters. Despite these challenges, more than 60% of respondents expressed an interest in learning more about how data could enhance animal care and shelter management. Some educational resources currently exist, but increasing data management uptake, and real-time assistance to shelters on a large scale remains a major challenge. Identifying common goals in data management, standardized definitions within platforms, and key metrics for in-shelter activities could represent another community-level improvement. Likewise, intentional support of organizations in interpreting their own data and applying data to decisions may help engagement with data management practices for organizations of all sizes.

Data utilization

Survey responses indicated a relatively high utilization (over 80%) of intake and outcome data (e.g. intake numbers, adoption rates) shared both internally and externally. This reported usage is consistent with industry best practices,[22,23] enhances transparency, and facilitates access to funding and community support. The high level of intake and outcome data utilization may be attributable to shelters' routine exposure to monthly Animal Intake/Outcome Reports generated by SAC, coupled with the longstanding emphasis placed on these metrics as foundational principles of animal welfare practice.[22,23] Organizations who fail to collect and report data effectively risk losing public trust and miss opportunities for government funding and grants, particularly from agencies that require rigorous data reporting requirements as a condition of support.

Less than half of reporting shelters used intake and outcome data to address issues suggested by the data (e.g. rising intake of stray dogs or unneutered dogs), missing opportunities to develop initiatives to address these issues. Less than 60% of reporting shelters used intake data when formulating budgets or assessing the effectiveness of programs. These findings suggest shelters would benefit from additional support in both operational and business management, particularly when demonstrating the critical use of data. Key Performance Indicators (KPIs) are commonly used in business settings as quantifiable measures of organizational performance in meeting key objectives. LOS represents one common KPI used in shelters currently, but varied software programs calculate it differently, and measures can be greatly impacted by variations in data entry. A broader set of baseline metrics, such as incidence of medical and behavioral conditions and interventions, would greatly contribute to improving outcomes for shelters and the animals in their care.[6] Data surveillance of KPI measures through dashboards or other data tools would provide real-time insight into trends within shelter activities.

Only approximately half of responding shelters used data to benchmark against other shelters and to collaborate. Enhanced data utilization and sharing can strengthen the operational capacity of individual shelters while simultaneously fostering innovation and collaboration across an entire network of welfare organizations. Evidence has shown collaboration between shelters and transparent sharing of data can lead to significant increases in lifesaving, particularly in communities with the possibility of collaboration between municipal and non-profit entities.[4] Community cooperation models between organizations can take many forms; partnerships and interventions will vary depending on organizational goals, philosophies, resources, and needs.[4] When organizations work together and share data, they can balance each other's strengths and deficits, allowing all partners – and the community as a whole – to achieve better outcomes.

Non-intake, non-outcome individual and aggregated animal data

Providing optimal care for resident animals also depends on good data regarding physical and behavioral health. More than 90% of shelters collected data regarding preventative healthcare (e.g. vaccinations, deworming, daily monitoring, spay/neuter surgery), indicating successful adoption of these core preventative medicine programs in shelters.[22,23] However, more granular but consistent capture of medical and behavioral services beyond basic preventive care is a challenge in current shelter software programs, both for individual animals and for populations. Specialized medical and behavioral interventions, along with other emerging best practices in shelter management, have proven effective in reducing euthanasia rates.[11] Collecting these data in aggregate would enable researchers to continue making evidence-based recommendations to advance shelter medicine practice.

Significant barriers exist to data management

Managing resources wisely relating to in-shelter services (e.g. S/N surgeries, medical and behavioral care) requires data. Not surprisingly, the most frequent barriers to

optimal data collection and utilization included lack of staffing and other resources (e.g. expertise, training and time). Also, when asked what might help them utilize all data more effectively, shelters similarly wanted more staff and other resources. Of note, private shelters with contracts reported significantly lower annual budgets than either private-only or municipal shelters; reported barriers to the use of non-intake, non-outcome data were not statistically different, however, across types of shelters. Perhaps the addition of a municipal role in a private organization, without adequate funding to support that role, results in resource challenges impacting staff time, training, and data management; however, analysis of the costs and benefits of this model was beyond the scope of this study.

Predictably, budget was a significant factor in whether shelters used dedicated software to manage data. Overall, access to hardware/equipment as a barrier was relatively low (14.7%), although slightly higher in private shelters than in municipal shelters. Data reporting requirements common in municipalities may drive the presence of the equipment meant to enable data management. When asked what would increase their utilization of data, however, one-third of shelters wanted better hardware and technology resources. Again, granting opportunities targeted at improving data management could help, as well as increased training regarding the importance and overall management of data. Software companies should ensure their customers are using software optimally as discussed above. Doing so could enhance retention and attract additional customers.

The importance of data in boosting morale

More than half of shelters summarizing data for internal purposes reported using non-intake, non-outcome data to boost staff and volunteer morale. We included 'boosting morale' as a possible use of non-intake and non-outcome data for internal operations but neglected to include this as a choice for possible uses of intake and outcome data. Despite this omission, a few respondents independently wrote in 'boosting morale' as an 'other' reason. These responses indicate that some organizations use data for morale-building purposes. Shelter staff often derive compassion and satisfaction from seeing the positive impact of their work, whether through adoption outcomes, animal recoveries, or other moments highlighting why the work matters.[24] Ultimately, some respondents viewed data as a tool for morale building. Even when not prompted, respondents reported using data summaries to highlight positive outcomes, recognize staff efforts, and reinforce the value of their work. The pattern appeared across non-intake, non-outcome data and intake/outcome data alike. While numerous studies exist describing the impacts of compassion fatigue and moral distress in animal welfare,[24–32] more evidence is needed to support the use of data as a culture tool.

Study limitations

Self-reported survey data are prone to errors associated with inaccurate or biased responses. For example, people in numerous positions completed the surveys, raising questions about the quality of their knowledge and comparability of data across shelters. Some risks were at least partially mitigated by using standard questions, requesting the most knowledgeable staff respond, and by pilot testing. Also, this study recruited shelters already reporting to SAC, which requires at least a minimum of data collection and, presumably, some value placed on data by the organization. Only an estimated 53% of US shelters currently report to SAC, and of these, approximately 10% responded, raising questions of generalizability. The under-representation of private shelters with contracts in relation to all SAC shelters strengthens the concern for bias. These discrepancies should be considered when deciding how representative participating shelters were of all shelters, or even of all SAC shelters. Also, results based on small numbers (particularly of the private shelters with contracts) should be viewed cautiously, especially when tempted to make comparisons across shelter types. Statistical comparisons were minimized for these reasons. The assumption was made that all shelters in an organization conformed to the same data collection and usage protocols. This may not be true. Only 9.3% of responding organizations had more than one location. Finally, there are no perfect surveys. Upon reflection, some wording of questions in the survey, such as 'shelter setting' or 'better training', may not have been standardly understood or were difficult to answer with clarity (e.g. what does 'collect' data mean?); this made data interpretation difficult at times. While some responses in this study may not be representative, the basic findings (particularly with regard to barriers shelters face) confirm the results of numerous other studies and the personal experience of the investigators.

Further research is needed to characterize and address the barriers to robust data practices and explore interventions such as simplified reporting tools, improved data platforms, workflow redesign, interactive dashboards, and targeted training programs. Additional research investigating the impact of data sharing and collaboration among shelters could provide insight into which partnership structures, data sharing frameworks, and collaborative interventions are most effective across diverse community contexts.

Conclusion

Although intake and outcome metrics were collected in sampled shelters (aligned with industry best practices),

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many SAC-reporting shelters did not fully use even these baseline data for performance assessment, goal-setting, budgeting, or process improvement. If shelters don't realize the value, data will not be collected, or will be collected in a haphazard manner, limiting its usefulness. Flawed or incomplete data at the shelter-level limits its usefulness at community-, regional- and national-levels.

In addition, industry agreement on baseline, shared definitions and metrics for key shelter functions beyond intake and outcome is also needed. Only 21.4% of shelters were pleased with their current use of non-intake, non-outcome data and were not facing barriers. SAC has already created a baseline Community Services Matrix and collects spay/neuter information for shelters. Adding standard baseline matrices for medical, behavioral, and foster care could better direct existing and developing shelter software platforms and provide more comprehensive representation of the work shelters do in these areas. Software companies, and AI tools, could be leveraged to help train and support shelters in collecting and managing their data.

Respondents identified data as a means to highlight positive outcomes, recognize staff efforts, and reinforce the value of their work. Data may be useful as organizational tools for enhancing transparency, celebrating wins, and identifying areas needing improvement.

Authors' contributions

JR– survey creation, data curation, data analysis, writing – original draft. JS – conceptualization, methodology, data curation, data analysis, writing – review & editing. SH – survey creation, writing – review. AR – conceptualization, survey creation. EB – conceptualization, methodology, data curation, writing – review & editing.

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Conflict of interest and funding

At the time this study was conducted, SAC was an independent non-profit organization; however, by the time of publication, SAC had been acquired by the ASPCA as part of an initiative to ensure sustainability. With the acquisition, ASPCA and SAC are committed to protecting the integrity of the data and the accessibility of the tools shelters rely on. One of the authors is affiliated with the ASPCA, one is employed by SAC, and one is employed by a program which receives funding from Maddie's Fund®. No external funding was provided specifically for this research.

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