



Impact Analysis and Social Return on Investment

Technical Document for:

Mission Animal Hospital

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TECHNICAL DOCUMENT FOR MISSION ANIMAL HOSPITAL

ECOTONE ANALYTICS IMPACT ANALYSIS

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About this Report

Ecotone Analytics conducted this impact analysis and calculated the projected social return on investment for Mission Animal Hospital. This report considers the impact generated from their Mission Program which serves low-income pet owners in the Twin Cities through multiple strategies.

About Ecotone Analytics

Ecotone Analytics is an impact accounting organization that does benefit-cost analysis for clients' social and environmental impacts. Combining evidence-based research analysis and monetization of impact outcomes, Ecotone derives a social return on investment ratio and identifies the key stakeholder groups to whom those impact benefits accrue. Results are communicated using a proprietary visualization of the flows of value that result from the initial investment.

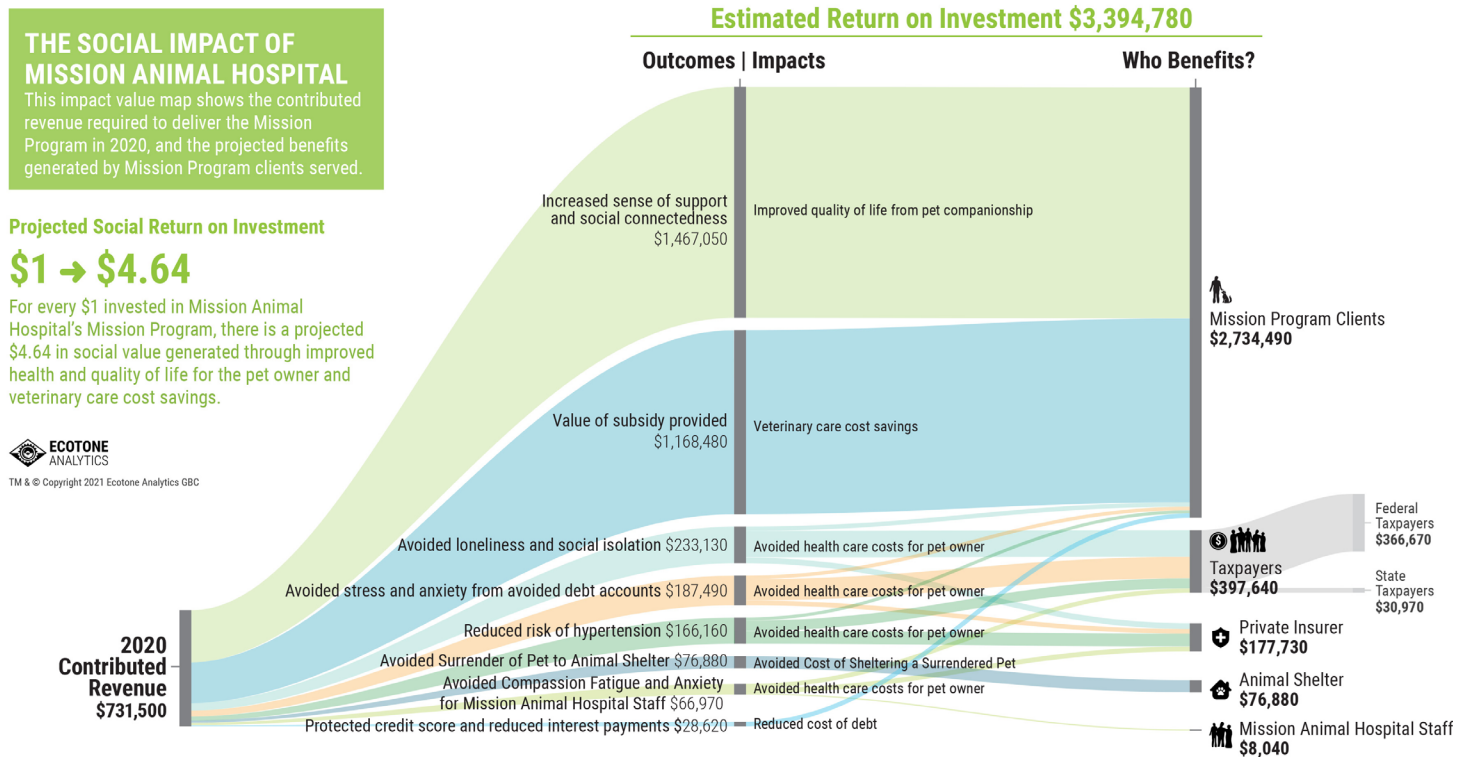
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IMPACT VALUE MAP

THE SOCIAL IMPACT OF MISSION ANIMAL HOSPITAL

For every \$1 invested in Mission Animal Hospital’s Mission Program, there is a projected \$4.64 in social value generated through improved health and quality of life for the pet owner and veterinary care cost savings.



ECOTONE ANALYTICS
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EXECUTIVE SUMMARY

Ecotone Analytics conducted an impact analysis and calculated a social return on investment (SROI) for Mission Animal Hospital's (MAH) Mission Program, a set of services tailored to low-income clients. As a 501(c)(3) organization, MAH offers a bevy of unique services in the veterinary medicine space including spectrum of care practices and within the Mission Program, services such as subsidized pricing based on a sliding scale income, payment plan flexibility, and other innovative solutions to reduce barriers and increase accessibility.

This analysis began with an agreed upon depiction of MAH's Logic Model, i.e. the roadmap for how a given set of inputs and activities will generate the outcomes and impact desired. From there, external literature's study of the effects of veterinary care, the impact of cost burden for pet owners, the health benefits of pet ownership, the impact of medical debt and debt accounts on households, the multi-faceted effects of a spectrum of care practice, among other subjects impacted by the MAH, all informed the identification of outcomes to monetize. Following our research and analysis, we project that the SROI on contributed revenue for MAH will be approximately \$4.64 when serving low-income pet owners by the Mission Program.¹ That is, for every \$1 dollar contributed to MAH to deliver the Mission Program provided to low-income pet owners, a projected \$4.64 in social value will be generated, with benefits flowing largely to the pet owners engaged but also to taxpayers through avoided Medicare and Medicaid expenditures,

private insurers, animal shelters and even MAH staff. The largest outcome monetized was the improved quality of life and sense of social support experienced by the pet owner from avoided surrender of a pet.

Based on this analysis, we have identified recommendations for future impact measurement, operational management, and strategic opportunities to consider pursuing. This includes leveraging the UN Sustainable Development Goals as well as the Impact Management Project's 5 dimensions of impact to communicate the type of change being facilitated by MAH. Similarly, the continued use of and further development of the internal data system used to track clients will help to recognize the needs clients are facing, the extent MAH is addressing those needs, areas for program improvement, and improved understanding of the impact attributable to MAH. Further discussion on recommendations are included starting on page 24.

¹ The SROI here is communicated as a benefit-cost ratio. SROI can also be communicated as a percent return, similar to a financial ROI which reflects a net SROI. Using the two definitions, MAH's SROI can be framed as \$4.64 or 364%. Each is valid although we utilize the benefit-cost ratio framing throughout for consistency and to minimize potential confusion



INTRODUCTION and RESEARCH QUESTION

Mission Animal Hospital (“MAH”) is a full service, non-profit veterinary clinic focused on providing high quality veterinary care for those in need, with a particular focus on low income groups, the unemployed, and the elderly. Along with affordability, MAH strives for accessibility, available seven days a week, offering appointments, Urgent Care, and surgery daily. MAH strives to reduce all barriers to pet care and to provide clients with the information, resources, and care they need. As a 501(c)(3) organization, MAH offers a bevy of unique services in the veterinary medicine space, including “Mission Program” pricing, a subsidized pricing structure based on a sliding scale income, payment plan flexibility, and other innovative solutions to reduce barriers and increase accessibility.

Ecotone Analytics conducted an impact analysis and calculated a social return on investment (SROI) for MAH’s Mission Program. The analysis takes a benefit-cost approach to external literature of the highest available level of evidence of causality to project the social value generated by the Mission Program in the year 2020. With growth plans underway, it is expected that the number of clients, and as a result, the associated impact of the Mission Program and MAH as a whole will continue to grow. Noting this context, Ecotone was guided by the following research question:

What is the estimated social return on investment in MAH’s Mission Program, the key outcomes generated and to whom do the benefits accrue?

STRUCTURING THE ANALYSIS

SCOPING

The scope of this analysis was developed in collaboration with the MAH team and participating staff from the ASPCA as well as our own review of secondary research which focused on approaches to valuing the long-term outcomes from engagement with services that mirror that of the Mission Program. This scoping process involved understanding the various components of the Mission Program and MAH more broadly, existing market conditions, the existence of similar services elsewhere, the types of data

already tracked by MAH, and the characteristics of clients served. From there, our analysis dug deeper into external research that aligned with the Mission Program services to provide us with evidence to inform our projections of potential value created.



Table 1. Scoping Summary

<p>Population Served</p>	<p>Pet owners in Twin Cities with prominent value proposition for low-income pet owners. This subset of MAH’s clients is the focus of this analysis - those pet owners that meet income qualifications are eligible for reduced-fee prices as a part of the “Mission Program”.</p>
<p>Target Audience for Analysis</p>	<p>MAH: Funders, Staff</p>
	<p>ASPCA: professionals in veterinary field, animals shelters, rescues, other vet clinics</p>
<p>MAH Scale</p>	<p>10,627 Unique Pets Cared For (patients/pets) - by species 7,756 Total Families Served: (unique clients/pet owners) 48 out of 87 counties in Minnesota had pets seen at Mission</p>
<p>Market Need</p>	<p>The American Veterinary Medical Association (2019) found that 35.5% of households in Minnesota own a dog and 26.5% own a cat. In the U.S., 69% of pets in underserved communities have never been to the veterinarian (Human Society of the United States). If these percentages are representative of the Twin Cities MSA, that’s over 100,000 households with incomes less than \$50k who are also pet owners. Further, of pet owners who had to give up their pets, those with household income less than \$50,000, 40% report cost as the reason they gave up their pet (Burns, 2016).</p>
<p>Theory of Change</p>	<p>Providing affordable, professional, spectrum of care, veterinary services can help pet owners and their pets stay together</p>

The scoping process involved several considerations before reaching the final scope of research. Considerations on the way to establishing the final scope included the extent the Ecotone analysis could focus on: the return on the subsidy provided by MAH, the return on philanthropic dollars vs. all MAH revenues, and the cost of providing spectrum of care services as opposed more traditional veterinary care.

As previously mentioned, the final scope ended up being a mix of these with the focus being the return on philanthropic dollars and indirectly accounting for the value of both the subsidy provided and the value generated from spectrum of care services as evidenced through the outcomes that were collectively supported by these strategies.

ASSUMPTIONS

To develop a suitable model for the impact analysis, a series of assumptions are relied upon. Below are the core assumptions that dictated the scope of the analysis. Additional assumptions are built into the individual outcome estimates and will be discussed later in this report as well as described in Appendix C.

- Contributed revenue is approximately equivalent to the cost to implement the Mission Program, noting that the fee for service revenue collected is sufficient to deliver all non-Mission Program services.
- Costs and benefits are based on 2020 operations.
- Benefits are estimated to apply to Mission Program clients only although we expect benefits to accrue to other clients as well through value-add generated by spectrum of care services and lower than market rate pricing of services.
- We do not account for additional costs or benefits that may be incurred in serving Mission Program clients in subsequent years. For example, if a client avoids a surrender in 2020 and in 2022 utilizes the payment plan option for an urgent care for their pet, we do not know how this combination of benefits may potentially interact. As a result, we account only for the benefits estimated to occur in 2020, but qualitatively note that with future engagement with MAH, a client may realize additional benefits which are supportive of the initial benefits generated in 2020.
- Several outcomes occur over multiple years. To manage this timescale we discount the future benefits back to 2020 dollars to allow for direct comparison between costs incurred in 2020 and the benefits. We utilize a discount rate of 3% for all multi-year benefits.
- We do not control for specific characteristics of Mission Program clients beyond their income level. This is due to the concurrent data limitations as well as lack of research into the long-term outcomes of MAH's services. Still, characteristics of clients are used to inform the selection and monetization of outcomes incorporated in the SROI. For example, MAH data shows that clients are more likely to have food insecurity than their pet. This informs the relative likelihood of placing pet needs above their own and the likelihood of the pet owner making veterinary expenditures in one way or another to support their pet's well-being.
- The benefits of this analysis must assume the types of pets served by MAH. We focus on dogs and cats as that is where the secondary research referenced was focused as well.



Additional clarifications regarding our analysis include:

This is a prospective analysis framed by program characteristics currently implemented by MAH. We do not know the true value generated by MAH's Mission Program. While each client will have a different experience and realize different types of benefits, our analysis frames the benefits as an aggregate value for 2020 to communicate the organization-wide value created. This should not belittle the stories of the individuals engaged.



LOGIC MODEL

The following tables (see next page) show the logic model, identifying the planned inputs, activities, and outputs for the MAH, and from there, describing the outcomes accruing from all those activities conducted. These outcomes can be distinguished by whether they were short-term outcomes, intermediate outcomes or long-term outcomes (those achieved indirectly from the short-term and intermediate outcomes achieved). Last are the impacts directly attributed to MAH. The logic model serves as the

map of the analysis, as intermediate and long-term outcomes are those we seek to monetize to calculate the final SROI.

Table 2. Logic Model Key

1. HOW TO READ IT	2. RELATIONSHIP BETWEEN COLUMNS	3. PURPOSE	4. IN COMPARISON TO WHAT
<p>Reads from left to right, with each column collectively influencing the column to its right and being influenced by the column on its left.</p>	<p>Individual cells do not necessarily link directly to those immediately on their left or right, although these specific causal chains will be established in our next steps.</p>	<p>Connects 'Inputs', those resources required to begin, with the projected final 'Impact' resulting and attributed to Mission Animal Hospital.</p>	<p>Outcomes and Impact described in the logic model are assumed to be in comparison to not having access to Mission Animal Hospital.</p>

Of note, while pursuing monetization for all those pathways identified in the logic model, inevitably some have a better evidence base than others, and in some cases, the data is too lacking to pursue monetization with a reasonable causal understanding. The following sections will describe in detail those pathways that were successfully monetized.



LOGIC MODEL FOR MISSION ANIMAL HOSPITAL

In comparison to not utilizing MAH's Mission Program services in general.



INPUTS

MAH Team

- 14 of veterinarians (onboarding 2 more in 2021)
- 21 of vet techs (including communications center vet techs)
- 16 of vet assistants
- 6 of customer service staff
- 4 of administrative staff
- 12 veterinary student interns on rotation (supporting more in 2021)
- 12 volunteers

Funding

- Earned revenue
- Contributed revenue (charitable contributions - ASPCA, etc.)
- Other revenue (in-kind, etc.)

Equipment, labs, drugs and specialty facilities such as:

- X-rays
- Blood tests
- Dental x-ray
- Surgery rooms
- Pharmaceuticals

Clients - Mission Program specific

- 26% of Mission Program Clients who reported facing housing insecurity in 2020
- 63% of Mission Program clients who reported facing food insecurity in 2020
- 40% of Mission Program clients who reported their pets were facing food insecurity in 2020
- 99% of clients who believe pets are family

Overhead

- Rent, utilities, endless laundry :)

Partnerships

- 98 Rescue Organizations



ACTIVITIES

<p>Spectrum of Care</p> <ul style="list-style-type: none"> Continuing education for staff in practicing Spectrum of Care - 12 week training program Detailed collection of pet history Professional services (conversations and education of long-term care)
<p>Service Features</p> <ul style="list-style-type: none"> Appointments / wellness care Urgent care General surgery Advanced surgery Below-market pricing of care and pharmaceuticals On-site prescriptions On-site, day of blood tests Designated cat areas Comfort room for saying goodbye Telehealth for pre-existing clients Adding social worker!
<p>Mission Program</p> <ul style="list-style-type: none"> Income based Subsidized care Mission assistance funds - mini grants Payment plans (4-6 months) - used by others as well? Connection to other funding support as needed Veteran billing plans
<p>Additional Services</p> <ul style="list-style-type: none"> High Quality / High Volume

OUTPUTS

In 2020:

- 24,989 Pet Visits - 16,671 Dogs vs 8,342 Cats
- 75% (5,900) of families (69% (7,373) of pets) qualified for Mission Program
- \$1,168,482.75 provided in subsidized care to families in need
- 523 Pet Surrenders and Euthanasia Prevented
- 10,627 Unique Pets Cared For (patients/pets) - by species
- 7,756 Total Families Served: (unique clients/pet owners)





SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
<ul style="list-style-type: none"> • Reduced barriers to care - especially cost barrier • Increased use of veterinary services in general • Increased access to and use of appropriate level of care required - thanks to spectrum of care approach • Increased awareness and knowledge of care for pets • Increased knowledge of risks from lack of care - such as zoonotic disease • Reduced overtesting • Increased pet history collected • Reduced stress while at the clinic 	<p>Pet-owner Centric</p> <ul style="list-style-type: none"> • Reduced rate of relinquishment for pet owners due to cost burdens • Reduced rate of future relinquishments due to effective preventative measures today • Avoided shame, guilt, depression from relinquishment • Reduced expenditures on veterinary services • Increased regularity of use of preventative care / wellness services • Increased affordability of urgent care and surgery <p>Potential Negative Outcomes from pet ownership</p> <ul style="list-style-type: none"> • Unruly pets could be detrimental to mental health • Cost burden stretches other pieces of household budget • Changes in lifestyle of pet owner to support pet's well-being • Disease and allergy risk for owner and family members 	<ul style="list-style-type: none"> • Reduced financial stress • Reduced transmission of zoonotic diseases • Increased walking and physical activity • Increased mobility for seniors • Improved systolic and diastolic blood pressure and heart rate • Reduce cholesterol and triglyceride levels. • Increase in pet providing comfort and affection • Reduced Isolation and loneliness • Increased physical contact experienced • Increased sense of self-worth and self-esteem • Increased social interaction (both friends and family as well as other social interactions) • Increased ease in social settings with the pet • Being able to have difficult conversations with existing friends and family through their pet • Increased feelings of acceptance and social support from pet • Lower overall symptoms of post-traumatic stress (if relevant) • Increased feelings of unconditional love and support • Reduced direct medical care during acute illness (e.g. salmonellosis), chronic supportive care (e.g. congenital toxoplasmosis), and disease prevention (e.g. rabies) • Reduced household cost burden • Reduced CVD, stroke risk • Reduced doctor visits • Reduced mortality (mixed evidence) • Increased life satisfaction • Decreases in depression, stress, and anxiety 	<p>Mission Program clients experience:</p> <ul style="list-style-type: none"> • Improved mental health • Increased quality of life • Improved physical health • Improved financial health • Increased self-actualization <p>Societal Impacts</p> <ul style="list-style-type: none"> • Increased equity - mental, physical, and emotional on the personal and interpersonal levels • Social cohesion



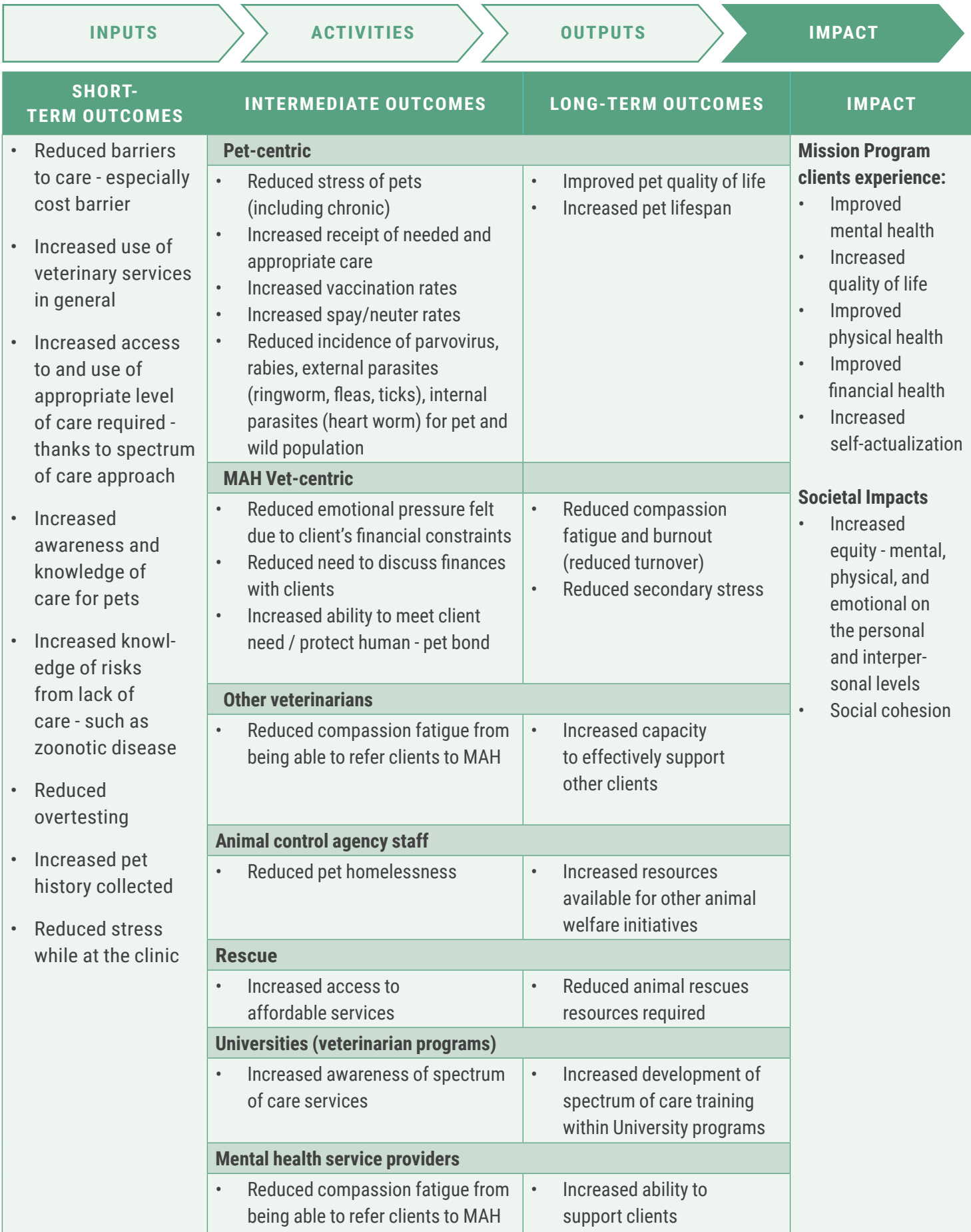


Table 3. Complete logic model for mission animal hospital

INPUTS	ACTIVITIES	OUTPUTS	SHORT-TERM OUTCOMES	INTERMEDIATE OUTCOMES	LONG-TERM OUTCOMES	IMPACT
<p>MAH Team</p> <ul style="list-style-type: none"> 14 of veterinarians 21 of vet techs, (including communications center vet techs) 16 of vet assistants 6 of customer service staff 4 of administrative staff 12 veterinary student interns on rotation 12 of volunteers <p>Funding</p> <ul style="list-style-type: none"> Earned revenue Contributed revenue (charitable contributions - ASPCA, etc.) Other revenue (in-kind, etc.) <p>Equipment, labs, drugs and specialty facilities such as:</p> <ul style="list-style-type: none"> X-rays Blood tests Dental x-ray Surgery rooms Pharmaceuticals <p>Clients - Mission Program specific</p> <ul style="list-style-type: none"> 26% of Mission Program Clients who reported facing housing insecurity in 2020 63% of Mission Program clients who reported facing food insecurity in 2020 40% of Mission Program clients who reported their pets were facing food insecurity in 2020 99% of clients who believe pets are family <p>Overhead</p> <ul style="list-style-type: none"> Rent, utilities, endless laundry :) <p>Partnerships</p> <ul style="list-style-type: none"> 98 Rescue Organizations 	<p>Spectrum of Care</p> <ul style="list-style-type: none"> Continuing education for staff in practicing Spectrum of Care - 12 week training program Detailed collection of pet history Professional services (conversations and education of long-term care) <p>Service features</p> <ul style="list-style-type: none"> Appointments / Wellness Care Urgent Care General Surgery Advanced surgery Below-market pricing of care and pharmaceuticals On-site prescriptions On-site, day of blood tests Designated cat areas Comfort room for saying goodbye Telehealth for pre-existing clients Adding social worker! <p>Mission Program</p> <ul style="list-style-type: none"> Income based Subsidized care Mission assistance funds mini grants Payment plans (4-6 months) - used by others as well? Connection to other funding support as needed Veteran billing plans <p>Additional services</p> <ul style="list-style-type: none"> High Quality / High Volume 	<p>In 2020:</p> <ul style="list-style-type: none"> 24,989 Pet Visits - 16,671 Dogs vs 8,342 Cats 75% (5,900) of families (69% (7,373) of pets) qualified for Mission Program \$1,168,482.75 provided in subsidized care to families in need 523 Pet Surrenders Prevented 10,627 Unique Pets Cared For (patients/pets) - by species 7,756 Total Families Served: (unique clients/pet owners) 	<ul style="list-style-type: none"> Reduced barriers to care - especially cost barrier Increased use of veterinary services in general Increased access to and use of appropriate level of care required - thanks to spectrum of care approach Increased awareness and knowledge of care for pets Increased knowledge of risks from lack of care - such as zoonotic disease Reduced overtesting Increased pet history collected Reduced stress while at the clinic 	<p>Pet-owner Centric</p> <ul style="list-style-type: none"> Reduced rate of relinquishment for pet owners due to cost burdens Reduced rate of future relinquishments due to effective preventative measures today Avoided shame, guilt, depression from relinquishment Reduced expenditures on veterinary services Increased regularity of use of preventative care / wellness services Increased affordability of urgent care and surgery <p>Potential Negative Outcomes from pet ownership</p> <ul style="list-style-type: none"> Unruly pets could be detrimental to mental health Cost burden stretches other pieces of household budget Changes in lifestyle of pet owner to support pet's well-being Disease and allergy risk for owner and family members <p>Pet-centric</p> <ul style="list-style-type: none"> Reduced stress of pets (including chronic) Increased receipt of needed and appropriate care Increased vaccination rates Increased spay/neuter rates Reduced incidence of parvovirus, rabies, external parasites (ringworm, fleas, ticks), internal parasites (heart worm) for pet and wild population <p>MAH Vet-centric</p> <ul style="list-style-type: none"> Reduced emotional pressure felt due to client's financial constraints Reduced need to discuss finances with clients Increased ability to meet client need / protect human - pet bond <p>Other veterinarians</p> <ul style="list-style-type: none"> Reduced compassion fatigue from being able to refer clients to MAH <p>Animal control agency staff</p> <ul style="list-style-type: none"> Reduced pet homelessness <p>Rescue</p> <ul style="list-style-type: none"> Increased access to affordable services <p>Universities (veterinarian programs)</p> <ul style="list-style-type: none"> Increased awareness of spectrum of care services <p>Mental health service providers</p> <ul style="list-style-type: none"> Reduced compassion fatigue from being able to refer clients to MAH 	<ul style="list-style-type: none"> Reduced financial stress Reduced transmission of zoonotic diseases Increased walking and physical activity Increased mobility for seniors Improved systolic and diastolic blood pressure and heart rate Reduce cholesterol and triglyceride levels. Increase in pet providing comfort and affection Reduced Isolation and loneliness Increased physical contact experienced Increased sense of self-worth and self-esteem Increased social interaction (both friends and family as well as other social interactions) Increased ease in social settings with the pet Being able to have difficult conversations with existing friends and family through their pet Increased feelings of acceptance and social support from pet Lower overall symptoms of post-traumatic stress (if relevant) Increased feelings of unconditional love and support Reduced direct medical care during acute illness (e.g. salmonellosis), chronic supportive care (e.g. congenital toxoplasmosis), and disease prevention (e.g. rabies) Reduced household cost burden Reduced CVD, stroke risk Reduced doctor visits Reduced mortality (mixed evidence) Increased life satisfaction Decreases in depression, stress, and anxiety <p>Improved pet quality of life</p> <ul style="list-style-type: none"> Improved pet quality of life Increased pet lifespan <p>Reduced compassion fatigue and burnout (reduced turnover)</p> <ul style="list-style-type: none"> Reduced compassion fatigue and burnout (reduced turnover) Reduced secondary stress <p>Increased capacity to effectively support other clients</p> <ul style="list-style-type: none"> Increased capacity to effectively support other clients <p>Increased resources available for other animal welfare initiatives</p> <ul style="list-style-type: none"> Increased resources available for other animal welfare initiatives <p>Reduced animal rescues resources required</p> <ul style="list-style-type: none"> Reduced animal rescues resources required <p>Increased development of spectrum of care training within University programs</p> <ul style="list-style-type: none"> Increased development of spectrum of care training within University programs <p>Increased ability to support clients</p> <ul style="list-style-type: none"> Increased ability to support clients 	<p>Mission Program clients experience:</p> <ul style="list-style-type: none"> Improved mental health Increased quality of life Improved physical health Improved financial health Increased self-actualization <p>Societal Impacts</p> <ul style="list-style-type: none"> Increased equity - mental, physical, and emotional on the personal and interpersonal levels Social cohesion

PROJECTED COSTS

Costs utilize the contributed revenue for 2020. This was based on discussion with the MAH team who noted that contributed revenue was the approximate value needed to deliver the Mission Program. In other words, this analysis assumes the contributed revenue is required for delivering the benefits of: 1) avoided surrender for Mission Program clients, 2) reduced costs borne by Mission Program clients including subsidies and forgivable payment plans, and 3) reduced compassion fatigue for MAH staff thanks to avoided financial concerns for their clients.

2021 projected contributed revenue are also noted for comparison although are not included within the SROI estimation due to a focus on 2020 outcomes.

Table 4. 2020 and 2021 Contributed Revenue

	2020	2021
Contributed Revenue	\$731,500	\$805,000

On a per Mission Program pet basis, this equates to approximately \$99 contributed per pet or \$124 per family (with some families having multiple pets coming to MAH). This value will vary greatly for each pet given the wide range of services that may be required, everything from a subsidized wellness check to a surgery paid in part with a payment plan. The difference in ‘investment’ per client in this case could potentially range greatly. The data is not currently available to signal the range of values but noting this range of experiences with MAH that value could stretch from tens of dollars to several hundred dollars per pet

and in some cases likely even higher (especially when accounting for the already comparatively low cost of services for non-Mission Program qualifying services against which the subsidy value is compared to). To help manage this variation and to not lose the story of impact in the unique case by case experience of it, the total contributed revenue figure is utilized for the SROI figure and for the visualization. This is meant to simplify the communication of the results while still allowing MAH staff to draw on powerful anecdotes that are a part of the total impact estimated.



PROJECTED OUTCOMES

Below are long-term outcome benefits attributed to the services provided as a part of the Mission Program. These outcomes are referred to as the marginal benefit (the cost/benefit of an event occurring multiplied by the likelihood of that cost/benefit occurring). Multi-year benefits are presented here as a net present value (NPV).

Table 5. Monetized Outcomes

Outcomes	Marginal Benefit
Increased physical activity and reduced risk of high blood pressure/hypertension	\$166,155
Avoided cost of sheltering a surrendered pet	\$76,881
Avoided loneliness and social isolation-related health care expenditures	\$232,779
Increased sense of support and social connectedness and the resulting improved quality of life	\$1,467,052
Avoided compassion fatigue/anxiety disorder and reduced productivity - MAH (not including potential turnover costs)	\$66,965
Value of subsidy to the Mission Program client - Cost Savings	\$1,168,483
Avoided stress and anxiety from an avoided additional debt account	\$187,207
Avoided reduction in credit score	\$15,120
Avoided use of credit card with MAH payment plan	\$13,502
Total	\$3,394,145



KEY METRICS

The key metrics that drive value creation in this estimation include:

- Number of surrenders avoided
- Proportion of surrenders avoided due to reduced costs
- Dollar value of subsidy provided
- Number of years of continued pet ownership following the avoided surrender
- Number of clients utilizing the MAH payment plan option
- Health care costs associated with hypertension

These metrics were especially important to delivering the outcome values projected. However, we do not expect each of these to be readily trackable by MAH. As a result, a later section notes the recommended Key Performance Indicators (KPIs) that the organization may track to help understand the impact of their work. Further, as these metrics were the most important for determining the current monetized outcomes, that is not to say there are not other metrics a part of a non-monetized impact that are valuable and important to track as well.

The following paragraphs describe the estimation process in more detail for the largest monetized outcomes and show why the above metrics became most important.

AVOIDED SURRENDERS

Four of the eight outcomes monetized in this analysis were tied to the benefits from an avoided surrender. As a result, some common methodological approaches were utilized for these four outcomes and are noted here to avoid redundancy within the description of specific outcomes. The first component to these estimates is tied the number of surrenders. This is

a data point provided by the MAH team and is a metric reported as a part of their annual impact report. To isolate the proportion of those surrenders that are benefiting from the reduced costs of service that are a part of the Mission Program (and likely unique to MAH, helping to control for the likelihood the surrender would be avoided by another veterinarian if the pet owner were to have gone elsewhere), we leverage secondary research to inform the likelihood that cost of care for a pet was a leading factor in a pet owner's decision to surrender the pet. Multiple studies are noted in this space (Dolan et al., 2015; Benka et al., 2016; Burns, 2016) and provide an estimate of upwards of 70% of pet owners cited costs as being either a primary or secondary factor in their decision to surrender the pet. As a result we utilize this figure to modify the number of surrenders (523) in 2020.

Finally, while noting the 4 monetized benefits that can accrue from avoided surrender, there is also a need to estimate the duration a pet owner may continue to own the pet thanks to the avoided surrender. This was an area of uncertainty as few studies conduct longitudinal follow-ups on avoided surrenders. Despite this, we were able to uncover sources noting the age of pets at surrender. In particular Salman et al, (1998) found that forty-six percent of the dogs and 35% of the cats surrendered had been owned for less than a year. For many dogs and cats, this will be the first year of their life. As a result, there is a large proportion of pets that are assumed to on average avoid surrender at a very young age, which suggests another potential 8-20 years of pet ownership (depending on the pet species and breed). However, we also know that many pets are surrendered due to costs of chronic



conditions, often occurring with older pets, thus shortening the potential additional years of pet ownership. Given these two ends of the age spectrum that are better understood we conservatively estimate the average additional years of pet ownership to be 5 years. Future research will serve to help better refine this estimate.

INCREASED SENSE OF SUPPORT AND SOCIAL CONNECTEDNESS

This outcome became the most highly valued one for this SROI projection. It, like a few of the others, leverages the avoided surrenders as a result of mitigated cost burden to establish a baseline for the number of clients likely to benefit from continued pet ownership. From there, the outcome leverages a key relationship established by McConnell et al. (2011) which noted that the sense of social support from “pets was statistically significant to the amount of overall support provided by parents or by siblings, with only best friends providing more support” than pets. Other support measures used in their analysis also note that pets are relatively ‘indistinguishable’ from most family members in terms of support provided. This provides a critical proxy for us to leverage by noting that we can reference literature around the benefits of friendship and family members as equivalent to that of a pet in terms of social support and connectedness. To attach a monetary value to this status, we reference literature around the benefits of increasing friendship in particular, interventions that are designed to improve friendships, increase the number of friends, depth of connection, among other outcomes. One review in particular, Mihalopoulos et al. (2020) included estimations of the Quality Adjusted Life Year (QALY) metric which can be converted into financial values. A study referenced estimated an increase of 0.035 QALY for a friendship intervention that occurred over 12 weeks. We utilize this value to be a very conser-

vative figure that could be realized annually by a pet owner given their continued ownership of the pet and the level of support a pet can provide. Utilizing a QALY financial value of \$50,000 we assign an annual benefit of pet ownership of about \$1,750 for each additional year the pet owner will on average own the pet following the avoided surrender. This is the first estimate of this nature we have seen for valuing the importance of pets to their owners. We expect future research, particularly following the COVID-19 pandemic, to further delve into this impact area.

REDUCED RISK OF HYPERTENSION

Hypertension, and the associated risk of heart disease, is a prominent health concern in the U.S. with heart disease being a leading cause of death. Thus, mitigating risk of heart disease has potentially widespread implications for society through both the direct health care related expenditures but also for the various ways that can impact a person’s life from work productivity, types of work that can be conducted, and influence on children’s health.

Estimating MAH’s impact on this outcome required a multi-faceted literature review that involved understanding the risk of hypertension, the effect of pet ownership on walking (and steps taken per day), the effect of walking on risk of hypertension, and the resulting additional annual health care related expenditures tied to hypertension. Building these linkages required several resources be referenced (detailed in Appendix C) as studies that directly measure the effect of pet ownership on hypertension risk are deserving of additional research. As a result, we utilize studies with higher levels of evidence and create a unique linkage between pet ownership, step count, and risk of hypertension.



In order to isolate the Mission Program clients who would receive this benefit we again isolate the proportion of clients who avoided surrender due to the cost burden of pet ownership that is mitigated by MAH.

VALUE OF SUBSIDY PROVIDED

This outcome is by its nature dollarized and is estimated by MAH staff. It's incorporation into this SROI is to recognize both 1) the value of cost savings being delivered by the Mission Program but also 2) to give an understanding of how MAH is leveraging contributed revenue. To the first point, there are many potential implications for clients and their households due to the avoided veterinary care expenses that may often come as a surprise. The extent this cost savings leads to other improved outcomes for the client is currently difficult to isolate as the household cost burden will vary from client to client based on the makeup of their household, their living situation, other costs in their life (e.g. personal medical expenditures, etc.). As a result, we are not able to reliably extrapolate the benefits of the cost savings to other social impacts and so conservatively note the value of the cost savings itself as a signal for the other types of benefits that may be realized such as reduced financial stress, improved mental health, improved housing and food security, among many others. With future data collection and research we may be able to better understand the causal effects from the subsidy.

To the second point made above, we note that the value of the subsidy is greater than the value of contributed revenue. This shows that MAH is able to effectively leverage donations to create

greater cost savings to their clients than if they used the donations to directly fund clients' bills.

AVOIDED LONELINESS AND SOCIAL ISOLATION

The subject of loneliness and social isolation has risen in prominence during COVID-19 as people have in many cases significantly reduced their amount of in-person social interaction and often suffered other mental health consequences as a result. This pandemic has also helped shine a light on the means people may use to mitigate their risk of loneliness - one of which, that even received the term 'pandemic puppy', was pet ownership. Pet ownership is strongly associated with reduced loneliness for the pet owners (Stanley et al., 2014). As a result, for this analysis we sought to isolate the additional value MAH generated through the avoidance of loneliness and the associated increase in health care expenditures that people with fewer social connections bear. In order to draw a clear line to determine whether or not loneliness was avoided, we assign this value for those clients who avoid surrender and do so thanks to the mitigated cost burden as a part of the Mission Program. It is likely that other services MAH provides also protect pet ownership and as a result, support avoided loneliness as well. As future research is conducted we may be able to incorporate these other channels of impact. For now, our focus on those clients who avoid surrenders serves as a conservative baseline.

AVOIDED STRESS AND ANXIETY FROM AVOIDED DEBT ACCOUNTS

There is a myriad of studies that look at the implications of debt on an individual's well-being. The trick with this analysis was tying that literature base back to the types of services provided by MAH. This involved considering the risk of bankruptcy that could result from MAH bills as well as the risk of mental health disorders due to rising financial debts. After discussion with the MAH and ASPCA team, we isolated key elements



of MAH services that were well-suited for connection to secondary research. One service in particular was the MAH payment plan that upon default is not reported to collection agencies. As a result, there is no risk of an outstanding debt with MAH leading to reduced credit scores for the client. This allowed us to leverage literature that looked at the risk of mental health deterioration from additional debt accounts given that MAH is effectively providing a forgivable debt service to clients that should serve to reduce the cognitive burden for clients as a result.

Utilizing MAH data on the number of payment plans that would otherwise be in the hands of a collection agency and the cost of an anxiety disorder (as a proxy for the associated cognitive burden of an additional debt account as described by Ong et al., 2019) we are able to estimate the value of the avoided stress and anxiety from avoided additional debt accounts.

Given that the MAH subsidy is reducing the cost of care as well, it is likely that other debt accounts are avoided or at least reduced thanks to this cost reduction, especially in cases where an MAH bill may be added to a credit card the client has. This would suggest our estimated number beneficiaries to be a baseline figure that as additional data on clients who do not utilize the payment plan option is collected, we may be able to assign additional value to them.

NON-MONETIZED OUTCOMES

Some impacts are not readily monetizable given that the suite of services provided by MAH are deserving of additional scientific research, resulting in limited data to understand how the many impacts may be realized, how they interact and the extent they can be isolated and attributed to MAH. These benefits may accrue to clients,

pets, society in general, 2nd generation, friends/family of the pet owner, employers, government, or other stakeholders as of yet not identified. It is important to note that where data limitations restrict the ability to monetize an outcome there may continue to be significant value not presently represented in this SROI. The numbers we have calculated in this analysis are conservative and can be considered a baseline onto which additional non-monetized outcomes can be added.

Examples of non-monetized outcomes include:

- **Reduced risk of zoonotic disease occurrence and transmission:** the mitigation of zoonotic disease as a result of veterinary services is well understood, however, recognition of the extent MAH services directly lead to increased use of veterinary services and the extent those services reduce the risk of zoonotic disease as well as the cost burden associated with those diseases is much less well understood at the microeconomic level (household level). Broader projections of the economic burden of zoonotic disease do however exist (Stehr-Green and Schanz, 1997).
- **Reduced mortality rate from pet ownership:** Various studies have looked at the potential connection between all-cause mortality rates and pet ownership, some showing positive associations, however more recent meta-analyses have not found a statistically significant relationship. (Bauman et al., 2020)
- **Improved quality of life for the pet:** We would expect increased access to spectrum of care services to help support the well-being of the pet, although aspects of this well-being likely drive the well-being of the pet owner as well, which were monetized. The discussion section of this document



also notes a preliminary study addressing the value of a statistical dog life - meant to begin to capture potential quality of life benefits of a dog.

- **Increased pet lifespan:** Similar to the above, increased pet lifespan may have a value-add that is currently not accounted for in this SROI.
- **Benefits experienced by family and friends of the pet owner:** Given that many pet owners have families that also live with the pet as well as friends and neighbors that engage with the pet there is likely large positive spillover effects of pet ownership that are not accounted for in this SROI. Further data collection around the size and make up of households in the Mission Program may help to better account for this value although additional scientific research will also be needed to understand how pets can variably impact many people given the varied responsibilities and level of connection different household members may have with the pet.
- **Increased capacity of other non-MAH vets to serve their clients thanks to being able to refer clients to MAH:** As there are many other vet clinics in the Twin Cities metro area we would expect at minimum some level of well-being benefits to be accruing to these clinics thanks to MAH's operations.
- **Increased budget and capacity for animal control agencies to address other animal welfare issues:** with reduced need to shelter surrendered animals as well as reduced unintended puppies and kittens due to MAH's high volume, high quality spay/neuter program the implications for where animal control budgets could be redirected are currently unaccounted for and unknown.
- **Increased development of spectrum of care training programs at universities:** Increased training of spectrum of care in university programs may simultaneously reduce costs borne by MAH to facilitate training as well improve the well-being of pets in other clinics where students eventually work.
- **Increased adoption of spectrum of care services by other veterinary clinics and hospitals:** Given MAH's use of spectrum of care and its advocacy of it, the long-term ripple effects of its use are potentially large as it relates to various aspects of pet care and pet ownership.
- **Increased ability of mental health providers to better serve their clients:** With improved mental health of individuals thanks to pet ownership there may be opportunity for mental health care providers to further specify the type of care provided and better address underlying needs of individuals.
- **Avoided turnover of MAH staff:** With additional data from MAH and further scientific research around how the MAH model can improve employee well-being there may be a strong case for the reduced turnover and as a result, future onboarding costs borne by MAH from additional hiring.
- **Avoided mortality risk from debt:** Research from the Federal Reserve branch in Atlanta notes that "moving from having no severely delinquent accounts to any severely delinquent accounts causes an increase in mortality risk for the next quarter of 0.003 percentage points, or approximately a 5 percent increase in mortality risk" (Argys et al., 2016). This pathway was trumped by the benefits of the avoided stress from an avoided debt account but with future research we may be able to include both pathways.



SOCIAL RETURN ON INVESTMENT

The SROI for this analysis takes the net benefits generated by the MAH Mission Program, divided by the total Contributed Revenue in 2020. This serves to isolate the philanthropic social return on investment i.e. the social return on donor dollars, given that the philanthropic revenue received makes the Mission Program possible. The total SROI, which includes the benefits of all stakeholders, is projected to be approximately

\$4.64. The Mission Program client is the leading beneficiary of the initiative, receiving a projected \$3.74 in social value for every \$1 spent by the program. Taxpayers (in the form of State and Federal governments) are the next stakeholder category to benefit from the program, primarily through avoided Medicare or Medicaid health care reimbursements.

Table 6. SROI for each stakeholder group

SROI		Notes
Total	\$4.64	
Mission Program Client	\$3.74	Improved well-being, financial cost savings, and avoided mental and physical health care expenditures
Federal Government	\$0.50	Avoided Medicare and Medicaid health care reimbursement
State Government	\$0.04	Avoided Medicaid health care reimbursement
Private health insurer	\$0.24	Avoided health care claims covered
MAH employee	\$0.01	Avoided out of pocket health care expenditures
Animal shelter (may also be publicly funded)	\$0.11	Avoided costs of sheltering pets otherwise surrendered

VALUE AT SCALE

Given that our projections were based around the clients served by MAH in 2020 we would expect there are many other potential clients in the Twin Cities area that could benefit from MAH services. And indeed the American Veterinary Medical Association (2013) found that 31.9% of households in Minnesota own a dog and 29.7% own a

cat. The Humane Society of the United States also notes that in the U.S. as a whole, 69% of pets in underserved communities have never been to the veterinarian. If these national level figures hold for the Twin Cities MSA, that’s over 100,000 households with incomes less than \$50,000 per year who are also pet owners. If the benefits of MAH were to scale to these 100,000 households



(from the 5,900 families served by the Mission Program in 2020) the resulting benefits would total upwards of \$57.5 million (in present value).

That is to say, there is approximately \$57.5 million in social value on the table from serving low income pet owners in the Twin Cities. Of that figure, MAH currently captures approximately 6% of that. Given we do not have complete data on all veterinary care providers in the Twin Cities MSA it may be that some of the \$57.5 million is also being captured by other providers. However, given the growth of MAH and lack of comparable organizations, we expect there to still be a large potential social benefit from expanding MAH.

OUTCOME ATTRIBUTION RATIOS

In order to estimate the SROI to each stakeholder (shown on previous page), we must estimate the extent each outcome affects the relevant stakeholder. The table on the next page shows how the value of each outcome (left column) is allocated to the given stakeholder (top row). Of note, the stakeholders with value assigned to them only include those with associated monetized outcomes. This stakeholder breakdown should be viewed as a preliminary estimate to note the potential scale of value to target beneficiaries.



Table 7. Outcome Attribution ratios	Mission Program Client	Government Federal	State	Private Insurance	MAH employee	Animal shelter	Notes
Increased physical activity and reduced risk of high blood pressure/hypertension	0.12	0.306	0.084	0.49			WSIPP, 2019 - Diabetes and Obesity related health care expenditures as a proxy
Avoided cost of sheltering a surrendered pet						1	Assumed to accrue to the shelter
Avoided loneliness-related health care expenditures (currently strongest for older adults)	0.12	0.7	0.0255	0.156			WSIPP, 2019 - mental health related expenditures
Quality of life (QALY) / life satisfaction - avoided loss of quality of life from pet companionship	1						Assume this value accrues entirely to the pet owner. This value may be multiplied if there are multiple household members who benefit.
Avoided compassion fatigue/anxiety disorder and reduced productivity – MAH staff (not including potential turnover costs)		0.326	0.094	0.46	0.12		WSIPP, 2019 - mental health related expenditures
Value of subsidy to the Mission Program client - Cost Savings (at 25% subsidy assumption)	1						Assume this cost savings accrues to the pet-owner
Avoided financial stress from avoided additional debt account	0.12	0.7	0.0255	0.156			WSIPP, 2019 - mental health related expenditures
Avoided reduced credit score	1						Assume cost burden is borne by the client
Avoided use of credit card with MAH payment plan	1						Assume cost burden is borne by the client

DISCUSSION AND FUTURE RESEARCH

When projecting impacts for any service, there are often questions around data and how that data is used to monetize the outcomes for use in an SROI estimation. As has been discussed, data in this projection is built from a combination of secondary research, MAH organization data, and discussions with the participating MAH and ASPCA staff.

The monetization process utilized a combination of market price and benefits transfer methods such that we are attaching dollar values to impacts based on the market price associated with that impact and/or utilizing the value in another study when the study is appropriately aligned with the services provided by MAH. This is in comparison to other valuation methods that may attach value based on surveying individuals for how they perceive the value (referred to as contingent valuation), among other methods.

AREAS OF UNCERTAINTY

As with any SROI projection there are uncertainties in the modeling - many of which were described within the previous description of the monetized outcomes. We note them here for transparency.

- The duration of impact from MAH services i.e. how long to the benefits generated in a given year last?
- The likelihood of receiving comparable services elsewhere in the Twin Cities
- The value of friendship/social support from a pet
- The effect of veterinary costs on household cost burden and how that translates to other social impacts

ADDITIONAL FUTURE RESEARCH

There are multiple opportunities for future research that can enhance the value monetized in this analysis. The first avenue of future research would be a longitudinal study of Mission Program clients. This would help to determine the true value of the program as opposed to relying on external sources and strengthen our ability to monetize impacts. Although monetization of impact is not always the end goal in cases of social value creation, it can serve as a beneficial impact measurement and management tool while putting impact into commonly understood monetary units.

For Mission Animal Hospital, specific areas of future research and data collection include:

- Size of debt avoided thanks to the payment plan and subsidized care
- Tracking proportion of clients coming from and/or being referred from other clinics
- Isolating benefits for non-Mission Program clients
- Isolating benefits by the size of cost savings for Mission Program clients
- Isolating reason(s) for avoided surrender
- Rates of employee turnover at MAH compared to other veterinary service providers
- Connecting the cost of a procedure with the value of a subsidy provided to a client. This includes identifying where the subsidy is most likely to be used. This includes questions of: Is it primarily put towards urgent care vs. preventative care vs. other? Both in terms of the value of the subsidy and the number of cases seen?
- Mission Program client retention and the extent the repeat use of MAH by a client supports long-term benefits for the client and their pet
- The rate clients, particularly Mission



Program clients, were referred by another veterinarian due to cost concerns.

Areas deserving of future research by the veterinary and more broadly the medical field include:

- The causal connection between pet ownership and mental health
- The causal connection between pet ownership and physical health
- Measuring benefits to the family and friends of a pet owner
- The duration of continued pet ownership following an instance of avoided surrender. There is an ongoing question around whether avoiding surrender simply delays its occurrence or whether it eliminates the risk of it occurring.
- Employee turnover from compassion fatigue and burnout
- The likelihood of reducing a case of zoonotic disease from increased access to veterinary services
- Reduction of unexpected cost burden on household costs from veterinary costs
- The extent household cost burden prioritizes pet well-being. There were varying results in the literature noting both how lower incomes were associated with reduced visits to a veterinarian but MAH data also shows higher rates of food insecurity for pet owners compared to the pets themselves. It would seem there is a threshold at which point when income is available it goes towards pet well-being, but there is still a level of basic needs the pet owner must consider for themselves and as applicable, their families.
- Valuation of animal welfare in general is understudied but would be a major addition to this and future SROIs for veterinary

care providers. Carlier and Trieck (2020) note this issue: “Research in economics is anthropocentric. It only cares about the welfare of humans, and usually does not concern itself with animals. When it does, animals are treated as resources, biodiversity, or food...Some economic studies value animal welfare, but only indirectly through humans’ altruistic valuation. This overall position of economics is inconsistent with the utilitarian tradition and can be qualified as speciesist.” A full utilitarian accounting of value would note the utility (i.e. the benefit) to the animals as well as to the humans.

VALUE OF A STATISTICAL DOG LIFE

Decisions around human well-being are often informed by an estimate of the risk of life to humans and the corresponding value of a statistical life (VSL) to put a monetary value to the risk of life lost. This is a tool often used in cost-benefit analyses to recognize for example the value of improved safety measures as compared to the cost to implement those safety measures. Until recently, such an estimate did not exist for animals, however Carlson et al. (2019) developed a preliminary estimate of the value of a statistical dog life (VSDL) to be about \$10,000 (this compares to \$6-\$10 million figure often used for humans).

We compare the benefits from avoided surrender as a proxy for the value of a statistical dog life so as to say the avoided surrender essentially protects the life of the dog in terms of its existence with the pet owner, being that the VSDL is based on the value of the dog to humans. Table 8 sums those monetized pathways that are associated with avoided surrender.

Noting that the \$10,000 VSDL estimated by Carlson et al. (2019) would be most relevant for a puppy, if we assume that the pets who avoid surrender with MAH have on average at least 35% of their life still ahead (i.e. a valued life of \$3,500), then our estimate of \$3,568 is conservative and defensible.



Table 8. Comparing benefits from avoided surrender to the Value of a Statistical Dog Life (assuming the surrendered pet is a dog)

	OUTCOME	VALUE PER PET
PATHWAYS ASSOCIATED WITH SURRENDERING PET	CVD/stroke or high blood pressure/hypertension	\$318
	Avoided loneliness-related health care expenditures (currently strongest for older adults)	\$445
	Quality of life (QALY) / life satisfaction - avoided loss of quality of life from pet companionship	\$2,805
	Average benefits per avoided surrender	\$3,568

CONSERVATIVE TRUMPING RULES

Where monetized pathways lead to the same category of outcome (e.g. increased earnings) we take the largest valued pathway to be the one utilized in the SROI calculation. This is to avoid risk of double counting gains made and to be sure not to overclaim impact generated. For example, in the case of increased life satisfaction and increased sense of social support, both lead to monetization of quality of life referred to as a Quality Adjusted Life Year (QALY). However, we do not sum the estimated impacts from both

pathways and instead only use the larger of the two given we do not know how the simultaneous experience of each benefit may overlap or if they'll be additive or multiplicative. With new research, we may learn that this approach has been overly conservative. For now it provides a defensible baseline of value creation.



TAKEAWAYS AND RECOMMENDATIONS

Boosting access to affordable veterinary services can support improved well-being for pet owners, their pets, amongst other stakeholders. Based on this analysis, with a conservative framing to manage data limitations, MAH’s Mission Program has a positive social return on investment. This SROI has shown the value proposition of the Mission Program is well over \$1 in social value for every dollar contributed to MAH. This suggests that resources devoted to supporting low-income pet owners will create an impact greater than the value of the donation. While the journey of each pet and pet owner can vary resulting in different outcomes being attained, the average values used in this analysis show a strong representation of the types and scale of value that can be generated.

The KPIs in Table 9 are recommended for tracking the MAH’s impact. Many of these are already being tracked, a sign of the growing sophistication of MAH’s impact management process. The

KPIs are oriented towards the Mission Program and associated clients but could be utilized for the broader client base as well. KPIs noted are those that align closely with the outcomes monetized in this analysis and/or would be useful for future monetization efforts. Scale KPIs are outputs and subsets of outputs that can be used to understand the scale of impact of MAH. Quality KPIs are those incremental improvements that can be used to help understand the benefit generated per client served. These are often short-term or intermediate outcomes within the logic model. Of note, these figures do not have to be an annual figure, and instead could simply reflect 1) the present state and 2) the direction pursued.

Use of these KPIs will be helpful in understanding the value generated by MAH as well as serve as strong communication points to help other stakeholders understand the types of impact MAH is generating.

Table 9. Key Performance Indicators

Scale KPIs	Quality KPIs
# of families served	% of surrenders avoided due to cost burden
# of families served in Mission Program	% of pets otherwise going without care
# of pets served	% of Mission Program clients who are repeat clients
# of pets served in Mission Program	% of Mission Program clients referred by other vets
# of pet surrenders and euthanasia prevented	% of Mission Program clients who live alone
\$ of subsidized care provided	% of all clients who live alone
	% of MAH staff reporting compassion fatigue

IMPACT COMMUNICATION

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS (UN SDGs)

sustainable future for all and include 17 distinct goals. They serve as an easily recognizable marker of agreed upon impact areas for stakeholders. See below for impacted United Nations Sustainable Development Goals (UN SDGs).

For more information on UN SDGs: un.org/sustainabledevelopment

These are the blueprint, established by the United Nations, to achieve a better and more



Goal 3:

Ensure healthy lives and promote well-being for all at all ages

Target 3.4 By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being

3.4.1 Mortality rate attributed to cardiovascular disease, cancer, diabetes or chronic respiratory disease

3.4.2 Suicide mortality rate

Target 3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all



Goal 4:

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Target 4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship



Goal 10:

Reduce inequality within and among countries

Target 10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard





Goal 11:

Make cities and human settlements inclusive, safe, resilient and sustainable

11.3 By 2030, enhance inclusive and sustainable urbanization and capacity for participatory, integrated and sustainable human settlement planning and management in all countries



IMPACT MANAGEMENT PROJECT

FIVE DIMENSIONS OF IMPACT

The Impact Management Project (IMP) is a community of 2,000+ organizations building consensus on how to measure, compare and report impact on environmental and social

issues. The IMP community has developed a set of 5 dimensions of impact in order to help build consensus and a common language when organizations and investors discuss their impact. This has been a rapidly growing field, and future alignment of Mission Animal Hospital’s impact with the 5 dimensions could help attract additional investment.

Table 10. The Mission Animal Hospital Five Dimensions of Impact











MISSION ANIMAL HOSPITAL FIVE DIMENSIONS OF IMPACT	
	WHAT: Affordable and subsidized veterinary services, practicing the spectrum of care, protecting the human-pet bond, and supporting the health and well-being of pet owners
	WHO: Pet owners in Minnesota, particularly low-income pet owners and families with limited access to alternative veterinary care, and veterinarians with desire to provide compassionate spectrum of care services
	HOW MUCH: In 2020, Mission Animal Hospital served 10,626 pets and 7,756 families. Of these, 5,900 families and 7,373 pets were part of the Mission program. 65 MAH team members benefit from reduced compassion fatigue for the duration of their employment/volunteer time
	CONTRIBUTIONS: There is a need for low-cost care and a range of affordable services as research illustrates the extent that financial barriers impact pet owners in relinquishment decisions and use of vet services. Veterinarians and staff suffer high rates of compassion fatigue and burnout, difficult to otherwise mitigate without MAH organizational model
	IMPACT RISK MITIGATION: Practicing spectrum of care combined with subsidized services and flexible payment plans supports both continued access to care while creating a model that strengthens service delivery quality and efficiency, and is embedded into the organization, protecting long-term positive impact creation. Facility design and in-house equipment further strengthen the model by providing a complete range of services in a single space that clients and pets are familiar and comfortable with, supporting continued engagement



Table 11. Details for the Five Dimensions of Impact

Impact Dimension	Impact Questions Each Dimension Seeks to Answer
 WHAT	<ul style="list-style-type: none"> • What outcome occurs in period? • How important is the outcome to the people (or planet) experiencing it?
 WHO	<ul style="list-style-type: none"> • Who experiences the outcome? • How under served are the affected stakeholders in relation to the outcome?
 HOW MUCH	<ul style="list-style-type: none"> • How much of the outcome occurs--across scale, depth and duration?
 CONTRIBUTIONS	<ul style="list-style-type: none"> • What is the enterprise’s contribution to the outcome accounting for what would have happened anyway?
 IMPACT RISK MITIGATION	<ul style="list-style-type: none"> • What is the risk to the people and planet that impact does not occur as expected?

IMPACT
MANAGEMENT
PROJECT

Impact Management Project: Creative Commons Attribution-NoDerivatives

Appendix A: SUPPLEMENTARY ANALYSIS

SENSITIVITY ANALYSIS

Variation in costs and benefits without specificity to a given assumption

The following scenarios are developed to test the sensitivity of the SROI estimation to a simultaneous change in costs and benefits without specificity to a given assumption. The following

table shows how the SROI could change given a 50% increase or decrease in costs and benefits. We see that under no scenario does the SROI go below \$1 - that is to say, there is a positive social return on investment for all scenarios included.

Table 12. MAH Mission Program SROI Sensitivity

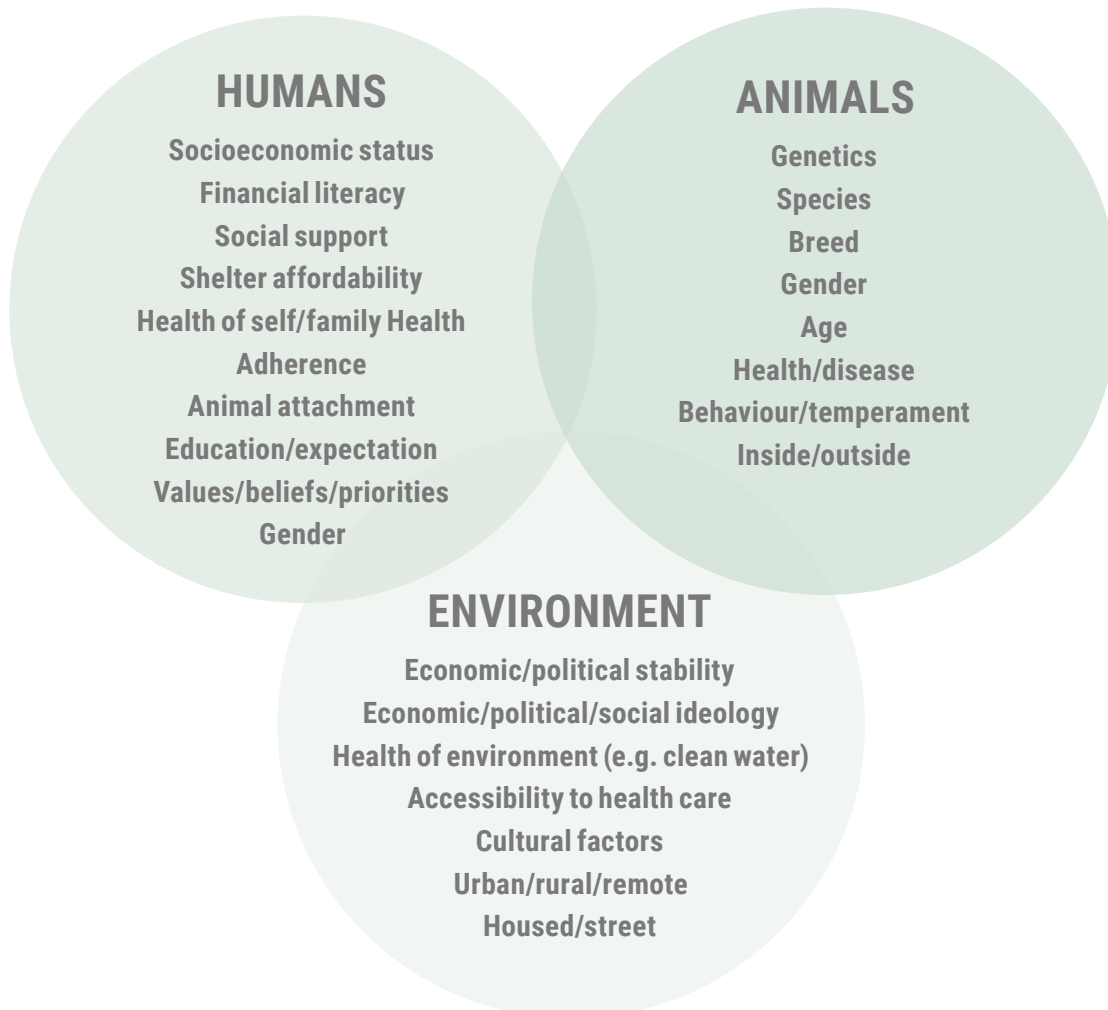
		% Change in Outcome Benefits										
		-50%	-40%	-30%	-20%	-10%	0%	10%	20%	30%	40%	50%
% Change in initiative cost	-50%	\$4.64	\$5.57	\$6.50	\$7.42	\$8.35	\$9.28	\$10.21	\$11.14	\$12.06	\$12.99	\$13.92
	-40%	\$3.87	\$4.64	\$5.41	\$6.19	\$6.96	\$7.73	\$8.51	\$9.28	\$10.05	\$10.83	\$11.60
	-30%	\$3.31	\$3.98	\$4.64	\$5.30	\$5.97	\$6.63	\$7.29	\$7.95	\$8.62	\$9.28	\$9.94
	-20%	\$2.90	\$3.48	\$4.06	\$4.64	\$5.22	\$5.80	\$6.38	\$6.96	\$7.54	\$8.12	\$8.70
	-10%	\$2.58	\$3.09	\$3.61	\$4.12	\$4.64	\$5.16	\$5.67	\$6.19	\$6.70	\$7.22	\$7.73
	0%	\$2.32	\$2.78	\$3.25	\$3.71	\$4.18	\$4.64	\$5.10	\$5.57	\$6.03	\$6.50	\$6.96
	10%	\$2.11	\$2.53	\$2.95	\$3.37	\$3.80	\$4.22	\$4.64	\$5.06	\$5.48	\$5.91	\$6.33
	20%	\$1.93	\$2.32	\$2.71	\$3.09	\$3.48	\$3.87	\$4.25	\$4.64	\$5.03	\$5.41	\$5.80
	30%	\$1.78	\$2.14	\$2.50	\$2.86	\$3.21	\$3.57	\$3.93	\$4.28	\$4.64	\$5.00	\$5.35
	40%	\$1.66	\$1.99	\$2.32	\$2.65	\$2.98	\$3.31	\$3.65	\$3.98	\$4.31	\$4.64	\$4.97
	50%	\$1.55	\$1.86	\$2.17	\$2.47	\$2.78	\$3.09	\$3.40	\$3.71	\$4.02	\$4.33	\$4.64

Appendix B: LITERATURE INSIGHTS

The following section provides additional details on key aspects of our analysis, including discussion around findings in the literature that are relevant to MAH's Mission Program, but were not readily incorporated into this analysis. These can be used as talking points when communicating with funders as well as reference points for the types of value that can be captured in the future with additional data available and research.

The cost burden of pet ownership and veterinary care is the most common reason for rehoming of a pet. (Weiss et al., 2015; Dolan et al., 2015)

The Social determinants of pet health (shown in the diagram below) are closely interwoven with that of their owners - efforts to provide appropriate care to animals must consider the situation of their owners.



Source: Card et al. 2018



There is additional research needed on subsidized veterinary services across multiple areas. This has been recognized by many researchers although there still remains significant gaps that would support MAH's value proposition.

- “Evaluation of subsidized veterinary services tends to focus on answering specific questions, rather than applying a broad, inclusive evaluation strategy that includes consideration for both the animal and human health impacts. Unlike many human health interventions, which regularly use structured guidelines for evaluation of intervention effectiveness (Rychetnik et al., 2002), subsidized veterinary programs appear often to be implemented in a reactive way to address immediate concerns, whether those concerns are animal welfare and overpopulation concerns or zoonotic disease transmission risks” (Baker et al., 2018).
- “Whereas the benefits of companion animals to people are well known, the public health implications of subsidized veterinary care in terms of animal welfare and control were not well-described and were limited to statements about decreases in perceived threats and nuisances following program implementation. Including evaluations of the social impacts of subsidized veterinary programs, such as changes in people’s relationships with companion or stray animals, would help to guide program development and delivery” (Baker et al., 2018).



Appendix C: MONETIZED PATHWAYS

This section will detail the estimation process for each monetized pathway, describing how each outcome was monetized, the sources utilized to inform the estimate, and any additional assumptions required to make the estimation.

Table 13. Monetized Pathways

OUTCOMES	EFFECT SIZE 1	EFFECT SIZE 2	EFFECT SIZE 3	EFFECT SIZE 4	OUTCOME COST	MARGINAL BENEFIT
	Number of surrenders avoided / Number of people impacted	Proportion of surrenders avoided due to cost of Mission Program / Care otherwise not received	Likelihood of protection against downside risk	Duration of protection / additional qualification for impact to be received	Cost of the downside risk / Value of the upside	
Increased physical activity and reduced high blood pressure/hypertension	523	0.7	0.051615	5	\$1,920	\$166,155
Avoided cost of sheltering a surrendered pet	523	0.7			\$210	\$76,881
Avoided loneliness-related health care expenditures (currently strongest for older adults)	523	0.7	0.0792	5	\$1,753	\$232,779
Quality of life (QALY) / life satisfaction - avoided loss of quality of life from pet companionship	523	0.7	0.5	5	\$1,750	\$1,467,052
Avoided compassion fatigue/anxiety disorder and lost productivity - for MAH staff (not including potential turnover costs)	85	0.18	0.66		\$8,672	\$87,570
Value of subsidy to the Mission Program client - Cost Savings						\$1,168,483
Avoided financial stress from avoided additional debt account	785		0.25	0.11	\$8,672	\$187,207
Avoided reduced credit score	63			0.08	\$3,000	\$15,120
Avoided use of credit card with MAH payment plan	785	0.43			\$40	\$13,502
					Total	\$3,394,145

Increased physical activity and reduced high blood pressure/hypertension				
Projected Marginal Benefit per Year			\$166,155	
Estimation Calculation: $523 \times 0.7 \times 0.051615 \times 5 \times 1920$ (NPV at 3% discount rate)				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
523	Number of surrenders avoided	MAH data	6	Number of surrenders prevented
0.7	Proportion of surrenders avoided due to cost of Mission Program / care otherwise not received	Dolan et al., 2015, Benka et al., 2016; Burns, 2016	4	Among the 162 participants who responded, 115 (71%) stated either primarily or secondarily that cost (i.e., inability to pay for some care) was a factor in their decision. Specifically medical issues and being given a notice to comply with the mandatory spay/neuter law were frequently mentioned with cost as reasons for relinquishment.
0.051615	Likelihood of avoiding a case of hypertension	Levine et al., 2013	4	A study of 1179 subjects found that pet owners had lower systolic blood pressure (132.8 versus 139.5 mm Hg), pulse pressure (55.5 versus 63.9 mm Hg), and mean arterial pressure (105.0 versus 107.6 mm Hg) than non-owners and a lower incidence of hypertension (OR, 0.62; 95% CI, 0.49–0.80); however, after adjustment for age and other confounders, pet ownership was no longer associated with a lower blood pressure or incidence of hypertension. The only randomized data on pet ownership and blood pressure come from a presented but unpublished study of 30 participants with borderline hypertension who were randomized either to adopt a dog from a shelter or to defer adoption of a dog. Ambulatory resting systolic blood pressure was similar in both groups at baseline (before dog adoption or deferred adoption). Ambulatory blood pressure monitoring 2 and 5 months after dog adoption demonstrated significantly ($P < 0.001$) lower systolic blood pressures in the dog-adoption group than in the deferred-adoption group. Interestingly, at later follow-up, after all study participants had adopted dogs, systolic blood pressure was found to be similarly lowered in the deferred-adoption group as well. Turning the impact of pet ownership on walking: After controlling for sociodemographic, health, and housing characteristics, the California Health Interview Survey found that dog owners walked 18.9 minutes more per week than pet non-owners. Some, but not all, 39 studies of adolescents and children found a relationship between the presence of a family dog and physical activity. A meta-analysis of 11 studies found that dog owners walked significantly more and were more physically active than non-owners, with the differences between the 2 groups being small to moderate.
5	Additional years of pet ownership	Salman et al., 1998	7	Assume on average 5 more years of being pet owner.
\$1,920	Annual additional health care costs from hypertension	Kirkland et al., 2018	4	Relative to individuals without hypertension, individuals with hypertension had \$1920 higher annual adjusted incremental expenditure, 2.5 times the inpatient cost, almost double the outpatient cost, and nearly triple the prescription medication expenditure. https://www.ahajournals.org/doi/10.1161/JAHA.118.008731



Avoided cost of sheltering a surrendered pet				
Projected Marginal Benefit per Year			\$76,881	
Estimation Calculation: $523 \times 0.7 \times \\$210$ (NPV at 3% discount rate)				
Where:				
<i>Figure</i>	<i>Type</i>	<i>Informed by</i>	<i>Level of Evidence</i>	<i>Notes</i>
523	Number of surrenders avoided	MAH data	6	Number of surrenders prevented
0.7	Proportion of surrenders avoided due to cost of Mission Program / care otherwise not received	Dolan et al., 2015, Benka et al., 2016; Burns, 2016	4	Among the 162 participants who responded, 115 (71%) stated either primarily or secondarily that cost (i.e., inability to pay for some care) was a factor in their decision. Specifically medical issues and being given a notice to comply with the mandatory spay/neuter law were frequently mentioned with cost as reasons for relinquishment.
\$210	Cost to shelter a pet	Athena Group, LLC., 2018	4	\$30 a day to shelter the pet for an average of 7 days - likely much more than this. Human Society in Washington State, Pierce County notes an average of \$200 per animal for intake, care, health + \$10 per day of holding = cost for the animal shelter alone. Rescue services would be on top of this.

Avoided loneliness-related health care expenditures (currently strongest for older adults)				
Projected Marginal Benefit per Year			\$232,779	
Estimation Calculation: $523 \times 0.7 \times 0.0792 \times 5 \times 1753$ (NPV at 3% discount rate)				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
523	Number of surrenders avoided	MAH data	6	Number of surrenders prevented
0.7	Proportion of surrenders avoided due to cost of Mission Program / care otherwise not received	Dolan et al., 2015, Benka et al., 2016; Burns, 2016	4	Among the 162 participants who responded, 115 (71%) stated either primarily or secondarily that cost (i.e., inability to pay for some care) was a factor in their decision. Specifically medical issues and being given a notice to comply with the mandatory spay/neuter law were frequently mentioned with cost as reasons for relinquishment.
0.0792	Reduced risk of loneliness	Stanley et al., 2014	7, 4	22% of US adults report loneliness https://www.kff.org/report-section/loneliness-and-social-isolation-in-the-united-states-the-united-kingdom-and-japan-an-international-survey-section-1/ Pet owners were 36% less likely than non-pet owners to report loneliness, in a model controlling for age, living status (i.e., alone vs. not alone), happy mood, and seasonal residency (adjOR = 0.64, 95% CI = 0.41-0.98, p < .05).
5	Additional years of pet ownership	Salman et al., 1998	7	Assume on average 5 more years of being pet owner.
\$1,753	Increased annual health care for people with few social connections	Shaw et al., 2017	4	\$1,753 in 2021 dollars per year for older adults in health care expenditures as compared to older adults with more social connections.

Quality of life (QALY) / life satisfaction - avoided loss of quality of life from pet companionship

Projected Marginal Benefit per Year

\$1,467,052

Estimation Calculation: $523 \times 0.7 \times 0.5 \times 5 \times 1750$ (NPV at 3% discount rate)

Where:

<i>Figure</i>	<i>Type</i>	<i>Informed by</i>	<i>Level of Evidence</i>	<i>Notes</i>
523	Number of surrenders avoided	MAH data	6	Number of surrenders prevented
0.7	Proportion of surrenders avoided due to cost of Mission Program / care otherwise not received	Dolan et al., 2015, Benka et al., 2016; Burns, 2016	4	Among the 162 participants who responded, 115 (71%) stated either primarily or secondarily that cost (i.e., inability to pay for some care) was a factor in their decision. Specifically medical issues and being given a notice to comply with the mandatory spay/neuter law were frequently mentioned with cost as reasons for relinquishment.
0.5	Qualifying scale of impact due to differing populations	Ecotone assumption	7	Reduce impact by half to account for different population characteristics.
5	Additional years of pet ownership	Salman et al., 1998	7	Assume on average 5 more years of being pet owner.
\$1,750	Increased annual value of quality of life improvement from social support provided by pets	Mihalopolous et al., 2020	4	Note that pets provide similar levels of support as friendship: The final intervention was a friendship programme targeting older women (> 55 years old) with 12 weekly lessons focused on topics related to friendship (i.e., expectations, self-esteem, conflict solving). The intervention costs totaled £77 per participant and resulted in significant benefits to increased friendships, contact with friends, number of friends, negative affect, self-esteem, life satisfaction, loneliness and self-efficacy. The CUA estimated a savings of £391 per person and a gain of .035 QALYs per person, making the friendship programme dominant over a waitlist control. (Mihalopolous et al., 2020: Level of Evidence 4) This may be a conservative lower bound of the value of a pet for an older woman. We assume the QALY value will be realized each year of pet ownership to note the continued friendship-level support received by the pet (as opposed to the drop-off likely in the intervention studied).



Avoided compassion fatigue/anxiety disorder and lost productivity - for MAH staff (not including potential turnover costs)				
Projected Marginal Benefit per Year			\$66,965	
Estimation Calculation: $65 \times 0.18 \times 0.66 \times 8672$				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
65	Number of MAH team members	MAH data	6	# of staff that would experience the anxiety: ~65 right now
0.18	Likelihood of job demands impacting stress and burnout	Monaghan et al., 2020	4	Job demands predicted 18% and 17% of the variance in secondary traumatic stress (STS) and burnout (BO), respectively, after controlling for age, involvement with euthanasia, and hours spent in the animal-care role. Significant relationships were identified among STS, BO, and the hypothesized moderators. . . reducing job demands may be an effective intervention for employers seeking to promote the well-being of animal-care professionals.
0.66	Likelihood of the stress and burnout being due to client financial constraints	Boatright, 2020; Kipperman et al., 2017	6	Over two-thirds of veterinarians report that client financial constraints have a moderate or large contribution to their feelings of professional burnout.
\$8,672	Average cost of anxiety disorder as a proxy for professional burnout	Marciniak et al., 2005	4	Cost of anxiety disorder: The mean estimated total medical cost for individuals diagnosed with any anxiety disorder was \$8,672 in 2021 dollars. https://pubmed.ncbi.nlm.nih.gov/16075454/

Value of subsidy to the Mission Program client - Cost Savings				
Projected Marginal Benefit per Year			\$1,168,483	
Estimation Calculation: \$1,168,483				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
\$1,168,483	Value of subsidy	MAH data	6	Estimated value of subsidy assuming subsidy equates to an approximately 25% discount on standard MAH pricing

Avoided financial stress from avoided additional debt account				
Projected Marginal Benefit per Year			\$187,207	
Estimation Calculation: $785 * 0.25 * 0.11 * \$8,672$				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
785	Number of people avoiding a debt account	MAH data	6	At least as many payment plans as there are in 2020 = 785 This number would be higher at other clinics due to not having a subsidy which further reduces likelihood of starting an MAH payment plan. As a result, the true number of families avoiding an additional debt account would be higher. If we assume the lack of a 25% subsidy is a linear impact on the number of people who decide they need a payment plan - the true number of payment plans would be over 1,000. Assuming that anybody needing to use an MAH payment plan would otherwise have created a new separate debt account to pay for MAH services.
0.25	Percent of adults reporting anxiety symptoms	Elfein, 2020	6	From June 24 to June 30, 2020, nearly 31 percent of surveyed adult Americans with a household income under 25,000 U.S. dollars reported symptoms of anxiety and depressive disorder related to the COVID-19 pandemic.
0.11	Reduced likelihood of anxiety	Ong, 2019	3	Comparing 196 beneficiaries before and after debt relief, and controlling for debt-relief amount, having an additional debt account paid off improves cognitive functioning by about one-quarter of a SD and reduces the likelihood of exhibiting anxiety by 11% and of present bias by 10%. To achieve the same effect on cognitive functioning of eliminating one debt account, a beneficiary must receive debt relief worth 1 month's household in-come.
\$8,672	Cost of anxiety disorder	Marciniak et al., 2005	4	The mean estimated total medical cost for individuals diagnosed with any anxiety disorder was \$6,475. \$8,672 in 2021. https://pubmed.ncbi.nlm.nih.gov/16075454/

Avoided reduced credit score (tied to a future car purchase)				
Projected Marginal Benefit per Year			\$15,120	
Estimation Calculation: $63 * 0.08 * \$3,000$				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
63	Number of people in 'COLLECT' status with MAH	MAH data	6	# of people in 'COLLECT' status with MAH - who under other circumstances would be considered severely delinquent.
0.08	Increase in subprime credit score from any delinquency	Braga, 2019	4	Consumers who become delinquent on one debt are 36 to 64 percent more likely to have a subprime credit score in three years and 33 to 56 percent more likely to have any other delinquency in three years. This amounts to a baseline of 8 percentage point increase in subprime credit score from any delinquency.
\$3,000	Cost savings	Braga, 2019	4	On a \$10,000 care loan: 17.548% loan with 500-589 FICO® score = \$3,987 4.898% loan with 720-850 FICO® score = \$1,031 The savings is approximately \$3,000 in 2021 \$.

Avoided use of credit card with MAH payment plan				
Projected Marginal Benefit per Year			\$13,502	
Estimation Calculation: $785 * 0.43 * \$40$				
Where:				
Figure	Type	Informed by	Level of Evidence	Notes
785	# of people avoiding a debt account	MAH data	6	At least as many payment plans as there are in 2020 = 785 This number would be higher at other clinics due to not having a subsidy which further reduces likelihood of starting an MAH payment plan. As a result, the true number of families avoiding an additional debt account would be higher. If we assume the lack of a 25% subsidy is a linear impact on the number of people who decide they need a payment plan - the true number of payment plans would be over 1,000. Assuming that anybody needing to use an MAH payment plan would otherwise have created a new separate debt account to pay for MAH services.
0.43	Proportion of people who would use a credit card to cover an unexpected expense greater than \$400	Federal Reserve, 2018	6	Proportion of people who would use a credit card to cover an unexpected expense greater than \$400: 43%
\$40	Avoided interest	McCann, 2021	7	Estimated approximately \$40 in interest avoided on a \$400 bill - average financed amount at MAH is \$436.

Appendix D: LEVELS OF EVIDENCE and BIBLIOGRAPHY

Table 14: Levels of Evidence of Causality – Ranked from highest to lowest, 1 to 7

1	Evidence from a systematic review or meta-analysis of all relevant RCTs (randomized controlled trial) or evidence-based clinical practice guidelines based on systematic reviews of RCTs or three or more RCTs of good quality that have similar results.
2	Evidence obtained from at least one well-designed RCT (e.g. large multi-site RCT).
3	Evidence obtained from well-designed controlled trials without randomization (i.e. quasi-experimental).
4	Evidence from well-designed case-control or cohort studies.
5	Evidence from systematic reviews of descriptive and qualitative studies (meta-synthesis).
6	Evidence from a single descriptive or qualitative study.
7	Evidence from the opinion of authorities and/or reports of expert committees.

In the table on the following page, specific sources referenced or whose figures were directly used, are included. Each study is ranked by its level of evidence and includes its relevant finding. This helps to communicate the relative strength of the findings estimated and used. Whenever possible, the highest level of evidence is utilized.



Level of Evidence	Study	Relevant Finding
<p>Level 1 Evidence: Meta-analysis of RCTs</p>	<p>Bauman, A. Et al. (2020). Does dog ownership really prolong survival? A revised meta-analysis and reappraisal of the evidence. <i>Circulation</i>, 13(10).</p>	<p>Dog ownership may be associated with mortality risk</p>
	<p>Murtagh, E. M., Nichols, L., Mohammed, M. A., Holder, R., Nevill, A. M., & Murphy, M. H. (2015). The effect of walking on risk factors for cardiovascular disease: an updated systematic review and meta-analysis of randomised control trials. <i>Preventive medicine</i>, 72, 34–43. https://doi.org/10.1016/j.ypmed.2014.12.041</p>	<p>Walking reduces blood pressure</p>
	<p>Washington State Institute for Public Policy. (December 2019). Benefit-cost technical documentation. Olympia, WA.</p>	<p>Health care expenditures are shared with taxpayers and private insurers</p>
<p>Level 2 Evidence: Randomized Controlled Trials</p>	<p>Levine, G.N. et al. (2013). Pet Ownership and Cardiovascular Risk: A Scientific Statement for the American Heart Association. <i>Circulation</i>, 127(23): 2353–2363.</p>	<p>Pet ownership can reduce hypertension</p>
<p>Level 3 Evidence: Quasi-experimental Analysis</p>	<p>Argys, L.M., Friedson, A.I. & Pitts, M.M. (2016). Killer Debt: The Impact of Debt on Mortality. Federal Reserve Bank of Atlanta.</p>	<p>As credit scores improve so too does mortality rates</p>
	<p>Human Animal Bond Research Institute. (2021). Research: Understanding the Human-Animal Bond.</p>	<p>Human-pet interaction has psychological benefits</p>
	<p>Ong, Q., Theseira, W., & Ng, I.Y.H. (2019). Reducing debt improves psychological functioning and changes decision-making in the poor. <i>PNAS</i>, 116(15): 7244-7249.</p>	<p>Avoiding a debt account can improve cognitive functioning</p>
<p>Level 4 Evidence: Case Control/ Cohort Studies</p>	<p>Adams, T.; Clark, C.; Crowell, V.; Duffy, K.; Green, M.; McEwen, S.; Wrape, A.; and Hammonds, F. (2017). The mental health benefits of having dogs on college campuses. <i>Modern Psychological Studies</i>, 22(2), Article 7. Available at: https://scholar.utc.edu/mps/vol22/iss2/7</p>	<p>Dogs can reduce homesickness in first-year college students</p>
	<p>Austin, D.A. (2014). Medical Debt as a Cause of Consumer Bankruptcy. <i>Me. L. Rev.</i>, 67. Available at: https://digitalcommons.maine.gov/mlr/vol67/iss1/2</p>	<p>Medical debt can be an important contributor to consumer bankruptcy</p>
	<p>Benka, V.A. & McCobb, E. (2016). Characteristics of cats sterilized through a subsidized, reduced-cost spay-neuter program in Massachusetts and of owners who had cats sterilized through this program. <i>Journal of American Veterinary Medical Association</i>, 249(5): 490-498.</p>	<p>Household income is significantly associated with number of visits to a veterinarian</p>



Level of Evidence	Study	Relevant Finding
	Braga, B. McKernan, S. & Hassani, H. (2019). Delinquent Debt Decisions and Their Consequences over Time. Urban Institute.	Delinquency on one debt account increases the likelihood of having a subprime credit score in three years
<p>Level 4 Evidence: Case Control/ Cohort Studies</p>	Brooks, H. L., Rushton, K., Lovell, K., Bee, P., Walker, L., Grant, L., & Rogers, A. (2018). The power of support from companion animals for people living with mental health problems: a systematic review and narrative synthesis of the evidence. BMC psychiatry, 18(1), 31. https://doi.org/10.1186/s12888-018-1613-2	Pet ownership is associated with improved mental health
	Carlson, D., Haeder, S., Jenkins-Smith, H., Ripberger, J., Silva, C., & Weimer, D. (2019). Monetizing Bowser: A Contingent Valuation of the Statistical Value of Dog Life. Journal of Benefit-Cost Analysis, 11(1), 131-149. doi:10.1017/bca.2019.33	The recommended Value of a Statistical Dog Life is estimated at \$10,000
	Carrot Health. (2021). The Health Impact of Very, Very Good Dogs.	Dog ownership is associated with improved social determinants of health
	Decker Sparks, J.L., Camacho, B., Tedeschi, P. & Morris, K.N. (2017): Race and ethnicity are not primary determinants in utilizing veterinary services in underserved communities in the United States, Journal of Applied Animal Welfare Science.	Race and ethnicity were not primary determinants of veterinary service utilization
	Dewa, C.S., Loong, D., Bonato, S. et al. How does burnout affect physician productivity? A systematic literature review. BMC Health Serv Res 14, 325 (2014). https://doi.org/10.1186/1472-6963-14-325	Burnout can lead to reduced productivity
	Feldman, S. (n.d.) How Science Supports Pets for Improving Your Mental Health. Mental Health America.	Pets can help mitigate negative effects of PTSD
	Haston, R. & Pailler, S. (2021). The effect of low-cost clinics on the market for veterinary services: simulating competition between full-service and low-cost providers. [Unpublished manuscript].	The market can benefit from both low-cost and full-service providers
Human Animal Bond Research Institute. (2021). Allergies & Immunity: Child Health & Development.	Prenatal exposure to dogs can influence immune development	



Level of Evidence	Study	Relevant Finding
	Kirkland, E.B. et al. (2018). Trends in Healthcare Expenditures Among US Adults with Hypertension: National Estimates, 2003-2014. <i>Journal of the American Heart Association</i> , 7(11).	Hypertension can increase annual health expenditures by over \$2,000
	Kramer, C.K., Mehmood, S., Suen, R.S. (2019). Dog Ownership and Survival: A systematic Review and Meta-Analysis. <i>Circulation</i> , 12(10).	Dog ownership may be associated with mortality risk
	Lue, T.W., Pantenburg, D.P., & Crawford, P.M. (2008). Impact of the owner-pet and client-veterinarian bond on the care that pets receive. <i>Journal of American Veterinary Medical Association</i> , 232(4): 531-540.	Strength of pet and owner bond can signal use of care
	Marciniak, M. D., Lage, M. J., Dunayevich, E., Russell, J. M., Bowman, L., Landbloom, R. P., & Levine, L. R. (2005). The cost of treating anxiety: the medical and demographic correlates that impact total medical costs. <i>Depression and anxiety</i> , 21(4), 178–184. https://doi.org/10.1002/da.20074	Incremental costs of depression or anxiety disorders can be close to \$2,000
	McConnell, A., Brown, C., Shoda, T.M., Stayton, L., & Martin, C. (2011). Friends with benefits: on the positive consequences of pet ownership. <i>Journal of personality and social psychology</i> , 101 6, 1239-52 .	Pets provide social support on par with family and siblings
Level 4 Evidence: Case Control/ Cohort Studies	Mihalopoulos, C., Le, L., Chatterton, M., Bucholc, J., Holt-Lunstad, J., Lim, M. & Engel, L. (2020). The economic costs of loneliness: a review of cost-of-illness and economic evaluation studies. <i>Social Psychiatry and Psychiatric Epidemiology</i> . 55. 10.1007/s00127-019-01733-7 .	More research is needed to understand the full cost of loneliness
	Monaghan, H., Rohlf, V., Scotney, R., & Bennett, P. (2020). Compassion fatigue in people who care for animals: An investigation of risk and protective factors. <i>Traumatology</i> . 10.1037/trm0000246 .	Jobs demands explained 17% of variance in burnout
	Ratschen E, Shoesmith E, Shahab L, Silva K, Kale D, Toner P, et al. (2020) Human-animal relationships and interactions during the Covid-19 lockdown phase in the UK: Investigating links with mental health and loneliness. <i>PLoS ONE</i> 15(9): e0239397. doi:10.1371/journal.pone.0239397	Pet ownership may mitigate negative mental health risks from COVID-19
	Saint-Maurice PF, Troiano RP, Bassett DR, et al. Association of Daily Step Count and Step Intensity With Mortality Among US Adults. <i>JAMA</i> . 2020;323(12):1151–1160. doi:10.1001/jama.2020.1382	A greater number of steps per day was significantly associated with lower all-cause mortality
	Shaw, J. G., Farid, M., Noel-Miller, C., Joseph, N., Houser, A., Asch, S. M., Bhattacharya, J., & Flowers, L. (2017). Social Isolation and Medicare Spending: Among Older Adults, Objective Social Isolation Increases Expenditures while Loneliness Does Not. <i>Journal of aging and health</i> , 29(7), 1119–1143. https://doi.org/10.1177/0898264317703559	Social Isolation Increases Health Care Expenditures



Level of Evidence	Study	Relevant Finding
<p>Level 4 Evidence: Case Control/ Cohort Studies</p>	<p>Stanley, I. H., C. Bowen, and K.A. Van Orden. 2014. " Pet ownership may attenuate loneliness among older adult primary care patients who live alone ." Aging & Mental Health 18(3) 394-399.</p>	<p>Pet ownership is associated with less loneliness</p>
	<p>Stehr-Green, J.K. & Schantz, P.M. (1987). The Impact of Zoonotic Diseases Transmitted by Pets on Human Health and the Economy. Veterinary Clinics of North America: Small Animal Practice, 17(1): 1-15.</p>	<p>Zoonotic diseases from pets pose a large cost on society</p>
	<p>Stull, J.W. (2018). Barriers and next steps to providing a spectrum of effective health care to companion animals. Journal of the American Veterinary Medical Association, 253(11).</p>	<p>Rising costs of care are associated with reduced use of care</p>
	<p>Wiltshire, J. C., Enard, K. R., Colato, E. G., & Orban, B. L. (2020). Problems paying medical bills and mental health symptoms post-Affordable Care Act. AIMS public health, 7(2), 274–286. https://doi.org/10.3934/publichealth.2020023</p>	<p>Problems paying medical debt is associated with worse mental health conditions</p>
	<p>Wood L, Martin K, Christian H, Nathan A, Lauritsen C, Houghton S, et al. (2015) The Pet Factor - Companion Animals as a Conduit for Getting to Know People, Friendship Formation and Social Support. PLoS ONE 10(4): e0122085. https://doi.org/10.1371/journal.pone.0122085</p>	<p>Pets can increase sense of community</p>
<p>Level 5 Evidence: Systematic Review of Descriptive Studies</p>	<p>Access to Veterinary Care Coalition. (2018). Access to Veterinary Care: Barriers, Current Practices, and Public Policy.</p>	<p>Millions of pets live with low-income households that may need support in accessing care</p>
	<p>ASPCA. (2020). ABVC and Effects on Relinquishment: Literature Review. [Unpublished manuscript]</p>	<p>Relinquishing pet owners often say low-cost care could've helped them keep the pet</p>
	<p>Baker, T., Kutz, S., Toews, L., Edwards, N. & Rock, M. (2018). Are we adequately evaluating subsidized veterinary services? A scoping review. Preventative Veterinary Medicine, 157: 59-69.</p>	<p>Public health implications of subsidized veterinary care are not well-researched</p>
	<p>Cocker, F. & Joss, N. (2016). Compassion Fatigue among Healthcare, Emergency and Community Service Workers: A Systematic Review. International Journal of Environmental Research and Public Health, 13: 618.</p>	<p>Compassion fatigue interventions are needed and also deserve more study</p>



Level of Evidence	Study	Relevant Finding
<p>Level 5 Evidence: Systematic Review of Descriptive Studies</p>	<p>Coe, J.B., Young, I., Lambert, K., Dysart, L., Borden, L.N. & Rajic, A. (2014). A scoping review of published research on the relinquishment of companion animals. <i>Journal of applied animal welfare science</i>, 13(3): 253-273.</p>	<p>Research on relinquishment has not given as much attention to managing costs of care</p>
	<p>LaVallee, E., Kiely Mueller, M. & McCobb, E. (2017): A Systematic Review of the Literature Addressing Veterinary Care for Underserved Communities. <i>Journal of Applied Animal Welfare Science</i>, DOI: 10.1080/10888705.2017.1337515</p>	<p>Cost is a leading barrier to access care</p>
	<p>Weiss, E., Gramann, S., Victor Spain, C., & Slater, M. (2015). Goodbye to a good friend: an exploration of the re-homing of cats and dogs in the U.S. <i>Journal of Animal Sciences</i>, 5: 435-456.</p>	<p>Low-income pet owners were more likely to rehome due to costs</p>
<p>Level 6 Evidence: Systematic Review of Descriptive Studies</p>	<p>American Cancer Society. (2019). Medical costs create hardships for more than half of Americans: 137 million adults in the United States suffered medical financial hardship in 2015/2017. <i>ScienceDaily</i>. Retrieved April 20, 2021 from www.sciencedaily.com/releases/2019/05/190502100818.htm</p>	<p>56% of Americans have reported medical financial hardship</p>
	<p>Anxiety & Depression Association of America. (2017). <i>Alleviating Anxiety, Stress and Depression with the Pet Effect</i>.</p>	<p>Pet ownership is associated with improved mental health</p>
	<p>Arluke, A., & Rowan, A. N. (2020). <i>Underdogs: Pets, people, and poverty</i>.</p>	<p>Increasing trust can increase use of veterinary services</p>
	<p>Bielenberg, J. E., Futrell, M., Stover, B., & Hagopian, A. (2020). Presence of Any Medical Debt Associated With Two Additional Years of Homelessness in a Seattle Sample. <i>Inquiry : a journal of medical care organization, provision and financing</i>, 57, 46958020923535. https://doi.org/10.1177/0046958020923535</p>	<p>Medical debt is associated with homelessness</p>
	<p>Boatright, K. (2020). <i>The Cost of Caring Too Much? Today's Veterinary Practice</i>.</p>	<p>Client financial constraints are major contributors to vet burnout</p>
	<p>Brown, C.R. et al. (2021). <i>Spectrum of Care: More than Treatment Options</i>. [Unpublished manuscript].</p>	<p>Cost of care transparency can help build trust with clients</p>
	<p>Card, C., Epp, T., & Lem, M. (2018). Exploring the Social Determinants of Animal Health. <i>Journal of Veterinary Medical Education</i>, 45(4): 437-447.</p>	<p>Social determinants of health for humans can reflect on the well-being of the pet as well</p>
	<p>DiJulio, B., Hamel, L., Munana, C. & Brodie, M. (2018). Loneliness and Social Isolation in the United States, the United Kingdom, and Japan: An International Survey. Kaiser Family Foundation.</p>	<p>More than a fifth of American report feeling lonely and socially isolated</p>



Level of Evidence	Study	Relevant Finding
<p>Level 6 Evidence: Systematic Review of Descriptive Studies</p>	<p>Dolan, E.D., Scotto, J., Slater, M. & Weiss, E. (2015). Risk Factors for Dog Relinquishment to a Los Angeles Municipal Animal Shelter. <i>Animals</i>, 5: 1311-1328.</p>	<p>People facing relinquishment are often unaware of other options</p>
	<p>Ehnert, K., Lamielle, G., Scott, T., Beeler, E., Tack, D., & Fielding, J. (2015). The Healthy Pets Healthy Families initiative as an example of one health in action. <i>Journal of the American Veterinary Medical Association</i>, 247(2), 143–147. https://doi.org/10.2460/javma.247.2.143</p>	<p>Pet well-being involves many stakeholder groups</p>
	<p>Federal Reserve. (2018). Report on the Economic Well-Being of U.S. Households in 2017 - May 2018.</p>	<p>Out of pocket health care expenditures are the most common unexpected cost burdens for households</p>
	<p>Kelly Costa, D. & Moss, M. (2018). The Cost of Caring: Emotion, Burnout, and Psychological Distress in Critical Care Clinicians. <i>Annals of American Thoracic Society</i>, 15(7): 787-790.</p>	<p>Critical care clinicians have the highest rate of burnout</p>
	<p>Lewis, A. (2020). Access to care: ‘Veterinary medicine’s social justice issue’. Veterinary Information Network, Inc.</p>	<p>Veterinary care can be expensive and limit access</p>
	<p>Loss, S., Will, T. & Marra, P. The impact of free-ranging domestic cats on wildlife of the United States. <i>Nat Commun</i> 4, 1396 (2013). https://doi.org/10.1038/ncomms2380</p>	<p>Un-owned cats have large impact on bird populations</p>
	<p>McCarthy, R.J., Reed, M. & Levine, S.H. (2013). A Cat-Eat-Bird World. <i>TuftsNow</i>.</p>	<p>Un-owned cats have caused or contributed to 14% of all modern bird and reptile extinctions</p>
	<p>Mission Animal Hospital. (2020). Mission Animal Hospital By the Numbers: 2020.</p>	<p>MAH Mission Program serves thousands of pets and avoids hundreds of surrenders</p>
	<p>Mission Animal Hospital. (n.d.). Pet Ownership [Fact sheet].</p>	<p>Many pets have never been to the vet</p>
	<p>Morris, K. et al. (n.d.). Measuring the One Health Impacts of Humane Society of the United States’ Pets for Life. Institute for Human-Animal Connection, University of Denver.</p>	<p>Reducing barriers to access has many associated KPIs for tracking</p>



Level of Evidence	Study	Relevant Finding
<p>Level 6 Evidence: Single Descriptive/ Qualitative Study</p>	<p>Salman, M.D., New, J.G., Scarlett, J.M., Kris, P.H., Ruch-Gaille, R. & Hetts, S. (1998). Human and Animal Factors Related to the Relinquishment of Dogs and Cats in 12 Selected Animal Shelters in the United States. <i>Journal of Applied Animal Welfare Science</i>, J(3): 207-226.</p>	<p>Upwards of 40% of pets are relinquished within the first year of ownership</p>
	<p>White, A. (2016). <i>The Power of Pet Therapy</i>. National Alliance on Mental Illness.</p>	<p>Pets are associated with increased sense of calm</p>
<p>Level 7 Evidence: Single Descriptive/ Qualitative Study</p>	<p>American Animal Hospital Association. (2018). <i>Veterinary Fee Reference, Table 1.1 2016 Average and Median Fees for All Practices</i>.</p>	<p>Fees for examinations, preventative care and vaccinations range from tens to hundreds of dollars</p>
	<p>American Veterinary Medical Association. (2018). <i>Pet Ownership and Demographics, A_Tab 10. Cat Ownership on December 31, 2016 at the National, Regional and State Levels, with 95% confidence intervals</i>.</p>	<p>Approximately 25% of households own a cat in MN</p>
	<p>American Veterinary Medical Association. (2018). <i>Pet Ownership and Demographics, A_Tab 9. Dog Ownership on December 31, 2016 at the National, Regional and State Levels, with 95% confidence intervals</i>.</p>	<p>Aproximately 36% of households own a dog in MN</p>
	<p>Athena Group, LLC. (2018). <i>PIERCE COUNTY ANIMAL SERVICES COST ANALYSIS: final report</i>. Pierce City Council.</p>	<p>Costs of sheltering a surrendered pet can vary by the needs of the pet</p>
	<p>Carlier, A. & Teich, N. (2020). <i>Directly Valuing Animal Welfare in (Environmental) Economics</i>. <i>International Review of Environmental and Resource Economics</i>.</p>	<p>Increased economic study of animal welfare is needed</p>

Appendix E: GLOSSARY

Common Terms in the Ecotone Analysis	
Discount Rate	The annual rate of reduction of the value of outcomes accrued in the future, designed to account for uncertainty and the time value of money when calculating a present value
Effect Size	The change in the likelihood of a cost occurring given the program
Estimated Return	Present value of all monetized outcomes
External Data	Data not gathered by and/or studies not conducted by the program being analyzed
External Validity	The extent to which results of a given study are applicable across other contexts
Evidence Based	An approach to the program's work which is designed based on existing research and applications
Evidence Informed	An approach to program's work which is designed with the knowledge and influence of existing research
Impact	The change in outcomes derived exclusively from the given program
Internal Data	Data gathered by the program itself
Internal Validity	The extent to which results of a given study are only applicable to the context of that study
Intermediate Outcome	The change resulting from the short-term outcome
Levels of Evidence of Causality	Level 1 = greatest level of evidence that there is a causal relationship between the variables, Level 7 = lowest level of evidence that there is a causal relationship between the variables
Logic Model (Theory of Change)	The planned methodology for accomplishing the desired change(s)
Long-term Outcome	The change resulting from the intermediate outcome
Marginal Cost	The effect size multiplied by the outcome cost. The average change in cost accrued
Monetized Outcome	An outcome which has been linked to a cost occurring event, thereby placing a dollar value on the outcome
Net Present Value (NPV)	The aggregation of benefits and costs valued in the present day given an assumed time period and discount (interest) rate
Non-monetized Outcome	The change which is not or could not be linked, due to data quality, to a cost occurring event, thereby keeping the outcome from having a dollar value placed on it
Outcome	The resulting change occurring from the program's inputs and activities
Outcome Cost	The total cost of an event occurring
Output	The product from the inputs and activities of the program (e.g. number of people served)
Present Value (PV)	A single annuitized benefit or cost (depending on the outcome) valued in the present day given an assumed time period and discount rate
Short-term outcome	The initial change generated from the program
Trumping Rules	Selecting certain outcomes over others when they are interlinked to avoid double counting



