

RABIES CONTROL MEASURES IN AZERBAIJAN: SURVEY OF STRAY DOG POPULATION IN BAKU

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Abstract. We assessed populations of stray dogs in the city of Baku, Azerbaijan, where cases of rabies among humans and animals are still found in the republic. In Baku, the density of stray dogs was 2480-3160 stray dogs / km², and the ratio of stray dogs to people was 1: 4.7. Since the population of stray dogs in Azerbaijan is very large, one of the measures used to prevent dog bites and dog-infected infections such as rabies is to try to catch stray dogs. Another such measure is an attempt to reduce the availability of food for stray dogs. In addition to the above measures and routine vaccination of dogs, this health education course is recommended as a long-term preventive program.

Keywords: *stray dog, population, infection, vaccination, risk.*

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1. Introduction

Rabies is a socio-economic problem. The main reservoir of rabies virus is wild animals, bats and stray dogs. Globally 50-60 thousand people die of rabies annually, 99%-got infected via stray dogs' bites. Therefore, it is important to evaluate stray dogs' population. In Azerbaijan 109,940 people requested post-exposure rabies prophylaxis during 2010-2016. 42 people died from stray dog-mediated rabies. During this period 213 rabies cases of animal were recorded, 47% were related to dogs' bites (Baryshnikov *et al.*, 2007; Hasanov *et al.*, 2018).

Despite the preventive vaccination against rabies of domestic animals (dogs, cats) in our country, the disease continues to be registered among animals, including agricultural ones (Davlin & VonVille, 2012; Kato *et al.*, 2013). Given that the main reservoir of the urban type of disease is free walking dogs, it is necessary to assess the health of animals and their populations in order to prevent human infection. Evaluating stray dogs also helps prevent the spread of disease and improve vaccination efficiency by strengthening the control system (Belo *et al.*, 2015; Downes *et al.*, 2009; Hasanov *et al.*, 2018).

The aim of this study is a multidisciplinary concept for stray dog management (DPM) that aims to improve the health and well-being of stray dogs, reduce the problems they can cause, while reducing the number of dogs (Gamble *et al.*, 2018; Kahn *et al.*, 2008; Kwaghe *et al.*, 2019).

Research Area

The purpose of this pilot study was to survey the stray dog population in Baku, Azerbaijan. Territory of city of Baku was divided in 117 wards similar by size, and the

counting was performed in 69 wards evenly distributed. Counting was performed In April 2016, between 05:30 AM-12:30 PM.

2. Materials and Methods

The composition and dynamics of the population were calculated according to the guidelines of the World Society for Animal Welfare survey and CDC. The study was implemented with financial support of the International Dialogue for Environmental Action, Public Union. The Royal Society for the Prevention of Cruelty of Animals, RSPCA's experts participated in the study.

Materials of the State Veterinary Control Service under the Ministry of Agriculture of the Republic of Azerbaijan, Republican Veterinary Laboratory, and Veterinary Department of Baku city were used.

3. Results

The world population of domestic dogs is estimated at about 700 million, of which about 75% are classified as "free roaming". Where free-roaming dogs exist in high densities, this has serious implications for public health, animal welfare and wildlife.

The spread and infection of stray dogs with rabies is more common in economically underdeveloped countries. Measures or programs need to be developed to combat the uncontrolled dog populations that are common in many low-income countries (Abela-Ridder *et al.*, 2018; Downes *et al.*, 2013; Bourhy *et al.*, 2005).

According to the World Health Organization (WHO), thousands of people die from rabies every year, even though 5 million people and more than 10 million animals are vaccinated against rabies worldwide. Most people who die from the disease are poor, do not seek medical attention, do not have access to appropriate treatment, and are indifferent to bites or contact. Disease, along with human lives, causes great damage to the economy of any country (www.who.int/rabies).

International partners have come together to achieve a common goal of zero human deaths from canine rabies worldwide by 2030. In a triangular partnership, the World Health Organization (WHO), the World Organization for Animal Health (OIE) and the Food and Agriculture Organization of the United Nations (UN FAO) prioritize rabies as a model for One Health in action (www.oie.int/rabies).

The reservoir of urban rabies is mainly orphaned animals. In this regard, with the support of the Public Association of the International Dialogue on Environmental Protection (IDEA), the composition and dynamics of the population of orphaned animals was determined in Baku, as well as the study of people's attitudes towards stray dogs in society.

In 2016, 12 administrative districts of Baku were divided into 117 sectors, and based on a selective method, in 69 of them the monitoring of the head count of stray dogs was conducted (with 1:2 ratio, numbering from 1 to 69).

New buildings are constructed, roads and parks are built in all districts of the city. Calculations were made both in areas under construction and newly built living quarters in order to define the number of the stray dogs. Stray dogs were mostly observed in the suburbs of the city, in the countryside, and near catering facilities in April.

The population dynamics, counting was carried out in accordance with the methodology described in the guidelines of the World Society for Animal Welfare (WSPA) survey, and the evaluation of the rabies surveillance system.

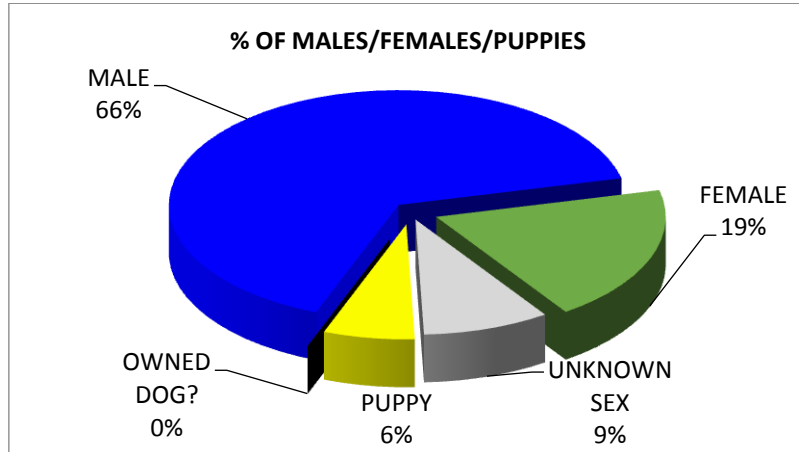


Figure 1. Of stray dog

1,666 dogs were estimated in 69 wards, 1090 were male, 320-female, 107-puppies and 149-undetermined. In terms of their physical appearance 136 out of the dogs were very thin, 414 were under weight, 843 were ideal, 73 were overweight and 5 were obese, while no body condition score could be assessed for 195. Other observed conditions were 10 pregnancies, 14 dogs that had just given birth, 27 with damaged skin and 23 limping dogs. In terms of behavior 94 of the dogs seemed loyal, 628 scared, 507 careful, 261 guarding and 18 aggressive, while the behavior of 158 dogs was unclear.

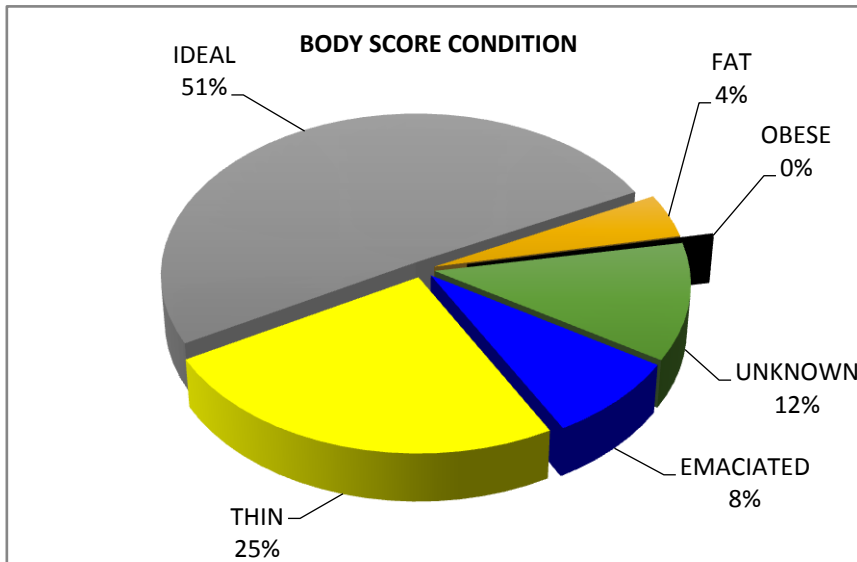


Figure 2. Body score condition

The average number of dogs counted per ward was 24,1 resulting in an estimated population of 2824 roaming dogs in the city of Baku. The 95% confidence interval on this estimate range is from 2480 to 3168.

The results of the counting is following:

1. 65 wards were selected out of 117 wards. A total of 1666 dogs were seen in these 69 wards.
2. Calculating the population estimate from the count:

$$\frac{\text{total number of dogs counted}}{\text{number of sample blocks} / \text{total number of blocks}} = \frac{1666}{69/117} = \frac{1666}{0.59} = 2824$$

Between the hours of 05:30 AM and 12:30 PM there an estimated 2824 roaming dogs in the city of Baku.

3. The table below shows the number of dogs counted in each ward, the difference between the number of dogs counted and the mean over the selected wards and that difference squared.

Ward number	Number of dogs counted (X)	Difference between number of dogs counted and mean (X - 24.1)	Difference between number of dogs counted and mean, squared (X - 24.1) ²
1	14	-10,1	102,01
2	27	2,9	8,41
3	43	18,9	357,21
4	24	-0,1	0,01
5	37	12,9	166,41
6	29	4,9	24,01
7	28	3,9	15,21
8	33	8,9	79,21
9	16	-8,1	65,61
10	32	7,9	62,41
11	34	9,9	98,01
12	26	1,9	3,61
13	19	-5,1	26,01
14	29	4,9	24,01
15	21	-3,1	9,61
16	37	12,9	166,41
17	43	18,9	357,21
18	13	-11,1	123,21
19	43	18,9	357,21
20	12	-12,1	146,41
21	31	6,9	47,61
22	35	10,9	118,81
23	56	31,9	1017,61
24	19	-5,1	26,01
25	23	-1,1	1,21
26	22	-2,1	4,41
27	19	-5,1	26,01
28	16	-8,1	65,61
29	4	-20,1	404,01

30	40	15,9	252,81
31	17	-7,1	50,41
32	2	-22,1	488,41
33	35	10,9	118,81
34	8	-16,1	259,21
35	8	-16,1	259,21
36	11	-13,1	171,61
37	41	16,9	285,61
38	24	-0,1	0,01
39	18	-6,1	37,21
40	31	6,9	47,61
41	23	-1,1	1,21
42	32	7,9	62,41
43	31	6,9	47,61
44	33	8,9	79,21
45	16	-8,1	65,61
46	35	10,9	118,81
47	27	2,9	8,41
48	61	36,9	1361,61
49	31	6,9	47,61
50	24	-0,1	0,01
51	12	-12,1	146,41
52	38	13,9	193,21
53	24	-0,1	0,01
54	11	-13,1	171,61
55	40	15,9	252,81
56	20	-4,1	16,81
57	20	-4,1	16,81
58	34	9,9	98,01
59	4	-20,1	404,01
60	5	-19,1	364,81
61	19	-5,1	26,01
62	16	-8,1	65,61
63	4	-20,1	404,01
64	8	-16,1	259,21
65	20	-4,1	16,81
66	15	-9,1	82,81
67	13	-11,1	123,21
68	27	2,9	8,41
69	3	-21,1	445,21
Total	1666	3.1	10762.69

4. Calculating the mean (average) number of dogs counted per ward:

$$\frac{\text{total number of dogs counted}}{\text{sample size}} = \frac{1666}{69} = 24.1$$

5. Calculating the variance of the counts (the average of the squared difference between the counts and their mean value):

$$\frac{\text{total of } (X - 26.4)^2}{\text{sample size}} = \frac{10762.69}{69} = 156$$

6. Calculating the standard deviation of the counts: $\sqrt{\text{variance}} = \sqrt{129} = 12.5$

7. Calculating the standard deviation for the average number of dogs counted:

$$\frac{\text{standard deviation}}{\sqrt{\text{sample size}}} = \frac{12.5}{\sqrt{69}} = 1.5$$

8. Calculating the standard deviation of the estimated number of dogs in the city:
standard deviation of mean \times *total number of blocks* = $1.5 \times 117 = 175.5$

9. Calculating the 95% confidence interval. With a sample size of 69 wards the t-statistic is 1.96

The lower limit of the confidence interval:

$$\begin{aligned} & \text{estimated number of dogs} - (\text{standard deviation} \times t \text{ statistic}) \\ & 2824 - (175.5 \times 1.96) \\ & 2824 - 344 = 2480 \end{aligned}$$

The upper limit of the confidence interval:

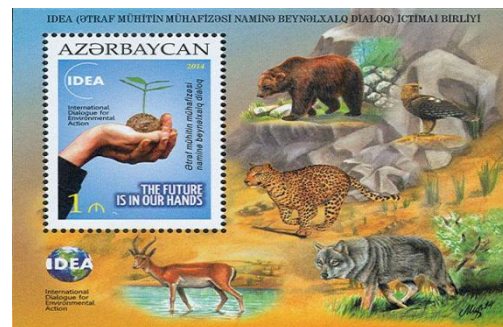
$$\begin{aligned} & \text{estimated number of dogs} + (\text{standard deviation} \times t \text{ statistic}) \\ & 2824 + (175.5 \times 1.96) \\ & 2824 + 344 = 3168 \end{aligned}$$

The foundation for IDEA Animal Care Center (IACC) was laid by the Vice-President of the Heydar Aliyev Foundation and IDEA founder Leyla Aliyeva in October of 2014. IACC officially commenced its operations on 1 March 2017.

While temporarily accommodating some animals that are in desperate need for shelter and care, IACC's prime focus in addressing the street animal problem is on sterilization, disease prevention, rehoming, responsible pet ownership and humane attitudes towards animals (www.ideacares.az).

The Center has a well-equipped clinic, kennel blocks for dogs and a cattery, separate isolations blocks for the quarantined animals, adoptions section, pet hotel, grooming parlor, playgrounds, hostel for resident volunteers and veterinarians, conference hall, cafe and shop.

The veterinary clinic has facilities for both street and owned animals. All medical care for street animals is completely free of charge. As to IACC's Catch-Vaccinate-Neuter-Release (CVNR) program for street animals, we have a well-equipped catching team, which will use the most humane methods for capturing animals. The sterilized and vaccinated dogs will be ear-tagged, while



cats will be marked by ear-tipping; profiles and medical records of all animals will be entered into IACC's electronic database. In the 2017-2020 years in the center of vaccinated and sterilized 3,339 dogs and 3,962 cats.

Another important part of our work consists of promoting humane attitude towards animals and responsible pet ownership practices, raising awareness on animal welfare, and changing people's perceptions of homeless animals in Azerbaijan.

The help of volunteers is an important prerequisite for IACC's activities. Animal-lovers that are willing to help us care for our resident dogs and cats can join us as volunteers by filling an application form and formally agreeing to comply with IACC rules and procedures.

Being dependent on the support and contributions of private and corporate sponsors, IACC accepts donations as well as in-kind contributions. Those willing to become an IACC sponsor will benefit from our various sponsorship benefits.

4. Conclusions & Recommendations

The study showed that stray dogs are a potential risk factor for transmission of the rabies virus in Baku. The Ministry of Agriculture developed the National Strategy for fight against Rabies in the Azerbaijan Republic for 2021-2025 in the frame of the EU Twinning Project and it's currently being prepared for state approval.

Appropriate sensitization of dog owners with annual canine rabies vaccination and post-exposure prophylaxis in humans is recommended. Local authorities should take effective measures to combat stray dogs to prevent the risk of dog bites and other environmental hazards posed by such dogs. The government must enact and enforce laws on responsible dog ownership, including mandatory annual vaccinations for all dogs. To provide comprehensive national dog environmental data needed for policy planning, development and implementation.

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