CONTROL OF RABIES IN THE MIDDLE EAST REGION

WITH EMPHASIS ON STRAY DOG CONTROL

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Summary: *Combined with dog vaccination, control of stray dog populations is one of the most effective tools to control rabies in humans and animals. A survey on rabies control and stray dog management was conducted among the national authorities of Member Countries of the OIE Regional Commission for the Middle East by means of a questionnaire. The results of the questionnaire are provided in the form of tables with both the numbers reported and the percentage of responses. A short discussion on the results of the questionnaire is provided, including recommendations based on observations on the results.*

Keywords: *disease control – Middle East – rabies – stray dog.*

1. Introduction

During the 83rd General Session of the OIE, held in Paris in May 2015, the OIE Regional Commission for the Middle East adopted 'Control of rabies in the Middle East with emphasis on stray dog control' as the topic for Technical Item I with questionnaire to be presented at the 13th conference of the OIE Regional Commission, to be held in Kaslik, Lebanon, from 10 to 14 November 2015.

Rabies is a widespread, neglected and under-reported fatal zoonosis with an almost 100% case fatality rate in animals and humans. It has a profound impact on human and animal health, economy and trade, and societies.

Stray and feral dogs pose serious zoonotic, socio-economic, political and animal welfare problems in many countries of the world. The vast majority of the estimated 55 000 human deaths from rabies each year occur in rural areas of Africa and Asia. In India alone, 20 000 deaths (i.e. about 2/100 000 population at risk) are estimated to occur annually; in Africa, the corresponding figure is 24 000 (about 4/100 000 population at risk) [1]. However, it is highly recognised that these statistics are much underestimated. Other statistics are mentioning 70 000 deaths yearly.

In some cases the rabies control schemes, dealing with dog population control, introduced by the authorities are not highly effective and are not based on relevant animal welfare principles. In some, but not all countries, national Veterinary Services are involved in the control of stray dogs and in official programmes to prevent human exposure to rabies. Human and animal cases occur in countries with inadequate systems of rabies control and especially with inadequate stray and feral dog surveillance to help prevent this fatal disease.

Due to their close association with people, dogs are almost ubiquitous and managing their populations is a challenge throughout the world. Dog population management and the control of the dynamics of the dog populations are important as an initial assessment in countries where rabies still exists and causes human cases. Stakeholders involved in dog population control can start a successful strategy to eradicate rabies based on the OIE's recommendations contained in the OIE *Terrestrial Animal Health Code* (the *Terrestrial Code*). The need to control the number of

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dogs, especially stray dogs, is motivated in part by public health concerns, particularly in relation to the transmission of rabies and other zoonotic diseases.

The OIE has taken a leadership role by issuing standards and guidelines on controlling stray and feral dogs for the improvement of terrestrial animal health and welfare and veterinary public health worldwide, to help Veterinary Authorities or national agencies or bodies responsible for the control of rabies and stray dogs in their respective countries. The development of these standards and recommendations is the result of the on-going work by the OIE Terrestrial Animal Health Standards Commission and the OIE working Group on Animal Welfare.

The OIE Regional Commission for the Middle East survey on 'Control of rabies with emphasis on stray dog control' is based on the results of a questionnaire, to which 18 of the 20 Member Countries of the Regional Commission responded within the given time limit[2].

The report will also include general knowledge about the disease and its distribution worldwide.

2. Methodology

The questionnaire was designed to capture the following information:

- Member Countries' level of understanding of the situation relating to stray dogs, given that almost all cases of human rabies are transmitted through dog bites.
- Member Countries' awareness of OIE recommendations on stray dog population control (*Terrestrial Code* Chapter 7.7.).
- The rabies situation in Member Countries, in the form of statistics on human and animal cases.
- Suggestions for additional support from the OIE that Member Countries would find most beneficial in the field of stray dog control and rabies control.

3. General definition

Stray dog [*Terrestrial Code* Glossary]: means any dog not under direct control by a person or not prevented from roaming. Types of stray dog:

a. free-roaming owned dog not under direct control or restriction at a particular time,
b. free-roaming dog with no owner,
c. feral dog: domestic dog that has reverted to the wild state and is no longer directly dependent upon humans.

4. Other relevant information

Rabies is a disease caused by one member of the Lyssavirus genus: the Rabies virus (formerly referred to as classical rabies virus, genotype-1); all mammals are susceptible to infection [*Terrestrial Code* Article 8.13.1.].

The incubation period for rabies is variable, and considered to be six months; the infective period for dogs, cats and ferrets is considered to start ten days before the onset of the first apparent clinical signs [*Terrestrial Code* Article 8.13.1.].

Globally, the most common source of exposure of humans to rabies virus is the dog. Other mammals, particularly members of the Orders Carnivora and Chiroptera, also present a risk [*Terrestrial Code* Article 8.13.1.].

Rabies should be notifiable in the whole country and any change in the epidemiological situation or relevant events should be reported in accordance with *Terrestrial Code* Chapter 1.1.

2 Afghanistan, Bahrain, Cyprus, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Oman, Qatar, Somalia, Sudan, Syria, Turkey, Yemen

The carrying capacity is the upper limit of the dog population density that could be supported by the habitat based on the availability of resources (food, water, shelter), and human acceptance [*Terrestrial Code* Article 7.7.2.].

The objectives of a programme to control the dog population may include the following [*Terrestrial Code* Article 7.7.3.]:

1. improve health and welfare of owned and stray dog population;
2. reduce numbers of stray dogs to an acceptable level;
3. promote responsible ownership;
4. assist in the creation and maintenance of a rabies immune or rabies free dog population;
5. reduce the risk of zoonotic diseases other than rabies;
6. manage other risks to human health (e.g. parasites);
7. prevent harm to the environment and other animals;
8. prevent illegal trade and trafficking.

5. Report

5.1. Introduction

Rabies is a zoonotic viral disease which infects domestic and wild animals; it is transmitted to other animals and humans through close contact with saliva from infected animals (i.e. bites, scratches, licks on broken skin and mucous membranes). Rabies virus is not transmitted through intact skin. Once symptoms of the disease develop, rabies is fatal to both animals and humans. The most frequent way that humans become infected with rabies is through the bite of infected dogs and cats, and to a lesser extent through wild carnivorous species such as foxes, raccoons, skunks, jackals and wolves, and insectivorous and vampire bats. It is important to realise that the disease can be transmitted via the saliva of an infected animal to other animals and humans before the onset of clinical signs of the disease in the infected animal.

The incubation period varies according to the amount of virus transmitted, the virus strain, the site of inoculation (bites closer to the head have a shorter incubation period), host immunity and the nature of the wound. In dogs and cats, the incubation period is 10 days to 6 months; most cases become apparent between 2 weeks and 3 months. In cattle, an incubation period from 25 days to more than 5 months has been reported. No one can reliably estimate how many animals are infected with rabies at any given time. The incidence varies greatly from country to country and from one year to the next.

Bangladesh is a country with one of the highest *per capita* ratios of rabies in humans, with more than 2 000 deaths each year. India has approximately 20 000 human deaths from rabies [WHO, 2009]. Over 80 countries (almost all developing countries) have endemic canine rabies. Some 4 million people annually receive post-exposure treatment.

5.2. Control of dog populations

Through fear of rabies, and due to a lack of knowledge and resources, some communities use cruel and ineffective methods of dog population control, such as poisoning, electrocution and drowning. Until recently, poisoning with strychnine was the only means of dog control available in some countries to the struggling local authorities; in many cases dogs died slowly, convulsing and taking up to several hours to die.

Combined with dog vaccination, monitoring and control of dog populations is still one of the most important, effective and cost-effective means to strategically address and eliminate rabies in humans and animals.

In many countries, and in Middle Eastern countries in particular, stray dogs pose serious human health, animal health and welfare problems, such as the transmission of rabies and other zoonotic diseases, pollution (e.g. faeces and noise), biting, traffic accidents and risks to other companion animal species, wildlife and livestock. Effective management of stray dog populations should therefore be considered as a priority, and be an integral component of any rabies control programme. Veterinary Services should play a lead role in preventing zoonotic

diseases and ensuring animal welfare and should be involved in dog population control, coordinating their activities with other competent public institutions and/or agencies. The OIE recognises the importance of controlling dog populations without causing unnecessary animal suffering.

Before starting a dog population control programme, it is important to be clear that the objective is to control all the dog population, including owned dogs, not to eradicate the dog population.

Before planning a dog population control programme in a country or at a lower jurisdictional level, the relevant authorities should consider the following:

- The presence of sustainable and applicable legislation;
- Assessment of the problem: estimating the existing number, distribution and ecology of dogs is a key factor for the success of the control strategy;
- The sources of stray dogs should be identified as well the dynamics of the dog population;
- The aim is to estimate the size and composition of the entire dog population in the city or country (including roaming and confined dogs), to begin to understand the dynamics of the population and more specifically what is maintaining the roaming dog population, and the community's attitude towards stray dogs;
- Available resources, logistics, training and standard operating procedures (SOPs) to implement the plan;
- The sustainability of the programme to achieve its objectives;
- Elimination of garbage and waste from slaughterhouses, restaurants and houses is a crucial factor in reducing the environment's dog carrying capacity. Stray/feral animal numbers would fall dramatically if there was nothing for them to eat along roadsides and in backyards;
- Awareness of the plan and strategy, and about the potential danger posed by stray dogs and zoonosis;
- Intersectoral collaboration: private and public veterinarians, municipalities; media, mosques and churches, human health authorities, and social experts; and
- Provision for 'monitoring and evaluation' of programme activities and outcomes[3].

5.3. Development of a dog population control programme

It is important to nominate an advisory group, which should include veterinarians, experts in dog ecology, dog behaviour and zoonotic diseases, and representatives of relevant stakeholders, such as local authorities, human health services/authorities, environmental control services/authorities, NGOs and the public.

This advisory group should analyse and quantify the problem, identify the causes, obtain public opinion on dogs and propose the most effective approaches to use in the short and long term. The following are important considerations:

- identifying the sources of stray dogs;
- estimating the existing number, distribution and ecology of dogs;
- the presence of a regulatory framework; and
- the resources available to the authorities.

3 Monitoring is a continuous process that aims to check the programme's progress against targets and allows for regular adjustments. Evaluation is a periodic assessment, usually carried out at particular milestones to check the programme is having the desired and stated impact.

6. Survey findings

6.1. Main results of the questionnaire

To evaluate the situation relating to rabies and stray dog population control in the Middle East region, a questionnaire was sent to the 20 Members of the OIE Regional Commission for the Middle East. Eighteen of the 20 countries responded, which is a very good response rate for a questionnaire related to a Technical Item to be presented at a Conference of the OIE Regional Commission for the Middle East.

The high number of responses indicates the interest shown by Member Countries in rabies and the issue of stray dog population control.

6.2. Questionnaire Section I – Understanding the situation of stray dogs

Before starting any dog population control programme, the size of the problem and all relevant data should be determined.

Estimation of the number of owned dogs

Table 1 shows that 8 of the 18 Member Countries that responded to this question indicated that they estimate the number of owned dogs.

Table 2 shows that the estimated number of owned dogs has remained fairly stable without any significant changes. The annual total for the 8 respondent countries was around 1 million.

Table 1. Responses to Question 3a 'Do you estimate the number of owned dogs in your country?'

Response	Number of countries	Percentage
Yes	8	45%
No	10	55%

Table 2. Cumulated total of owned dogs in the eight countries that responded to Question 3b. 'Which is the estimated number of owned dogs in your country?'

Year	Total number of owned dogs in the 8 respondent countries
2010	939 041
2011	950 743
2012	963 308
2013	1 038 747
2014	1 002 514

Methods used to estimate the number of owned dogs

Table 3 shows that 'dog registration' and 'dog licensing' are each used by 4 countries, while 'dog registration in a peripheral database' and 'breeder licensing' are each used by 1 country. Three countries did not specify how they estimate the owned dog population, which is an indication that many countries do not undertake serious steps to control the owned dog population.

Table 3. Responses to Question 3c 'Which methods are used to estimate the number of owned dog in your country?'

Methods to estimate dog population	Number of countries using this method
Dog registration in organised database	4
Dog registration in a peripheral database	1
Dog licensing	4
Breeder licensing	1
Other (please specify)	3

Problems posed by the stray dog population

Table 4 shows that problems posed by the stray dog population are common in the region as, 17 of the 18 respondent countries declared that they have problems with stray dogs. The most important problems (+72%) are 'noise', 'humans bitten by dogs' and 'zoonosis', followed by 'attacks to livestock' and 'road accidents'. The least important problem in the region is the presence of faeces. Only 1 country reported having no problems.

Table 4. Responses to Question 4a 'Does the stray dog population pose a problem in your country?'

Type of problem	Number of respondents experiencing the problem	Percentage of respondents experiencing the problem
Humans bitten by dogs	13	72.2%
Zoonosis/rabies	13	72.2%
Noise	14	77.7%
Faeces	5	27.7%
Attacks to livestock	12	66.6%
Road accidents	11	61.1%

No additional problem was mentioned by the respondent countries.

Number of dog bites to humans

From the two tables below (Tables 5 and 6) it appears that the Veterinary Services in only 11 of the 18 respondent countries in the region are aware of the number of dog bites to humans; the least number of dog bites to humans per year was in Somalia, where it ranged from 2 to 6 and in Djibouti where it ranged from 18 to 30; the highest numbers were in Egypt (200 000 in 2010, increasing to 300 000 in 2014) and Turkey (152 000 in 2010 increasing to 197 000 in 2014).

In general, the number of dog bites to humans seems to be increasing, which suggests that most countries are not making progress with dog population control. The total number of dog bites to humans in the 11 countries increased from 485 623 in 2010 to 692 876 in 2014, an increase of around 40% in only five years.

Table 5. Responses to Question 5a 'Do you know the annual number of dog bites to humans in your country?'

Response	Number of countries	Percentage
Yes	11	61%
No	7	39%

Table 6. Responses to Question 5b 'What is the annual number of dog bites to humans in your country?'

Country	Annual number of dog bites to humans				
	2010	2011	2012	2013	2014
Djibouti	ND	ND	18	20	30
Egypt	201 065	212 738	239 321	273 942	303 861
Iran	122 498	134 523	150 476	150 790	160 430
Iraq	63 86	9 530	13 467	12 230	13 467
Jordan	2 915	3 423	4 305	4 500	4 857
Kuwait	ND	ND	ND	ND	1 052
Somalia	2	3	2	6	4
Sudan	90	72	85	102	72
Syria	ND	ND	ND	10 085	11 531
Turkey	152 236	156 141	191 015	186 466	197 215
Yemen	431	330	449	449	357
Total	485 623	516 760	599 138	638 590	692 876

ND = no data

Annual number of road accidents provoked by stray animals

According to the questionnaire returns, only 2 out of 18 countries are aware of the number of road accidents caused by stray animals. Only 1 country (Turkey) indicated the annual number (3).

Estimation of the number of stray dogs

As shown in Table 7, only 4 of the 18 respondent countries estimate the number of stray dogs. Fourteen national Veterinary Services thus have no estimate of how many stray dogs are present in their countries.

Table 7. Responses to Question 7a 'Do you estimate the number of stray dogs in your country?'

Response	Number of countries	Percentage
Yes	4	22.3%
No	14	77.7%

As shown in Table 8, the number of answers to Question 7b 'What is the estimated number of stray dogs in your country?' is limited, as only 5 countries (not 4 as might be expected given the answers to the previous question) provided estimates. This means that at least 13 countries in the region do not know approximately how many stray dogs are present in their country.

According to the questionnaire returns, the highest numbers of stray dogs were in Yemen (1 million) and Turkey (more than 750 000), whereas the smallest numbers were in Somalia (between 3 and 21) and Bahrain (3 000). In Jordan, the number of stray dogs was between 17 000 and 20 000.

Table 8. Responses to Question 7b 'What is the estimated number of stray dogs in your country?'

Country	2010	2011	2012	2013	2014
Bahrain					3 000
Jordan	17 000	17 500	18 000	17 000	20 000
Somalia	12	6	21	3	8
Turkey	372 827	415 512	532 323	779 963	763 452
Yemen				1 000 000	

Methods used for estimating the number of stray dogs

Out of the 18 respondent countries, only 3 (17%) use the direct observation method referred to in the *Terrestrial Code* Article 7.7.8.

Identification of the sources of stray dogs

From Table 9 it is evident that the respondent countries consider 'un-owned dogs reproducing successfully' to be the main source of stray dogs.

Table 9. Incidence of three categories of dogs as the source of stray dogs in the respondent countries (responses to Question 8b)

Country	Owned dogs	Dogs abandoned by their owner	Un-owned dogs reproducing successfully
Afghanistan	40%		50%
Bahrain	10%	60%	40%
Djibouti	<10%	10%	80%
Iraq	20%		70%
Jordan	<10%	20%	70%
Kuwait	<10%	10%	80%
Libya	10%	40%	40%
Oman	<10%	<10%	80%
Qatar	20%	10%	70%
Somalia	>10%	>10%	30%
Syria	<10%	20%	70%
Turkey	<10%	20%	80%
Yemen		10%	80%

Organisation of counting activities of the stray dog population

Only 3 countries (Bahrain, Iran and Turkey) organise counting of stray dogs.

Iran organises annual counting activities of stray dogs in rural areas; Turkey has organised counting activities three times in both rural and urban areas.

Bahrain organises counting activities of stray dogs in both rural and urban areas.

Actors responsible for stray dog population control in the country

According to the responses received, the actors responsible for stray dog population control are as follows: the Veterinary Authorities (in 72% of respondent countries), dog owners and local authorities/municipalities (in 50% and 44% of respondent countries, respectively), and private veterinarians in 22% of respondent countries.

It is reasonable for the Veterinary Authorities to be the main actors in dog population control but they should pay more attention to this important issue.

Table 10. Responses to Question 10 'Who are the actors responsible for the stray dog population control in your country?'

Actors responsible for stray dog control	Number of countries	Percentage
Veterinary Authority	13	72.2%
Other government agencies	5	27.7%
Private veterinarians	4	22.2%
Non-Governmental Organisation(s)	5	27.7%
Dog owners	9	50.0%
Local authorities/Municipalities	8	44.4%
Other	0	0%

Presence of the necessary regulatory framework for various key elements

As shown in Table 11, most countries (88%) have the necessary regulations for the control of rabies and other zoonosis, while for 'veterinary procedures', 'registration and identification', 'control of dog movement' and 'control of dangerous dogs' the necessary regulations are present in between 66% and 55% of the respondent countries. This means that 40-45% of the countries lack the necessary regulations for these four important tools.

Table 11. Responses to Question 11 'Does your country have the necessary regulatory framework for the following key elements?'

	Yes		No	
	Number of countries	Percentage	Number of countries	Percentage
Registration and identification	11	61.1%	5	27.7%
Vaccination against rabies and other preventive measures against zoonotic diseases, as appropriate	16	88.8%	2	11.1%
Veterinary procedures (e.g. surgical procedures)	12	66.6%	4	22.2%
Control of dog movement (national and international)	10	55.5%	7	38.8%
Control of dangerous dogs	10	55.5%	7	38.8%
Regulations on dog breeding and sale of dogs	5	27.7%	11	61.1%

Do the authorities in charge of stray dog control have the necessary/adequate resources?

It is clear from Table 12 that 10 countries, more than the half of the respondent countries, do not have adequate resources for controlling stray dogs.

Table 12. Responses to Question 12 'Do the authorities in charge of stray dog control have the necessary/adequate resources?'

Response	Number of countries	Percentage
Yes	8	45%
No	10	55%

Level of adequacy of the resources used by the authorities in charge of stray dog control

Table 13. Responses to Question 13 'Please rank the level of adequacy of the following resources used by the authorities in charge of stay dog control'

	No answer	Rank (1 is 'inadequate' and 5 is 'fully adequate')				
		1	2	3	4	5
Human resources	1 (5.5%)	4 (22.2%)	3 (16.6%)	3 (16.6%)	3 (16.6%)	4 (22.2%)
Financial resources	2 (11.1%)	8 (44.4%)	3 (16.6%)	2 (11.1%)	2 (11.1%)	1 (5.5%)
Technical tools	1 (5.5%)	7 (38.8%)	4 (22.2%)	3 (16.6%)	2 (11.1%)	1 (5.5%)
Infrastructure	1 (5.5%)	7 (38.8%)	4 (22.2%)	3 (16.6%)	2 (11.1%)	1 (5.5%)
Cooperative activities	1 (5.5%)	7 (38.8%)	4 (22.2%)	3 (16.6%)	2 (11.1%)	1 (5.5%)
Public–private–NGO partnerships	13 (72.2%)	3 (16.6%)	6 (33.3%)	1 (5.5%)	3 (16.6%)	0 (0%)
Central–State partnerships	4 (22.2%)	6 (33.3%)	4 (22.2%)	0 (0%)	3 (16.6%)	1 (5.5%)
Province – Local	4 (22.2%)	4 (22.2%)	5 (27.7%)	2 (11.1%)	2 (11.1%)	1 (5.5%)

Countries' compliance with the standards in *Terrestrial Code* Chapter 7.7

Only 1 country considers to be fully compliant with these OIE standards, while 10 countries consider they are partially compliant and 5 consider they have no compliance. This situation should be improved and considerable efforts are needed to correct it, both on the part of the countries concerned and on the part of the OIE also.

Table 14. Responses to Question 14 'According to your responses on Section I 'Understanding the situation of stray dogs', how do you estimate the current level of compliance with the OIE *Terrestrial Code* Chapter 7.7.?'

	Number of respondent countries	Percentage
No compliance	5	27.7%
Partial compliance	10	55.5%
Full compliance	1	5.5%

Methods of euthanasia used for stray dog control

As shown in Table 15, euthanasia by chemical injection is the most common method, used by 13 (62%) of the 18 respondent countries. Only 5 countries use a mechanical method.

Table 15. Responses to Question 15 'If relevant, which methods of euthanasia are used for stray dog control?'

Method	Number of respondent countries	Percentage
Chemical via injection	13	61.9%
Mechanical	5	23.8%
Gaseous	0	0%
Electrical	0	0%
Other	3	14.2%

6.3. Questionnaire Section I bis – Understanding the situation of rabies

Presence or absence of rabies in the country

As shown in Table 16, 11 of the 18 respondent countries reported that rabies is present, while seven reported that it is not present. This means either that the latter 7 countries are free from rabies or efforts have to be done to detect it.

Table 16. Question 16a 'Is rabies present in your country?'

Response	Number of countries	Percentage
Yes	11	61.1%
No	7	38.8%

Information on rabies provided by countries that reported it present in Question 16a

As shown in Table 17, rabies is notifiable in 14 out of 16 countries (87%), whereas it is not notifiable in 2 countries. Rabies is present in the dog population in 10 out of 15 countries (67%). There are human cases originated from stray dogs biting in 10 out of 15 countries. Only 2 out of 15 countries have information on the prevalence of rabies in the stray dog population; the remaining 13 countries therefore have no accurate information about the presence of rabies in their dog population.

Table 17. Responses to Question 16b requesting further information on rabies (prevalence, etc.) from countries that reported it present

	Yes		No	
	Number of countries	Percentage	Number of countries	Percentage
Is rabies in dogs a notifiable disease in your country?	14	87.5%	2	12.5%
Is rabies present in dog population in your country?	10	66.6%	5	33.4%
Do you know the prevalence of rabies in stray dogs?	2	13.4%	13	86.7%
Are there human cases originated from stray dogs biting?	10	66.6%	5	33.4%

Recorded and/or estimated number of human rabies cases per year originating from stray dogs biting

According to the information provided in Table 18, only 7 out of 18 countries have a record of the number of human rabies cases originating from dog bites. In 6 of the 7 countries, the number of cases ranged from 0 to 21. The exception is Yemen, which recorded 7 560 cases in 2010 and 11 214 cases in 2014.

Estimates of the number of human cases originating from dog bites were provided only by Iran and Yemen (not shown in the table). The estimated number of cases in Iran was 8 000 in 2010 and reached 10 000 in 2014; the estimated number in Yemen was between 38 and 48, however it is unclear what these figures represent given the large numbers of cases recorded by Yemen, as shown in the table.

Table 18. Recorded number of human rabies cases originating from stray dogs biting (based on the responses to Question 16c 'Please indicate the number of human rabies cases per year originated from stray dogs')

Country	2010	2011	2012	2013	2014	Total
Jordan	0	0	1	0	1	2
Libya	4	21	0	2	1	28
Somalia	0	0	6			6
Sudan	13	5	2	2	1	23
Syria	0	0	0	7	0	7
Turkey	1	0	1	0	4	6
Yemen	8 609	7 560	10 269	10 435	11 214	48 087

Number of humans treated for rabies per year

The number of humans treated for rabies is relatively high in 2 countries; it reached over 100 000 per year in 2 countries and several thousand per year in 2 countries.

Table 19. Recorded number of humans treated for rabies (based on the responses to Question 16d 'Please indicate the number of humans treated for rabies per year')

Country	2010	2011	2012	2013	2014	Total
Iran	122 498	134 523	150 476	150 790	160 430	718 717
Iraq	23	9	10	5	10	57
Jordan	2915	3423	4305	4500	4857	20 000
Libya	4	21	0	2	1	28
Somalia	0	0	6	4	5	15
Syria		0	0	0	10 531	10 531
Turkey	138 022	142 333	175 529	171 615	184 466	811 965
Yemen	8 609	7 560	10 169	10 453	11 214	48 005

If one compares the recorded number of human cases originating from dog bites and the recorded number of humans treated for rabies, there is a big gap which requires clarification.

In Jordan, the total number of human rabies cases originating from stray dogs biting was 2 during the last five years (Table 18) whereas the total number of humans treated for rabies was 20 000 (Table 19). In Syria, the total number of human rabies cases originating from stray dogs biting during the last five years was 7, whereas the total number of humans treated for rabies was 10 531. In Turkey, the total number of human rabies cases originating from

stray dogs biting during the last five years was 6, whereas the total number of humans treated for rabies was 811 965.

A situation where the number of dog bites causing rabies is less than 1 per thousand of treated cases is questionable (see Table 20).

Table 20. A comparison of some apparently inconsistent data between the total number of human rabies cases originating from stray dogs biting and the total number of humans treated for rabies

Country	Total number of human rabies cases originating from stray dogs biting 2010–2014	Total number of humans treated for rabies 2010–2014
Jordan	2	20 000
Syria	7	10 531
Turkey	6	811 965

Recorded rabies cases in other animal species

When countries were asked to indicate the presence of recorded rabies cases in other animal species (Question 17), 9 of the 18 countries answered this question and indicated that the highest number was in cattle, with a combined total of 272, 224, 334, 410 and 485 cases in the years 2010, 2011, 2012, 2013 and 2014, respectively.

Are foxes a reservoir of rabies in your country?

As shown in Table 22, foxes are considered as a reservoir for rabies in 7 out of 16 countries that responded to this question.

Table 22. Responses to Question 18 'Are foxes considered a reservoir of rabies in your country'

Response	Number of respondent countries	Percentage
Yes	7	43.7%
No	9	56.3%

How many stray dogs are vaccinated in your country per year?

As shown in Table 23, stray dog vaccination started in 2014 in three countries. In two other countries, stray dog vaccination continued throughout the five-year period, progressing in one country to reach 13 622 in 2014 and in the other country to 580 002.

Table 23. Recorded number of vaccinated stray dogs by year (2010–2014) (responses to Question 29 'How many stray dogs are vaccinated [recorded and estimated] in your country per year?')

Country	2010	2011	2012	2013	2014
Bahrain					347
Egypt	10 839	10 626	9689	11 919	13 622
Iraq					350
Qatar					25
Turkey	526 000	529 000	536 280	565 677	580 002

How many owned dogs are vaccinated in your country per year?

As shown in Table 24, the number of vaccinated owned dogs ranged from 0 in some countries to 171 000 in the country with the highest number.

Table 24. Responses to Question 20 'How many owned dogs are vaccinated in your country per year?'

Recorded vaccinated owned dogs

Country	2010	2011	2012	2013	2014
Afghanistan					171 000
Djibouti				200	300
Egypt	10 839	10 626	9 686	11 919	13 622
Iraq	52	654	390	801	0
Jordan	3 696	3 240	2 063	2 710	1 606
Kuwait	2 300	2 930	2 750	2 459	3 438
Libya	3 220	3 650	3 420	3 200	2 850
Oman	143	43	13	25	82
Qatar					2 825
Sudan	983	5 000	2 718	2 630	35 770
Syria	2 450	3 665	3 800	4 280	8 017

Estimated vaccinated owned dogs

Country	2010	2011	2012	2013	2014
Afghanistan					171 000
Bahrain					500
Iran	70 000	80 000	80 000	70 000	65 000
Jordan	6 000	6 500	7 000	7 800	8 000
Oman	300	300	300	300	300
Syria	2 450	3 665	3 800	4 280	8 017

The contribution of each of four categories of partners in dog vaccination

Table 25 shows that the highest contribution is from public and private veterinarians, which were ranked almost equal. The lowest contribution is from veterinary para-professionals and community animal health workers.

Table 25. Responses to Question 21 'Please rank the contribution of each of the following partners in dog vaccination: 0 for no contribution, while 10 for maximum of contribution'

Country	Public veterinarians	Private veterinarians	Veterinary para-professionals	Community animal health workers
Afghanistan	10	10	10	5
Bahrain	7	3	2	2
Cyprus		10		
Djibouti	10	10		
Iran	3	6	7	0
Iraq	9	1		
Jordan	8	10	5	6
Kuwait	5	10	0	0
Lebanon	0	9	2	2
Libya	8	6	2	0
Oman	5	8	0	6
Qatar	10			
Somalia	5	1	1	4
Sudan	10	0	2	0
Syria	2	6	1	1
Turkey	9	6	2	
Yemen	3	3	4	0

Does your country organise campaigns for dog vaccination?

As shown in Table 26, only 7 countries organise campaigns for dog vaccination.

Table 26. Responses to Question 22 'Does your country organise campaigns for dog vaccination?

Response	Number of respondent countries	Percentage
Yes	7	38.9%
No	11	61.1%

How many doses of rabies vaccines for dogs were used in your country last year?

From a comparison of the number of doses of rabies vaccine for dogs used in the various countries in 2014 (Table 27) and the number of vaccinated owned dogs (Table 24), we conclude that most of the vaccines are used for owned dogs.

Table 27. Responses to Question 23 'How many doses of rabies vaccines for dogs were used in your country last year?'

Country	Number of doses of rabies vaccines used for dogs in 2014
Afghanistan	171 000
Bahrain	800
Cyprus	18 400
Djibouti	300
Egypt	13 622
Iran	400 000
Iraq	350
Jordan	8 000
Lebanon	35 000
Oman	300
Qatar	2 825
Sudan	35 770
Turkey	750 000
Yemen	4 000

6.4. Questionnaire Section IV – Satisfaction Survey

Respondents were asked to rate 'the easiness to fill the questionnaire'. Most of the countries considered the easiness of the questionnaire to be between 'easy' and 'neutral'.

Table 28. Satisfaction survey

Very easy	1
Easy	7
Neutral	8
Difficult	0
Very Difficult	1

6.5. Questionnaire Section II – Additional support

Question 24 'What additional support from the OIE would most help your country in the field of stray dogs and rabies control?

From the responses received, additional support was requested with the following:

- Technical and financial support;
- Provision of vaccination methods for wildlife and stray dogs;
- Organisation of training workshops for the preparation of a stray dog population control programme and strategy;
- The establishment of a regional rabies project that is coherent with the 'One Health' concept; and
- Assistance with establishing national projects for eradication of rabies and stray dog control at national and regional level.

The high number of responses to the questionnaire indicates the strong interest in the topics of rabies and stray dogs in Member Countries of the Regional Commission for the Middle East.

7. Conclusions

From the analysis of the collected responses from Member Countries, one may draw the following conclusions:

- The relatively high number of responses (18 out of 20 countries) to the questionnaire indicates the strong interest in the topics of rabies and stray dog population control among Member Countries of the Regional Commission for the Middle East.
- 8 of the 18 respondent countries have an estimation of the number of owned dogs, whereas 10 countries have no such information.
- 11 Veterinary Services in the region are aware of the number of dog bites to humans in their country, whereas 7 are not.
- Only 5 of the 18 respondent countries estimate the number of stray dogs, whereas 13 Veterinary Authorities have no estimate of how many stray dogs are present in their countries; a considerable improvement is needed in this respect.
- The respondent countries consider 'un-owned dogs reproducing successfully' to be the main source of stray dogs.
- Only 3 countries organise counting of stray dogs, while 15 do not; major efforts will be required to improve this situation.
- The main actors responsible for stray dog population control are the Veterinary Authorities (72%).
- Most countries have the necessary regulations for 'control of rabies and other zoonosis' (88%). For 'veterinary procedures', 'registration and identification', 'control of dog movement' and 'control of dangerous dogs', the necessary regulations are present in between 66% and 55% of the respondent countries, which means that 40-45% of the countries do not have the necessary regulations for these four important tools.
- 10 countries, more than the half, do not have adequate resources for controlling stray dogs.
- Only 1 country considers it is fully compliant with the OIE standards in *Terrestrial Code* Chapter 7.7. Stray dog population control, while 5 countries report 'no compliance' and 10 report 'partial compliance'; this situation should be improved and considerable efforts on the part of the countries concerned and on the part of the OIE are needed to correct the situation.
- Euthanasia by chemical injection is the method most commonly used for stray dog control; it is used by 13 (62%) of the 18 responding countries.
- 11 out of the 18 respondents indicated that rabies is present in their countries.
- Rabies is notifiable in 14 (87%) of the 16 countries that answered this question.
- Only 2 out of 15 countries indicated they have information on the prevalence of rabies in the stray dog population, therefore the remaining 13 countries have no accurate information on the presence of rabies in their dog population; this requires action to improve the situation.
- Only 7 out of 18 countries have a record of the number of 'human rabies cases originated from stray dogs biting'.
- The number of humans treated for rabies is relatively high in some countries, reaching over 100 000 per year in 2 countries and several thousand per year in 3 countries.

- When one compares the figures provided for ‘number of human cases per year originated from dogs biting’ and the figures for ‘number of humans treated for rabies per year’, there is a big gap which requires clarification.
- 9 of the 18 countries answered this question and indicated that the highest number of rabies cases in animals other than dogs was in cattle, with combined annual totals of 272, 224, 334, 410 and 485 cases in 2010, 2011, 2012, 2013 and 2014, respectively.
- Foxes are considered to be a reservoir for rabies in 7 out of 16 countries.
- Only 5 countries have a vaccination programme for stray dogs.
- Only 7 countries organise dog vaccination campaigns.
- From the number of rabies vaccine doses for dogs used in the respondent countries and the indicated number of vaccinated owned dogs one may conclude that most of the vaccine doses are used for the owned dogs.
- Most of the respondent countries considered the easiness of the questionnaire to be between easy and neutral.

From the responses received, additional support was requested with the following:

a. Technical and financial support;

b. Provision of vaccination methods for wildlife and stray dogs;

c. Organisation of training workshops for the preparation of a stray dog population control programme and strategy;

d. The establishment of a regional rabies project that is coherent with the ‘One Health’ concept; and

e. Assistance with establishing national projects for eradication of rabies and stray dog control at national and regional level.

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