

**Commentary**

# Iraqi policies and epidemiology on dog bites and rabies elimination

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**Received:** 01 Mar 2021 - **Accepted:** 09 Mar 2021 - **Published:** 10 Mar 2021

**Keywords:** Rabies, dog's bites, Iraq, global health, elimination

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**Cite this article:** Hashim Talib Hashim et al. Iraqi policies and epidemiology on dog bites and rabies elimination. PAMJ - One Health. 2021;4(12). 10.11604/pamj-oh.2021.4.12.28640

**Available online at:** <https://www.one-health.panafrican-med-journal.com/content/article/4/12/full>

## Iraqi policies and epidemiology on dog bites and rabies elimination

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## **Abstract**

*A stable supply of reliable services, constructive collaboration between veterinary and public health authorities, and comprehensive surveillance are needed to control rabies. In any conditions, but particularly during conflict, these are difficult. The available human rabies surveillance data from Iraq, the results of renewed sampling for animal rabies and the first genetic characterization of Iraqi strains of circulating rabies are listed here. Human rabies is reportable, with cases reported increasing since 2003, and a marked rise between 2009 and 2010 in Baghdad. These developments correlate with the rising number of dog bites that have been reported. There is no laboratory evidence of the characterization of the disease or virus and no*

*formal animal rabies surveillance. Global strategies have been developed by the World Health Organization to eliminate rabies by 2030.*

## Commentary

One of the oldest and most terrifying diseases known to man is rabies. More than 4000 years ago, written and pictorial records of rabies date back, and today it is widespread in more than 150 countries around the world. While the disease can be avoided, an estimated 59 000 people are killed every year, mainly in the poorest and most disadvantaged communities in the world. Around 40 percent of the victims are children living in Asia and Africa under the age of 15 years. Instead of exposure to the many and varied wild animals that serve as viral reservoirs on different continents, a whopping 99 percent of human cases are acquired through the bite of an infected dog [1]. Over the past few years, several countries have stepped up efforts to combat rabies: scaling up dog vaccination services, making more available human biologicals for post-exposure and pre-exposure prophylaxis, and engaging rabies populations. Dog-mediated rabies from Western Europe, Canada, the United States, and Japan have been removed. Twenty eight of the 35 countries in Latin America have recorded no human deaths from rabies transmitted by dogs. In nations such as Bangladesh, the Philippines, Sri Lanka, Tanzania, Vietnam, and South Africa, to name a few, great strides have been made in reducing rabies deaths. These experiences have produced valuable collective knowledge of what works and have improved both the quality of rabies-related data and our arsenal of instruments for improving rabies-related management, capacity building, education and surveillance programs [2].

In the Laws of Eshunna, a Sumerian city in ancient Mesopotamia, the first written account of illness consistent with rabies. Mesopotamia, which primarily corresponds to the territory of what is now the Republic of Iraq, embraced the river systems of the Euphrates and Tigris and is

considered by many to be the birthplace of civilization. Some of the earliest archaeological records of dog domestication have come from the region, and during that period, dogs are believed to have had religious significance [2,3]. The correlation of disease with infected dogs is consistent with the understanding that in many endemic areas, rabies is transmitted via the saliva of infected animals, and that dogs are the main source of human infections. Rabies virus, the single stranded ribonucleic acid (RNA) virus in the Rhabdoviridae family, genus lyssavirus, was not known as the causative agent until the last century [4]. In most countries in the Middle East, rabies is considered endemic, but a relative lack of organized monitoring and reporting prevents determining the true burden. Previous studies have provided useful insight into canine rabies molecular epidemiology in the Middle East, but isolates from Iraq have not been available for study before [4]. In 2010, the Middle East and Eastern Europe Rabies Expert Bureau (MEEREB) network was set up to strengthen regional cooperation on rabies management and to boost knowledge exchange [4,5]. While Iraq is not currently represented in the network, in neighboring countries, rabies is reported in both dogs and wildlife, with dogs being the main reservoir of rabies for humans. Similar figures of an annual human rabies incidence of 0.02/million and 0.025/million respectively in 2009 and similar levels of post-exposure prophylaxis (PEP) administration were recorded by Iraq's two largest neighbors, Turkey and Iran, both at 1,700 and 2,290 per million population during the same year [5].

**Global strategies to prevent rabies:** the global response to rabies was sporadic and uncoordinated until recently. For the first time now WHO, the Food and Agriculture Organization of the United Nations (FAO), the World Organization for Animal Health (OIE) and the Global Rabies Control Alliance (GARC) have joined forces to assist countries in their attempts to intensify their efforts to eradicate dog-mediated rabies by 2030 [5,6]. For the affected countries, development partners and key

stakeholders, the Global Strategic Plan has set three objectives: (1) to efficiently use vaccines, drugs, instruments and technology to avoid the spread of dog rabies and minimize the risk of deaths from human rabies; (2) to produce evidence-based advice and high-quality data to assess the impact and inform policy decisions; and (3) to harness multi-stakeholder action [6]. Our new rabies-focused alliance, known as United Against Rabies, provides us with a forum to mobilize resources and coordinately exploit existing instruments and expertise. It is completely consistent with the goals of the Tripartite Memorandum of Understanding between WHO, FAO and the OIE, signed in May 2018. Through that agreement, the three organizations are intensifying their cooperation on the human-animal-environment interface to combat critical health threats, i.e. issues requiring a genuine One Health solution [6]. The Global Alliance for Vaccines and Immunizations (GAVI), has conducted a series of country studies to improve awareness of current post-exposure prophylaxis distribution and delivery processes to support the adoption of the Global Strategic Plan. We look forward to the GAVI Board's decision later this year on whether rabies will be included in their next investment plan for vaccines. In addition to saving an estimated 300 000 lives within 5 years and improving living conditions for millions of people, the elimination of dog-mediated rabies would contribute to improving global health stability. Investing in the elimination of rabies globally would potentially free up an estimated US\$ 8.6 billion in economic capital per year according to our report [7]. The prevention measures in Turkey have successfully decreased dog rabies in urban areas to a small degree. Despite this decrease in dog rabies and the introduction of control measures, however, rabies has re-emerged in the Aegean region, underlining the difficulties of disease control [7].

**Efforts and surveillance in Iraq:** there is minimal systemic monitoring in Iraq for animal rabies, and no medical confirmation in the laboratory. For dogs, vaccination is mandatory, but the bulk of the

population of urban dogs are considered ownerless, free-roaming and thus believed unvaccinated. There are no concerted campaigns for dog vaccination or sterilization and dog population control has historically been attempted, considered to be an ineffective measure, by culling [8]. In wildlife, especially in western regions, rabies is also sporadically recorded, but the prevalence of wildlife and the role of wildlife in the maintenance and transmission of Rabies virus (RABV) to domestic animals and humans is poorly understood [8]. Rabies prophylaxis, while not always initiated and seldom completed, is available in Iraq. The five-dose (Essen) regime is practiced most often, and while a significant percentage of dog bite victims receive the first vaccine, the full course is completed by a much smaller amount [9]. Less than 1000 dog bites were registered annually in Baghdad between 2002 and 2004, corresponding to an occurrence of 20 bites per 100,000 persons, based on a population estimate of 5 million. Between 2007 and 2010, the total number of bites registered per year increased to 3300, leading to an annual occurrence of 46 bites per 100,000 persons, based on a population estimate of 7.2 million [8,9]. Since rabies is a zoonotic disease, changes to the free-roaming dog population would also have a significant impact on the occurrence of human rabies, with domestic dogs as the primary reservoir host in many regions [9].

The effects of conflict on public services and human habitation disturbance are likely to have an impact on the population of urban dogs. The doubling of recorded dog bites reported here in Baghdad coincides with the rise in cases of human rabies and anecdotal reports of a mass expansion of Baghdad's free-roaming dog population. It is also possible that the rise in human rabies is due to an increase in the population of free roaming dogs and the resulting increase in dog bites. In addition to the rise in zoonotic disease risk, the increase in the population of dogs has consequences for animal welfare [10]. In areas where significant accumulations of free roaming dogs are registered, historical approaches to managing dog populations in Baghdad have

included pro-active culling. While this leads to fewer free roaming dogs temporarily, it is increasingly understood that indiscriminate culling is not a long-term solution to the regulation of the dog population or to decrease the incidence of rabies, has health effects and can make the problem worse. These near ties between Iraqi viruses and neighboring countries reiterate that rabies does not comply with cultural or political barriers and that the removal of rabies must be handled at regional level, with international veterinary (OIE/FAO) and health (WHO) providers collaborating globally. Via NGOs and the MEEREB network, this is already being tackled, but it will take consistent dedication and resources [10]. Notable efforts, with foreign funding, are being made to enhance primary health care in addition to hospital-based healthcare in Iraq, amid the continuing conflict. In addition, cooperation between departments of environmental, human and veterinary health is important at the local level in order to eradicate rabies in dogs and thus reduce the risk to humans [10].

## Competing interests

The authors declare no competing interests.

## Authors' contributions

All the authors have read and agreed to the final manuscript.

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