

Stray animal populations and public health in the South Mediterranean and the Middle East regions

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Zoonoses.

Summary

Uncontrolled urban growth in South Mediterranean and the Middle East regions involves city dwellers and stray animals (mainly dogs and cats) creating a dense and downgraded environment, in which irregular street garbage collection disposes sufficient food for survival and proliferation of stray animals. Under such conditions serious public health hazards are expected due to the increase of animal bites, the multiplication of insects and rodents vectors of different viral, bacterial, fungal and parasitic agents to which humans are exposed. Traditional national stray animal eradication programs and occasional small animals' humane elimination campaigns are insufficient to avert human and veterinary health risks when not coupled with modern technologies. In such environments, multiple foci of emerging and re-emerging zoonoses easily spread, i.e. rabies, hydatidosis, leishmaniasis and toxoplasmosis. Upgrading urban and peri-urban situations requires integrated/coordinated management programmes, in which public and animal health services as well as municipalities have a crucial role. Control and upgrading programmes should be flexible and able to adapt to the specific conditions of the given country/region. In this context, intersectoral/interprofessional collaborations and community participation are crucial for any national and regional development strategies. In this respect, a global approach considering both public health and socio-economic problems shows to be extremely adequate and effective.

Popolazioni di animali randagi e sanità pubblica nelle regioni del Sud Mediterraneo e del Medio Oriente

Parole chiave

Ambiente,
Animali randagi,
Sanità pubblica,
Sanità pubblica
veterinaria,
Sovraffollamento,
Zoonosi.

Riassunto

Lo sviluppo urbano non controllato, rilevabile in alcuni paesi del Sud-Mediterraneo e Medio Oriente, coinvolge abitanti e animali randagi (soprattutto cani e gatti). L'ambiente risulta saturo e degradato visto che esseri umani e animali coesistono in situazioni di sovraffollamento. La raccolta irregolare dei rifiuti urbani offre la disponibilità di alimenti sufficienti per la sopravvivenza e proliferazione degli animali randagi. Questa condizione rappresenta un serio pericolo per la salute pubblica, in quanto si moltiplicano le morsicature da animali randagi e aumenta la proliferazione di insetti e roditori trasmettitori di agenti virali, batterici, fungini e parassitari. I vecchi programmi nazionali di lotta al randagismo, così come le campagne di eliminazione dei piccoli animali, non sono sufficienti se non sono accompagnate da tecnologie moderne e risorse adeguate. In questi contesti, è facilitata la diffusione di zoonosi emergenti e riemergenti, quali per esempio rabbia, echinococcosi, leishmaniosi, toxoplasmosi. Il miglioramento degli ambienti urbani e sub-urbani richiede programmi di gestione coordinati e integrati. A tal fine, i servizi di sanità pubblica, sanità animale e le amministrazioni locali rivestono un ruolo cruciale. I programmi di controllo e sviluppo devono essere flessibili e capaci di adattarsi alle condizioni del territorio. La collaborazione intersettoriale e interprofessionale, con la partecipazione della comunità, sono fattori di fondamentale importanza nonché componenti essenziali delle strategie di sviluppo a livello nazionale e regionale. Questo articolo descrive un tentativo di approccio globale ai problemi di sanità pubblica e socio-economici legati al randagismo nei paesi del Sud-Mediterraneo e Medio Oriente, fornendo alcune indicazioni generali sulle possibili soluzioni.

Introduction

In the epidemiology of the most important zoonoses such as cystic echinococcosis (hydatidosis), leishmaniasis and rabies, South Mediterranean and Middle East regions (SMMER) present many similar climatic, geophysical and socio-cultural characteristics. The endemicity and/or the gradual spread of such diseases in these neighbouring regions create serious public health and socio-economic hazards (Mantovani 2005).

Several interconnected factors are prevailing in characterising such situation. The most significant among them may include:

- the increasing human population density and displacement in urban areas;
- close and intensive coexistence between humans and animals;
- high number of stray animals in urban settings;
- intensification of animal production and trade;
- illegal and unsafe production, processing and use of food of animal origin;
- traditional socio-cultural characteristics;
- lack of awareness of most of community concerning health hazards;
- weak intersectoral collaboration;
- strong financial limitations and shortages of resources;
- badly informed decision-makers;
- extreme difficulty in evaluating the phenomenon of stray animals in terms of numbers and then epidemiological geographic areas. In this context, dog and cat roaming is recognized as an important public health and socio-economic hazard. Small animals may be either stray or owned but not adequately controlled, may be formerly owned but have become feral or may have always been free-living (Abdou 1999, Baldelli *et al.* 2000, Boegel 2001).

These aspects depict a quite different scenario than the one characterising coastal countries of the Northern area of the Mediterranean basin. In the SMMER canine and feline populations play their own roles in the epidemiological status of zoonotic diseases, where animals are passively supported by the considerable amounts and the growing quantities of feed available in streets' garbage. While stray animals are not allowed in houses due to the hygienic and health hazard they represent, they are not chased. In urban areas few domestic cats' owners permit their cats to wander around to collect their feed. Free-roaming cats create additional social hazards. They can be a nuisance, feed on garbage,

defecate in places they are digging and are an additional factor to overpopulation of stray animals.

The large number of stray animals, with or without owners, poses many problems, among which:

- the spread of zoonoses to humans;
- the transmission of disease to other animals;
- bites, scratches and related problems;
- economic problems, mainly connected with attacks on domestic animals;
- pollution of soil and water;
- problems connected with public security (road accidents, attacks by single or packs of dogs);
- attraction of wild animals.

Overpopulation in developing countries includes also the city dwellers living in proximity with animal populations, generating large volumes waste. The management of urban waste in these circumstances becomes a difficult issue for city administrations, which should contribute to properly approaching financial and public health problems created under such undesirable conditions (Baldelli *et al.* 2000, Poglayen 2003).

Stray Animals and Public Health

Hundreds of thousands of stray dogs are eliminated every year in SMMER countries, without significant results given the 'holding capacity' of a territory, directly related to the amount of waste food available. Animals surviving mass elimination can easily reproduce, and together with newly abandoned animals, can create new stray animal populations (Mantovani 2003, Vos 2000).

Public health impact of the phenomenon of roaming animals in urban and peri-urban areas includes the emergence and endemicity of a lot of zoonoses (Calum *et al.* 2000). Without forgetting brucellosis, campylobacteriosis, cat scratch disease, cheyleteliiosis, cryptosporidiosis, dermatophytozoonoses, dirofilariasis, giardiasis, leptospirosis, Mediterranean spotted fever, opistorchiasis, pasteurellosis, visceral and cutaneous larva migrans, and many other, which all fall outside the scope of this article. The most important zoonoses in dogs and cats in SMMER may be considered the following: rabies, cystic echinococcosis, zoonotic visceral leishmaniasis and toxoplasmosis.

Urban and peri-urban rabies

The World Health Organization (WHO) estimates that there are more than 200 million stray dogs worldwide and that every year, 55 thousand people die from rabies, while another 15 million receive

post exposure treatment to avert the deadly disease; 95% of these cases occur in Asia and Africa, and 99% of the fatalities are caused by dogs (WHO 2013).

Urban Rabies is known to be an important public health hazard. It is maintained and propagated primarily by dogs; their bites are the main route of rabies among humans. Cats constitute the second most important group of human infection followed by other domestic and wild animal species occasionally found in cities or peri-urban settlements (Meslin *et al.* 2002).

The reported cases in the SMMER are supposed to range from 800 to 1000 annually, while post-exposure treatments reach several tens of thousands in each country. Children account for the largest group receiving such treatment. At the same time, there is an increasing role of wildlife in rabies epidemiology in the same area (Seimenis 2004, Seimenis 2009). Only a part of the infected animals is recognized and recorded by the veterinary services, mainly in connection with human exposure to animals, while only part of the rabies reported cases are laboratory confirmed (Seimenis 2004).

Cystic echinococcosis

The increasing interaction between humans and animals is a well-known factor influencing the occurrence and endemicity of other zoonoses such as Cystic echinococcosis (CE) by *Echinococcus granulosus*. It involves mainly dogs and rural families, together with urban dwellers, which may be (and are) endangered by close contact with these animals. (Mantovani 2003, Mantovani and Seimenis 2003).

There are many possible sources providing infected food for stray dogs. For example, human habits of feeding dogs of slaughter and/or butcher waste in specific situations are responsible for canine infection; also the parasite may be spread in urban and sub-urban districts through owned and stray dogs roaming in the country or peri-urban areas (Mantovani 2003, Mantovani and Seimenis 2003, Mantovani 2005).

Slaughterhouses may be insufficiently attended in developing countries, being so accessible to dogs; they may also lack facilities for the proper destruction of infected material. Illegal and non-inspected slaughtering represents an important infection source for dogs by discarded offal. Therefore, measures to be taken should aim, besides the control of free roaming dogs and cats, to impede their access to the sources of infection, particularly slaughterhouses and butcheries (Abdou 1999, Baldelli *et al.* 2000, Mantovani 2003, Mantovani and Seimenis 2003).

Zoonotic visceral leishmaniasis

There is no doubt that dogs are the reservoir of leishmaniasis caused by viscerotropic and dermatotropic strains of *Leishmania infantum* (Gramiccia and Gradoni 2005), while its role in the epidemiology of cutaneous leishmaniasis due to dermatotropic *Leishmania tropica* is still to be proved. Canine leishmaniasis is widespread in the Mediterranean area showing typical focal distribution and a broad spectrum of infection prevalence from 2 to 40%, in countries such as Afghanistan, Egypt, Iran, Iraq, Jordan, Lebanon, Libya, Morocco, Saudi Arabia, Syria, Tunisia and Yemen. Dogs in general, but most particularly stray dogs, are exposed to infected sandflies, which then act as domestic reservoirs. Once the parasite is introduced into a community it is maintained in a dog-insect-dog transmission cycle. The uncontrolled overpopulation in a deteriorated urban environment constitutes the appropriate background for the multiplication of hosts and vectors. Infected sandflies bite people causing visceral and cutaneous leishmaniasis. If appropriate measures are not timely undertaken towards urban and peri-urban environmental management, the disease becomes endemic affecting an increasing number of individuals, among which children are prevailing. (Postigo 2010, Seimenis 2010, Tesh 1998, World Health Organization-Eastern Mediterranean Regional Office 2009).

Toxoplasmosis

It is of particular health significance because of long-term contamination of soil, water and dust by oocysts, through faeces. Contact with oocyst-contaminated soil and water is probably the major means through which different species (rodents, ground-feeding birds, sheep, goats, pigs, and cattle, as well as humans living in the SMMER) are exposed to *Toxoplasma gondii*. The uncooked, raw meat is another important source of infection for humans and also for cats. Cats are the main host species contaminating the environment near human settlements. Stray and feral cats are much more implicated in this role than pet ones (Baldelli *et al.* 2000, Boegel 2001, Poglayen 2003).

General measures for the control of stray animals to enhance public health in the SMMER

Upgrading urban general public and veterinary hygienic conditions and infrastructure, community's educational level, as well as human and animal populations' density rationalization, are interconnected factors to be managed in an

integrated way in order to achieve an acceptable level of veterinary public health in urban and peri-urban environments. Interventions of urban veterinary hygiene in order to be effective should cover simultaneously at least the most important among the factors creating and maintaining an existing stagnatory epidemiology. This is more than a hard and difficult task (Abdou 1999, Baldelli *et al.* 2000, Wisner and Adams 2002).

Public and animal health services and councils have a crucial role in the improvement of urban hygiene conditions. The main measures expected to be taken concern:

- the establishing of an effective and comprehensive policy for roaming animal populations management, and provide resources for implementation;
- providing adequate and regular garbage collection systems in urban and peri-urban areas, and monitor their management;
- activating an efficient system for collection, rendering and/or destruction of dead animals and infected viscera;
- protecting slaughterhouses, butcheries, dumps and other attraction places from dog and cat access;
- promoting adequate legislation on management of animal populations in urban settlements, based on their welfare;
- undertaking public health educational campaigns for the community focusing, among other things, on the human – animal interaction and ‘responsible animal ownership’.

With regard to the dog population management, the systematic or incidental removal campaigns are still a much-applied ‘tool’ in many developing countries. However, as previously referred, this offers only limited spatial and temporal success, as there is rapid repopulation of the evacuated area (Vos 2000, World Health Organization-Eastern Mediterranean Regional Office 2009).

The most appropriate method for the elimination of the animal stray population and for avoiding its reproduction remains open for discussion. In this context it is worth recalling the International Companion Animal Management Coalition (ICAMC), which was formed in 2006 from representatives of the World Society for Protection of Animals (WSPA), the World Small Animal Veterinary Association, the Alliance for Rabies Control and other parent organizations. Based on the original 1990 WHO/WSPA document, the Coalition published in 2008 a revised set of guidelines to manage roaming dog populations and the risks these may present, including population size reduction when this

is considered necessary (ICAM Coalition 2008). Coordinated activities together with the community involvement could offer approaches appropriate for each country. Basic rule of cardinal importance remains the implementation of integrated management schemes either in normal or in emergency situations (Abdou 1999, Baldelli *et al.* 2000, Massei 2009, Aidaros 2009).

Decision-makers at central and local levels should be well informed of the environmental health hazards and the inter-relationships between population, health and sustainable development. There is a need for political commitment to the development of environmental health activities including well organized governmental services and community participation, in order to ensure their incorporation in urban and peri-urban development plans. Such plans should provide strengthening of local authorities and enabling them to tackle health and environmental problems including those due to roaming animals (Wisner and Adams 2002).

In order to achieve the best possible effect, all programmes and activities concerned with the management of stray animal population in urban and peri-urban areas should be based on the principles of the intersectoral cooperation. The lack of such cooperation undermines any kind of efforts aiming at improving the situation. Multi-disciplinary and cross-sectoral structures associated with an appropriate coordinating administrative mechanism are absolutely essential. The combination of financial constraints, weak cooperation/coordination and lack of community involvement maintain important problems, becoming very difficult to address. Such situation is an additional characteristic in most SMME countries. Therefore, this is one more occasion to emphasize the importance of attitudes changing and the continuous strengthening of a global social and technical involvement aiming to the development of public health (Busani *et al.* 2006, Vos 2000).

Conclusion

The task of establishing a step-by-step consistent improvement of urban hygiene conditions (in developing world in general but most particularly in the SMMER) is extremely complex and difficult, but it deserves the challenge. It is the only way which may lead to ensuring acceptable living conditions, alleviating human suffering as well as maintain socio-economic development, while combating the impact to public health coming from the uncontrolled human and animal co-existence. Public health impact and the associated social and financial damages of free-roaming animals in developing countries require action. These actions

seem to collide with animal welfare and especially stray dogs and cats are at the centre of these collisions and admittedly, the method for managing stray animals population in poor societies is still to be improved. At the same time, financial limitations, often ineffective legislative implementation and enforcement, the lack of intersectoral coordination and the insufficient awareness of the urban and peri-urban communities in the SMMER, create difficulties on how best such problems could be managed (Battelli 2003, Vos 2000, Massei 2009, Aidaros 2009). This is true even when the resources come from supranational organizations (see for example the case of Ukraine and World Cup).

The challenge is to identify and implement, as best as possible, an integrated, effective, comprehensive and affordable management program for roaming animal population, tailored for countries sharing conditions such as those characterising the SMMER.

The mass vaccination of dogs against rabies put in place in the SMMER will not achieve its target and same results it has achieved in developed countries, just because many dogs cannot be handled and therefore cannot be vaccinated. The possibility of oral vaccination campaigns, as a supplementary

method to the traditional parenteral vaccination of dogs, could mean a breakthrough in this aspect (Vos 2000, Seimenis 2009).

Specialized international organizations and NGOs are offering their expertise and technical assistance, including training of inter-professional staff, so that all relevant programmes could be actively managed, therefore, their contribution is always essential.

Public health education regarding hygienic sanitation of the environment and responsible ownership of dogs and cats should become among the most important working tools. Schools and mass media play an important educational role for the community in this domain.

Preparedness on contingency programmes to face emergencies of different kinds should be elaborated and inter-professional teams have to be trained for intervention in case of necessity.

Difficult and complex situations can only be afforded through inter-sectoral/inter-professional collaboration and community involvement. It is the only strategy, leaving aside local cultures and beliefs entrenchments, could contribute to address the socio-economic development and human suffering alleviation in the SMMER.

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