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A prospective study on the incidence of dog bites and management in a rural Cambodian, rabies-endemic setting

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ABSTRACT

Rabies circulates intensely in Cambodia, mainly affecting rural populations. We conducted a prospective study to estimate the baseline incidence of potentially infective dog bites in rural villages of Siem Reap province, Cambodia. The study was conducted in a convenience sample of 844 families totaling 1779 persons in four villages. The study collected data in a total of 802.3 person-years.

Trained village health workers (VHW) exhaustively documented consecutive dog bites at the end of each month. Between May 15th and November 15th, 2011, a total of 40 attacks (43 bites; 1.07 bites per attack) were notified by 39 persons (50% female; one suffered two distinct incidents) to VHW. The all-age attack rate for bites over this 6-month period was 2.3% (CI95%: 1.7–3.1%), with a global incidence rate estimated at 4.84 bites/100 person-years (CI95%: 3.5–6.6). The mean age in bite victims was 20.8 ± 18.9 years (median 12.5; interquartile range 6–36; range 1–63). The dog was identified in 39 (97.5%) of cases, being the household dog in 9 (22.5%) of cases. Bites were classified as severe (WHO Category III—broken skin with bleeding) in 33 (82.5%) of cases with a severe dog bites incidence estimated at 4/100 person-years (CI95%: 2.8–5.6). The bites involved the hand or face in 1 (2.5%) case each (both Category III). In 20 incidents (50%), only rice was applied to the wounds. There were no suspected or confirmed human rabies deaths during the study period but one dog died after biting (2 others were lost to follow-up and 14 were put down by their owner). Our study documented an extremely high incidence of dog bites in of rural Cambodian adults and children. Adapted control policies for canine vaccination are urgently needed.

1. Introduction

Dog bite injuries are a major public health issue worldwide. Dogs' attacks and consecutive wounds can lead to permanent disfigurement, post traumatic trauma, and sometimes death by direct traumas or rabies virus inoculation (Gandhi et al., 1999; Dwyer et al., 2007). They also cause an economic burden for the victims. Research studies show that efforts to raise awareness among communities (American Veterinary Medical Association Task Force on Canine Aggression and Human-Canine Interactions, 2001; Palacio et al., 2005) or individuals (Wake et al., 2009), policy makers (Ozanne-Smith et al., 2001) and health care professionals (Morgan and Palmer, 2007) are effective in preventing dog bites and improving aggressive dogs' ownership practices and legislation (Michel, 2009; de Keuster and Overall, 2011; Tarantola et al., 2013). In developing countries, a series of factors are likely to increase dog bite incidence and bites seriousness: dogs are often not confined and dog population is uncontrolled (Dalla Villa et al., 2010). The rural areas of developing countries are characterized by the uneven distribution of health infrastructures with often long distance to travel to and from these health care facilities (Cleaveland et al., 2007), the scarcity of human resources, the poor quality of services and the difficulty of payment (Kanchanachitra et al., 2011).

In 2012, the population of Cambodia was 14.86 million people, with 80% living in rural areas (Cambodia—National Census of Agriculture in Cambodia, 2013). Cambodia remains one of the poorest countries of Southeast Asia, ranked 136 out of 187 on the Human Development Index (Explanatory, 2014) and the illiteracy rate is one of the World's highest, at 63%. Despite increasing economic growth, 2.8 million of people are still considered very poor (earning less than $1.25 per day). Life expectancy is 71 years, and 40% of children under the age of 5 are malnourished (World Bank Country, 2016). Dogs play an important role in Cambodian families as house or farm guards, as companions but also increasingly as a source of

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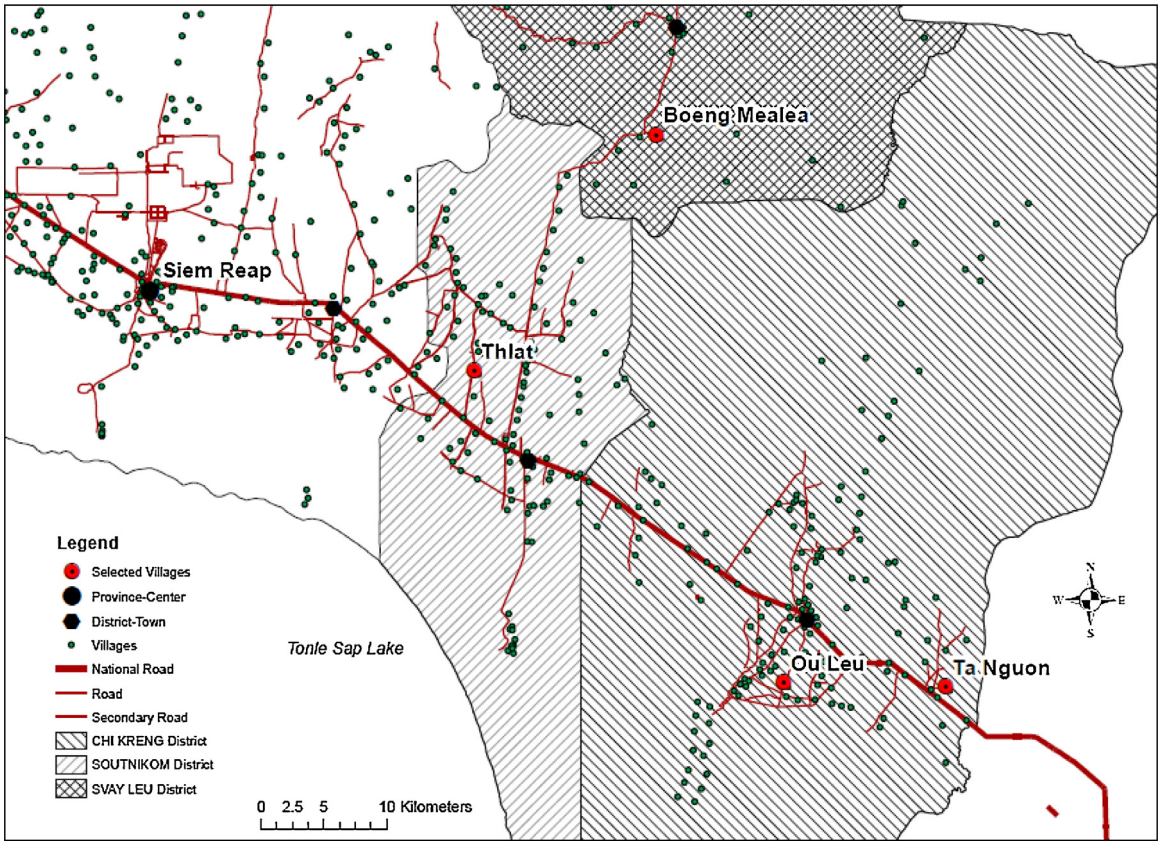

Fig. 1. Map of study area, localization of the four study villages in Siem Reap province, Cambodia.

protein and therefore a source of income. In Cambodia, the dog-to-human ratio is the highest in the region according to a study conducted by the Institut Pasteur du Cambodge (IPC) in 2007: 1 dog to 3.1 humans (95% CI 1:3.0–1:3.2) in rural areas, with 75% of the families having at least one dog (Ly et al., 2009). This suggests that interactions between humans and dogs are intense and that dog attacks are frequent.

IPC hosts the largest rabies prevention center (rpc@ipc), providing post exposure prophylaxis (PEP) to over 21,000 bite victims each year (Tarantola et al., 2015). The dog bite incidence in Phnom Penh, the capital city, was estimated in 2007 at around 591/100,000 population (Ly et al., 2009). This estimation is one of the highest published worldwide, and we suspected bite incidence in rural areas to be even higher (WHO | Rabies, 2016; Sudarshan et al., 2001; Sudarshan et al., 2006; Sudarshan et al., 2007). Although 80% of the Cambodian population lives in rural areas there are no precise data on rural dog bite incidence. A KAP study in Phnom Penh and in Kandal, a periurban province, found a yet higher annual incidence estimated retrospectively at 1120/100,000 population per year (Lunney et al., 2012). Knowing that animal bites are the most common exposure to rabies and that 99% of human cases are caused by dogs (Fooks et al., 2014) improved estimates of dog bites incidence in rural areas are crucial to better evaluate the risk of rabies in the population.

2. Material and method

2.1. Area description

Siem Reap province, with an area of 10,300 km^2 and a population of 900,000 inhabitants is located in the northwestern part of the country. It is among the poorest provinces of Cambodia. The villages where the study took place are located in the rural areas in three different districts, 30–60 km from the city of Siem Reap. The poverty rate in these districts ranges from 36% to 45%. Villages are surrounded with paddy fields and are usually organized around one main road with farms alongside and paths leading to other houses. Houses are not fenced and animals are free to circulate inside and outside the houses.

2.2. Villages' selection

The villages' selection was facilitated because AVSF, partner of the study, had former experience in this area and contacts were already established. Villages were selected according to key person's acceptance and willingness to participate. We selected the four villages in distinct locations, spaced out one from each other from at least 30 km (Fig. 1).

2.3. Sample size calculation

The results of this study were intended as baseline data for a cluster randomized vaccine trial. Sample size was determined in the frame of this trial, for a power of 80% and an α risk of 5% (Hayes and Bennett, 1999). A minimum of 80 households per village had to be randomly selected. The lists of village households were provided by the Village chiefs.

2.4. Questionnaire design and data collection by teams of villagers

The longitudinal survey lasted six months between the 15th of May to the 15th of November. With approval and support from the National Veterinary Research Institute, local authorities in each