ABSTRACT

Every year an estimated 59,000 people die from rabies globally. Domestic dogs transmit over 99% of human rabies cases, and mass dog vaccination is a key strategy for achieving elimination of dog-mediated human rabies global target by 2030. Achieving and maintaining herd immunity against rabies within domestic dog populations can be influenced by dog demographic and ecological factors. To estimate parameters for these factors, a six-month dog health and demographic surveillance study was conducted within an ongoing linked Human-Animal Syndromic Surveillance System covering 1500 households in rural Western Kenya. Structured questionnaires were administered to study households to collect information related to dog demographics, ecology and health relevant to rabies transmission. These data collected included dog ownership patterns, age and sex structure, dog management practices, rabies vaccination status, birth rates, death rates, survival rates, dog morbidity and mortality rates and their associated risk factors, human-dog mediated movements and dog bite information. Data were analysed using R statistical software (version 3.4.1) and QGIS (version 2.18.14). In total, 1213 households in 10 study villages consented to participate in the study. A total of 460 (38%) of the households owned dogs, with an average of 1.7 dogs per dog-owning households and 802 dogs were recruited at the beginning of the study. The estimated dog to human ratio was 1:6.9 and the dog density ranged between 50-57 dogs/km2. Half of the dog population was ≤1 year pointing to high dog population turnover rate. The birth rate was 1.8 puppies/female dog/year, mean litter size 3.9 was reported. The litter size increased to a maximum of 4.9 for bitches in age category 3-4 years, similarly the fecundity rates peaked (3.3) in age category of 2-3 years. Mortality rate was higher (43%) in dogs less than one year. Females had a lower life expectancy (2.8 years) compared to males (4.1 years).

New additions to the initial recruited population of dogs were mostly own litters (55.7%) and gifts from neighbors(37.1%) while losses were mainly attributed to dogs that disappeared(63.9%) from households and never returned or 32.6% given away as gifts.

Dog population management was low with only 5.1% of the males and 0.3% of the females castrated and spayed, respectively. In the absence of mass dog vaccination campaigns, rabies vaccination coverage was 5.1%. A larger proportion of the dogs either roamed freely (61.2%) or were partially (38.4%) restricted with only 0.4% of the dogs completely restricted within households. Most (97.4%) dogs were not fed at home but left to scavenge for leftovers from household garbage dumping sites and elsewhere. The dogs were predominantly the local mongrel breed (98%), and mainly kept for security purposes (97%). Twenty-seven (27) human dog bites cases translating to a bite incidence of 820 bites /100,000 people and 6 dog rabies confirmed cases translating a rabies incidence rate of 125 in 100,000 dog population were reported.

In the absence of active rabies elimination program, the low vaccination coverage, unrestricted dog movement, and the high dog turnover rates support rabies endemicty among domestic dogs. High turn-over rates may make it necessary to conduct vaccination campaigns for dogs several times a year to maintain the herd immunity. Canine rabies control programs should encourage good dog management and promote responsible ownership to minimize spread of the rabies virus.
among dog populations. Effective dog rabies control plans should improve rabies vaccination coverages and reduce dog turnover rates to maintain herd immunity for longer. More active surveillance of rabies in both human and animal populations is required.