EVALUATING THE EFFECT OF SURGICAL STERILIZATION ON OWNED DOG POPULATION SIZE IN A SMALL, SEMI-URBAN COMMUNITY IN MEXICO USING AN INDIVIDUAL-BASED SIMULATION MODEL

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Developing countries are challenged in finding innovative and humane ways to permanently reduce and control their dog populations. This is especially important for the sustainability of canine rabies control programs. In Mexico, the Ministry of Health initiated a subsidized pet surgical sterilization program in 1994, within the framework of their dog population and rabies control program. However, many local health authorities, as in the case of Villa de Tezontepec, Hidalgo, Mexico, are faced with limited funds and resources to control their pet population. The purpose of this study was to develop an individual-based computer simulation model to determine the projected impact of surgical sterilization interventions on the owned dog population size in Villa de Tezontepec, over a 20-year period. A stochastic, individual-based simulation model was constructed and parameterized using a combination of empirical data collected on the demographics and population dynamics of owned dogs in Villa de Tezontepec and data available from the peer-reviewed literature. The model was used to examine the effect of surgical sterilization interventions at varied surgical capacity (21, 42 and 84 surgeries per month), directed at: 1) dogs of any age and sex, 2) female dogs of any age, 3) young dogs (i.e., not yet reached sexual maturity) of any sex, and 4) young, female dogs on mean owned dog population size. Model outcomes indicated that as surgical capacity increases from 21 to 84 surgeries/month (for dogs of any age and sex), the mean owned dog population size after 20 years was reduced between 14% and 79% at the lowest and highest surgical capacity, respectively, compared to the base case scenario (in the absence of intervention). Surgical sterilization interventions focused only on young dogs of any sex yielded greater reductions (81% - 90%) in the mean population size depending on the level of surgical capacity. Surgical sterilization directed at female dogs of any age, resulted in mean population size reductions between 82% - 92%, which was comparable to interventions targeted only at young dogs of mixed sex. The greatest mean reduction in population size (90% - 91%), was associated with sterilization of young female dogs only. Our model suggests that focusing sterilization to young, female dogs could enhance the efficacy of existing surgical dog population control interventions in this location, without investing extra resources.