Ten years of leptospirosis epidemics in Thailand: understanding the rodent-to-human transmission through spatial analysis

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With over 50,000 cases and 1200 deaths recorded since 1996, leptospirosis has emerged in Thailand as a major vector-borne zoonosis. Rats previously considered as agricultural pests and occasionally hunted for their meat, have become the target of public health officers in an effort to prevent leptospirosis transmission. In collaboration with the Thai Ministry of Public Health, a Geographical Information System (GIS) for leptospirosis in Thailand has been developed to set up a surveillance mapping of the epidemics and assess the relations between rodents, socio-environmental patterns and leptospirosis occurrence.

A rodent sampling was conducted in different regions and ecosystems with either low or high leptospirosis human incidence. Rodents were geographically located and identified to species to assess their diversity, describe their niche and observe their proximity with humans. Blood samples and kidneys were collected in field for the identification of Leptospira in laboratory and determine the main species as vectors. Monthly cases, reported by the Ministry of Public Health from 2000 to 2004, were geo-referenced at a district level (amphoe), and incidence calculated using population data from the National Census (National Statistical Office). Rainfall and temperature data, provided by the Thai Meteorological Department, were spatially interpolated to assess the close association with the rainy season. Spatial correlations were then refined, for the country, using remotely sensed description of the landscape, derived from Landsat V TM images.

Since the first epidemics, leptospirosis has annually shown both occupational specificity in human exposure, with the highest vulnerability for farmers, and environmental specificity, occurring mainly in Northeast and North regions, in paddy field areas, during or after the rainy season. Rainfall has a complex action by amplifying the hazard and transmission of the leptospire bacteria and, in the long-term, by acting on the dynamics of rodent populations. High risk areas have been identified and these provide an important focus for health campaigns aimed at preventative actions to reduce the risk of leptospirosis infection in humans.

Key words: leptospirosis, rodents, Bandicota, Rattus, spatial analysis, GIS