

Rodents and disease – the never ending problem

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Rodents are hardy animals and can usually survive in any environment. However changes in the environment can affect their survival. In a 30-year study it was found that some dominant species in an arid environment had their population drastically affected by extreme climate conditions. These extreme weather events affected the rodent's survival, distribution and advantage in that environment leading to reorganisation of the population structure. This shows the vulnerability of population dynamics of a dominant species when it is exposed to extreme conditions such as floods or any other natural disasters. Rodent distribution and disease transmission has been seen to have a clear link with changes in climatic conditions. In the United States of America there have been many outbreaks of rodent borne diseases that show a link to climatic changes; a good example is the 1992-1993 Four-Corners Outbreak of the Korean Haemorrhagic Fever. The rodent population increased dramatically during this period due to the El-Nino effect on the climate. The resultant heavy rainfall led to good harvest, increase in rodent numbers, invasion of buildings and an environment suitable for disease transmission. Indiscriminate land clearing for cultivation has resulted in the creation of new niches for vectors of dangerous diseases such as the Argentine Haemorrhagic Fever and the Korean Haemorrhagic Fever. For instance, barns used for grain storage will become infested with rodents and the resulting urine from infected animals will contaminate the environment within and farm workers will be exposed to the pathogens resulting in the disease. In different countries different rodent species are involved in the transmission of this disease. *Apodemus agrarius* (striped field mouse) in Korea is the vector for Hantaan Fever with Renal Syndrome (HFRS), and bank voles (*Myodes glareolus*) for the European hantavirus (*Puumala virus*). However the natural host for the Korean Haemorrhagic Fever in many countries including Malaysia is *Rattus norvegicus*. Massive land conversion for cultivation is a major problem contributing to increase in rodent population. The natural ecological habitats of rodent

species in forests must be managed well as the impact of climatic conditions on population diversity in disturbed environments can be drastic if not addressed adequately in time. Buffer zones must be created between land schemes and forests to control movement of commensal species into the forest habitat. Climate changes do have an impact on rodents as seen when predators of rodents are reduced in number due to extreme climatic conditions such as droughts but rodents are able to survive. However rains that favour the increase of the predators such as the owl, snake and coyote also have the same impact on rodents.

Drastic change in the climatic patterns does impact biodiversity globally. Therefore there is a need for practical approaches to deal with issues arising from climate change. Competition among species may be mutual or antagonistic resulting in changes in population of dominant species. These may have an impact on rodent population and their role in disease transmission. Population of rodents can explode due to climate conditions that support plant growth such as that seen for the flowering of bamboo in Myanmar. The rodents especially *Rattus rattus* sp. became a pest and destroyed crops resulting in food shortage for thousands of people. The increase of alien rodent population such as *Rattus norvegicus* on some islands has resulted in extinction of many endemic species of birds, small mammals, reptiles, invertebrates, and plants.

A wide spectrum of diseases is spread by these rodents. Their infected droppings and urine are the route by which many of these diseases are spread. Diseases such as the bubonic plague, leptospirosis, murine typhus, salmonellosis and rat-bite fever are some of the major ones. The Ministry of Health Malaysia recently reported 62 deaths and 1,418 cases of infection due to leptospirosis. The two species of rodents commonly found in the Malaysian habitat are *Rattus norvegicus* (port rat) and *Rattus rattus diardi* (house rat). Therefore disease transmitting rats have become a serious problem.

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The increase in the population of rodents in many countries is attributed to poor sanitation, inadequate waste management processes, over-crowding and poor planning of urban centres. Statistics from the relevant authorities in Kuala Lumpur and Penang show that rodents are an ever occurring problem and they must be constantly under surveillance for proper control. It is clearly evident that all known measures are never enough to solve this problem. Therefore authorities must always ensure there are good practices of hygiene, control programmes for destruction of breeding grounds, as well as good and efficient disposal of food waste and rubbish. If these measures are not implemented aggressively by a local authority or other relevant federal agencies, than the rodents will keep winning the race and good health will be held to ransom. There are ever increasing reports on the incidence of leptospirosis and salmonellosis. The compromised environmental conditions will trigger the outbreak of many such diseases. Poor living conditions will always attract rodents that carry pathogens of human health importance. To overcome this problem, good management practices governed by legislation must be put in place. For the control of spread of disease by ground dwelling mammals, we need more studies as current data only favours large cities. Knowing the habitat and behaviour of rodents in cities of any size will give a better footing for implementation of appropriate measures for control.

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