

Managing Urban Rats & Rodent-borne Diseases in a Squatter Camp - the Cato Crest Model?



Results from the European-Commission-sponsored 'RatZooMan' (Rodent Zoonosis Management) Project, completed in mid-2006, has prompted a concerted action plan of improved sanitation, community education and rodent control by the eThekweni Municipality in Durban in order to reduce rodent numbers and minimise sanitary risks to affected communities. Durban was one of 14 sites in four African countries which were actively monitored between 2003 and 2006 for the presence of three rodent-borne diseases (bubonic plague, leptospirosis and toxoplasmosis) in rodents, humans and domestic livestock.



Durban was the only urban study site and as such the research has been very useful in developing a model for rodent control in an African city. An urban rodent-control model was previously developed based on First World experience. Known as the 'Boston Model', it was based on a rodent control project undertaken in Boston, Massachusetts in 1990, and has

Flow chart of centralised, inclusive, proactive & organised urban rodent control programme (Boston Model)



From Colvin & Jackson 1999

been widely adopted as a model approach for urban rodent control. However, many of the elements, such as private pest-contractors, law enforcement and sewer departments that contributed to its success, do not appear to be applicable to Third World aspects of developing cities, such as informal settlements. The recent research in Durban, which focussed on the informal settlement of Cato Crest (population 20,000), prompted an alternative approach. Based on the Municipality's positive response to the findings of the RatZooMan project, it is now possible to evaluate the applicability of the Boston Model to solving rodent problems (in particular, health-related problems) in a city (Durban) which has both First World (e.g. busiest harbour in Africa, and world class recent developments such as uShaka Marine World and the International Convention Centre) and Third World (squatter camps) elements.



Abdool Ali

As reported previously in this magazine (*Palmmut Post* Volume 8(1): 2005), initial results indicated 'hotspots' of leptospirosis and toxoplasmosis infection in Norway rats, *Rattus norvegicus*, from the Central Business District of Durban and from the Cato Crest informal settlement. Fortunately, none of 200 rodents tested showed antibodies against bubonic plague. However, the background infection rate in over 200 rodents (from 54 sites) tested was 10% and 4% for leptospirosis and toxoplasmosis respectively; these values rose to 39% and 8% in an isolated hotspot of Cato Crest (a single dwelling used as a 'tuck shop'). Socio-economic, anthropological and soil pH studies were carried out in Cato Crest along the same transects used for rodent sampling. This integrated approach enabled researchers from the Durban Natural Science Museum (DNSM), National Health Laboratory Services (Johannesburg), Natural Resources Institute (Greenwich), University of

KwaZulu-Natal and the eThekweni Municipality's Vector Control Section to better understand the factors responsible for the spread of rodent-borne diseases and to be able to better predict the sanitary risks to humans living in these conditions.

Leptospirosis is a jaundice-like disease caused by a spirochaete bacterium that causes chronic renal infection in rats and can be spread to humans through food or water contaminated by the rodent urine. Humans become infected either through the skin, the respiratory or oral tracts and after an incubation period of 10 - 15 days, develop an intense fever with conjunctivitis, damage to the kidney tubules, jaundice and damage to both heart and skeletal muscle. The causative bacterium, *Leptospira icterohaemorrhagiae*, can persist in damp soils which have a suitable pH (around 7.2) - such conditions are widespread in Cato Crest due to the existence of broken pipes, dripping standpipes for drinking water and canals for disposal of waste water.



Peter Taylor

Toxoplasmosis is a common infection world-wide caused by the protozoan, *Toxoplasma gondii*, and is typically spread to humans by contact with the faeces of cats infected through eating infected rats. It is usually asymptomatic in normally healthy individuals, but a small minority of persons may develop any one of four clinical syndromes viz. acute acquired toxoplasmosis, congenital toxoplasmosis, ocular toxoplasmosis or toxoplasmosis in an immunocompromised host. Cats are common in Cato Crest and are shared between households, so increasing the risks of transmission of this disease.

Both leptospirosis and toxoplasmosis are treatable diseases, but are diseases which are often mis-diagnosed as being influenza or tuberculosis, and both can be



fatal in immune-suppressed patients such as babies, the elderly and AIDS-sufferers. If toxoplasmosis is contracted for the first time by a pregnant woman, it can result in foetal abnormalities and/or abortion (this form of the disease is referred to as congenital toxoplasmosis).



Guy Redman

The final step in the RatZooMan research programme was to enlist human donors from Cato Crest to test their blood for antibodies to bubonic plague, leptospirosis and toxoplasmosis. The rodent-based results and associated socio-economic studies predicted that we would find these diseases to be prevalent in the community. Gaining both legal ethics approval and the trust of the Cato Crest community in order to recruit donors for this project proved onerous and time-consuming. Once ethics approval was achieved for the RatZooMan Project as a whole (through Wits University for South Africa), further ethics approval was required from the eThekweni Municipality's City Health Department, who also offered the use of the local Cato Crest Clinic. Community trust and support was gained slowly through various means: close cooperation between relevant municipal departments, regular meetings with community leaders and committees, councillors and the local Cato Manor Area-Based Management, as well as a humorous play on rodent-borne diseases for local Cato Crest school learners, performed by well known education performer, Aubrey Silinyana during the 'Celebrate Durban' festival in September 2005. The play warned about the dangers of contracting rodent-borne diseases, advised on ways to minimise risks through improved hygiene and encouraged children to urge their parents to co-operate with researchers in order to be able to establish the actual incidence of these diseases in the community. The play helped to break the ice and bring parents and community leaders on board.



Alison Kullers

A requirement for working in the Cato Crest community was that it provide part-time employment for local residents. A total of 10 volunteers from the community were trained by Museum staff (Mammalogist, Education Officers, Director and Museum Volunteers) to recruit donors for a specific week, which was scheduled for the bleeding trials. A local nurse was hired to perform the bleeding during one week of October 2005. With the help of the community volunteers, locals were encouraged to donate blood. Women proved much braver than men, and a total of 217 donors finally volunteered blood samples (by far the majority being women). The results showed no antibodies to plague, but seroprevalences of 19% for leptospirosis and 35% for toxoplasmosis overall. Prevalence of these two diseases did not vary between the sexes or between the nine different areas of Cato Crest. Nevertheless, inhabitants of newer brick houses (Area 9) showed slightly lower than average prevalence of leptospirosis (13%) and toxoplasmosis (23%), suggesting that shack-dwellers are at a slightly higher risk of infection.

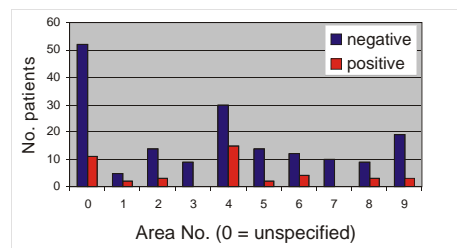


Peter Taylor

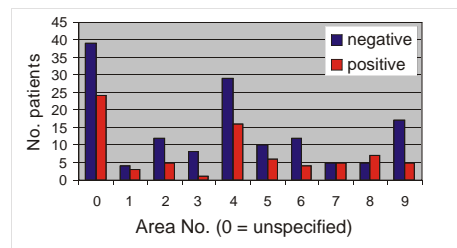


Peter Taylor

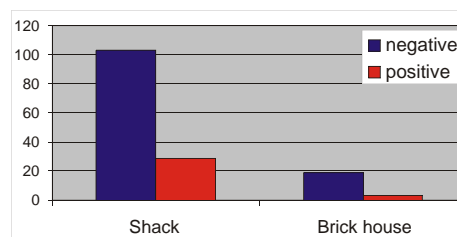
Leptospirosis results by area: 19% overall



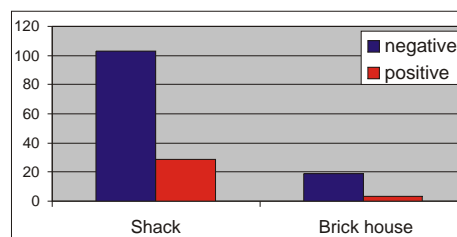
Toxoplasmosis results by area: 35% overall



Leptospirosis: 13% (brick) vs 19% overall



Toxoplasmosis: 23% (brick) vs 35% overall

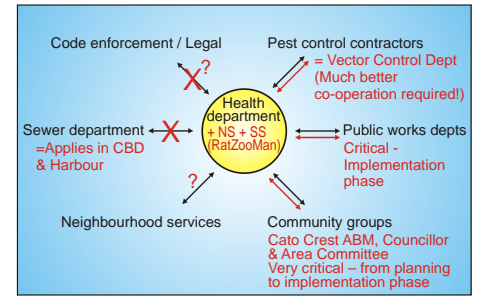


Although the disease prevalence measured was not significantly different from those figures available globally (which mostly reflect developed countries), the results demonstrated clearly for the first time that the disease risks due to rodents are real and not just hypothetical in Durban. Elderly people, pregnant women and AIDS-sufferers are particularly at risk.

Very soon after the results for humans were published in Durban newspapers, the Municipality sprang into action. The Cato Manor ABM (Area Based Management) (a Council structure which liaises with the local community) registered 'RatZooMan'



Modification of Boston Model to apply to Cato Crest



Modified from Colvin & Jackson 1999

Peter Taylor

as its own funded project, with funding coming from the European Commission. They then launched a successful Cato Manor Beautification Campaign. This programme involved inspections of the informal settlement by city officials, repeated rat-baiting campaigns in the most seriously affected areas, regular meetings between service departments (such as Water & Waste, Storm Water Drainage, Solid Waste, Housing, Vector Control and Environmental Health) to co-ordinate service delivery and distribution of sanitation awareness brochures to 5000 shacks by hired local residents. This culminated in a concerted 'Clean-up Day' in June 2006, involving all relevant municipal departments and the local residents. A pilot project involving the issuing of rodent traps to residents has been planned to run for a year to 18 months. A follow-up bleeding campaign

is planned in two year's time in order to be able to measure the success of various anti-rodent measures in terms of human exposure to leptospirosis and toxoplasmosis.

Certain principles and elements of the Boston Model contributed to the success of the Cato Crest programme. As explained by Colvin and Jackson in 1999, the Boston Model advocates a strong centralised approach driven by the City



Guy Redman

Health Department with the full support of biologists and other scientists. In Durban, City Health championed the rodent research and anti-rodent campaign and was supported by a very strong international team of natural and social scientists (RatZooMan Project consortium). The RatZooMan Project gave impetus and funding to the project and its research results guided management actions. Strong integration between all municipal departments, including service providers, City Health and the DNSM contributed to the success of the project (viz. the 'Public Works' element in the Boston Model flowchart), as did the leadership and support provided by the Cato Manor ABM, the Cato Crest Community Committee and local councillors (i.e. 'Community Groups' in the Boston Model flowchart). Although Cato Crest lacked the input of pest control operators (specified in the Boston Model), the City's Vector Control Department served this function admirably. Other elements from the Boston Model which were lacking in Cato Crest included Code enforcement (legal), Sewer department and Neighbourhood services.



Guy Redman

By maximising certain elements from the Boston Model, in particular by ensuring both a strong, centralized and scientifically-based core driving force as well as strong grassroots involvement of the community at all stages from planning to implementation of control measures, it is possible to test proactively and ultimately minimise the sanitary risks of rodent-borne diseases. Education remains the most effective tool in promoting adequate litter disposal and personal hygiene habits in affected communities, as well as generating greater awareness of the diseases by the staff of city clinics.

Peter Taylor
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