

# A REVIEW OF RODENT INFESTATION IN SELECTED LOCATIONS WITHIN THE CITY OF JOHANNESBURG (2009 - 2010)

<sup>1</sup>L. Kunene; <sup>2</sup>N. Naicker; <sup>3</sup>T. Sigudu

<sup>1</sup>Department of Environmental Health, University of Johannesburg, Johannesburg, SA

<sup>2</sup>Environment and Health Research Unit, SA Medical Research Council, Johannesburg

<sup>3</sup>Department of Environmental Health, University of Johannesburg, Johannesburg, SA

## ABSTRACT

### *Background*

Rodent infestation is a public health challenge globally. Cities in high and low income countries have been ravaged by rodent infestation. The lack of basic services has exposed communities to health risks and rodent-borne diseases.

### *Objective*

The study aimed at determining the rodent infestation in the five study sites within the City of Johannesburg namely: Bertrams; Braamfischerville; Hillbrow; Hospital Hill; and Riverlea with special focus on 2009 to 2010, seeing that previous articles have dealt with infestation of rodents from 2006 to 2008.

### *Methods*

Secondary data extracted from Head, Environment, and Development (HEAD) study project was used to analyse and interpret the trend of rodent infestation over a period of five years. Sampling comprised of households from the afore-mentioned study sites. Data was collected by means of a structured questionnaire from members of households above the age of 18 years residing in the study sites. Data was analysed using STATA software version 13.

### *Results*

The study indicated significant differences in rodent prevalence across the study sites. For instance, residents living in Hillbrow (high rise buildings) reported the lowest (17.4%) prevalence from 2009 to 2010 study period, while those living in Hospital Hill (informal settlement) reported the highest (79.7%) prevalence compared with other study sites during the same study period. However, overall there is a significant decrease in rodent infestation across the study sites except in Bertrams where an increase of 7.8% was reported.

### *Conclusion*

Informal settlements are more exposed to rodent's infestation than formal settlements due to lack of proper basic sanitation services e.g. waste management. Municipal departments such as Solid Waste and Public Works should work together with communities towards a sustainable resolution of rodent problem. Socio-economic and environmental variables such as type of dwelling, toilet facilities, absence of refuse containers and rodents' access to water sources were noted as contributing factors of rodents infestation.

## BACKGROUND

Rodent infestation is a phenomenon in which rodents exist in large numbers in a particular place, often causing damage or disease (de Masi *et al.*, 2009). This study focuses mostly on rodents generally found in urban areas, namely the brown rodent (sometimes known as the Norway rat, sewer rat or *Rattus rattus*. and the black rodent (sometimes known as the roof rat or *Rattus rattus*) and the domestic mouse, also known as *Mus musculus* (Gratz, 1996: 405). Rodent infestation poses a serious environmental health hazard to susceptible urban communities globally, either directly or indirectly, through rodent bites, diseases, and other parasitic conditions (Centers for Disease Control [CDC, 2007], Childs *et al.*, 1998; Gratz, 1988; World Health Organisation [WHO], 1992).

For rodents to breed in nests made in burrows, lumber, and rubble or in secluded places within buildings, environmental lifeline factors such as water, food and shelter are required. Rodents are also known to be attracted to unhealthy environments characterised by the following (Department of Health, 2015):

- open foodstuffs and food waste;
- domestic, garden or trade refuse accumulations;
- accumulations of waste, rubber;
- grain, forage, seeds;
- haphazard or untidy storage; and
- Poultry runs, aviaries, stables.

Rodent infestation is a global public health challenge. Cities across the United States of America such as New York, Boston, Detroit, Chicago, Baltimore, Atlanta, New Orleans, and Houston are ravaged by rodents causing major structural damages resulting in economic losses (Childs *et al.*, 1991). It is estimated that over 30 million rodents are found in New York alone, especially in the inner city areas and this has been attributed to human behaviour, decayed buildings and storage and removal of waste (Langton, 2001; Childs *et al.*, 1998, Demers *et al.*, 1983). The cities of Paris and London are also

being regarded as the most rat infested cities in the Western World (Demers *et al.*; 1983). Many factors have been attributed to rodent infestation in these cities for example, in Paris the stagnant water from the River Seine contribute immensely to rodent infestation, while in London decayed buildings, deteriorating sewer system and waste play a pivotal role (Davidson, 1956).

In the developing countries the challenges of rodent infestation are the same as experienced in developed countries. The difference is that the problem is widespread and difficult to solve (Brown, 1970). The problem is made difficult because for example, in India, rodents cannot be killed because of religious beliefs and other cultural traditions (Brown, 1970). Other factors contributing to the scale of rodent infestation are the lack of knowledge in technologies of rodent management. Studies conducted by Singleton *et al.*, (2003) in 11 rice producing Asian countries, namely, Bangladesh, Cambodia, People's Republic of China, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Thailand, and Vietnam, showed one of the worst rodent infestations in the world. China, India, Japan, and Thailand experienced the greatest losses, as they were the main rice producers in the region (Singleton *et al.*, 2003). Damage estimates recorded in India were between 2.4 and 2.6 million tons of rice loss annually (Buck, 1988; Bounneuang *et al.* 2003; Singleton *et al.*, 2003).

Rodent infestation has become a challenge in big cities and towns of South Africa (Goldstein, 1995). Unplanned urban expansion has promoted the creation of slums together with inadequate housing and poor waste management resulting in the breeding grounds for rodents (Hart, 1991). This challenge manifested itself among poor communities living within the City of Johannesburg (World Health Organization Collaborating Centre for Urban Health (WHOCCUH), 2007).

Gauteng Province, which is one of the largest regions in South Africa with a population of approximately 7 million people, within which the City of Johannesburg is situated and is regarded as the fastest growing urban metropolis, with a population of about 3.2 million people occupying about 1 006 930 households (WHOCCUH, 2008; Frazer; 2007; and City of Johannesburg Integrated Development Plan [IDP], 2010). Although

infrastructural development has taken place within the city of Johannesburg, there are challenges of rapid urbanisation and an unplanned influx of people, unemployment, and poverty resulting in the city being unable to provide adequate housing and health infrastructure needs for the growing population (Hart, 1991). The said challenge manifested in the development of squalid conditions within the inner city areas (Frazer, 2007; and Demers *et al*; 1983). Numerous informal settlements with no basic facilities (adequate toilet facilities, potable water supply, waste water disposal facilities, and waste management systems) also developed on the periphery of the city (Hart, 1991). The decaying conditions of the inner city and the informal settlements attracted large numbers of rodents, leading to rodent infestation, which pose health risks to the communities within these areas (Frazer, 2007; and Demers *et al*; 1983).

## **METHODOLOGY**

Secondary data extracted from HEAD study project was used to analyse and interpret the trend of rodent prevalence over a period of two years from 2009 to 2010 in the study sites. Although the other studies examined the trend of rodent infestation from 2006 to 2008, this study focuses on 2009 to 2010 period. Sampling comprised of households residing in Bertrams, Braamfischerville, Hospital Hill, Riverlea, and Hillbrow. Data was collected by means of a structured questionnaire from members of households above the age of 18 years residing in the study sites. Interview questions were based on housing infrastructure, migration patterns, expenditure patterns, hygiene behaviour, health, and housing.

The data was analysed using STATA (Release 10, stat Corp. 2007) and a significant level of 0.05 was used and a p-value below 0.05 was considered statistically significant in the univariate analysis.

## **RESULTS**

The analysis and interpretation of the results regarding the prevalence of rodent infestation within the selected locations in Johannesburg focus on demographic variables (including socio-economic) and environmental variables namely housing

infrastructure, access to environmental services, personal and domestic hygiene, and perceptions of the housing and neighbourhood conditions. The selection of these independent variables was based on the literature reviewed regarding rodent prevalence in the selected sites. The interpretation of the results focused on the data collected from 2009 to 2010 in order to determine the extent and the trend of rodent infestation over a period of two years.

### Prevalence of Rodent Infestation in Five Study Sites, 2006-2010

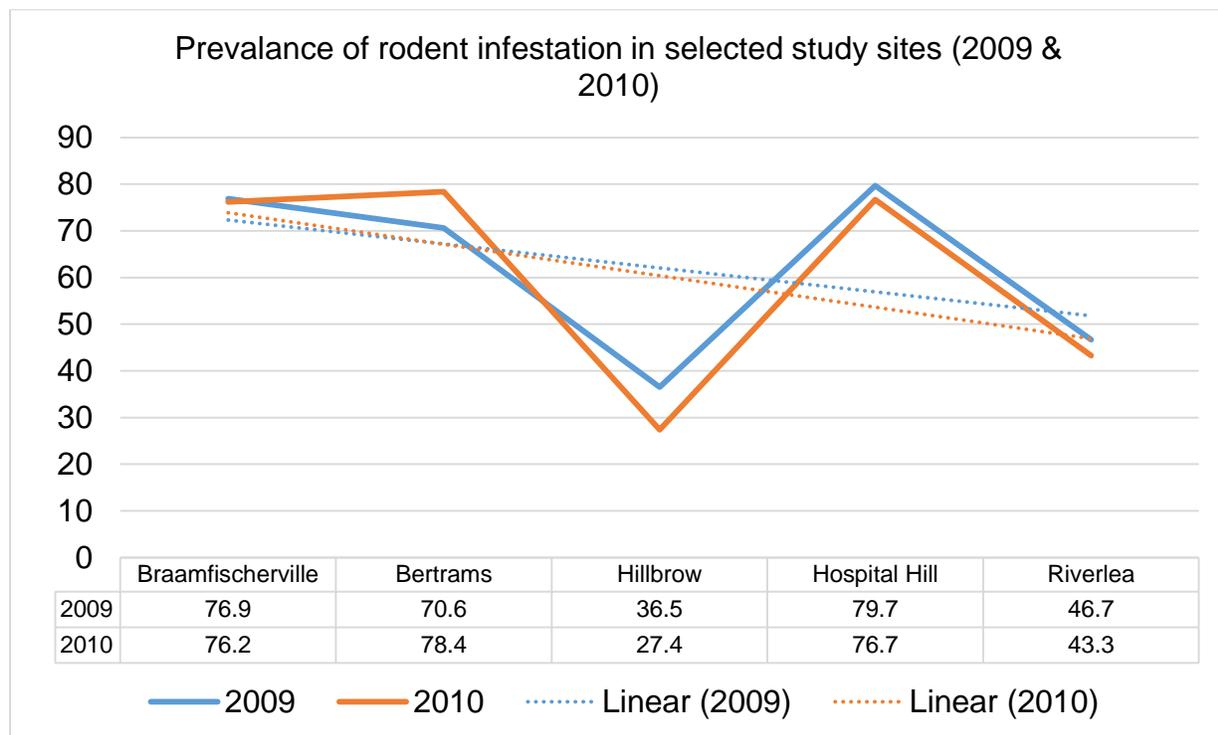


Figure 1. Prevalence of rodents in households across the five study sites, 2009 - 2010

As shown in Figure 1 there were significant differences in rodent prevalence across the study sites. For example, residents living in Hillbrow during 2009 reported the lowest prevalence (27.4%), while those living in Hospital Hill in 2009 reported the highest (79.7%) when compared with other study sites during the study period. However, overall there is a significant decrease in rodent infestation across the study sites except in Bertrams where an increase of 7.8% was reported. The overall decrease in rodent infestation could be attributed for instance, to the housing development in Hospital Hill

where the informal settlement changed to a more formal setting including the introduction of the use of flushing toilets. Other factors could be the impact of the city of Johannesburg's efforts in the management of rodents.

### **Frequencies and univariate analysis of rodent infestation across five study sites from 2009 to 2010**

During the reviewed time period, the rodent infestation prevalence was highest in 2009 (63.9%) and 2010 (63.9%). Table 4.17 shows that the odds of rodent infestation were nearly twice as high in 2009 [OR=1.68, p<0.001] and 2010 [OR=1.67, p<0.001] respectively when compared to the previous years.

Table 4.17 Frequencies and univariate analysis of rodent infestation per year.

<b>Year</b>	<b>Rodents Prevalence n (%)</b>	<b>Crude OR</b>	<b>95% CI</b>	<b>P value</b>
<b>2009</b>	247 (63.9)	1.68	1.29 to 2.21	< 0.001
<b>2010</b>	350 (63.9)	1.67	1.31 to 2.14	< 0.001

### **CONCLUSION**

The results showed a significant decrease in rodent infestation in the five study sites during 2009 to 2010, with Hospital Hill showing the highest rate of 79.7%, while Hillbrow showed a rate of 27.4%. The rate of rodent infestation dropped at a faster rate in 2010 as compared with 2009. This drop in 2010 could be as a result of the developments that took place prior to 2010 in preparation of the 2010 Soccer World Cup held in South Africa.

The results highlighted how household income influences the rodent prevalence. Although this factor showed the same effect on the five study sites, factors such as type of dwelling, use of pesticides in the household, water source, and use of pit latrines have impacted differently on each study site. Communities residing in informal housing

were more prone to rodent infestation compared to those residing in more formal settings. For example, Hospital Hill, an informal settlement, was shown to have the highest rodent infestation, while Hillbrow with its formal characteristics had the lowest rodent infestation. Households in Hospital Hill used more pesticides to control rodent infestation than households in Hillbrow did.

The results also showed how the use of outdoor taps and communal taps influenced the prevalence of rodents in comparison to the use of indoor taps. This has also illustrated how households in informal settings were more prone to rodents than those that had indoor taps. This factor contributes to rodent prevalence because water forms part of the life line to rodents, together with food sources and shelter. The analysis has also shown how the use of pit latrines has attracted rodents to an area. Rodents feed on excreta and pit latrines provide this opportunity.

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