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FOREWORD

Plague is currently quiescent in South Africa, but recent outbreaks in other countries serve as a warning that activity can resume unexpectedly, making ongoing surveillance of rodent and vector populations in historically plague-endemic areas important. Plague surveillance in South Africa over the last decade is described in this issue, which also includes a report of a new surveillance programme for additional respiratory pathogens. Pathogens under surveillance in this new programme include *Haemophilus influenzae*, *Streptococcus pneumoniae, Bordetella pertussis, Mycoplasma pneumoniae*, *Chlamydophila (Chlamydia) pneumoniae*, *Legionella* species and *Pneumocystis jirovecii*. It is envisaged that this programme will enable descriptions of how co-infections with these pathogens relate to patient outcome.

Also in this issue is the very topical problem of estimating HIV incidence in South Africa. Laboratory methods and post-test algorithms are discussed in the context of South Africa's HIV epidemic. Equally pertinent to the epidemic is the severity of transmitted HIV-1 drug resistance among individuals assumed to be recently infected, such as pregnant women. Data presented in this issue suggest that transmission of drug resistant HIV viruses is occurring in a number of provinces in South Africa.

This is the final issue for 2013 and we wish all our readers and contributors a safe, healthy and joyous holiday season.

Basil Brooke, Editor

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A DECADE OF PLAGUE SURVEILLANCE IN SOUTH AFRICA, 2002-2012

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Introduction

Plague is a potential major public health problem and is subject to the International Health Regulations. Outbreaks involving humans are always notifiable to the World Health Organization. Plague is a zoonotic disease caused by the bacterium *Yersinia pestis*. It is considered to be one of the most pathogenic bacteria to humans due to its rapid progression and high fatality rate (bubonic plague 40%–70%; pneumonic 100%) if not treated timeously.[1,2]

Wild rodents are considered to be the primary natural reservoirs for *Y. pestis* and wild plague exists independent of human populations in natural foci. Transmission of plague from animal to human is usually via the bite of an infected flea (70 - 80% of cases) or handling of an infected animal (20% of cases). Pneumonic plague can be transmitted from human to human at the end-stage of disease by means of aerosols, when an infected person may cough copious amounts of bloody sputum.

Plague is considered a re-emerging disease with 1,000 to 5,000 human cases resulting in 100 to 200 deaths reported to the World Health Organization (WHO) each year. More than 90% of cases occur in Africa.[3]

Plague was first introduced into South Africa during the late 1890s on trade ships visiting its harbours with 2568 cases and 1505 deaths reported between 1899 and 1926.[4] In 1921, plague became notifiable to the National Department of Health (NDoH) and remains a current threat due to the existence of susceptible wild rodent foci in several parts of South Africa.

The last reported outbreak of plague in South Africa occurred in 1982 in the Coega area, Eastern Cape Province (EC), after a dormant period of 10 years.[5] Epizootics should be identified as quickly as possible so that steps can be taken to control disease spread. Plague surveillance is being carried out in this and other natural plague foci by monitoring the susceptible rodent populations in order to alert public health authorities to increased human plague risks.

Materials and methods

Plague surveillance in susceptible rodent populations commenced in July 2002. Surveillance sites were established in the Coega area in the Nelson Mandela Bay Metropolitan (NMBM) (2002 to present), eThekwini Municipality (2003-2010) and the City of Johannesburg (2010 to present). Environmental health officers collected various samples including serum, liver, spleen, heart and lung, and ectoparasites from live-caught rodents. For the period July 2002 to December 2012, 6474 rodent samples were submitted to the Special Bacterial Pathogens Reference Laboratory of the Centre for Emerging and Zoonotic Diseases, National Institute for Communicable Diseases (NICD), for testing (table). Serum samples were tested using a competitive-blocking enzyme-linked immunoassay (EIA) for the detection of *Y. pestis* anti-F1 antibodies.[6] Genotypic species identification of a plague-positive rodent was done by 18S ribosomal DNA sequencing.

Table. Rodent samples received and tested by year for plague surveillance.

Year	Received	Tested
2002	164	160
2003	563	537
2004	414	377
2005	265	204
2006	564	357
2007	827	652
2008	1183	975
2009	761	621
2010	631	560
2011	730	646
2012	327	252
2013	45	31
Total	6474	5372

Results

Over a 10-year period, a total of 5372 rodents with sufficient serum sample volumes was tested, with only one rodent testing positive for plague anti-F1 antibodies. The plague-seropositive rodent was subsequently identified as a southern African vleirat (*Otomys irroratus*) that was trapped in August 2010 in an industrial area close to Motherwell in the Coega area (figure 1). Public health authorities were alerted to increased human plague risks and appropriate steps were taken to prevent disease spread to humans. The NMBM Environmental Health Services conducted flea control that was followed by an intensified rodent control program. An investigation of the area revealed that the rodent trapping site was in relatively close proximity (approximately 1 km) to the 1982 outbreak site (figure 2). In an effort to increase plague awareness in the area, a workshop on plague surveillance and control was conducted by the NICD in collaboration with the NDoH.

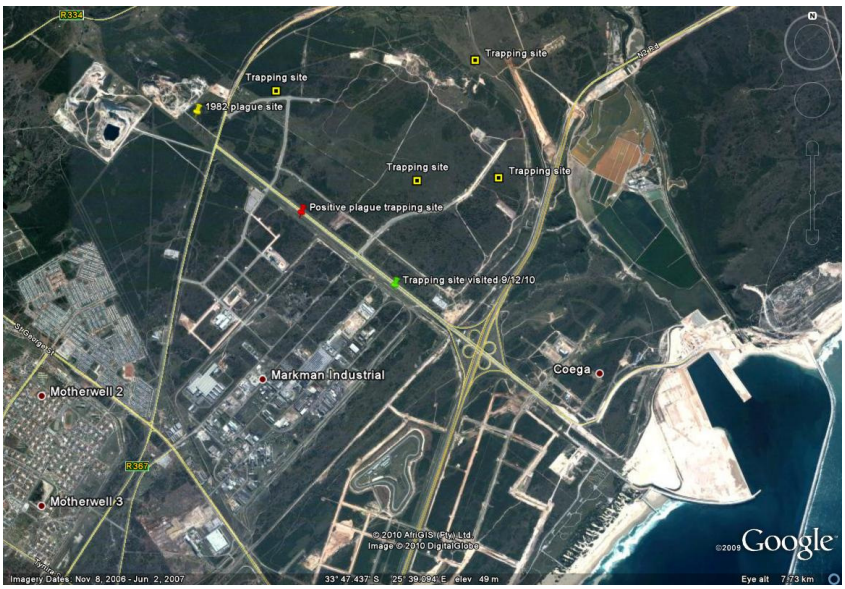

Figure 1: Satellite image of Coega area, Nelson Mandela Bay Metropolitan Municipality, showing rodent trapping sites. Note the site of the 1982 outbreak (upper left quadrant).

Figure 2: Site of 1982 plague outbreak,Coega area, now abandoned. Note environmental disruption from industrial activity in the background, a potential risk factor for plague transmission.

Discussion and conclusion

Even though plague is currently in a quiescent phase in South Africa, experience from outbreaks in other countries (India, Algeria, Libya, Tanzania and Uganda) has shown that plague activity can resume unexpectedly after decades of quiescence. Continued surveillance of rodent and vector populations in historically plague-endemic areas such as Coega is therefore of paramount importance even during periods when no human cases are reported.

Dogs are good sentinel animals for predicting plague outbreaks because they catch rodents and get infected, but generally seroconvert without becoming ill. However, efforts to recruit dog blood samples from the Coega area have been unsuccessful to date. Introducing this strategy may be a future priority if plague activity increases.

Acknowledgements

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