

# Will Plague Continue to Haunt Hilly States of India?

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## Abstract

Plague is an ancient disease existing in a 'nest' or rat-hole or rat valley (commonly called as munshnali), a reservoir of animals (rats or squirrels etc.), which perpetuates the bacillus by fleabites or by the ingestion of the infected animal tissues, *Yersinia pestis*. Humans, however, are an accidental host and have no role in the maintenance or propagation of the disease in nature except in pneumonic spread, person-to-person. In winters, when ice recedes, hunters and mushroom collectors live in jungles for days together and eat dead/ live animals. These animals may be inhabited by plague bacilli, which may be transmitted to humans through inhalation or by other routes. Super Rat (or Norway or Wharf Rat or roof rat or brown rat), the primary reservoir of plague is found in hilly regions dwelling in temperatures ranging from 18-23 ° C. It is a relatively large rat approximately 16 inches from the tip of the nose to the tip of the tail (tail small than rest of body) and weighing, on the average, about 12 ounces. It has distinguished features like it can leap five times its body length straight up, can squeeze through any hole, can dig tunnels straight down without leaving dirt around the hole, can chew through wood siding, door jams, and wall board in minutes, can swim under water for great distances, can climb the inside of smooth vertical pipes, can thrive in total darkness, and gain weight on a diet of dog droppings. *Xenopsylla cheopis* is the principal and efficient vector of plague bacillus and are most dangerous vectors to humans<sup>1</sup>.

An outbreak of plague occurred in village Hat Koti, District Shimla, State of Himachal Pradesh, India in the first week of February, 2002 in which 16 cases were reported out of which 4 died. The official declaration of plague was done quite late after thorough investigation by NICD on 17<sup>th</sup> February even though it was strongly suspected as plague by a local medical officer. It was reported that the index case died due to heavy dose of the plague bacteria through his respiratory tract resulting in 'pneumonic plague' after he had consumed the meat of an animal ( rat ) killed and de-skinned

by himself during his extended hunting trip to Kelvi forests during heavy snowfall. The infection spread to Northern States of India including Uttaranchal, Punjab and Chandigarh. Earlier, in September 1982, on the eve of the Asian Games being held in Delhi, plague had reportedly gripped the region. But the matter was suppressed as it could have had serious repercussions on the games. The official death count was eight, though NICD officials put the toll at 23. Another similar outbreak of plague claimed 200 lives in Surat, Gujarat, in 1994. Government of India also reported a plague outbreak (3 cases) in a small village of Uttaranchal in year 2004, but the report did not reach the public attention<sup>2,3,4</sup>. Recurrent outbreaks of plague in India in recent past have yet again exposed not only the vulnerability of the Indian population to such epidemics, but also the glaring lack of an efficient disease surveillance system.

An understanding of the relationship between climate and plague could be useful in predicting periods of increased risk of plague transmission. Slight variations in temperature, relative humidity, and precipitation either permit an epidemic to flourish or cause a decline in its intensity<sup>5,6</sup>. Plague cases occurred more frequently (over 60% of normal cases) following winter-spring periods with above-average precipitation as compared to dry winter-spring periods probably due to either increased resource productivity (plants and insects) of rats or increased flea survival and reproduction after winter-spring season<sup>7,8</sup>. Temperature is another important factor in propagation as temperature below 28 ° C increase rate of metamorphosis of *X. cheopis* from egg to adult and also increases the vector efficiency of *X. cheopis*. All these factors are predominant in hilly regions following winter-spring season (February to May). Unlike recent outbreak in Himachal Pradesh, Nature (restriction of people movement due to snowfall, thus containing the epidemic) may not come to our rescue every time. We have to shed our ostrich like attitude of medical undergraduate

teaching and rely somewhat on traditional wisdom about plague epidemiology (that plague has a variable dormant period between its subsequent outbreaks). A professional scientific area specific approach, considering behavioral/anthropological/Socio-epidemiological/ environmental factors should be adopted to predict and tackle any subsequent outbreak of plague efficiently. Postgraduates in field of Community Medicine should undertake such operational topics for their dissertations so as to suggest the policy makers about designing future strategies.

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