

Plague Outbreaks in India : Surat and Himachal Pradesh

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Within a gap of eight years, plague has struck twice in India. The outbreaks caused panic and necessitated an urgent assessment of our public health apparatus vis-a-vis our vulnerability towards infectious diseases. Generally speaking, the resurgence of epidemics and their effects on society demonstrated at least three vital national security issues. They are human mobility (cross-border and intra-border movements), transparency, and tensions between states, (which includes the threat of biological warfare).¹ The re-emergence of plague in India in 1994 (Surat) and in 2002 (Himachal Pradesh) invokes these issues and calls for national and international discourse on disease control. Whether it was caused by intra-state tensions (biological war) or due to a natural phenomenon is still debatable, especially in the case of Surat. However, the plague which ravaged the Diamond City of Surat and scenic hamlets in Shimla affected the economic and political activity in the country, but also posed a serious threat to our national security.

Before discussing the causes, courses and effects of plague outbreaks in India, it would be useful to know the history and aetiology of this dreadful disease.

History of Plague

Often regarded as a curse from God, plague has its place in every religious scripture. For Christians, it was divine punishment, for Muslims, a symbol of self-sacrifice (martyrdom). In the Hindu scripture (Bhagwat Purana), plague was known as Mahamari, the 'great death' which was caused by rats and mentioned with no blind beliefs attached to it.² Derived from a Greek word, plaga, meaning a blow or sudden strike, plague has got a

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1. Laurie Garrett, "The Return of Infectious Disease", *Foreign Affairs*, Vol.75 (1), January/February 1996, p.73.
 2. K. Park, *Preventive and Social Medicine* (16th edn.), Jabalpur, Banarasidas Bhanot 2000, p.220.

detailed description including its clinical manifestations in Thucydides' *The History of the Peloponnesian War*.³ The history of plague is documented among the Great Pandemics. There are three plague pandemics so far. The world witnessed the first plague pandemic in AD 542 during the reign of Byzantine emperor, Justinian-I, and for almost six decades it caused widespread casualties.⁴ The second pandemic struck Europe in the 14th century. The 'Black Death', as it was called, killed almost 25 million people. It is widely believed that the disease spread through the first recorded incident of biological warfare, in the memoirs of the Italian Gabriele de' Mussi. According to this work, soldiers of the Golden Horde (Mongols) catapulted corpses of plague victims into the besieged Genoese trading port of Caffa (now in Ukraine) on the Black Sea.⁵ From here the disease spread to Italy, Spain, England, France, and North Africa and soon engulfed Europe. Even after the great pandemic wore out, plague remained endemic among the rodent population, the main vector of this disease. As a result, the disease surfaced sporadically in Asia and Europe throughout the 17th century. The third pandemic was caused by the increasing human mobility and movement of steamships. It started in the later part of the 19th century in China and reached the Indian shores in 1896, and subsequently other major port cities of the world.⁶

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3. In the wake of the political struggle between Athens and Sparta, plague broke out in its virulent form causing many deaths in Athens. It also caused total disruption of community ties and massive demoralisation in the society. Also, its impact on military and economic strength resulted in undermining civil and religious institutions. For a detailed description, see Mohan Rao, "Plague: The Fourth Horseman", *Economic and Political Weekly*, Vol. XXIX (42), 15 October 1994, pp.2720-2721.
 4. See <<http://www.globalterrorism101.com/JustiniansPlague.html>>
 5. Mark Wheelis, "Biological Warfare at the 1346 Siege of Caffa", *Emerging Infectious Disease* (serial online), Vol.8 (9), September 2002<www.cdc.gov/ncidod/EID/Vol8no9/010536.htm>. Also for a critical analysis see, Vincent Derbes, "De Mussis' and the Great Plague of 1348: A Forgotten Episode of Bacteriological Warfare", *Journal of American Medical Association*, Vol. 196 (1), 1966, pp.59-62.
 6. India had experienced plague before, in 1612, which primarily affected Agra city. It was in the modern pandemic era that India experienced the plague in its most virulent form along with United States and many south and central Asian countries. See, S.A.Dhanukar and Avijit Hazra, "Return of the Ancient Scourge", *Science Reporter*, Vol.31 (11), November 1994, p.21.

During this modern pandemic, scientists identified and cultured the plague bacillus after thorough investigations and developed a crude vaccine.⁷ However, by this time plague had spread around the globe except for Australia and the endemic foci had established itself in rodent populations in almost every continent, irrespective of climatic conditions. Though the pandemic subsided gradually, it was the international regulations on rat control in ports and ships which largely restricted the spread. Though there were no laboratory-confirmed cases of human plague in India after 1968, the disease continued to be present in its wild life. The foci exist in Maharashtra, Himachal Pradesh, Andhra Pradesh and Tamil Nadu.⁸

The Aetiology

What is plague? How are humans susceptible to it? The answers to these questions depict the aetiology of plague. It is a zoonotic disease primarily spread to humans from its natural hosts, rats. The most common carrier is the wild rat (*Tatera Indica*). But the transmission occurs when there are some disturbances in the environment which facilitates contacts between wild rats and house rats (*Rattus rattus*) or field rats. It also gets transmitted to rabbits and squirrels and, through rat fleas (*Xenopsylla Cheopis* and *X brasiliensis*), infects the humans.⁹ There are three principal clinical manifestations of plague: Bubonic, Pneumonic and Septicaemic. Bubonic plague is characterised by the swelling of lymph nodes (buboes), mainly in the groin and less often in the neck and armpits, depending on the site of the flea bite. It cannot spread from person to person, while pneumonic plague involves the lungs and is highly infectious and can spread among humans as the plague bacillus is present in the sputum. The septicaemic plague is very rare and only occurs when the bacilli

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7. The plague bacillus was first cultured by Alexander Yersin in Hong Kong, thereafter known as *Yersinia pestis* (also, *Pasturella pestis*). But a French scientist while investigating the bubonic plague in Bombay discovered the connection between rat, rat fleas (*Xenopsylla Cheipos*) and plague bacillus. Later, Waldemmar Haffkine developed the vaccine, also in Bombay.
 8. S.A.Dhanukar and Avijit Hazra, "Return of the Ancient Scourge", *Science Reporter, op.cit.*, p.21.
 9. This is the most common mode of transmission of *Y.pestis* to humans. Also infection can be caused by infectious body fluids or tissues (both animal and human) and by inhaling infectious droplets. See, "Of Mice and Men", *Down to Earth* (CSE, New Delhi), 31 October 1994, p.8.

invade the blood stream and even death could occur.¹⁰ Among these three types, pneumonic plague is more fatal, and patients who do not receive treatment within 18 hours after the onset of symptoms are unlikely to survive.

Outbreaks in India

India experienced a plague epidemic in 1895-96, which continued for almost two decades, killing approximately ten million people. One estimate even places the period of outbreaks until 1950 and the number of deaths at 12.5 million.¹¹ However, it is believed that after 1950, due to the emergence of many broad-spectrum antibiotics and disinfectants like DDT and Gamaxine, the spread / transmission of plague was contained. Upto 1993 two separate incidents of plague occurred but could not be confirmed as plague.¹² This period of quiescence (1967-1993) did raise hopes of human plague eradication and, simultaneously, complacency in the health administration. Ironically, the decade following this quiescence witnessed two plague outbreaks : Surat (1994) and in Hatkoti village near Shimla (2002). The former took a heavy toll that shook India's health infrastructure and urban management to the core.

Plague in Surat. In India, empirical studies shows that the plague occurs either in spring or autumn, but at most times is interrupted by the hot Indian summer.¹³ The recent outbreaks only confirmed this pattern. In the case of Surat, the disease broke out in the month of September. It is believed that the earthquake in Beed district in 1993 disturbed the territorial equilibrium between wild rats and house rats, which facilitated fleas jumping their hosts. A flood in the river Tapti aggravated this nature-driven development.¹⁴ Besides, the growth in the city skyline and haphazard planning increasing slums and unhygienic conditions, all

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10. K.Park, *Preventive and Social Medicine, op.cit.*, p.223.
 11. Quoted in V. Ramalingaswami, "The Plague Outbreaks in India", *Current Science*, Vol.71, (10), November 1996, p.781.
 12. In the early 1980s, there were two suspected outbreaks of plague in areas in the Tamil Nadu / Andhra Pradesh border and in Himachal Pradesh. See, V.K. Ramachandran, "Plague Through the Centuries", *Frontline*, 21 October 1994, p.18.
 13. Samuel K. Cohn Jr., "The Black Death: End of Paradigm", *The American Historical Review*, Vol.107 (3), June 2002, p.725.

combined together to cause the epidemic.

In the first week of September, a bubonic plague outbreak occurred in Mamla village in Beed district of Maharashtra. It began with a sudden rat fall and high flea densities in the area.¹⁵ Within a week, despite massive use of disinfectants like DDT and pesticide sprays, the number of patients rose to 183.¹⁶ When the panic-stricken inhabitants fled the area, they carried the disease to other parts of India.¹⁷ Surat came under the grip of plague, in both forms: bubonic and pneumonic. While the official figure put it at 752:44 (infected: killed) ratio by the end of the month, the truth was more alarming.¹⁸ Although Surat remained the epicentre of the plague outbreak, it spread to other parts of the country, primarily due to unrestricted human movement.

The disease was first reported from Ved Road on the night of 19 September 1994. The victim was declared dead on arrival at the Surat Civil Hospital (SCH). Soon another eight people from the slums of Ved Road, Vatagram and Limbayat areas died. All of them had similar symptoms: high fever, cough and blood in the sputum. Reportedly, these were not sudden deaths. Since 13 September people had been dying of a mysterious fever

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14. *India Disasters Report: Towards A Policy Initiative*, New Delhi, Oxford University Press, 2000, p.291.
 15. This evidence though not widely accepted, was sent in initial reports of a probable plague epidemic in the area. See, V.Ramalingaswami, "Resurgence of the Plague", *Science Reporter*, Vol.31 (11), November 1994, p.15.
 16. "The Plague: How Serious is it?" *India Today*, 15 October 1994, p.53.
 17. Besides Surat other cases were reported from Maharashtra(488), Karnataka (46), Uttar Pradesh(10), Madhya Pradesh (4), New Delhi (68) and Gujarat (77). "International Notes Update: Human Plague-India, 1994", *Centre for Disease Control*, 43(41), 21 October 1994, pp 761-762.
 18. "The Scourge: The Indian Plague Epidemic of 1994", *Frontline*, 21 October 1994, pp.4-5. The reports varied from one source to other. It varied to a great extent even in official sources. India's leading daily, *The Times of India*, cited one official report that 24 people died, another widely cited official figure was 45, whilst the Chief Secretary of Gujarat reported 17 deaths by the evening of 22 September. Finally the Indian government reported to the World Health Organisation (WHO) that from 26 August to 18 October, 1994, there were 56 deaths (48 in Surat) due to plague. "International Notes Update: Human Plague-India, 1994", *op.cit.*, pp. 761-762. For on line Morbidity and Mortality Report (MMWR) see URL <www.cdc.gov/mmwr/preview/mmrwhtml/00032992.htm>

then called 'Surat fever'.¹⁹

Investigation and Control

Till 22 September, the mysterious disease was believed to be pneumonia. After 17 people died and many others were infected, it was suspected that Surat was in the grip of pneumonic plague. Soon the National Institute of Communicable Diseases (NICD), New Delhi, swung into action, and worked with international bodies like the World Health Organisation (WHO) and Centre for Disease Control (CDC) to take necessary measures to control the outbreak. The problem of restricting the disease to certain zones proved an uphill task as the panic-stricken people fled to other parts of the country as soon as the news broke out. Though plague is one of the three diseases (besides, cholera and kala-azar) which can be quarantined by international regulations, it is very difficult to identify, check and restrict the movement of patients especially within the country. Even after the Chief Minister of the State and initial investigation by NICD denied that the disease was plague, people ran helter-skelter within the city. The inhabitants of Surat mainly constituted migrant workers from different states. Migrants from Orissa, Maharashtra, West Bengal, Rajasthan and Bihar are crammed into the city making it a 'big transit camp'.²⁰ Before any restrictions could be imposed, these migrants took to flight (mainly, by road and railways) to their home states and carried the disease with them.

As the disease spread, various investigating agencies worked relentlessly to contain its spread and prevent further complications. NICD, being the nodal agency on communicable diseases, started its investigations right from 2 September after getting information about the suspected bubonic plague in Mamla. After testing four sera samples, NICD confirmed that all of them were positive for plague antibodies. According to a paper presented by the present Director of NICD, a team from NICD was rushed to the affected area.²¹ The paper claimed that 'typical epidemiological events like enhanced rodent activity, higher flea indices, rat fall, clinical cases confirming human bubonic plague and serological results, all in

19. Rahul Srivastava, "A Plague on This Country", *Down To Earth* (CSE, New Delhi), 31 October 1994, p.6.

20. V.K.Ramachandran, 'Filth and Decay', *Frontline*, 21 October 1994, p.13.

combine confirmed the outbreak in Mamla and its spread to adjoining areas with diminishing intensity'.²² But in Surat both pneumonic and bubonic plague had occurred, according to the paper. The main findings regarding the genesis of the outbreak in Surat city confirmed that there had been a spillover infection from wild rodents to city or house rats. This was facilitated by the sudden environmental change in the area due to floods in the catchment areas of the Ukai reservoir and subsequent flashflood in Surat city. After the floodwater began receding on 10 September, the movement of people started and the cleaning operation mainly by community members for some days in the flood affected localities. In this process some might have handled or come in contact with dead and infected rodents or animals and developed the disease.²³

There are two major bodies working on the scene: WHO International Team and NICD, New Delhi. Initially the WHO Team was not satisfied with the prevailing methods of disease investigation in India. In its Executive Report (22 November 1994) the WHO International Team suggested that there were problems with the investigating laboratories in differentiating real cases of plague from other infectious disease with similar symptoms, both epidemiological and clinical.²⁴ One of the WHO Team members, May C. Chu, microbiologist at the Reference Laboratory for Plague at the Centre for Disease Control and Prevention (CDC), Fort Collins, USA, denied there were any clearly identified *Y.pestis* culture associated with any specimen obtained from the suspected plague patients.²⁵ However, further research confirmed the association of *Y.pestis* with the epidemic at Surat and Beed, and demonstrated that *Y.pestis*

21. A team consisting of an epidemiologist, an entomologist and a microbiologist was sent immediately to investigate the outbreaks. After a village wise study, it concluded that from 26-27 August to 17-18 September there were 63 cases of suspected bubonic plague. The highest reported cases were from Mamla (38). K.K.Dutta, "Plague Outbreaks in India-1994". This paper was presented at the *National Workshop for Developing Surveillance Mechanism for Pathogens with Biological Warfare Potential*, held 18-19 September 2001, at New Delhi.

22. *Ibid.*

23. "Epidemiological Investigation of Pneumonic Plague Outbreak in Surat During 23-25 September 1994 by the National Institute of Communicable Diseases (NICD), Delhi," Appendix B, in Ghanashyam Shah, *Public Health and Urban Development: The Plague in Surat*, New Delhi: Sage, 1997.

24. V. Ramalingaswami, "Plague Outbreaks in India", *op.cit.*, p.781.

isolates obtained from these regions were identified, most likely clonal in origin, and that the pathogen had an enzootic existence in the region.²⁶

Plague, Media and the Controversy

Since the outbreak of the disease, there have been conflicting views in professional circles and controversial reporting in the media as well. The questions, which hovered around, were regarding the identity of the causative agent and whether it was a natural outbreak or not.

The Government of India constituted a Technical Advisory Committee (TAC) immediately under the Chairmanship of V. Ramalingaswami on 11 October 1994 with three major terms of references. They were:²⁷

- to elucidate factors responsible for the outbreak of plague and its spread,
- to advise on strategies, policies and programmes for the control of plague,
- to recommend steps for prevention of such outbreaks in future.

TAC's investigation drew flak for two reasons: one, the outbreak had subsided and second, fresh samples were not available. It had to continue the investigation with the clinical samples stored in NICD, New Delhi and Surat. The WHO International Team opined that efforts to isolate and identify the microorganism *Y.pestis* were not successful. Even six months after the outbreak, the then WHO Director General, Dr. Hiroshi

25. *Ibid.*

26. For a vivid scientific analysis, see, S.K.Panda, et.al, "The 1994 Plague Epidemics of India: Molecular Diagnosis and Characterisation of *Y.pestis* Isolates from Surat and Beed", *Current Science*, Vol. 71(10), 25 November 1996, pp.794-799.

27. "Summary of the Report of Technical Advisory Committee on Plague", Appendix D, in Ghanashyam Shah, *Public Health and Urban Development: The Plague in Surat*, (New Delhi: Sage 1997), p.292. It entrusted the task of isolation and characterisation of *Y.pestis* from the clinical samples to the Defence Research and Development Establishment (DRDE), Gwalior. Other major institutes and organisations involved in the TAC were AIIMS, NICD, IMTECH, PGIMER, etc.

Nakajima, said that their experts were not able to isolate the microorganism from Beed samples that had confirmed bubonic plague but they could only confirm the presence of plague bacterium from the Surat sample.²⁸ However, the TAC Report concluded that pneumonic plague was the cause of the deaths.

The findings of the TAC also ran into trouble when one of its members, Kalyan Banerji of the National Institute of Virology (NIV), Pune, did not sign the document due to disagreements. After a gap of five years, in December 1999, an ex-WHO official, Dr. Satnam Singh (former WHO Programme Director) revived the controversy again. According to him 'the disease which killed 47 people in the Surat city in 1994 and caused economic loss worth \$600 million was not plague'. He substantiated his argument by mentioning the Report of the American Public Health Association, Manual on Control of Communicable Diseases, (17th Edition). The manual had added 'Surat plague' in its 16th edition, but deleted it in the 17th edition.²⁹

Another controversial aspect of the outbreak was, that the Surat plague was not a natural outbreak, and that the causative organism was suspicious. An Indian weekly magazine, *The Week*, published an interesting story regarding this suspicion. Raising the issue of biowarfare, it zeroed in on two possibilities:³⁰ first, enemy agents could have introduced mutated and cultured germs into Beed and Surat as there was no sign of natural plague (no rat fall before the outbreak); second, someone could have experimented with a newly developed organisms and their vaccines for biological warfare. The story cited various clinical reports and expert opinion, primarily focussed on the activities of the United States and Russia.³¹ As time passed, more information regarding the outbreak came out. Such information, which fuelled further suspicions,

28. "WHO Still Puzzled Over Surat Epidemic", *The Hindustan Times*, 14 March 1995.

29. "Surat Epidemic, Plagues Again: Now Ex-WHO Official Contests Diagnosis", *The Indian Express*, 19 December 1999. Also, Satnam Singh pointed out that according to the Chairman of the Expert Committee appointed by the Gujarat Government in 1995, N.R.Mehta, most of the evidence did not support the initial suspected diagnosis of pneumonic plague.

30. R. Prasannan, "Germ War", *The Week*, 9 October 1994, p.28.

came from the Centre for Disease Control and Prevention (CDC). It was stated that the Surat strain of the disease was 'unique' and not related to any known variety of the agent, *Y.pestis*.³² However, the then defence science adviser and present President of India Dr. A.P.J. Abdul Kalam, investigated the matter. Though the outcome was never made public, some scientists, who thought that the Surat outbreak was an experiment, believed that the aim could have been to study how the government, the scientific community and the people would react in the event of a real biological weapons attack.³³ However, the TAC Report, including that of the NICD, discounted this theory. The tests at various international institutes and tests at DRDE, Gwalior are supposed to have confirmed that the Surat outbreak was plague and a natural outbreak.³⁴

Outbreak in Himachal Pradesh. The second case study, plague in Himachal Pradesh in 2002, was not as controversial as its predecessor. But the outbreak did expose some of the inherent lacunae in our civic health system. It was not the first time that this region experienced plague. In September 1982, NICD diagnosed a mystery fever that had gripped the region as bubonic plague, but the matter was suppressed.³⁵ The scourge

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31. For a story related to the US involvement, see, R.Prasannan, "American Hand", *The Week*, 16 October 1994. Regarding Russia's role, the Indian Government received information in the first week of July 1995, about a firm called 'Viva' located in Almaty in Kazakstan selling plague microbes. It became hard to rule out the possibility of militants purchasing the organisms from the Kazak company and releasing it in Surat. For a report see, "Were Ultras Responsible for Surat Plague?", *Hindustan Times*, 9 July 1995.
 32. "New Twist to Plague Story", *Tribune* (Chandigarh), 10 July 1995. It was stated that the strain had a chromosome with a curious extra gene. This gene contained a code for the structure of a single RNA molecule.
 33. For example, Prof. Indira Nath of AIIMS, believed that it was not surprising for a genetic engineer to introduce an extra gene or genes into the plague microbe. According to her this organism was one that was intensely studied for its biological warfare potential. See, "Scientists Suspect Plague was Engineered", *Hindustan Times* (New Delhi), 7 July 1995.
 34. The test reports from the Centre for Disease Control and Prevention, Fort Collins, USA, the Pasteur Institute, Paris and the Stavropol Research Anti-Plague Institute, Russia confirmed the case as a plague outbreak. See, "Surat Deaths: Expert Discounts Theory of Mysterious Disease", *The Hindu* (Madras) 21 June 1995. Also for a detailed scientific analysis see, H.V. Batra, V.Tuteja and G.S.Agrawal, "Isolation and Identification of *Yersinia pestis* Responsible for the Plague Outbreaks in India," *Current Science*, Vol.71 (10), 25 November 1996, pp.787-791.

visited the scenic hamlets again on 5 February 2002. This time the disease was somewhat restricted area-wise and virulence. Out of 16 cases, 4 persons died of pneumonic plague.³⁶ A NICD team visited the epicentre, Rohru-Jubbal belt of Himachal Pradesh, from 14 to 17 February 2002 to investigate the outbreak and provide other technical guidance to the State Government. Surprisingly, it took fourteen days for the NICD to confirm that the disease was plague.³⁷

The experts suggested that the cause of the outbreak was contact between infected animals and human beings. Known as 'Sylvatic plague', which exists in nature, it can be transmitted while handling infected animals. The first victim belonged to Hatkoti village in Rohru subdivision. He had reportedly gone to hunt game and fallen ill after eating the flesh in his in laws house in nearby Gallu village. He died on 4th February of a viral disease. Soon, three of his relatives also died in the hospital. The infection travelled with one relative to Banupur, Uttaranchal. Besides these four deaths, 12 other infected persons got medical attention in different hospitals: five at Civil Hospital Rohru, six at the Post Graduate Institute of Medical Education and Research (PGIMER), Chandigarh, and one at the Indira Gandhi Medical College (IGMC), Shimla.

Remarkably, the spread of the disease was contained with the initial efforts of doctors at Rohru Civil Hospital when they launched a screening drive on their own, much before the official confirmation of the epidemic.³⁸ It is believed that the experience of locals helped in containing the plague before it could turn epidemic. Also, prompt action by the NICD team and the local health administration under its guidance did a good job in restricting the spread. Some of the important measures undertaken were:³⁹

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35. The outbreak was reportedly suppressed because of the Asian Games, which was scheduled at that time in Delhi. The official death count was eight, though one official of NICD puts the toll at 23. See "Germ of A Problem", *India Today*, 4 March 2002.
 36. "Final Investigation Report on Pneumonic Plague: Outbreak in Hatkoti Village, Himachal Pradesh", NICD, New Delhi, February 2002. < <http://www.nicd.org/investreports/2002.02.Plague.asp> >
 37. "Grim Reminder", *Down to Earth* (CSE, New Delhi), Vol.10 (20), 15 March 2002.p.6.
 38. Davinder Kumar, "Death Finds a Hill Station", *Outlook*, 4 March 2002, n.16, 18.

- administration of Chemoprophylaxis (using drugs such as doxycycline and tetracycline) to relatives of the patients and to residents of the affected and neighbouring areas, apart from doctors, paramedics and health workers
- fumigation in the affected villages and transport vehicles;
- last but not least, public awareness campaign.

Conclusion

In an interview in 1994, Ashish Kumar Mukerjee, the then Director General of Health Services (DGHS), India said following the plague in Surat that no mechanism existed to combat situations like Surat and the plague took the health department by surprise.⁴⁰

Though India had a plague surveillance unit since 1975, in Bangalore it is moribund. The TAC, in its report pointed out to the need for a national surveillance and response system in India for the control and prevention of infectious disease. In accordance with the recommendation of the TAC, the Government of India set up a National Apical Advisory Committee (NAAC) for national disease surveillance and response⁴¹. Its establishment was a landmark event in India's struggle against infectious diseases. On the recommendation of NAAC, the National Surveillance Programme for Communicable Diseases (NSPCD) had been launched with the objective to strengthen the disease surveillance system.

However, after the recent plague epidemic in Himachal Pradesh, the World Health Organisation had consciously taken steps to strengthen the surveillance mechanism against plague in India and countries in the endemic regions of South-East Asia.⁴² But it seems the worry is still far from over. People are dying of mysterious fevers that go undetected. Dr. R.V. Swami, who was a member of the TAC, and currently is in the Defence

39. *Plague in India*, 20 February 2002 <www.who.int/disease-outbreak-news/n2002/February/20february2002.html>

40. Read the full text of the interview in *Down to Earth*, 31 October 1994, pp.50-51.

41. For details of NAAC's activities and the National Surveillance Programme For Communicable Diseases (NSPCD), see <http://www.nicd.org/ProgramsNICD.asp>

Research and Development Organisation (DRDO), New Delhi, has observed that these sporadic and mysterious epidemics point out that India needs a comprehensive disease surveillance and health care system. Whether it is Siliguri fever or Himachal plague; whether a natural outbreak or through biowarfare (or, bio-terrorism for that matter), disease control and prevention must have priority.

42. "WHO to step up surveillance against plague", *The Hindu*, Friday, 28 June 2002.

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