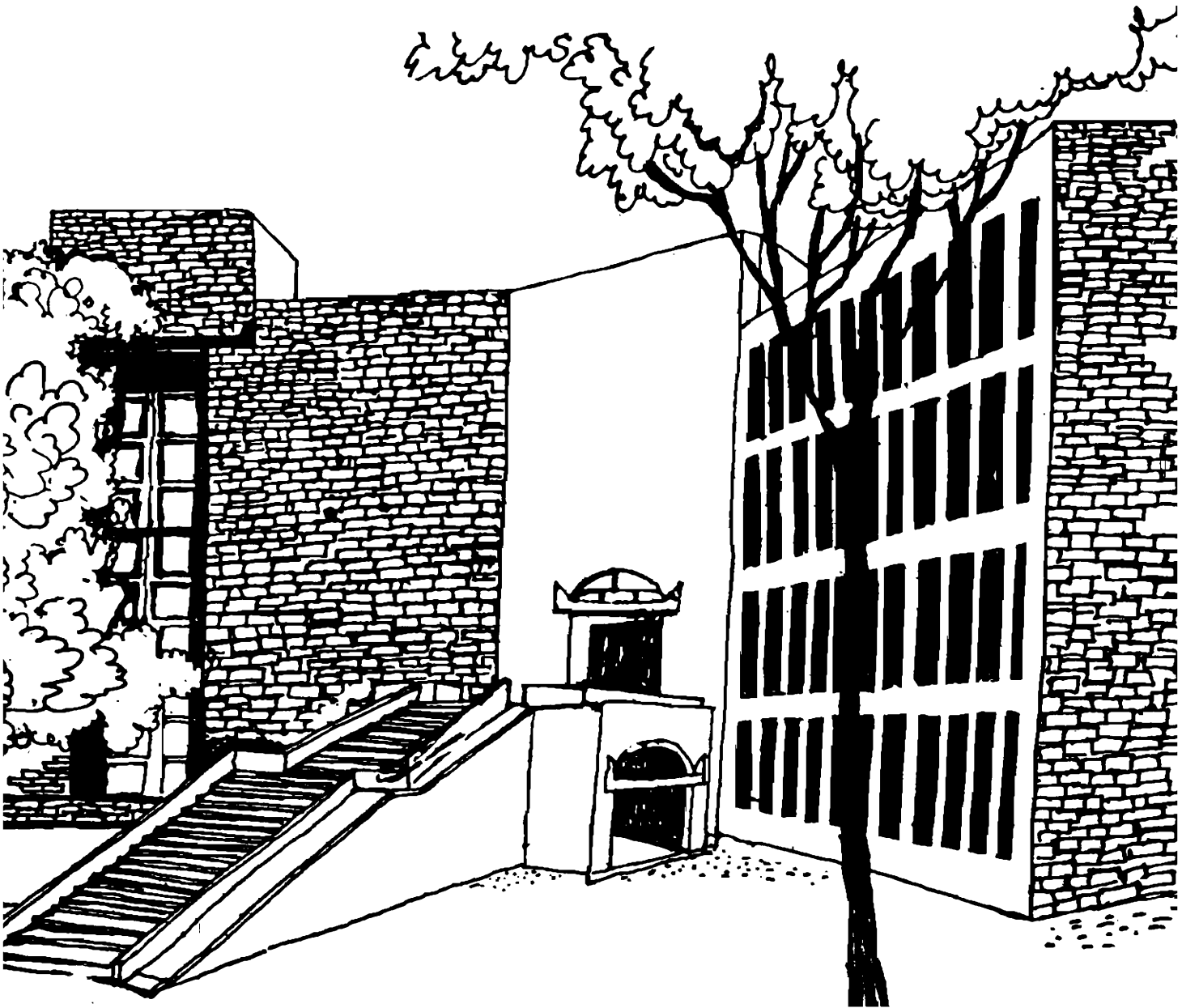




# Working Paper




**INDIAN 'PLAGUE' EPIDEMIC: UNANSWERED  
QUESTIONS & KEY LESSONS**

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## Indian 'Plague' Epidemic: Unanswered Questions & Key Lessons

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Suddenly during the third week of September 1994, news started to appear that cases of suspected pneumonic plague had been reported in City of Surat, in western India. In the first few days the news papers and some TV channels reported very high number of deaths and cases, of the order of 200 deaths and thousand affected. The news spread like wild fire and with equally devastating effect on the populace of the city and the surrounding areas. People fled the city in massive proportions. Guestimates put these numbers at 4-500,000.

Massive relief and control measures were instituted to combat this biblical scourge. The control measures included searching the affected areas for new cases, admission of all cases with slightest suspicion of pneumonic plague to the hospital, treatment of all such suspected cases with three antibiotics, massive spraying of DDT, BHC and other insecticides, cleaning of garbage on unprecedented scale, closing down of all food vendors and restaurants as well as places of public gathering. With in first one week the number of deaths declined drastically and after a few weeks the 'suspected' cases also declined to a trickle. Government declared that the epidemic was over in first week of November. The total deaths ascribed to plague were about 52 and total suspected cases about 1,000. The total number of cases (suspected and confirmed) and deaths in Surat and other places in India is given in table 1.

**Table 1: Cases and Deaths due to plague in India: 26th August to 9th October 1994.**

State/District	Suspected Cases		Confirmed cases (Clini./ lab.)
	Cases	Deaths	
Delhi	1003	3	60
Gujarat - Surat	944	52	118
Gujarat - Other districts	605	0	7
Maharashtra - Bombay	383	0	0
Maharashtra - Beed	449	0	46
Maharashtra - Other districts	2341	0	35
Total in all parts of India	6334	55	288

(Source: W.H.O. Press Release 11th October 1994)

The fear of the disease was so great that it had severe impact on national and international

community. Most international news magazines covered the stories on the front page<sup>1</sup> and TV gave wide coverage to the events in and around Surat. After a lag of few weeks some of the countries responded by suspending air traffic and cargo movement from India eventhough W.H.O. had recommended the contrary<sup>2</sup>. WHO director general urgently visited the city of Surat and sent an expert team to investigate the epidemic in mid october. Based on these visits and investigations W.H.O. assured the world that adequate steps have been taken to prevent spread of the disease<sup>3</sup>. In spite of this, Indian exports suffered substantially and tourist traffic declined nearly by half. Almost all production in Surat came to a standstill for more than one month.

As in any such calamity what is left after the dust settles and smoke clears are many unanswered questions and some important lesson for public health and public policy which are discussed here.

### Unanswered Questions:

The unanswered questions are in the area of (a) nature of the disease, (b) its origin, and (c) mode of transmission. Still controversy is going on in India regarding the exact nature of the disease which caused the epidemic<sup>4</sup>. There are conflicting reports in the national press and international journals. National institutes involved in the investigations of the out-break have very strongly held but diametrically opposite views about the nature of the disease - one of them confirming the plague as the cause and other denying. Local doctors from Surat also have such polarised views on the basic issue of whether the epidemic was because of plague or not; and some doctors go to the extent of saying that there was no epidemic at all, but it reflected normal pattern of deaths due to pneumonia and other causes. The WHO International Plague Investigation Report does point to indications of presence of sylvatic plague in dogs in the area and some indirect evidence of a few cases of human plague but stops short of confirming human pneumonic plague cases in Surat. Under operational conclusions the W.H.O. report states "The identification of plague as a cause of this outbreak cannot be established in the absence of the confirmed isolation of *Y. Pestis* from clinical materials, even though some clinical, epidemiological and serologic findings suggest this possibility"<sup>5</sup>. Such an uncertainty in 1994 about a disease whose causative organism *Y. Pestis* was discovered exactly one hundred years ago reflects how seriously bacteriology has been neglected in Indian medical, health and scientific community.

Inability to confirm the suspected diagnosis of plague could partly be explained by the fact that bacteriology laboratory systems even in medical colleges in India are in very poor shape. They work in very haphazard way, with very little staff, equipments and resources. Systematic collection of samples and bacteriological and serological work up to identify, culture, isolate and confirm *Y. Pestis* was not done during this epidemic. This meant that samples, cultures and other materials were not properly isolated or preserved and hence all bacterial cultures got contaminated precluding any possibility of confirming the identity of the organisms at a later stage. The crucial diagnosis of plague was based on opinions of local government microbiologists from Surat and was supported by a team of experts from one of the National institutes. Independent microbiological opinion or confirmation was not sought from other national institutions, experts or international reference centres. Almost all of the serologically positive results were based on single PHA test samples and Hemagglutination Inhibition test was not done to rule out false positive results. Unfortunately the sample and

culture preservation system, as well as laboratory and clinical data recording systems were in such a poor shape that the WHO and other expert teams which came after the epidemic was over could not get enough concrete and unrefutable evidence to confirm the diagnosis of Plague.

The second un-answered question is how did the epidemic start, assuming that it was of Pneumonic Plague. Last reported cases of plague in India were several decades ago. Even though there was no surveillance of sylvatic plague in or around Surat, there was no report of rat falls or isolated human cases of bubonic or pneumonic type reported in or around surat. Bubonic Plague was reported in August from Beed district of Maharashtra which is in a neighbouring state but that district is more than 300 Km away from Surat. Secondly, inspite of hundreds of bubonic cases reported from Beed there has been no pneumonic case or no death in that district (See table 1). This suggests that if the cases in Beed were of plague there were more like Pestis Minor with low virulence than the classical bubonic plague. While in Surat suddenly pneumonic cases appeared with very high initial mortality but surprisingly without bubonic cases.

Only large known epidemic of primary pneumonic plague in history has occurred among Marmot trappers in Manchuria in China and Mongolia during early part of this century<sup>6</sup>. Most earlier (1898-1911) reported outbreaks of pneumonic plague in India occurred as part of bubonic plague epidemics<sup>7</sup> and pneumonic cases constituted very small proportion of total plague cases 2-13%. The last reported outbreak of suspected Pneumonic plague occurred in 1983 in a small village of Himachal Pradesh when 17 out of 22 affected persons died. The primary case developed in this outbreak after handling an infected rat<sup>8</sup>.

In the world, primary pneumonic plague is extremely rare and has been reported in persons handling infected animals, but in Surat epidemic almost none of the cases seems to have any direct contact with dead or sick animals even though in the areas from where the epidemic started there were many dead pigs and other small animals which were drowned due to the floods that preceded the epidemic by about 10 days. Unfortunately due to heavy rains and other reasons carcasses of such animals were not removed for several days during the epidemic. But there is no recorded case among the municipal staff of who removed the carcasses suggesting that the carcasses were not the source of the infection. In Surat cases were reported among people who were not occupationally or otherwise exposed to animals which can be affected by sylvatic plague. Most initial cases were in young adult males many of whom were diamond cutters. Also there is no history suggestive of single exposure to large number of people at one point in time or one place and the scattered distribution of cases also does not support single exposure. All this makes the question of source of infection very complicated and still un-answered.

The third unanswered question is the mode of transmission. This question is very important from the point of view of prevention and control of the spread of the disease. Pneumonic Plague being highly infectious communicable disease one expects high proportion of secondary cases among close contacts, especially in a setting of highly crowded urban slums where 3-5 persons per room is not an uncommon living arrangement. But in spite of such situation in Surat almost no confirmed secondary cases were reported in any of the investigations. The cases were not even closely clustered in any locality. There were hardly any families where more than one person was affected. Cases were reported almost

simultaneously from far off areas of the same locality and from different parts of the city. During the later part of the epidemic one can argue that absence of secondary cases could be due to quick isolation and tetracyclines prophylaxis. Even though tetracyclines were misused a lot but it was obvious that prophylactic dosage and duration were not universally adhered to by all the contacts. It seems that most contacts did not take full course of the drug. In the early part of the epidemic the diagnosis was not certain and hence many did not take any prophylaxis at all or took it several days after the exposure. Given these circumstances of high chance of person-to-person infection through drop-lets and inadequate prophylaxis, the absence of secondary cases becomes a very important epidemiological evidence pointing against droplet as mode of transmission in this epidemic of lower respiratory tract infections.

Unfortunately no systematic efforts were done by any agency to establish mode of transmission of this disease and hence all the public health actions taken were based on the known mode of transmission of plague - bubonic and pneumonic. This could be understandable at least for pneumonic plague in the initial few days of the epidemic but would be unacceptable as the epidemic progressed without any efforts to find out mode of transmission. Unfortunately none in the health bureaucracy or the national institutes paid any serious attention to finding the mode of transmission of this disease. One of the national institutes had pointed to the need of such a study early in the epidemic. But such study was never done - not because of the expertise was not there but it was thought of as having only 'academic importance' and hence could be done after the epidemic was controlled. The state government did appoint an independent technical expert committees to investigate the epidemic, which was commendable, but it was appointed late in the epidemic and the focus was on preventing recurrence of the situation rather than helping control the epidemic. The committee has done substantial data collection, compilation and analysis of available data and presented its report to the government<sup>9</sup>. The central government also appointed a technical advisory committee on Plague at a later stage which is still investigating the epidemics that occurred in Surat and other parts of India.

Hence the public health actions during the epidemic remained massive but wide ranging and cover-all type. For example insecticides were heavily sprayed in and around the houses and sprinkled on garbage heaps and dead animals to kill fleas in spite of the fact that there were no proven bubonic cases. Mass consumption of tetracyclines was promoted even though there was evidence of no secondary cases among the close contacts. People started wearing masks on the streets, not only in Surat but in others cities like Ahmedabad, Bombay and New Delhi which are hundreds of kilometres away. All suspects were put on plague treatment and were incarcerated in the hospital for more than 10 days so that they would not "spread" the infection in the community. Food vendors, restaurants, slaughter houses were closed and places of congregation like swimming pools and cinema houses were also closed as precautionary measures.

In spite of several teams of experts visiting the city still the nature of the disease and mode of transmission of the disease is unclear. Hence still repeated news paper reports keep on appearing that 'suspected plague cases have occurred again' with government denying the reports later on<sup>10</sup>. Thus several months after the epidemic in Surat it is still unclear what caused it, how it was spread and how to prevent it.

### Lessons From The Epidemic:

This epidemic, notwithstanding the controversy of its nature, clearly demonstrated that killer diseases of the past which were controlled could come back and cause great harm not only to the health and well being of the people but the image and pride of the nations by severely impacting on the trade and commerce. Such epidemics even though tragic can serve an important function of shaking up a nation - its people, bureaucrats and politicians out of a sort of slumber of neglect about public health. Several lessons can be learnt from the experience of the epidemic in India.

The first and foremost lesson could be that any epidemic require immediate investigation to find the cause and nature of the disease and mode of transmission as all the case management and public health actions depend on it. Such an investigation is not an 'academic' exercise to be done later - it is as important as military intelligence function in a war, as it has to guide all the clinical and public health efforts in the right direction. And such investigation has to be done in real time, as the epidemic is going on, at the earliest. It has to be done by epidemiologists working with microbiologists, clinicians and public health authorities. Such investigation must identify the causative organism beyond reasonable doubt, identify modes of transmission, delineate the epidemiology of the disease so as to guide the prevention and control strategy. If needed, as is almost always the case the expertise must be drawn from within and outside the government, and if required even from the international level. But this has to be done early in the epidemic. If it is not possible to assemble expertise locally then the required samples should be sent nationally or to the global reference centres for that disease for confirmation and cross verification of the diagnosis - especially in disease which are not run of the mill type. Countries hesitate to ask for international help as it hurts their misplaced 'national pride' or arouse some far fetched fears about 'national security'. Unclear diagnosis in an epidemic of this nature could lead to lot of harm to the country as shown by this epidemic.

The second major lesson is managing the public fear. The amount of public fear that was created due to this epidemic was unprecedented in recent times. It was partly because of the nature of the disease in question but largely due to exaggerated reports by the press and media. Continuous underplaying of adverse events by the government has lead to the loss of credibility of the government in the minds of people, while the private press media has fallen into the habit of exaggerating and sensationalizing any problem. Governments are also not systematically prepared to deal with the media in a credible way. In this epidemic the situation was more complicated because the government was also not sure for some time what is the nature of the disease and what is its extent. The clear lesson from this epidemic is that correct information should be widely and clearly communicated and an atmosphere of mutual credibility has to be developed between the media and the government. At the same time irresponsible reporting in the press should be systematically rooted out. People also have to learn a lesson to seek out reliable sources of information and take rational actions rather than panic because of rumours or press reports.

Third lesson is in the area of managing suspected cases of highly infectious diseases such as plague during an epidemic. Here also unnecessary fear seems to have taken over rational approach. No doubt that pneumonic plague is a serious condition and one can not take it lightly but that does not mean that all suspected cases must be treated with three antibiotics and kept in the hospital for more than 10 days especially when most of the suspected cases were negative on all tests, and their general condition did not warrant hospitalization. The

main problem occurred at the stage of screening of the cases in who presented with any symptoms similar to pneumonic plague. Setting up an clear case definition as well as proper screening and management protocol are one of the first thing that needs to be done. When suddenly rush of the initial cases comes one may not be able to cope with it systematically. But proper systems of screening and management must be established at the earliest. Separating highly infectious cases from others is vital to avoid in-hospital spread of the disease. Proper protective clothing, equipment and systems must be planned for and used even before such an epidemic. Hospital must treat and reassure the patients and their relatives rather than be a place to lock up infected souls so that medicines can be pushed into them. Proper understanding of disease transmission and changing the hospital culture would be needed to do this. Many Indian cities, including Surat had infectious disease hospitals established before the antibiotic era. Unfortunately due to systematic neglect of infectious diseases as a speciality in India, these hospitals have deteriorated and have not kept up with changing knowledge about the infectious diseases and use of antibiotics. This means that the whole approach to infectious diseases has to be revamped and integrated in the medical and health systems of the country.

As many epidemics this epidemic also died out perhaps on its own or aided by the control measures. But what remains is the larger work of rebuilding the health, sanitation and social systems that collapsed under the 'last straw' of the epidemic, in ways that can prevent any future epidemics. Proper surveillance of this or similar diseases, proper management of infectious disease and long term measures to improve housing and sanitation need to be taken for preventing such epidemics. Till the nature of the disease is not clear and till the mode of transmission is unknown, it can not be said that improvement of general housing and sanitary standards could reduce chances of the recent epidemic. But this is not argument to continue the totally deplorable state of sanitation, hygiene and housing in urban and rural India and for that matter may developing countries. The Cholera epidemics of the past century lead to the Sanitary reforms in the west, but the conditions in developing countries are perhaps worse than that was in the 1800s in the west. Unfortunately what has changed between 20th century Europe and developing countries of today is that we now have powerful antibiotics and pesticides. I call it 'unfortunate' because that has put the health professionals, the bureaucrats and the politicians into a peaceful coexistence with the most dirty and deplorable sanitary conditions. I feel that the antibiotics-pesticide protection has led to neglect of basic health promoting factors like sanitation, personal hygiene, proper housing. Even international focus and support to sanitation and hygiene seems to be dwindling. Nationally also there is no substantial force seen which can help, redirect government's and people's attention to these basics of human health. On the other hand there are strong domestic and multinational industrial interests in promoting use of antibiotics and pesticides.

### **Conclusion:**

The lessons to be learnt from the Indian epidemic are that each such unusual epidemic must be investigated thoroughly with utmost rigour from the very beginning. Secondly the public health actions to control it must be based on modes of transmission. The management of the epidemic must include rational therapeutics and steps to win confidence of the people and dispel the fear. Under a strong public health leadership surveillance of the disease and the environmental factors related to the disease should be set up to give fore warning of the epidemic or deterioration in standards of sanitation and hygiene. Infectious diseases and



epidemic diseases seem to be forgotten agenda in most of the developing countries. It is clearly reflected in the situation that in a continental country of the size of India are very few centres doing research on or training in infectious diseases. Epidemiology and Public Health seem to be dying art. The public health legislation in India as many other 'public' things, is archaic and the implementing machinery highly inadequate, in-effective and in many places highly bureaucratized and powerless.

All the countries in the developing world must understand that the competitive advantage in the global market place not only comes from high technology but also from the quality of the human capital for which health is the fundamental input. The epidemic in India provides a warning signal to the nations that neglect sanitation, public health and creation of efficient health care infrastructure. The sheer economic impact of the epidemic should be enough reason for governments and international agencies and people to take long term action to prevent such diseases.

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