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From Human Segregation to Rat Surveillance: The Attari Investigation Scheme and the Ecological Turn in Colonial Plague Policy

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ABSTRACT

This article reassesses the plague policy of colonial powers through the Report on the Results of Certain Investigations Regarding Rats in the Punjab (The Attari Investigation Scheme, 1907–1908). The article argues that the policy on plague shifted from the coercive human-centered methods to environmental management, which was based upon controlling rats and doing scientific investigations to create statistical analysis. Villages were used as experimental sites and the officials reframed plague as a problem of environmental conditions instead of human contagion. Although this ecological control required constant supervision, statistical comparisons helped justify the intervention. This article shows that how the numerical and scientific reasoning reshaped the colonial public health administration in the rural Punjab.

Keywords: Plague governance, rat ecology, environmental management, Punjab, colonial medicine, Attari investigation report

INTRODUCTION

When India was struck by bubonic plague in the late nineteenth century, it produced public health crisis as well as crisis for colonial health governance. The historiographers focused on the dramatic years where the British medical authority introduced forced hospitalization, segregation camps, intrusive house inspections and sanitary policing and the studies done by David Arnold and Mark Harrison (Harrison, 1994) have demonstrated that how these epidemic diseases exposed the limits of the British medical authority. (Arnold, 1993) Ultimately these limits pushed the British to have coercive measures to insert control in the region. This shows the picture where plague control became a story of intervention, control, political tension and

resistances by the local people. The works already done by the historians reshaped the understanding on colonial medicine. Yet it remained focused on the early years and how the policies were shaped by the British. Less attention was given to the decades which followed specially in the rural areas where it became a routine. By the first decade the officers of the British government were not only attending to the emergency outbreaks, but they were also attempting to make sustainable methods of prevention which were grounded in the bacteriological science.

There was an investigation named "The Attari Investigation Scheme 1907-1908", was conducted in the rural Punjab in the direction of Captain G. I. Davys of the Indian Medical Service offers a revealing case. Attari report documents months of trapping of the rats, poison experiments, post mortem examinations, identification of the fleas and statistical tabulation across the selected villages. The ratios of rat to humans were calculated and the percentages of rats was destroyed by poisoning these rats was estimated (Davys, 1910). Experiments were conducted to know whether *mus rattus* migrated between the different villages or survived in the nearby fields. Over 5000 rats were tested and 1200 of these had a proper detailed post-mortem analysis. The villages hence became experiment sites.

This article argues that the Attari investigation scheme turned the focus of British from segregation camps, intrusive inspections, and disciplining infected bodies to the systematic and ecological management of the infected rats. Plague was stopped being seen as a disease because of contact between people, instead it was understood as a part of the wider ecological system. The focus shifted towards the rats, their breeding cycles and the environmental conditions. Scientists started focusing on animal populations and how the disease moved between rats and humans. As a result, the health authority relied less on the simple quarantines and more on experiments, counting and scientific outcomes to understand the outbreaks and ways to control it. This shift can be understood as a shift in the events how plague was made governable, rather than concentrating solely on infected people the officers in the Attari approached the rats as a measurable population. The number of rats was estimated, the destruction they caused was calculated and lastly their recovery was also tracked by their breeding patterns. The villages were treated as stable units within which ratios were derived, for example rats per human inhabitant in the villages, traps per hundred people and number of people killed by infection. As Michel Foucault has talked in his discussion of governmentality, the modern governance depends on techniques that render the populations which are manageable and knowable. (Foucault, 1991) The Attari experiments is an example of this logic as translating the rat's population in numbers, efficiency indices, and tables. The officials of British government framed plague as something that could be regulated through constant interventions and systematic measurements. Moreover, British produced numerical information to made plague looks manageable by intervening technically and their governance worked by calculating all the statistics.

Similarly, the historical scholarship on colonial methods of science such as (Chakarbarti, 2014) have reasoned in his works that imperial medicine relied mostly on laboratory knowledge which was further extended into the field settings. The

Attari scheme was the example as rats were not merely observed they were caught by constant trapping and controlled baiting. And the experts of bacteriological science became important to administration. The Attari report also discusses the limits British faced during rat destruction as in the large villages destroying of rats yielded only temporary reductions. The continuous trapping was required at that time to maintain low-rate density and the success was only depended upon proper ecological management which was depended upon discipline, supervision and sustained labour. The shift that happened from human segregation to the rat surveillances did not stop British interventions it just reorganized it.

This article reconsidered plague governance beyond the narrative of coercion and cordons, the Attari Investigation Scheme argues that by the early twentieth century the colonial medical policy depended heavily and increasingly on ecological reasoning and measuring of statistics. The following sections of the article examine the experimental design of the Attari scheme for example methods of counting rats, rat breeding and rat migration. Together these methods show that ecological knowledge proved to be a practical instrument for British governance in the later phase of plague control.

LITERATURE REVIEW

The Historians of medicine in colonial India have highlighted the coercive nature of the plague governance and control in India. Studies done by David Arnold and Mark Harrison put light on the intrusive nature and measures choose by the British Raj to control and treat spread of Plague during the early years of the epidemic. British set up caste-based segregation camps, sanitary policing, inspections of houses of native people which were forceful were presented as mechanisms via which the state managed authority and control over Punjab during the times of crisis. These works put stress upon resistance, conflict and political consequences of the epidemic intervention. However, recently some scholars like Pratik Chakrabarti shows the fact that bacteriological research reshaped the colonial public health by making a connection between field experiments and laboratory knowledge. The methods of controlling disease became increasingly dependent upon experimental classification and verification. Similarly, Warwick Anderson elaborate that the scientific experiments in colonial Punjab extended their authority as they presented technical interventions as evidence based and a necessity.

The studies which are which are already done suggests that colonial medicine worked through both scientific rationality and coercion. However, less attention was paid to how environmental investigations influence the policy made for plague in the rural settlements after the starting years of crisis. The Atari investigation scheme offers Deep sites into this letter, it shows how rat ecology, experimental practices, and statistical measurements generated knowledge and new approaches to the disease management. This article extends the existing hystorography by exploring how environmental approaches influenced the governance to control plague within rural settlements instead of focusing on coercive measures taken by British. It would stress on how scientific knowledge pre-shaped the administrative strategies. The report on

the results of certain investigations regarding rats in the Punjab (The Attari Investigation Scheme) shows that how played control was closely connected to the ecological management and statistical evaluation.

MATERIALS AND METHODS

This study is based primarily on a close reading of the report Attari investigation scheme prepared by Captain G. I. Davys in 1910. The report is documented heavily with field experiments conducted in the rural Punjab between 1907 and 1908. It has descriptions of the procedures of poisoning and trapping the rats, statistical tables the records of post-mortems and comparative data of death. These materials provided detailed evidence of how that populations were controlled and studied. The analysis done in this article follows a qualitative historical method which was combined with quantitative interpretation. The statistical tables in the reports were studied and numerical reasoning was shaped to understand administrative measures. The experimental procedures were analyzed to identify the relationship between governance and the scientific practices. moreover, attention is given to how villages were selected, rats were counted and how the effectiveness was measured by the scientists.

Secondary sources on the history of colonial medicines were used to contextualize the findings. These works helped understanding Atari scheme and transformation of heterology Hindi imperial health policy instead of treating the report as a technical document interpret it as evidence of changing the British administrative logic. The approach used in the article is analytical and interpretative rather than descriptive. As it seeks to understand how governance practices and methods were altered to environmental reasoning and their focus shift to scientific experiments. Why are this method the study reconstructed the relationship between colonial authority, statistical reasoning and field investigations.

Context:

Early twentieth century was the time when the colonial responses to the disease of plague began to move beyond the initial measures of sanitary and segregation. In the rural areas of the Punjab the plague authorities and scientists turned their focus to bacteriological research and investigation of the environment to understand the transmission of the disease. The *Attari* Investigation Scheme (1907-1908), also emerged as a detailed study of populations of the rats, behavior of the rats and how they contributed in sustaining plague. By focusing on trapping, experimental analysis and enumeration the scheme reflected a broader shift in the policies of British public health towards ecological and scientific management of the disease.

Construction of the experimental villages:

The Attari investigation scheme was not just started with destruction of the rats instead the British made a proper system before starting it. They started baiting and trapping by selecting villages and they made two categories: typical and atypical. The atypical or abnormal villages were excluded from the final report and there were some specific reasons for excluding these villages. Such as the opposition by the residents, structural features of these villages and unusual infestations of the rats. The

typical rural settlements were those which were agriculturally ordinary, without grain marts, large numbers of muddy houses, without cast groups who resist rat killing and without specialized trades. The validity of the experiments depended upon some average conditions such as population size, occupational structure, and number of the houses. five to six persons used to occupy one house on average and both Muslims and Hindus were described as agriculturists. The Attari investigation report called these typical villages manageable unit to analyze by filtering social and economic factors. These specific selection shows a broader logic of the colonial scientific practices. Colonial investigations required environments to be standardized before starting experiments on them (Chakarbarti, 2014). In Attari report, the village was first transformed into customized control area in which rat population was to be measured against the human population with less to no disturbance.

The classification of villages was further reinforced by the size of the village. There were small, medium and large structures of experiments. These sizes were compared in the terms of density of rats and trapping efficiency. Human population was the main denominator through which the life of rats was determined. This ratio-based reasoning had some requirements as well such as the villages should have been internally coherent and externally comparable. Villages were working as bounded epidemiological units rather working as lived social world. The construction did not take out the human population, but on the contrary the report constantly mentions as some villages were disposed because of the fear of opposition, the cooperation on the constructed villages was still a task. Scientific neutrality also depended on environmental stability and social behavior. The Attari scheme shows clearly that the investigation depended on prior order and administration. Villages had to be stabilized before counting the rats, and this construction allowed later calculations to claim the broader validity. Thus, environmental variables were deliberately selected to enable reasoning based on statistics.

Rat Enumeration and Statistical Authority:

Villages were stabilized first as experiment units, the next task was to make the rat population measurable and the Attari scheme acknowledges in the report quite openly that it was difficult to determine the rat population in these villages. It was impossible to totally eradicate the rats lived in the village and precise counting of the rats was also unlikely. The officials ran a series of experiments intended to have an approximate estimate the population of the rats. The results were not just numbers but a method which translated British uncertainty into knowledge.

Attari report mentioned *Galluwala* experiment and elaborates very clear illustrations, as this small village was categorized as “normal” in terms of its construction and its infestations. In this village the rats were trapped for two days and it was baited with poison. It was followed by various events as to find rat carcasses floors were dug up and burrows opened. An exhaustive and extensive search was made to find as much poisoned rats as possible. After baiting the search continued for eighteen days 277 poisoned rats were found. Trapping continued from nineteenth day to sixty-second day and no rats were captured, officers inferred that most of the rats were destroyed. According to their estimate they eliminated 90% of the rat

population. Original population was around 306 in a village of 180 inhabitants which makes 1.7 rats per person (Davys, 1910).

The logic behind this experiment also requires some reflection as the estimates did not come from counting the rats alive before starting the experiment. The estimates were concluded from the patterns of delayed reappearance and removal. The report mentioned that some of the dead rats were not found and to deal with this missing information the scientists adjusted their calculations. Attari report noted that early investigators estimated that only 25% rats killed were retrieved only, it suggests that the visible carcasses show only a little amount of total mortality. A multiplier was later applied to raise the estimates upward. The gap in the numbers was addressed via calculations later.

Further experiments confirmed the reasoning behind the conclusions the British drew earlier. In a controlled environment a rat proof godown was built and 200 rats were confined inside it. They were given food and water and trapped daily with eight traps. One hundred and thirty-seven rats were captured with some natural deaths and births going on. This controlled environment became a base to estimate the numbers of captured rats in a certain timeframe. Similar trapping was done in across eight additional villages named: *Raja Tal*, *Bhaini Rajputan*, *Mahawa*, *Nowshera*, *Daoke*, *Nowshera*, *Nathupura*, *Dhala* and *Muhammadnagar*. The number of rats caught in these villages was compared to the human population living in these villages. From this data officials calculated estimated numbers of rat per person. The results show a consistent ratio across the villages of different sizes and one to two rats per person. Nonetheless, the ratio form allowed rat populations to be compared across the villages and it correlated with the trapping effort. Official scientists created an index for the efficiency to measure the success rate of poisoning of the rats. They counted how many rats were trapped per hundred rat traps before and after the baiting. The result showed around 70-90% killed rats were in good condition and the results also pointed to the fact that baiting worked better in smaller villages than the larger ones. Rat life was translated into percentages and traps per hundred villagers became a formula and kill rates became indicators of the success. The report shows that even acknowledged irregularities in the results were managed in statistics rather it was treated as failures. Also, there was variations in the results between the villages and the blame was put on some unknown factors rather acknowledging irregularities. And despite all these factors the report accepted the approximation or estimation as sufficient factor for administrative decision making. These methods turned the hard to track rat population into something measurable. After these rats were not just pests to chase away but a whole population that could be estimated, compared and reduced. Plague control hence treated as managing the rat density. However, these numbers depended upon various assumptions about trapping assumptions and missing bodies of rats. The report admitted that its findings are only estimated not concrete and it could contain errors. Statistics in this case did not remove uncertainty; they simply helped in managing it. The Attari experiments showed a governance which was grounded in calculations. Apparently rendering the rats was the solution to the problem of plague which could be managed technically. Killing the rats was seen as

planned and measurable plan by the British officers.

Understanding Rats: Dynamics of local disease, breeding and migration:

The earlier sections of the Attari report address the trapping, baiting and counting of the rats, the next major part however deal with the rat populations. It answers various questions like did these infected rats went from one village to another, did they leave their settlements during harvesting seasons, did plague spread because infected rats travelled across the countryside. These were some questions which were important as well as necessary as before this human mobility was considered main drive behind plague. Movement meant that the borders were not as strict and large areas had to be controlled and the Attari investigations reached a different conclusion. Officials did a series of careful experiments to test rat migration and the most accepted method was visual identification. In *Mahawa* village, several adult *mus rattus* had a distinctive shade on their bellies which appeared to be reddish. And the nearby villages by contrast was populated by darker grey and black rats. Village *Mahawa* was observed for some time to monitor the rats and scientists believed that if these rats are migrating their belly colors pattern will change but it did not happen. There were no black belly rats as much as red bellies rat's and they remained mostly dominant. Similar to this experiment there was another experiment at *Rangarh* and it produced almost same results as rats in this village had noticeably darker tone than those in the surrounding villages. The extensive belly colors type did not appear outside of the villages. These observations suggested that these rat populations were mostly confined in their local villages than it was previously assumed. There were additional experiments which reinforced these conclusions as in many villages' traps were set to catch these rats and these traps were setup in the neighboring fields that there might be some poisoned rats which might try to escape. However, despite many tries almost not any *mus rattus* was caught beyond the immediate settlement zones. Only one rat was captured but that was before the baiting began. Extensive digging was done of burrows and bushes were being searched and it yielded many rats but of other species. Investigators dug around 2000 tunnels in nearby fields, yet *mus rattus* remained tied to the village spaces.

Seasonal migration of the rats was also being questioned as some scientists believed that these rats left the villages during the harvest seasons to get feed in the open fields. From October to May there was continuous trapping in the agricultural fields. Threshing floors, grain heaps, bushes and scrubs were examined throughout a vast area. A huge number of rodents were found, but village rats were in a small number were found. In the season of peak harvesting only a consistent number of village rats was caught. It pointed to the fact that these rats were more inclined towards human settlements and they preferred food and shelter in these areas rather in exposed rural settings. These experiments and the findings reshaped the understanding that how plague was transmitted. These were assumptions that these rats might be migrating among the interconnected countryside areas, but the Attari report portrayed otherwise. According to the report each village was self-contained unit for the rats as these rats were fed and bred locally and mostly remained inside the village boundaries. Moreover, when the numbers of rats increased even after baiting,

it was because of reproduction and not migrating. Because in post-poisoning trapping there were a large and noticeable number of young rats.

This shift in results after the experiments gave a new direction to understand the spread of the plague and its control. If rats were not moving between the villages, then the spread cannot be explained simply by wandering carriers as plague became a matter of internal growth of the rats and their internal growth. In each village's ecosystem rat's population was expanding unless it was suppressed the task of administration focused only on movement and regulating rat population levels within them.

Historians like David Arnold have emphasized cordons, quarantine and controlling measures as key tools to stop the plague spread as these controls depended on controlled mobility. The Attari report supported something different like the management of environmental conditions that was sustaining the plague's vector. In this sense, the plague policy stressed on bacteriological science that put stressed ecological balance, stressed reservoirs and plague vectors rather simple contact by humans (Chakarbarti, 2014). By this time the plague was increasingly understood as rooted in the relationships between habitats, humans and animals. This ecological reasoning gave more authority to the British medical authority, as the experiments shows that the rat movement was limited. In this way the British officials could justify their interventions in the houses of local villages. The villages became not only settlements; these villages became biological environments which required continued surveillance. As Warwick Anderson has argued in other colonial powers contexts, the laboratory work often comes to the field where the ecological systems were treated as controlled observation sites (Anderson, 2006). Attari report shows the same pattern as rat behavior was concluded from the general belief but it was tested through repeated experiments in the fields.

At the same time these experiments and the derived results were not presented in the report as absolute truth as the report acknowledge uncertainty and variations in the results. Report never claimed that the migration of *mus rattus* never happened. The evidence for large scale migration of these rats was not enough and this caution shows the practical nature of the colonial authorities. The knowledge was derived via comparison, revision and trial. The understanding of the environment was made from the repeated observations and it was not made by theoretical assumptions. Attari investigation report narrowed the British governance scale and control was not depended upon territorial barriers but on sustained local management. Rats were observed their population could be tracked via interventions. The ecological field was stabilized. This reinterpretation of plague did not reduce the involvement of the administration it just reorganized it. Management of the breeding cycles of the rats needed attention. In this way, the ecological knowledge of the British understanding for the plague transmission and the different techniques were considered appropriate for the control of the disease.

Limitations of destroying rats: maintenance and administrative dependence:

Attari report elaborates that rat populations were able to be measured and contained, the report also showed that it was a difficult procedure which was hard to

sustain. The destruction of the rat Did not pull permanent results in fact the report shows that the environmental management needs continuous supervision, technical discipline, and labour. In this sense the experiments done by a British government exposed their limits.

The Atari report shows one consistent finding and that was the recovery of the rat population after poisoning. Even where they killed a high number of rats, numbers rose again. The report shows that the rat population was able to return up to 70% of their original strand within a little time. Complete recovery in the number of rats before the poisoning took longer, but the pattern was obvious because destruction was just temporary, unless it was followed by interventions. This pattern in the number of rats concluded that the reappearance of the rats was from breeding and not immigration.

The size of the village also played an important role in determining the effectiveness of poisoning and trapping as it was more successful in small as compared to large settlements. Rat populations was reduced significantly for longer periods of time. In larger villages it was opposite, instead of extensive baiting produced limited desired results. There was no single baiting campaign, no matter how carefully it was conducted reduced the density of the rats to prevent the future outbreaks. The ecological scale made the comprehensive control difficult for the British government. This variation in number of rats led the officials to think about the intensity of trapping which was needed for destruction of the rats. These experiments compared different trapping ratios of the rats based on the human population. Attari report concluded that using about four traps per hundred inhabitants offered the desired results. Lower ratios produced lower impact, while higher ratios also did not improve the outcomes. Even this efficient level required regular application. Daily trapping was required to maintain the reduced population of rats as monthly or weekly trapping was not sufficient.

These trappings demanded heavy organization and labour. Continuous trapping, replacing of bait, monitoring the catches and recording the results with precision. This was not a onetime intervention as it required repetitive routine. The report also recognized that villagers were not able to keep such level of discipline without any external supervision. The destruction of rats required schedules, staff which should be trained, and administrator's supervision. Environmental control hence was dependent on state-directed management.

The limitations of baiting reinforced this dependence as the report mentioned that not all baited rats were caught and many poisoned carcasses were recovered. Some rats showed behavior of avoiding baiting and those who survived initial baiting campaigns reproduced. Burrows, storage areas and walls gave refuge shelters to the rats that's why even the most precise campaign didn't brought even outcomes. Scientifically approved techniques couldn't eliminate the vector it only reduced it.

These observations revealed an important tension within the British governance. As on one hand the report elaborated that rat population was analyzed and controlled via scientific intervention. On the other hand, it showed the fact that these interventions were short lived and temporary. Environmental management did

not produce a stable result as it required maintenance.

This tension showcases a wider pattern in colonial public health policy. As Mark Harrison and David Arnold have observed in their studies the colonial medical system was depended on sustained bureaucratic effort. Attari scheme reorganized the administration around ecological maintenance. The need for constant intervention also shaped administrative measures. The Attari report tell us whether one compounder might maintain the rat suppression across a large area if the trapping schedules were carried out consistently. This idea reflects the desire of British administrators to rationalize the labour and reduce the costs. However, experimental results suggested this simplification was not realistic. Without intense and continuous trapping rat populations returned quickly. Efficient governance required resources that couldn't be minimized rat destruction was not a definitive solution but it was a process which required constant renewal. This reality shows that British authority had effortless control. Knowledge expanded the authority but revealed constant fragility of environmental management.

Field science and scientific authority of the British:

The Attari investigation scheme was not just trapping and baiting the rats but it also functioned as a scientific enterprise. British authorities extended the laboratory methods into the village ecology by making these settlements their fields of scientific experiment. One important dimension of these scientific experiments was the post-mortem examination. According to the report around 5000 rats were examined in the villages and more than 3000 were trapped in the surroundings of nearby villages. Around 1200 of these rats went through detailed post-mortems. These post-mortems were compulsory to know if playing infection was present and to understand it's internal effects. Hence, these infected rats were not treated just as pest, but as a plague specimen which could give diagnostic evidence. Related to post-mortem was the identification of fleas, as fleas were also recognized as vectors of transmission of plague. Presence of fleas on different rat species also became an important thing to enquire. scientists investigated the flea types that were found on rodents and mus rattus to assess their epidemiological importance. The scientist's attention to please and parasites shows that how the disease control had moved beyond microscopic processes and surface sanitation. The transmission of the disease was now seen as occurring via complex biological relationships between the host animals and the insect carrier carriers.

Rats were used to do controlled experiments to observe the infection patterns and for the confirmation of the bacteriological theories. These procedures linked field investigations with laboratory reasoning. These practices helped the British authorities of bacteriology in shaping public health strategy.

The involvement of the plague commission in the Attari investigation also strengthened the scientific legitimacy. Collaboration between central research bodies and field officers ensured that findings were not isolated but it contributed to wider medical knowledge. Rural areas of Punjab hence became connected to the large networks of imperial science. The information gathered in the rural experiments fed into broader understandings of plague across Punjab.

The characteristic of governance was also changed as the decisions were altered according to the results of these experiments rather administrative preference. The Attari investigations showed the scientific procedures gave plague policy the appearance of rational inevitability. Experimental knowledge and routine observations worked better than coercion alone.

DISCUSSION

In the report the Attari investigation scheme was not merely presented rat destruction, but the findings were used to argue that systematic intervention could reduce the human impact of plague. To support the air, claim the scientists relied on comparison, the statistical difference between protected and unprotected villages were used to show the practical value of environmental management. Protected villages as we know where the ones where are destruction campaigns had been conducted constantly. And the unprotected villages did not receive any systematic intervention. Scientists compared the immortality data across these protected and unprotected villages and they showed that rat-controlled settlements produced Mehboob results. one table in the report suggested that the mortality rate in the unprotected villages was many time higher as compared to the protected ones. These experimental findings justified administrative control in the areas. Scientists linked ecological management with the reductions in the human mortality, the report framed rat destruction as necessary part of public health policy.

The classification of the levels of protection introduced a graded understanding of effectiveness. The villages were evaluated on the scale of rat destruction as good, fair or bad. It dependent on how thorough was the operation and the results varied with the quality of the implementations. So the success depended on constant efforts and supervision.

However the Atari report also acknowledges the fact that protection was not absolute as even the well managed settlements could experience click outbreaks if the infection was introduced from the outside.

These qualifications strengthened the administrative legitimacy as officials presented experimental results as measured and credible.

Use of comparative data transformed the governance in the colonial Punjab as public health measures mostly relied on numerical demonstration to justify their intervention. Infection counts death rates and statistics of population worked as tools through which the health policies effectiveness was being evaluated.

CONCLUSION

Atari investigation scheme demonstrates how governance in rule in Punjab made a shift from coercive measures towards environmental management. Population of rats, their breeding cycles, an environmental conditions became necessary for the disease control. True experiments and statistical comparisons plague was reframed as a technical problem that could be managed through interventions. However, this transformation did not reduce the involvement of administration in the local

settlements but it re-organized it. The villages were treated as measurable units and the right populations were converted into statistical ratios. The scientific Experiments provided a base for intervention, but it also revealed their practical limits. The destruction of rats required continuous effort and environmental control, but it remained dependent on sustained supervision.

The report also shows how laboratory science extended into rural settlements and how it shaped administrative decisions. The statistical comparison between protected and unprotected villages further legitimizes these interventions by linking reduced mortality to ecological management. Overall, the report on the results of certain investigations regarding rats in the Punjab the Attari investigation scheme complicates the point of view that plague policy mainly relied on coercion. It reveals how environmental reasoning and scientific knowledge reshaped the governance by rooting the disease control within the environmental management and administrative practices.

Recommendations

The findings of this study show the value of studying colonial public health beyond the moments of coercion and crisis. Future studies should focus more on rural and local investigations. For example, the Attari investigation scheme as it gives a clear picture of how scientific knowledge shaped everyday governance. In future researches great attention can be given to the relationship between administration control and environmental management. Comparative studies across regions can also give further clarification that how ecological approaches changed within colonial India. Lastly, the integration of quantitative data from the archival reports with cultural and social analysis can provide a more balanced understanding of plague and its management.

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