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Introduction

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1.1 Introduction

The study of "public health" has gained importance in social science research in recent years. The status of health determines the quality and quantity of human resources residing in a geographical area and is influenced by many geographical factors like location and climate; by economic factors that determine the standard of living and nutritional levels; by social conditions that determine access to health services; and by the political decision-making processes.

India, located in a tropical zone, is a country with varied physiographic and climatic conditions that have influenced the health conditions of its people. It has experimented with almost all-important systems of medical treatment over the ages because each reigning dynasty who came from different parts of the world to settle in India introduced their own medical system to combat prevalent disease. When the European mercantile groups came to India in the sixteenth century, the medical systems practised in the country were Ayurveda, Yunani, and traditional Folk. They initially used these systems, but when they developed allopathic, the 'modern medicine', they let these older systems wither with disuse.

History reveals that, like in many European countries, cholera, dysentery, diarrhoea, smallpox, plague and fevers of varied forms have been the common diseases in this country. However, the fatality rate in India was very high. No significant measures were taken to combat these diseases until the middle of the nineteenth century when the British government was fully entrenched in India. This was the period when England was going ahead with scientific innovations and was developing its existing medical systems because the working conditions during the Industrial Revolution in Europe and the massive growth of the urban population it encouraged, led to the deteriorating public health condition in Britain. This scientific 'western medical system' was slowly introduced in India and other colonies of the British Empire replacing the traditional medical system to ensure the safety of the European population in the colony against 'tropical diseases'.

The spread of this medical system was slow and concentrated in the European settlements and army barracks until the end of the eighteenth century. Gradually it was made available to the indigenous population since they and their habitations were the sources from where infectious diseases spread. The slow progress of western modern medicine in India was not only because of the negligence of the colonial authorities, but also due to the differences of opinion among the Indian population themselves and the socio-cultural inhibitions of the different religious groups.

1.2 Study Area

During the period under study, 'Calcutta'/Kolkata' evolved as a major port town in eastern India along with Bombay (Mumbai), Madras (Chennai), Karachi and Dacca and gained importance as it was the Capital City and the major hub for commercial activity. All new developments therefore emanated from Calcutta. All major hospitals, dispensaries with modern clinical facilities were first opened in this city. Construction of pucca roads, proper sewer system, purification of drinking water, removal of filth and garbage from the streets and proper disposal of the dead were also first initiated in this city. However, in spite of all these facilities, the occurrence of a number of environmental diseases like cholera, dysentery, fever, malaria, plague, etc. devastated the city.

In an earlier study, it has been observed that, during the early twentieth century, urban death rates were higher than the rural death rates in India. Table 1.1 shows the trend in death rate in the rural and urban areas under British rule. Therefore, despite the colonial policies of selective development, the condition of health in the urban areas was worse.

Table: 1.1 Rural-Urban Death Rate in British India
[1900 A.D. – 1920 A.D.]

<table>
<thead>
<tr>
<th>Year</th>
<th>1900</th>
<th>1902</th>
<th>1904</th>
<th>1906</th>
<th>1908</th>
<th>1910</th>
<th>1912</th>
<th>1914</th>
<th>1916</th>
<th>1918</th>
<th>1920</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>37.23</td>
<td>33.16</td>
<td>32.41</td>
<td>34.08</td>
<td>38.10</td>
<td>33.12</td>
<td>29.41</td>
<td>29.71</td>
<td>28.81</td>
<td>62.98</td>
<td>35.63</td>
</tr>
<tr>
<td>Urban</td>
<td>53.77</td>
<td>41.20</td>
<td>40.37</td>
<td>41.98</td>
<td>39.09</td>
<td>33.72</td>
<td>33.09</td>
<td>33.21</td>
<td>32.15</td>
<td>56.76</td>
<td>38.51</td>
</tr>
</tbody>
</table>


2 Nandy, Kaberi (1991): "Health in British India – A Historico-Geographical Interpretation"; unpublished M. Phil Dissertation; Centre for the Study of Regional Development, School of Social Sciences, Jawaharlal Nehru University, New Delhi.
The main reasons that contributed to the poor health condition in Calcutta were:

Calcutta was sited on marshy low-lying area along the coast. It received heavy rainfall during the monsoon period i.e. between April and May to August and September and hence the level of humidity in this area was very high giving rise to the occurrence of a number of fevers. The swampy marshy lowlands became the breeding ground of mosquitoes and bacteria leading to diseases like cholera, dysentery, diarrhoea, plague, smallpox and fevers that were rampant in the city.

Calcutta experienced unprecedented growth during the late nineteenth and early twentieth century, as we shall see in Chapter 2. This led to congestion and overcrowding. With a bare minimum of urban facilities, the urban population became the target of disease often leading to high death rates.

The political milieu was also exploitative and not conducive to investment in human development parameters. The main aim of the Imperial rulers was economic and political consolidation of the country so as to extract the maximum raw material and use labour at the minimum cost to accelerate economic growth of Britain. Any development related to the well being of the native population, who were affected mostly by pestilence, took place when there was an acute crisis.

Calcutta as an urban ecological setting for studying diseases and mortality has been discussed in detail in the following chapter.

1.3 Period Of Study

The period of study extends from the late seventeenth to mid twentieth century when, India was under the colonial rule. This period is important in the history of disease in India because both positive and negative developments took place in this period:

(1) Some diseases were transmitted directly by the Europeans themselves. Colonial labour recruitment policies also had serious health consequences both for the workers and for the communities from which they were drawn. For example, 'plague bacilli' was imported to India for the first time in 1896 through Bombay from a ship carrying infected rats from China. Colonial wars of conquest, the crushing of the local
rebellions and the military campaign of the two World Wars brought epidemiological disaster to the civilians and also to the soldiers themselves.

(2) Many argue that imperialism destroyed the existing balances between people and their environment. Indigenous medical systems were destroyed because they were deprived of the elite patronage.

(3) The local village-based society was also destroyed. The living standards of the Indian people were lowered particularly through excessive land revenue demands, drain of wealth and commercialisation of agriculture. Thereby, the increasing level of poverty affected the health conditions in India.

(4) The construction of roads and railways for communication as well as the canals for irrigation had negative effects on health and population size. Famines that were common in India since time immemorial, however, rapidly increased in their frequency during the nineteenth century. Studies reveal that the nature of famines in the later half of the nineteenth century changed from a shortage of food supply, to, a lack of purchasing power. C. A. Bentley, the director of Public Health for Bengal noted "some healthy environments of the early nineteenth century were unhealthy, malarious by the end of the century". He pointed that "canals and roadways obstructed the normal surface and drainage, and that after the monsoon, stagnant pools were ideal for breeding mosquitoes". Moreover, the provisions of health services were urban and primarily medical in character with preventive and sanitary measure receiving low priority.

Apart from the above-mentioned negative effects of imperial rule on "health status", there were some benefits that helped to develop the health-care facilities in the country. Health services based on "scientific medicine" replaced "ancient" and "medieval" medicine. Famine policies, provision of jobs and relief in times of scarcity, were introduced. The development of modern hospitals and dispensaries with modern technology and research centres took place during this period. Another major

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contribution of western medicine was the introduction of "vaccination" and spread of
the modern "sanitary system".

1.4 An Overview of Literature
The study of health and health-care systems has gained importance in geography in
recent years. Most of the existing studies attempt to analyse the spatial distribution of
diseases, death rates, spread of health-care facilities etc. in the recent past. Historical
studies of the geography of disease and health care facilities in India and specifically
in its urban areas are few. But the literature with a social science perspective is vast
and varied. We have therefore reviewed the relevant literature and on the basis of the
nature and approach of the studies we have classified it into four main groups:

1. Studies on environment and growth of Calcutta urban area,
2. Studies on the distribution of diseases in different ecological or environmental
   conditions,
4. Studies on the sanitary conditions and civic amenities.

1.4.1 Studies on Environment and Growth of Calcutta Urban Area
Most of the literature available on Calcutta mainly concentrates on its growth and the
existing environmental scenario. A. K. Ray\(^5\) and P. T. Nair have made the most
important contribution in this aspect. Nair's voluminous work\(^6\) on the city of Calcutta
begins from the seventeenth century and deals with every aspect of the city's life.
The National Atlas and Thematic Mapping Organisation\(^7\) in 1996 published the old
maps of Calcutta making research possibilities easy. The other studies on the city's
growth, its demographic and socio-economic structure, were made by Asok Mitra\(^8\) in

and Suburbs, Part 1


\quad \quad (1984): \textit{Calcutta in the Eighteenth Century: Impression of Travellers}; Calcutta:
Firma KLM.


Ministry of Science and Technology; Government of India; Calcutta.

1963, Murari Ghosh, Alok K. Dutta and Biswanath Roy⁹ in 1972, Pradip Chowdhury and A. Mukhopadhyay¹⁰ in 1975. Attempts to analyse the economic structure of the city during the late nineteenth century were made by Prajnananda Banerjee¹¹ in 1975, Raja Binay Krishna Deb¹² in 1977, Pradip Sinha¹³ in 1978, Biren Roy¹⁴ in 1982, Ranjit Sen¹⁵ in 1985, and by Nitish Ranjan Ray¹⁶ in 1986. Atiya Habeeb Kidwai¹⁷ published an article on the Urban History of Calcutta in 1989. In 1990, Sukanta Chaudhury¹⁸ edited a book published in two volumes, which was a collection of articles on various aspects of Calcutta such as the growth of the city, geology, water supply, drainage system, population, etc both during the colonial era and in the post independence period. In the same year, Manimanjari Mitra¹⁹ published her work on twentieth century Calcutta that deals with the growth of the city, the demographic structure, the economic aspects etc. In 1991, Rita Mukherjee²⁰ published an article on the city of Calcutta based on several travel accounts by Scottish Travellers who visited the City during the colonial era. In the same year, Biplab Das Gupta²¹ edited a book on Calcutta’s Urban Future, in which a number of articles were published on the growth of the city, settlement pattern, drainage and water supply, Municipal Corporation etc.

A number of studies are also available on the growth and function of The Calcutta Municipal Corporation. Keshab Chowdhury published the most important work\textsuperscript{22} in 1973. The other works on the same theme are by P. T. Nair, Mohit Bhattacharya\textsuperscript{23}, and R. Basu\textsuperscript{24}.

1.4.2 Studies on the Distribution of Diseases in different Ecological or Environmental Conditions.

The British administrators made a number of studies on the health of the people in India in relation to the surrounding environment. Mention may be made here of the studies by D. A. Maclead\textsuperscript{25} in 1837 for Assam, Sir James Ronald Martin’s work for Calcutta in 1837\textsuperscript{26}, and F. N. Macnamara’s\textsuperscript{27} work for the Himalayan and Sub-Himalayan Region in 1880. They studied the respective topography and climate of the regions to associate them with the prevalence of specific diseases and their impact on health in those regions. Later in 1882, J. Fayrer\textsuperscript{28} studied the climatic conditions in India and the spread of the then prevailing fevers in the country. In 1916, C. A. Bentlay\textsuperscript{29} studied the incidence of Malaria in Bengal and associated it with the climatic and economic structure of the region.

In 1947, P.C. Sengupta\textsuperscript{30} studied the history of Kalazar in India in detail i.e. he even analysed the medical factors relating to the disease. In 1951, a number of articles were published in “Indian Journal of Medical Research” on the incidence and causes for the spread of Cholera. A. C. Banerjee’s\textsuperscript{31} work on United Provinces, S. R.


\textsuperscript{25} Maclead, D. A. (1837): \textit{A Sketch of the Medical Topography of Bishnath and its Immediate Neighborhood: With an account of the diseases generally prevailing in Assam}; Calcutta: G. H. Huttmann.

\textsuperscript{26} Martin, Sir James Ronald (1837): \textit{Notes on the Medical Topography of Calcutta}; Calcutta: G. H. Huttmann.

\textsuperscript{27} Macnamara, F. N. (1880): \textit{Climate and Medical Topography}; London: Longmans.


Pandit’s\textsuperscript{32} essay on Assam and, S. Swaroop’s\textsuperscript{33} work for India as a whole deserves mention. All the studies reveal that the diseases were associated with surface water systems and dense population, altitude and slope of a region. In another study, S. Swaroop\textsuperscript{34} related the incidence of Cholera in Madras Presidency to topographical features, habits of the people, agricultural practices, irrigation facilities etc.

The contribution of A. T. A. Learmonth\textsuperscript{35} to Historical Medical Geography of India is highly acclaimed. His earliest work was published in 1958, in which he made a district level analysis of birth rates and death rates in India and Pakistan for the period between 1921 - 40. Later in 1961\textsuperscript{36}, he studied the health conditions in the Mysore State (1936-55) with reference to the physical and human environments. I. Klein\textsuperscript{37}, she made an attempt in 1989 to analyse population expansion in India during the Inter-War period and relate mortality rates to the growth of food acreage for the same period. In 1972,\textsuperscript{38} she analysed the pattern of mortality in Bengal due to Malaria for the period 1840 – 1921. In 1973\textsuperscript{39}, she studied the mortality pattern for India as a whole.

A. K. Dutt and H. M. Dutta’s\textsuperscript{40} study of “Disease Dynamics in South and South East Asia” shows the relation between the different factors that relate to the origin of a particular disease among the population of a region. David Arnold\textsuperscript{41} in 1989, made an attempt to study the diseases in British Colonies like Belgium, Congo Basin, and

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\textsuperscript{32} Pandit, S. R. (1951): “A Note on Cholera in Assam and the Cholera Bacteriophage Experiment”; \textit{Indian Journal of Medical Research}; Vol. 12; No. 1.
\textsuperscript{34} __________ (1951): “Endemicity of Cholera in Madras Presidency”; \textit{Indian Journal of Medical Research}; Vol. 12; No. 2; pp.185 – 196.
\textsuperscript{38} Klein, I. (1972): “Malaria and Mortality in Bengal, 1840-1921”; \textit{The Indian Economic And Social History Review}; Vol. 9; No.2; pp.132 - 160.
India, where Western Medicine had its impact in shaping the interaction between the rulers and the ruled. He has also dealt with the spread of diseases like smallpox and plague in India during the Colonial era.

Very few studies are available regarding the geography of health in the city of Calcutta during the period under study. Most of the available literature deals with the post independence period. Small editorials on the prevailing diseases in Calcutta during the colonial era are found in the volumes of the “Indian Medical Gazette”. Some of them are “Cholera in the Port”\textsuperscript{42}, “On the Endemicity of Cholera in Calcutta”\textsuperscript{43}, “Health of the European Army in India”\textsuperscript{44} and “Health of Calcutta in 1878”\textsuperscript{45}.

In 1947, S. Sen and B.C. Basu\textsuperscript{46} studied the incidence of Malaria in the city of Calcutta. In 1957, S. N. De\textsuperscript{47} and U. Sen\textsuperscript{48} studied the factors that were associated with the spread of Cholera in the city of Calcutta and West Bengal. In 1969, R. Basu\textsuperscript{49} made an attempt to study the incidence of Cholera in Calcutta. Later it was Jayoti Hazra who made some attempt to study disease dynamics for the city of Calcutta. Her paper with B. Banerjee\textsuperscript{50} in 1983 made an attempt to study the prevalence of various diseases in the city of Calcutta. Her other studies\textsuperscript{51} include “The Changing Pattern of Diseases in West Bengal, India”.

\textsuperscript{41} Arnold, David (ed.) (1989): Imperial Medicine and Indigenous Societies; Delhi: Oxford University Press.
\textsuperscript{42} Anonymous (1866): “Cholera in the Port”; Indian Medical Gazette; July 1; pp.190-191.
\textsuperscript{43} (1867): “On the Endemicity of Cholera in Calcutta”; Indian Medical Gazette; March 1; pp.81-82.
\textsuperscript{44} (1877): “The Health of the European Army in India”; Indian Medical Gazette; Vol. 14; pp.145-146.
\textsuperscript{45} (1879): “Health of Calcutta in 1878”; Indian Medical Gazette; pp. 204 - 206.
\textsuperscript{50} Hazra, Jayati and B. Banerjee (1983): “Geo-Medical Profile of Calcutta Metropolis”; Geographical Review of India; Vol. 45; No. 2; June; pp.55-65.
The historical geography of disease and public health in Europe is well documented. G. M. Howe\textsuperscript{52} has studied the historical geography of disease for the several centuries between the Roman period and the middle of the twentieth century. It gives details regarding socio-economic condition of the people affected, the number of deaths, number of epidemic years etc. W. M. Frazer\textsuperscript{53} in 1950 has also dealt with the history of public health in Britain with special reference to smallpox. J. H. H. Williams\textsuperscript{54} in 1932 gave a brief description of public health in Britain during mid-nineteenth and early twentieth centuries. He also studied some of the public health policies declared by the government at the time of epidemics.

W. Farr\textsuperscript{55} in 1868 published his report on cholera epidemics in England. H. J. Habakkuk\textsuperscript{56}, T. Ferguson\textsuperscript{57}, J. T. Krause\textsuperscript{58}, W. P. D. Logan\textsuperscript{59}, T. H. Marshall\textsuperscript{60}, T. Mckeown\textsuperscript{61} and R. G. Brown and Robert Woods\textsuperscript{62} published several articles on population and public health in England and Wales during the seventeenth, eighteenth and early nineteenth centuries. Bernard Benjamin\textsuperscript{63} in 1964 discussed the role of urbanization in public health in England and Wales during early twentieth century. M. Dobson\textsuperscript{64} in 1980 published his work on historical geography of Malaria in England.

\textsuperscript{52} Howe, George Melvyn (1972): \textit{Man, Environment and Disease in Britain: A Medical Geography of Britain Through Ages}; New York: Barnes and Noble Books.
England. He discussed the topography of England and the prevalence of malaria
disease there in. E. W. Gilbert\textsuperscript{65} published a pioneer map of health and disease in
England in 1958 and in 1968 B. Benjamin\textsuperscript{66} published his work on the health and vital
statistics of British Army in different places of the world.

\subsection*{1.4.3 Studies on the Distribution and Utilization of Health Care Facilities.}

Distribution of curative and preventive health-care facilities in related to the condition
of health in a region has been analysed by O. P. Jaggi\textsuperscript{67} in 1979. His book deals with
the spread of hospitals, evolution of medical services, vaccination and sanitation
system in India during the colonial rule. In another book he has studied the
indigenous system of medicine\textsuperscript{68} in India and the technologies that were available in
this country before the introduction of western medicine. He has also made an
attempt to study the social impact of western medicine in India\textsuperscript{69} and on the major
tropical diseases and the endemcity in the country\textsuperscript{70}. Among the recent studies, the
work by K. K. Ganguly\textsuperscript{71}, on “Indian Hospitals: A Cultural Interface” deserves
mention. He has analysed briefly the history of hospitals in India. In 1978\textsuperscript{72}
and 1979\textsuperscript{73}, D. Banerjee published articles on the role of politics in the development of
indigenous and western system of medicine in health services in India. In 1990, W. J.
Buchanan\textsuperscript{74} published an article on the first hospitals that were set up in Calcutta. In

Vol. 124; No. 2.


Delhi: Atma Ram and Sons.

\textsuperscript{68}Jaggi, O. P. (1973): \textit{History of Science and Technologies in India - Indian System of Medicine};
Vol. IV; Delhi: Atma Ram and Sons.

\textsuperscript{69}Jaggi, O. P. (1980): \textit{Western Medicine in India: Social Impact}; Vol. XV; Delhi: Atma Ram and
Sons.

\textsuperscript{70}Jaggi, O. P. (1979): \textit{Western Medicine in India: Epidemics and Other Tropical Diseases}; Vol. XII;
Delhi: Atma Ram and Sons.

\textsuperscript{71}Ganguli, K. K. (1990): “Indian Hospitals: A Cultural Interphase”; in P.C. Joshi and Anil Mahajan,

\textsuperscript{72}Banerjee, D. (1978): “Political Dimension of Health and Health Services”; \textit{Economic and Political
Weekly}; Vol. 13; No. 22; June 3; pp.924 – 928.

\textsuperscript{73}Banerjee, D. (1979): “Place of the Indigenous and Western Systems of Medicine in Health Services
of India”; \textit{International Journal of Health Services}; Vol. 9; No. 3; pp. 511-519.

\textsuperscript{74}Buchanan, W. J. (1990): “The First Hospitals in Calcutta”; \textit{Bengal Past and Present}; Calcutta
Tercentenary Special.
the same year, D. M. Moir\textsuperscript{75} published the history of Presidency General Hospital of Calcutta.

Apart from the above-mentioned studies, some information on the early hospitals and dispensaries in Calcutta were obtained from the Souvenirs published by the Presidency General Hospital\textsuperscript{76} and Medical College Hospital\textsuperscript{77}. In 1994, Mark Harrison\textsuperscript{78} made a major contribution by studying the public health of India with special reference to Calcutta during the colonial era. In his study he has dealt with the public health policies existing in the country, the role of hospitals and dispensaries in the country as well as in the city of Calcutta and the spread of the vaccination system. He has also studied the major politics behind public health in a colony. Poonam Bala\textsuperscript{79}, in 1991, studied the impact of imperialism on medicine in Bengal with special reference to Dacca during the colonial era.

Literature on hospital facilities and vaccination in Britain during the period under study in this thesis was obtained from R. M. Acheson\textsuperscript{80} and Spencer Hagards' work of 1966. The book deals with international comparisons on incidence of diseases and health services, and the role of clinical medicine and health planning. A history of the growth of various hospitals and dispensaries in England can also be traced from "An Encyclopedia of London"\textsuperscript{81}. Rama V. Baru\textsuperscript{82} in 1998 examined the trends in privatization of health care system in India with special reference to private hospitals in Hyderabad city in recent years. She has also discussed in brief about the health

\textsuperscript{76} Anonymous (1992): Annual Souvenir, S.S.K.M. (P.G.) Hospital, Calcutta; Souvenir; 222\textsuperscript{nd} Celebration, April.
\textsuperscript{77} __ (1984): "Medical College Bengal (1835-1984)"; Comemorative Volume on the Occasion of Golden Jubilee Re-Union and Terjubilee Year of Medical College Bengal; Calcutta: The Medical College Ex-Students' Association.
\textsuperscript{78} Harrison, Mark (1994): Public Health in British India: Anglo-Indian Preventive Medicine, 1859-1914; Welcome Institute for the History of Medicine, London; United Kingdom: Cambridge University Press.
\textsuperscript{80} Acheson, Roy M. and Spencer Hagard (1966): Health, Society and Medicine; Oxford: Blackwell Scientific Publication;
\textsuperscript{81} Kent, William (1937) (ed.): An Encyclopaedia of London; London: J.M. Dent and Sons Limited.
care provision in United Kingdom during the nineteenth century. Frazer\textsuperscript{83} and Williams\textsuperscript{84} have discussed the nature of vaccination system in England during the years following its introduction. In 1992 Martin Powell\textsuperscript{85} discussed the historical geography of hospitals in England in the 1930s.

1.4.4 Studies on the Sanitary Condition and Civic Amenities

Not many historical studies are available on the sanitary conditions and facilities in urban India. Some of the reports on the sanitary conditions of India\textsuperscript{86} and Bengal\textsuperscript{87} were available from old journals. C. A. Gordon\textsuperscript{88}, in 1879 and 1880 outlined the sanitary problem of India. Later in 1913\textsuperscript{89} Patrick Hehir published his work on ‘Hygiene and Diseases’ in India. In 1914, J. A. Turner\textsuperscript{90} studied the sanitary condition of the city of Bombay and its impact on health. Mariam Dossal\textsuperscript{91} in 1991 published her work on the sanitary condition of Bombay during the colonial era (1845 – 1875). Sandeep Sinha\textsuperscript{92} in 1998 published his work on the public health of Bengal with special reference to sanitary system in Bengal and the prevailing diseases during the British rule in India.

\textsuperscript{83} op. cit. footnote no.52.
\textsuperscript{84} op cit. footnote no. 53.
\textsuperscript{85} Powell, Martin (1992): “The Geography of English Hospital Provision in the 1930s: The Historical Geography of Heterodoxy”; Journal of Historical Geography; Vol. 18; No. 3; pp.307-316.
\textsuperscript{86} Anonymous (1856): “Sanitary Reform”; Calcutta Review; Vol. 27; September; pp.1-16.
\textsuperscript{____} (1868): “Sanitary Reform in India”; Calcutta Review; 50:99; pp 94-159
\textsuperscript{____} (1872): “A Decade of Sanitation in India”; Calcutta Review; Vol. 55; pp.72-84.
\textsuperscript{87} Anonymous (1867): “Bengal Sanitary Report for 1865”; Indian Medical Gazette; February 1; pp.47-50.
\textsuperscript{89} Hehir, Patrick (1913): Hygiene and Disease of India; Madras: Higgin Bothams.
\textsuperscript{90} Turner, J. A. (1914): Sanitation in India; Bombay: Times of India.
\textsuperscript{91} Dossal, Marriam (1991): Imperial Designs and Indian Realities: The Planning of Bombay City; Bombay: Oxford University Press.
\textsuperscript{92} Sinha, Sandeep (1998): Public Health Policy and The Indian Public, Bengal 1850-1920; Calcutta: Vision Publications (P) Ltd.
The earliest work available for the sanitary condition of the City Calcutta by Maclead Wylie\(^{93}\) dates back to 1846. Pauline Rohatgi\(^{94}\) in 1992 wrote about Calcutta’s environment based on the impressions of various Britishers who came to the city during the early years of the city’s origin. Nemai Sadhan Bose\(^{95}\) in 1975 edited a book in which the various aspects of Calcutta’s life, including the sanitary condition of the city of Calcutta is discussed. A Report on the existing “Drainage and Conservancy of Calcutta”\(^{96}\) was also obtained from Indian Medical Gazette. A. K. Sen published some information on the prevailing water supply system in city of Calcutta\(^{97}\) in 1937. An anonymous paper on the tanks of Calcutta was published in the Indian Medical Gazette\(^{98}\). S. W. Goode\(^{99}\) has given a detailed analysis of the existing sanitary situation in the city of Calcutta during the Colonial era along with the measures taken by the colonial rulers in 1916. P. T. Nair\(^{100}\) has discussed various problems of Calcutta’s life from the day it gained importance in the history. Recently, S. K. Das Gupta\(^{101}\) and S. K. Bhattacharya\(^{102}\) published their articles on the present day drainage system and water supply in the City of Calcutta with a brief history of the pre-independence period.


\(^{98}\) Anonymous (1870): “Calcutta Tanks”; *Indian Medical Gazette*; March 1; p.60.


The sanitary situation and the sanitary problems in England during the Industrial Revolution were first analysed by Edwin Chadwick\textsuperscript{103}. Later, C. A. Bentlay\textsuperscript{104} outlined the major reforms in the existing sanitary system of the country. Allen Daley and B. Benjamin\textsuperscript{105} have discussed the situation in London city. Robert Woods\textsuperscript{106} in 1978 discussed the nature of mortality due to the sanitary problems in Birmingham city during the late nineteenth and early twentieth century. In 1982, John Sheail\textsuperscript{107}, highlighted the indirect effect of continuous extraction of underground water in some important urban areas in England.

There are many unexplored areas in the historical study of the characteristics and causes of death and disease in cities. We attempt to fill some of these lacunae for one specific city, the city of Calcutta for a brief period in its history.

1.5 Objectives of the Study

The main objectives of the present study are to:

(1) Identify the reasons that made the British authorities aware and concerned about sanitation and health conditions in India and specially in Calcutta.

(2) Analyse the incidence and correlates of mortality in the city for diseases associated with bad environmental conditions.

(3) Analyse efforts made for, and policies adopted by the colonial government to combat disease by improving sanitary conditions in Calcutta.

(4) Identify the crisis management techniques and long term health care facilities provided by the colonial government to fight death and disease in the city.

(5) Analyse the above objectives in the light of public health policy and practice in contemporary England.


1.6 Research Questions

1. What was the pattern of Calcutta's physical and demographic expansion and how did this pattern affect the environmental condition of the city?

2. What factors made the British authorities aware and concerned about health conditions in Colonial India and especially in its capital city – Calcutta?

3. What were the “preventive measures” taken and policies adopted for improving sanitary conditions and for combating disease and death in Calcutta?

4. What were the “health care facilities” provided by the colonial government to check disease and death in the city?

5. What were the parallel issues raised in contemporary England about public health and how did these influence policy and practice in India?

1.7 Methodology and Sources of Information

Demographic and housing conditions in the city:

Statistical Techniques

(a) Density of Population = \( \frac{\text{Area in sq. km.}}{\text{Total population}} \)

(b) Sex Ratio = \( \frac{\text{Total Female Population} \times 1000}{\text{Total Male Population}} \)

(c) Religious Composition = \( \frac{\text{Total Population of Religion (A)} \times 1000}{\text{Total Population}} \)

(d) Housing Density = \( \frac{\text{Area in sq. kms.}}{\text{Total Number of Houses}} \)

(e) Crowding in each house = \( \frac{\text{Total Population}}{\text{Total Number of House}} \)

Note: The above calculations are made for the city as a whole and also for different wards for some of the Census Years when data are available. Total Population has been taken into consideration, as mid-year population was not available.

Mortality rate in the city:

Statistical Techniques

(a) Crude Death Rate = \( \frac{\text{Total Deaths} \times 1000}{\text{Total Population}} \)
(b) Crude Death Rate Sex Wise =

\[
\text{Male Death Rate} = \frac{\text{Total Male Deaths}}{\text{Total Male Population}} * 1000
\]

\[
\text{Female Death Rate} = \frac{\text{Total Female Deaths}}{\text{Total Female Population}} * 1000
\]

(c) Disease Specific Death Rate =

\[
\text{Total Death due to cause A} \times 100000
\]

\[
\text{Total Population}
\]

(d) Community Specific Death Rate =

\[
\frac{\text{Total Death in Community A}}{\text{Total Population of Community A}} * 1000
\]

**Note:** The above calculations are made for the city as a whole and also for different wards for some of the Census Years when data are available. Total Population has been taken into consideration, as mid-year population was not available.

**Source of Information:**

(i) Census of British India 1872-1941

(ii) Administrative Reports of the Commissioners of the Town of Calcutta, 1866-1940.

(iii) Municipality Administrative Reports of Calcutta, 1866-1940.

(iv) Statistical Abstracts of British India,

**Health services in Calcutta:**

**Statistical Techniques**

**Distribution of Hospitals and Dispensaries:**

(a) Total Number Of Hospitals and Dispensaries in Bengal in year (1) *100

\[
\text{Total Number of Hospitals and Dispensaries in British India for year (1)}
\]

(b) Total Number Of Hospitals and Dispensaries in Calcutta in year (1) *100

\[
\text{Total Number of Hospitals and Dispensaries in British India for year (1)}
\]

(c) Total Number Of Hospitals and Dispensaries in Calcutta in year (1) *100

\[
\text{Total Number of Hospitals and Dispensaries in Bengal for year (1)}
\]
(d) **Total Number of Category I type of Hospital / Dispensary in year (1) \*100**

Total Number of Hospitals / Dispensaries in Calcutta in year (1)

**Availability of Beds in Different Hospitals and Dispensaries:**

(a) **Beds available in Category I \* 100**

Total Beds available in all Hospitals and Dispensaries

(b) **Number of Beds available for Male / Female \* 100**

Total Beds Available in all Hospitals and Dispensaries

(c) **Interpolated Population for Year (1)**

Total Number of Hospitals and Dispensaries in Year (1)

(d) **Interpolated Population for Year (1)**

Total Number of Beds Available in Year (1)

(e) **Total Number Of Patients Admitted in Year (1)**

Total Number of Beds Available in Year (1)

**Patients Treated in Hospitals And Dispensaries:**

(a) **Total Number of Indoor / Outdoor Patients Treated in Year (1) \*100**

Total Patients Treated in all Hospitals and Dispensaries In Year (1)

(b) **Total Number of Patients Treated in Different Category \*100**

Total Patients Treated in all Hospitals and Dispensaries

(c) **Total Indoor/Outdoor Patients Treated In Different Category \*100**

Total Patients Treated in all Hospitals and Dispensaries

**Diseases Treated and Deaths in Hospitals and Dispensaries:**

(a) **Number of Patients Treated under Cause (A) In Year (1) \*100**

Total Patients Treated in all Hospitals And Dispensaries

(b) **Number of Deaths from Cause (A) in Hospital (A) for Year (1) \*100**

Total Deaths in Hospital (A) in Year (1)

**Vaccination in Calcutta:**

(a) **Total Vaccination Rate = Total Vaccinated in Year (1) \*1000**

Total Population in Year (1)
(b) Vaccination Rate (Sex Wise) =
\[
\frac{\text{Total of Male / Female Vaccinated in Year (1)}}{\text{Total Male / Female Population in Year (1)}} \times 1000
\]

(c) Vaccination Rate (Religion Wise) =
\[
\frac{\text{Number of Person Vaccinated of Religion (A) in Year (1)}}{\text{Total Population of Religion (A) in Year (1)}} \times 100
\]

Note: The above calculations are made for the city as a whole and also for different wards for some years when data are available. Total Population has been taken into consideration, as mid-year population was not available.

Source of Information:
(i) Census of British India 1872-1941
(ii) Administrative Reports of the Commissioners of the Town of Calcutta, 1866-1940.
(iii) Municipality Administrative Reports of Calcutta, 1866-1940.
(iv) Statistics of British India, Vol. III, Public Health, Department of Statistics

1.8 Limitations of the Data Base
A number of problems have been faced while collecting information for the research work.

1. The Census data for the City is available only from 1872. The sex-wise distribution of religious population is not available for some of the census years. This has not permitted a time series comparative analysis.

2. The ward wise distribution of the religious groups in the city for all the census years is also not available.

3. There are some differences in population statistics as provided by the Census of India and as published by the Municipal Corporation of Calcutta.

4. Historical information regarding the hospitals and vaccination in the City is limited as most of the old documents have been destroyed by the hospitals themselves and the authorities do not readily give what is available.
5. The secondary statistical information about the hospitals, dispensaries and vaccination programmes for the City of Calcutta can be obtained from “Statistics of British India – (1898–1920)”. But, the different volumes of this source are further classified into several issues and are distributed in three different libraries – National Archive, New Delhi; Central Secretariat Library, New Delhi; and National Library, Kolkata. Some of the issues are also missing. Though this information is available from 1900 to 1947, this study had been limited to the period between 1900-1920 because the format for the period 1920-1947 was different and less detailed. Information for some of the years in between is also not available.

6. Among the various indicators for measuring health status of the population, only mortality data is available for the city during the period under study. Moreover, the sex wise, religion wise, and age wise classification of mortality in the city is not available. Some of the years do show the above classifications, but mortality figures do not match the total deaths in that respective year. Hence, this data was not collected.

7. Regarding the causes of death in the city, the detailed classification of the diseases is not available. Therefore, the study had to be limited to the information available.

8. Comparative statistical information and literature for the different urban areas in Britain between the sixteenth and the early nineteenth century is available in British Archives and has not been accessible to the scholar. The study has had to depend on whatever was available in Indian libraries.

9. The maps collected from various old records and sources were without scale and not geo-referenced. Hence, the maps reproduced in this study also do not give this information.
1.9 Organization of the Study

The study has been organized into six chapters.

Chapter 1 incorporates the statement of the problem, review of relevant literature available on the topic under discussion, the objectives of the study, the research questions asked to materialize the objectives, and the data used and methodology applied for answering the research questions. The major limitations of the study are also highlighted.

Chapter 2 answers the first research question and therefore, analyses the demography and geography of Calcutta in terms such factors that determine the health condition in the city. A brief discussion of its physiography, climatic condition, geological structure, changing pattern of land use and housing is given.

Following the geographical analysis of the study area, Chapter 3 answers the second research question. It therefore, discusses the prevalence of the major diseases that affected the European and Indian population in Calcutta during the colonial era. A brief comparative analysis has also been done of the public health conditions in Calcutta and in London. This chapter also discusses the major health policies introduced in India for the civilian population and for the British army. The prophylactic measures taken in Calcutta during the outbreak of epidemics by the colonial authorities are also outlined.

Chapter 4 answers the third research question. It, therefore, analyses the measures taken by the colonial authorities to improve the sanitary conditions in the city of Calcutta because their neglect had been the major reason for a high mortality rate among the European as well as the indigenous population in the city. A brief analysis of the sewerage system, water supply, roads, removal of solid waste and the dead follows. Wherever possible a comparative analysis of the situation prevailing in contemporary England and London has been done.

Chapter 5 answers the fourth research question. It analyses the growth of western system of health services in colonial Calcutta as an import from contemporary London. The chapter discusses the role of the Indian Medical Service during the early
eighteenth century in India as well as in Calcutta. The phased development of the hospitals and dispensaries and the vaccination system in Calcutta to combat death and disease is also outlined.

Chapter 6 presents the major findings of the study.