

# **MORTALITY IN COLONIAL PUNJAB**

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**Centre for the Study of Regional Development**

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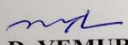
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# Chapter-1

## Introduction

### 1.1 Introduction

Mortality is one of the three components of population change; the other two are fertility and migration. Historically, the factor of mortality has played a dominant role in determining the growth of population, the size of which fluctuated in the past mainly in response to variations in mortality.

The increase in the population of European countries following the Industrial Revolution in the seventeenth century was mainly due to a decline in the death rates. The developing countries, which are undergoing a typical demographic transition, have also been affected initially by the fall in the death rates. In fact, the single most important contribution of demography has been the revelation of the fact that sharp declines in mortality rates, rather than any rise in the fertility rates, have been responsible for bringing about a rapid growth of population.

In India first synchronized Census was held in 1881. In 1881 the population of British India (undivided India) was 253896330, which was increased to 388997955 in 1941. In Punjab it was 18842264 in 1881 and increased to 28418819 in 1941 (Table 1:1).

**Table 1:1 Population of British India and Punjab, 1881-1941**

Years	British India	British Territory Punjab	% of population in Punjab
1881	253,896,330	18,842,264 #	7.42
1891	287,314,671	20,866,847	7.26
1901	294,361,056	20,330,339 £	6.91
1911	315,156,396	19,974,956 ¶	6.34
1921	318,942,480	20,685,478	6.49
1931	352,837,778	23,580,864	6.68
1941	388,997,955	28,418,819	7.31

Source: Census of India 1881, 1891, 1901, 1911, 1921, 1931 and 1941

Note: # population of Khaiber Pass not included.

£ Excluding population of those districts which were included in North West Province in 1901.

¶ Till 1911 population of Delhi included. Since 1911 Delhi was a district of Punjab. In 1912 it became the capital of British India.

District wise population of Punjab is given in appendix 1.1. There was a break in population growth. In India population decreased in 1921 and in Punjab in 1901 and 1911. In 1901 this shrink was due to territorial changes but in 1911 (Punjab) and 1921 (India) it was due to high mortality<sup>1</sup>. As the Table 1:1 shows that population of India during the time increased gradually till 1921. It increased sharply after 1921. On the other hand population of Punjab slightly increased in 1891 and then decreased in 1901 and 1911. After 1911 it started to increase rapidly. However the growth rate of population was fluctuating during the time. The exponential decadal growth rates of population are as below:

**Table 1:2 Decadal Growth Rate of Population of British India and Punjab, 1881-1941**

Years	British India	British Territory Punjab
1881-1891	12.37	10.21
1891-1901	2.42	-2.60
1901-1911	6.83	-1.76
1911-1921	1.19	3.50
1921-1931	10.10	13.10
1931-1941	9.76	18.66

Source: Census of India, Various years

In India population growth was least in 1921. It was about one percent. Above given table is for undivided India. According to adjusted data only for India's population, in 1921 decadal growth rate was negative (-0.31 percent)<sup>2</sup>. After 1921 population growth rate steadily increased. Unlike India, in Punjab province in 1911 there was a negative growth rate instead of 1921<sup>3</sup>

Unlike India in 1921, Population growth rate was negative in Punjab during 1901-1911. During the period from 1901-10 average annual death rate (43.98) was higher than average birth rate (41.21)<sup>4</sup>. Plague epidemic was very common and dreadful in Punjab. In 1897 plague interrupted in Hoshiarpur and Jullundur districts of Punjab. By 1900-1901 it spread in whole province. Till 1905 plague was consistently present in the province as a severe epidemic. Again in April 1905 there was an earthquake in Kangra district as a result 1,374 persons lost their lives. 1906 was an exceptionally healthy year. In 1907 death rate peaked on

<sup>1</sup> Reasons for high mortality are discussed later in this chapter.

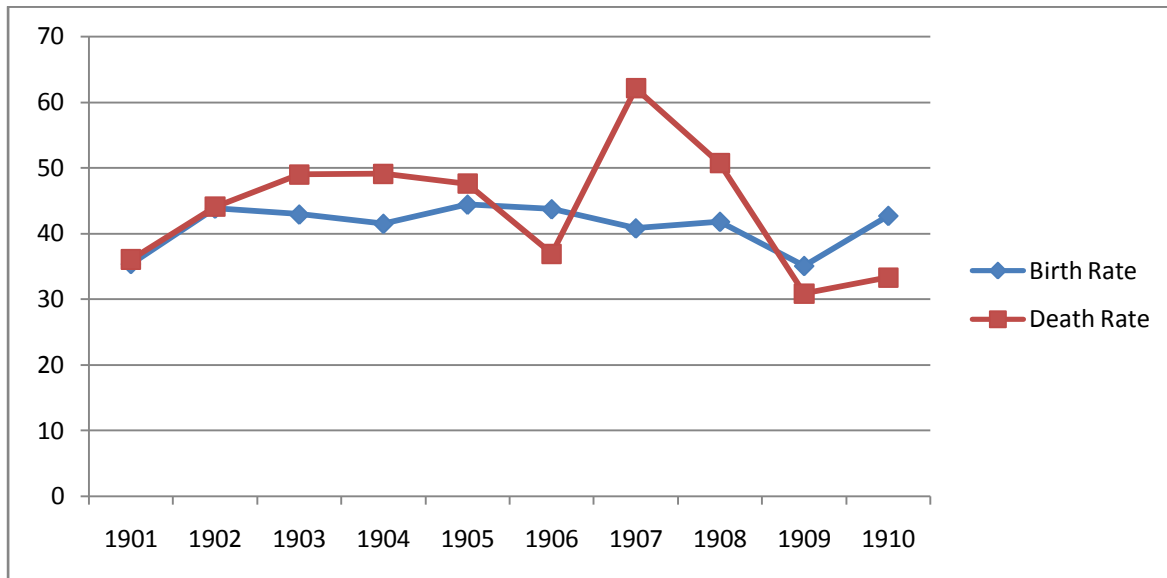
<sup>2</sup> Registrar General of India

<sup>3</sup> We are not accounting negative growth rate in 1901. As it was result of territorial changes in the area.

<sup>4</sup> Annual Death Rate and Birth Rate is given in Appendix 1.5

highest point at 62.2. It was next highest after 1918's CDR (80.1). In 1908 it slightly decreased to 51.6 per mille but still remained higher than CBR. It was malaria year (Report of malaria bureau of Punjab, 1916). Hence population decreased during 1901-1911.

**Figure 1.1 Crude Death Rates and Crude Birth Rates in Punjab 1901-1910**



Source: SCR, various years

## 1.2 Need for the study

The study of mortality is useful for analysing current demographic conditions as well as for determining the prospects of potential changes in mortality conditions of the future. The public health administration depends heavily on the study of mortality, for statistics on death in the population cross-classified by age; sex and the cause of death are of great value for the formulation, implementation and evaluation of public health programmes. Statistics on deaths also form the basis of the policies of insurance companies.

It is, of course, possible to study mortality, from several angles, for various biological, social, economic and cultural factors affect the health of an individual and consequently the mortality rate in society. When mortality is viewed from the demographic point of view, it is studied to determine changes in the population size and structure, rather than from the medical angle. Reason for choosing the area of Punjab is that the data of mortality was relatively well documented and regular.

### 1.3 Mortality in India and Punjab

In India crude death rate was 41.3 per thousand in 1881-1891. By the period 1941-51 it decrease to 27.4 per thousand (Kingsley Davis, 1950). In India there was two most striking facts about the trends of mortality: (1) the higher level of death rate prior to 1921 (i.e. between 40 to 50 per thousand of population). (2) The decline in the death rates after 1921.

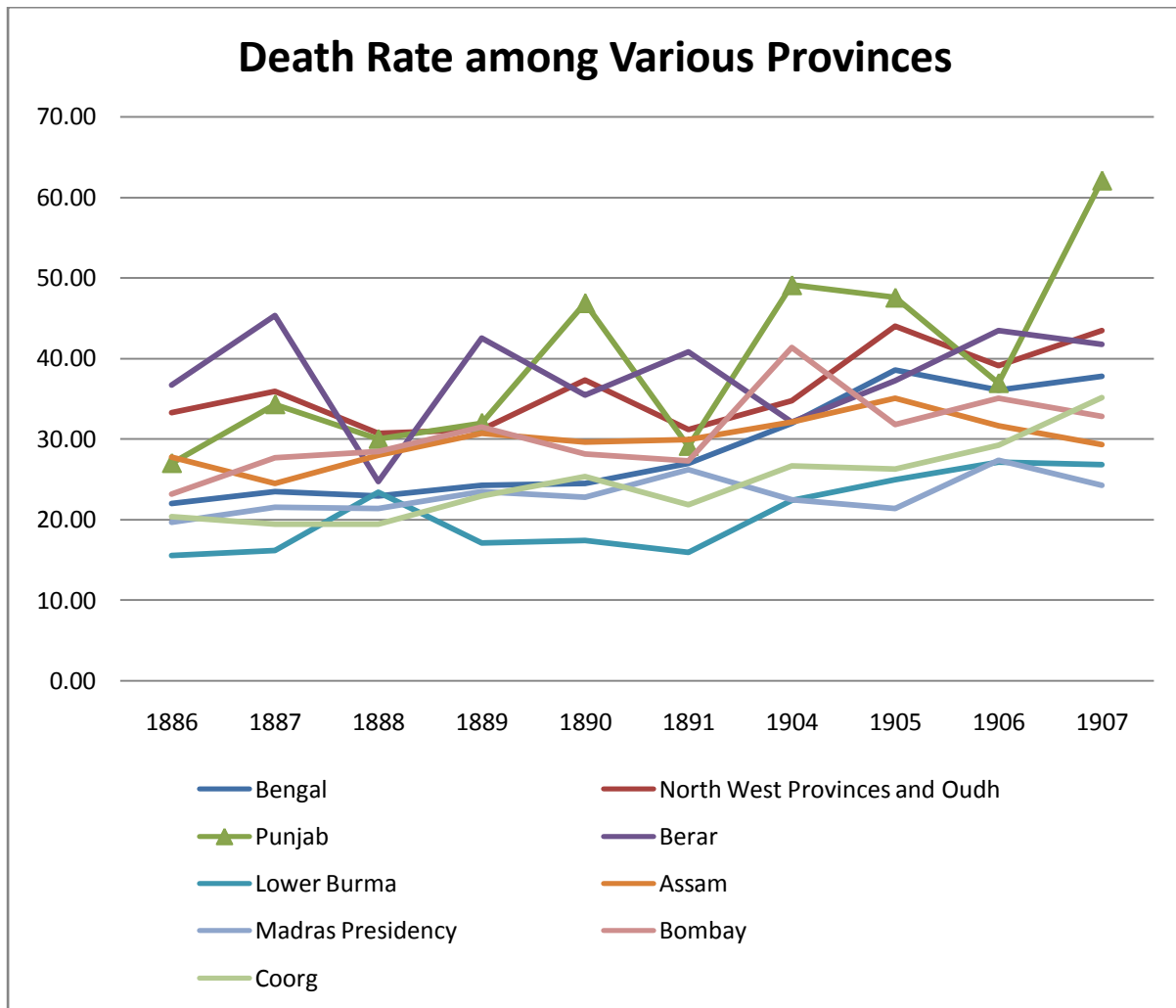
Till 1920s it was time of severe famines, epidemics breakouts. Cholera, smallpox, plague were chief diseases which came time to time in the form of epidemics. . Hence the country had lost millions of lives due to these huge mishaps. At the closing time of 19<sup>th</sup> century there was famine in north India (Dyson, Tim 1989). At the same time plague epidemic broke out. People were hardly recovered from this crisis when another influenza epidemic appeared in 1918. More than 15 million people died due to this epidemic (Kingsley Davis, 1951). These epidemics resulted a negative growth rate  $(-0.31)^5$  in the country.

In India there was high death rate in Punjab, Berar, United Provinces of Agra and Oudh as compare to other regions (as in Figure 1.2). Registered death rate was least in Lower Burma. In rest of regions death rate was reported between 20 and 40 per thousand of population. Mortality rate fluctuated during the time period (Table 1:3).

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<sup>5</sup> In 1921 this negative growth rate was only for Indian part. For united India (India and Pakistan), it was 0.9. (Davis, Kinsley, 1951).

**Figure 1.2 Crude Death Rates in Different Provinces and Presidencies of British India, 1886-1907**



Source: SCR of various years

Among these regions Punjab was worst affected of plague epidemic. As stated in Public Health Report (1905):

*“The Punjab, for the fourth successive year, shows the highest rate of mortality in India in 1905. Of a total of 956,108 deaths which occurred in the province, 334,897 were due to plague, the ratio per mille<sup>6</sup> from this cause alone being 16.65.”*

As the Figure 1.2 illustrates that there was no province where death rate remained continually high. However Punjab was the province where average CDR was high and also reached at the highest point at different time.

<sup>6</sup> In Public Health Reports “mille” is used as thousand or 1000

**Table 1:3 Crude Death Rates in Different Provinces and Presidencies of British India, 1886-1907**

	Bengal Presidency	United provinces of Agra and Oudh *	Punjab	Berar	Lower Burma	Assam	Madras Presidency	Bombay Presidency	Coorg	North West Frontier Provinces	Ajmer Merwara
1886	21.99	33.27	27.00	36.70	15.54	27.77	19.70	23.17	20.33	***	***
1887	23.46	35.86	34.31	45.30	16.18	24.52	21.60	27.67	19.41	***	***
1888	22.94	30.68	30.00	24.70	23.40	27.98	21.40	28.44	19.41	***	***
1889	24.25	31.11	32.00	42.50	17.07	30.70	23.50	31.51	22.92	***	***
1890	24.48	37.27	46.87	35.4	17.40	29.64	22.80	28.18	25.32	***	***
1891	26.94	31.14	29.13	40.80	15.93	29.91	26.20	27.26	21.79	***	***
1904	31.95	34.70	49.1	32.06	22.36	32.11	22.50	41.39	26.62	28.60	27.57
1905	38.53	44.00	47.55	37.21	24.93	35.06	21.40	31.84	26.24	26.79	34.25
1906	36.08	39.07	36.94	43.47	27.15	31.67	27.40	35.06	29.26	33.73	32.22
1907	37.72	43.46	62.10	41.70	26.84	29.30	24.30	32.82	35.15	35.12	29.63

Source: Sanitary Commissioner reports with government of India, Various Years

Note \* The name of "N.W.P. (North West Province) and Oudh" was changed to United Provinces (U.P.) of Agra and Oudh after formation of North West Frontier Province in 1901 to avoid confusion between the two provinces.

\*\*\* Data not available

## **1.4 Objective of the study**

- 1.4.1 To examine the levels and trends of mortality in colonial Punjab.
- 1.4.2 To study the pattern of mortality by age, sex and location of residence i.e. rural-urban.
- 1.4.3 To observe the mortality among army, prisoners.
- 1.4.4 To study the causes of death.

## **1.5 Study Area**

The Punjab is named for the five rivers by which it is watered, from the Persian word "Punj" (five) and "Ab" (water), the rivers are Jhelum, Chenab, Ravi, Beas and Sutlej, all tributaries of the Indus. Geographically the Punjab province of India was a triangular tract of country of which the Indus and the Sutlej to their confluence formed the two sides, the base being the lower Himalaya hills between those two rivers; but the Punjab province also included a large tract outside those boundaries. Along the northern border Himalayan ranges divided it from Kashmir and Tibet. On the west it was separated from the North-West Frontier Province by the Indus, until that river reaches the border of Dera Ghazi Khan District, which was divided from Baluchistan by the Sulaiman Range. To the south lay Sindh and Rajputana, while on the east the rivers Jumna and Tons separated it from the United Provinces (Census of India, 1881).

Punjab was a province of British India. It was annexed by the East India Company in 1849, and was one of the last areas of the Indian subcontinent to fall under British control. By the time British administration divided Punjab in different commissioner (division). A number of princely states of that area, called Punjab states or native States were also under British rule through different treaties. According to Census 1881 below were the administrative division and their districts of Punjab province.

**Delhi Division-** Delhi, Gurgaon, Karnal

**Hissar-** Hissar, Rohtak, Sirsa

**Umballa (Ambala)-** Umballa, Simla, Ludhiana

**Jullundur Division-** Jullundur, Hoshiarpur, Kangra

**Amritsar-** Amritsar, Gurdaspur, Sialkot

**Lahore Division -** Lahore, Gujranwala, Ferozepore (Ferozepur)

**Rawalpindi Division -** Rawalpindi, Jhelum, Gujarat, Shahpur

**Mooltan (Multan) -** Mooltan, Muzaffargarh, Montgomery, Jhang

**Derajat Division** - Dera Ismail Khan, Dera Ghazi Khan, Bannu

**Peshawar Division** - Peshawar, Hazara, Kohat

**Khaiber Pass**

**Native States**

**Eastern Plains**- Dujana, Faridkot, Jind, Kalsia, Kapurthala, Loharu, Maler Kotla, Nabha, Pataudi, Patiala

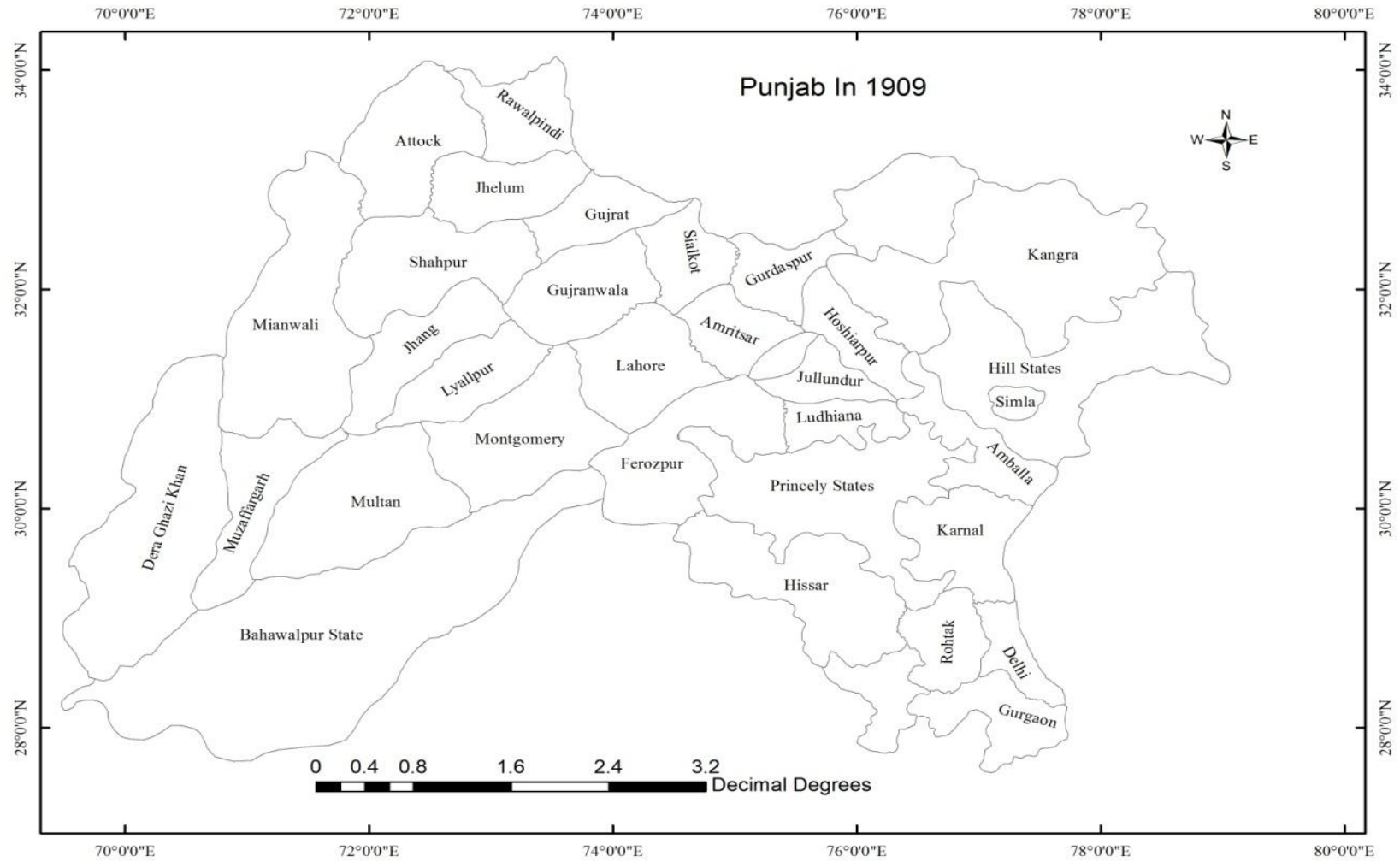
**Western Plains**- Bahawalpur

**Hill States**- Baghal, Baghi, Balsan, Bhajji, Bashahr, Bija, Bilaspur, Chamba, Dadhi, Dhami, Darkoti, Jubbal, Keonthal, Kunharsain, Kunhiar, Kotaha, Mailog, Mandi, Mangal, Nahan, Nalagarh, Rawai, Sangri, Suket, Tarhoch

The boundaries of the Punjab have been changed from time to time since its annexation in 1849. In 1901 five Districts (Hazara, Peshawar, Kohat, Bannu and Dera Ismail Khan) of Punjab province and the areas not previously included in India, The North-West Frontier Province was formed (Grover, B.L.2003). Minor Changes in the name and area of districts were also went on. Attock as a new district shaped in 1901. Jhang district was divided into two; Jhang and Lyallpur in 1904 (Ali, Imran 1988). Sheikhpura district was formed from Gujranwala in 1921 (Ali, Imran 1988). Umaballa district later became Amballa. Also Mooltan became Multan. In 1911 there was *Delhi Darbaar* in Delhi in the honour of George V and Delhi was declared new capital of India. In 1912 capital of India transferred to Delhi from Calcutta. Now Delhi was no longer part of Punjab Province.



**Map 1:1 Administrative Boundaries of Punjab, 1909**



Source: Imperial Gazetteer of India, 1909

In present-day India, it includes the regions of Punjab, Haryana, Chandigarh, Delhi, and Himachal Pradesh. In present-day Pakistan, it includes the regions of Punjab, Islamabad Capital Territory and Khyber Pakhtunkhwa. In this research work the word “Punjab” is used for British territorial area and “Punjab States” is for Native States including Native Hill states.

## **1.6 Review of literature**

Mortality is one of the main determinants of the population changes of any place. There is a debate on the population changes in India because before 1921, population was fluctuating but after 1921 population was increasing.

Kingsley Davis in his work “Population of India and Pakistan” tried to explain the demographic shift in India. According to him, the public welfare works like road, building, railways construction, coming up of hospitals etc. were the major reasons for demographic shift. Kingsley Davis thinks that the decrease in general mortality rate was more than the decline in infant mortality rate. Earlier it was 19.6% which later reached up to 27.6%. Economic and medical reforms had not had much impact on infant mortality rate.

Sheila Zurbrigg has attempted to correlate economy and diseases in her article “Hunger and Epidemic Malaria in Punjab (1868-1940)”. She used rain fall data, wages and food grain price as index of economy and related these with malaria disease. Sheila Zurbrigg has worked on mortality in Punjab state. In her work she argued that in Punjab, famine was the main cause of death rather than malaria. This study is an initial effort to assess the role of hunger in the specific sense of acute starvation as a factor in south Asian epidemic patterns across the colonial period, It does so in the context of the enormous socioeconomic shifts which occurred with the commercialisation of India's agricultural economy across the second half of the 19th and early 20th century, and the implications of these and the administrative changes with respect to precariousness of access to food. In her opinion a hungry person is more exposed to any epidemic compared to other well off person.

Tim Dyson raises important questions about the reliability of the various data sources an issue which all contributors are forced to address. He also uses some of the new insights of the papers to suggest four broad phases of Indian population growth over the period covered by the book. The years 1760-1820 are characterized by low or negative growth; from 1830-91, growth was positive but of unknown magnitude; 1891-1920 saw a reduced rate of growth perhaps because of deterioration in mortality rates. From 1921-60, growth was positive and

rising with improvements in mortality rates. However, regional differences may be very great and disaggregation is essential.

R. Gopinath in his study on Malabar has informed how various demographic factors affect economy. He has dealt systematically with historiography followed by details of sources used and with case studies. While describing the shifts in mortality rate in Malabar, a close correlation between mortality and price was frequently observed. On the basis of it, Gopinath shows that the price-mortality nexus is of a greater casual significance than other demographic variables. In order to test his hypothesis he took vital process as the internal components of demographic change and economic factors as external variable.

Ira Klein has given her description on the basis of income level and food availability for first half of 20<sup>th</sup> century. Klein has considered increased immunity and developed host-parasite relationship as the reason for decreased mortality instead of economic reforms. Especially the decline in mortality after war can be attributed to the increased immunity of the population which had faced the war.

Mc Keown considers improvement in nutrition as the cause for decline in mortality between 1750 and 1850 due to increased resistance against diseases. But Sumit Guha (1991) thinks that such conclusion is not as easy to draw in context of India as it is for England.

Arup Maharatna (1996) finds that northern famine locations such as Punjab and United Provinces in fact exhibit a reverse pattern of relative female disadvantage in crisis mortality.

## **1.7 Chapterisation**

This dissertation is divided into five chapters. First Chapter includes introduction, need for study, Mortality in India and Punjab perspective, objectives, study area and review of literature. Second Chapter contains conceptual framework, data sources, data quality and limitations. Third Chapter consists of structure of mortality in Punjab. In this chapter trends and level of mortality in Punjab has been discussed. Pattern of mortality age-wise, sex-wise, area-wise and mortality among army and prisoners are also discussed in this chapter. Forth Chapter discusses about the causes of death. Fifth Chapter contains conclusions.

## Chapter-2

### Data base and Methodology

#### 2.1. Introduction

In colonial period mortality was the most discussed component of demography. That was the time when population size was affected by mortality rather than fertility. This research work is about mortality in colonial Punjab. In this work we tried to throw the light on levels, trends and pattern of mortality among general population, army and prisoners. To observe the pattern of mortality age, sex and rural- urban area will be discussed in next chapter. Causes of death will be discussed in chapter fourth.

#### 2.1 Data sources

The data used in this research work has been collected from various sources.

- The annual reports of sanitary commissioner with the government of India
- The annual reports of public health department of various years from national archives of India, New Delhi
- Reports on Malaria in the Punjab 1913-1918. *Punjab Malaria Bureau* Vol. 1-6, Lahore
- Report on Plague & Inoculation in the Punjab 1897- 1904.
- Census data from 1881 to 1941
- Imperial Gazetteer of India 1909
- Districts Gazetteer of Punjab of various years
- A number of data has been accessed from website: The Digital South Asia Library (DSAL) .The DSAL is a program of the University of Chicago and the Centre for Research Libraries. This is a global collaborative effort to make important and rare resources available to the international community.

#### 2.2 Data quality

Earlier British rulers were more interested in army mortality than mortality in general population, as army was the important tool of colonial state. Therefore a worth data is available for army and prisoners mortality. Annual sanitary commissioner reports with the government of India provide a detailed data about morbidity and mortality among European army and their families. In these reports causes of death, admission rate from different causes, average daily sick, number of treated cases, deaths after treatment etc have been

provided for different provinces. Similarly statistics are available for native troops. They were also concern for mortality of prisoners. Data for prisoner's mortality is available for district jails and central jails separately in the annual sanitary commissioner reports. The registration reports had been published annually since 1867 onwards in Punjab. The earliest reported data on mortality for Punjab was on death rates of the European army since 1866, while since 1870 it was for data on births in Punjab. Unfortunately, those early reports provided merely the total numbers of events for the whole area; no break-down was made by district, age and sex.

As a subject the vital registration system was under Medical Department. It was headed by the provincial sanitary commissioners. In most villages, village headman or chaukidar used to gather vital statistics. Often this person was illiterate and certainly not learned in medical affairs (Kingsley Davis 1951). In most cases of death it was he who must state the cause of death. Whenever there was doubt, cause was considered fever. Therefore in the published reports 60 percent of the total deaths are ascribed to fever and over 25 percent to the all causes is other causes (figure 4.1). They show that the cause of death is unknown in at least 85 percent of the reported cases.

*If the existing system worked perfectly we should obtain complete information regarding the number and sex of Infants born and the number and sex of the persons that die, and we should have a general idea of the causes of death but the existing system does not yet work perfectly, and very often the results obtained are misleading. It is evident, moreover, that there is a point beyond which the present system of registration of vital statistics cannot go; however perfectly it may work it cannot give us accurate details of the causes of death; to obtain this information a professional agency is necessary.*(SCR,1905 p. 97)

In practice chief causes of death in these reports are cholera, smallpox, plague, fever, dysentery and diarrhoea, respiratory diseases, injuries and other causes. The first three; Cholera, smallpox and plague are the most specific. It is considered that there is more information on these than on the other diseases.

In these reports vital statistics of general population is also provided. Further annual Public health commissioner reports provided detailed figure for chief causes of death.

When we discuss about data quality of mortality among general population we observe that the quality is very poor and that is majorly because of large number of unregistered deaths. Female deaths and infant deaths were particularly under-registration. There is no doubt that India's registration data was far from perfect. Under- registration of births and deaths and age misreporting seem to be two major deficiencies, which very relevant to our present analysis. In fact the problem of under-registration was relatively pronounced during the early days of registration.

The Public Health Reports gave separate statistics for rural and urban; since 1901 for deaths from different causes, since 1932 for the cases of monthly deaths and since 1935 for deaths from selected diseases cancer, malaria, tuberculosis, etc. Since 1920 the Health Reports have classified infantile deaths as those (1) within one week of birth, (2) one to four weeks, (3) over one month to six months, and (4) over 6 months to less than 12 months.

### **Methodology:**

There are different types of mortality measurement method. For example crude death rate, Age specific death rate, infant mortality rate, neonatal mortality, post neonatal mortality, early neonatal mortality, late neonatal mortality, maternal mortality rate, cause specific death rate, cause specific death ratio etc.

### **Crude Death Rate**

$$CDR = \frac{D}{P} * k$$

Where is

$CDR$  = Crude death rate

$D$  = total number of deaths registered during the calendar year

$P$  = total population at the middle of the year

$k$  = per 1000

### **Age Specific Death Rate**

$$ASDR = \frac{Dn}{Pn} * 1000$$

Where is

$ASDR$  = Age Specific Death Rate

$Dn$  = number of deaths of persons of a given age during a year

$Pn$  = midyear population at that age

### **Infant Mortality Rate**

$$IMR = \frac{Dn}{B} * 1000$$

Where is

*IMR* = Infant Mortality Rate

*Dn* = total number of deaths under one year

*B* = total number of live births during the same year

### **Neo-natal Mortality**

$$NMR = \frac{Dn}{B} * 1000$$

Where is

*NMR* = Neo natal mortality rate

*Dn* = total number of deaths occurred within 28 days (one month in this study)

*B* = total number of live births

### **Post Neo-natal Mortality**

$$PNMR = \frac{Dn}{B} * 1000$$

Where is

*PNMR* = Post Neo natal mortality rate

*Dn* = total number of deaths occurred after one month of birth and before completing twelve months

*B* = total number of live births

### **Early Neo- natal mortality**

$$ENMR = \frac{Dn}{B} * 1000$$

Where is

*ENMR* = Early neo-natal mortality rate

*Dn* = total number of deaths occurred within 7 days or one week

*B* = total number of live births

### **Late Neo- natal mortality**

$$LNMR = \frac{Dn}{B} * 1000$$

Where is

LNMR = Late neo-natal mortality rate

$Dn$  = total number of deaths occurred during after one week of life and before one month

$B$  = total number of live births

### **Still Birth Rate**

$$SBR = \frac{Dn}{B} * 1000$$

Where is

SBR = Still Birth rate

$Dn$  = total number of still Birth

$B$  = total number of live births

### **Perinatal Mortality Rate**

$$PMR = \frac{Dn}{B} * 1000$$

Where is

PMR = Perinatal mortality rate

$Dn$  = total number of still births

$B$  = total number of live births and still births

### **Cause Specific Death Rate**

$$= \frac{Dc}{P} * 1000$$

Where is

$D_c$  = Deaths from a particular cause or group of causes

$P$  = midyear population.

### **Cause Specific Death Ratio**

$$= \frac{Dc}{D} * 100$$

Where is

$D_c$  = Deaths from a particular cause or group of causes

$D$  = Deaths due to all causes



- ❖ Maps which show the district wise distribution of Infant mortality rate, deaths from smallpox and deaths from plague are prepared with the help of GIS software.

### **2.3 Limitations**

Due to lack of data availability and its poor quality there are many limitations. The data what we could find from national archive is not enough to compute all measurement of mortality. Some mortality statistics are available in percentage and others are in absolute number. Therefore it is difficult to analyze different methods of mortality measurement. For example maternal mortality for towns of Punjab, which is discussed in fourth chapter, is available in percentage. It is mentioned that the figures are only of recorded deaths. As it is well known, many deaths are not recorded or else recorded inaccurately. There were territorial changes; name and number of districts were also changing continuously during that time. So it is slightly difficult to compare the changes in such a long time period. It was beyond the scope to collect data at district level. Other limitation of the study is to present data without any adjustment. However it is possible using some modern techniques.

Maps used in this study are based on Imperial Gazetteer, 1909. But the data used for analysis in those maps are of different years (1917, 1918, 1908, 1912, 1913, 1901-02, 1902-3). As infant mortality rates is shown in 1917 in the districts of Punjab; the administrative boundaries remains of the 1909. In 1909, Delhi was part of Punjab but no longer in 1917. Thus data of Delhi's infant mortality is not taken for the study.

The data is sketchy over the years. This is rather limited because of incomplete and inaccurate data. However the data we have collected indicates the mortality situation in colonial Punjab. The additional data may change some of the findings but these changes may not alter the overall scenario of mortality in colonial Punjab.

## Chapter-3

### Structure of Mortality in Colonial Punjab

#### 3.1. Introduction

In demography studies death is not studied in its medical terms. But it is studied to find out variation in population size and structure. United Nations and the World Health Organization have proposed the following definition of death: “Death is the permanent disappearance of all evidence of life at any time after birth has taken place (post-natal cessation of vital functions without capability of resuscitation)” (United Nations, 1953, p. 6; World Health Organization, 1950, p. 17). Mortality often varies at different stages of life, as it is commonly high among infants and elders. In this chapter level and trends of mortality in Punjab have been discussed. To observe the pattern of mortality by age various measurements of mortality i.e. age specific mortality, mortality among children (under 10 years), infant mortality, neo natal mortality, early neo natal mortality, perinatal mortality have been discussed. The other important factor which affects pattern of mortality is Sex as mortality rate varies in males and females. It also varies in rural and urban area. It is considered that mortality is high in rural areas as compare to urban areas. Mortality among army and prisoners has also been examined in this chapter which was one of the main concerns for the British government.

The data used in this chapter was collected from national archives of India, New Delhi. Major source of data like annual Sanitary Commissioner reports of India for various years, annual report of the Public Health Commissioner with the government of India, Reports of Malaria Bureau of Punjab from 1913 to 1918 have been used.

#### 3.2. Level and Trends of mortality

The mortality data of Punjab had been recorded since 1867. In the early days of registration under-reporting was a big issue. As a result, it seemed that the death rate was lower in this study area. A straight and common measure of mortality is crude death rate (CDR). This rate expresses as the number of deaths during the year to the mid- year population of that year (Barclay, 1958). Here is Table 3:1 given annual crude death rate in Punjab.

**Table 3:1 Crude Death Rates in Punjab, 1868-1940**

Years	Crude Death Rates	Years	Crude Death Rates
1868	16.0	1905	47.9
1869	26.5	1906	36.9
1870	24.8	1907	62.9
1871	21.5	1908	51.6
1872	25.8	1909	30.9
1873	21.4	1910	33.3
1874	18.9	1911	34.1
1875	26.9	1912	26.6
1876	30.2	1913	30.2
1877	20.6	1914	32.0
1878	37.8	1915	36.3
1879	38.8	1916	30.7
1880	27.1	1917	37.9
1881	30.7	1918	81.0
1882	27.2	1919	28.3
1883	25.4	1920	28.6
1884	37.5	1921	30.1
1885	28.3	1922	22.1
1886	27.8	1923	30.9
1887	36.0	1924	43.4
1888	31.0	1925	30.0
1889	32.1	1926	36.5
1890	49.8	1927	27.5
1891	29.4	1928	24.7
1892	50.2	1929	28.8
1893	29.0	1930	29.7
1894	38.3	1931	26.0
1895	29.4	1932	24.7
1896	30.8	1933	28.2
1897	31.3	1934	27.7
1898	31.7	1935	24.9
1899	29.8	1936	24.0
1900	50.9	1937	23.7
1901	36.7	1938	23.3
1902	45.1	1939	22.1
1903	50.2	1940	23.7
1904	50.6		

Source: SCR, various years

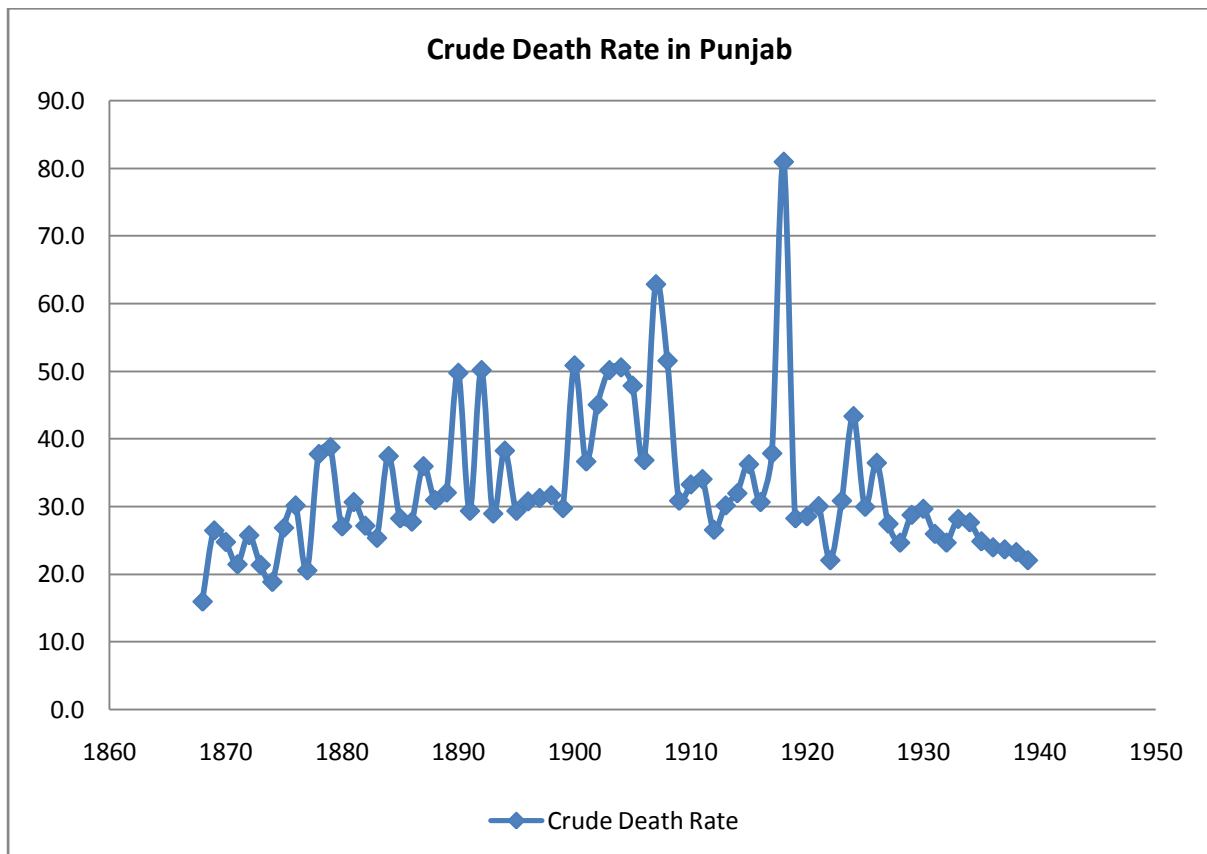
The Table 3:1 depicts that the CDR often increased during the unhealthy years. In 1868 CDR was only 16.0 per mille which seems very low due to the highly under reporting of deaths. In 1878 and 1879 CDRs were 37.8 and 38.8 per mille respectively. During both of these years smallpox epidemic occurred in Punjab. Moreover cholera epidemic also broke out there in 1879. During the decade of 1880s there was a sharp fluctuation in deaths. In 1890 CDR raised to 49.8 per thousand of population. In 1892 CDR raised to 50.2 per mille against 29.4 per mille in preceding year as it was cholera and smallpox epidemic year (SCR 1907). There were two severe famines in Punjab in 1896 and 1900. Although 1896 was declared as famine year, the CDR was only 30.8 per mille, but in 1900 it was recorded 50.9 per mille. CDR decreased in 1901 but again increased in 1902. This time plague epidemic broke out in the province and continued till 1907 excluding 1906. In 1907 CDR was 62.2 per mille; this was the highest CDR since the data started being recorded. 1908 was malaria year (as mentioned earlier); therefore the CDR was 51.6 per mille. 1909, 1910 and 1911 were relatively healthy years. In 1912 and 1913 there was smallpox epidemic<sup>7</sup> but it could not resulted in high CDR. In 1915 CDR reached to 36.3 per mille, cholera and plague epidemic broke out this time. After a healthy year of 1916 there was again malaria epidemic in 1917 which raised the CDR to 37.9. The world famous influenza epidemic raised the CDR to its highest point. In the history of Punjab the CDR never touch the number eighty, neither before and nor after it. Thereafter CDR tended to fall. However there was mild epidemic of plague arose during 1924 and 1926. The following figure depicts the trend of mortality in colonial Punjab from 1868 to 1940.

The figure on next page illustrates that the trend in CDR is not linear. Apart from the reason of under registration, epidemic outbreaks and famine became the cause of this fluctuation. Till 1920s there was sharp fluctuation. Thereafter the mortality started shrinking. There was little boost in CDR due to plague epidemic during 1924 and 1926. Despite this little fluctuation there was smooth fall in CDR.

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<sup>7</sup> Details are discussed in 4<sup>th</sup> chapter.

**Figure 3.1 Crude Death Rates in Punjab, 1868-1940**



Source: *ibid.*

### 3.3. Pattern of mortality

Crude death rate gives us a general idea about mortality. But it is crude in its quality as it is unable to define the distribution of mortality. It does not help us know the pattern of mortality. To know the importance of pattern of mortality let's take an example. Assume that a CDR of exactly 25 per 1000 has been observed for two different countries respectively. In first glance it seems that the level of mortality in both countries is same. But it may be quite possible that in one of them infant deaths are high and in another contribution of deaths among elders is high. Therefore, to observe the structure of mortality of any area, it is better to understand the pattern of mortality of that area. Pattern of mortality is mainly affected by age, sex, and living place of population for example in rural or urban area.

#### 3.3.1. Pattern of mortality by Age

Age is one of the significant factors in mortality determinants. Infants and population above 60s are more vulnerable. Therefore mortality is very high at both the extremes of the life span. To analysis age pattern of mortality; Age Specific Death Rate (ASDR) is an important measurement of mortality. The age- specific death rate (ASDR) is one of the most frequently

used indexes of mortality. An ASDR is defined conventionally as the number of deaths of persons of a given age during a year per 1000 of the midyear population at that age.

**Table 3:2 Age Specific Death Rates according to Sex in Punjab, 1888, 1891, 1907, 1938, 1939**

Age - group	1888*		1891*		1907*		1938		1939	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
under 1 year <sup>1</sup>	225.75	219.88	160.29	152.02	307.80	305.96	214.58	178.07	203.04	165.49
1-5 years	63.75	62.69	44.70	45.35	75.83	80.66	41.92	39.20	39.7	37.1
5-10 years	12.60	13.20	10.46	10.71	30.68	38.31	8.62	8.78	8.0	8.2
10-15 years	7.29	8.61	7.19	8.36	32.86	47.25	6.41	7.48	5.4	6.5
15-20 years	8.57	9.85	8.96	10.33	37.98	44.11	7.75	9.56	7.1	8.6
20-30 years	11.27	12.56	12.31	13.24	38.51	40.85	6.70	8.86	6.3	8.6
30-40 years	13.67	14.92	15.80	16.75	43.05	48.43	8.48	10.82	6.8	10.2
40-50 years	21.29	19.10	25.66	22.83	55.69	59.10	13.51	14.12	12.9	13.5
50-60 years	34.08	31.00	39.77	33.86	72.03	76.88	23.03	23.91	23.4	23.7
60 years and above	83.40	81.60	107.94	102.21	123.99	134.63	64.72	68.50	65.5	67.1

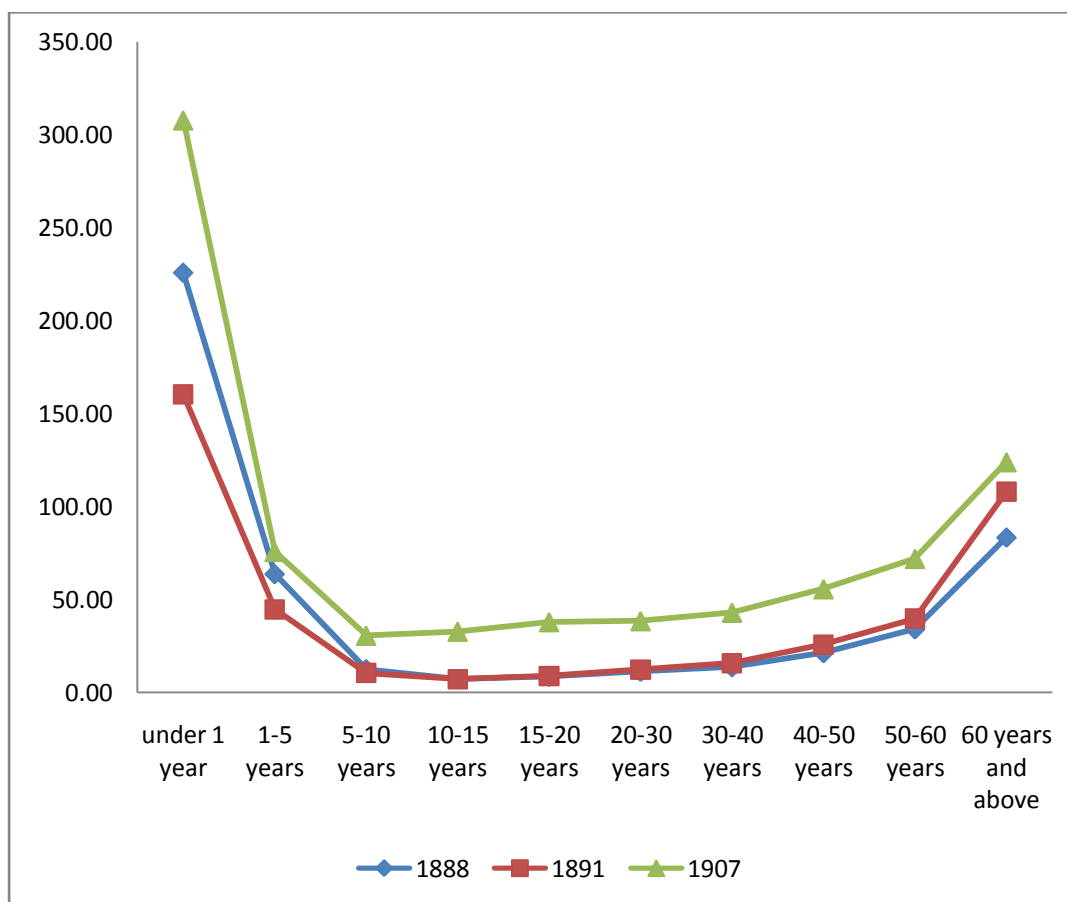
Source: SCR, Various years

Note:\* For the year 1888, 1891 and 1907 not sure whether this is actually age-specific death rate or not. As for these years the death rates have been given as death ratio per 1000 population. There was population given as registered population, without mentioning mid -year population. However for the year 1938 and 1939 denominator used is estimated mid -year populations respectively.

1. Rates given under 1 year for the year 1888, 1891 and 1907 are also doubtful. As it is not cleared whether these death rate under 1 year or actually infant deaths per 1000 live births

The Table 3:2 presents the age specific death rate for males and females for Punjab province. And Figure 3.2 presents ASDR for males for the same. It may be observed that ASDRs were higher at age under one year than any other age group for both sexes. The death rate suddenly went down for the group of 1-5 years and then gradually decreases up to the age group 10-15. The lowest values of ASDRs were observed for the age group 10-15 except 1907, where this was 5-10 years age group. After the age of 15, the values of ASDRs gradually increased up to age 40-50, and then rise steeply at higher ages. It may be observed from figure 3.1 that the typical age specific mortality curve is roughly U- shaped, which indicates that the mortality is very high at both the extremes of life span i.e. in infancy and in old age.

**Figure 3.2 Age Specific Death Rates in Punjab, 1888, 1891, 1907**



Source: *ibid.*

About one half of the deaths are of children, and another one-fifth of those over 50; the adolescents and adults together account for the remaining one-third. It is disturbing to see child mortality so high, and that it is increasing relative to the other stages of life.

The table given below shows the quinquennial average deaths in each stage of life.

**Table 3:3 Quinquennial averages of Deaths at different stage of life in Punjab, 1901-1940**

	under 10 years	10- 20 years	20-50	above 50
1901-1905	43.3	10.0	25.6	21.1
1906-1910	46.8	9.3	23.8	20.1
1911-1915	50.9	8.6	21.2	19.3
1916-1920	46.0	9.1	25.1	19.8
1921-1925	47.8	9.6	21.5	21.1
1926-1930	48.8	9.8	21.1	20.3
1931-1935	51.6	8.7	19.3	20.4
1939-1940	56.4	7.1	16.3	20.2

Source: Public Health Reports of Punjab, 1901-1940

### **Mortality among children**

Mortality among children gains importance as in this group mortality is extremely high especially in developing countries. Reduction in mortality among children under-five by two thirds between 1990 and 2015, is one of the important goals of Millennium Development Goal (2010). In India infant mortality rate (IMR) is 40 per 1000 live births (SRS, 2014). For Punjab this data is 26 per 1000. In the past, the condition was more dreadful. In 1918 IMR was 262.68 in Punjab which is ten times of present IMR. In those days children were more vulnerable to death. As in Figure 3.2 has been shown, till age of ten years mortality was very high. Here is the table given, showing proportion of child mortality in total deaths.

**Table 3:4 Deaths and Death Ratio under 10 years in Punjab, 1938, 1939**

	Total Deaths	Deaths under 1 year	% of total deaths	Deaths 1-5 years	% of total deaths	Deaths 5-10 years	% of total deaths	Deaths under 10 years	% of total deaths
1938	622699	194508	31.2	131131	21.1	30818	4.9	356457	57.2
1939	603192	186273	30.9	126602	21.0	29370	4.9	342245	56.7

Source: PHCR 1938,1939

As the Table 3:4 showing, 56-57 percent of total deaths were occurred under 10 years. Within this group it is under 1 year and 1 -5 years age group that contributed more than 50 percent of the total deaths.

### **Infant Mortality**

The mortality of newly born babies who have not yet reached their first birthday is known as infant mortality. Although infant mortality receives the most attention yet it is vague in record keeping.

However the given data is already available as IMR. The appalling wastage of life before the babies reach their first birthday will be seen from the following table which also shows for each sex the rate of infantile mortality per 1,000 birth (in the sex) registered for 1901-1940 year.



**Table 3:5 Infant Mortality Rates in Punjab, 1901-1940**

Years	Male	Female	Total
1901	246.00	260.00	252.55
1902	233.43	241.84	237.06
1903	260.00	270.00	265.02
1904	224.00	229.00	225.94
1905	234.00	236.00	235.05
1906	230.00	240.00	234.94
1907	244.00	248.00	245.78
1908	305.00	322.00	313.23
1909	228.00	231.00	229.83
1910	199.00	200.00	199.84
1911	200.86	196.17	198.52
1912	195.10	194.57	194.85
1913	217.61	216.13	216.91
1914	208.98	211.38	210.12
1915	188.02	189.17	188.57
1916	201.79	198.47	200.21
1917	247.35	218.60	247.95
1918	261.19	264.36	262.69
1919	189.33	188.04	188.73
1920	186.32	178.65	182.69
1921	195.51	187.27	191.61
1922	169.58	163.58	166.75
1923	198.43	194.59	196.62
1924	213.75	211.23	212.57
1925	189.33	185.90	187.71
1926	206.30	200.23	203.43
1927	171.27	163.29	167.50
1928	171.55	163.25	167.62
1929	189.79	182.18	186.20
1930	189.14	181.90	185.73
1931	182.66	173.35	178.25
1932	182.80	173.72	178.52
1933	195.13	189.66	192.55
1934	192.35	184.86	187.40
1935	159.67	150.16	155.19
1936	163.85	152.21	158.44
1937	169.77	155.38	163.04
1938	173.47	159.46	166.84
1939	174.88	159.35	167.57
1940	183.76	172.00	178.22

Source: PHR, 1901-1940

From 1901 to 1940 annual average infant mortality for both sexes was 203.06 per thousand of live birth. The rate in the early years as well as in 1918 was very high but in later years it has tended to be lower. The highest rate was 313.23 in 1908 which was malaria epidemic year (Malaria Bureau Report Punjab, 1916) and the lowest was 155.19 in 1935. The mortality rates in the above table till 1910; females have higher mortality rate than males. Biologically male infants are more vulnerable. Mortality by sex has changed. Since 1911 male infant mortality was higher than females. Except 1915 and 1918 where female infant mortality rate was more than that of male infant. The mothers internalise the cultural norms in their infancy and early age. It leads them to give priority to their sons and husbands over daughters and their own self in every respect. Such self-effacement partly contributes to the higher IMR of females.

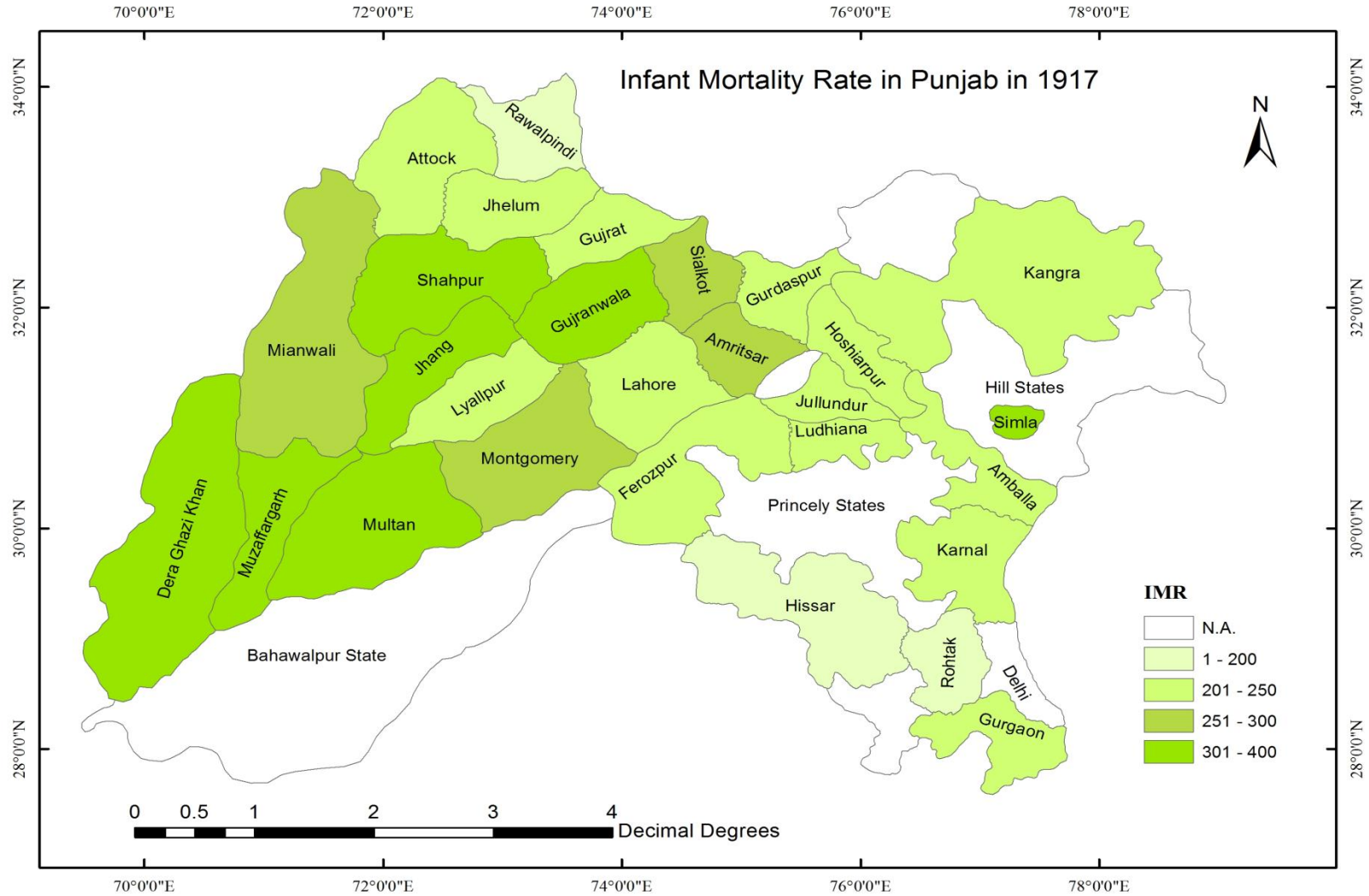
After 1908 next highest IMR was in 1918 (262.69) and 1917 (247.95). Since 1917 was a malaria year and 1918 was malaria and influenza epidemic year. Here data is given for IMR and infant death in Punjab at district level for the year 1917 and 1918. District level data has lots of variance in these two years. By observing this data one could find that influenza epidemic did not have much effect on infant mortality as malaria.

**Table 3:6 Infant Mortality Rates and Infant Deaths at District level in Punjab, 1917, 1918**

District	Infant mortality Rate		Infant Deaths	
	1918	1917	1918	1917
Hissar	251.00	188.22	8749	7496
Rohtak	327.20	190.89	11498	7562
Gurgaon	388.60	240.36	10167	9649
Karnal	284.70	207.75	11679	8666
Amballa	276.65	222.77	7509	6306
Simla	343.67	340.64	255	264
Kangra	254.96	228.73	7216	6451
Hoshiarpur	241.00	213.46	8787	8584
Jullundur	278.00	233.75	9579	8678
Ludhiana	327.10	229.01	7697	6279
Ferozpur	280.89	224.79	11193	10698
Lahore	257.05	240.64	11065	12232
Amritsar	262.76	266.81	9878	12223
Gurdaspur	236.90	230.28	9020	9414
Sialkot	207.37	251.29	8856	11460
Gujranwala	240.08	336.52	8149	12794
Gujrat	228.13	217.77	6599	6771
Shahpur	241.80	301.52	5279	8068
Jhelum	194.51	200.58	3206	3528
Rawalpindi	233.05	199.8	4279	3800
Attock	133.33	204.88	3336	3897
Mianwali	251.47	291.01	3376	3726
Montgomery	289.95	296.77	5260	7409
Lyallpur	252.46	232.31	9874	10223
Jhang	290.85	319.43	6023	7285
Multan	274.38	345.62	6582	11660
Muzaffargarh	229.54	383.33	3468	7332
Dera Ghazi Khan	264.80	350.29	2499	4930
Punjab	262.68	247.94	201078	217385

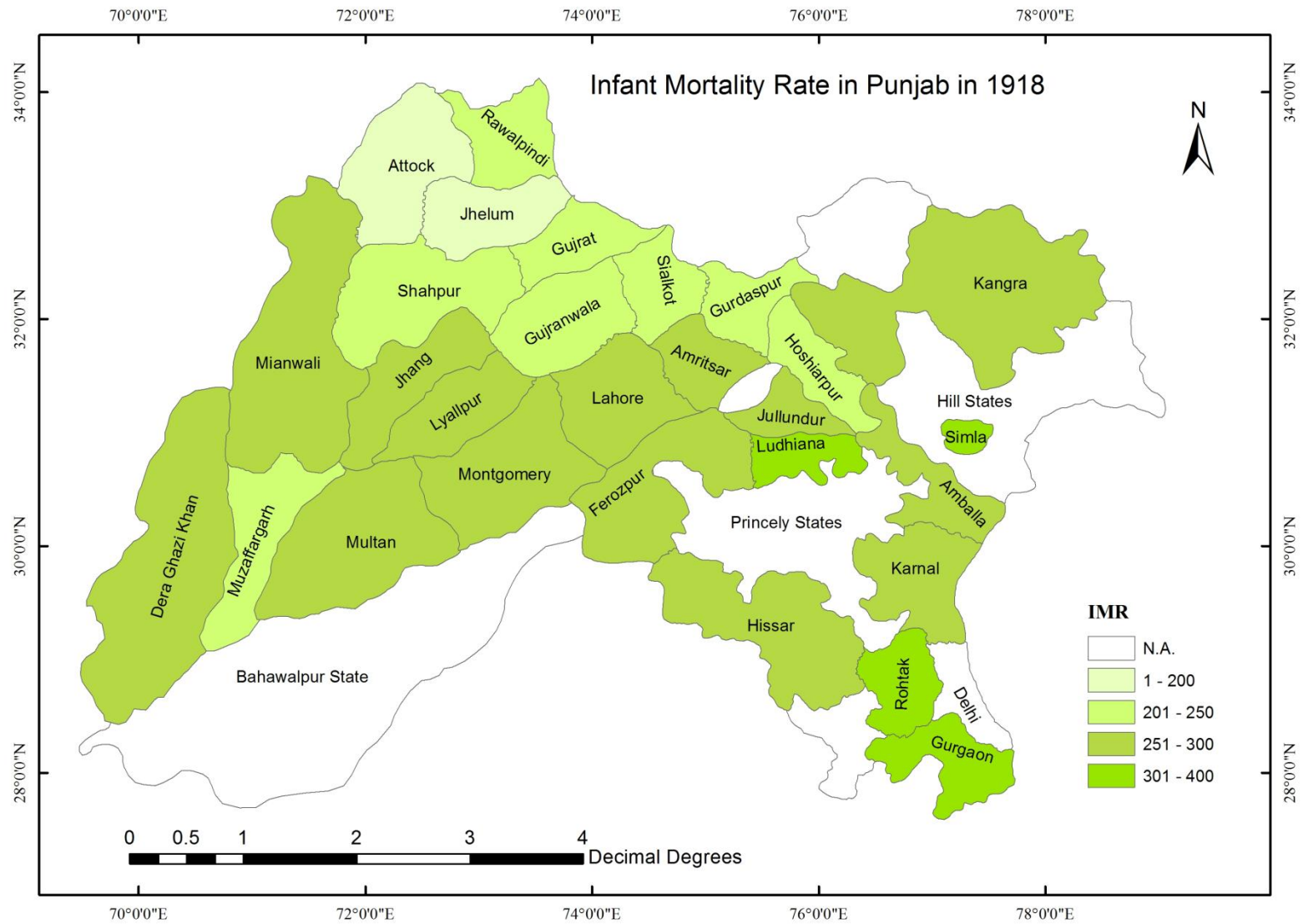
Source: Malaria Bureau of Punjab report 1917, 1918

**Map 3:1 Infant Mortality Rates in Punjab, 1917**



Source: Malaria Bureau Punjab report, 1917

**Map 3:2 Infant Mortality Rates in Punjab, 1918**



Source: Malaria Bureau Punjab report ,1918

After observing the Table 3:6 and Map 3:1 and Map 3:2 it is clear that the total infant deaths decreased in 1918 in Punjab. There were 16307 less infant deaths in 1918 as compare to 1917. However IMR increased to 262.68 as compare to 247.94 in 1917. Out of 28 districts of province, in 17 districts infant deaths decreased in 1918. In Muzaffargarh, Dera Ghazi Khan and Multan district this number decreased almost 50 percent. In central and west Punjab infant deaths decreased, whereas Rawalpindi district was exception where 479 more infant deaths were registered as against 1917. In the eastern district of Punjab infant death increased in 1918. In Rohtak 11498 infant deaths recorded, it was 50 percent more than in 1917. In this part Simla was an exception with 3 less infant deaths in 1918 though its IMR was still high (343.67). In the context of IMR there were many twists in Punjab. In Gurdaspur, Gujrat, Lahore and Lyallpur actual number of infant deaths decreased but their IMR increased. In Gurgaon only 518 more cases were recorded but its IMR was increased to 388.60 in 1918 from 240.36 in 1917. As the Map 3:1 and Map 3:2 are showing that only 4 districts in 1917 and 14 in 1918 were lying in the IMR group 251-300. In 1917 there was high concern of IMR in western districts of Punjab that is changed in 1918. Now eastern districts were recorded with high IMR.

According to Punjab malaria bureau reports (1918) malaria was major reason for infant deaths than influenza.

*“The remark to the effect that there is no disease in the Punjab comparable to malaria as a cause of sickness and mortality is not applicable to the year under review which was unique, by reason of an appalling ‘visitation of influenza in epidemic form.’”*

Although it is difficult to find out the reasons of infant mortality as data was not available for the causes of infant deaths. Yet there were some reports which addressed the causes of such alarming IMR. DR. S. ROZDON who was Health Officer in Amritsar during 1912 reported that these were the reasons which were responsible for higher IMR; Entire disregard on the part of the mother about the science of child-rearing and infant hygiene. (b) Ignorance about the life they should lead during pregnancy. (c) Unconscious bringing up of children on the poorest quality of sophisticated and skimmed milk as sold in the streets. (d) Quack midwives being easily procurable are commonly favoured. (e) Diseases like smallpox and malaria. (f) Overcrowding.

**Table 3:7 Registered Numbers of Births, Deaths under one year and Infant Mortality Rates in Punjab States, 1938, 1939**

Punjab States	Births		Deaths under one year		Infantile mortality per 1000 Live Births	
	1938	1939	1938	1939	1938	1939
Patiala	72472	66469	8056	10722	111.2	161.3
Nabha	8177	7783	253	300	30.9	38.5
Kapurthala	10350	9622	994	967	96.0	100.5
Bahawalpur	23720	23321	***	***	***	***
Jind	15897	14939	2311	2163	145.4	144.8
Sirmoor	2787	2218	454	331	162.9	149.2
Faridkot	8827	8920	1383	1386	156.7	155.4
Malerkotla	2515	2229	196	324	77.9	145.4
Chamba	1919	1926	8	8	4.2	4.2
Kalsia	2645	2253	384	371	145.2	164.7
Pataudi	988	912	155	330	156.9	361.8
Dujana	1162	***	227	***	195.4	***
Nalagarh	842	1024	118	146	140.1	142.6
Mandi	7553	6739	1101	885	145.8	131.3
Suket	1507	1284	***	126	***	98.1
Bilaspur	3719	2805	603	579	162.1	206.4

Source: PHCR 1938, 1939

Note: \*\*\* Data not available

According to Table 3:7, infant mortality rates were increased in all states except in Jind, Sirmoor, Faridkot and Mandi in 1939. Interestingly number of registered births decreased in all states except Faridkot and Nalagarh. Chamba recorded least IMR (only 4.2) for both years. It is hard to believe on such a tiny amount. The infant mortality rate in most of the native states of Punjab was less than Punjab province that was 166.84 and 167.57 in 1938 and 1939 respectively (Table 3:5). This might be due to under registration in Punjab states. In 1938 only in Dujana state the IMR (195.4) was higher than Punjab province. In 1939 it was Patudi (361.8) and Bilaspur (206.4), which reported higher IMR than Punjab province.

### Neo-natal Mortality

The mortality occurred from the birth to first four weeks or 28 days of life is known as the neo-natal mortality.

$$NMR = \frac{Dn}{B} * 1000$$

Where is

*NMR* = Neo natal mortality rate

*Dn* = total number of deaths occurred within 28 days (one month in this study)

*B* = total number of live births

$$PNMR = \frac{Dn}{B} * 1000$$

Where is

*PNMR* = Post Neo natal mortality rate

*Dn* = total number of deaths occurred after one month of birth and before completing twelve

*B* = total number of live births

**Table 3:8 Neo natal Mortality and Post Neo natal Mortality in Punjab, 1938, 1939**

		Under 1 month		1 to 12 months		Total deaths under 1 year	No. of live Births
		Number	NMR*	Number	PNMR*		
British India	1938	735555	78.27	834641	88.81	1570196	9398011
	1939	687880	73.60	766798	82.04	1454678	9346145
Punjab	1938	78528	67.36	115980	99.48	194508	1165837
	1939	72232	64.98	114041	102.59	186273	1111604

Source: ibid

Note: 1. As per availability of data, this NMR is based on deaths under one month instead of 28 days

Neonatal and post neonatal mortality as shown in Table 3:8 are high and this rate increases till the child has not completed even 1<sup>st</sup> year of his birth because by that time his immune system was developing. Compare to British India NMR was less in Punjab in both given years. However PNMR was high in Punjab than that of India. Almost 40 % of infant death took place within one month.

### Early Neo- natal mortality

The mortality of live births during the first week of life is called early neo- natal mortality.

The first week in life seems to be the most critical and over two fifths of those who die within the first year, pass away within seven days of birth. This is very difficult to examine the



actual early neonatal mortality, as most of the babies who die very soon after birth, may not be registered either at birth or on death.

$$ENMR = \frac{Dn}{B} * 1000$$

Where is

ENMR = Early neo-natal mortality rate

$Dn$  = total number of deaths occurred within 7 days or one week

$B$  = total number of live births

And deaths which take place after one week of birth and before completing of one month called late neo natal mortality.

$$LNMR = \frac{Dn}{B} * 1000$$

Where is

LNMR = Late neo-natal mortality rate

$Dn$  = total number of deaths occurred during after one week of life and before one month

$B$  = total number of live births

**Table 3:9 Early Neo- natal Mortality and Late Neo- natal Mortality in Punjab and British India, 1938, 1939**

		Deaths under 1 week	ENMR	Deaths 1 week to 1 month	LNMR
British India	1938	444200	47.3	291355	31.00
	1939	420715	45.0	267165	28.59
Punjab	1938	43245	37.1	35283	30.26
	1939	39543	35.6	32689	29.41

Source: ibid

The ENMR and LNMR shown in Table 3:9 are very high. Out of total deaths under one month, more than 50 percent deaths were under one week. The major causes of ENMR are more biological than environmental. Maternal malnutrition is indirectly associated with neonatal and early neoneonatal mortality.

### Still Birth Rate and Perinatal Mortality Rate

Number of still births per thousand of live births and still births during the year called still birth rate.

$$SBR = \frac{Dn}{B} * 1000$$

Where is

*SBR* = Still Birth rate

*Dn* = total number of still Birth

*B* = total number of live births

Number of still births and infants deaths during first week of life per thousand of live births and still births during the year called perinatal mortality rate.

$$PMR = \frac{Dn}{B} * 1000$$

Where is

*PMR* = Perinatal mortality rate

*Dn* = total number of still births and infants deaths during first week of life

*B* = total number of live births and still births

**Table 3:10 Still Birth Rates and Perinatal Mortality Rates in British India and Punjab, 1938,1939**

years	No. of Still Birth			male still births per 100 female still births	SBR	PMR	
	Male	Female	Total				
British India	1938	111456	89092	200548	125	20.89	67.17
	1939	107258	85383	192641	126	20.20	64.30
Punjab	1938	5186	3411	8597	152	7.32	44.14
	1939	4633	2982	7615	155	6.80	42.13

Source: *ibid.*

According to report of DR. S. ROZDON (1912) these were the causes of still births; (a) The want of sufficient knowledge on the part of women about pregnancy. (b) Early marriage. (c) Diseases of women such as gonorrhoea, syphilis, etc. (d) Abortion. (e) Overwork during pregnancy.

### 3.3.2. Pattern of mortality by Sex

It has been observed that in most countries of the world, mortality conditions differ for males and females. The general experience is that females have an overall advantage over males with respect to mortality. But Punjab is exception as mortality was generally greater among women as compared to men. The average mortality rate of the men in the Punjab from 1901 to 1920 was 5.85 per mille while that of the women was 7.55. Similarly, in the case of fevers, the average annual death rate per mille for men was 21.75 while the corresponding figure for women was 23.95(Tandon, Sasha. 2013). There seems a link between the higher incidence of disease and mortality among women and the prevailing patriarchal structure. Compared to their male counterparts, women had less vaccination for plague and smallpox. This was due to ignorance as well as the general disregard for women's health. The upper classes always associated this to their 'honour' and 'custom'. The touch of a male physician was considered 'polluting' due to which the women refused or were not permitted by the family members to get inoculated. Also, the women were discouraged to get them vaccinated by the manner in which vaccination was carried. Often, they were dragged out of their homes. The vaccinators were not sensitive to the social susceptibilities of the women and were careless for their domestic privacy. Family considerations, along with poverty, restrictions on the movement of women, cost of medication and lack of time to travel long distances to reach medical institutions, were some inter-related factors which discouraged women from seeking medical aid. Consequently, the number of women was lesser than that of men, who received treatment in the government hospitals and dispensaries. From 1875 to 1885, of the total number of people going to dispensaries, the percentage of males varied between seventy and seventy-five, while the percentage of women was twenty-five to thirty per cent.

**Table 3:11 Deaths and Death Rates by Sex of age group 15-40 years in Punjab, 1938, 1939**

Year	Deaths		Deaths Rate	
	Male	Female	Male	Female
1938	43184	45508	7.5	9.6
1939	40670	43992	7.0	9.1

Source: ibid

According to the Table 3:11 female's death rate is high in the age group of 15-40. This is mainly because of their reproductive period. Also if we look at the Table 3:2 it clearly shows that the data of Punjab was not favourable for females. Although under five year age group

female death rate was lesser than that of males (except 1891 and 1907). After that in each age group it was higher than male.

### 3.3.3. Pattern of mortality by Rural, Urban area

According to the area specific i.e. rural or urban, the mortality pattern varied in different years. It was observed that the urban areas were benefited by various facilities (e.g. medical facility, transport, communication, water-supply etc). On the other hand rural areas were less benefited by these facilities. Despite being facilitated urban areas had other problem like overcrowded locations, polluted water and air, congested accommodation etc. which invite various diseases. Due to different area conditions some diseases were more prevalent in urban areas than in the rural e.g. respiratory diseases were more likely to occur in urban areas as compare to rural areas. The following table shows death rates in rural and urban areas of Punjab.

**Table 3:12 Death Rates in Rural and Urban area of Punjab, 1888-1940**

years	Rural	Urban	Rural	Urban
1888	29.0	36.0	***	***
1891	28.7	35.5	***	***
1907	62.9	54.7	***	***
1932#	24.9	22.7	509740	69642
1933	28.9	22.3	592092	68450
1934	28.4	21.8	582821	66954
1935	25.2	21.6	517577	66262
1936	24.2	21.2	497336	64956
1937	23.8	22.0	488845	67423
1938	26.8	23.4	550765	71934
1939	26.0	22.8	533268	69924
1940	28.4	24.8	581743	76225

Source: SCR, Various years

Note # since 1932 death rates are as per according to census 1931

\*\*\* Data Not Available

According to Table 3:12 in 1888 and 1891 in urban area death rate was higher than rural death rate. It could be due less reporting in rural area. However later it was higher in rural area.

The occurrence of malaria, plague and cholera epidemics was greater in the rural areas in Punjab. In 1882, the fever death rate in the rural areas was 18.50 per mille while in the urban areas it was 17.14 per mille. The rural population was more exposed to humid and swampy conditions, which were conducive for the breeding of mosquitoes. The lack of funds

prevented drainage work and filling up of ponds and pools around the villages. In general, there was shortage of medical aid and personnel as well. On the whole, people lacked information about the cause of the disease and the preventive measures to be adopted.

From 1868 to 1890, the average mortality rate of cholera in the rural areas was 4.87 per mille whereas in the urban areas it was 1.06 per mille. The marked difference in the death rate from cholera in the rural areas was primarily due to the polluted drinking water which was obtained from kuchha tanks or shallow wells. Also, the food sold in the villages was reported to be contaminated and unhygienic as the bylaws for the sale of milk, butter and other food articles were hardly operative in the rural areas and were increasingly being adopted by the municipalities in the urban areas,.

The plague too was largely a rural phenomenon. The plague death rate in rural Punjab was 6.30 per mille in excess of the urban deaths caused by the plague. The poorly ventilated, ill-built and congested houses facilitated a faster spread of the disease in the rural areas of Punjab. In the towns, food grains were not stored in the houses in larger quantities as in villages, which probably contributed towards a lesser presence of rats and, consequently, a lower incidence of the plague.

**Table 3:13 Death Rates from certain Causes of Mortality in Rural and Urban area of Punjab, 1938**

Cholera		Smallpox		Fevers		Dysentery and Diarrhoea		Respiratory Diseases	
Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
0.2	0.2	0.2	0.2	16.4	8.9	0.3	1.2	2.7	4.7

Source: PHCR 1938

As the Table 3:13 showing that there is not much difference in rural, urban deaths due to cholera and smallpox. But the data of fever death rates for rural is almost double than the death rate in urban areas. Deaths from Dysentery and Diarrhoea were high in urban areas. Also Respiratory deaths were higher in urban areas. The table shows that it was almost double than rural areas.

### 3.4. Mortality among army

During the colonial period, public health measures were focused largely on protecting British civilians and army cantonments. A series of measures ensured that the British civilians lived in residentially segregated areas with good environmental sanitation, good management of water, disposal of solid and liquid waste etc. Even though, in colonial India Britishers were more concerned for mortality among army, especially for European army. Therefore there is huge data available for the mortality of army and also for their families. However the quality of data is not rich as in present days. This could be due to lack of techniques used for data collecting. The army of Punjab province was under Bengal Presidency in colonial time.

**Table 3:14 Sickness, Mortality and Invaliding in European Army of Punjab, 1895-1903**

	Average Strength	Admissions into Hospital				Constantly Sick	Death Ratio per 1,000			
		Fevers, (chiefly Intermittent)	Cholera	All other Diseases	Total		Enteric Fever	Cholera	All other Causes	Total
1895	19,733	520	419	580	1,519	92	10.29	-	9.73	20.02
1896	18,823	329	395	558	1,282	84	6.11	0.16	7.33	13.60
1897	17,190	535	404	521	1,460	93	11.05	0.12	10.35	21.52
1898	18,388	698	269	591	1,558	90	14.74	0.54	12.35	27.63
1899	18,080	319	227	539	1,085	62	6.64	0.06	8.12	14.82
1900	16,562	376	236	473	1,085	65	4.35	1.15	7.12	12.62
1901	16,431	377	229	493	1,099	63	4.99	-	7.91	12.90
1902	15,636	315	218	517	1,050	62	5.05	-	9.02	14.07
1903	17,997	358	176	473	1,007	57	4.39	1.72	6.45	12.56

Source: Digital south Asia library (07/09/2014 5:33 p.m.)

In Punjab climate was more suitable for fever and cholera disease. Europeans were not habitual of tropical climate. Therefore it was very difficult for them to survive in such conditions. Generally soldiers passed away in wars. But in colonial Punjab a large proportion of army died due to disease, as it is clear in Table 3:14. Fever was the most reported disease as the cause of death. In 1898 almost fifteen percent died due to fever.

**Table 3:15 Death Rates among European and Native Army of Punjab, 1885-1888**

Years	European army	Native army
1885	12.67	6.34
1886	16.64	4.31
1887	13.63	4.94
1888	16.25	6.44

Source: *ibid.*

According to Table 3:15 European troop's death rate were higher than native troops in Punjab. Soldiers were well-fed, well-tended and reasonably educate population. The soldiers were also tolerably well housed. European soldiers were more paid than Indian soldiers (Sumit Guha, 1993). Sumit Guha argued in his work that it difference was high as European soldiers were not habitual of Indian environment. Although death rate of European army was higher than Native army yet it is still lower than general population (Table 3:1).

### **3.5. Mortality among prisoners**

The annual reports on prison administration in colonial India covered without interruption during the years 1867 to 1940. This gave as much space to the incidence of disease and the rate of mortality among the inmate population as perhaps any other issue in the running of the province's jails. This concern might be explained in a number of ways. For example, it is possible that the prison authorities' real interest was to maintain order and discipline, but it was considered that this would be far more difficult to achieve it if disease ran unchecked through the prison population and mortality rates were high. Or perhaps the authorities saw their prisons primarily as instruments of modernity and progress, in which the criminal would be disciplined, reformed, and rehabilitated, each of which required a measure of good health and well-being.

**Table 3:16 Mortality in Districts Jail of Punjab, 1888**

District Jails	Average Strength	Admissions	Death per 1000
Delhi	524	1954	24.81
Gurgaon	5	****	****
Rohtak	167	1701	29.94
Hissar	247	1142	28.34
Karnal	126	1190	7.94
Amaballa	540	1370	53.7
Simla	20	900	****
Ludhiana	236	699	25.42
Hoshiarpur	36	1417	****
Jullundur	275	822	10.91
Ferozepur	372	704	13.44
Amritsar	407	3528	36.86
Lahore Central	1751	1537	57.68
Lahore District	648	1219	38.58
Lahore Female	131	3389	7.63
Sialkot	391	317	2.56
Dharmasala	195	564	5.13
Gurdaspur	387	716	12.92
Gujranwala	998	1578	41.08
Chinawna	268	507	11.19
Gujrat	358	553	8.38
Shahpur	359	1106	36.21
Jhelum	359	1106	36.21
Montgomery	508	724	25.59
Jhang	291	557	17.18
Multan Central	22	2727	45.45
Multan District	702	491	12.82
Muzaffargarh	83	1313	****
Dera Ghazi Khan	284	535	14.08
Dera Ismail Khan	473	1605	19.03
Bannu	173	1815	52.02
Kohat	176	1295	17.05
Rawalpindi	773	1741	53.04
Abbottabad	66	1227	30.3
Peshawar	600	1995	16.67

Source: SCR, 1888

Amballa, Lahore central jail, Bannu and Rawalpindi are worst in mortality. On the other hand in Karnal, Sialkot, Gujrat death rate is low.



**Conclusion:**

Infant deaths were very high in Punjab, as it was 305 per thousand for male and 322 per thousand for female in 1908. It also should be kept in mind that child death especially infant deaths were underreported. However children were more vulnerable. Similarly females were more likely to be affected by diseases. Although biologically females are stronger than males, female mortality rested high in colonial Punjab.

In the context of rural and urban area, for a few diseases rural was prone area like cholera, plague, malaria. On the other hand, deaths due to dysentery and diarrhoea were high in urban area as compare to rural area. Mortality among European army was higher than native army. Although it was still lower than general population. Mortality was higher in prisoners than general population.

## Chapter-4

### Causes of Deaths

#### 4.1. Introduction

Punjab was one of the worst regions from the point of view of mortality. Colonial Punjab was noted for high mortality due to certain diseases like fever, smallpox, Cholera and plague. Mortality was high due to epidemics which broke out recurrently from 1850 to 1947. The chapter discusses the causes of death and pattern of cause specific death. However, the data is sketchy over the years. This is rather limited because of incomplete and inaccurate data.

The data used in this chapter has been collected from various sources. The annual reports of Sanitary Commission with the government of India and of the public health department of various years from national archives of India have been used. A number of data has been accessed from website: The Digital South Asia Library (DSAL) .The DSAL is a program of the University of Chicago and the Centre for Research Libraries. This is a global collaborative effort to make important and rare resources available to the international community.

There are different types of mortality measurement methods. Out of those methods, cause specific death ratios and rates are the tools to analyse the death statistics classified by cause. These two devices also help to compare the distribution of deaths by cause between two populations or to trace the time trend for a particular population.

“A **cause specific Death rate** is conventionally defined as the number of deaths from a given cause or group of causes during a year per 100000<sup>8</sup> of the midyear population.

$$= \frac{D_c}{P} * 100000$$

Where  $D_c$  represents deaths from a particular cause or group of causes, and  $P$  represents midyear population.” (Shryock, 1980,404 )

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<sup>8</sup> In this rate is available per 1000 instead of 100000

“A **cause specific Death ratio** represents the percent of all deaths due to a particular cause or group of causes. The death ratio for cause C is:

$$= \frac{D_c}{D} * 100$$

Where  $D_c$  represents deaths from a particular cause or group of causes, and  $D$  represents all deaths.” (Shryock, 1980, 404)

**Table 4:1 Cause Specific Death Rates per 100000 of Population of Various Provinces of British India, 1907**

Province \ Causes	Cholera	Smallpox	Plague	Fevers	Dysentery and Diarrhoea	Respiratory Diseases	Injuries	All Other Causes	Total
Lower Burma	130	28	107	1028	161	70	30	1117	2684
Upper Burma	14	46	112	753	47	64	45	1530	2613
Eastern Bengal and Assam	258	29	0.02	2117	68	9	35	412	2930
Bengal	407	57	165	2318	102	29	50	641	3772
U.P. and Oudh	47	47	690	2831	47	46	50	587	4346
Punjab	2	55	3027	2016	75	320	32	682	6210
North West Frontier	14	40	81	2744	29	99	35	469	3512
Ajmer- marwara	0.2	104	103	2331	104	78	44	300	2963
Central Provinces and Berar	36	32	318	1800	394	264	53	1273	4170
Bombay Presidency	41	10	506	1409	291	314	37	674	3282
Coorg	104	117	1	2695	208	43	7	341	3515
Madras Presidency	220	60	10	780	170	70	30	1090	2430

Source: SCR 1907

According to Table 4:1, Punjab was one of the worst regions affected by epidemics. Among the all provinces, Cause specific Death rate from all causes was highest in Punjab in 1907. Its mortality rate was the highest for the plague. Death rate was high also for respiratory disease. However, Cholera death rate was very low in that year.

**Table 4:2 Cause Specific Deaths among General Population of Punjab, 1894- 1947**

Causes Year	Cholera	Small Pox	Plague	Fevers*	Dysentery and Diarrhoea	Injuries	Respiratory Diseases	All other Causes	Total
1894	113	6,068	—	515,238	17,983	6,899	—	204,380	750,681
1895	549	8,334	—	392,118	15,648	6,754	—	178,569	601,972
1896	5,146	45,084	—	393,535	13,886	7,093	—	183,355	648,099
1897	622	16,077	179	422,826	15,851	7,265	—	175,407	638,227
1898	3	4,998	2,019	418,206	15,747	7,323	—	189,828	638,124
1899	1,816	5,149	255	381,689	13,410	7,064	—	198,342	607,725
1900	28,260	10,425	572	685,895	25,913	7,725	—	221,421	980,211
1901	180	6,154	14,959	508,035	14,722	6,303	—	176,258	726,611
1902	371	11,629	171,302	473,352	14,124	6,392	—	209,803	886,973
1903	14,688	15,635	205,462	509,307	16,498	6,581	—	217,305	985,476
1910	2,131	3,019	135,483	343,925	10,040	7,094	46,999	120,548	669,239
1911	1,260	5,024	175,345	302,417	11,713	6,762	45,294	124,104	671,919
1912	2,239	30,856	29,902	284,727	10,073	6,891	44,807	120,984	530,479
1913	5,811	38,687	17,877	331,698	11,065	6,925	44,943	126,778	583,784
1914	6,656	2,900	64,010	345,501	13,272	7,261	46,785	131,688	618,073
1915	13,196	1,694	221,966	284,784	12,558	6,893	47,193	114,266	702,550
1916	1,651	2,886	3,278	376,003	15,551	7,175	50,009	137,117	593,670
1917	1,365	1,417	8,775	510,812	15,571	7,154	54,392	133,623	733,109
1918	257	3,032	95,615	1,287,027	10,358	6,191	52,786	110,294	1,565,560
1919	8,561	15,365	11,068	365,045	8,639	6,896	37,813	94,683	548,070
1936¶	427	1,306	38	184,982	6,059	3,462	31,413	59,540	287,227
1937	93	816	4	189,338	4,938	2,771	30,664	55,710	284,334
1938	4,364	1,435	1	194,539	6,979	2,960	47,073	57,557	314,908
1939	18	2,543	—	215,576	6,683	3,272	48,421	51,694	328,207
1940	113	1,996	—	239,037	7,839	3,074	37,670	49,873	339,602
1941	512	348	—	244,120	7,829	2,964	34,895	48,364	339,032
1942	30	87	—	351,790	9,218	3,188	30,262	51,696	446,271
1943	174	410	1	286,092	5,350	2,555	31,379	40,390	366,351
1944	812	1,012	61	269,089	5,150	2,694	34,792	43,209	356,819
1945	884	741	203	210,571	4,814	2,603	29,484	44,057	293,357
1946	339	787	245	190,561	4,890	2,434	31,997	43,877	275,130
1947	2,017	1,448	1,905	184,690	6,117	3,517	31,659	41,138	272,491

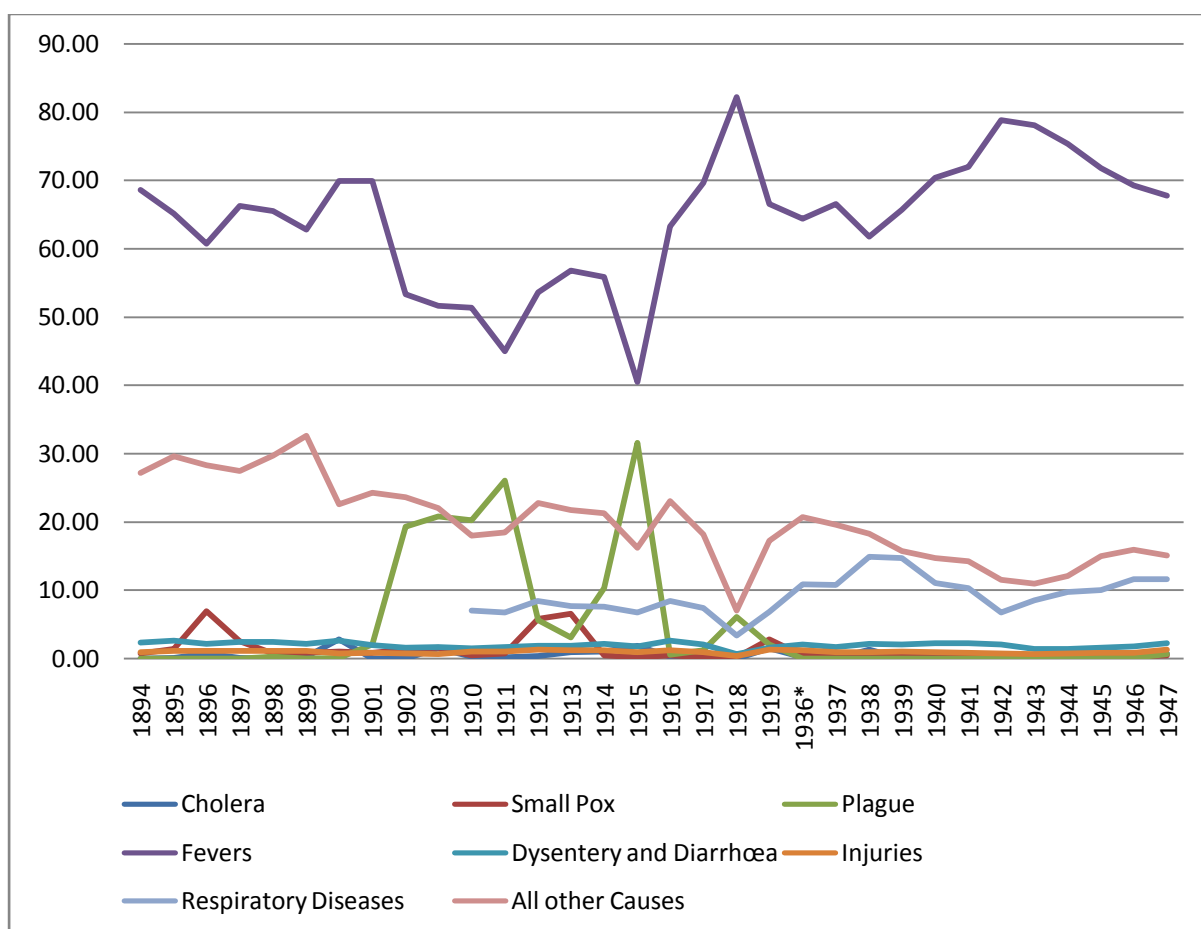
Source: Various Reports of Public Health Department

**Note:** \* Fever includes data for malaria, influenza, typhoid etc.

¶ 1936 onwards data is only for eastern Punjab (Indian part)

1896 and 1900 were the famine years. Many people died in 1896 due to smallpox. In 1900, a large number of deaths occurred due to Cholera. During 1901, only 180 deaths were registered in the Punjab from Cholera, against 28,260 of the epidemic outbreak of the disease in the previous year. Again in 1903, deaths due to Cholera raised to 14,688 and this year was also noted as the plague year. Out of 985,476 deaths which occurred in the province, 205,462 were the result of plague which caused the death count to be the highest in 1915. In 1918, there influenza epidemic broke out. Out of 1,565,560 deaths, 1,287,027 were reported as fever death. It should be noted that fever includes data for malaria, influenza, typhoid etc.

**Figure 4.1 Cause Specific Death Ratios among general Population of Punjab for 1894-1947**



Source: ibid.

Fever Death Ratios remained high from 1894 to 1947. This is because malaria, influenza, typhoid and other unknown reasons of death were reported as fever death. As 1918 was the influenza epidemic year, fever death ratio was more than 80. From 1900 to 1915, plague deaths were high. In 1915, plague death ratio was 31.59 which was the second highest after

fever. Respiratory diseases death ratio increased after 1936. Death ratio of all other causes contributed more deaths after fever. That is because of inaccuracy of data.

## 4.2. Cholera

Cholera is a communicable disease that causes frequent watery diarrhoea, which can lead to dehydration and the patient becomes very serious in hours and may lead to death if not cured. It is caused by eating food or drinking water contaminated with a bacterium called ‘Vibrio Cholerae’. The food or water gets infected by the infected stools, through files, clothes, hands, rats, etc., when a healthy person eats or drinks the infected food or drinks, the microbes enter the person’s body and grow inside. As the bacteria survive in the human body they attack the intestines and produce Cholera. The disease is most common in places with poor sanitation, crowding, war, and famine.

Twelve major Cholera epidemics broke out in the Punjab between 1866 and 1921(Tandon, Sasha. 2013). The districts most affected by Cholera were Gujranwala, Hazara, Rawalpindi, Ambala, Gurgaon, Lahore, Jullundur, Peshawar, Amritsar and Shahpur. The recurrence of Cholera in these areas was attributed to a large number of local and regional fairs.

**Table 4:3 Deaths from Cholera in Punjab, 1877 - 1946**

Years	Cholera
1877-1879	26379
1880-1884	6321
1885-1889	28528
1890-1894	90219
1895-1899	8136
1900-1904	44,215
1905-1909	20354
1910-1914	18,097
1915-1919	25,030
1920-1924	22843
1925-1929	18765
1930-1934	2524
1935-1939	8360
1940-1946*	4560

Source: SCR, Various years

Note: \* data not available for 1941, 1942 and 1943

As the Table 4:3 tells us that the Cholera was intense in 19<sup>th</sup> century. On an average, 5063 people died of Cholera annually from 1877 to 1946. Highest deaths recorded in 1890-1894 (90219) and lowest deaths recorded in 1930-1934(2524).

**Table 4:4 Deaths from Cholera in Punjab, 1877 - 1946**

Year	Cholera	Year	Cholera
1877	29	1909	1,191
1878	215	1910	2,131
1879	26135	1911	1,260
1880	271	1912	2,239
1881	5207	1913	5,811
1882	39	1914	6,656
1883	190	1915	13,196
1884	614	1916	1,651
1885	1936	1917	1,365
1886	12	1918	257
1887	8804	1919	8,561
1888	14938	1921	19215
1889	2838	1924	3351
1890	3401	1925	3049
1891	10107	1926	87
1892	75959	1927	11286
1893	639	1928	2034
1894	113	1929	2309
1895	549	1930	1181
1896	5,146	1931	391
1897	622	1932	614
1898	3	1933	160
1899	1,816	1934	178
1900	28,260	1935	714
1901	180	1936	1762
1902	371	1937	105
1903	14,688	1938	5760
1904	716	1939	19
1905	2,197	1940	189
1906	4,232	1944	2,317
1907	437	1945	1,285
1908	12,297	1946	769

Source: SCR, Various years

In 1892, 75959 deaths were reported as Cholera deaths while in 1898; only 3 deaths were reported as Cholera death. Compared with this figure there were 15 years which show a higher incidence and 59 years that show lower rate. The particularly bad years were 1879 (26135), 1888 (114688), 1891 (10107), 1892 (75959), 1900 (28260), 1903 (14688 deaths), 1908 (12,297), 1915 (13,196), 1921 (19,215) and 1927 (11,286). Cholera has never been entirely vanished from the province since records have been kept, but its occurrence in

epidemic form almost invariably coincides with the holding of the *Kumbh*<sup>9</sup> Fair at Hardwar. From this fair the disease was imported into the Punjab by returning pilgrims who spread the infection throughout the province (Public Health Report, 1924). Whereas in non-*Kumbh mela* years deaths from Cholera can be counted in hundreds or less, in *mela* years the deaths could be counted in thousand. All these deaths were marked by overcrowding, insanitary conditions and as well as by inadequate and contaminated water supply.

Until 1930, Cholera epidemic broke out recurrently. Later deaths from Cholera started decreasing. A *Kumbh Mela* was held in 1938 during which deaths from Cholera were recorded as 5760 which was much lesser as compare to 1921 when the *Adh-Kumbh mela* was held and 19215 deaths were recorded. This difference was the result of the introduction of vaccine and good water supply and due to which cases of Cholera started reducing (Public Health report. 1930).

### **4.3. Smallpox**

Smallpox is a very serious disease which spreads through ‘Virola Virus’. It travels through extra disposal of the patients or through the smallpox spots. Even a healthy attendant can be infected from a smallpox patient. This fatal disease took heavy toll of lives, blinded lakh of people and made several people ugly. It left far-reaching effects on the affected ones and they carried these impressions throughout their life.

Smallpox was regarded as goddess in India. It is believed that smallpox is a phase which everyone has to pass through as per the consent of Goddess named *Sitla* and everyone has to face her once in the whole life. In general smallpox was not considered as a disease but it used to be called *Mata* or mother. The body heat of patient caused by the fever was often considered as the divine heat of goddess.

In Gurgaon, district of Punjab, there is temple of goddess *Sitla*. Pilgrims visited to *Sitla Mata* temple in the month of March or *Cheitra* according to Hindu calendar. Basically March was the month of beginning of smallpox (Arnold, David 1993),

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<sup>9</sup> There are four *Kumbh Melas* in a twelve year period held at Hardwar, Allahabad, Ujjain and Nasik respectively, every three year. Originally the fair was all assemblage of religious leaders to decide certain, matters relating to the Hindu religion. Every twelve and six year there is full *Kumbh Mela* and *Adh-Kumbh Mela* held respectively.



**Table 4:5 Deaths from Smallpox in Punjab, 1865-1943**

Years	No. of Deaths	Years	No. of Deaths
1865	65595	1905	4722
1866	30615	1906	13239
1867	21298	1907	11082
1868	23759	1908	28652
1869	53192*	1909	3349
1870	27163	1910	3019
1871	25534	1911	5024
1872	23738*	1912	30339
1873	25699	1913	38687
1874	12026	1914	2900
1875	13611	1915	1694
1876	10254	1916	2885
1877	12296	1917	1417
1878	40271	1918	3032
1879	49489	1919	15365
1880	9145	1920	9319*
1881	6749	1921	4575
1882	6379	1922	1608
1883	12103	1923	2140*
1884	16416	1924	4040
1885	7575	1925	7038
1886	10771*	1926	17595
1887	16382	1927	9920
1888	16938	1928	8764
1889	7928	1929	7763
1890	8922	1930	5341
1891	3426	1931	3646
1892	11173	1932	5184
1893	4085	1933	11626
1894	6068	1934	1692
1895	8334	1935	1822
1896	45084	1936	2613
1897	16076	1937	3991
1898	4998	1938	5455
1899	5149	1939	4311
1900	10425	1940	4074
1901	6154	1941	1492
1902	11629	1942	754
1903	15635	1943	783
1904	9632		

Source: SCR, Various years

Note: \* Data is illegible in sources; however it is best of author's knowledge.

Smallpox accounted for 1002668 deaths in the region from 1868 to 1943. Smallpox broke out with maximum intensity from 1875 to 1919 when nine major epidemics of smallpox affected twenty-seven districts. The average annual smallpox deaths were considerably higher than the rest of the provinces of British India (Arnold, David 1993).

During 1880, a significant decrease is shown in the mortality from smallpox, the total deaths amounting to 9,145, the lowest number ever yet registered from the disease since the introduction of the registration system in 1868. These figures show a very complete subsidence of the epidemic activity of the disease during the two previous years, when the number of deaths registered from smallpox rose to 40,271 in 1878, and 49,489 in 1879, against 12,296 in 1877 and 10,254 in 1876, which last was the next lowest mortality from this disease registered in any year since 1868 (The British Medical Journal, 1882).

Smallpox is normally more prevalent in Urban than in Rural areas and the year under report proved no exception to the rule since the urban death-rate was 0.51 *per mille* as compared with 0.23 *per mille* in the rural areas. The higher death rate in towns may partly be due to more complete reporting but it is probable that the congestion prevailing in urban areas is responsible for the greater exposure to infection of the urban population.

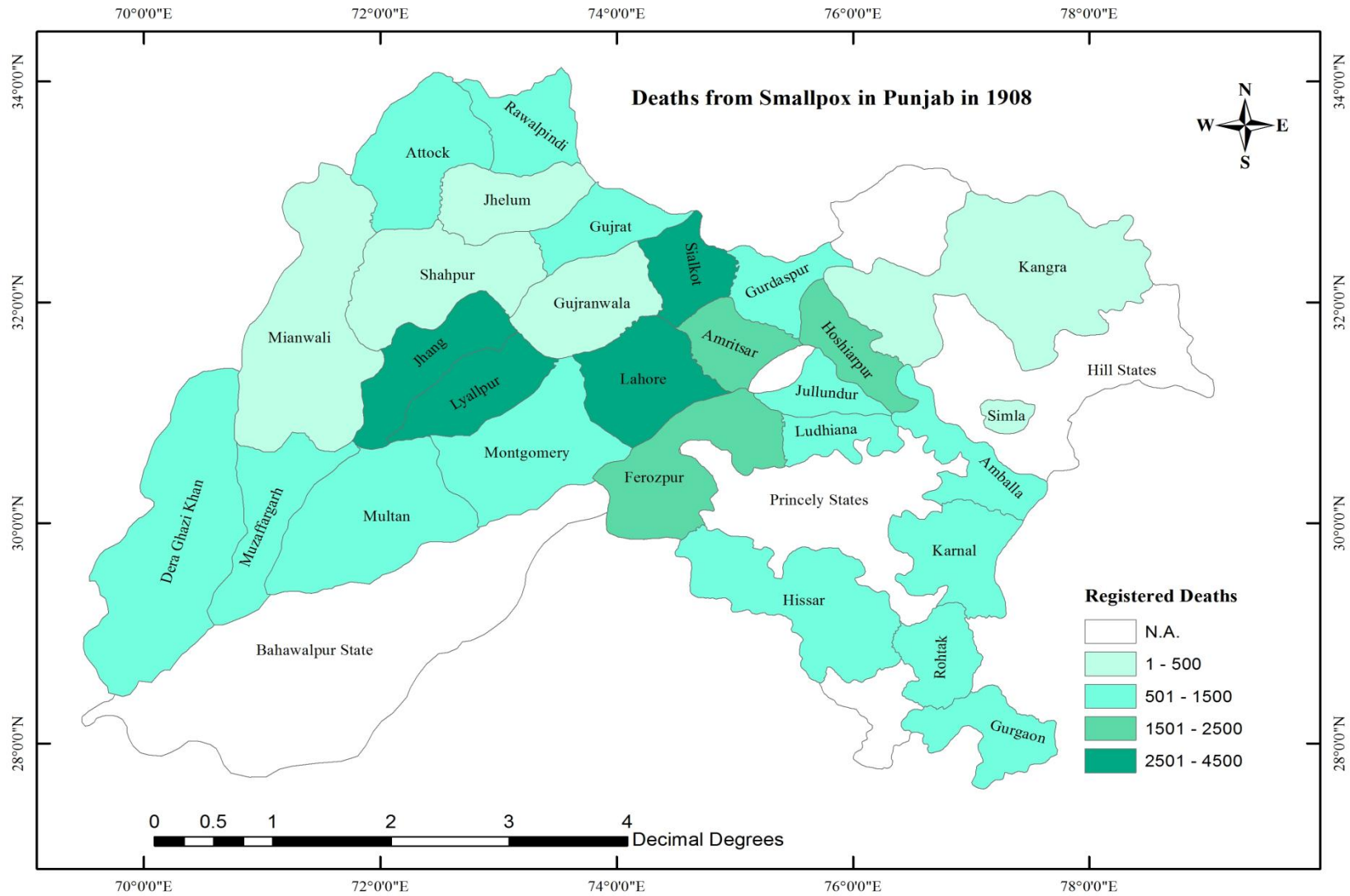
**Table 4:6 Total Number and Rates of Deaths from Smallpox in Rural and Urban areas, of Punjab, 1938, 1939**

years	Deaths		Rate per mille		Deaths in children		% of total mortality from smallpox	
	Rural	Urban	Rural	Urban	under 1 year	1-10 year	under 1 year	1-10 year
1938	4644	811	0.2	0.2	1531	2737	28.1	50.2
1939	3381	930	0.1	0.3	1177	2131	27.3	49.4

Source: *Annual Report of the Public Health Commissioner with the Government of India for 1938,1939.*

As the above table showing that the children under 10 year were vulnerable to smallpox. Almost 70 to 80 percent deaths caused by smallpox were in children under 10 year. Smallpox was more dreadful in urban areas than in rural. To understand the spatial difference among districts of Punjab maps are given ahead. These maps are only for 1908, 1912 and 1913. These years have been chosen only for examples due to lack of space.

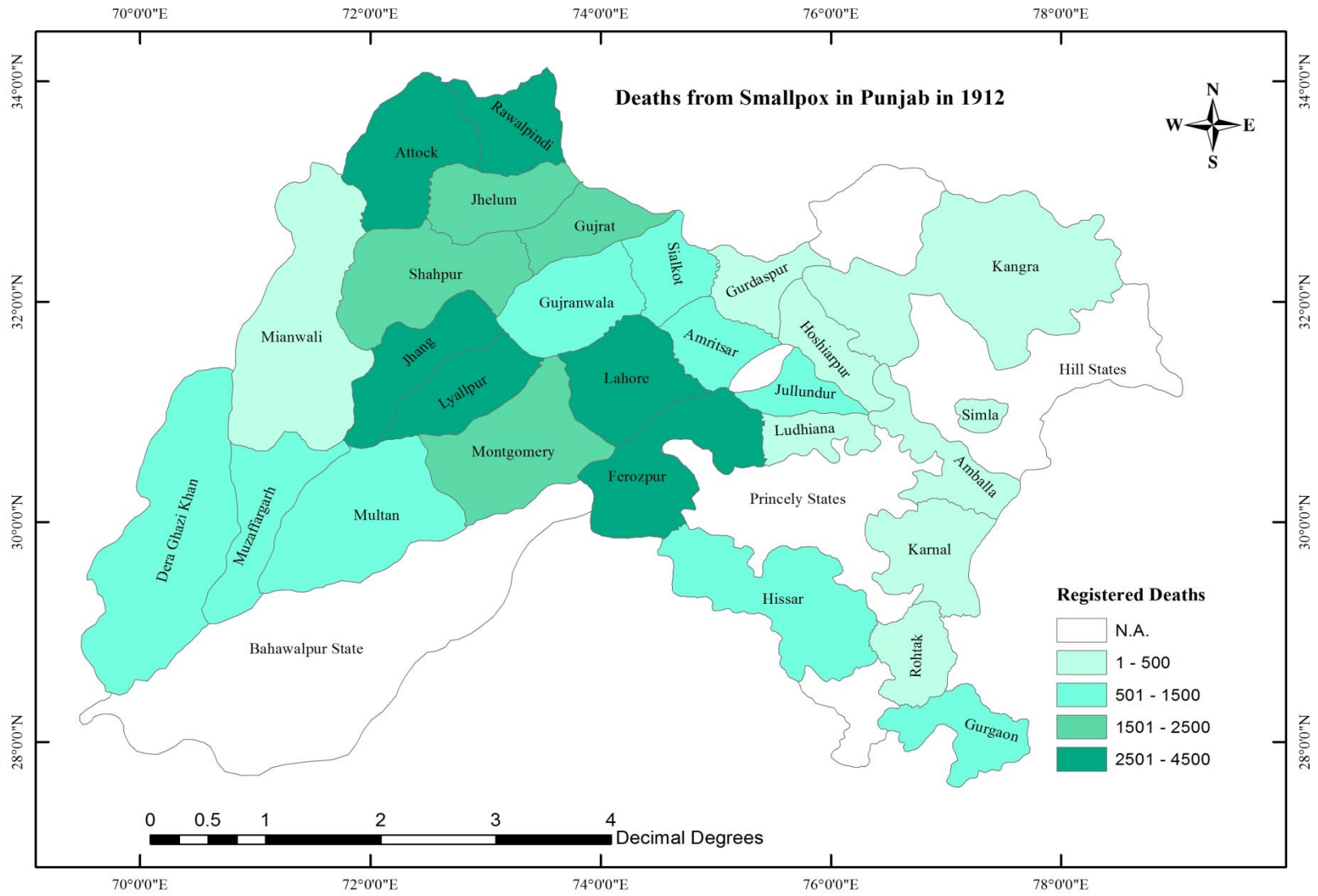
**Map 4:1 Deaths from Smallpox in Punjab, 1908**



Source: Swaroop, S. n.d.. "Demographic Study of Smallpox in the Punjab," Thesis..

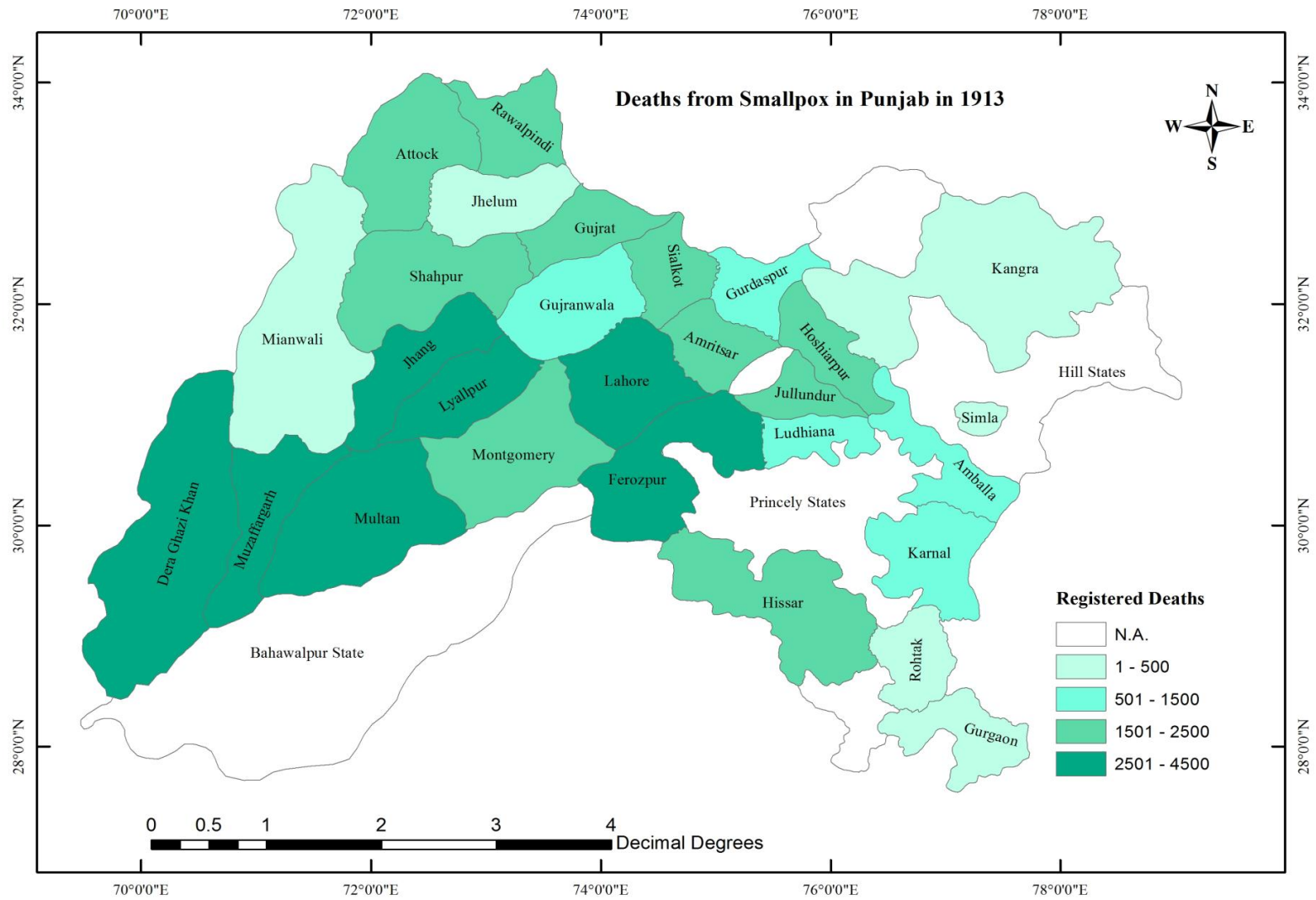
Note: data is available in group for districts Rawalpindi and Attock as Rawalpindi, for Jhang and Lyallpur as Jhang.

**Map 4:2 Deaths from Smallpox in Punjab, 1912**



Source: ibid

**Map 4:3 Deaths from Smallpox in Punjab, 1913**



Source: *ibid*

In all these three maps it is difficult to observe a universal trend of distribution of deaths from smallpox. However in few districts condition was not much different. As in Lahore, Ferozpur, Jhang deaths were high in three years. In eastern districts of Punjab deaths were low except in Hissar where death increased in 1913. Deaths were low in Multan, Muzaffargarh and Dera Ghazi Khan in 1908 and 1912, but suddenly increased in 1913 (Appendix 4.1.)

#### **4.4. Plague**

Till the outbreak of influenza in 1918 no disease had created such alarm and destruction in the Punjab as plague. It appears to have been imported into India from China in 1897 and first appeared in the Punjab in parts of Hoshiarpur and Kapurthala State.

From 1897 to 1918, the plague erupted with varied intensity in twenty-six districts, and had a mortality rate, which was approximately four times the all India average. In mortality and dreadfulness, the plague surpassed all other epidemics in the Punjab. The first case of the plague occurred in Khatkar Kalan village in Banga circle on 17 October 1897. Until 1899, the plague remained confined to Jullundur and Hoshiarpur districts. The ignorance regarding its cause and mode of spread did not help in arresting the disease that spread to Patiala state by 1900 (Tandon, Sasha, 2013). In 1901, the epidemic moved to the other thickly cultivated, densely populated and humid areas in the upper doabs (interfluves) of central Punjab and affected seven districts, extending till Ferozpur, Gurdaspur and Sialkot. By 1901-2, it spread to the sparsely populated, arid areas in the south-west, which were being canalised and colonised, and affected sixteen districts in all the five divisions of the province. The extensive irrigation from canals also resulted in increasing the humidity level, which was conducive to the spread of the disease. By the end of 1902-3, twenty-one districts had been affected. By 1904-5, the plague had spread to twenty-six districts, including Dera Ghazi Khan across the Indus.

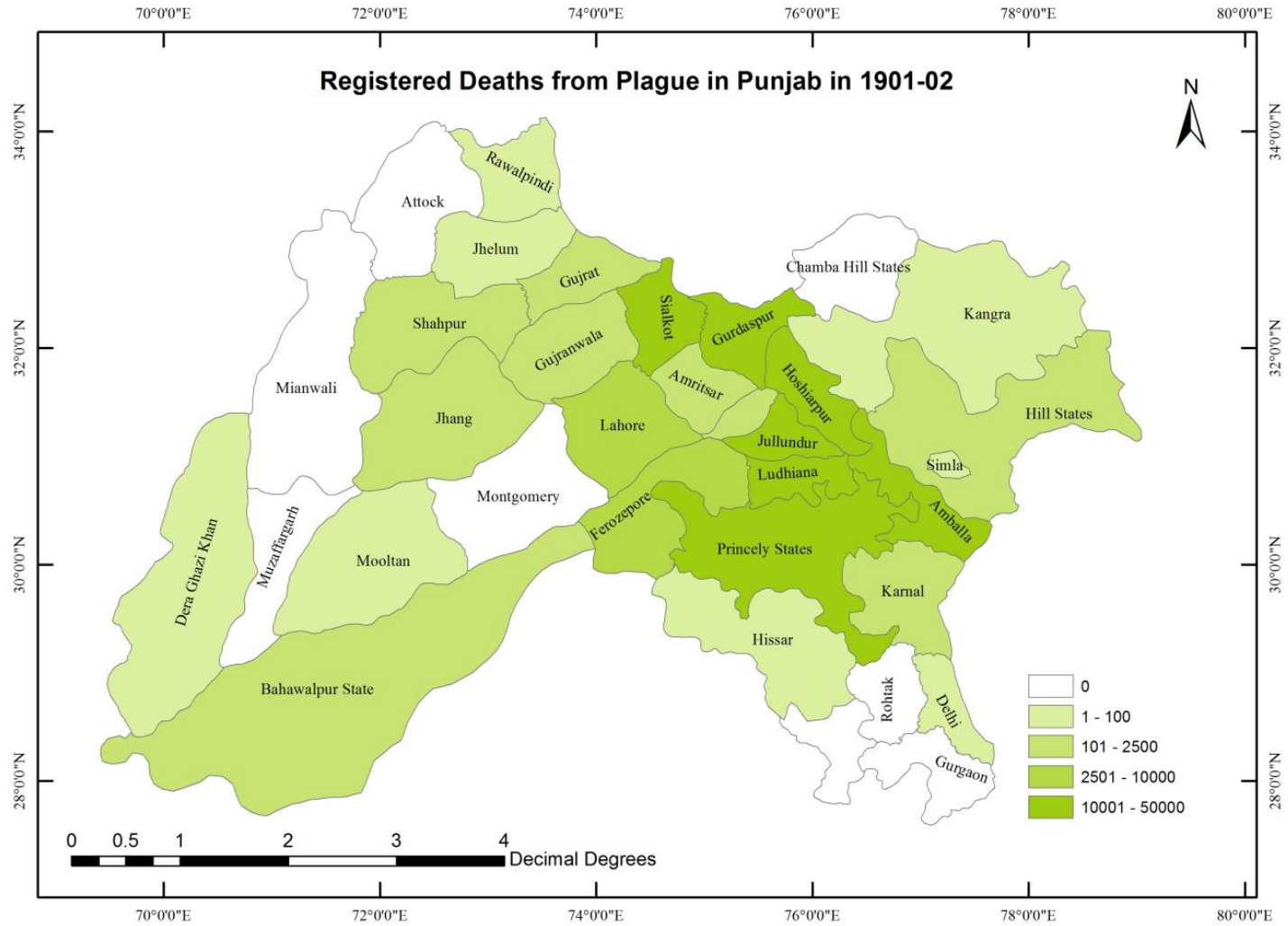
The Punjab shows the highest rate of mortality in India in 1905. Out of a total of 956,108 deaths which occurred in the province, 334,897 were caused by plague, the ratio per mille from this cause alone being 16.65 (Public Health Reports, 1906). In 1907 the mortality rate affected by plague in the Punjab (30.27) was more than four times higher than in the United Provinces (6.90) where the next highest death rate was recorded (SCR, 1908).

The plague was largely a rural phenomenon. The plague death rate in rural Punjab was 6.30 per mille in excess of the urban deaths caused by the plague. The poorly ventilated, ill-built

and crowded houses facilitated a faster spread of the disease in the rural areas of the Punjab. In the towns, food grains were not stored in the houses in larger quantities as in villages, which most likely contributed towards a lesser presence of rats and, consequently, incidence of the plague was lower.

The eight Native States in which outbreaks of plague occurred during the year 1902-03, were Patiala, Kapurthala, Nabha, Kalsia, Maler Kotla, Jínd, Farídkot and Dujana but the reports have been received from only four; Kapurthala, Maler Kotla, Farídkot and Dujana. The data could not be received from the other states due to some riots caused by the public oppose against compulsory vaccination.

**Map 4:4 Deaths from Plague in Punjab, 1901-02**

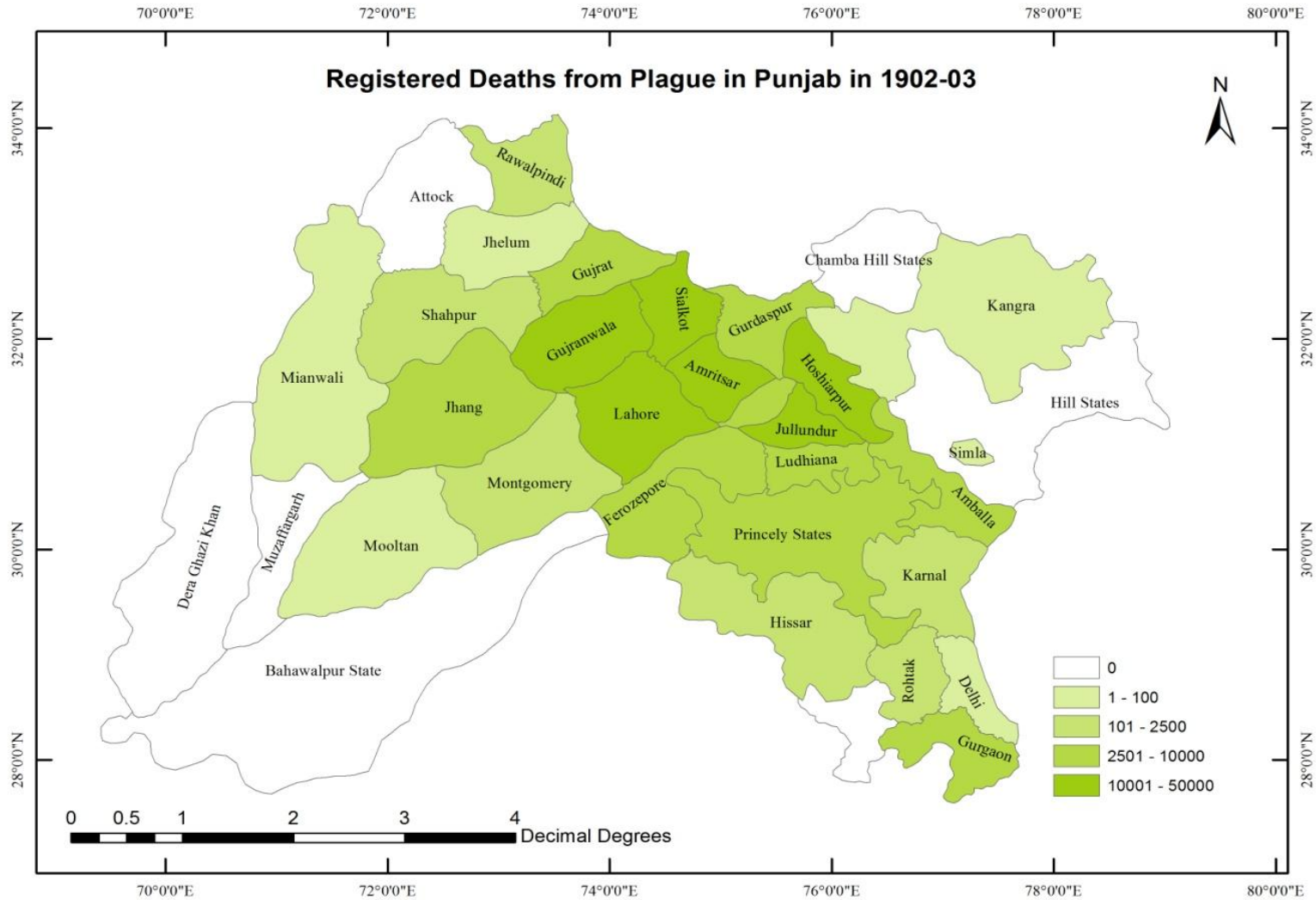


Source: Report on Plague in Punjab, (1903)

Note: Data is given for 1<sup>st</sup> October 1901 to 30<sup>th</sup> September 1902



**Map 4:5 Deaths from Plague in Punjab, 1902-03**



Source: Report on Plague in Punjab, (1904)

Note: 1. Data is given for 1st October 1901 to 30th September 1902.

As above maps are showing Jullundur and Hoshiarpur were most affected by plague epidemic. Two of the neighbouring districts were also affected in 1901- 02. Ambala, Ludiana, Gurdaspur, Sialkot and princely states of those area were highly affected by plague. By the next year plague spread in more districts. Now Gujranwala, Lahore, and Amritsar became new epicentre of the disease. It is clear in map that plague was more awful in central Punjab; outer districts of Punjab were less affected. Even in few districts like Delhi, Simla, Kangra, Rohtak, Attock, Jhelum, Multan, Dera Ghazi Khan, Muzaffargarh and Mianwali there was either no deaths from plague or very few number of deaths from plague occurred which is negligible (Appendix 4.2). It is believed by officials who have had long and varied experience in India that the reported deaths from plague do not cover more than 60 per cent of the actual number (Michael, C.G. 1907). As recorded elsewhere the higher death-rate of females as compared to that of males is ascribed to the greater exposure to infection of the former owing and to their domestic habits which made them spend most of their time indoors.

#### **4.5. Fever, Malaria, Influenza**

The largest number of mortality is caused by fevers, which include ordinary fevers, seasonal fevers, influenza, typhoid, malaria, etc. in Punjab (as shown in Table 4:2). These fever deaths were caused due to unhygienic conditions, infection, malnutrition and unbalanced diet.

Malaria is caused by the female Anopheles mosquito which transmits a vector-borne parasite into body. When an infected mosquito takes a blood meal, the parasite enters a susceptible human host's blood stream, and then develops in the host's liver before returning to the blood stream. Thereafter, an uninfected mosquito can obtain the parasite by taking a blood meal from an infected human host. Before malaria can be transmitted to another human host, the parasite grows and reproduces in the mosquito's stomach, a process known as "sporogony." Rainfall and certain land features are important since mosquitoes lay their eggs in standing water. In addition, warm ambient temperatures are necessary for mosquito survival, larval development and sporogony.

During 1850-1947 fifteen major epidemics of malaria broke out in the region which caused 51, 77,407 deaths (Tandon, Sasha. 2013). Both the official and non-official sources highlight the disastrous consequences of malaria. 'In 1891, several square milles of overripe rice fields could be seen as the villagers were too weak to reap them. In towns, no wages could be earned as the earners were sick. The Khalsa Advocate commented on the 1908 epidemic: 'Malaria is so depressing in its outset, so devitalising in its effect, so disorganising in its result to the whole system, is (sic) better understood than it used to be, it is still unhappily

exceedingly prevalent and is likely to continue until the conditions which produce it have been banished' (cited in Tandon, Sasha. 2013). The malaria epidemic caused maximum disaster in nearly twenty five centrally located districts of the province where it is reported to have claimed 22, 03,576 lives. A higher rainfall made the central Punjab districts of Jullundur, Amritsar, Lahore, Gujranwala and Shahpur, and the sub-montane areas of Rawalpindi and Peshawar, a perennial breeding ground for mosquitoes which caused recurrent outbreaks of malaria. In the north-west dry area of Montgomery, Shahpur, Lyallpur, Jhang, Multan and Dera Ghazi Khan, 8, 78,763 people were affected by the disease. There were relatively few casualties in the Himalayan region where only 1, 55,493 deaths were reported.

**Table 4:7 Total Number and Rates of Deaths from Fevers and malaria in rural and urban areas of Punjab, 1938, 1939**

Years	Fever Deaths			Rate per mille			Reported malaria deaths		
	Rural	Urban	Total	Rural	Urban	Total	Rural	Urban	Total
1938	379310	30888	410198	16.4	8.9	15.4	4242	773	5015
1939	379266	29410	408676	16.1	8.3	15.1	1606	871	2477

Source: *Annual Report of the Public Health Commissioner with the Government of India for 1938,1939*

Above table showing that the death rate was high in rural area as compare to urban area. Deaths due to malaria were also high in rural area.

*The "fever " statistics for 1918, being so profoundly affected by influenza, it would appear to serve no useful purpose to attempt to analyse them from the point of view of malaria. (Report on Malaria in the Punjab, 1918)*

As showing the report of malaria bureau of the Punjab, for the year 1918, it was difficult to define whether it was malaria death or influenza. Influenza was first reported to be present in the Punjab in July. In August, a mild epidemic was recognized at Lahore, Simla, and Amritsar. In Simla the European population was most affected, but at the plains stations the prevalence was mostly among natives. During the Month of September, the infected area rapidly increased. During this second epidemic, the disease was still mild and the death rates for August and September, 1918 were recorded the lowest during the year. During the month of October, the nature of the disease changed completely and the Punjab began to experience the worst epidemic in its history, one that particularly attacked young adults. A noticeably fatal type of pneumonia peered to be associated with the disease, and from October 15 to

November 8 the epidemic prevalence was very rigorous, and was universal throughout the Province in rural and urban areas. By November 8, the worst of the epidemic prevalence was passed both in the urban and rural areas. In December epidemic was practically over except in the Kangra district and the remote hill districts, where it was prevalent and virulence. The total mortality recorded for the period between October 1 and December 31, 1918 and attributable to influenza was estimated at 962,937, or 4.77 per cent of the estimated Population. The estimated population of the Punjab was 20,205,141. The estimated number of influenza deaths was based on the total mortality from all causes during the five-year period 1912-1916, the year 1917 being omitted as an abnormal year for fever prevalence (Public Health Reports,1919).

#### 4.6. Dysentery and Diarrhoea

Dysentery and Diarrhoea are generally used as similar terms but they both are clinically different from each other. The most important difference between dysentery and Diarrhoea relates to the affected area. While watery Diarrhoea is a disease that affects the small bowel, dysentery affects the colon. Diarrhoea is presented as watery stool that may or may not be accompanied by cramps or a pain. However, in case of dysentery, the person suffers from a bloody or purulent stool.

Dysentery is mostly caused by *Shigella* species (bacillary dysentery) or *Entamoeba histolytica* (amoebic dysentery). Diarrhoea is a common symptom of gastrointestinal infections caused by pathogens like bacteria, viruses and protozoa. Diarrhoea is more prevalent in the developing world due to the lack of sanitation and hygiene, safe drinking water, as well as poorer overall health and nutritional status. Due to their similar symptoms Dysentery and Diarrhoea were recorded under the same category in the public health reports in colonial period.

**Table 4:8 Total Number and Rates of Deaths from Dysentery and Diarrhoea by Sex; in Rural and Urban areas of Punjab, 1938, 1939**

years	Deaths					Rate per mille		
	Rural	Urban	Total	Male	Female	Rural	Urban	Total
1938	7705	4341	12046	6540	5506	0.3	1.2	0.5
1939	6141	4348	10489	5746	4743	0.3	1.2	0.4

Source: SCR, 1938, 1939

Deaths from dysentery and diarrhoea vary in rural and urban area. In urban area the death rate was four times higher than the rural area. The number of male death was more than female death.

**Table 4:9 Deaths from Dysentery and Diarrhoea in Punjab, 1888 - 1935**

Years	Dysentery and Diarrhoea	Years	Dysentery and Diarrhoea
1888	18626	1910	10,040
1890	17163	1911	11,713
1891	12152	1912	10,073
1894	17,983	1913	11,065
1895	15,648	1914	13,272
1896	13,886	1915	12,558
1897	15,851	1916	15,551
1898	15,747	1917	15,571
1899	13,410	1918	10,358
1900	25,913	1919	8,639
1901	14,722	1924	11,817
1902	14,124	1925	13,208
1903	16,498	1926	12,247
1906	17,595	1934	12046
1907	15,091	1935	10489
1908	21,103		

Source: SCR, Various years

The Table 4:9 give us an idea about deaths from dysentery and diarrhoea in Punjab. There was not much variation like other diseases. The worse years were 1888 (18626), 1890 (17163), 1894 (17983), 1900 (25913), 1906 (17,595) and 1908 (21,103). Usually children with poor health and malnutrition are more vulnerable to dysentery and diarrhoea.

#### **4.7. Respiratory Disease**

Respiratory diseases were next to fevers. Smoky and dingy rooms without smoke outlets, windows and ventilators cause breathing troubles or respiratory diseases. Allergic diseases viz., bronchitis and asthma, etc. are also caused by environmental pollution. Since the district is not adequately industrialised, the incidence of respiratory diseases is low. Persons suffering from such diseases are provided treatment in different hospitals, health centres and dispensaries.

**Table 4:10 Deaths from Respiratory Disease in Punjab, 1903-1940**

Years	Respiratory Diseases
1903	68064
1910	46,999
1911	45,294
1912	44,807
1913	44,943
1914	46,785
1915	47,193
1916	50,009
1917	54,392
1918	52,786
1919	37,813
1924	54,488
1930	51,678
1938	77668
1939	79775
1940	67303

Source: SCR, Various years

The bad years for respiratory diseases were 1903 (68,064 deaths), 1938 (77,668), 1939 (79,775) and 1940 (67,303).

#### **4.8. Maternal Death**

Maternal mortality represents all deaths of women attributed to complications of pregnancy, childbirth and the puerperium occurring within 42 days after the termination of pregnancy. Among females, maternal death was decisive cause of death. In past time health facilities were not highly developed. In addition, their accessibility was low. Due to unhygienic conditions and unawareness about health, maternal deaths were very common in those days.

According to the 10<sup>th</sup> Revision of the international classification of diseases (ICD 10), ‘maternal death is defined as follows:

*“A maternal death is defined as the of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes”.*

The lower status of women in the society, malnutrition due to the poor socio- economic conditions, social prejudices and inhibitions attached to various events starting from the time of conception till to the termination of pregnancy, and the ignorance of the general mass

regarding pre- and post- natal cares leads to excess maternal mortality. Child marriage was also a cause of maternal mortality as women had to bear a child in their adolescence. After the birth of a child the women used to be segregated from rest of the family. She used to be segregated for 40 days and this period was termed as ‘*Sutak*’ (Ambala Gazetteer, 1923-24). *Sutak* or the segregation period was considered polluting therefore the women were left in unhygienic conditions which caused more chances for their maternal death.

**Table 4:11 Maternal Death Rates per 1000 of Live Births for certain towns of Punjab, 1938, 1939**

Towns	1938		1939	
	Deaths	Rate per mille	Deaths	Rate per mille
Bhiwani	6	3.2	10	5.9
Rohtak	2	1.3	2	1.3
Panipat	13	7.9	16	10.8
Ambala city	10	6.8	6	4.4
Jullundur	14	3.3	14	3.3
Ludhiana	10	2.8	30	8.3
Ferozepur	5	2.9	5	2.9
Lahore	119	7.2	82	4.9
Kasur	16	7.6	7	3.7
Amritsar	103	9.5	63	5.9
Batala	1	0.5	1	0.5
Sialkot	10	2.3	7	1.6
Gujranwala	6	2.8	0	0.0
Rawalpindi	19	5.3	2	0.5
Lyallpur	16	6.8	20	8.0
Jhang Maghiana	13	7.1	13	6.8
Multan	58	10.4	63	11.4

Source: PHCR, 1938, 1939

After the birth of a child the women used to be segregated from rest of the family. She used to be segregated for 40 days and this period was termed as ‘*Sutak*’ (Ambala Gazetteer, 1923-24). *Sutak* or the segregation period was considered polluting therefore the women were left in unhygienic conditions which caused more chances for their maternal death.

Table 4:11 presents the distribution of maternal deaths among certain towns of Punjab for the year 1938 and 1939. As the table showing that there was not much difference in the given two years. Lahore, Amritsar, and Multan were having large number of maternal deaths. As well as Maternal death rate was also high in these areas. Except these towns, maternal death rate was also high in Panipat, Kasur, Jhang Maghiana. On the other hand in Rohtak city, Batala registered maternal death rate was very low.

In 1939, there was a sudden increase in maternal death rate of Ludhiana town whereas in Lahore and Amritsar this rate was decreased. In Rawalpindi this decreased to 0.5 from 5.3.

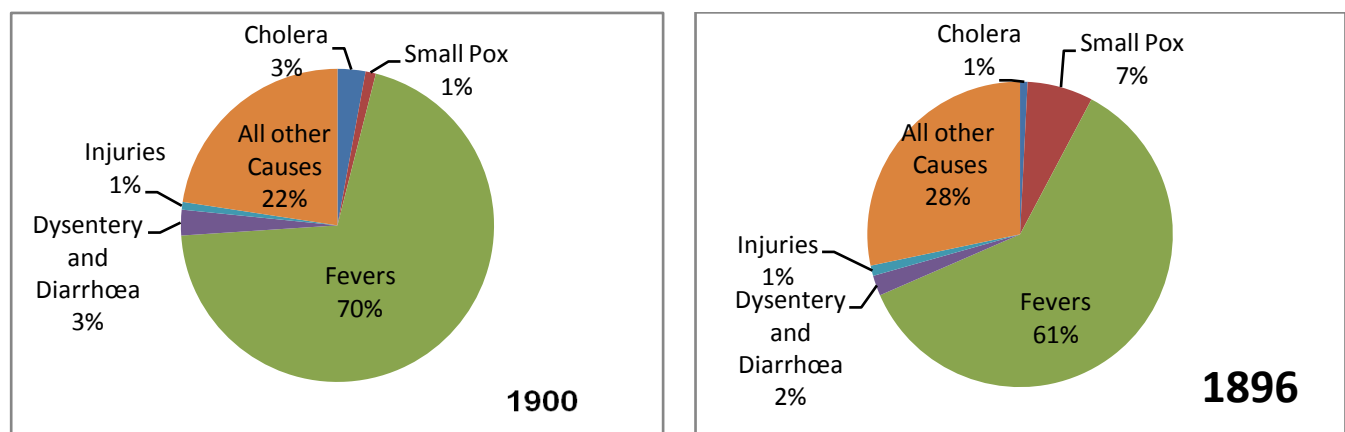
However, the picture of maternal death is not completely clear; as the data is only about those deaths which occurred in hospitals. There is no data available for maternal deaths occurred at home. It is well known that most of the deliveries at that time were conducted at home instead of hospital.

#### 4.9. Famine

Famine represents a crisis with many dimensions i.e. economic, social, political, historical and demographic. While famine is a crisis in every sense of the term, therefore it is associated with abnormality and it is recurrent and systematic in its impact on peasant societies. This phenomenon is usually accompanied by regional malnutrition, starvation, epidemic and increased mortality.

In Punjab 1896 and 1900 is the famine year. A famine year leads to smallpox, plague and Cholera deaths. In 1896, Deaths from Cholera, smallpox, fever increased comparing with previous year except plague as it was not introduced before 1897, as shown in Table 4:2. Similarly number of deaths increased in 1900. Smallpox caused 45084 deaths in 1896 which was higher as compared 1895 when smallpox deaths were recorded as 8334. Cholera and the diarrhoeal disease were relatively insignificant. Fever accounting for the overwhelming majority of deaths in 1896 and 1900 in Punjab.

**Figure 4.2 Causes of Deaths in Punjab, 1896, 1900**



Source: based on Table 4:2



In 1896 and 1900 fever was main disease as reported cause of death. In her work “Hunger and Epidemic Malaria in Punjab, 1868-1940” Sheila Zurbrigg argued that it is hunger what made people to more vulnerable to death.

#### **4.10. Other Causes**

After fever, it was ‘all other causes’ category which includes largest proportion of causes of deaths. Actually this column is for unspecified deaths. This column share 25 to 30 percent of total deaths. As a result the picture of causes of death is sketchy.

#### **Conclusion:**

Table 4:2 presents the change in the pattern of the causes of deaths in Punjab. The figures are obviously not very reliable, as it is evident from the high proportion of deaths due to other causes. In spite of the unreliability of the data, a broad picture depicts the change in the pattern of causes of deaths.

It may be observed that “fever” which includes influenza, malaria, measles and typhoid has all along been a very important cause of death in Punjab. After fever, dysentery and diarrhoea were second in the category of causes of death. It has been also observed that effect of different cause of death vary in different areas. The proportion of deaths due to fever was high in rural area as compare to urban area. The rural population was more exposed to wet and marshy conditions, which were conducive for the breeding of mosquitoes, flies and pathogens. Drainage work and filling up of ponds and pools around the villages were other problems. There was shortage of medical aids and personnel as well. People were unaware to the cause of the disease and the preventive measures. The effects of the epidemics varied in rural and urban areas.

A comparison between the figures for the rural and urban areas in the Punjab shows that the incidence of malaria, plague and Cholera epidemics was greater in the countryside. The marked difference in the death rate from Cholera in the rural areas was primarily due to the impurities of drinking water which was obtained from unhygienic water sources. Also, the food sold in the villages was reported to be contaminated and unhygienic.

The plague incidence caused many deaths in rural Punjab. The poorly ventilated, ill-built and crowded houses encouraged a faster spread of the disease in the rural areas of the Punjab. In the towns, food grains storage tradition contributed towards a lesser presence of rats and, consequently there was lower incidence of the plague in towns as compare to the villages.

## Chapter- 5

### Conclusion

In the present study; levels, trend, pattern and causes of mortality of colonial Punjab have been studied. An effort has been done to observe mortality among army and prisoners. Level of mortality was high in Punjab. Trend of mortality was not linear there. As some years were reported as healthy years and others were as unhealthy. Age pattern of mortality in Punjab was similar to the other province of British India. Mortality was higher among children than adults. Sex pattern of mortality was not same as the other provinces. Female mortality was higher than male mortality. In rural areas the death rate was higher than urban areas.

After the detailed study we can say that level of mortality was high in Punjab. As like other parts of India famines and epidemics were frequent in Punjab. In the demographic history of India, 1921 was the unique year when due to the influenza epidemic population growth rate was negative. But the same was not happened in Punjab. Here it was 1911 instead of 1921 when population decreased due to the plague and malaria.

Plague, malaria<sup>10</sup>, smallpox, cholera were major diseases responsible for high mortality. 1896 and 1900 were famine years in Punjab. For the years crude death rate was 30.8 and 50.9 respectively<sup>11</sup>. In 1897 plague epidemic broke out in the region. Till 1920s death rates remained 40 to 50 per thousands of population. The first decade of the twentieth century was unhealthy as plague was present there; the second decade was much better except the influenza incidence. However its intensity reduced after 1920s. Since 1920 there was a steady improvement in the health of the province.

Punjab was among the high mortality region in British India. Mortality rate was highest in Punjab in the first decade of twentieth century. Children (under ten years) were more vulnerable to death. Death of Children was about 50 percent of total deaths. 10-20 years age was least at the risk of death. As the age increased the risk of death also increased. Above sixty years death rate remained more than 60 per 1000 of population. Still this was very low as compare to the infant mortality.

From 1901 to 1940 average annual infant mortality rate for both sexes was 203.06 per thousand of live birth. It is observed that in the first decade of twentieth century female IMR

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<sup>10</sup> Registered under Fever category.

<sup>11</sup> This data is only for registered death. Actual deaths was much higher this.

was more than male IMR. From 1901-1910 average annual female IMR was 247.78 and male IMR was 240.34. Again in 1915 (189.17 F<sup>12</sup>, 188.02 M<sup>13</sup>) and 1918 (264.36 F, 261.19 M) female IMR was more than male IMR. For rest of the years female IMR was less than male IMR.

Biologically females are stronger than males. So it is obvious that female's death rate was less as compare to male's death rate. But Punjab was exception. Female death rate; at every age group except under five year was higher than that of males. This was due to gender biasness. Female's health was secondary than male. A few females could avail medical facilities. A Touch by male doctor was considered as a social stigma.

In rural area death rate was higher than the urban area. The main causes for this are probably lack of education and insufficient medical facilities, which make people turn towards superstitious observances, such as charms, tabizes, toonas, etc. However in the early days of registration, urban death rate was higher than rural death rate. It could be due to complete registration in urban areas than in the rural. For example in 1888 registered death rate in rural area was 29.0 and in urban area it was 36.0.

Despite the fact that urban areas were more benefited in the context of medical facilities and transport system, were more crowded more polluted than rural area. Consequently respiratory diseases were more prevalent there. Besides it deaths due to dysentery and diarrhoea were reported more in urban area than in rural. Malaria, Plague and cholera were more concentrated in rural area.

Mortality among army was much lower than general population. As this section of population was well fed, well settled and well treated. However there was a difference between the mortality rate of European army and Native army. Despite the fact that European army was more paid and much better facilitated than Native army, their mortality was higher than native army as they were not habitual to Indian climate. Mortality among prisoners was varied in different jails and their mortality was also less than general population. This was due compulsory vaccination among prisoners.

Punjab was not home for cholera disease. However it was never absent from the province. Cholera is basically communicable disease which spreads through polluted water, food etc.

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<sup>12</sup> F= Female

<sup>13</sup> M= Male

From 1877-1947 average annual 5063 deaths were recorded because of cholera. In 1892, 75959 people died due to the cholera. This was the highest amount since records have been maintained in province. In Punjab province it has been observed that cholera epidemics usually broke out in the year of *Kumbh Mela*. Usually the disease was imported by pilgrims returning from *Kumbh Mela* who spreads the infection all over the province. Cholera was ascribed to the increasing number of people going to the fairs and places of pilgrimage. The chief source of infection was the *Kumbh* fair at Hardwar, followed by the fairs at Nurpur, Katas, Jwalamukhi and Naina Devi. People from rural areas migrated to towns and cities owing to different economic reasons and got infected with the disease. After 1930 intensity of cholera tended to reduce. From 1930-1946 cholera has shown average annual deaths of only 1100. Despite the fact that the year 1938 was full *Kumbh Mela* year, only 5760 deaths were registered as cholera deaths.

Smallpox was serious disease. In most of the cases it was proved fatal disease. Those who survived spent rest of their life with blindness or with horrible faces. From 1865-1943 average annual deaths due to smallpox were 12962. 19<sup>th</sup> century was badly affected of smallpox. From 1865-1874 more than three lakh people passed away due to smallpox. In 20<sup>th</sup> century most unpleasant years were 1908 (28652), 1912 (30339), 1913(38687). In these years most affected districts were Lahore, Sialkot, Jhang, Lyallpur, Ferozepore, Rawalpindi and Attock. Of total deaths from smallpox 70 to 80 percent deaths occurred in children (under ten years). Smallpox was normally more prevalent in urban than in rural areas. In 1930 the urban death-rate was 0.51 per mille as compared with 0 .23 per mille in the rural areas. The higher death rate in towns may partly be due to more complete reporting but it is probable that the congestion prevailing in urban areas is responsible for the greater exposure to infection of the urban population.

In the first decade of 20<sup>th</sup> century plague played an awful role in Punjab. During the period average annually two lakh people died due to plague. Plague appeared in the province in 1897 for the first time and remained till 1947. Jullundur, Hoshiarpur, Amritsar, Lahore, Sialkot, Gurdaspur, Amballa were most affected districts in the early days of plague epidemic. It is feared that more than sixty percent plague death could not be registered.

Fever was major disease reported as cause of death. The various reasons were there. Malaria, influenza and typhoid were recorded under fever category. Some time plague death was also considered fever death. Besides this many unknown reasons were also reported as fever

death. This happened so because deaths were recorded by village *chowkidar*, who used to be generally an illiterate person. So whenever there was any confusion in recognizing the cause of death, it was recorded as fever. For these reasons fever mortality rate remained high throughout the time. Thus in 1908 as many as 697,058 deaths were recorded under this head, but in that year malaria was prevalent in an acute form. Similarly, in 1918 the recorded number of fever deaths were 1,287,027, and as it is well-known, in that year influenza struck the province with all its venom.

Malaria (Fever) was more prevalent in rural area than in the urban area. Fever death rate was 16.4 in rural area and 8.9 in urban in 1938. It was almost double of the urban fever death rate. Malaria was more common in central Punjab which was benefited from canal irrigation.

Dysentery and diarrhoea was combined in a single category as a cause of death. This was a common disease and never obtained a form of epidemic. This was basically urban phenomenon. The death rate was four times higher in urban area (1.2) than the rural area (0.3) in 1938. Respiratory disease was also highly concentrated in urban area. The death rate was three times higher in urban area (5.9) than rural area (2.1) in 1930.

Maternal mortality was high in colonial time. Unfortunately adequate data is not available for maternal death. Data is only available for the deaths which occurred in hospitals. Lahore, Amritsar, and Multan were having large number of maternal deaths and death rate as well. Except these towns, maternal death rate was also high in Panipat, Kasur, Jhang Maghiana.

Famine was the reason which made disease more terrible. Food shortage and malnutrition make a person more vulnerable to disease as compare to healthy person. 1896 and 1900 were famine year in Punjab. During these years cholera and smallpox epidemics occurred. Fever deaths also increased during the time. However due to large scale under reporting of deaths picture is not clear.

Hence the mortality in Punjab was mainly important due to its high intensity especially among females and children. As compare to other diseases the main causes of deaths were malaria, plague and respiratory diseases.

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## Appendices

### Appendix 1.1 Populations of Districts of Punjab 1891-1941

Years	1891	1901	1911	1921	1931	1941
Hissar	775896	781589	804889	816810	899479	1006709
Rohtak	779875	834010	714834	772272	805621	956399
Gurgaon	760226	842932	730204	682361	740175	851458
Karnal	862548	884722	801110	828822	852614	994575
Ambala	864719	816808	690854	681477	742902	847745
Simla	36102	39467	38436	45327	36786	38576
Kangra	763030	768124	770386	766065	801312	899377
Hoshiarpur	1011465	989738	918569	927419	1032187	1170323
Jullunder	907583	917587	801920	822544	943721	1127190
Ludhiana	648744	673097	517192	567622	672494	818615
Ferozepur	886078	957727	960204	1098866	1156732	1423076
Lahore	898790	1003862	999521	1129839	1378570	1695375
Amritsar	993039	1024208	881053	929688	1117485	1413876
Gurdaspur	943922	940334	836771	852192	970898	1153511
Sialkot	961600	933205	871650	877867	979617	1190497
Gujranwala	661223	739546	605582	623581	736138	912234
Sheikhupura	401262	523299	540317	634270	696367	852508
Gujrat	806382	792159	787999	824046	922427	1104952
Shahpur	478289	488149	645001	719918	821490	998921
Jhelum	514090	501424	511575	477068	541076	629658
Rawalpindi	533740	558699	547827	569224	634357	785231
Attock	448420	464430	519273	512249	583960	675875
Mianwali	287026	301910	341377	358205	411539	506321
Montgomery	416559	429674	481965	685690	999772	1329103
Lyallpur	60306	586009	836372	968063	1166702	1396305
Jhang	402341	462225	524803	570559	664833	821631
Multan	621158	700227	801455	879146	1159549	1484333
Muzaffargarh	493914	527681	569461	568478	591375	712849
Dera Ghazi Khan	428375	471786	499860	469052	491044	581350
Biloch Trans-Frontier Tract	5934	24087	28587	26758	29642	40246
British Territory Punjab	18652614	19942715	19579047	20685478	23580864	28418819

Source: Census of India, 1941

### Appendix 1.2 Population of Punjab states 1891-1941

Years	1891	1901	1911	1921	1931	1941
Dujana	26450	24174	25485	25833	28216	30666
Pataudi	19002	21933	19543	18097	18873	21520
Kalsia	68633	67181	55909	57371	59848	67393
Loharu	20139	15229	18597	20621	23338	27892
Sirmoor	124134	135687	138520	140448	148568	156026
Bilaspur	91760	90873	93107	98000	100994	110336
Mandi	166923	174045	181110	185048	207465	232593
Suket	52403	54676	54928	54328	58408	71092
Kapurthala	299690	314351	268133	284275	316757	378380
Malerkotla	75755	77506	71144	80322	83072	88109
Faridkot	115040	124912	130294	150661	164364	199283
Chamba	124032	127834	135873	141867	146870	168908
Patiala	1583521	1596692	1407659	1499739	1625520	1936259
Jind	284560	282003	271728	308183	324676	361812
Nabha	282756	297949	248887	263334	287574	340044
Bahawalpur	650042	720877	780641	781191	984612	1341209
Punjab Hill States	278440	298476	311236	306718	330850	359520
Punjab States	4263280	4424398	4212794	4416036	4910005	5891042

Source: Census of India, 1941

### Appendix 1.3 Females per 1000 males in Native States of Punjab 1901-1941

States	1901	1911	1921	1931	1941
Patudi	905	925	893	902	938
Kapurthala	851	785	816	847	872
Malerkotla	849	752	711	811	830
Faridkot	802	765	789	803	838
Patiala	820	776	791	805	816
Jind	839	812	816	841	875
Nabha	802	786	792	819	843
Sirmoor	798	822	824	803	818
Punjab Hill State	903	921	917	929	904
Bilaspur	840	862	874	900	938
Mandi	915	933	944	923	922
Suket	888	893	897	893	860
Chamba	923	924	911	931	904
Kalsia	817	786	761	797	805
Bahawalpur	822	814	816	806	819
Loharu	866	863	882	893	901
Dujana	937	904	908	941	1007

Source: Census of India, 1941

### Appendix 1.4 Females per 1000 Males in the Districts of Punjab, 1901-1941

Districts	1901	1911	1921	1931	1941
Hissar	869	836	875	852	876
Rohtak	880	855	850	861	912
Gurgaon	903	874	854	857	878
Karnal	844	827	827	815	832
Jullunder	847	783	807	841	859
Ludhiana	823	762	780	791	832
Ferozepur	827	782	801	818	821
Lahore	811	738	751	735	752
Amritsar	829	774	790	799	820
Gujranwala	858	794	788	802	782
Sheikhupura	797	779	786	813	842
Simla	839	589	488	564	577
Kangra	925	921	946	930	913
Ambala	807	750	776	784	798
Hoshiarpur	882	832	860	870	884
Gurdaspur	844	783	811	825	852
Sialkot	906	807	839	823	853
Gujrat	916	854	879	851	874
Jhelum	981	904	976	914	941
Rawalpindi	863	848	827	851	846
Attock	916	902	933	902	895
Montgomery	849	824	811	810	843
Shahpur	934	830	836	843	899
Mianwali	912	898	885	905	907
Lyalpur	735	763	795	825	856
Jhang	884	858	868	869	855
Multan	829	832	824	819	826
Muzaffargarh	845	847	842	844	838
Dera ghazi khan	835	831	819	820	817
Punjab	854	817	828	831	846

Source: Census of India, 1941

### Appendix 1.5 Crude Birth Rate and Crude Death Rate of Punjab, 1901-1910

Year	Birth Rate	Death Rate
1901	35.4	36.1
1902	43.8	44.1
1903	42.9	49.0
1904	41.5	49.1
1905	44.4	47.6
1906	43.7	36.9
1907	40.8	62.2
1908	41.8	50.6
1909	35.1	30.9
1910	42.7	33.3

Source: SCR, Various Years

### Appendix 3.1 Deaths under one month in British India and Punjab in 1938, 1939

Area	years	Under 1 month		1 to 6 months		6 to 12 months	
		Number	% of Total infant Death	Number	% of Total infant Death	Number	% of Total infant Death
British India	1938	735555	46.8	480135	30.6	354506	22.6
	1939	687880	47.3	441166	30.3	325632	22.4
Punjab	1938	78528	40.4	56865	29.2	59115	30.4
	1939	72232	38.8	57277	30.7	56764	30.5

Source: PHCR, 1938, 1939

### Appendix 3.2 Deaths under one week in Punjab in 1938, 1939

	Deaths under 1 week	Rate per mile of live births	% of Deaths under 1 month	% of Total infant deaths
1938	43245	37.1	55.1	22.2
1939	39543	35.6	54.7	21.2

Source: *ibid.*

#### Appendix 4.1 District wise deaths from Smallpox in Punjab in 1908, 1912, 1913

District	1908	1912	1913
Hissar	1196	1379	1511
Rohtak	538	139	125
Karnal	1258	289	537
Gurgaon	859	1065	240
Amballa	1235	272	1412
Simla	32	10	16
Kangra	99	109	87
Hoshiarpur	1612	396	1716
Ferozpur	2406	3519	3955
Ludhiana	655	358	1495
Jullundur	1093	989	2184
Amritsar	1849	1113	1602
Lahore	3709	2998	3488
Gurdaspur	1385	193	959
Sialkot	2695	1256	2326
Gujrat	947	1926	2030
Jhelum	254	1683	457
Rawalpindi and Attock	600	2936	2077
Shahpur	456	2164	1947
Montgomery	1036	2327	1531
Gujranwala	354	1085	869
Jhang and Lyallpur	3032	2691	4543
Mianwali	173	112	278
Multan ,Muzaffargarh and Dera Ghazi Khan	1179	1330	3302

Source: Swaroop, S. (n.d.). *Smallpox Thesis*.



#### Appendix 4.2 District wise Deaths from Plague in Punjab in 1901-02, 1902-03

District	1901-02	1902-03
Delhi	9	7
Gurgaon	0	3700
Rohtak	0	220
Karnal	333	1701
Amballa	22762	6318
Hoshiarpur	12500	19355
Hissar	2	468
Jullundur	18959	25229
Ludhiana	48028	4929
Gurdaspur	16479	5164
Kangra	5	12
Simla	45	9
Amritsar	1837	27891
Princely States	44256	2610
Princely States	1713	5255
Hill States	209	0
Sialkot	34137	14355
Lahore	9400	25652
Gujranwala	2244	45456
Gujrat	553	2829
Jhelum	1	83
Rawalpindi	2	455
Shahpur	206	585
Jhang	176	2597
Mianwali	0	1
Montgomery	0	228
Mooltan	20	2
Muzaffargarh	0	0
Dera Ghazi Khan	1	0
Ferozepore	6342	7895
Bahawalpur State	170	0

Source: Report on Plague in Punjab, 1903, 1904