

Chapter-3

Data and Their Collection

§ 3.1 Introduction:

In this chapter, the types of data needed for the proposed study has been outlined first. Then, the source of the needed data and the method of collecting data along with the scrutiny of data have been briefly discussed. Also, the underlying assumptions of the study along with the limitations of the study have been briefly discussed.

§ 3.2 Types of Data Needed:

The two objectives, in broad, aimed in the project are

(1) to obtain the projected values on the number of persons (total, with respective to age and with respect to sex) in India and in its states by probabilistic approach

and (2) to obtain the forecasted picture on temperature and rainfall in India (i.e. in locations covering India) by probabilistic approach.

To achieve the first objective, data on

(i) total number of persons

and (ii) number of persons with respective to age and sex

in India and in its states are needed. To achieve the second objective, data related to temperature and rainfall in India (i.e. in locations covering India) are needed. The two problems here are

(i) to determine what parameters are to be considered to get the picture of temperature and rainfall in a location

and (ii) to determine what locations are to be considered that cover India overall.

Four, among many others, vital characteristics of temperature in a region are

(1) Mean Maximum Temperature,

(2) Highest Maximum Temperature,

(3) Mean Minimum Temperature

and (4) Lowest Minimum Temperature.

Similarly, three, among many others, vital characteristics of rainfall in a region are

(1) Total Rainfall,

(2) Heaviest 24 Hours Rainfall in the Month

and (3) Number of Rainy Days in the Month.

§ 3.3 Collection and Scrutiny the Required Data:

Below we briefly discuss the various sources of the scrutiny of the two types of the required data mentioned above viz.

- (i) data on various characteristics of population of India
- and (ii) data on the characteristics, mentioned above, of temperature and rainfall in India.

Also, various aspects of collection and scrutiny of the required data have been briefly outlined along with it.

§ 3.3.1 Collection and Scrutiny of Population Data:

The best among the available sources of population data is 'census'. Census, in India, is held at an interval of 10(ten) years. After independence, censuses in India were held in the years 1951, 1961, 1971, 1981, 1991 & 2001. However, census was not held in Assam in the year 1981. Records of census reports in India are available since the year 1881.

Census reports, in India, are recorded in the office of the Registrar General of India and its branches situated in the state capital cities in India. Therefore, in order to collect population data these offices have been visited. It has been found that the records of census reports in India are available since the year 1881. Accordingly, associated data have been picked up from the records. Following are the records from which these data have been collected:

- (1) CENSUS OF INDIA, 1901, Vol. I, INDIA, Part I.
- (2) CENSUS OF INDIA, 1911, Vol. I, INDIA, Part I.
- (3) CENSUS OF INDIA, 1921, Series-I, INDIA, Part I.
- (4) CENSUS OF INDIA, 1931, Vol. I, INDIA, Part I & II.
- (5) CENSUS OF INDIA, 1941, Vol. I, INDIA, Part I & II.
- (6) CENSUS OF INDIA, 1951, Vol. I, INDIA, Part I-A & II-A.
- (7) CENSUS OF INDIA, 1961, Vol. I, INDIA, Part-II A(i).
- (8) CENSUS OF INDIA, 1971, Series-I, INDIA, Part II, Special

(9) CENSUS OF INDIA, 1981, Series-1, INDIA, Part II, Special.

(10) CENSUS OF INDIA, 1991, Series-1, INDIA, Part II, Special.

(11) CENSUS OF INDIA, 2001, Series-1, INDIA, Provisional Population Totals.

(All published by Registrar General & Census Commissioner, India.)

After the data collected have been collected, the next task is to scrutinize the collected data. The data, collected in the study, relate to

(i) total population (i.e. total number of persons)

and (ii) number of persons age-sex wise

of India and of its states since the year 1901 to the year 2001. For the interest of maintaining consistency in data, the same have been retained for the years 1951, 1961, 1971, 1981, 1991 & 2001. Also due to the same reason, the age groups viz.

0 – 10, 10 – 20, 20 – 30, 40 – 50, 50 – 60 etc.

have been chosen in the classification of the number of persons with respect to age and sex.

§ 3.3.2 Collection and Scrutiny of Data on Temperature and Rainfall:

Indian Meteorological Department has 41 locations (called stations in meteorological terminology) from where data relating to weather are collected and recorded. These 41 locations cover India overall. The names of the 42 stations with the corresponding indices (fixed by the Indian Meteorological Department) have been listed in Table-3.3.1. Accordingly, these 42 stations have been selected for the study. In order to collect data on the characteristics mentioned above from these stations, the stations have been visited. Data on the same have been to be available in the stations since 1961. Accordingly, data have been picked up. In the collection of data from these stations we had been supplied the prior information that the daily data suffer from inconsistency (undetectable and immeasurable) while monthly data are almost free from it. For this reason, monthly data have been collected. Thus, the data that have been collected deals with

- (1) Monthly Mean Maximum Temperature,
- (2) Monthly Highest Maximum Temperature,
- (3) Monthly Mean Minimum Temperature,
- (4) Monthly Lowest Minimum Temperature,
- (5) Total Rainfall in the Month,

(6) Heaviest 24 Hours Rainfall in the Month
and (7) Number of Rainy Days in the Month
from the 42 Stations since 1969 to 2002.

Table-3.3.1

(Name, with Index No, of the Meteorological Stations under Study)

Index No	Name of the Station	Index No	Name of the Station
1210	SHILLONG(A)	42492	PATNA(A)
7205	CHANDIGARH(A)	42516	SHILLONG/C.S.O.
42042	SRINAGAR(A)	42527	KOHIMA
42055	JAMMU(A)	42542	UDAIPUR(DABOK)
42071	AMRITSAR	42619	SILCHAR
42081	BHUNTER(A)	42623	IMPHAL/TULIHAL
42083	SIMLA	42647	AHMADABAD
42101	PATIALA	42667	BIHAR/BAIRAGARH
42105	CHANDIGARH	42724	AGARTALA
42111	DEHRA DUN	42807	CALCUTTA
42131	LUCKNOW	42867	NAGPUR/SONEGAON
42181	PALAM(A)	42971	BHUBANESHWAR
42182	NEW DELHI/SAFDARJU	43003	BOMBAY/SANTACRUZ
42314	DIBRUGARH/MOHANBAR	43063	PUNE
42348	JAIPUR/SANGANER	43128	HYDARABAD(A)
42369	LUCKNOW/AMAUSI	43192	PANJIM
42404	DIHUBRI	43279	MADRAS/MINAMBAKKAM
42410	GUWAHATI/BHORJOR	43295	BANGALORE
42415	TEZPUR	43328	PONDICHERRY
42475	ALLAHABAD	43333	PORT BLAIR
42479	VARANASI/BABATPUR	43371	TRIVANDRUM/THIRUVA

After the data collected have been collected, the next task is to scrutinize the collected data. The data, collected in the study, relate to the seven characteristics mentioned above. It has already been mentioned that the daily data, on the characteristics

mentioned in §3.2, suffer from inconsistency (undetectable and immeasurable) while monthly data on these characteristics are almost free from it. Therefore, monthly data on all the characteristics except total rainfall have been retained for analysis. It has been found that monthly data on total rainfall are not consistent. That is why the monthly data on total rainfall that have been collected have been converted into yearly total rainfall. The data (converted) on yearly total rainfall have been found to be suitable for analysis and hence data on yearly total rainfall have been retained for analysis.

§ 3.4 Assumptions of the Study:

Collection of data, scrutinization of data and analysis of scrutinized data that have been done in this study are based on some assumptions. The assumptions made in the study are outlined below.

§ 3.4.1 Assumptions behind the Study on Probabilistic Projection of Population:

Following are the assumptions made in the study on the probabilistic projection of population in India and in its states:

- (1) The environment within which the human population in India has been changing since 1951 is identical.
- (2) Interstate migration of the human population in India (i.e. the migration of population from one state to another in India) is negligible.
- (3) Facts and figures on human populations of India and of its states with respect to age and sex, recorded in the census reports published by the Registrar General of India, are accurate.
- (4) Current behaviour of the change in the human populations of India and of its states remains the same in the future for which projected figures have been computed.

§ 3.4.2 Assumptions behind the Study on Probabilistic Forecasting of Temperature and Rainfall in India:

Following are the assumptions made in the study on the probabilistic forecasting of temperature and rainfall in India:

(1) Facts and figures on

- (i) Monthly Mean Maximum Temperature,
- (ii) Monthly Highest Maximum Temperature,
- (iii) Monthly Mean Minimum Temperature,
- (iv) Monthly Lowest Minimum Temperature,
- (v) Total Rainfall (Yearly),
- (vi) Heaviest 24 Hours Rainfall in the Month

and (vii) Number of Rainy Days in the Month

collected from the 42 stations in India are free from methodological errors (i.e. errors due to machine/tool having unknown defect/defects and due to wrong handling of machine/tool). It has also been assumed that the facts and figures observed have been recorded correctly.

(2) Data on the characteristics mentioned in (1) are free from inconsistency.

(3) Chance errors associated to the observations in each of the characteristics mentioned in (1) are independently and identically distributed normal variates with zero mean and a common unknown variance.

(4) Current behaviours of the changes in temperature and rainfall in the 42 stations in India remain the same in the future for which projected figures have been computed.