

# Understanding Data through Presentation



# CONTENT

- **Significance of diagram and graphs**
- **Comparison of tabular and diagrammatic, graphics presentation**
- **Difference between diagrams and graphs**
- **General rule for constructing diagrams and graphs**
- **Types of diagrams**
  - **Diagrams and graphs for understanding data**

# Learning Objective

- **Trainee will be able to describe:**
  - significance of diagrams and graphs, Compare between tabular and diagrammatic, graphics presentation;
  - general rule for constructing diagrams and graphs;
  - able to construct different types of diagrams and graphs
- **Trainee will be able to use appropriate diagrams and graphs to understand data**

# Significance of diagram and graphs

- Gives birds eye view of the entire data.
- The mind through the eye can more readily appreciate the significance of the figures.
- Figures are dry but diagram and graphs delight the eye.
- More popular in exhibition, fairs, conference, board meetings and public functions.
- Great memorizing effect.
- Easy and quick comparison.
- Bring out hidden fact and relationship
- Stimulate and aid analytical thinking and investigation.

# Comparison of tabular, diagrammatic & graphics presentation

- i. Table contains **precise figures**, diagrams give only an **approximate idea**.
- ii. More information on a **number of characteristic** can be presented in a table than in one graph or diagrams.
- iii. Tables require much **closer reading** and more **difficult to interpret than diagrams**.
- iv. Graphs and diagrams have a **visual appeal** and therefore more impressive to lay man.
- v. For **higher statistical analysis** data has to be presented in tabular form

# Difference between diagrams and graphs

## Graphs

- For construction a graph paper is required.
- It depicts functional or mathematical relationship between two variables, whereas diagram does not.
- For presenting frequency distribution and time series data, graphs are more appropriate than diagrams

## Diagrams

- Constructed in plain papers.
- More attractive to the eye than the graph and as such are better suited for publicity and propaganda.

# **General rule for constructing diagrams and graphs**

- **Number**
- **Title**
- **Proportion between width and height**
- **Selection of scale**
  - example “million of tones” number of persons in thousand”, etc.
- **Footnotes**
- **Index**
- **Neatness and Cleanness**
- **Simplicity:-**
  - reader can understand their meaning clearly and easily

# Types of diagrams

- **One-dimensional diagram**
  - ❖ **bar diagrams**
- **Two dimensional diagram**
  - ❖ **rectangles, squares and circles.**
- **Three dimensional diagram**
  - ❖ **cubes, cylinders, and spheres**
- **Pictographs and**
- **Cartograms**

# One-dimensional diagram: bar diagrams

- Only one dimension i.e. length of the bar represents the value of the variable.
- These are very simple and easy to understand.
- Bar should be uniform thickness and space between bars should be uniform.
- The vertical bars may be preferred to horizontal bars and respective figures may be written at the top of the bar.

# Types of bar diagrams

- **Simple Bar Diagram:** Used to present only one variable for different time period or for different regions
- **Multiple bar diagram:** Used to represent two or more sets of inter related data
- **Deviation bar:** Used for representing net quantities excess or deficit.
- **Percentage bar:** Used to present relative changes in data
- **Sub-divided bar:** Each bar is further sub-divided in to various components

# Types of bar diagrams

**Table 3.1 Sex Ratio (females per 000' males) of Orissa by Social Groups**

| Year | Scheduled Castes |     |      | Scheduled Tribes |     |      | General |     |     |
|------|------------------|-----|------|------------------|-----|------|---------|-----|-----|
|      | R                | U   | T    | R                | U   | T    | R       | U   | T   |
| 1961 | 1020             | 930 | 1015 | 1018             | 946 | 1016 | 1013    | 779 | 991 |
| 1971 | 996              | 955 | 993  | 1009             | 958 | 1007 | 1000    | 821 | 979 |
| 1981 | 992              | 951 | 988  | 1015             | 947 | 1012 | 994     | 837 | 969 |
| 1991 | 981              | 932 | 975  | 1006             | 930 | 1002 | 983     | 849 | 959 |
| 2001 | 983              | 949 | 979  | 1006             | 948 | 1003 | 980     | 881 | 960 |

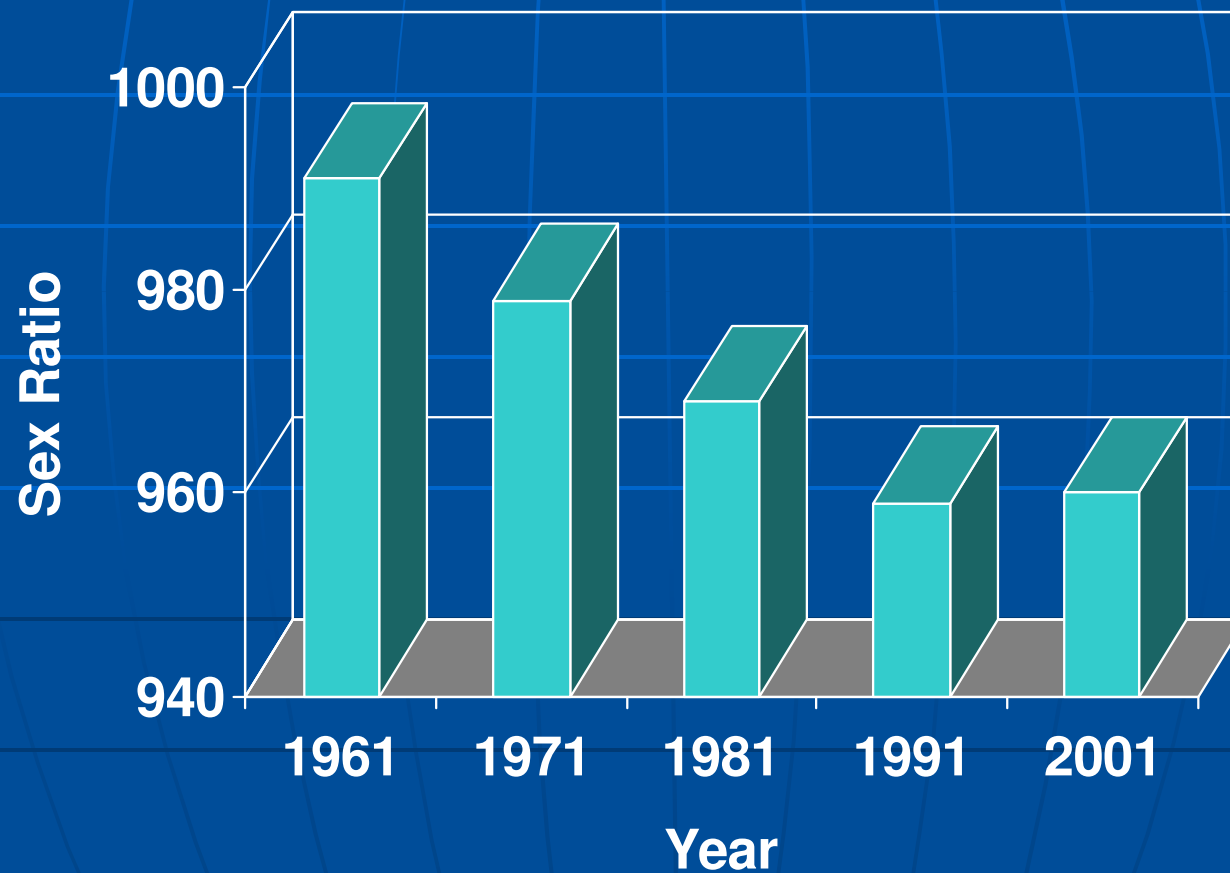
Source: Census of India, 1961 – 2001

R = Rural, U = Urban, T = Total

Please find out the significant features of DATA from the table

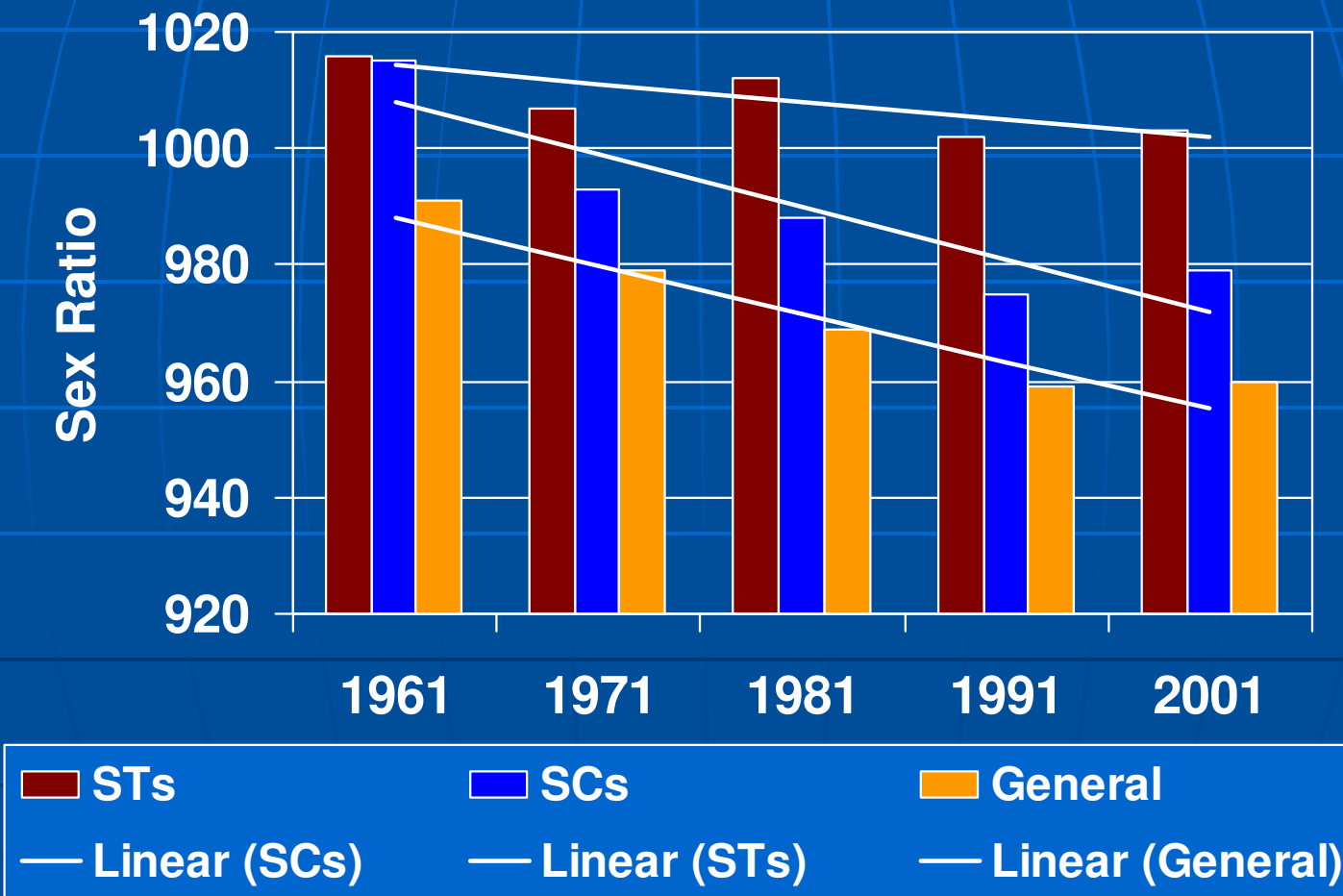
# Simple Bar Diagram

**Fig. 3.1 Sex ratio (Females per 000' Males) in Orissa: 1961 - 2001**



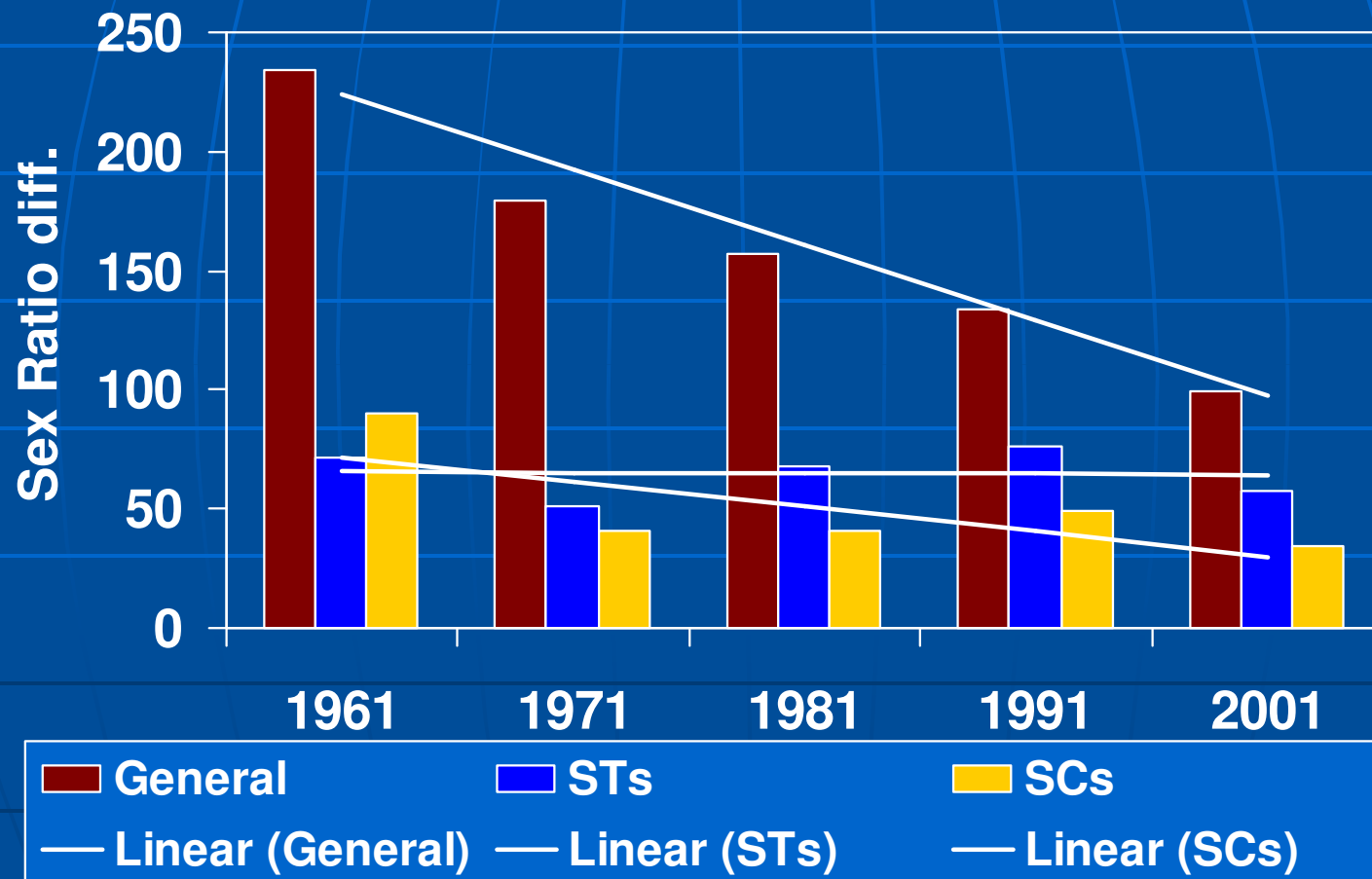
# Multiple Bar Diagram

## Sex ratio (Females per 000' Males) in Orissa by Social Groups



# Multiple Bar Diagram

## Rural-Urban difference in the sex ratio in Orissa



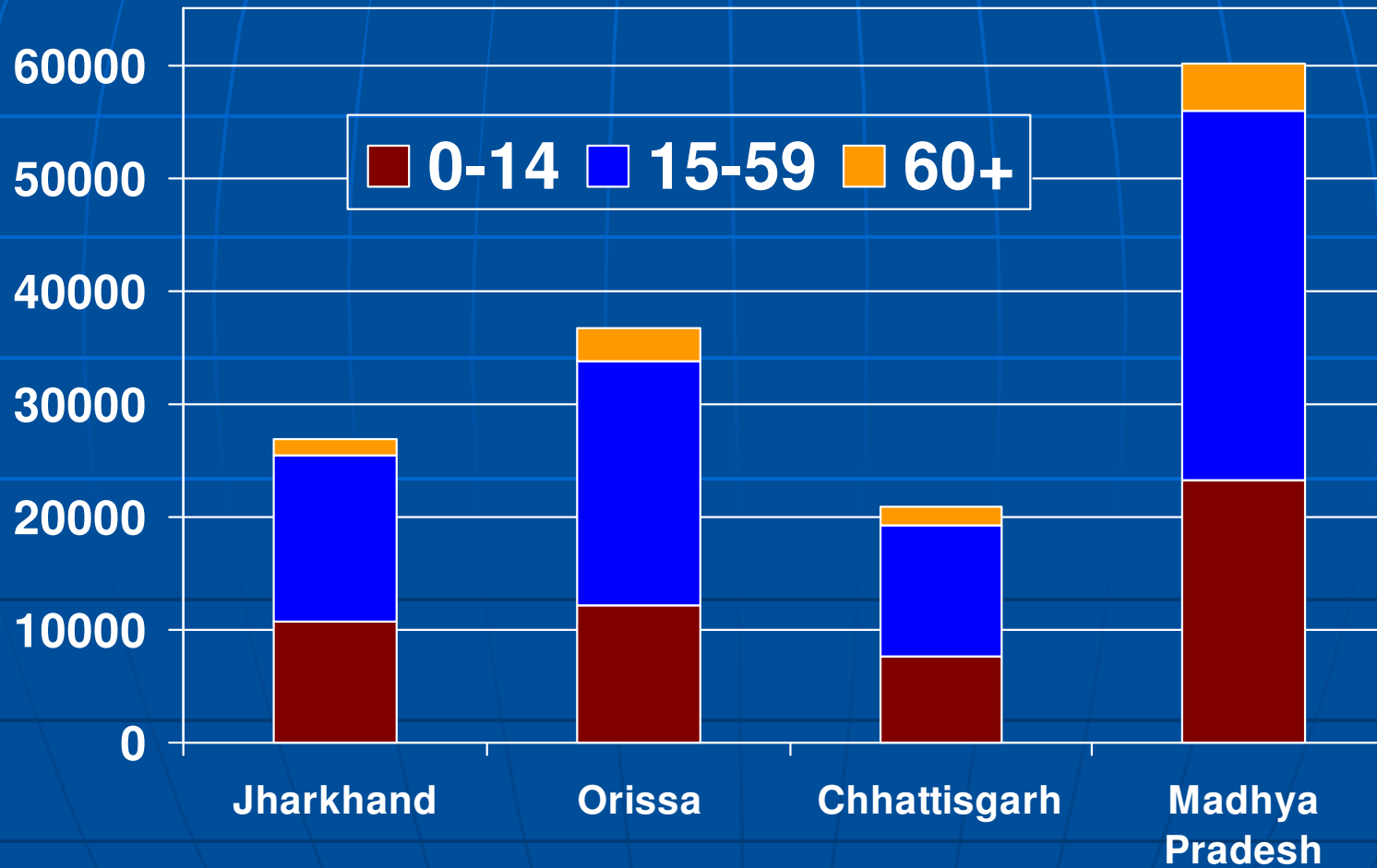
# Population of Four Indian States by Broad Age Group: Census 2001

## Population in 000' numbers

| States<br>Age<br>Group | Jharkhand | Orissa | Chhattisgarh | Madhya Pradesh |
|------------------------|-----------|--------|--------------|----------------|
| 0-14                   | 10709     | 12208  | 7693         | 23252          |
| 15-59                  | 14625     | 21496  | 11609        | 32655          |
| 60+                    | 1579      | 3039   | 1504         | 4281           |

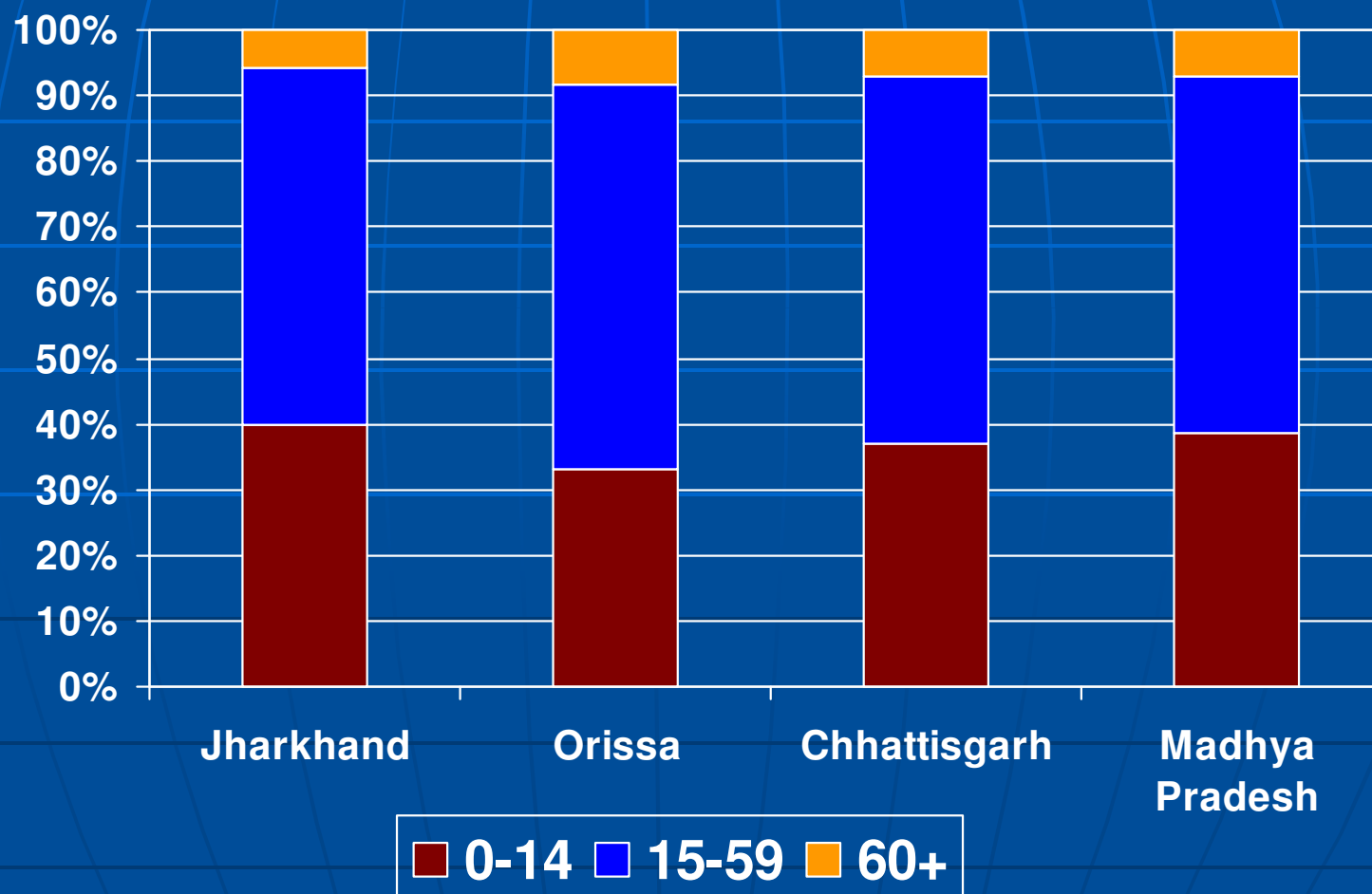
## Sub-divided Bar Diagram

**Fig. 3.4 Distribution of population by age group: Census 2001**



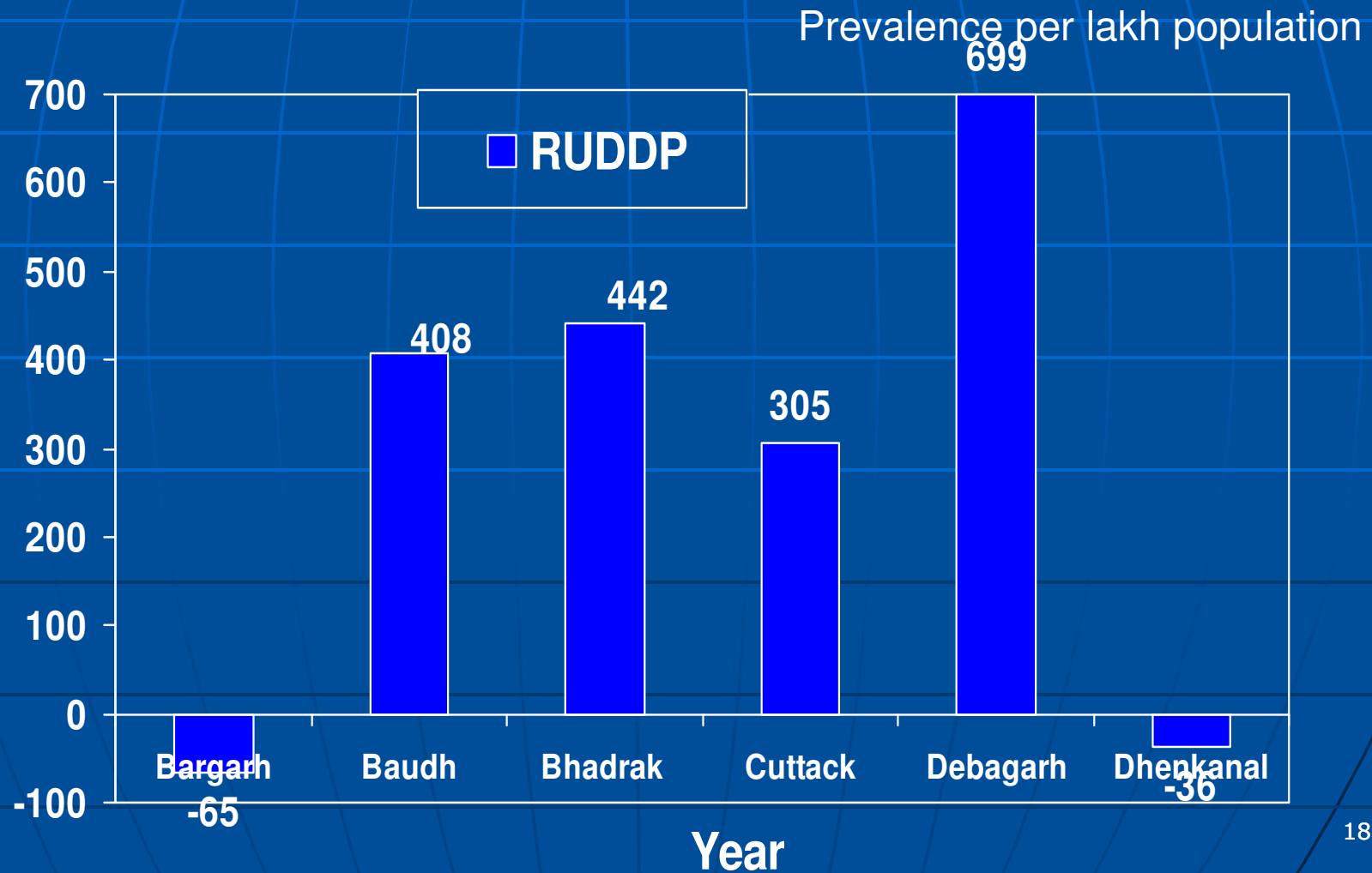
## Percentage Bar Diagram

**Fig. 3.5 Percentage distribution of population by age group: Census 2001**



# Deviation Bar Diagram

## Rural – Urban Difference in Prevalence of Disability- Census 2001



# Two Dimensional Diagram

Area or surface diagram where two dimensions-length and breadth are taken into consideration to represent the data series.

Here area of the diagram represents the given data.

Important types of such diagram are:

- i) Rectangle,
- ii) Squares,
- iii) Circles,
- iv) Pie diagram

# Two Dimensional Diagram

## i) Rectangle,

- Since the area of a rectangle is equal to the product of its length and width, while constructing such a diagram both length and width are considered.

## ii) Squares

- When the values of the items vary widely, squares should be preferred to rectangles to represent the data.
- One has to take the square root of the values of the item and then select a suitable scale to draw squares.

# Two Dimensional Diagram

## iii) Circles

- Here the data values are proportional to the area of the circle.
- Area of the circle is proportional to the squares of the radius.
- One has to divide the values of the items by  $\pi$  and then take the square root to find the radius of the circles.
- Select a suitable scale to draw the circles.

# Two Dimensional Diagram

## iv) Pie diagram

- Pie diagram are very popular to show relative changes in terms of percentage break down of different components.
- Examples: percentage shares of different sectors of economy in the group of the states.
- Steps for Construction
  - Work out the percentage share of different components
  - Convert the percentage share into corresponding degrees on the circle by multiplying with  $360/100$ .

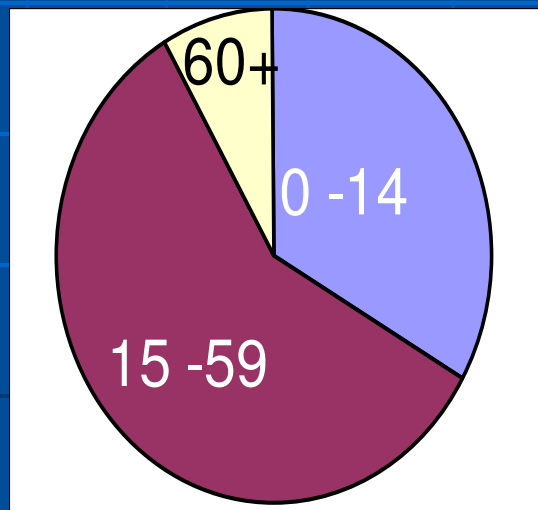
# Two Dimensional Diagram

## iv) Pie diagram

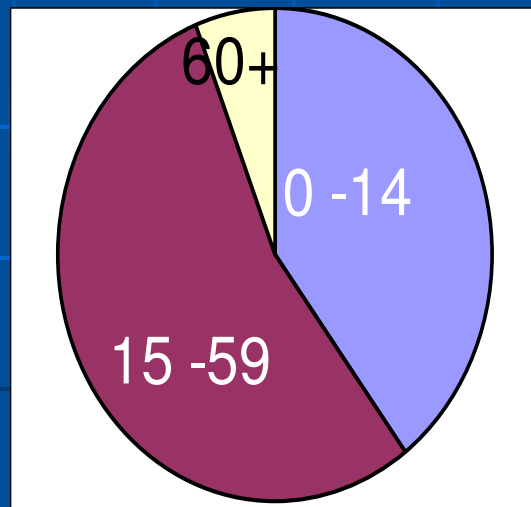
- Draw a circle of appropriate size with a compass. Size depends upon the available space and other factors of presentation.
- Use different colours or shades to distinguish different components.
- Generally while cutting sectors in the circle the largest sector (representing the largest component) should be drawn at 12 O'clock position in the circle and other components sectors are placed in clock wise manner in descending orders of magnitude.

## Fig. 3.7 Percentage Composition of population by age Group: 2001 Census

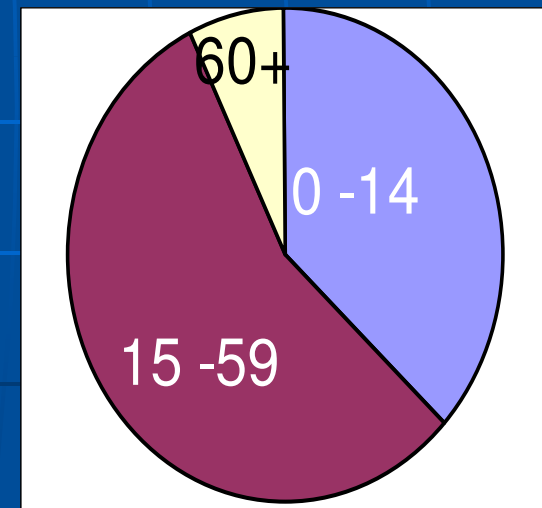
**JHARKHANDA**



**ORISSA**



**CHATISHGARH**



## Three - Dimensional Diagrams (Volume diagram):

- In such diagram three dimensions – length, breadth and height are taken into consideration and diagrams are show constructed that their volumes are proportional to the values of the items.
- Cubes, Cylinders and spheres are usually used to re-present data in this category.

**Pictographs or pictorial diagrams:** Pictographs are very popularly used in presenting statistical data. In this category actual pictures are used to depict the kind of data being dealt with.

## Population of Orissa

| Year                       | 1951 | 1961 | 1971 | 1981 |
|----------------------------|------|------|------|------|
| Population<br>(in million) | 14   | 18   | 22   | 26   |

Source: Census of India, 1961 – 2001

# Population of Orissa

Year

1951



1961



1971



1981



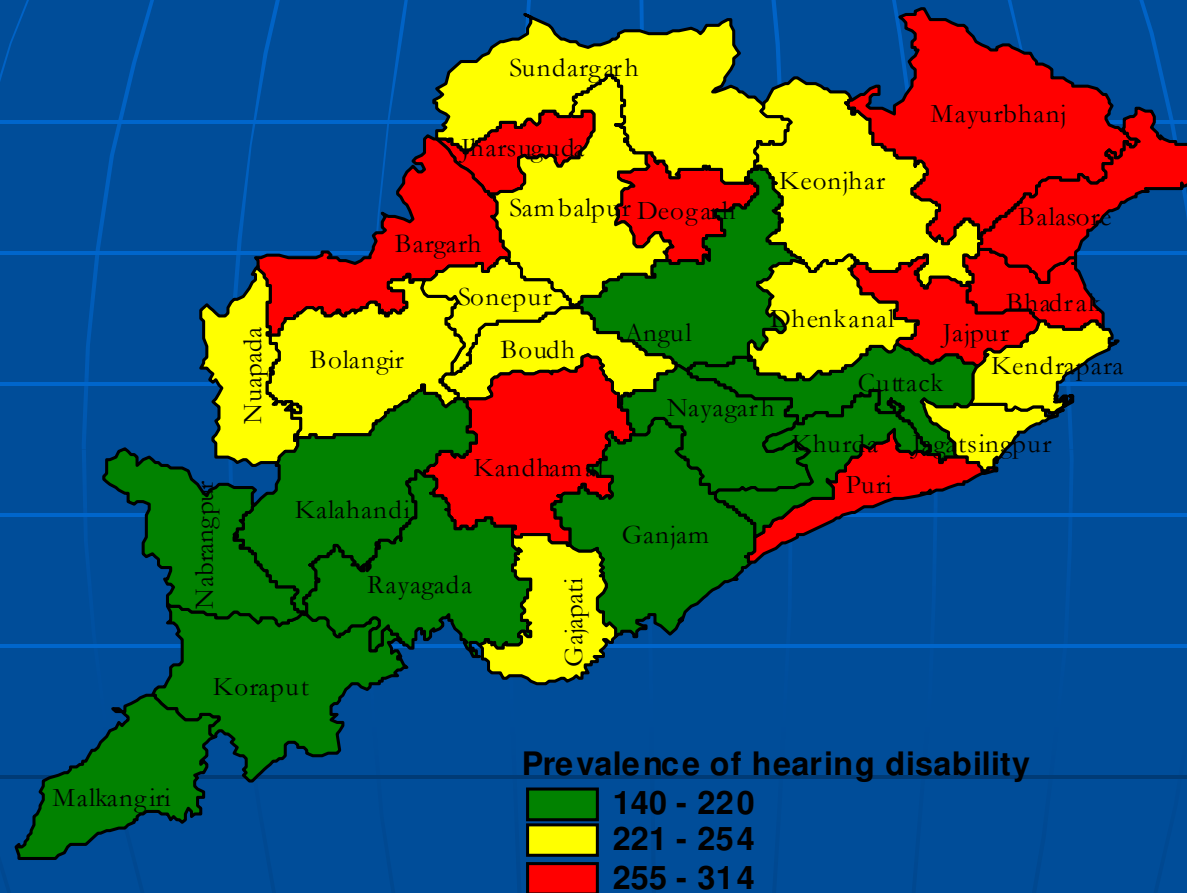
Source: Census of India, 1961 – 2001

## Cartograms (Statistical Maps)

- Geographical comparison of data
- These are used to give quantitative information on a geographical basis.
- The quantities on the map can be shown in many ways, such as through shades or colours by dots, by placing pictograms or actual figures in each.

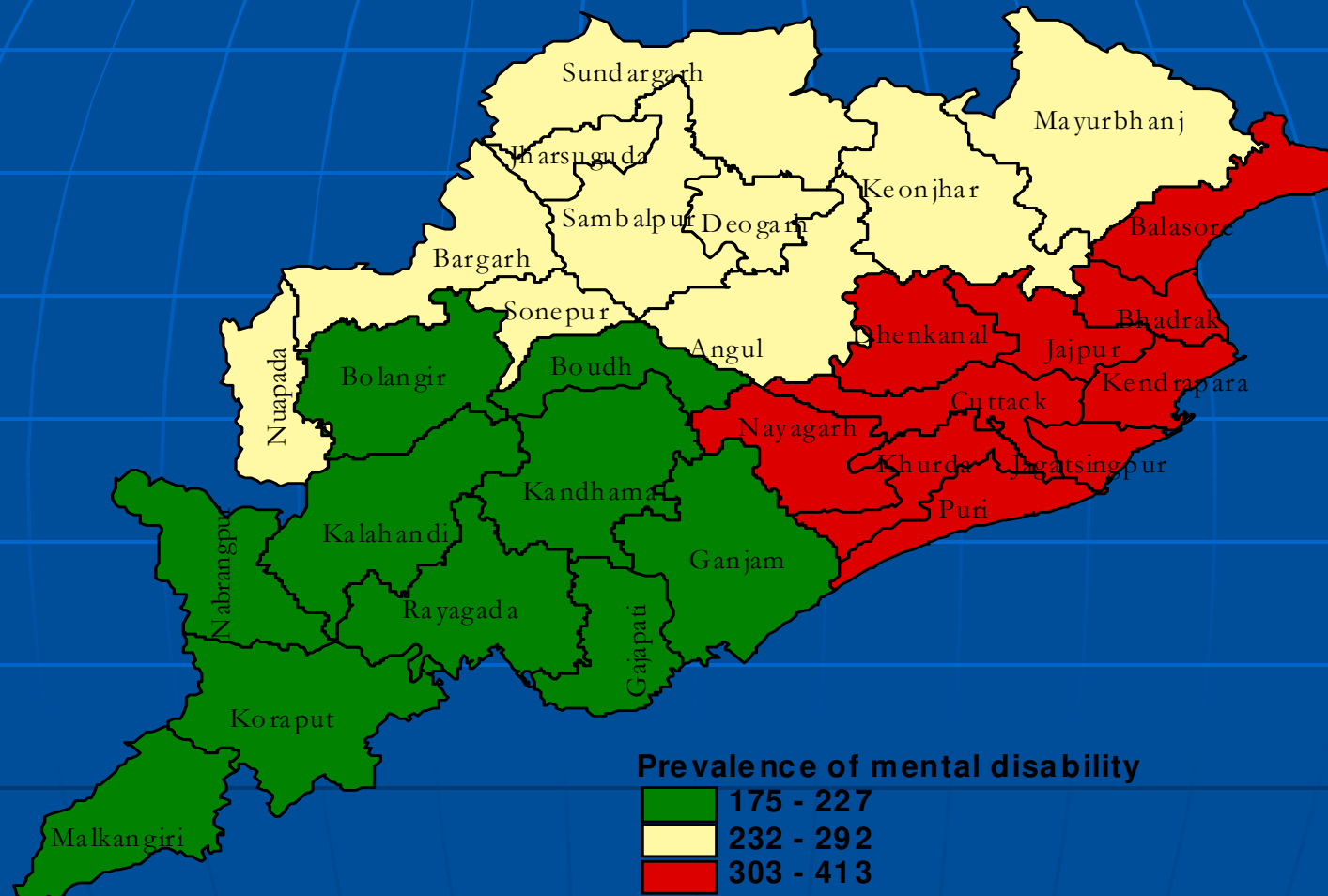
**LOOK AT THE DATA**

**Map 3.2 Districts of Orissa Classified according to  
Prevalence of Hearing Disability per lakh population : Census 2001**



**Data Source: Derived from Disability data from Census ,2001**

**Map 3.6 Districts of Orissa Classified according to  
Prevalence of Mental Disability per lakh population : Census 2001**



Data Source: Derived from Disability data from Census ,2001

*Map not to scale*

# GRAPHS

Broadly various graphs can be classified under the following two heads

- a) Graphs of time series,
- b) Graphs of frequency distributions.

## **GRAPHS OF TIME SERIES**

- Values of the variable observed at different point of time give rise to a time series.
- Time series presented graphically becomes extremely helpful in studying changes over time. Such graphs are most widely used in practice.

## GRAPHS Contd.

### **Technique of construction of time series graph**

- Time is taken on the X-axis (horizontal) and the variable on the Y-axis (vertical) of the graphs.
- The unit of time i.e. calendar year or financial year and
- unit of measurement of the variable should be clearly stated.
- Generally begin Y-axis with zero and select a suitable scale so that the entire data is accommodated in the space available.

## GRAPHS Contd.

- **Technique of construction of time series graph**
  - On the arithmetic scale magnitude is represented by equal distance.
  - Time period vrs. the values of the variables are plotted in the graph paper.
  - Points so obtained are joined with straight lines (not with curves).
  - If in one graph more than two variables are plotted they should be distinguished by thin , thick dotted lines etc.,

- **Graph of one variable:** When only one variable is to be represented.
- **GRAPH OF TWO OR MORE VARIABLES:-** If the unit of measurement is same we can represent two or more variables on the same graph and different lines are distinguished by plotting thick, thin, dotted, broken lines etc...

➤ **GRAPH HAVING TWO SCALES:-** If two variables are expressed in two different units, then we will have two scales - one on the left and the other on the right. To facilitate comparison each scale is made proportional to respective average of each. The average values of both the variables are kept in the middle of the graph and then scales are determined.

- **RANGE CHART:-** Shows the range of variation, i.e. the minimum and maximum values of variable for example minimum and maximum temperature for different time period can be depicted with range chart.

### **Constructing Range Chart**

- Take time on the X-axis and the variables on the Y-axis.
- Draw two curves by plotting the given data- one curve representing the lowest value and the other curve representing the highest value

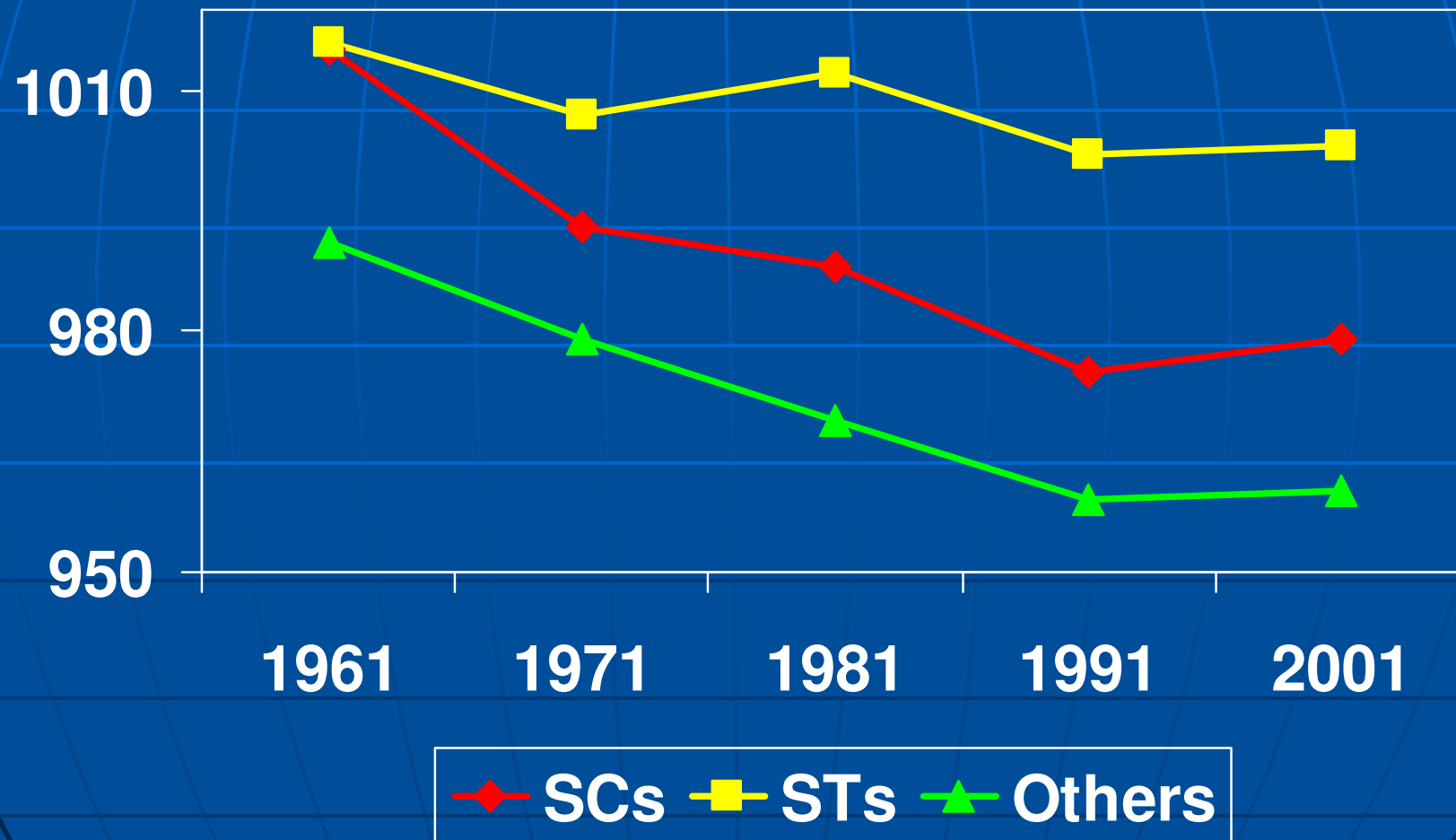
## LOOK AT THE DATA

### Trend of Sex Ratio of SCs and STs of Orissa, 1961 - 2001

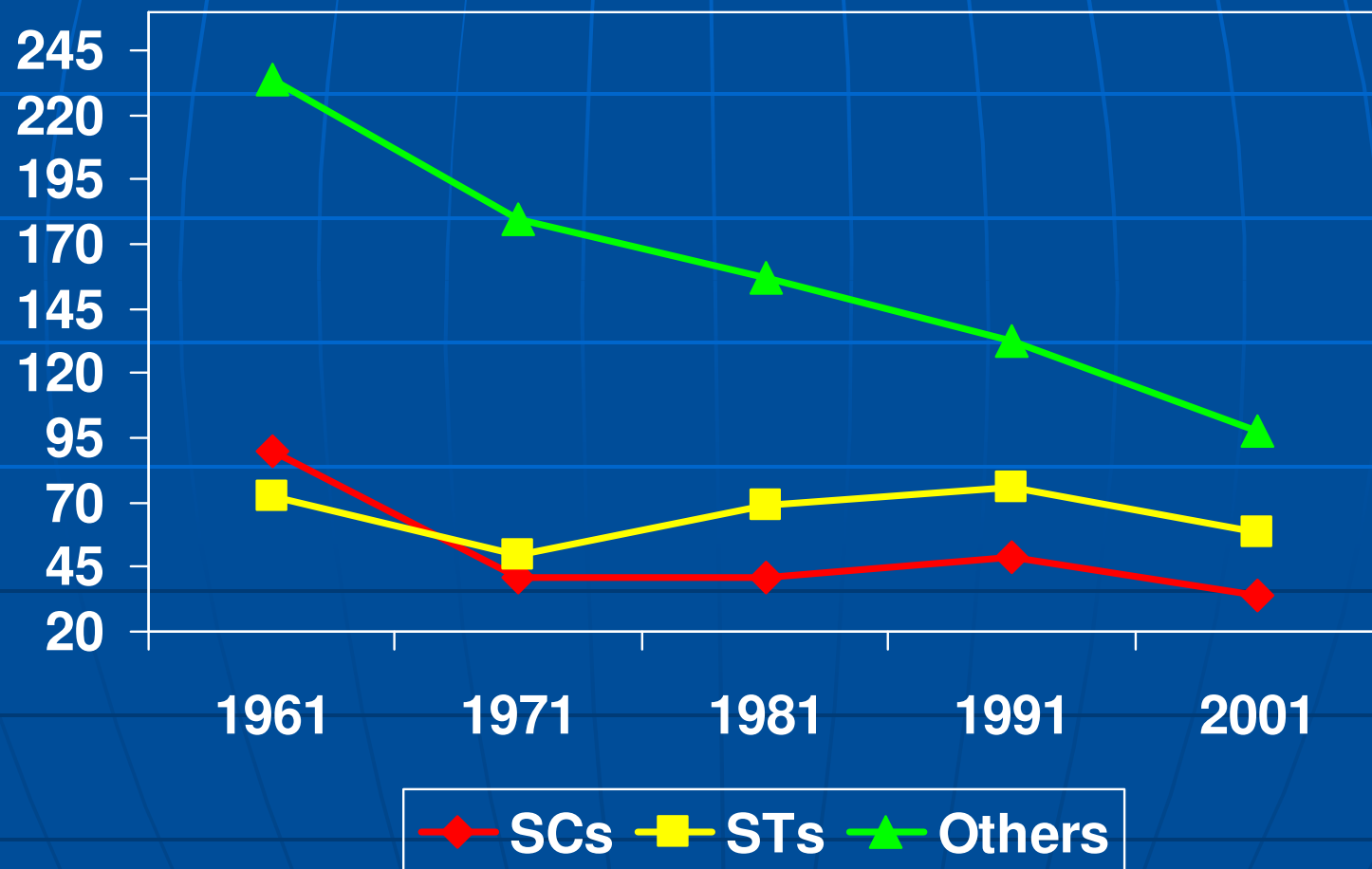
| Census<br>Year | Scheduled Castes |     |      | Scheduled Tribes |     |      | Others |     |     |
|----------------|------------------|-----|------|------------------|-----|------|--------|-----|-----|
|                | Orissa           |     |      | Orissa           |     |      | Orissa |     |     |
|                | R                | U   | T    | R                | U   | T    | R      | U   | T   |
| 1961           | 1020             | 930 | 1015 | 1018             | 946 | 1016 | 1013   | 779 | 991 |
| 1971           | 996              | 955 | 993  | 1009             | 958 | 1007 | 1000   | 821 | 979 |
| 1981           | 992              | 951 | 988  | 1015             | 947 | 1012 | 994    | 837 | 969 |
| 1991           | 981              | 932 | 975  | 1006             | 930 | 1002 | 983    | 849 | 959 |
| 2001           | 983              | 949 | 979  | 1006             | 948 | 1003 | 980    | 881 | 960 |

Source: Census of India: 1961 -2001

**Fig. 3.8 Trend of Sex Ratio of SCs and STs of Orissa, 1961 - 2001**



**Fig. 3.9 Trend of Rural – Urban difference in Sex Ratio of Orissa by Social Groups, 1961 - 2001**



**Table 3.2 Age specific sex ratio in Orissa by social groups:  
1961—2001**

| Age Group | Social Groups | 1981 | 1991 | 2001 |
|-----------|---------------|------|------|------|
| 0-14      | SCs           | 992  | 1035 | 964  |
|           | STs           | 999  | 998  | 959  |
|           | Others        | 995  | 959  | 955  |
| 15-49     | SCs           | 994  | 963  | 982  |
|           | STs           | 1011 | 1013 | 1012 |
|           | Others        | 953  | 970  | 962  |
| 50-59     | SCs           | 868  | 898  | 996  |
|           | STs           | 935  | 914  | 1012 |
|           | Others        | 881  | 946  | 942  |
| 60+       | SCs           | 1062 | 887  | 1012 |
|           | STs           | 1247 | 1044 | 1203 |
|           | Others        | 1024 | 978  | 981  |
| All ages  | SCs           | 988  | 975  | 979  |
|           | STs           | 1012 | 1002 | 1003 |
|           | Others        | 969  | 959  | 960  |

**Source: Census of India, Social & Cultural Table, 1961, 1971,  
1981, 1991& age-data Census-2001**

**EXERCISE:** Look at the data and try to understand it through diagrams and graphs and interpret.

# FREQUENCY GRAPHS

- Histogram
- Frequency polygon
- Smoothed frequency curve
- Cumulative frequency curve or ogives.

***THANK YOU***