

Kumar: Research Methodology

# Data Processing & Display

Prepared by Stephanie  
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## Chapter 15

# Processing Data

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# Topics covered

- Part 1: Methods for processing data in quantitative research
  - Coding
  - Analysis
- Part 2: Methods for processing data in qualitative researcher
  - Content analysis in qualitative research
- Computers in research



# Figure 15.1 Steps in data processing

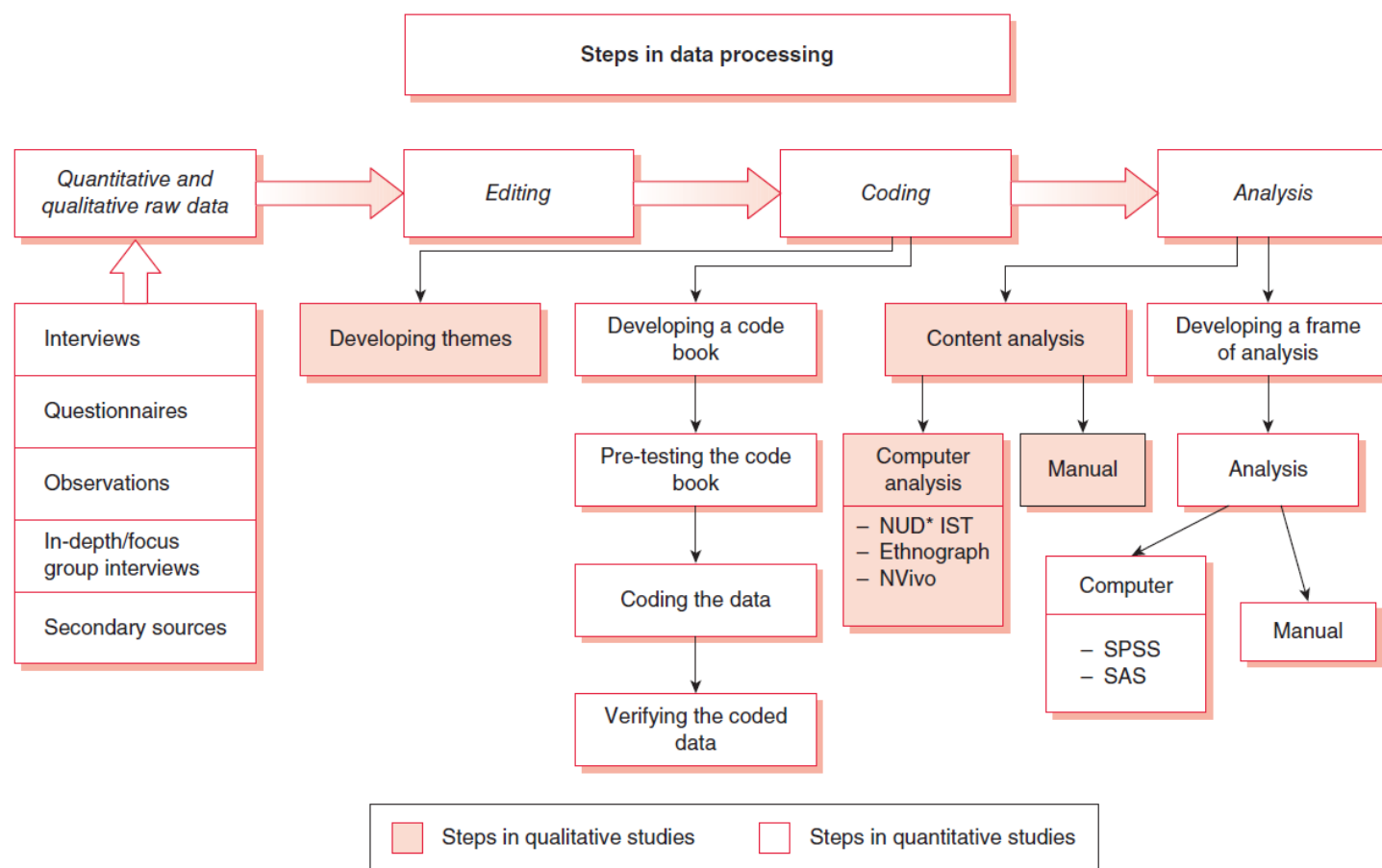


Figure 15.1 Steps in data processing



# PART I: Methods for processing data in quantitative research

- The raw data need to be edited or cleaned for analysis to check for completeness
- Problems can be minimised by:
  - By inference
  - By recall
  - By going back to the respondents
- Checking all answers to one question/variable
- Checking all responses given to all questions by one respondents



# Coding

- The way a variable has been measured
  - Nominal
  - Ordinal
  - Ratio/interval
- Numerical values will be used to describe the data
  - Quantitative (numerical) responses
  - Categorical responses
  - Descriptive responses



# Types of Measurement Scales

## Nominal scale

It's used to label variables in different classifications and does not imply a quantitative value or order.



## Ordinal Scale

It's used to represent non-mathematical ideas such as frequency, satisfaction, happiness, a degree of pain, etc.



## Interval Scale

It's defined as a numerical scale where the order of the variables as well as the difference between these variables is known.



## Ratio Scale

It's a variable measurement scale that not only produces the order of the variables, but also makes the difference between the known variables along with information about the value of the true zero.

Source: <https://www.questionpro.com/blog/nominal-ordinal-interval-ratio/>



# Steps of coding

1. Developing a code book
2. Pre-testing the code book
3. Coding the data
4. Verifying the coded data





RESPONDENT = 59

1 Please indicate:

(a) Your current age in completed years: 45

(c) Your marital status: (Please tick)

Currently married ☒

Living in a de facto relationship \_\_\_\_\_

Separated \_\_\_\_\_

Divorced \_\_\_\_\_

Never married \_\_\_\_\_

2 (b) If tertiary/university, please specify the level achieved and area of study. (Please specify all postgraduate qualifications.)

Level of achievement	Area of study: e.g. engineering, accounting
Associate diploma	
Diploma	
Bachelor	<i>Behavioural Sciences</i>
Graduate diploma	
Masters	
PhD	

11 What, in your opinion, are the main differences between your jobs prior to and after redeployment?

*Less responsibility, More specific jobs, Restricted scope.*

12 We would like to know your perception of the two jobs *before* and *after* redeployment with respect to the following aspects of your job. Please rate them on a five-point scale using the following guide:

5 = extremely satisfied, 4 = very satisfied, 3 = satisfied, 2 = dissatisfied, 1 = extremely dissatisfied

Before redeployment					Areas	After redeployment				
1	2	3	4	5		1	2	3	4	5
			✓		Job status		✓			
			✓✓		Job satisfaction			✓		
			✓✓		Motivation to work		✓			
				✓	Interest in the job			✓		
				✓	Self-esteem			✓		
				✓	Professional competence			✓		
				✓	peer interaction				✓	
				✓	Morale		✓			
			✓		Work environment			✓		
			✓		Social interaction				✓	

Figure 15.5 Some questions from a survey – respondent 59



Fig. 15.7 An example of coded data on a code sheet

[illegible]

**Figure 15.7** An example of coded data on a code sheet



# Analysing the data

- Developing a frame of analysis
- Analysing data manually or using a computer software: frequency distributions, percentages, means, etc.
- Examining the relationship between variables
- Other statistical procedures
- Objectives of the study need to be addressed



# PART II: Methods for processing data in qualitative research

- Developing a narrative to describe the situation, episode, event or instance
- Identify main themes that emerge from the field notes or transcriptions
- In addition also quantify the frequency of occurrence of main themes in order to provide their prevalence



# Content analysis in qualitative research

Process of content analysis:

1. Identifying the main themes
2. Assigning codes to the main themes
3. Classifying responses under the main themes
4. Integrating themes and responses into the text of the report



# Computers in research

- Statistical packages such as SPSS or SAS can help to organise numerical data and to understand it
- Computers can help to aggregate and display data
- Word processing is useful in qualitative research
- ATLAS.ti and Nvivo software help to handle large volumes of written information



# Kumar: Research Methodology

## Chapter 16

# Displaying Data

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# Topics covered

- Methods of communicating and displaying analysed data
- Text
- Presenting data in tables
- Types of graphs
- Statistical measures





# Methods of communicating and displaying data

- Presenting findings to the reader in a clear way using:
  - Text
  - Tables
  - Graphs
  - Statistical measures
- Analytical style with factual information for quantitative results
- Descriptive and narrative writing style for qualitative findings



# Text

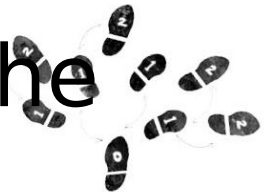
*“The language of well-written documents helps to communicate information effectively. Language is also the means by which writers create the tone or register of a publication and establish relationships with their readers. For these relationships to be productive, the language the writer uses must take full account of the diversity of knowledge, interests and sensitivities within the audience.”*

Commonwealth of Australia Style Manual (2002: 49)



# Presenting data in tables

- Most common method to accurately and effectively present analysed data
- Frequency tables (univariate, one variable)
- Cross tabulations (bivariate, two variables)
- Multivariate containing information about more than two variables
- Use of percentages to interpret the data presented



# 16.1 structure of a table

**Title**

*Table X. YY: Attitudes towards uranium mining by age*

(x-axis)

**Column heading**

Attitude towards uranium mining	Age of respondent					Total
	<25	25–34	35–44	45–54	55+	
Strongly in favour						
In favour						
Uncertain						
Against						
Strongly Against						
Total						

(y-axis)

Source: ..... Hypothetical data

**Stub**

**Supplementary notes**

**Body**

**Figure 16.1** The structure of a table

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# Table 16.4 attitude towards uranium mining by age and gender

**Table 16.4** Attitude towards uranium mining by age and gender (hypothetical data)

	Number of respondents												
Attitude towards uranium mining	<25		25-34		35-44		45-54		55+		Total		
	F	M	F	M	F	M	F	M	F	M	F	M	T
Strongly in favour	0	0	1	1	3	1	5	2	3	0	12	4	16
In favour	0	0	1	2	3	2	3	1	0	0	7	5	12
Uncertain	0	0	0	0	1	1	2	2	0	0	3	3	6
Against	1	1	4	3	1	0	0	0	0	0	6	4	10
Strongly against	4	8	17	7	8	7	2	3	0	0	31	25	56
Total	5	9	23	13	16	11	12	8	3	0	59	41	100



# Types of percentages

- Row percentage
  - Cell vs row total
- Column percentage
  - Cell vs column total
- Total percentage
  - Cell vs grand total



# Presenting data in graphs

- Histogram
- Bar chart
- 100 per cent bar chart
- Frequency polygon
- Cumulative frequency polygon
- Stem-and leaf display
- Pie charts
- Line diagram or trend curve
- Area chart
- Scattergram



# Figure 16.2a two-dimensional histogram

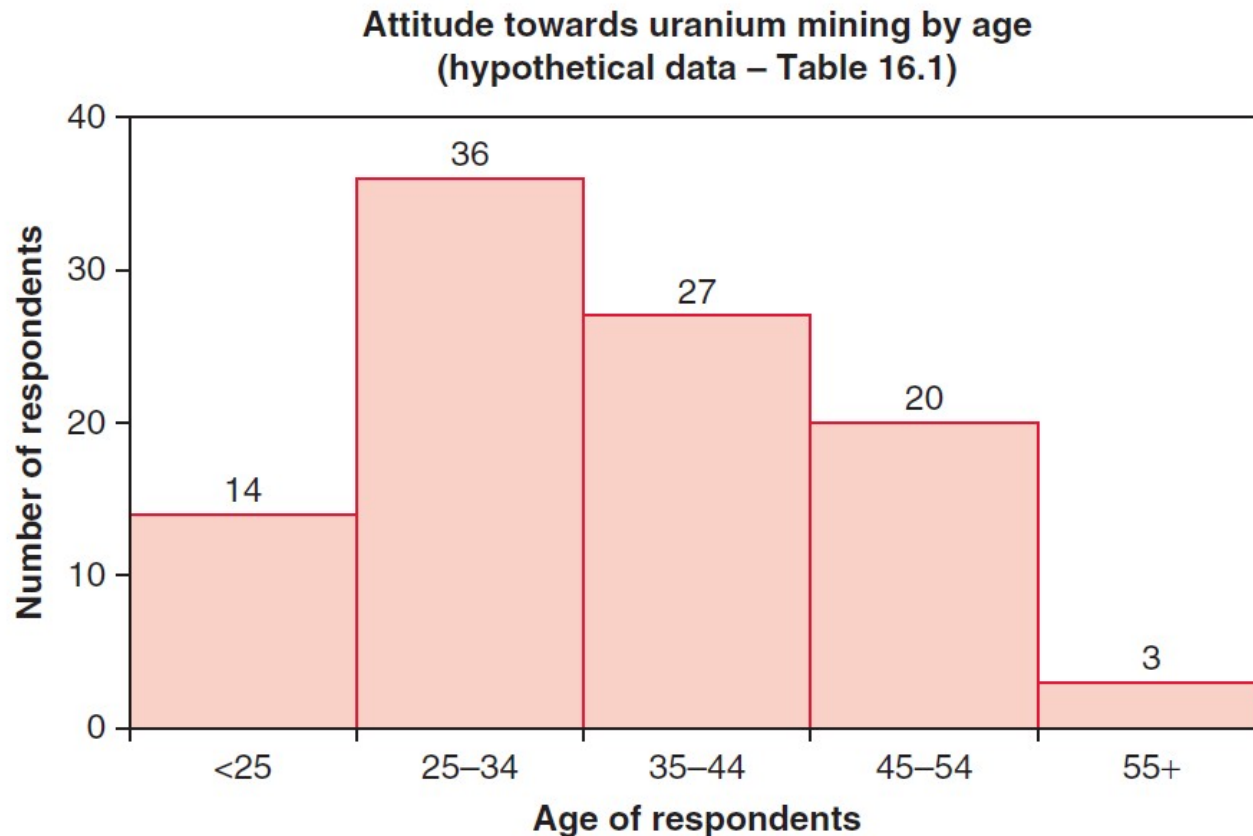


Figure 16.2a Two-dimensional histogram

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# Figure 16.2b three-dimensional histogram

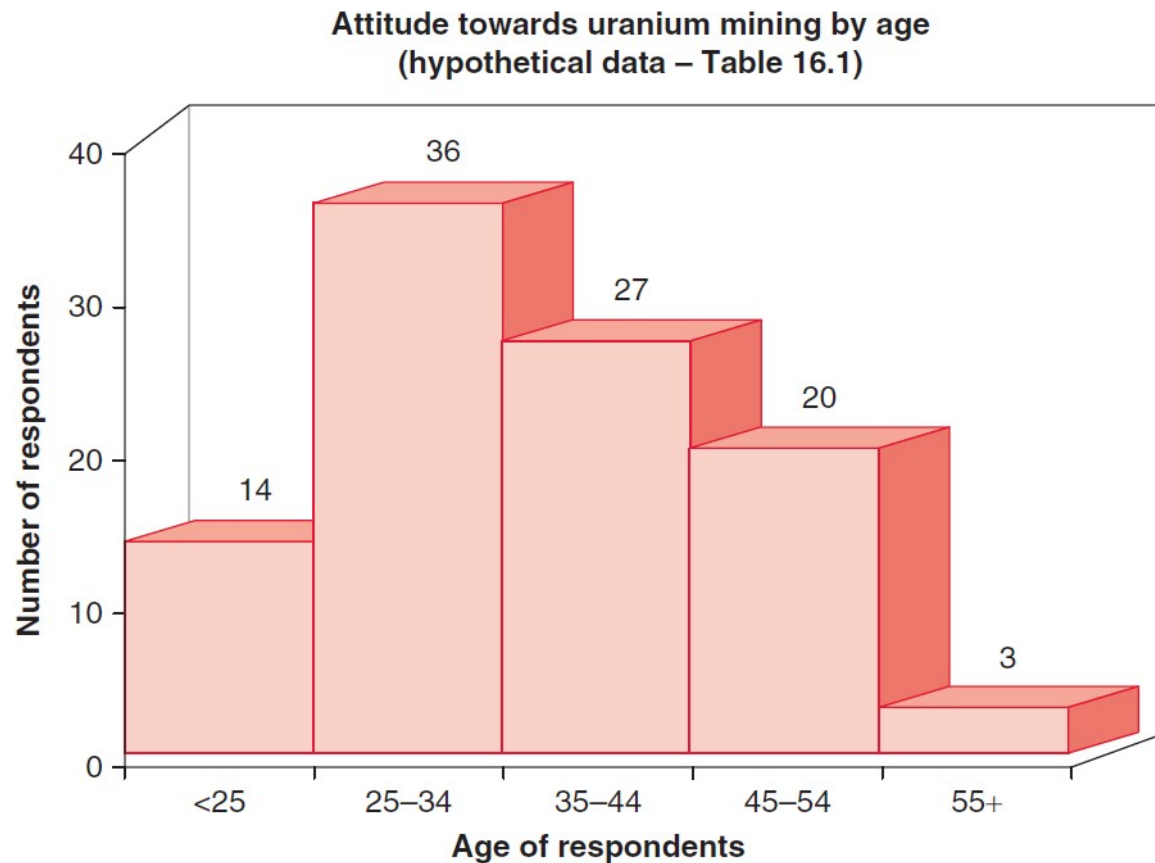
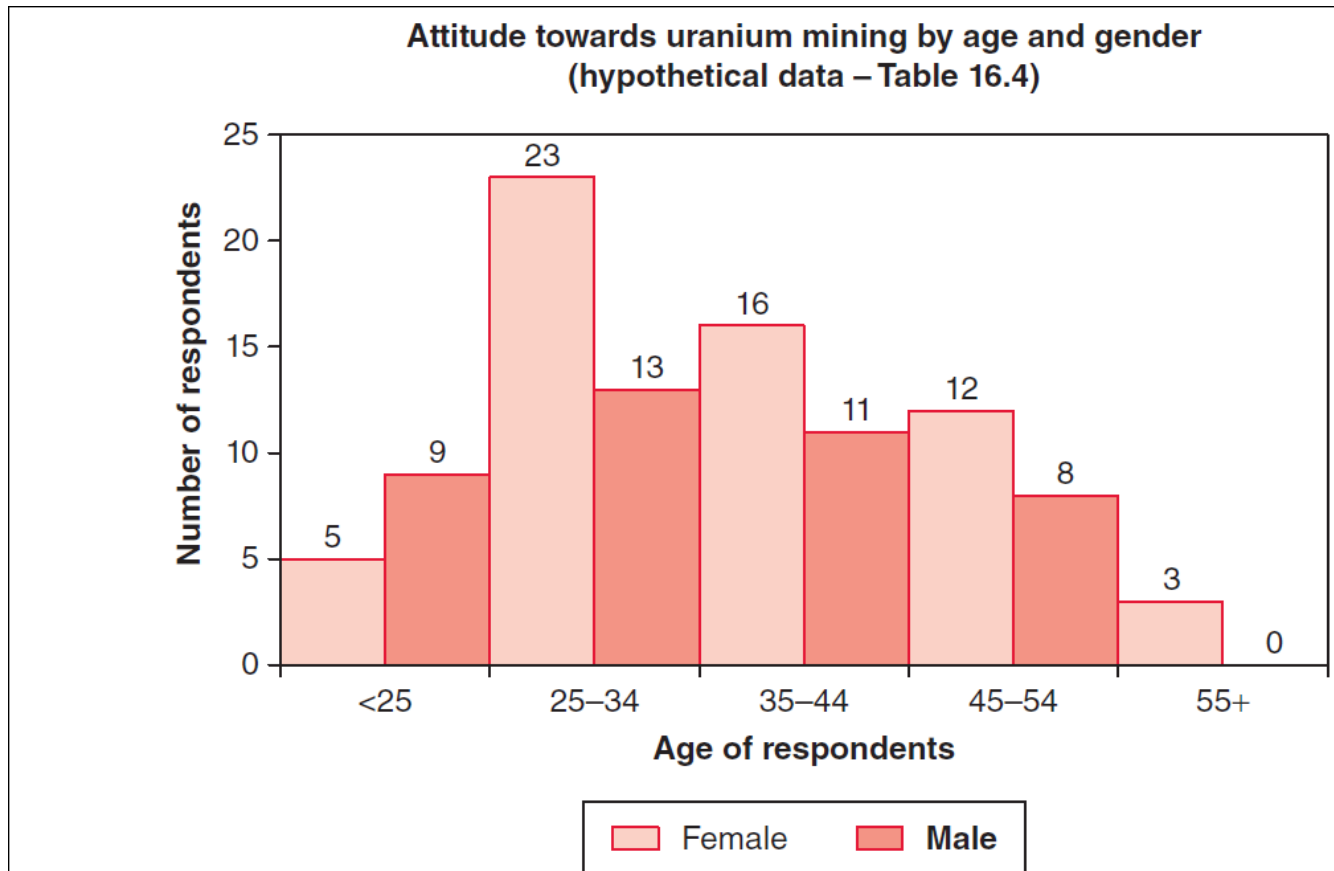


Figure 16.2b Three-dimensional histogram

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# Figure 16.2c two-dimensional histogram with two variables

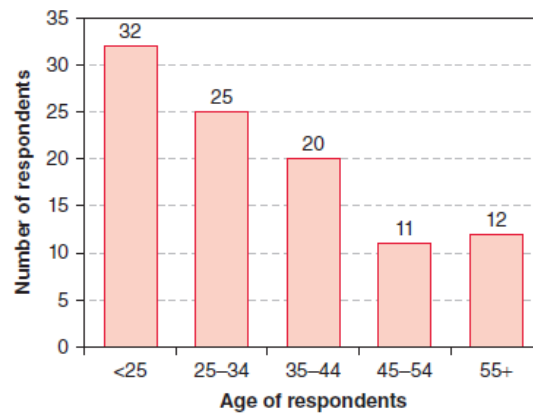


**Figure 16.2c** Two-dimensional histogram with two variables

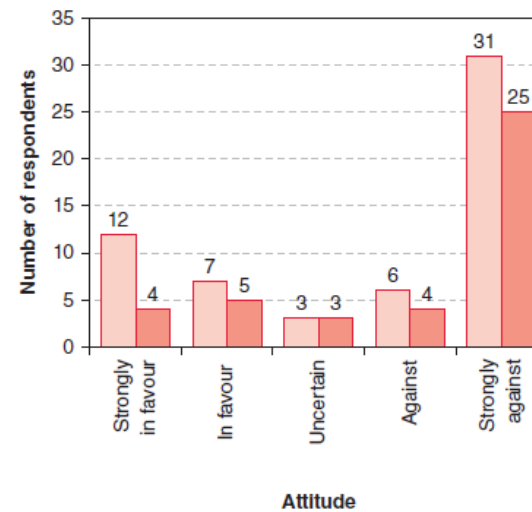
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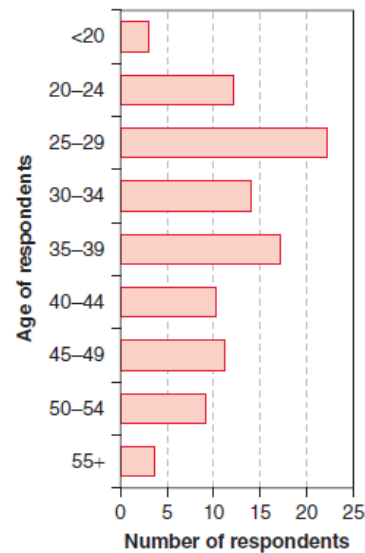
(a) one variable (2D)



(b) two variables (2D)



(c) one variable (vertical box)



(d) two variables (3D)

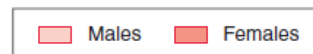
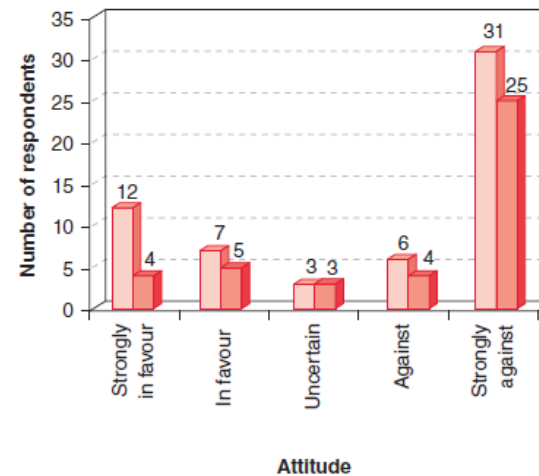


Figure 16.3 Different types of bar chart



# Figure 16.4 the stacked bar chart

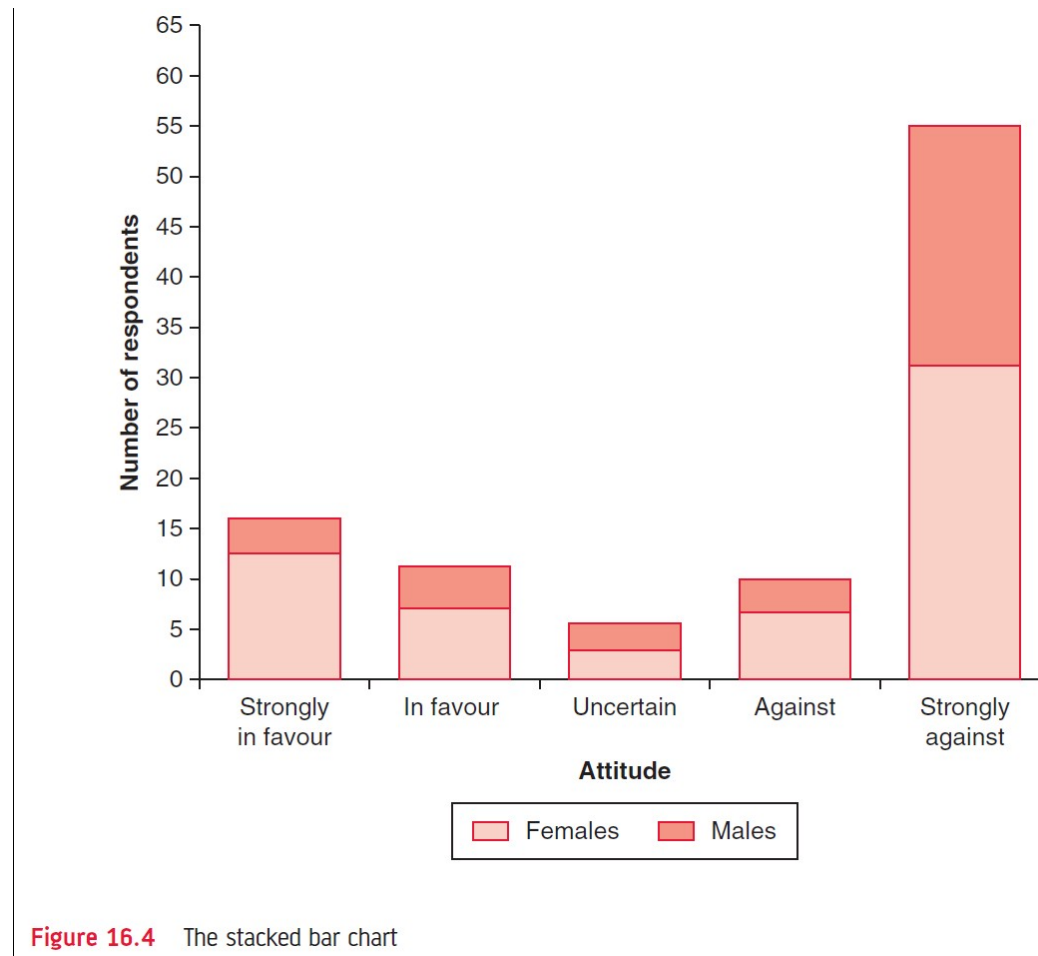


Figure 16.4 The stacked bar chart

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# Figure 16.5 the 100 per cent bar chart

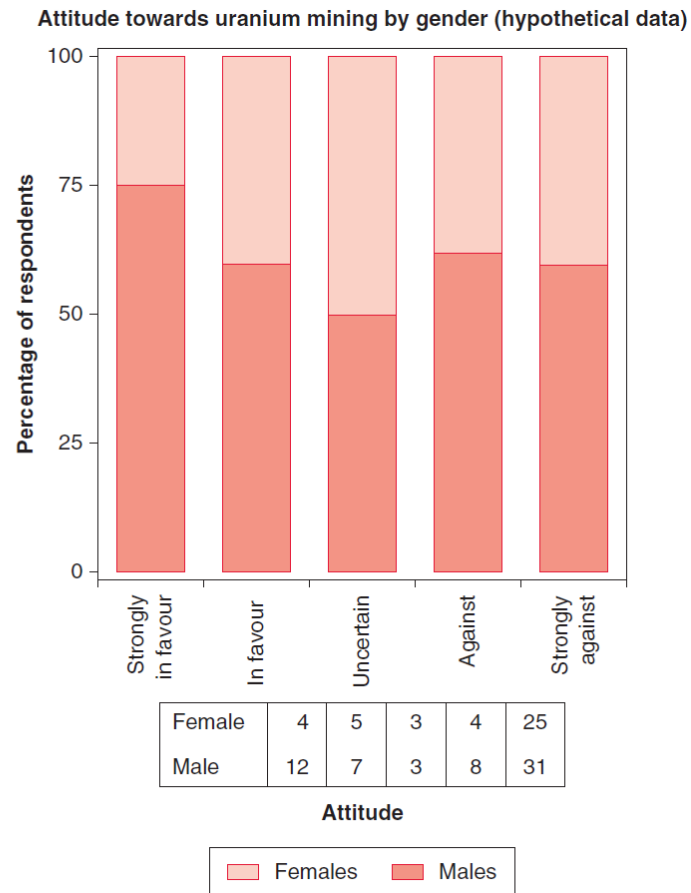
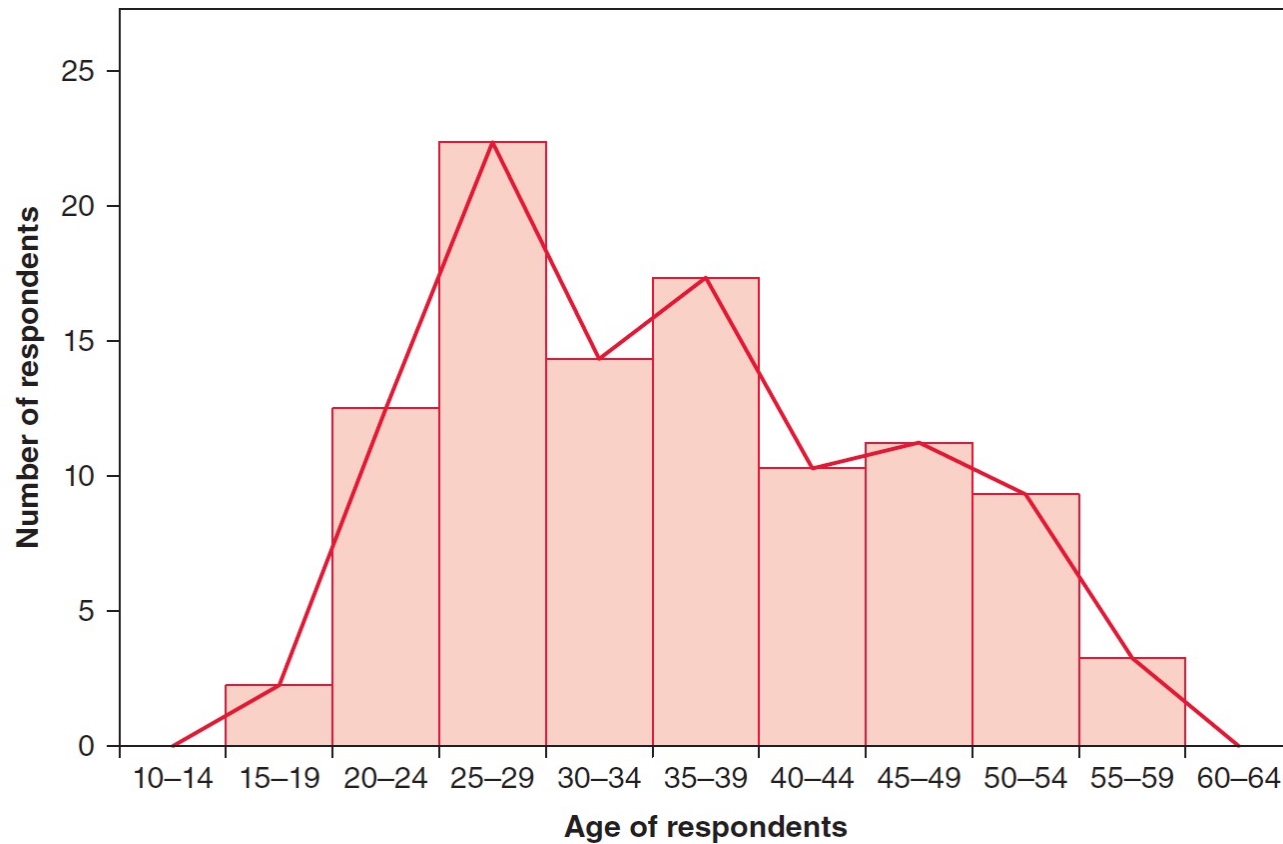


Figure 16.5 The 100 per cent bar chart

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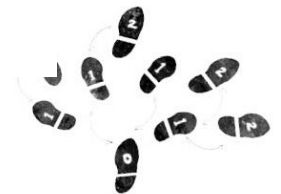


# Figure 16.6 the frequency polygon

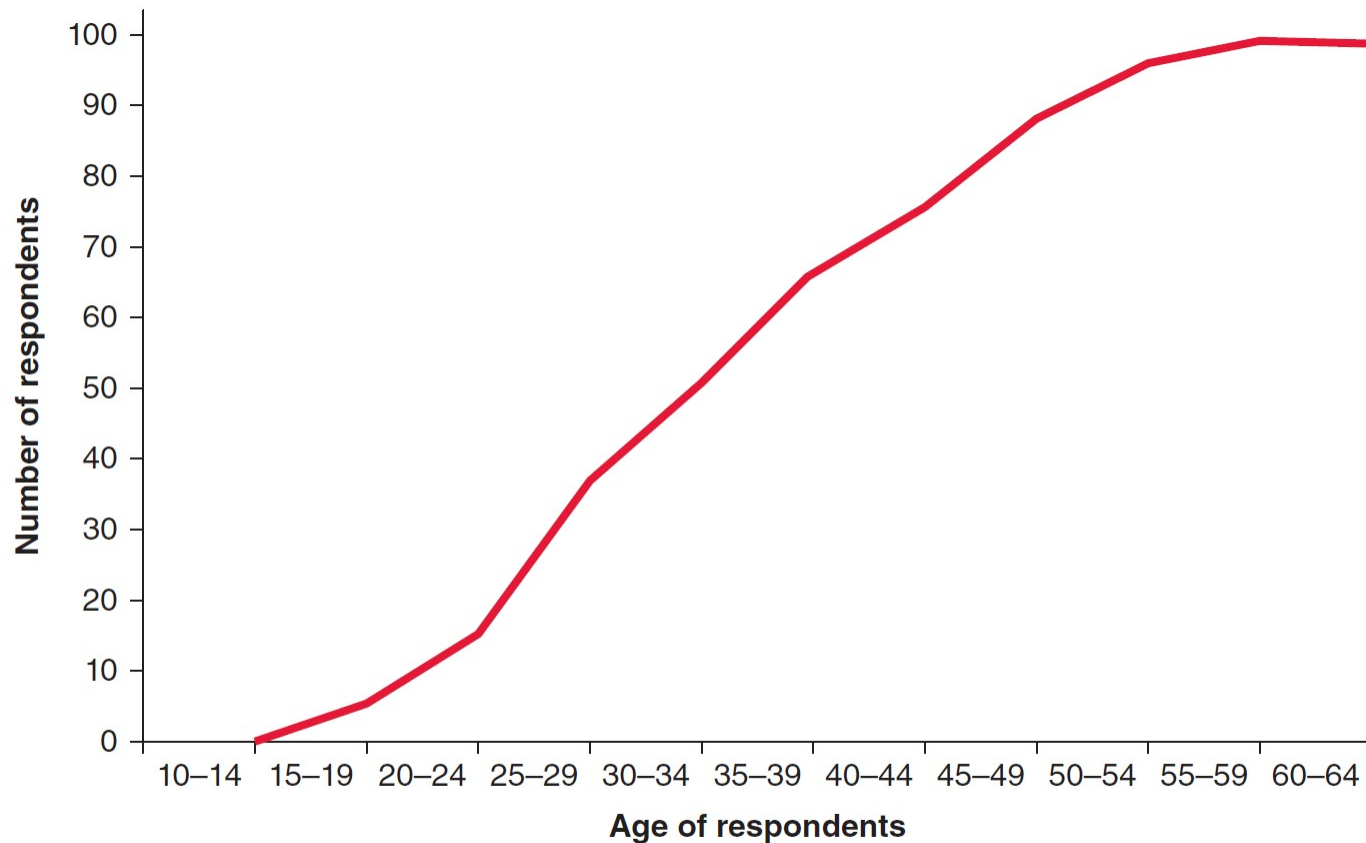


**Figure 16.6** The frequency polygon

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# Figure 16.7 the cumulative frequency polygon



**Figure 16.7** The cumulative frequency polygon

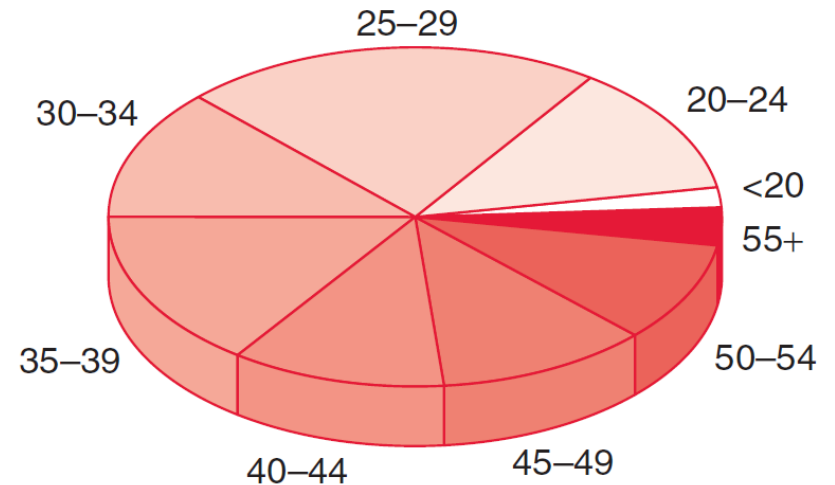
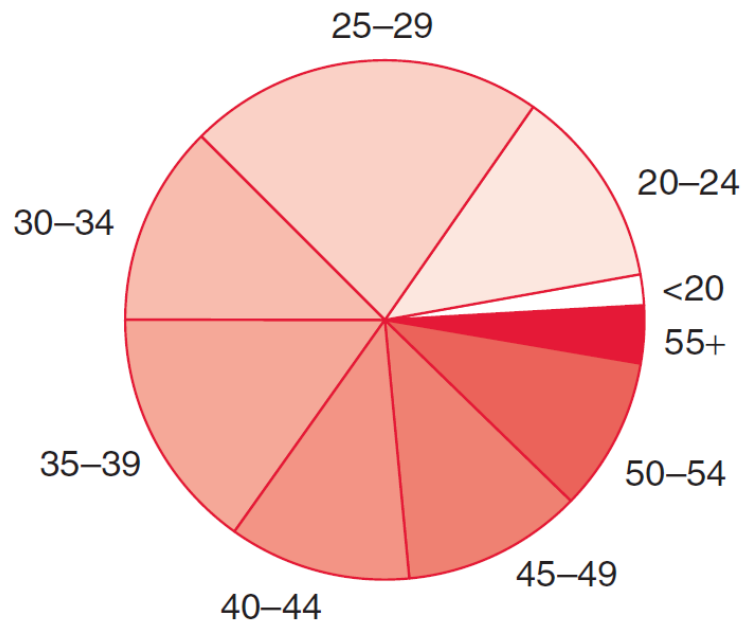
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# Pie charts

## Respondents by age

Attitude towards uranium mining (hypothetical data)



**Figure 16.9** Two- and three-dimensional pie charts





# More charts

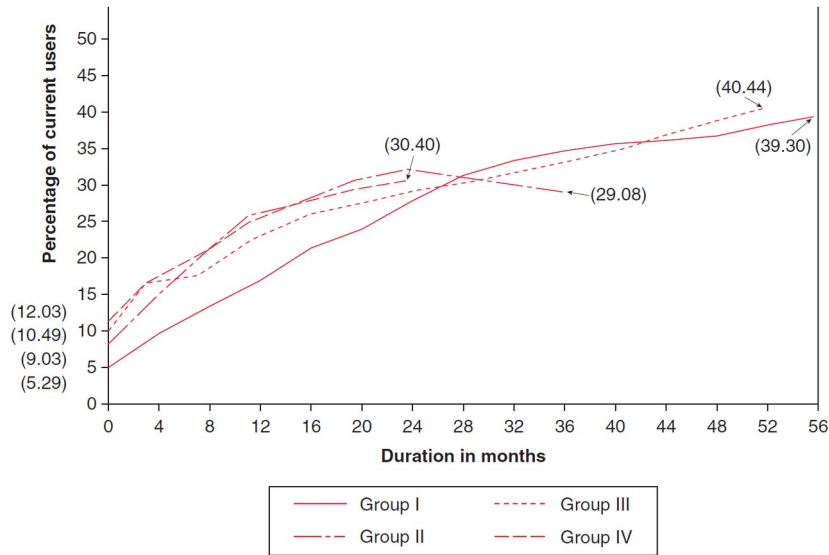


Figure 16.10 The line diagram or trend curve

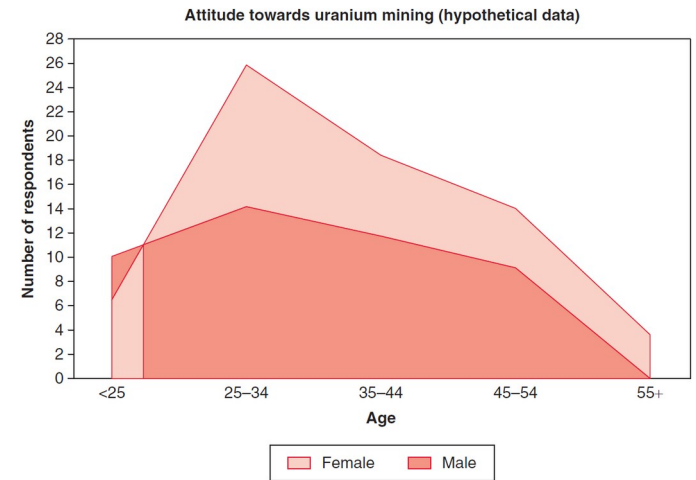


Figure 16.11 The area chart

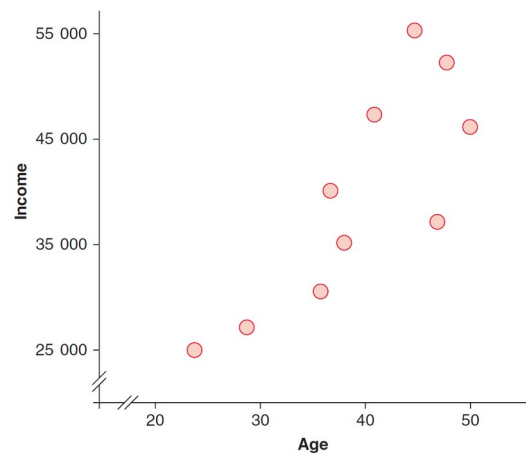


Figure 16.12 The scattergram



# Statistical measures

- Dependent on:
  - Type of data
  - Knowledge of statistics
  - Purpose of communicating the results
- Descriptive statistics such as mean, mode, median
- Inferential statistics like ANOVA, factor analysis or multiple regression

