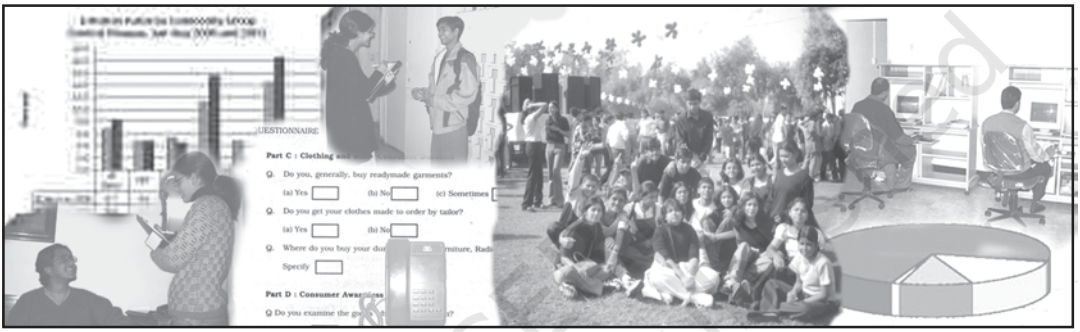
CHAPTER

8

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Use of Statistical Tools



Studying this chapter should enable you to:

- *be familiar with steps in designing a project;*
- *apply various statistical tools in analysing a problem.*

1. INTRODUCTION

You have studied about the various statistical tools. These tools are important for us in daily life and are used in the analysis of data pertaining to economic activities such as production, consumption, distribution, banking and insurance, trade, transport, etc. In this chapter, you will learn the method of developing a project. This will help in understanding how statistical tools and methods can be used for various types of analysis. For example, you may have to collect information about a product from the consumer or about a new product or service to be launched in the market by the producer or analyse the spread of information technology in schools and so on. Developing a project by conducting a survey and preparing a report will help in analysing relevant information and suggesting improvements in a product or system.

Steps Towards Making a Project

Identifying a problem or an area of study

At the outset, you should be clear about what you want to study. On the basis

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of your objective, you will proceed with the collection and processing of the data. For example, production or sale of a product like car, mobile phone, shoe polish, bathing soap or a detergent, may be an area of interest to you. You may like to address certain water or electricity problems relating to households of a particular area. You may like to study about consumer awareness among households, i.e., awareness about rights of consumers.

Choice of Target Group

The choice or identification of the target group is important for framing appropriate questions for your questionnaire. If your project relates to cars, then your target group will mainly be the middle income and the higher income groups. For the project studies relating to consumer products like soap, you will target all rural and urban consumers. For the availability of safe drinking water your target group can be both urban and rural population. Therefore, the choice of target groups, to identify those persons on whom you focus your attention, is very important while preparing the project report.

Collection of Data

The objective of the survey will help you to determine whether the data collection should be undertaken by using primary method, secondary method or both the methods. As you have read in Chapter 2, a first hand collection of data by using primary method can be done by using a questionnaire or an interview schedule, which may be obtained by personal interviews, mailing/postal surveys, phone, email, etc. Postal questionnaire must have a covering letter giving details about the purpose of inquiry. Your objective will be to determine the size and characteristics of your target group. For example, in a study pertaining to the primary and secondary level female literacy or consumption of a particular brand or soap, you will have to go to each and every family or household to collect the information i.e. you have to collect primary data. If sampling is used in your method of data collection, then care has to be taken about the suitability of the method of sampling.

Secondary data can also be used provided it suits your requirement. Secondary data are usually used when there is paucity of time, money and manpower resources and the information is easily available.

Organisation and Presentation of Data

After collecting the data, you need to process the information so received, by organising and presenting them with the help of tabulation and suitable diagrams, e.g. bar diagrams, pie diagrams, etc. about which you have studied in chapter 3 and 4.

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Analysis and Interpretation

Measures of Central Tendency (e.g. mean), Measures of Dispersion (e.g. Standard deviation), and Correlation will enable you to calculate the average, variability and relationship, if it exists among the variables. You have acquired the knowledge related to above-mentioned measures in chapters 5 and 6.

Conclusion

The last step will be to draw meaningful conclusions after analysing and interpreting the results. If possible you must try to predict the **future prospects** and suggestions relating to growth and government policies, etc. on the basis of the information collected.

Bibliography

In this section, you need to mention the details of all the secondary sources, i.e., magazines, newspapers, research reports used for developing the project.

2. Suggested List of Projects

These are a few suggested projects. You are free to choose any topic that deals with an economic issue.

1. Consider yourself as an advisor to Transport Minister who aims to bring about a better and coordinated system of transportation. Prepare a project report.
2. You may be working in a village cottage industry. It could be a unit manufacturing *dhoop, agarbatti,* candles, jute products, etc. You want to start a new unit of your own. Prepare a project proposal for getting a bank loan.
3. Suppose you are a marketing manager in a company and recently you have put up advertisements about your consumer product. Prepare a report on the effect of advertisements on the sale of your product.
4. You are a District Education Officer, who wants to assess the literacy levels and the reasons for dropping out of school children. Prepare a report.
5. Suppose you are a Vigilance Officer of an area and you receive complaints about overcharging of goods by traders i.e., charging a higher price than the Maximum Retail Price (MRP). Visit a few shops and prepare a report on the complaint.
6. Consider yourself to be the head of Gram Panchayat of a particular village who wants to improve amenities like safe drinking water to your people. Address your issues in a report form.
7. As a representative of a local government, you want to assess the participation of women in various employment schemes in your area. Prepare a project report.
8. You are the Chief Health Officer of a rural block. Identify the issues to be addressed through a project study. This may include health and sanitation problems in the area.
9. As the Chief Inspector of Food and Civil Supplies department, you have received a complaint about

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food adulteration in the area of your duty. Conduct a survey to find the magnitude of the problem.

10. Prepare a report on Polio immunisation programme in a particular area.
11. You are a Bank Officer and want to survey the saving habits of the people by taking into consideration income and expenditure of the people. Prepare a report.
12. Suppose you are part of a group of students who wants to study farming practices and the problems facing farmers in a village. Prepare a project report.



3. Sample Project

This is a sample project for your guidance. Depending on the subject of your study the method used will obviously be different from the one used here.

Project

X is a young entrepreneur who wants to set up a factory to produce toothpaste. You are asked to advise X about how he should proceed.

One of the first things you could do would be to study people's tastes with regard to toothpastes, their monthly expenses on toothpaste and other relevant facts. For this, you may decide to collect primary data.

The data is to be collected with the help of a questionnaire. Whatever questionnaire you use must be capable of generating the information which you need for your study. Suppose you decide that the most important information that you need for your study is:

- The average monthly expenditure on toothpaste
- The brands of toothpaste that are currently in demand
- The attitude of the customers towards these brands
- Customers' preferences in regard to ingredients in the toothpaste
- The major media influences on consumers' demand for toothpaste
- The relation between income and all the above factors.

If you can get hold of a questionnaire that has already been tried out and tested (perhaps for some similar study), you could use it after suitably modifying it to suit your requirements. Otherwise, you may need to prepare the questionnaire yourself, making sure that all the required information has been asked for.

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EXAMPLE OF QUESTIONNAIRE TO BE USED FOR THIS PROJECT REPORT

1. Name
2. Sex
3. Ages of family members (in years)
.....
.....
.....
.....
.....
.....
4. Total Number of family members:-
5. Monthly family income
6. Location of residence Urban ☐
Rural ☐
7. Major occupation of the main bread-winner:
   (i) Service ☐
   (ii) Professional ☐
   (iii) Manufacturer ☐
   (iv) Trader ☐
   (v) Any other (please specify) ☐
8. Does your family use toothpaste to clean your teeth?
   Yes ☐ No ☐
9. If Yes, then according to you what should be the essential qualities of a good toothpaste (you can tick more than one option):
   (i) Plain ☐
   (ii) Gel ☐
   (iii) Antiseptic ☐
   (iv) Flavoured ☐
   (v) Carries Protection ☐
   (vi) Fluoride ☐
   (vii) Other ———
10. If Yes, which brand of toothpaste do you use? ———
11. How many 100 gram packs of this toothpaste do you use per month?
12. Are you satisfied with this toothpaste? Yes ☐ No ☐
13. Are you prepared to try out a new toothpaste? Yes ☐ No ☐
14. If Yes, what are the features you would like in the new toothpaste? (you can tick more than one option):
   (i) Plain ☐
   (ii) Gel ☐
   (iii) Antiseptic ☐
   (iv) Flavoured ☐
   (v) Carries Protection ☐
   (vi) Fluoride ☐
   (vii) Other ———
15. What are the main sources of your information about toothpaste?
   (i) Cinema ☐
   (ii) Exhibitions ☐
   (iii) Internet ☐
   (iv) Magazines ☐
   (v) Newspapers ☐
   (vi) Radio ☐
   (vii) Sales Representatives ☐
   (viii) Television ☐
   (ix) Other ———

DATA ANALYSIS AND INTERPRETATION

After collecting the required information you now have to organise and analyse. The final report may be as follows:

EXAMPLE OF SIMPLIFIED PROJECT REPORT

1. **Total Sample Size:** 100 households
2. **Location:** Urban 67%
   Rural 33%

Observation: Majority of users belonged to urban area.

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(i) *Age distribution*

Age in years	*No. of Persons*
Below 10	74
10–20	56
20–30	91
30–40	146
40–50	93
Above 50	40
Total	*500*

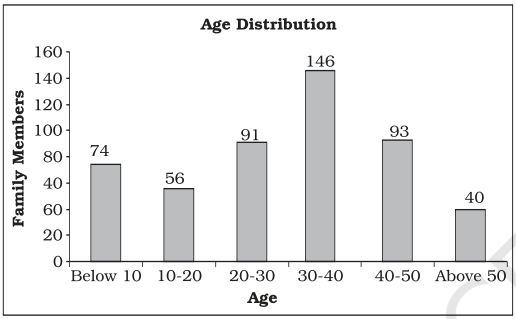


Fig. 8.1: *Bar diagram*

Observation: Majority of the persons surveyed belonged to age group 20–50 years.

(ii) *Family Size*

Family size	*No. of families*
1–2	20
3–4	40
5–6	30
Above 6	10
Total	*100*

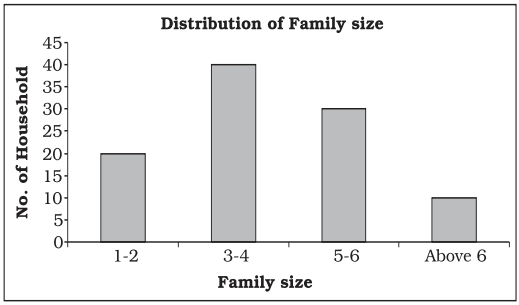


Fig. 8.2: *Bar diagram*

Observation: Majority of the families surveyed have 3–6 members.

(iii) *Monthly Family Income status*

Income	*No. of Households*
0 - 10,000	20
10,000–20,000	40
20,000–30,000	30
30,000 - 40,000	10

Frequncy Distribution of Monthly Family Income and Calculation of Mean and Standard Deviation

Income Class (1)	*Midpoint x* (2)	*Freq. f* (3)	*d'=(X-20000)/5000* (4)	*fd'* (5)	*f'd'²* (6)
0-10000	5000	20	-3	-60	180
10000-20000	15000	40	-1	-40	40
20000-30000	25000	30	1	30	30
30000-40000	35000	10	3	30	90
		100		-40	340

Histogram for this data is shown below.

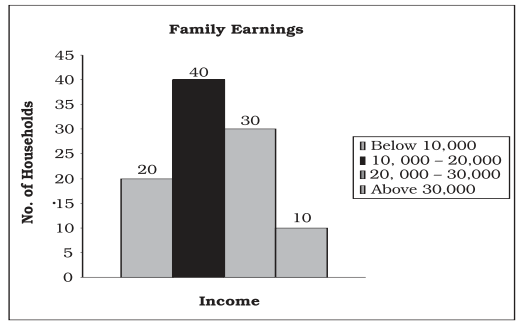


Fig. 8.3: *Histogram*

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Observation: Majority of the families surveyed have monthly income between 10,000 to 30,000.

$$\bar{X} = A + \frac{\sum d'}{\sum f} \quad c = 2000 + \frac{(-40)}{100} \times 5000$$

$$= 20000 - 2000 = 18000$$

$$\sigma = \sqrt{\frac{\sum fd'^2}{\sum f} - \left(\frac{\sum fd'}{\sum f}\right)^2} \times c$$

$$\sigma = \sqrt{\frac{340}{100} - \left(\frac{-40}{100}\right)^2} \times c$$

$$= \sqrt{3.40 - 0.16} \times 5000$$

$$= \sqrt{3.24} \times 5000$$

$$= 1.8 \times 5000$$

$$= 9000$$

The mean income was Rs.18000 and standard deviation was Rs.9000

(iv) ***Monthly Family budget on toothpaste***

The mean expenditure on toothpaste per household was Rs. 104 per month and standard deviation was Rs.35.60.

$$\bar{X} = A + \frac{\sum fd'}{\sum f} \times c$$

$$= 100 + \frac{10}{100} \times 40$$

$$= 104$$

$$\sigma = \sqrt{\frac{\sum fd'^2}{\sum f} - \left(\frac{\sum fd'}{\sum f}\right)^2} \times 40$$

$$\sigma = \sqrt{\frac{80}{100} - \left(\frac{10}{100}\right)^2} \times 40$$

$$= \sqrt{0.8 - 0.01} \times 40$$

$$= \sqrt{0.79} \times 40$$

$$= 0.89 \times 40$$

$$= 35.60$$

Frequncy Distribution of Monthly Family Expenditure on Toothpaste and Calculation of Mean and Standard Deviation

Income Class *(1)*	*Midpoint x* *(2)*	*Freq. f* *(3)*	*d'=(X-100)/40* *(4)*	*fd'* *(5)*	*fd'²* *(6)*
0-40	20	5	-2	-10	20
40-80	60	20	-1	-20	20
80-120	100	40	0	0	0
120-160	140	30	1	30	30
160-200	180	5	2	10	20
		100		10	90

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(v) Major Occupational Status

Family Occupation	*No. of Families*
Service	30
Professional	5
Manufacture	10
Trader	40
Any other (please specify)	15

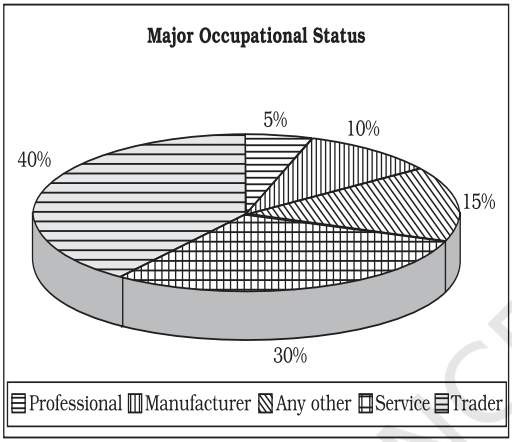


Fig. 8.4: *Pie diagram*

Observation: Majority of the families surveyed were either service class or traders.

(vi) Preferred use of toothpaste

Brand	*No. of Hh.*	*Brand*	*No. of Hh.*
Aquafresh	5	Anchor	4
Cibaca	9	Babool	3
Close-up	12	Promise	3
Colgate	18	Meswak	5
Pepsodent	20	OralB	7
Pearl	4	Sensodyne	7
Any other	3		

Observation: Pepsodent, Colgate and Close-up were the most preferred brands.

(vii) Basis of selection

Features	*Family members*
Advertisement	15
Persuaded by the Dentist	5
Price	35
Quality	45
Taste	20
Ingredients	10
Standardised marking	50
Tried new product	10
Company's brand name	35

Observation: Majority of the people selected the toothpaste on the basis of standardised markings, quality, price and company's brand name.

(viii) Taste and Preferences

Brand	*Satisfied*	*Unsatisfied*
Aquafresh	2	3
Cibaca	5	4
Close up	10	2
Colgate	16	2
Meswak	3	2
Pepsodent	18	2
Anchor	2	2
Babool	2	1
Promise	2	1
OralB	4	3
Sensodyne	5	2
Pearl	2	2

Observation: Amongst the most used toothpastes the percentage of dissatisfaction was relatively less.

(ix) Ingredients Preference

Plain	40
Gel	70
Antiseptic	80
Flavoured	50
Carries protective	30
Fluoride	10

Observation: Majority of the people preferred gel and antiseptic-based toothpastes over the others.

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(x) ***Media Influence***

Advertisement	*Families Influenced*
Television	47
Newspaper	30
Magazine	20
Cinema	25
Sales representative	15
Exhibits - stall	10
Radio	18

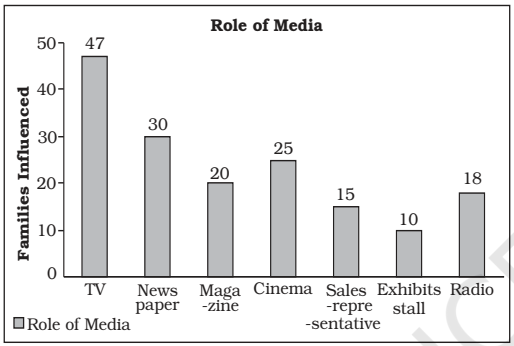


Fig. 8.5: *Bar diagram*

Observation: Majority of people came to know about the product either through television or through newspaper.

(xi) ***Concluding Note of the Project Report***

Majority of the users belonged to urban area. Most of the people who were surveyed belonged to age group 25 to 50 years and had an average 3–6 members in a family. The monthly income of these families ranged between Rs 10,000 and Rs 30,000 and their main occupations were service and trading. Expenditure on toothpaste accounted for about Rs.104 per month per household. Pepsodent, Colgate and Close-up were the most preferred brands in the households surveyed. People preferred those brands of toothpaste which has either gel or antiseptic based. A lot of people get influenced by advertisements and the most popular medium to get across through people is television.

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Recap

- The objective of the study should be clearly identified.
- The population and sample has to be chosen carefully.
- The objective of survey will indicate the type of data to be used.
- A questionnaire/interview schedule is prepared.
- Collected data can be analysed by using various statistical tools.
- Results are interpreted to draw meaningful conclusions.

APPENDIX A

GLOSSARY OF STATISTICAL TERMS

Analysis Understanding and explaining an economic problem in terms of the various causes behind it.

Assumed Mean An approximate value in order to simplify calculation.

Attribute A characteristic that is qualitative in nature. It cannot be measured.

Bimodal Distribution A distribution which has two mode values.

Bivariate Distribution Frequency distribution of two variables.

Census Method A method of data collection, which requires that observations are taken on *all* the individuals in a population.

Chronological Classification Classification based on time.

Class Frequency Number of observations in a class.

Class Interval Difference between the upper and the lower class limits.

Class Mark Class midpoint

Class Midpoint Middle value of a class. It is the representative value of different observations in a class. It is equal to (upper class limit + lower class limit)/2.

Classification Arranging or organising similar things into groups or classes.

Consumer One who buys goods for one's own personal needs or for the needs of one's family or as a gift to someone.

Constant A constant is also a quantity used to describe an attribute, but it will *not* change during calculation or investigation.

Continuous Variable A quantitative variable that can take any numerical value.

Cyclicity Periodicity in data variation with time period of more than one year.

Decile A partition value that divides the data into ten equal parts.

Discrete Variable A quantitative variable that takes only certain values. It changes from one value to another by finite "jumps". The intermediate values between two adjacent values are not taken by the variable.

Economics Study of how people and society choose to employ scarce resources that could have alternative uses in order to produce various commodities that satisfy their wants and to distribute them for consumption among various persons and groups in society.

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Employee One who gets paid for a job or for working for another person.

Employer One who pays another person to do or do some work.

Enumerator A person who collects the data.

Exclusive Method A method of classifying observations in which an observation equal to either the upper class limit or the lower class limit of a class is not put in that class but is put in the class above or below.

Frequency The number of times an observation occurs in raw data. In a frequency distribution it means the number of observations in a class.

Frequency Array A classification of a discrete variable that shows different values of the variable along with their corresponding frequencies.

Frequency Curve The graph of a frequency distribution in which class frequencies on Y-axis are plotted against the values of class marks on X-axis.

Frequency Distribution A classification of a quantitative variable that shows how different values of the variable are distributed in different classes along with their corresponding class frequencies.

Inclusive Method A method of classifying observations in which an observations equal to the upper class limit of a class as well as the lower class limit is put in that class.

Informant Individual/unit *from* whom the desired information is obtained.

Multi Modal Distribution The distribution that has more than two modes.

Non-Sampling Error It arises in data collection due to (i) sampling bias, (ii) non-response, (iii) error in data acquisition.

Observation A unit of raw data.

Percentiles A value which divides the data into hundred equal parts so there are 99 percentiles in the data.

Policy The measure to solve an economic problem.

Population Population means *all* the individuals/units for whom the information has to be sought.

Qualitative Classification Classification based on quality. For example classification of people according to gender, marital status etc.

Qualitative Data Information or data expressed in terms of qualities.

Quantitative Data A (often large) set of numbers systematically arranged for conveying specific information on a subject for better understanding or decision-making.

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Questionnaire A list of questions prepared by an investigator on the subject of enquiry. The respondent is required to answer the questions.

Random Sampling It is a method of sampling in which the representative set of informants is selected in a way that every individual is given equal chance of being selected as an informant.

Range Difference between the maximum and the minimum values of a variable.

Relative Frequency Frequency of a class as proportion or percentage of total frequency

Sample Survey Method A method, where observations are obtained on a representative set of individuals (the sample), selected from the population.

Sampling Error It is the numerical difference between the estimate from the sample and the corresponding true value of the parameter from the population.

Scarcity It means the lack of availability.

Seasonality Periodicity in data variation with time period less than one year.

Seller One who sells goods for profit.

Service Provider One who provides a service to others for a payment.

Spatial Classification Classification based on geographical location.

Statistics The method of collecting, organising, presenting and analysing data to draw meaningful conclusion. Further, it also means data.

Structured Questionnaire Structured Questionnaire consists of "closed-ended" questions, for which alternative possible answers to choose from are provided.

Tally Marking The counting of observations in a class using tally (/) marks. Tallies are grouped in fives.

Time Series Data arranged in chronological order or two variable data where one of the variables is time.

Univariate Distribution The frequency distribution of one variable.

Variable A variable is a quantity used to measure an "attribute" (such as height, weight, number etc.) of some thing or some persons, which can take different values in different situations.

Weighted Average The average is calculated by providing the different data points with different weights.

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APPENDIX B

TABLE OF TWO-DIGIT RANDOM NUMBERS

03 47 43 73 86	36 96 47 36 61	46 98 63 71 62	33 26 16 80 45	60 11 14 10 95
97 74 24 67 62	42 81 14 57 20	42 53 32 37 32	27 07 36 07 51	24 51 79 89 73
16 76 62 27 66	56 50 26 71 07	32 90 79 78 53	13 55 38 58 59	88 97 54 14 10
12 56 85 99 26	96 96 68 27 31	05 03 72 93 15	57 12 10 14 21	88 26 49 81 76
55 59 56 35 64	38 54 82 46 22	31 62 43 09 90	06 18 44 32 53	23 83 01 30 30
16 22 77 94 39	49 54 43 54 82	17 37 93 23 78	87 35 20 96 43	84 26 34 91 64
84 42 17 53 31	57 24 55 06 88	77 04 74 47 67	21 76 33 50 25	83 92 12 06 76
63 01 63 78 59	16 95 55 67 19	98 10 50 71 75	12 86 73 58 07	44 39 52 38 79
33 21 12 34 29	78 64 56 07 82	52 42 07 44 38	15 51 00 13 42	99 66 02 79 54
57 60 86 32 44	09 47 27 96 54	49 17 46 09 62	90 52 84 77 27	08 02 73 43 28
18 18 07 92 46	44 17 16 58 09	79 83 86 19 62	06 76 50 03 10	55 23 64 05 05
26 62 38 97 75	84 16 07 44 99	83 11 46 32 24	20 14 85 88 45	10 93 72 88 71
23 42 40 64 74	82 97 77 77 81	07 45 32 14 08	32 98 94 07 72	93 85 79 10 75
52 36 28 19 95	50 92 26 11 97	00 56 76 31 38	80 22 02 53 53	86 60 42 04 53
37 85 94 35 12	83 39 50 08 30	42 34 07 96 88	54 42 06 87 98	35 85 29 48 39
70 29 17 12 13	40 33 20 38 26	13 89 51 03 74	17 76 37 13 04	07 74 21 19 30
56 62 18 37 35	96 83 50 87 75	97 12 25 93 47	70 33 24 03 54	97 77 46 44 80
99 49 57 22 77	88 42 95 45 72	16 64 36 16 00	04 43 18 66 79	94 77 24 21 90
16 08 15 04 72	33 27 14 34 09	45 59 34 68 49	12 72 07 34 45	99 27 72 95 14
31 16 93 32 43	50 27 89 87 19	20 15 37 00 49	52 85 66 60 44	38 68 88 11 80
68 34 30 13 70	55 74 30 77 40	44 22 78 84 26	04 33 46 09 52	68 07 97 06 57
74 57 25 65 76	59 29 97 68 60	71 91 38 67 54	13 58 18 24 76	15 54 55 95 52
27 42 37 86 53	48 55 90 65 72	96 57 69 36 10	96 46 92 42 45	97 60 49 04 91
00 39 68 29 61	66 37 32 20 30	77 84 57 03 29	10 45 65 04 26	11 04 96 67 24
29 94 98 94 24	68 49 69 10 82	53 75 91 93 30	34 25 20 57 27	40 48 73 51 92
16 90 82 66 59	83 62 64 11 12	67 19 00 71 74	60 47 21 29 68	02 02 37 03 31
11 27 94 75 06	06 09 19 74 66	02 94 37 34 02	76 70 90 30 86	38 45 94 30 38
35 24 10 16 20	33 32 51 26 38	79 78 45 04 91	16 92 53 56 16	02 75 50 95 98
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14 90 84 45 11	75 73 88 05 90	52 27 41 14 86	22 98 12 22 08	07 52 74 95 80
68 05 51 18 00	33 96 02 75 19	07 60 62 93 55	59 33 82 43 90	49 37 38 44 59
20 46 78 73 90	97 51 40 14 02	04 02 33 31 08	39 54 16 49 36	47 95 93 13 30
64 19 58 97 79	15 06 15 93 20	01 90 10 75 06	40 78 78 89 62	02 67 74 17 33
05 26 93 70 60	22 35 85 15 13	92 03 51 59 77	59 56 78 06 83	52 91 05 70 74
07 97 10 88 23	09 98 42 99 64	61 71 62 99 15	06 51 29 16 93	58 05 77 09 51
68 71 86 85 85	54 87 66 47 54	73 32 08 11 12	44 95 92 63 16	29 56 24 29 48
26 99 61 65 53	58 37 78 80 70	42 10 50 67 42	32 17 55 85 74	94 44 67 16 94
14 65 52 68 75	87 59 36 22 41	26 78 63 06 55	13 08 27 01 50	15 29 39 39 43

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APPENDIX B (Cont.)

17 53 77 58 71	71 41 61 50 72	12 41 94 96 26	44 95 27 36 99	02 96 74 30 83
90 26 59 21 19	23 52 23 33 12	96 93 02 18 39	07 02 18 36 07	25 99 32 70 23
41 23 52 55 99	31 04 49 69 96	10 47 48 45 88	13 41 43 89 20	97 17 14 49 17
60 20 50 81 69	31 99 73 68 68	35 81 33 03 76	24 30 12 48 60	18 99 10 72 34
91 25 38 05 90	94 58 28 41 36	45 37 59 03 09	90 35 57 29 12	82 62 54 65 60
34 50 57 74 37	98 80 33 00 91	09 77 93 19 82	74 94 80 04 04	45 07 31 66 49
85 22 04 39 43	73 81 53 94 79	33 62 46 86 28	08 31 54 46 31	53 94 13 38 47
09 79 13 77 48	73 82 97 22 21	05 03 27 24 83	72 89 44 05 60	35 80 39 94 88
88 75 80 18 14	22 95 75 42 49	39 32 82 22 49	02 48 07 70 37	16 04 61 67 87
90 96 23 70 00	39 00 03 06 90	55 85 78 38 36	94 37 30 69 32	90 89 00 76 33
53 74 23 99 67	61 32 28 69 84	94 62 67 86 24	98 33 41 19 95	47 53 53 38 09
63 38 06 86 54	99 00 65 26 94	02 82 90 23 07	79 62 67 80 60	75 91 12 81 19
35 30 58 21 46	06 72 17 10 94	25 21 31 75 96	49 28 24 00 49	55 65 79 78 07
63 43 36 82 69	65 51 18 37 88	61 38 44 12 45	32 92 85 88 65	54 34 81 85 35
98 25 37 55 26	01 91 82 81 46	74 71 12 94 97	24 02 71 37 07	03 92 18 66 75
02 63 21 17 69	71 50 80 89 56	38 15 70 11 48	43 40 45 86 98	00 83 26 91 03
64 55 22 21 82	48 22 28 06 00	61 54 13 43 91	82 78 12 23 29	06 66 24 12 27
85 07 26 13 89	01 10 07 82 04	59 63 69 36 03	69 11 15 83 80	13 29 54 19 28
58 54 16 24 15	51 54 44 82 00	62 61 65 04 69	38 18 65 18 97	85 72 13 49 21
34 85 27 84 87	61 48 64 56 26	90 18 48 13 26	37 70 15 42 57	65 65 80 39 07
03 92 18 27 46	57 99 16 96 56	30 33 72 85 22	84 64 38 56 98	99 01 30 98 64
62 95 30 27 59	37 75 41 66 48	86 97 80 61 45	23 53 04 01 63	45 76 08 64 27
08 45 93 15 22	60 21 75 46 91	98 77 27 85 42	28 88 61 08 84	69 62 03 42 73
07 08 55 18 40	45 44 75 13 90	24 94 96 61 02	57 55 66 83 15	73 42 37 11 61
01 85 89 95 66	51 10 19 34 88	15 84 97 19 75	12 76 39 43 78	64 63 91 08 25
72 84 71 14 35	19 11 58 49 26	50 11 17 17 76	86 31 57 20 18	95 60 78 46 75
88 78 28 16 84	13 52 53 94 53	75 45 69 30 96	73 89 65 70 31	99 17 43 48 76
45 17 75 65 57	28 40 19 72 12	25 12 74 75 67	60 40 60 81 19	24 62 01 61 16
96 76 28 12 54	22 01 11 94 25	71 96 16 16 88	68 64 36 74 45	19 59 50 88 92
43 31 67 72 30	24 02 94 08 63	38 32 36 66 02	69 36 38 25 39	48 03 45 15 22
50 44 66 44 21	66 06 58 05 62	68 15 54 35 02	42 35 48 96 32	14 52 41 52 48
22 66 22 15 86	26 63 75 41 99	58 42 36 72 24	58 37 52 18 51	03 37 18 39 11
96 24 40 14 51	23 22 30 88 57	95 67 47 29 83	94 69 40 06 07	18 16 36 78 86
31 73 91 61 19	60 20 72 93 48	98 57 07 23 69	65 95 39 69 58	56 80 30 19 44
78 60 73 99 84	43 89 94 36 45	56 69 47 07 41	90 22 91 07 12	78 35 34 08 72
84 37 90 61 56	70 10 23 98 05	85 11 34 76 60	76 48 45 34 60	01 64 18 39 96
36 67 10 08 23	98 93 35 08 86	99 29 76 29 81	33 34 91 58 93	63 14 52 32 52
07 28 59 07 48	89 64 58 89 75	83 85 62 27 89	30 14 78 56 27	86 63 59 80 02
10 15 83 87 60	79 24 31 66 56	21 48 24 06 93	91 98 94 05 49	01 47 59 38 00
55 19 68 97 65	03 73 52 16 56	00 53 55 90 27	33 42 29 38 87	22 13 88 83 34
53 81 29 13 39	35 01 20 71 34	62 33 74 82 14	53 73 19 09 03	56 54 29 56 93
51 86 32 68 92	33 98 74 66 99	40 14 71 94 58	45 94 19 38 81	14 44 99 81 07
35 91 70 29 13	80 03 54 07 27	96 94 78 32 66	50 95 52 74 33	13 80 55 62 54
37 71 67 95 13	20 02 44 95 94	64 85 04 05 72	01 32 90 76 14	53 89 74 60 41
93 66 13 83 27	92 79 64 64 72	28 54 96 53 84	48 14 52 98 94	56 07 93 89 30

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What They Say

☞ Statistics are no substitute for judgement.

Henry Clay

☞ I abhor averages, I like the individual case. A man may have six meals one day and none the next, making an average of three meals per day, but that is not a good way to live.

Louis D. Brandies

☞ The weather man is never wrong. Suppose he says that there's an 80% chance of rain. If it rains, the 80% chance came up, if it doesn't, the 20% chance come up.

Saul Barron

☞ The death of one man is a tragedy. The death of millions is a statistic.

Joseph Stalin

☞ When she told me I was average, she was just being mean.

Mike Beckman

☞ Why is a physician held in much higher esteem than a statistician? A physician makes an analysis of a complex illness whereas a statistician makes you ill with a complex analysis!

Gary C. Ramseyer

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NOTES

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