

# STA10003 Reading B – Reporting Information about Single Variables

## ***Classifying a variable according to its level of measurement:***

When reporting information about single variables, we need to take into account the level of measurement before making decisions about which procedure is required, and the statistics that are the most appropriate to report.

Data can be classified under the two broad headings: Categorical or Metric. Categorical data has a nominal or ordinal level of measurement, whereas metric data has an interval or ratio measure.

<b>Levels of Measurement:</b>	
<b><i>Categorical: Nominal &amp; Ordinal</i></b>	
<b><i>Nominal:</i></b>	used to <b>label</b> the group eg 1 = Male 2 = Female
<b><i>Ordinal:</i></b>	used to <b>label AND order</b> eg 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> in a race, Chapter 1, Chapter 2, Chapter 3 in Text
<b><i>Metric: Interval &amp; Ratio</i></b>	
<b><i>Interval:</i></b>	numbers are used to <b>label and order AND</b> the <b>intervals</b> between the numbers <b>are equal</b> eg Temperature in °C or °F
<b><i>Ratio:</i></b>	numbers are used to <b>label and order</b> and the <b>intervals</b> between the numbers <b>are equal AND ZERO means a complete absence</b> of something eg number of correct answers in a test

In an existing SPSS data file, categorical data will usually have named categories, as numbers are used to either represent different named categories only [nominal data] or to represent different named categories which also have some form of ranking [ordinal data]. By contrast, when a variable recorded in an SPSS file is metric, it occurs naturally as numbers which represent a reasonably accurate quantitative measurement, so these numbers will not have name labels assigned to them.

## ***Producing the analysis and writing the report:***

The report is a **description** of the information / findings from the sample.

### **FOR CATEGORICAL VARIABLES:**

#### **SPSS FREQUENCIES procedure:**

Frequencies Table [default]

Percentage Bar Chart [requested]

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## REPORT SHOULD CONTAIN:

An introductory sentence about the variable of interest, a description of the sample [size and who / what] and reference to the Figure representing graphical information about the distribution. Information relating to the 'most typical' [mode] response category – including percentages.

Any other information that will provide an 'overall' picture of the data. For example, was there one response category that was quite different from the others?

## FOR METRIC VARIABLES:

### SPSS EXPLORE procedure:

Descriptives Table [default]

Histogram [requested] and Boxplot [default]

Percentiles Table [requested]

## REPORT SHOULD CONTAIN:

An introductory sentence about the variable of interest, a description of the sample [size and who / what] and refer to the Figure representing graphical information of the distribution.

The shape of the distribution [symmetrical or skewed – if skewed the direction of the skew] and interpretation of the 'measure of centre' [mean / sd for symmetrical or median for skewed data]

An interpretation of the 'middle 50%' [25th to 75th percentiles] – which provides an indication of how spread out the data is

Any other information that will provide an 'overall' picture of the data – eg outliers.

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## FOR CATEGORICAL VARIABLES:

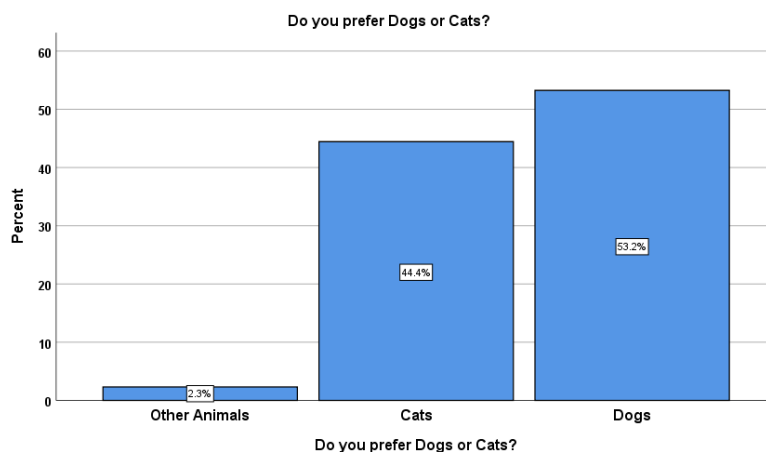
**Worked example:** [Dogs&Cats.sav]      **Variable:** Pet Preference

Using the Frequencies procedure, the following output [Frequency Table and Percentage Bar Chart] was produced. The colour coding shows the linking of the information. The data is for a sample of pet owners.

Do you prefer Dogs or Cats?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Other Animals	5	2.3	2.3	2.3
	Cats	96	43.6	44.4	46.8
	Dogs	115	52.3	53.2	100.0
	Total	216	98.2	100.0	
Missing	9	4	1.8		
Total		220	100.0		

### Report:

The distribution of pet preference for a sample of 216 pet owners is displayed in *Figure 1*. The most typical reported preference was for dogs (53.2%), although cats were also popular (44.4%). Few pet owners reported a preference for other types of animals (2.3%).



*Figure 1:*      Distribution of pet preference

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## FOR METRIC VARIABLES:

**Worked example:** [Dogs&Cats.sav]

**Variable:** Number of Pets

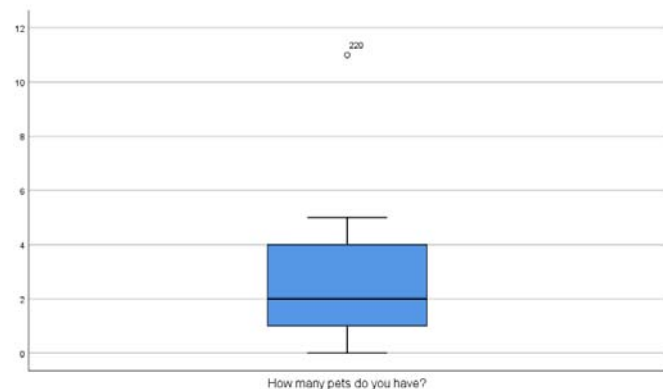
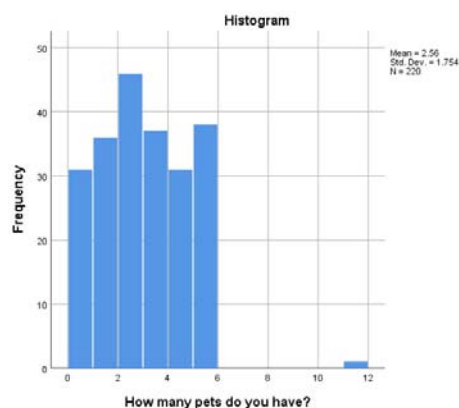
Using the Explore procedure, the following output [Descriptives Table / Histogram / Boxplot and Percentiles Table] was produced. The colour coding shows the linking of the information to the report. The data is for a sample of pet owners.

### Descriptives

			Statistic	Std. Error
How many pets do you have?	Mean		2.56	.118
	95% Confidence Interval for	Lower Bound	2.33	
		Upper Bound	2.80	
	5% Trimmed Mean		2.54	
	<b>Median</b>		<b>2.00</b>	
	Variance		3.078	
	Std. Deviation		1.754	
	Minimum		0	
	<b>Maximum</b>		<b>11</b>	
	Range		11	
	Interquartile Range		3	
	Skewness		.492	.164
	Kurtosis		.969	.327

### Percentiles

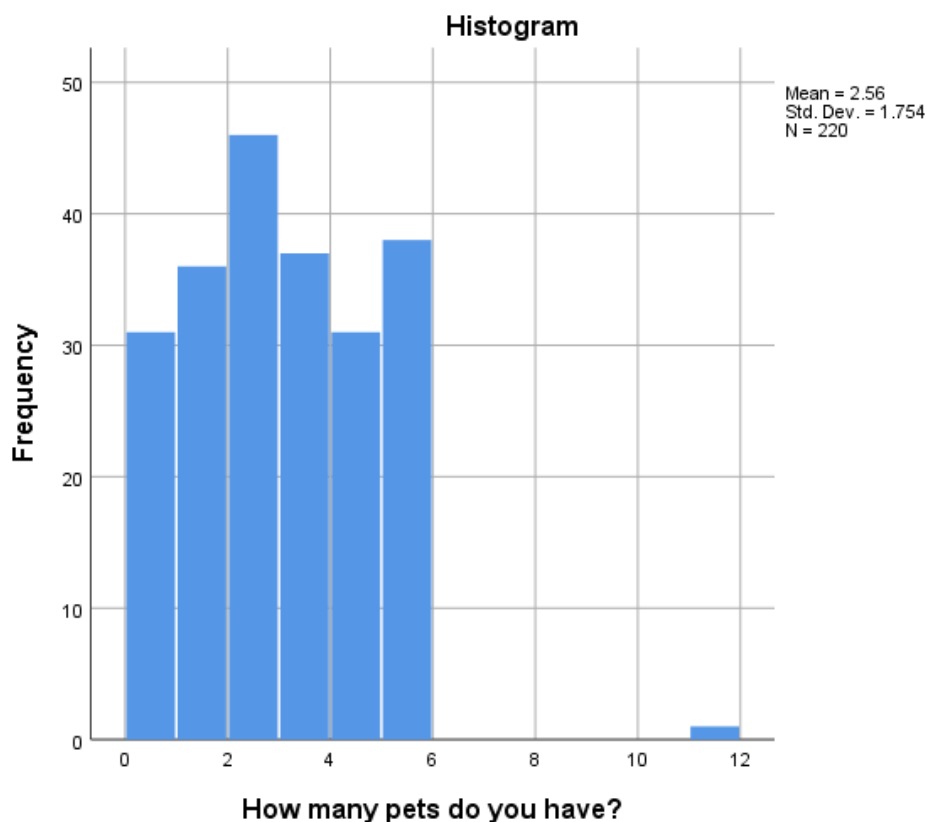
		Percentiles						
		5	10	25	50	75	90	95
Weighted Average(Definition 1)	How many pets do you have?	.00	.00	<b>1.00</b>	2.00	<b>4.00</b>	5.00	5.00
Tukey's Hinges	How many pets do you have?			1.00	2.00	4.00		



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**Report:** [skewed distribution with outliers]

The distribution of the number of pets for a sample of 220 pet owners is displayed in *Figure 2*. This distribution is positively skewed, with 50% [ or could say half] of people in the sample having 2 or more pets [or could say ... 2 or less]. Typically, the number of pets were between 1 and 4, with half of ‘the number of pets’ values falling within this range. One respondent reported having an exceptionally high number of pets (11).



*Figure 2:* Distribution of the number of pets

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**Worked example:** [Travel\_Time\_Work.sav]      **Variable:** Travel

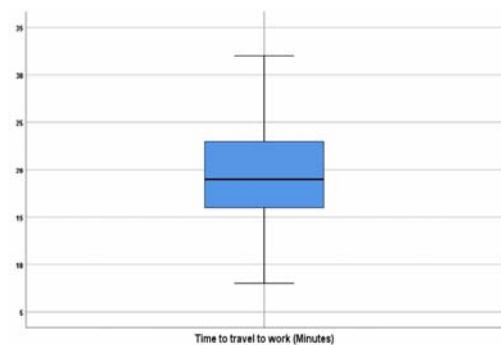
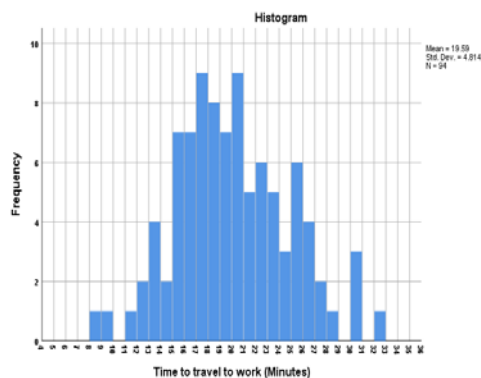
Using the Explore procedure, the following output [Descriptives Table / Histogram / Boxplot and Percentiles Table] was produced. The colour coding shows the linking of the information to the report. The data is for a random sample of Australian adults.

## Descriptives

		Statistic	Std. Error
Time to travel to work (Minutes)	<b>Mean</b>	<b>19.59</b>	.496
	95% Confidence Interval for Mean	Lower Bound	18.60
		Upper Bound	20.57
	5% Trimmed Mean	19.52	
	Median	19.00	
	Variance	23.170	
	<b>Std. Deviation</b>	<b>4.814</b>	
	Minimum	8	
	Maximum	32	
	Range	24	
	Interquartile Range	7	
	Skewness	.232	.249
	Kurtosis	-.089	.493

## Percentiles

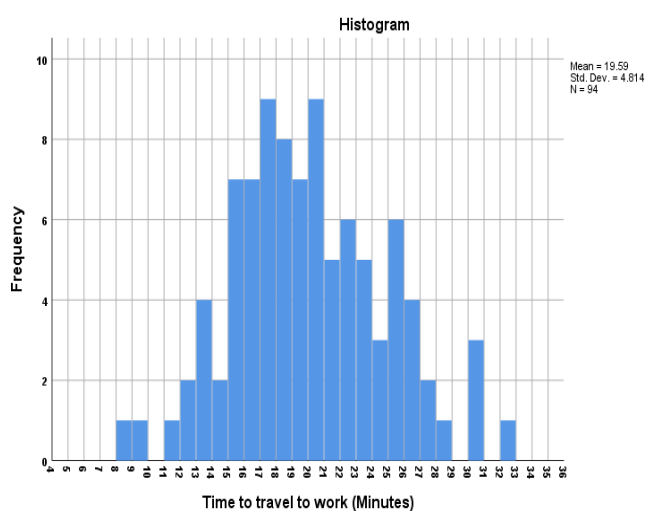
		Percentiles						
		5	10	<b>25</b>	50	<b>75</b>	90	95
Weighted Average	Time to travel to work (Minutes) (Definition 1)	12.00	13.50	<b>16.00</b>	19.00	<b>23.00</b>	26.00	28.50
Tukey's Hinges	Time to travel to work (Minutes)			16.00	19.00	23.00		



# STA10003 Supplement B – Reporting Information about Single Variables

**Report:** [approximately symmetric distribution with no outliers]

The distribution of ‘travel time to work’ for a random sample of 94 Australian adults is displayed in *Figure 3*. This distribution is approximately symmetric, with the average travel time to work being 19.59 minutes ( $s = 4.81$  minutes). Typically, travel time to work was between 16.00 and 23.00 minutes, with half of the travel times to work falling within this range.



*Figure 3:* Distribution of travel time to work