

Statistical Literacy Textbook: Chapter 6 Slides

Statistical Literacy: Critical Thinking about Everyday Statistics **Kendall-Hunt 2023**

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Comparing Ratios

Chapter 6: Table of Contents

- 6.1 p 234 Learning Outcomes
- 6.2 p 235 Review
- 6.3 p 235 Comparing Ratios: Introduction
- 6.4 p 236 Attributable Comparisons
- 6.5 p 240 Comparing Ratios: Common vs Distinct Part
- 6.6 p 243 Comparing Ratios using Likely
- 6.7 p 254 Comparing Ratios using Named Ratios
- 6.8 p 263 Comparing Quintiles
- 6.9 p 263 Comparing Ratios: Critical Thinking
- 6.10 p 264 Confounding: A Review

Understanding Measurements: Learning Outcomes

Calculate percentage and counts attributable to group

Distinguish common part and distinct part comparisons

Read and write comparisons of ratios using likely grammar

Read and write comparisons of ratios: named ratio grammar

Review

Comparisons and Named Ratios

Chapter 2: Comparisons

ARITHMETIC COMPARISONS	
Difference	Test is $(T-B)$ more less than Base
Ratio	Test is (T/B) times as much as Base
% difference	Test is $[(T-B)/B]*100\%$ more less than Base
Times difference	Test is $[(T-B)/B]$ times more less than Base

Chapters 4 and 5: Named Ratios

CHAPTER 4 NAMED RATIO GRAMMARS		CHAPTER 5 NAMED RATIO GRAMMARS	
Percent	X% of <Whole> are <Part>	Rate (Phrase)	The <Part> rate of <Whole> is ...
	Among <Whole>, X% are <Part>		Among <Whole>, the rate of <Part> is ...
Percentage	The percentage of W who are P is X%	Chance	The chance of <Process><Result> is X%
	Among W, the percentage who are P is X%		<Process's> chance of <Results> is X%.
	Among W, the percentage of P is X%		The chance that <Process> will <Result> is X%

Introduction: Comparing Ratios

This chapter introduces two kinds of comparisons:

- Attributable comparisons of ratios. These are modeled.
- Arithmetic comparisons of ratios

Attributable vs. caused:

- 216,000 deaths *attributable to* obesity
- 216,000 deaths *caused by* obesity.

Likely vs. frequently or commonly:

- Military men: less *likely* to be patients than women
- Military men: more *commonly* patients than are women.

Attributable Data:

- *What percentage is attributable to _____?*
About 33% of all private medical insurance costs, and 20% of Medicare medical costs are *attributed to* smoking.
- *How many cases (deaths) are attributable to _____?*
Premature deaths *attributed to*: smoking (470K), hypertension (395K), overweight (216K), high salt intake (102K), low omega3 fatty acids (84K), and high trans-fatty acids (82K). Pollution *kills* 9 million people/year.

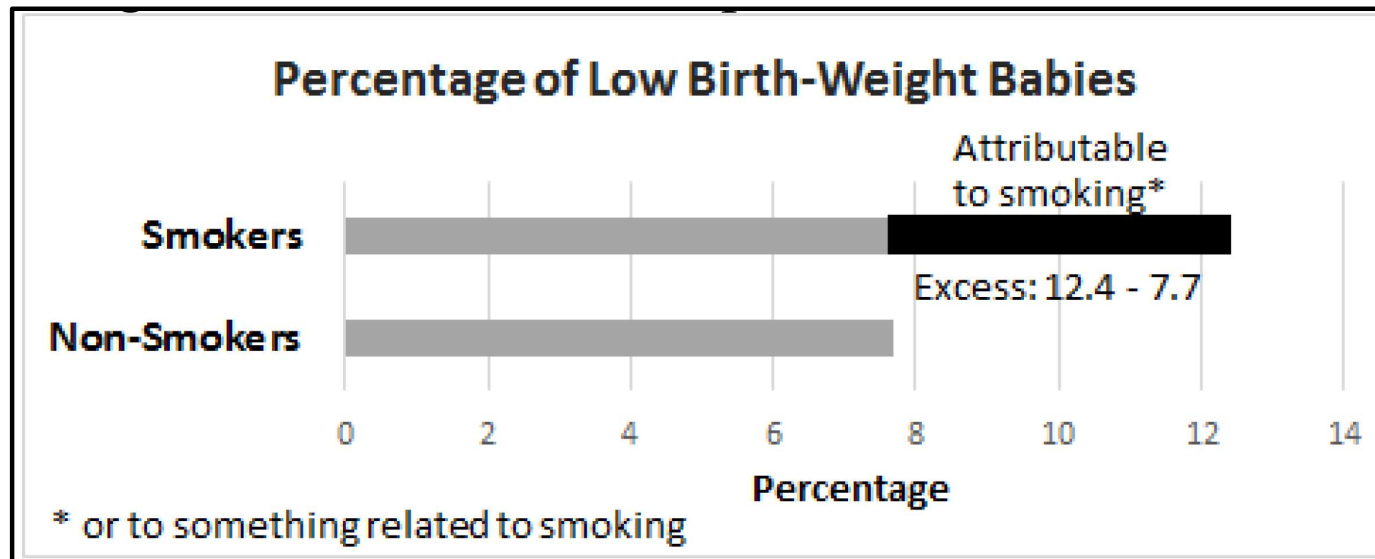
Q. Can anyone know any of these things?

Can these things be counted or connected?

A. No! They can't!

Attributable Comparisons: Percentage Attributable

The **excess rate** is the difference between the bigger (exposure) rate and the smaller (control) rate.



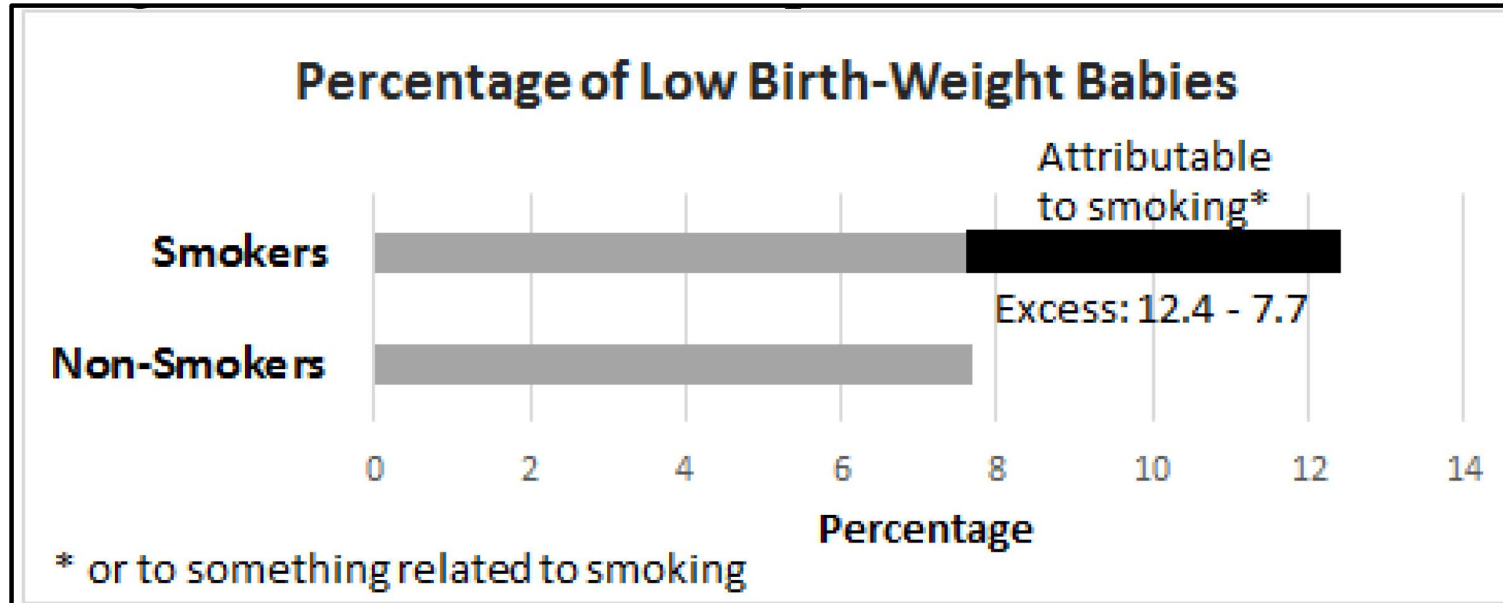
The percentage of exposure cases that are attributable to the exposure is the exposure excess as a percentage of the exposure rate: $(\text{Big}\% - \text{Small}\%) / \text{Big}\%$.

$$\text{Eq. 6-1: } \% \text{ attributed to exposure} = 100\% * (\text{ExpRate} - \text{CtrlRate}) / \text{ExpRate}$$

$$\text{Eq. 6-2: } \% \text{ of Big attributed to exposure} = 100\% * (\text{Big}\% - \text{Small}\%) / \text{Big}\%$$

Attributable Comparisons: Cases Attributable

The percentage of low birth-weight babies attributable to having a mom who smoked is 38%: $100\% * (.124 - .077) / .124$



If moms who smoked had 20,000 low-birthweight babies, then the # of low birth-weight babies attributable to having a mom who smoked is 7,600: $0.38 * 20K$

Attributable Comparisons: Percentage Attributable

1. If lung cancer death rate: 200/100K smokers (20/100K non-smokers), what percentage of lung cancer deaths for smokers is attributed to smoking?
2. If accident rate per 100K licensed drivers is 20 for young (10 for older), what percentage of accidents among the young are attributed to being young?
3. If US poverty rate is 50% for children in single parent families (10% in married-parent families), what percentage of poverty in single parent families is attributable to living in a single-parent family?

Attributable Comparisons: Cases Attributable

1. If 90% of lung cancer deaths among smokers are attributed to smoking, and there are 100,000 lung cancer deaths for smokers in the US in 2026, how many of these deaths among smokers are attributable to smoking?
2. If 50% of auto accidents are attributed to younger drivers (under 20), and there are 1 million auto accidents involving younger drivers, how many of these accidents are attributable to the driver being a teenager?
3. If 80% of families in poverty are attributable to having a single parent, and there are 11 million US families in poverty headed by a single parent, then how many of these of these families in poverty are attributable to being headed by a single parent?

Attributable Comparisons: Percentage Attributable

Study: 45,000 deaths *attributable* to Uninsurance (PNHP 9/17/09)
45,000 American deaths *associated with* lack of insurance (CNN 9/18)
No health coverage *tied* to 45,000 deaths a year (Reuters MSNBC 9/17)
Lack of insurance *linked* to 45,000 deaths (White Coat News, 9/17/09)
Study *links* 45,000 U.S. deaths to lack of insurance (9/17/09)
Study: 45,000 U.S. Deaths *From* Lack of Insurance (MoneyNews 9/17/09)
One American dies every 12 minutes *due to* no health insurance (blog DR)
45,000 Americans die ... *because of* lack of health insurance (blog MyDD)
Study: 45,000 *Uninsured Die* a Year (CBS News, 9/17/09)
Lack of Health Insurance *Kills* 45,000 a Year (Health Insurance com)
Lack of Health Insurance *causes* 44,789 deaths in US every year (blog)
Lack of insurance to *blame* for almost 45,000 deaths: Study (HealthDay)

Comparing Part-Whole Ratios

Thus, there are two kinds of comparisons of part-whole ratios. They are seductively similar, but they assert very different things. Small differences in syntax (grammar) can produce big differences in semantics (meaning)!

A **common part** exists when two part-whole ratios share the same part. **Distinct-parts** exist when two groups or two part-whole ratios share the same whole.

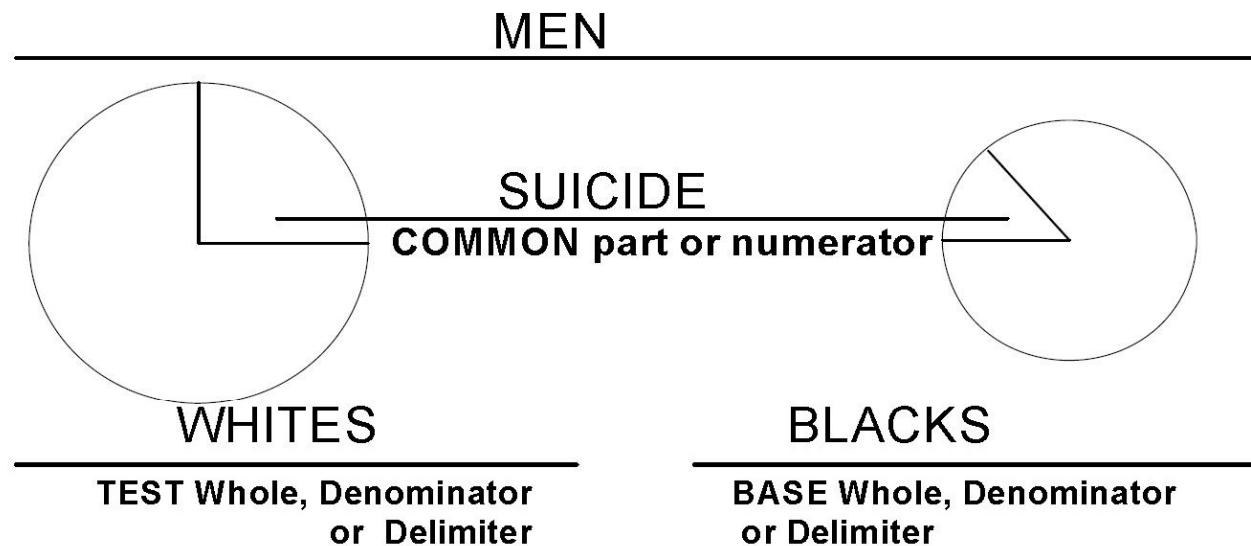
A **common-part comparison** compares two ratios having a common part of two different wholes.²⁵⁷ The percentage of cars that are stolen is greater among Cadillac Escalades than among Toyota Camrys. The common part is *stolen*.

A **distinct-parts comparison** compares two ratios involving different parts of a common whole. Among stolen cars, the percentage that are Toyota Camrys is greater than the percentage that are Cadillac Escalades. The common whole is stolen cars, the distinct parts are Toyota Camrys and Cadillac Escalades.

Common-Part Comparison

Percentage of suicides among white men vs. that among black men:

Figure 6-3 Common-Part Comparison of Part-Whole ratios

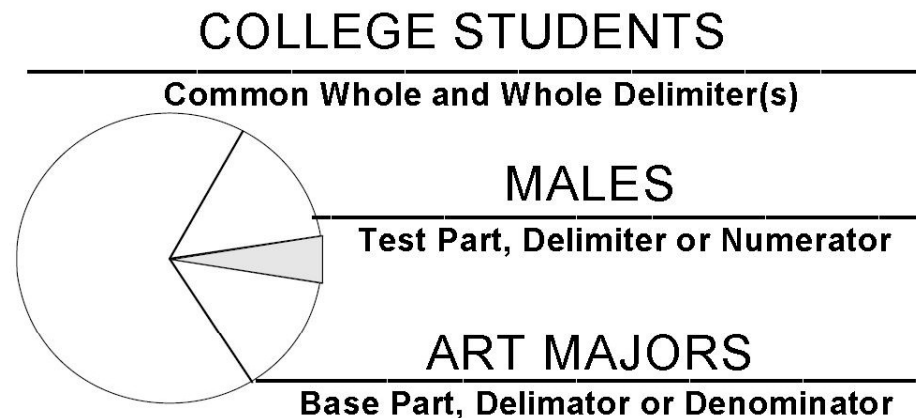


A common part comparison always has two wholes: a test-whole and a base-whole. A **test-whole** in a comparison of ratios is the test in the comparison and the whole in the part-whole ratio. A **base-whole** in a comparison of ratios is the base in the comparison and the whole in the part-whole ratio.

Distinct-Parts Comparison

The percentage of college students who are male versus the percentage of art majors among college students.

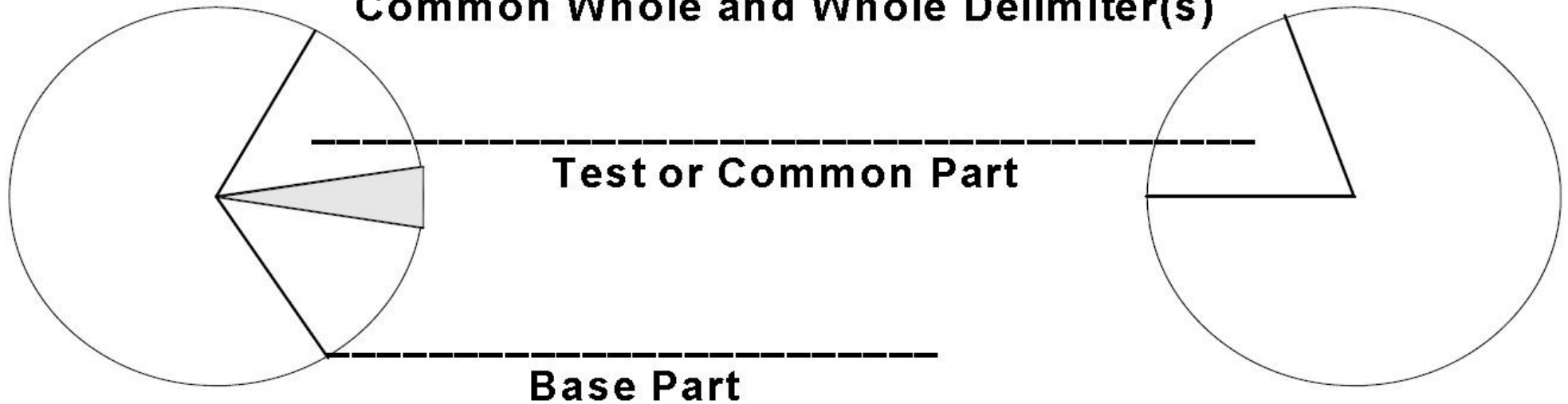
Figure 6-4 Distinct-Parts Comparison of Part-Whole Ratios



A distinct-parts comparison in a comparison of ratios always has two parts: a test-part and a base-part. A **test-part** in a comparison of ratios is the test in the comparison and the part in a part-whole ratio. A **base-part** in a comparison of ratios is the base in the comparison and the part in the part-whole ratio.

Comparison of Ratios: Graphical Template

Common Whole and Whole Delimiter(s)



TEST Whole, Denominator
or Delimiter

BASE Whole, Denominator
or Delimiter

Comparing Ratios Using Likely Grammar

The percentage of smokers among men is greater than among women.

- 1) Men are more *likely* to smoke than women.
- 2 Smokers are more likely (prevalent) among men than among women

1	"Among" always introduces a whole
2	"Likely to" introduces the part -- when followed by an object
3	A comparison of two part-whole ratios must contain three part-whole terms with at least one part and one whole
4	Two phrases with matching grammar (nouns, pronouns, verbs or prepositions) are linked: they have the same part-whole status
5	"likely to" without an object (e.g., likely to occur, likely to happen) indicates the subject is the part.

Comparing Part-Whole Ratios. Likely Grammar: Common Part

Likely to: Common part follows 'likely to'; subject is 'test whole'.

_____ is ____ <compare> likely to _____ than/as** [is] _____
 {test whole} # {common part} {base whole}

Likely among: *Among* introduces whole; subject is common part.

_____ is ____ <compare> likely* among _____ than/as** [among] _____
 {Part} # {test whole} {base whole}

* 'Prevalent', 'probable' or 'risky' can be used in place of 'likely'

Can use 'likely to occur' or 'likely to be found'. They refer to the *part* in the subject.

** Use 'than' for a difference compare; use 'as' for a times ratio compare.

An 'among' phrase can be added at the beginning for a common whole.

Change 'is' to 'are' if the subject is plural. Brackets [] indicate the item is optional.

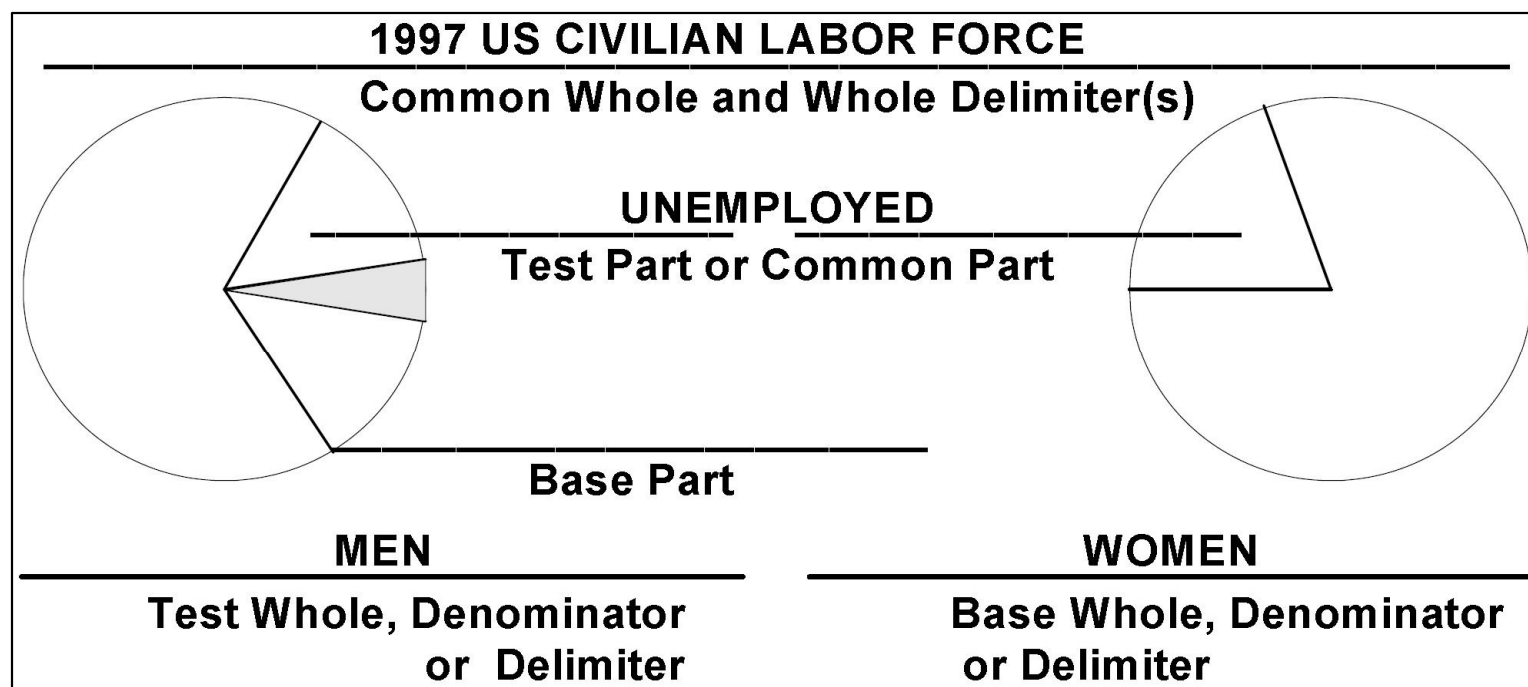
This figure fixes an error in the 2023 textbook: Figure 6-9.

Comparing Part-Whole Ratios.

Named Ratios: Common Part

In the 1997 US civilian labor force, the percentage of men who were unemployed was 13% higher than that of women.

In the 1997 US civilian labor force, unemployment was 13% more *likely among* men than [among] women.



Likely/Prevalent Grammar: Covert between 'likely' statements

Likely common-part comparisons of part-whole ratios:
<Test> are <compare> **likely to** <part> than/as [are] <base>
<Part> are <compare> **likely among** <test> than/as [among] <base>

1. Smoking is more *likely among* women than *among* men. Convert to 'likely to'.
2. Black families are more *likely to* have (be headed by) a single parent than [are] White families. Convert to 'likely among'.

Likely/Prevalent Grammar: Covert between 'likely' statements

Common-part comparison of part-whole ratios.

<Test> are <compare> **likely to** <part> than/as [are] <base>

<Part> are <compare> **likely among** <test> than/as [among] <base>

3. Among single-parent families, living in poverty is more *likely among* those with a GED than that *among* those with a high- school degree. Convert to 'likely to'
4. Families headed by a single parent are more *likely to* live in poverty than [are] families headed by a married couple. Convert to 'likely among'.

Using 'likely' to compare %: Given Percent Grammar

75% of business majors are males. (50% of MIS majors).

1. Compare as a % difference; smaller as base; use 'likely among'.
<Part> are <compare>likely among <test> than/as <base>

*Men are 50% more prevalent among business majors
than [among] MIS majors.*

2. Compare as a times ratio; smaller as the base; use 'likely to'.
<Test> are <compare> likely to <part> than/as [are] <base>.

*Business majors are 1.5 times as likely to be men
as [are] MIS majors.*

Using 'likely' to compare %: Given Percentage Grammar

The percentage of men who smoke is 25% (20% of women)

1. Compare as a % difference; smaller as base; use 'likely among'.
<Part> are <compare>likely among <test> than/as <base>

*Smoking is 25% more prevalent among men
than [among] women.*

2. Compare as a times ratio; smaller as the base; use 'likely to'
<Test> are <compare> likely to <part> than/as [are] <base>.

*Men are 1.25 times as likely to be smokers
as [are] women.*

Using 'likely' to compare %: Given Percentage Tables

In left column, compare 60% with 30%. Use likely-to grammar.

<Test> are <compare> *likely to* <part> than/as [are] <Base>.

Use 'times ratio' if ratio > 2 . Otherwise, use '% more'.

Students	-----SEX -----		
MAJOR	MALE	FEMALE	ALL
Business	60%	20%	40%
Economics	10%	50%	30%
MIS	30%	30%	30%
ALL	100%	100%	100%

Business majors are 100% more *likely to* be men than [are] MIS majors.

Using 'likely' to compare %: Given Percentage Half-Table

Compare 36.2% with 16.6%. Use likely-among grammar.

<Part> is <compare> likely among <Test> than/as [among] <base>

Use 'times ratio' if ratio > 2. Otherwise, Use '% more'.

23.5%	U.S. Adults, 1995
25.6	White
25.8	Black
18.3	Hispanic
16.6	Asian
36.2	American Indian

Smoking is 100% more likely among American Indians
than [among] Asians.

Comparing Part-Whole Percentages

Common-part comparisons:

Slides 26-28: Using named ratios:
percentage, rate and chance grammar.

Distinct-part comparisons:

Slides 29-30. Graph and template

Comparing Percentages: Using Percentage Grammar

75% of business majors are male. (50% of MIS majors).

Percentage difference; smaller as the base.

Step	{test}	{compare}	{base}
1	75% 	is 50% more than	 50%
2a	The percentage of business majors who are male	is 50% more than	The percentage of MIS majors who are male
2b	The percentage of males among business majors	is 50% more than	the percentage of males among MIS majors

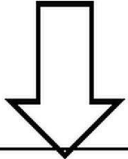
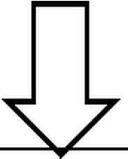
Simple difference; larger as the base

Step	{test}	{compare}	{base}
1	50%	is 25 points less than	75%
2a	The percentage of MIS majors who are male	is 25 points less than	the percentage of Business majors who are male
2b	The percentage of males among MIS majors	is 25 points less than	the percentage of males among Business majors

Comparing Percentages: Using Rate Grammar

Male's accidental death rate:
142/100K for non-Whites (81/100K for White).

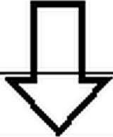
Times ratio; smaller as the base.

Step	{test}	{compare}	{base}
1	142 per 100,000 	is 1.75 times as much as	 81 per 100,000
2a	The accidental death rate of non-white males	is 1.75 times as much as	the accidental death rate of white males
2b	The rate of accidental death among non-white males	is 1.75 times as much as	the rate of accidental death among white males
2c	The accidental death rate of males among non-whites	is 1.75 times as much as	the accidental death rate of males among whites

Comparing Percentages: Using Chance Grammar

Chance of two identical outcomes:
flipping a coin ($1/2$) vs. rolling a six-sided die ($1/6$)

Times ratio; smaller as the base.

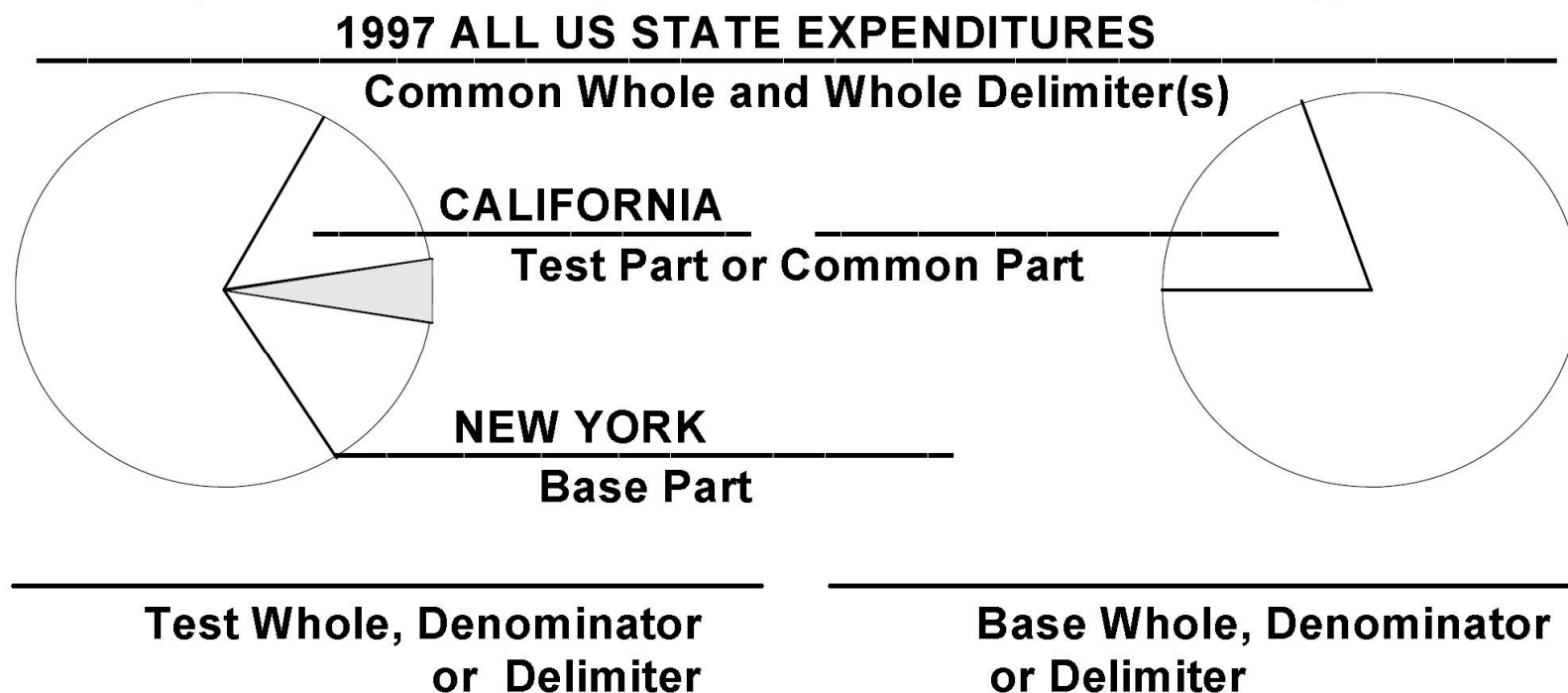
Step	{test}	{compare}	{base}
1	50% 	is 3 times as much as	 16.67%
2	The chance of two identical outcomes in two flips of a coin	is 3 times as much as	The chance of two identical outcomes in two rolls of a 6-sided die

Comparing Part-Whole Ratios.

Named Ratios: Distinct Parts

In the US in 1997, the percentage of all state expenditures that were spent by California was 33% more than that spent by New York.

Likely grammar requires countables for part and whole.



Comparing Part-Whole Ratios. Likely Grammar: Distinct Parts

Likely to: Whole is the subject. Use "to" to introduce each part.

_____ is _____ <compare> likely to _____ than|as** to _____.
 {Whole} # {test part} {base part}

Likely among: Test part is the subject.

_____ is _____ <compare> likely* among _____ than|as** is _____.
 {Test part} # {whole} {base part}

* *Prevalent* can be used in place of *likely*.

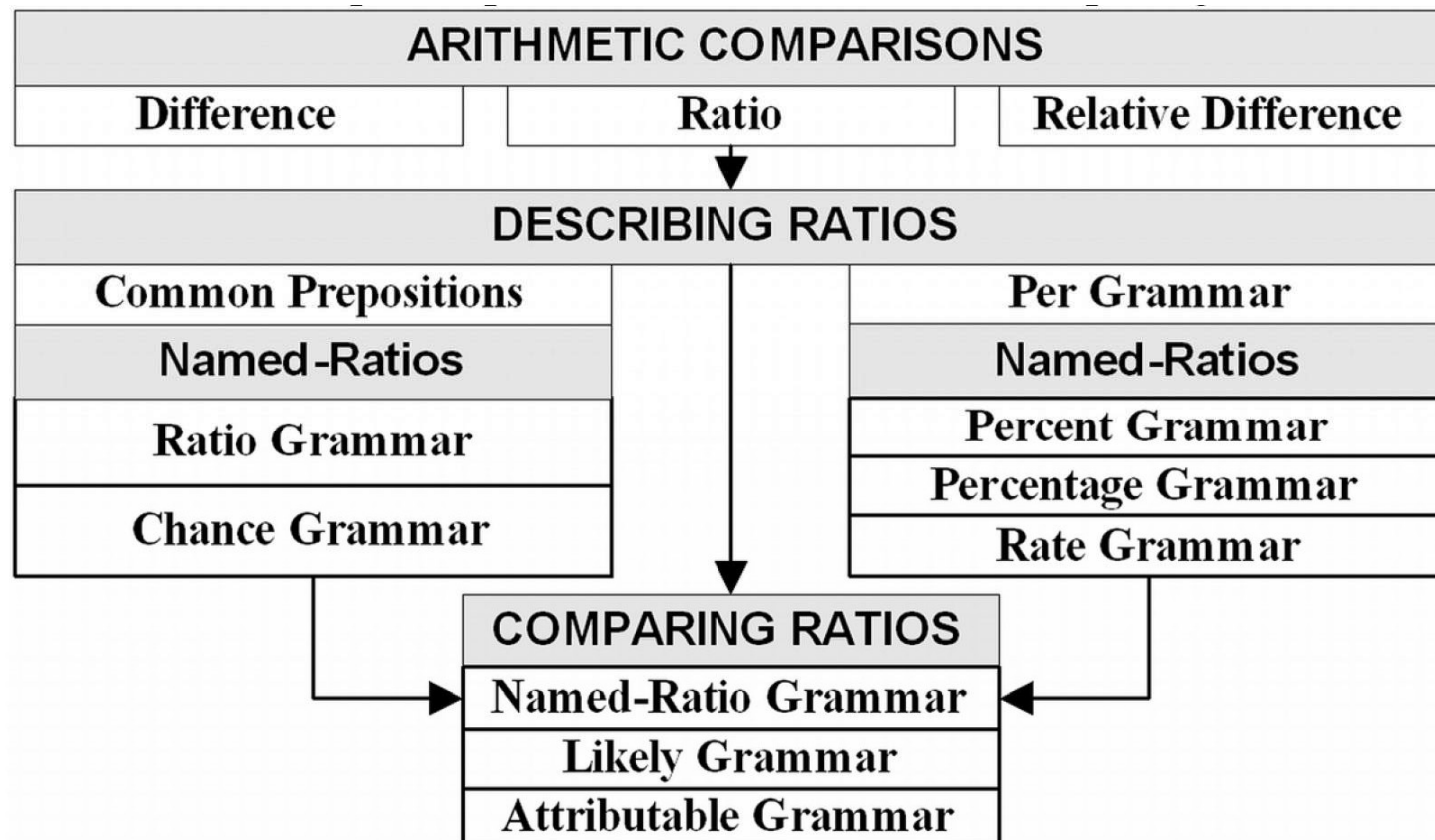
* Optional 'likely to occur; likely to be found'. Refers to the test part.

** Use 'than' for difference compares; use 'as' for a ratio compare.

Chapter Summary

Chapter 6: Key Words, Phrases and Ideas (12)

Attributable/attribution	Percent attributed	Cases Attributed	due to / because of
Compare ratios	Common part	Distinct part	Compare named ratios
Likely ratio compare	Likely to <part>	Likely among <whole>	Likely / prevalent



Seven Questions when Dealing with Statistics

1. Confounding. How big/many/much?
2. Assembly: Compared to what?
3. Assembly: How are things defined, counted/measured, summarized, grouped, presented?
4. Confounded: Why not a rate? Per what?
5. Confounded: What was taken into account?
6. Confounded: What should be controlled for?
7. Random/Error: Coincidence/selection bias?

StatLit: Chapter 6 Slides 1 VOC

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1

6.0, P 234 StatLit: Chapter 6 Slides 2 VOC

Comparing Ratios Chapter 6: Table of Contents

- 6.1 p 234 Learning Outcomes
- 6.2 p 235 Review
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- 6.6 p 243 Comparing Ratios using Likely
- 6.7 p 254 Comparing Ratios using Named Ratios
- 6.8 p 263 Comparing Quintiles
- 6.9 p 263 Comparing Ratios: Critical Thinking
- 6.10 p 264 Confounding: A Review

2

6.1, P 234 StatLit: Chapter 6 Slides 3 VOC

Understanding Measurements: Learning Outcomes

Calculate percentage and counts attributable to group
Distinguish common part and distinct part comparisons
Read and write comparisons of ratios using likely grammar
Read and write comparisons of ratios: named ratio grammar

3

6.2, P 235 StatLit: Chapter 6 Slides 4 VOC

Review Comparisons and Named Ratios

Chapter 2: Comparisons

ARITHMETIC COMPARISONS	
Difference	Test is (T-B) more less than Base
Ratio	Test is (T/B) times as much as Base
% difference	Test is $[(T-B)/B]*100\%$ more less than Base
Times difference	Test is $[(T-B)/B]$ times more less than Base

Chapters 4 and 5: Named Ratios

CHAPTER 4 NAMED RATIO GRAMMARS		CHAPTER 5 NAMED RATIO GRAMMARS	
Percent	X% of <Whole> are <Part> Among <Whole>, X% are <Part> The percentage of W who are P is X%	Rate (Phrase)	The <Part> rate of <Whole> is ... Among <Whole>, the rate of <Part> is ...
Percentage	Among W, the percentage who are P is X% Among W, the percentage of P is X%	Chance	The chance of <Process><Result> is X% <Process>'s chance of <Result> is X%. The chance that <Process> will <Result> is X%

4

6.3, P 235 StatLit: Chapter 6 Slides 5 VOC

Introduction: Comparing Ratios

This chapter introduces two kinds of comparisons:

- Attributable comparisons of ratios. These are modeled.
- Arithmetic comparisons of ratios

Attributable vs. caused:

- 216,000 deaths *attributable to* obesity
- 216,000 deaths *caused by* obesity.

Likely vs. frequently or commonly:

- Military men: *less likely* to be patients than women
- Military men: more *commonly* patients than are women.

5

6.4.1, P 237 StatLit: Chapter 6 Slides 6 VOC

Attributable Data:

- What percentage is attributable to _____?*
About 33% of all private medical insurance costs, and 20% of Medicare medical costs are *attributed to* smoking.
- How many cases (deaths) are attributable to _____?*
Premature deaths *attributed to*: smoking (470K), hypertension (395K), overweight (216K), high salt intake (102K), low omega3 fatty acids (84K), and high trans-fatty acids (82K). Pollution *kills* 9 million people/year.

Q. Can anyone know any of these things?
Can these things be counted or connected?

A. No! They can't!

6

6.4.1, P 237 StatLit: Chapter 6 Slides 7 V0C

Attributable Comparisons: Percentage Attributable

The **excess rate** is the difference between the bigger (exposure) rate and the smaller (control) rate.

The percentage of exposure cases that are attributable to the exposure is the exposure excess as a percentage of the exposure rate: $(\text{Big}\% - \text{Small}\%) / \text{Big}\%$.

Eq. 6-1: $\% \text{ attributed to exposure} = 100\% * (\text{ExpRate} - \text{CtrlRate}) / \text{ExpRate}$

Eq. 6-2: $\% \text{ of Big attributed to exposure} = 100\% * (\text{Big}\% - \text{Small}\%) / \text{Big}\%$

7

6.4.1, P 237 StatLit: Chapter 6 Slides 8 V0C

Attributable Comparisons: Cases Attributable

The percentage of low birth-weight babies attributable to having a mom who smoked is 38%: $100\% * (12.4 - 7.7) / 12.4$

If moms who smoked had 20,000 low-birthweight babies, then the # of low birth-weight babies attributable to having a mom who smoked is 7,600: $0.38 * 20K$

8

6.4.1, P 238, 239 StatLit: Chapter 6 Slides 9 V0C

Attributable Comparisons: Percentage Attributable

- If lung cancer death rate: 200/100K smokers (20/100K non-smokers), what percentage of lung cancer deaths for smokers is attributed to smoking?
- If accident rate per 100K licensed drivers is 20 for young (10 for older), what percentage of accidents among the young are attributed to being young?
- If US poverty rate is 50% for children in single parent families (10% in married-parent families), what percentage of poverty in single parent families is attributable to living in a single-parent family?

9

6.4.1, P 238, 239 StatLit: Chapter 6 Slides 10 V0C

Attributable Comparisons: Cases Attributable

- If 90% of lung cancer deaths among smokers are attributed to smoking, and there are 100,000 lung cancer deaths for smokers in the US in 2026, how many of these deaths among smokers are attributable to smoking?
- If 50% of auto accidents are attributed to younger drivers (under 20), and there are 1 million auto accidents involving younger drivers, how many of these accidents are attributable to the driver being a teenager?
- If 80% of families in poverty are attributable to having a single parent, and there are 11 million US families in poverty headed by a single parent, then how many of these of these families in poverty are attributable to being headed by a single parent?

10

6.4, P 239 StatLit: Chapter 6 Slides 11 V0C

Attributable Comparisons: Percentage Attributable

Study: 45,000 deaths *attributable* to Uninsurance (PNHP 9/17/09)
 45,000 American deaths *associated with* lack of insurance (CNN 9/18)
 No health coverage *tied to* 45,000 deaths a year (Reuters MSNBC 9/17)
 Lack of insurance *linked to* 45,000 deaths (White Coat News, 9/17/09)
 Study *links* 45,000 U.S. deaths to lack of insurance (9/17/09)
 Study: 45,000 U.S. Deaths *From* Lack of Insurance (MoneyNews 9/17/09)
 One American dies every 12 minutes *due to* no health insurance (blog DR)
 45,000 Americans die ... *because of* lack of health insurance (blog MyDD)
 Study: 45,000 *Uninsured* Die a Year (CBS News, 9/17/09)
 Lack of Health Insurance *Kills* 45,000 a Year (Health Insurance.com)
 Lack of Health Insurance *causes* 44,789 deaths in US every year (blog)
 Lack of insurance to *blame* for almost 45,000 deaths: Study (HealthDay)

11

6.5, P 240 StatLit: Chapter 6 Slides 12 V0C

Comparing Part-Whole Ratios

Thus, there are two kinds of comparisons of part-whole ratios. They are seductively similar, but they assert very different things. Small differences in syntax (grammar) can produce big differences in semantics (meaning)!

A **common part** exists when two part-whole ratios share the same part. **Distinct-parts** exist when two groups or two part-whole ratios share the same whole.

A **common-part comparison** compares two ratios having a common part of two different wholes.²⁵⁷ The percentage of cars that are stolen is greater among Cadillac Escalades than among Toyota Camrys. The common part is *stolen*.

A **distinct-parts comparison** compares two ratios involving different parts of a common whole. Among stolen cars, the percentage that are Toyota Camrys is greater than the percentage that are Cadillac Escalades. The common whole is stolen cars, the distinct parts are Toyota Camrys and Cadillac Escalades.

12

6.5, P 241 StatLit: Chapter 6 Slides 13 VOC

Common-Part Comparison

Percentage of suicides among white men vs. that among black men:

Figure 6-3 Common-Part Comparison of Part-Whole ratios

A common part comparison always has two wholes: a test-whole and a base-whole. A **test-whole** in a comparison of ratios is the test in the comparison and the whole in the part-whole ratio. A **base-whole** in a comparison of ratios is the base in the comparison and the whole in the part-whole ratio.

13

6.5, P 241 StatLit: Chapter 6 Slides 14 VOC

Distinct-Parts Comparison

The percentage of college students who are male versus the percentage of art majors among college students.

Figure 6-4 Distinct-Parts Comparison of Part-Whole Ratios

A distinct-parts comparison in a comparison of ratios always has two parts: a test-part and a base-part. A **test-part** in a comparison of ratios is the test in the comparison and the part in a part-whole ratio. A **base-part** in a comparison of ratios is the base in the comparison and the part in the part-whole ratio.

14

6.5, P 242 StatLit: Chapter 6 Slides 15 VOC

Comparison of Ratios: Graphical Template

15

6.6, P 244 StatLit: Chapter 6 Slides 16 VOC

Comparing Ratios Using Likely Grammar

The percentage of smokers among men is greater than among women.

- 1) Men are more *likely* to smoke than women.
- 2) Smokers are more likely (prevalent) among men than among women

1	"Among" always introduces a whole
2	"Likely to" introduces the part -- when followed by an object
3	A comparison of two part-whole ratios must contain three part-whole terms with at least one part and one whole
4	Two phrases with matching grammar (nouns, pronouns, verbs or prepositions) are linked: they have the same part-whole status
5	"likely to" without an object (e.g., likely to occur, likely to happen) indicates the subject is the part.

16

6.6, P 246 StatLit: Chapter 6 Slides 17 VOC

Comparing Part-Whole Ratios. Likely Grammar: Common Part

Likely to: Common part follows 'likely to'; subject is 'test whole'.
 _____ is _____ <compare> likely to _____ than/as** [is] _____
 {test whole} # {common part} {base whole}

Likely among: *Among* introduces whole; subject is common part.
 _____ is _____ <compare> likely* among _____ than/as** [among] _____
 {Part} # {test whole} {base whole}

* 'Prevalent', 'probable' or 'risky' can be used in place of 'likely'
 Can use 'likely to occur' or 'likely to be found'. They refer to the *part* in the subject.
 ** Use 'than' for a difference compare; use 'as' for a times ratio compare.
 An 'among' phrase can be added at the beginning for a common whole.
 Change 'is' to 'are' if the subject is plural. Brackets [] indicate the item is optional.

This figure fixes an error in the 2023 textbook: Figure 6-9.

17

6.7, P 254 StatLit: Chapter 6 Slides 18 VOC

Comparing Part-Whole Ratios. Named Ratios: Common Part

In the 1997 US civilian labor force, the percentage of men who were unemployed was 13% higher than that of women.

In the 1997 US civilian labor force, unemployment was 13% more *likely among* men than [among] women.

18

6.6.4; P 249

StatLit: Chapter 6 Slides

19 VOC

Likely/Prevalent Grammar: Covert between 'likely' statements

Likely common-part comparisons of part-whole ratios:

<Test> are <compare> **likely to** <part> than/as [are] <base>
<Part> are <compare> **likely among** <test> than/as [among] <base>

1. Smoking is more *likely among* women than *among* men. Convert to 'likely to'.
2. Black families are more *likely to* have (be headed by) a single parent than [are] White families. Convert to 'likely among'.

19

6.6.4; P 250

StatLit: Chapter 6 Slides

20 VOC

Likely/Prevalent Grammar: Covert between 'likely' statements

Common-part comparison of part-whole ratios.

<Test> are <compare> **likely to** <part> than/as [are] <base>
<Part> are <compare> **likely among** <test> than/as [among] <base>

3. Among single-parent families, living in poverty is more *likely among* those with a GED than that *among* those with a high-school degree. Convert to 'likely to'.
4. Families headed by a single parent are more *likely to* live in poverty than [are] families headed by a married couple. Convert to 'likely among'.

20

6.6.2; P 246

StatLit: Chapter 6 Slides

21 VOC

Using 'likely' to compare %: Given Percent Grammar

75% of business majors are males. (50% of MIS majors).

1. Compare as a % difference; smaller as base; use 'likely among'.
<Part> are <compare> **likely among** <test> than/as <base>
Men are 50% more prevalent among business majors than [among] MIS majors.
2. Compare as a times ratio; smaller as the base; use 'likely to'.
<Test> are <compare> **likely to** <part> than/as [are] <base>.
Business majors are 1.5 times as likely to be men as [are] MIS majors.

21

6.6.2; P 246

StatLit: Chapter 6 Slides

22 VOC

Using 'likely' to compare %: Given Percentage Grammar

The percentage of men who smoke is 25% (20% of women)

1. Compare as a % difference; smaller as base; use 'likely among'.
<Part> are <compare> **likely among** <test> than/as <base>
Smoking is 25% more prevalent among men than [among] women.
2. Compare as a times ratio; smaller as the base; use 'likely to'.
<Test> are <compare> **likely to** <part> than/as [are] <base>.
Men are 1.25 times as likely to be smokers as [are] women.

22

6.6.6; P 253

StatLit: Chapter 6 Slides

23 VOC

Using 'likely' to compare %: Given Percentage Tables

In left column, compare 60% with 20%. Use likely-to grammar.

<Test> are <compare> **likely to** <part> than/as [are] <Base>.
Use 'times ratio' if ratio > 2. Otherwise, use '% more'.

Students	SEX		
MAJOR	MALE	FEMALE	ALL
Business	60%	20%	40%
Economics	10%	50%	30%
MIS	30%	30%	30%
ALL	100%	100%	100%

Men are 3 times as *likely to* be business majors as [are] women.

23

6.7.2; P 256

StatLit: Chapter 6 Slides

24 VOC

Using 'likely' to compare %: Given Percentage Half-Table

Compare 36.2% with 16.6%. Use likely-among grammar.

<Part> is <compare> **likely among** <Test> than/as [among] <base>
Use 'times ratio' if ratio > 2. Otherwise, Use '% more'.

23.5%	U.S. Adults, 1995
25.6	White
25.8	Black
18.3	Hispanic
16.6	Asian
36.2	American Indian

Smoking is 100% more *likely among* American Indians than [among] Asians.

24

6.7; P 254 StatLit: Chapter 6 Slides 25 VOC

Comparing Part-Whole Percentages

Common-part comparisons:
Slides 26-28: Using named ratios:
percentage, rate and chance grammar.

Distinct-part comparisons:
Slides 29-30. Graph and template

25

6.7.2; P 256 StatLit: Chapter 6 Slides 26 VOC

Comparing Percentages: Using Percentage Grammar

75% of business majors are male. (50% of MIS majors).

Percentage difference; smaller as the base.

Step	{test}	{compare}	{base}
1	75%	is 50% more than	50%
2a	The percentage of business majors who are male	is 50% more than	The percentage of MIS majors who are male
2b	The percentage of males among business majors	is 50% more than	the percentage of males among MIS majors

Simple difference; larger as the base

Step	{test}	{compare}	{base}
1	50%	is 25 points less than	75%
2a	The percentage of MIS majors who are male	is 25 points less than	the percentage of Business majors who are male
2b	The percentage of males among MIS majors	is 25 points less than	the percentage of males among Business majors

26

6.7.2; P 257 StatLit: Chapter 6 Slides 27 VOC

Comparing Percentages: Using Rate Grammar

Male's accidental death rate:
142/100K for non-Whites (81/100K for White).

Times ratio; smaller as the base.

Step	{test}	{compare}	{base}
1	142 per 100,000	is 1.75 times as much as	81 per 100,000
2a	The accidental death rate of non-white males	is 1.75 times as much as	the accidental death rate of white males
2b	The rate of accidental death among non-white males	is 1.75 times as much as	the rate of accidental death among white males
2c	The accidental death rate of males among non-whites	is 1.75 times as much as	the accidental death rate of males among whites

27

6.7.2; P 257 StatLit: Chapter 6 Slides 28 VOC

Comparing Percentages: Using Chance Grammar

Chance of two identical outcomes:
flipping a coin (1/2) vs. rolling a six-sided die (1/6)

Times ratio; smaller as the base.

Step	{test}	{compare}	{base}
1	50%	is 3 times as much as	16.67%
2	The chance of two identical outcomes in two flips of a coin	is 3 times as much as	The chance of two identical outcomes in two rolls of a 6-sided die

28

6.7; P 255 StatLit: Chapter 6 Slides 29 VOC

Comparing Part-Whole Ratios. Named Ratios: Distinct Parts

In the US in 1997, the percentage of all state expenditures that were spent by California was 33% more than that spent by New York.

Likely grammar requires countables for part and whole.

1997 ALL US STATE EXPENDITURES
Common Whole and Whole Delimiter(s)

CALIFORNIA
Test Part or Common Part

NEW YORK
Base Part

Test Whole, Denominator or Delimiter

Base Whole, Denominator or Delimiter

29

6.6; P 247 StatLit: Chapter 6 Slides 30 VOC

Comparing Part-Whole Ratios. Likely Grammar: Distinct Parts

Likely to: Whole is the subject. Use "to" to introduce each part.
_____ is _____ <compare> likely to _____ than/as** to _____.
{Whole} # {test part} {base part}

Likely among: Test part is the subject.
_____ is _____ <compare> likely* among _____ than/as** is _____.
{Test part} # {whole} {base part}

* *Prevalent* can be used in place of *likely*.
* Optional 'likely to occur; likely to be found'. Refers to the test part.
** Use 'than' for difference compares; use 'as' for a ratio compare.

30

6.6, P.247 StatLit: Chapter 6 Slides 31 V0C

Comparing Part-Whole Ratios. Likely Grammar: Distinct Parts

Compare the 60% with the 30% in the left column.

Students	-----SEX-----		
MAJOR	MALE	FEMALE	ALL
Business	60%	20%	40%
Economics	10%	50%	30%
MIS	30%	30%	30%
ALL	100%	100%	100%

Business majors are 2 times as *prevalent among* males as [are] MIS majors. [One 'among']
Males are 2 times as *likely to be* business majors as *to be* MIS majors. [Two 'likely to']

31

Ch 6: P.365 StatLit: Chapter 6 Slides 32 V0C

Chapter Summary

Chapter 6: Key Words, Phrases and Ideas (12)

Attributable/attribution	Percent attributed	Cases Attributed	due to / because of
Compare ratios	Common part	Distinct part	Compare named ratios
Likely ratio compare	Likely to <part>	Likely among <whole>	Likely / prevalent

32

Ch 2: P.155 StatLit: Chapter 6 Slides 33 V0C

Seven Questions when Dealing with Statistics

1. Confounding: How big/many/much?
2. Assembly: Compared to what?
3. Assembly: How are things defined, counted/measured, summarized, grouped, presented?
4. Confounded: Why not a rate? Per what?
5. Confounded: What was taken into account?
6. Confounded: What should be controlled for?
7. Random/Error: Coincidence/selection bias?

33