

Identifying Levels of Measurement: Nominal, Ordinal, Interval, and Ratio

EXERCISE

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Questions are in bold followed by answers.

- 1. In Table 1, identify the level of measurement for the income variable. Provide a rationale for your answer.**

Answer: The level of measurement for the income variable is ordinal. This variable includes categories that can be ranked but the categories do not have equal intervals or an underlying continuum of values (see Figure 1-1; Grove, Burns, & Gray, 2013). For example, an income of <\$40,000 is less than the category of \$40,000 to 60,000, but these categories are not equal numerically.

- 2. In Table 1, what is the level of measurement for the marital status variable? Provide a rationale for your answer.**

Answer: The marital status variable is nominal level measurement because the categories cannot be ranked. The category of being married cannot be ranked as higher or lower than the categories of not married or divorced. The categories for nominal data need to be exhaustive and exclusive, which is evident because all of the parents were placed in only one of the three marital status categories of married, not married, or divorced.

- 3. What is the mode for the child gender variable in the diabetes group? Provide a rationale for your answer.**

Answer: Female is the mode for child gender in the diabetes group, which included 15 or 40% males and 22 or 60% female. The diabetes group included 37 children, so $37 - 15 \text{ males} = 22 \text{ females}$ or $100\% - 40\% \text{ males} = 60\% \text{ females}$. Thus, female is the most frequent occurring gender or mode for this group.

- 4. What are the mean, SD, and range for the variable age of the 66 children included in this study?**

Answer: The mean age = 6.8 years, $SD = 1.01$, and range = 5 to 8 years (see the study results section).

- 5. Were nonparametric or parametric analysis techniques used to analyze the child age data for the asthma group? Provide a rationale for your answer.**

Answer: Parametric analysis techniques were used to analyze the child age data, which are ratio level. The data are ratio because there are equal intervals between each age, with each year including 12 months or 365 days. A zero age means the absences of age. Ratio level data that are normally distributed are analyzed with parametric analysis techniques.

6. Identify the nonparametric analyses conducted to describe variables in this study.

Answer: Nonparametric analysis techniques are used to analyze nominal and ordinal level data and interval and ratio level data that are not normally distributed. Frequency, percentage, mode, median, and range were conducted in this study to describe or summarized the demographic variables for the total sample and for the diabetes and asthma groups.

7. Is there a significant difference in gender between the diabetes and asthma groups? Provide a rationale for your answer.

Answer: There is a significant difference in gender between the diabetes and asthma groups as indicated by $p = 0.05$. A result in this study is considered significant if $p \leq 0.05$, which was the level of significance or alpha set for this study.

8. Ordinal level data need to have exclusive and exhaustive categories that can be ranked. Does the income variable follow these three rules? Provide a rationale for your answer.

Answer: No, because the income variable categories are exhaustive and are ranked but are not exclusive. The categories seem to be exhaustive because all incomes are covered by the categories of $< \$40,000$, $\$40,000$ to $60,000$, $\$60,000$ to $80,000$, and $> \$80,000$, and the categories were ranked from lower to higher income. However, the categories are not exclusive because a person making $\$60,000$ could mark either the second or the third categories. This overlap in income for the two categories decreases the accuracy of the income results.

9. Identify the number of parents included in this study. What were the frequency and percentage of the parents who were fathers? Round your answer to the nearest tenth of a percent (%).

Answer: A total of 109 parents (66 mothers and 43 fathers) were included in this study (see relevant study results). Percentage of fathers in the study = $(\text{Frequency of fathers } 43 \div 109 \text{ total parents}) \times 100\% = 0.3945 \times 100\% = 39.45\%$ or 39.5%

10. What are the mean and SD for the illness severity of the children with asthma in this study? What was used to measure the illness severity variable in this study? What resources are available for nurses to use to decrease illness severity scores for children with asthma?

Answer: For the severity of illness variable in the asthma group: Mean = 1.37 and $SD = 0.82$. Illness severity was measured using a 0 to 3 rating scale. Students might provide a variety of answers to this question about resources such as following national guidelines in caring for children with asthma and their families. The Agency for Healthcare Research and Quality provides national guidelines for asthma management that can be located at <http://www.guideline.gov/>. The American Academy of Allergy Asthma and Immunology has a website with guidelines for management of asthma at <http://www.aaaai.org/conditions-and-treatments/asthma.aspx>. The Centers for Disease Control and Prevention also provides guidelines for asthma management at <http://www.cdc.gov/asthma/healthcare.html>. Information on the assessment, diagnosis, and management of asthma needs to be obtained from quality sources such as nationally recognized websites and quality research articles.