1. The different types of regression models (simple, multiple, logistic, and multiple-logistic) and circumstances in which they are appropriate to use.

* Simple regression- This model assumes that each x and y value have a normal distribution, and a linear relationship exists between x and y. This model would be appropriate for estimating a relationship between two quantitative variables (i.e., the association between rainfall and soil erosion).
* Multiple regression- This model is an extension of simple regression but has more than one independent variable. The association between the independent variables and the dependent variable is assessed at the same time (i.e., the association between rainfall and temperature on soil erosion).
* Logistic regression- This model is commonly used in epidemiology. The dependent variable is dichotomous. Many of the outcome measures involve nominal data. The variables can be separated, and the y variable can only take on 2 values (i.e., did a specific area achieve a certain amount of rainfall? Yes or no).
* Multiple-logistic regression- Adding to logistic regression, this model has more than one independent variable (much like multiple regression) and the variables are assessed simultaneously (i.e., did the area achieve a certain amount of rainfall and achieve a certain temperature, yes or no for both variables).

1. Suppose the estimated slope coefficient in a regression model measuring the association between the independent variable, exercise (in hours per week) and dependent variable pulse has a slope of -0.05 (per minute). Interpret this result.

* This result means that as the exercise (in hours per week) increases, the pulse decreases at a rate of 0.05 per minute.

1. Referring to the mortality data in two populations (Population A and Population B) in the Tables below, calculate the following: age-adjusted rates, crude rate ratio, age-adjusted rate ratio. Use Population A as the Standard Population.

* Age-adjusted rates: 589/14619= .0403 or 40.3
* Crude rate ratio: .013/.019= .68
* Age-adjusted rate ratio: .014/.0403= .35

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| --- | --- | --- | --- | --- | --- |
| Population A | |  |  |  |  |
| Age (years) | Population | Number of deaths | Rate |  |  |
| 15-29 | 1000 | 34 | 34/1000= .34 |  |  |
| 30-49 | 3220 | 26 | 26/3220= .008 |  |  |
| 50-54 | 6000 | 85 | 85/6000= .014 |  |  |
| 55+ | 4399 | 37 | 37/4399= .008 |  |  |
| Total | 14619 | 184 | 184/14619= .013 |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Population B | |  |  |  |  |  |  |  |
| Age (years) | Population | Number of deaths | Rate |  |  |  |  |  |
| 15-29 | 5000 | 45 | 45/5000= .009 |  |  |  |  |  |
| 30-49 | 2000 | 10 | 10/2000= .005 |  |  |  |  |  |
| 50-54 | 1000 | 75 | 75/1000= .075 |  |  |  |  |  |
| 55+ | 2467 | 65 | 65/2467= .026 |  |  |  |  |  |
| Total | 10,467 | 195 | 195/10467= .019 |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Population A | |  | |  | |  | |  | |
| Age (years) | Population | | Rate Pop. B | | Expected | |  | |  |
| 15-29 | 1000 | | 45/5000= .009 | | .009\*1000= 9 | |  | |  |
| 30-49 | 3220 | | 10/2000= .005 | | .005\*3220= 16 | |  | |  |
| 50-54 | 6000 | | 75/1000= .075 | | .075\*6000= 450 | |  | |  |
| 55+ | 4399 | | 65/2467= .026 | | .026\*4399= 114 | |  | |  |
| Total | 14619 | |  | | 589 | |  | |  |