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Assignment done without other students

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Q1: Dichotomies

Bolker discusses the dichotomy of theoretical and applied models. Theoretical models are more difficult mathematically but are more generalizable. Applied models are usually more complex but are less generalizable. When it comes to my studies in epidemiology, both types of these models are useful. An applied model could help us understand the dynamics of disease in a specific community. A theoretical model could inform disease control in the future and, due to their generalizability and could uncover outliers by applying the model to different communities.

Q2: Assumptions and Biases

Publication bias occurs when the result of a study influences whether or not the study is published. Publication bias is one type of bias that I think is both scientific and cultural. This bias could result in studies that show significant evidence to reject the null hypothesis to be published more often than studies that do not disprove a null hypothesis. As many studies are conducted at a 5% significance level, this could lead to an outside number of research with Type 1 errors to be published. This not only affects scientific discourse, but also meta studies conducted on data published previously.

This bias seems related to McGarigal's statement about how the status quo needs solid evidence to be disproven. Perhaps it is scientific journal's cultural bias toward publishing "interesting" status quo breaking articles that causes this issue. Whatever the cause, this bias can lead to ineffective management strategies to be elevated to common use, because the one study that said it worked is published while the 19 others that said it didn't work were not.

Q3: Dual Model Paradigm

The dual model paradigm includes two components, the null model and the alternative model. The null model represents what would happen if the null hypothesis was true. For example, if one variable had no effect on another variable, a linear model would show a horizontal line. An alternative model represents what would happen if the null hypothesis is not true. For example if a variable had an effect on another variable, a linear model would show a line that is not horizontal.

These two components exist in models about causal factors in cancer research. Possible risk factors can be examined using these models. If the null model is true, there is no relationship between the possible risk factor and cancer. If the alternative model is true, then there is some relationship between the possible risk factor and cancer.

Q4: Populations

A statistical population includes just the individuals related to a research question. An ecological population includes all individuals in a species. A statistical population is affected by the spatial or temporal scale of the research question while ecological populations are not.

Q5: Model Thinking

Scenario: Cattails

A continuous variable on a ratio scale would be appropriate to represent the percentage of a swamp that is covered by invasive cattails. It is appropriate for this variable to be continuous because percentages include the decimal values between integers. A ratio scale is an appropriate because a percent value of 0 is meaningful. It means there are no cattails covering the swamp.

A discrete variable would be appropriate to represent the number of cattail plants in an area. It is appropriate because the counts of cattail plants do not have intermediate values, the number is always an integer.