Assignment 5 – QMEE

The theoretical context of my data is determining how microplastic ingestion changes across different exposure levels of a mixture of microfibers (PET and nylon) in freshwater snails. My specific question addresses whether more microfibers are ingested at higher exposure rates.

The relevant attributes are the treatment groups (control (0ppm), low (100ppm), medium (1000ppm), high (10,000ppm)), microfiber type (PET, nylon), and microfiber count per snail.

I will measure microfiber types on a nominal scale because they are categories without order and can only be used to determine proportions, frequencies, and the mode but not variances or means. I will also measure microfiber count on a ratio scale because this data has meaningful zeroes and can be used to calculate geometric/arithmetic means and log transformations. I will test the residuals of my microfiber count data for normality and if it is normally distributed, I will use a parametric test to compare microfiber counts across treatment groups. If it is not normally distributed, I will use a non-parametric test. Treatment groups would also be measured on a ratio scale because the control group has meaningful zeroes, and the microfiber counts are equally spaced in each group (Voje et al. 2023).

For microfiber counts across treatment groups, I will decide that a difference is important based on environmental relevance. Since my low treatment group has an environmentally relevant concentration, ingestion of fibers in this treatment group would most accurately model possible real-world situations. The importance of the difference will also be evaluated by the magnitude of the difference (p-value) and its precision, indicated by the confidence intervals. Since microplastics and particularly microfibers were only recognized officially in the early 2000s, research on their effect sizes is limited and controversial in the literature. Therefore, I will be using Cohen's effect size conventions to determine whether an effect is small, medium, or large (Nakagawa & Cuthill, 2007).

References

Nakagawa, S., & Cuthill, I. C. (2007). Effect size, confidence interval and statistical significance: a practical guide for biologists. *Biological Reviews/Biological Reviews of the Cambridge Philosophical Society*, *82*(4), 591–605. https://doi.org/10.1111/j.1469-185x.2007.00027.x

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