THE *Abdus Salam* INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS
MASTER OF ADVANCED STUDIES IN MEDICAL PHYSICS

Homework #3 comments

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Course: *2024 Statistics for Medicine* – Professor: *Massimo Borelli*
Due date: *Saturday 28th January, 2024*

Question

1. Reconsider the data (the `breastioert.csv` dataset) considered during Homework #1 about the paper by Mara Severgnini, Mario de Denaro et al., entitled *In vivo dosimetry and shielding disk alignment verification by EBT3 ...* (PMID 25679150).

2. According to a proper test, is the *Area outside shielding* different, in a statistical sense, with respect of the two levels of *Energy*?

3. Imagine that your analysis belongs to a research project and you are required to publish it. How would you report your finding in the 'Result' section of a paper?

4. Would you report any important issue concerning the analysis in the 'Limitation' section of the paper?

5. Go to `https://forms.gle/rTCaN2gbyRMK8mJR7` in order to upload your final .pdf document.

Comments.

Table 1: Frequencies for Energy

Energy	Frequency	Percent	Valid Percent	Cumulative Percent
6	7	18.919	18.919	18.919
9	30	81.081	81.081	100.000
Missing	0	0.000		
Total	37	100.000		

As a relevant limitation of the study, one observes that the dataset is strongly unbalanced: only seven data have been observed for the 'low energy' (6 MeV) group.

According to a frequentist approach, groups appear to be homoskedastic (Levene's test p = 0.56), but not normally distributed (Shapiro-Wilk test, p = 0.003 in 9 MeV group): therefore, according to Mann-Whitney U test (p = 0.451) there is no significant evidence that Area outside shielding differs at different energies.