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## **Book Review**



**Basic biostatistics for medical & biomedical practitioners,** 2<sup>nd</sup> edition. J.I.E. Hoffman (Academic Press, Elsevier Inc., London, UK) 2019. 712 Pages. Price: Not mentioned.

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Biostatistics has recently gained tremendous importance in medical research results - so much so that some legitimate questions are being raised about the dominant role the P value and statistical significance has started playing. The net result of this undue importance is that a large number of books have appeared in the market during the last decade by authors ranging from hard-core statisticians to strict clinicians. It would not be unfair to call this a mushroom growth. Amidst this scenario, it was interesting to see a book on this subject authored by a clinician, with apparently no special biostatistics training. The title further raised the expectation that the book will focus on medical applications rather than on mathematical issues. The breadth of mathematical coverage in the book, undertaken by a clinician was a pleasant surprise. The author, deserves appreciation for his attempt towards writing such a comprehensive statistics book as this one.

With a clinician as the author, one would expect to see an overdose of signs-symptoms, diagnoses, complications and survival, but there is not much on clinical issues in this book. However, since the book was intended for medical practitioners, it would have been more relevant for them, had statistics methods explained much more in the clinical context than done at present.

This is an exhaustive book and is divided into eight sections and 38 chapters. A large number of topics have been discussed, such as scales of measurement, descriptive analysis, probability, normal distribution, confidence intervals (CIs), testing of hypothesis, binomial and multinomial distributions, Poisson distribution, hyper-geometric distribution, negative binomial distribution, ANOVA, regression and correlation, time series, logistic regression, Poisson regression, survival analysis, meta-analysis and sampling. Thus, the book practically covers all basic statistics plus more. Amidst this comprehensive coverage, luckily, there is a chapter on odds ratio and relative risk, and another section on ROC curves, which are of special interest to medical professionals. However, several other core clinical issues such as the role of probability in diagnosis, treatment and prognosis; scoring systems and prospective-retrospective designs are missing. The explanation of the statistical concepts is mostly mathematical and their medical application is not fully demonstrated. Not much relevance for medical professionals is shown for the inclusion of a discussion on hyper-geometric and negative binomial distributions. These distributions are rarely included in a basic biostatistics book because these are sparingly used in medicine and have been discussed mostly with generic examples instead of medical examples so that it is not clear to the reader where these are used in medicine.

Whereas their figure (4.6, p 53) on histograms with different sizes of class intervals is revealing, the mixing the notations such as lower case p and upper case P (see, e.g. p 287) and lower case n and upper case N (p 288) is perplexing. There are many misprints in the formula for multinomial distribution (p 261). In addition, here, the statistical notation  $X_1 = x_1, X_2 = x_2, \dots, X_k = x_k$  has been used which is not used for most other distributions discussed in this book. This kind of formulation of a statistical distribution is not suitable for medical practitioners.

There are other errors too. In an example (example 18.8, p 277), there is a huge difference between the CI obtained by the exact method and the normal approximation, but the sentence in the context of the

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previous example says that the CIs by the two methods are not much different. If this is excused, the *z*-formula for RR (p 302) assumes that RR is a proportion and always <1 – this is not true. In their example (p 297), RR=3.6811 which is more than 1. There is a big confusion between subscript *i* and *n* in the formula for mean and standard deviation (p 71-72).

The examples I cite are illustrative of some of the errors in the book. The author has attempted a mathematical exposition but has not succeeded. Due to this, this book may not be very useful for medical and biomedical practitioners. The book will become useful to the intended audience when the errors are removed and more relevant medical applications are demonstrated.

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900