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Purely sequential and two-stage bounded-length confidence intervals for the Bernoulli parameter with illustrations from health studies and ecology. (English) [Zbl 1351.92005](#)

Choudhary, Pankaj K. (ed.) et al., Ordered data analysis, modeling and health research methods. In honor of H. N. Nagaraja's 60th birthday. Selected papers based on the presentations at the international conference, Austin, TX, USA, March 7–9, 2014. Cham: Springer (ISBN 978-3-319-25431-9/hbk; 978-3-319-25433-3/ebook). Springer Proceedings in Mathematics & Statistics 149, 211-234 (2015).

Summary: Infestation affects supplies of food and nutrition as well as the environment, thus making a deep impact in the ecological balance of the health of humans, animals, plant populations, and other natural resources. It is well known, for example, that estimation of (i) the probability of presence of infestation, (ii) the chance of getting a disease, and (iii) the chance of a relapse are very important in entomology and health studies. They frequently involve binary data modelled by a Bernoulli(p) distribution where p is an unknown parameter, $0 < p < 1$. In this paper, we begin by summarizing selected existing methodologies of confidence interval estimation and illustrate how they may fail to estimate p efficiently. Consequently, we introduce new confidence interval methods for estimating p . Having fixed $0 < \alpha < 1$ and $d(> 1)$, we develop approximately $100(1 - \alpha)\%$, confidence intervals (L_N, U_N) for p such that $0 < L_N < U_N < 1$ and $U_N - L_N \leq d$ w.p.1. Here, N is a properly designed and determined stopping variable obtained via both two-stage and purely sequential sampling strategies. The proposed two-stage and purely sequential bounded-length confidence interval methodologies are shown to enjoy both asymptotic first-order efficiency and asymptotic consistency properties. Then, we present summary performances of the new methodologies by analyzing data generated from simulations. We have also implemented the proposed methodologies for three real data sets of size small to moderate to large.

For the entire collection see [\[Zbl 1337.92005\]](#).

MSC:

- [92B15](#) General biostatistics
- [62L12](#) Sequential estimation
- [92C50](#) Medical applications (general)
- [62P12](#) Applications of statistics to environmental and related topics
- [62L05](#) Sequential statistical design

Cited in **2** Documents

Keywords:

[environmental statistics](#); [first-order properties](#); [infestation](#); [multistage sampling](#); [second-order properties](#); [statistical ecology](#)

Full Text: [DOI](#)

References:

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