Reviewer's report

Title: Testing for Differences in Distribution Tails to Test for Differences in 'Maximum' Lifespan

Version: 1 Date: 22 March 2008

Reviewer: Huixia Wang

Reviewer's report:

General remarks

In this paper, a new test is proposed to identify the difference in “maximum lifespan” between two populations. The authors conducted extensive simulation studies to compare the proposed method with several existing methods in terms of both Type I error and power in different model settings. This is an interesting problem. The proposed method and the numerical comparisons are potentially useful in practice.

Minor Essential Revisions

1. Note that $E(Z)=P(Y>\tau)E(Y|Y>\tau)$. Therefore, the Gao-Alison test is really testing whether $P(Y>\tau|X=1)E(Y|Y>\tau, X=1)$ equals $P(Y>\tau|X=0)E(Y|Y>\tau, X=0)$. On the other hand, the test of $H_{(0B)}$ is testing whether $E(Y|Y>\tau, X=1)$ equals $E(Y|Y>\tau, X=0)$. The difference of $E(Z)$ between two groups consist of two parts: the probability of $Y$ exceeding $\tau$, and the expectation of $Y$ for the subpopulation exceeding $\tau$. The difference in the first part is the focus of $H_{(0A)}$, while the difference in the second part is the interest of $H_{(0B)}$.

The defined $Z$ is like zero-inflated data. Dominici and Zeger (2005) studied a similar problem by comparing the conditional mean difference between two groups given some covariate for zero-inflated data through smoothing the percentiles of data from two groups. The authors may consider discussing such connections in the paper.

Reference:


2. Page 8, line 15. It seems surprising to me that the method for testing $H_{(0B)}$ has larger Type I errors than Gao-Alison test in simulation 1, as the null space of $H_{(0C)}$ is the intersection of that of $H_{(0B)}$ and that of $H_{(0A)}$. Some explanation is needed here.

3. Page 10, I feel the discussion of real data analysis is too brief. As the results show that $H_{(0B)}$ is not rejected, but methods show significance for rejecting
$H_{0A}$ and $H_{0C}$. This suggest that the difference of two groups in terms of $E(Z)$ is mainly due to the different probabilities of $Y$ being exceeding $\tau$ between two groups, but not to the difference in $E(Y|Y>\tau)$. The authors may consider providing some graphics, e.g., histograms or kernel density estimations, to help readers understand the sources of differences between two groups. A histogram can also justify the usage of Weibull distribution in the simulation study. Quantities such as the proportion of observations exceeding $\tau$, and some estimation of $E(Y|Y>\tau)$ in each group may also be useful for demonstration.

4. Page 17, Table 2. The confidence intervals for Type I error should be included for significance level 0.05 and 0.01.

5. Page 15, Table 1. The parameters in Simulation 1 are exactly the same as in Simulation 3. So are the plots.

6. Page 5, last line, sample mean of $Z$ # population mean of $Z$?

7. Page 9, line 18, 90th percentile # the 90th percentile.

What next?: Accept after minor essential revisions

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: Yes, and I have assessed the statistics in my report.

Declaration of competing interests:

I declare that I have no competing interests