SURVIVAL ANALYSIS AND LENGTH-BIASED SAMPLING

Masoud Asgharian
McGill University, Department of Mathematics and Statistics
Burnside Hall, 12th floor, Room 1237, 805 Sherbrooke Street West, Montreal, Quebec H3A 2K6
Phone: ++ 514 398 1461; E-mail: masoud@math.mcgill.ca

Key words: *cross-sectional sampling, prevalent cohort, length-biased sampling, and right censoring*

EXTENDED ABSTRACT

When survival data are colleted as part of a prevalent cohort study, the recruited cases have already experienced their initiating event. These prevalent cases are then followed for a fixed period of time at the end of which the subjects will either have failed or have been censored. When interests lies in estimating the survival distribution, from onset, of subjects with the disease, one must take into account that the survival times of the cases in a prevalent cohort study are left truncated. When it is possible to assume that there has not been any epidemic of the disease over the past period of time that covers the onset times of the subjects, one may assume that the underlying incidence process that generates the initiating event times is a stationary Poisson process. Under such assumption, the survival times of the recruited subjects are called "length-biased". I discuss the challenges one is faced with in analyzing these type of data. To address the theoretical aspects of the work, I present asymptotic results for the NPMLE of the length-biased as well as the unbiased survival distribution. I also discuss estimating the unbiased survival function using only the follow-up time. This addresses the case that the onset times are either unknown or known with uncertainty. Some of our most recent work and open questions will be presented. These include some aspects of analysis of covariates, strong approximation, functional LIL and density estimation under length-biased sampling with right censoring. The results will be illustrated with survival data from patients with dementia, collected as part of the Canadian Study of Health and Aging (CSHA).