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Estimating the mean quality adjusted life using Aalen's linear hazards model

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Quality of Life(QoL) has emerged as an important endpoint in the analysis of data generated by clinical trials. We need health measures which will integrate the longevity of the individual with the state of health during the period of survival. In such studies, based on the data on a number of covariates, it is common to classify the health condition of an individual, at any given time point, into one of a finite set $\{1,2,\dots,k\}$ of well defined health states using standardised Questionnaires. Appropriate pre-determined scores, say q_1,\dots, q_k , referred to as QoL scores, are assigned to the health states. Quality Adjusted Lifetime (QAL) is then taken as the weighted average of the times spent in the health states with the QoL scores as the weights. In this paper, we propose some estimators of the Mean QAL in terms of estimated restricted mean time spent in each of the health states using an additive linear hazards regression model that accounts for the covariate effect. Two estimators arise from the choice of the least-squares methods used, namely, ordinary- and weighted- least squares. We also study the asymptotics of the proposed estimators. The methods developed here are applied to a real data set, the Ludwig Trial V data of the International Breast Cancer Study Group covering two treatment arms, the *short duration* and the *long duration*. We find that our methods very clearly bring out the differences between the short- and long- treatment arms in terms of the QoL. It is also possible to discriminate the two arms with respect to the sojourn time distributions for specific health states of interest.