

ABSTRACT

The idea of pool testing originated with Dorfman during the World War II as an economical method of testing blood samples of army inductees in order to detect the presence of infection. Dorfman proposed that rather than testing each blood sample individually, portions of each of the samples can be pooled and the pooled sample tested first. If the pooled sample is free of infection, all inductees in the pooled sample are passed with no further tests otherwise the remaining portions of each of the blood samples are tested individually. Apart from classification problem, pool testing can also be used in estimating the prevalence rate of a trait in a population which was the focus of our study. In approximating the prevalence rate, one-at-a-time testing is time consuming, non-cost effective and is bound to errors hence pool testing procedures have been proposed to address these problems. This study has developed statistical model which is used to sequentially switching between two experiments when the sensitivity and specificity of the test kits is less than 100%. The experiments are selected sequentially, so that at each stage, the information available at that stage is used to determine which experiment to carry out at the next stage. The method of maximum likelihood estimator (MLE) was used in obtaining the estimators. The fisher information of different experiments is compared and the cut off values where one experiment is better than the other are calculated. The variance of the estimators has also been compared. The joint model has been compared to one-at-a-time and pool testing models by computing ARE. The joint model is found to be more efficient.

Keywords

Pool, Pool Testing, Cut off Value, Prevalence Rate, Sensitivity, Specificity