Negatively skewed survival data arise occasionally in public health fields and in statistical research. Standard distributions such as the exponential, generalized F, generalized gamma, Gompertz, log-logistic, lognormal, Rayleigh, and Weibull distributions are not always well suited to this data. The primary goal of this dissertation is to find a viable alternative for modeling negatively skewed survival data such as the time to first remission for pediatric patients diagnosed with frequently relapsing or steroid dependent nephrotic syndrome.

We begin with a brief introduction to survival analysis and the nature of pediatric nephrotic syndrome. A meta-analysis on atopy and pediatric nephrotic syndrome using worldwide studies is performed. The reflected, shifted, truncated gamma (RSTG) distribution is introduced as an alternative model for survival data whose event times arise from a negatively skewed distribution. Explicit expressions are provided for the mean, variance, hazard function, survival function and quantile function of the RSTG distribution. A simulation study verifies the consistency of maximum likelihood estimates of model parameters. We use previously published data sets to compare the RSTG distribution to the exponential, generalized F, generalized gamma, Gompertz, log-logistic, lognormal, Rayleigh, and Weibull distributions for modeling negatively skewed complete (uncensored) data, right-censored data and interval-censored data. Comparisons are made using AIC criteria. Our research shows that the RSTG distribution is a superior alternative for modeling negatively skewed survival data.

The RSTG distribution is applied to negatively-skewed pediatric nephrotic syndrome data from the Clinical Data Warehouse of Health Sciences of South Carolina and from the Robert Wood Johnson Medical School in New Jersey using accelerated failure time (AFT) models with and without frailty. A brief example of the RSTG distribution applied to a 1972 study on diabetic retinopathy is also included. Results and future goals are discussed.