

# Theory and Inference Methods for Zero Truncated Poisson Exponential Gamma Distribution

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## Resumo/Abstract:

There will be presented a new probability distribution, the Zero Truncated Poisson Exponential Gamma Distribution (ZTPEG). In the last few years studies on new probability distributions has become common. The distribution Exponentiated Gamma that was introduced by [1], where the model is obtained by the method  $F * (x) = [F(x)]^\theta$ , where  $F(x)$  is a distribution base and  $\theta$  (shape parameter) is a real and positive number. This distribution has the flexibility to model monotonous and not monotone failure rates. Thus, using the composition method and the proposed distribution by [1] the model has been developed and studied. Often, obtaining a new distribution may be advantageous due to the different shapes of its hazard curve, and this new proposed model has a very flexible hazard rate, and just two parameters. With the help of the software *Maple* and *R*, it was possible to obtain some probabilistic results of the new distribution such as  $n - th$  time and moment generating function.

For the new distributions found, were also made simulations for different parameter values in order to find the best estimation method for each parameter. The methods used were: maximum likelihood, ordinary least-squares, weighted least-squares, Cramér-von-Mises, Anderson Darling, Anderson Darling - RT (right-tail), Anderson Darling - LT (left-tail), Anderson Darling - 2LT (left-tail second order), Kolmogorov and bayesian estimator with the prior Gamma. Some techniques to compare the estimators were used. Finally, an applications was also performed, where the adjustment of some proposed distributions in relation to the database was tested.

## References

- [1] GUPTA, R. C., GUPTA, P. L., AND GUPTA, R. D. , *Modeling failure time data by lehman alternatives* , Communications in Statistics-Theory and Methods.