DISCRETE GENERALIZED WEIBULL DISTRIBUTION: PROPERTIES AND APPLICATIONS IN MEDICAL SCIENCES

B.A. Para and T.R. Jan

Department of statistics, University of Kashmir, Srinagar, J&K (India) Email: parabilal@gmail.com drtrjan@gmail.com

ABSTRACT

In this paper, we introduce a discrete analogue of generalized Weibull distribution (DGWD) as a new discrete model. Initially we study some fundamental distributional properties of this new discrete model and discuss unimodality and failure rate functions. Finally, we discuss the application of the model with a data set studied by Morgan et al. (2007) and McElduff (2012).

KEYWORDS

Simulation, Hazard Rate, Index of Dispersion.

1. INTRODUCTION

Researchers obtain new probability models by using different techniques such as compounding, discretization, transmutation etc. in order to illustrate a phenomenon in the form of mathematical expressions. Recently discretization of continuous probability distributions has also received attention from researchers from past decade. Discretized Statistical models form a basic field of study to handle discrete lifetime data and also count data in a wide variety of disciplines such as biological and medical sciences, physical sciences, engineering, agriculture and so on. As plethora of the lifetimes in reliability are of continuous in nature and therefore many continuous lifetime models have been discussed in statistical modelling literature [See for example Kapur and Lamberson (1997), Lawless (1982) and Sinha (1986)]. However, there are many situations when it is impractical in lifetime experiments to quantify the life span of a component or a device on a continuous scale. There are many components which operate in cycles and the experimenter counts number of completed cycles before failure. We can quote a well-known example of copier whose lifetime is simply the total number of copies it produces. Another referred example is the life length of an off/on switching component or machine whose life length depends on the number of times we switch the device on/off, is a random variable with discrete nature, or lifetime of a component which receives a number of shocks prior to failure. In reliability theory, we sometimes record the number of hours/days a cancer patient survives since the time of therapy, or the times from remission to relapse are also most of the times recorded in number of hours/days. In the current era discrete distributions play special role in the field of reliability theory and other applied fields. In this background, the well-known distributions like GD (Geometric distribution) and NBD (Negative Binomial Distribution) are the well-known discrete versions for the ED (Exponential distribution) and GD (Gamma distribution), © 2017 Pakistan Journal of Statistics 337