

# Package ‘tpglp’

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**Type** Package

**Title** Three-Parameter Generalized Lindley-Poisson Distribution  
Functions

**Version** 0.1.0

**Description** Provides functions for random generation, density,  
cumulative distribution, quantile function, moments, and  
log-likelihood for a three-parameter generalized  
Lindley-Poisson mixture model.

**License** GPL-3

**Encoding** UTF-8

**RoxygenNote** 7.3.3

**Imports** stats

**NeedsCompilation** no

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dtpglp	<i>Density Function of the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes the probability mass function of the Three-Parameter Generalized Lindley-Poisson distribution.

**Usage**

```
dtpglp(y, pi, theta1, theta2, log = FALSE)
```

**Arguments**

y	Numeric vector of non-negative integers.
pi	Numeric. Mixing probability in [0,1].
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.
log	Logical. If TRUE, returns log-probabilities.

**Value**

Numeric vector of probabilities.

**Examples**

```
dtpglp(0:5, pi = 0.6, theta1 = 1, theta2 = 2)
```

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logLik_tpglp	<i>Log-Likelihood Function for the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes the log-likelihood.

**Usage**

```
logLik_tpglp(y, pi, theta1, theta2)
```

**Arguments**

y	Numeric vector of counts.
pi	Numeric. Mixing probability.
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.

**Value**

Numeric value.

**Examples**

```
y <- rpois(100, 2)
logLik_tpglp(y, pi = 0.5, theta1 = 1, theta2 = 2)
```

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mean_tpglp	<i>Mean of the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes the mean.

**Usage**

```
mean_tpglp(pi, theta1, theta2)
```

**Arguments**

pi	Numeric. Mixing probability.
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.

**Value**

Numeric value.

**Examples**

```
mean_tpglp(pi = 0.6, theta1 = 1, theta2 = 2)
```

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ptpglp	<i>Distribution Function of the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes cumulative probabilities.

**Usage**

```
ptpglp(q, pi, theta1, theta2, lower.tail = TRUE)
```

**Arguments**

q	Numeric vector of quantiles.
pi	Numeric. Mixing probability in [0,1].
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.
lower.tail	Logical.

**Value**

Numeric vector of probabilities.

**Examples**

```
ptpglp(5, pi = 0.6, theta1 = 1, theta2 = 2)
```

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qtpglp	<i>Quantile Function of the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes quantiles numerically via inversion.

**Usage**

```
qtpglp(p, pi, theta1, theta2, max_y = 1000, lower.tail = TRUE)
```

**Arguments**

p	Numeric vector of probabilities.
pi	Numeric. Mixing probability.
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.
max_y	Integer search limit.
lower.tail	Logical.

**Value**

Numeric vector of quantiles.

**Examples**

```
qtpglp(0.5, pi = 0.6, theta1 = 1, theta2 = 2)
```

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rtpglp	<i>Random Generation from the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Generates random observations from a two-component mixture model: an Exponential-Poisson (geometric) component and a Gamma-Poisson (negative binomial) component.

**Usage**

```
rtpglp(n, pi, theta1, theta2, seed = NULL)
```

**Arguments**

n	number of observations
pi	mixing probability
theta1	positive parameter
theta2	positive parameter
seed	optional seed

**Details**

For each observation:

- With probability  $\pi$ :  $\lambda \sim \text{Exp}(1/\theta_1)$
- With probability  $1 - \pi$ :  $\lambda \sim \text{Gamma}(\text{shape} = 2, \text{rate} = 1/\theta_2)$
- Then:  $Y \sim \text{Poisson}(\lambda)$

**Value**

vector of counts

**Examples**

```
rtpglp(100, pi = 0.6, theta1 = 1, theta2 = 2)
rtpglp(100, pi = 0.6, theta1 = 1, theta2 = 2, seed = 123)
```

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var_tpglp	<i>Variance of the Three-Parameter Generalized Lindley-Poisson Distribution</i>
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**Description**

Computes the variance.

**Usage**

```
var_tpglp(pi, theta1, theta2)
```

**Arguments**

pi	Numeric. Mixing probability.
theta1	Numeric. Positive parameter.
theta2	Numeric. Positive parameter.

**Value**

Numeric value.

**Examples**

```
var_tpglp(pi = 0.6, theta1 = 1, theta2 = 2)
```

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