

# Package ‘survexp.fr’

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**Type** Package

**Title** Relative Survival, AER and SMR Based on French Death Rates

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**Depends** R (>= 3.5.0), survival

**Imports** WriteXLS, stats, graphics

**Encoding** UTF-8

**LazyData** Yes

**Description** It computes Relative survival, AER and SMR based on French death rates.

**License** GPL (>= 2)

**RoxygenNote** 7.3.2

**NeedsCompilation** no

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**Repository** CRAN

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survexp.fr-package      *Relative survival, AER and SMR based on French death rates*

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### Description

Relative survival, AER and SMR based on French death rates

### Author(s)

Jean-Philippe Jais and Hugo Varet

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AER      *Absolute Excess Risk (AER)*

---

### Description

Computes the AER, its confidence interval and its associated p-value

### Usage

```
AER(
  futime,
  status,
  age,
  sex,
  entry_date,
  PY.stand = 10000,
  ratetable = survexp.fr::survexp.fr,
  alpha = 0.05
)
```

### Arguments

futime	follow-up time of the subjects in days
status	0 if censored or 1 if dead at futime
age	age in days
sex	"male" or "female"
entry_date	entry date in the study
PY.stand	value to get the AER for stand person-years
ratetable	a table of event rates, such as survexp.fr or survexp.us
alpha	determines the confidence level (1-alpha) of the confidence interval

**Details**

The Absolute Excess Risk (AER) is defined as:

$$AER = O - E$$

where  $O$  is the observed number of deaths and  $E$  is the expected number based on the patients' characteristics (sex, age and entry date in the study). This function uses an additive Poisson model to compute the AER.

**Value**

A list containing the AER with the corresponding number of person-years (PY, stand argument), its confidence interval, its p-value, the observed number of deaths, the expected number of deaths and the observed number of person-years

**Author(s)**

Jean-Philippe Jais and Hugo Varet

**References**

N. Breslow and N. Day, Statistical methods in cancer research, Volume II - The design and analysis of cohort studies, World Health Organization, 1987

P. Dickman, A. Sloggett, M. Hills and T. Hakulinen, Regression models for relative survival, Statistics in Medicine, 2004

C. Elie, Y. De Rycke, J.-P. Jais and P. Landais, Appraising relative and excess mortality in population-based studies of chronic diseases such as end-stage renal disease, Clinical Epidemiology, 2011

**Examples**

```
attach(data.example)
AER(futime, status, age, sex, entry_date)
```

---

data.example

*Example data to illustrate the functions*

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**Description**

Example data to illustrate the functions

**Format**

A data frame with 200 observations on the following 5 variables.

sex "male" or "female"

age age in days

entry\_date entry date in the study

status status at follow-up time: 0 if alive, 1 if dead

futime follow-up time in days

---

LR *Log-Rank test between an observed and an expected survival curve*

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### Description

Log-Rank test between an observed and an expected survival curve

### Usage

```
LR(futime, status, age, sex, entry_date, ratetable = survexp.fr::survexp.fr)
```

### Arguments

futime	follow-up time of the subjects in days
status	0 if censored or 1 if dead at futime
age	age in days
sex	"male" or "female"
entry_date	entry date in the study
ratetable	a table of event rates, such as survexp.fr or survexp.us

### Details

The Log-Rank is calculated as:

$$LR = (O - E)^2 / E$$

where  $O$  is the observed number of deaths and  $E$  is the expected number based on the patients' characteristics (sex, age and entry date in the study). It follows a Khi-2 distribution with one degree of freedom, which allows to compute its p-value.

### Value

A list containing the observed number of deaths, the expected number of deaths, the Log-Rank statistic and its p-value

### Author(s)

Hugo Varet

### References

R. Peto and J. Peto, Asymptotically Efficient Rank Invariant Test Procedures, Journal of the Royal Statistical Society, 1972

### Examples

```
attach(data.example)
LR(futime, status, age, sex, entry_date)
```

---

SMR	<i>Standardized Mortality Ratio (SMR)</i>
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---

### Description

Computes the SMR, its confidence interval and its associated p-value

### Usage

```
SMR(
  futime,
  status,
  age,
  sex,
  entry_date,
  ratetable = survexp.fr::survexp.fr,
  alpha = 0.05
)
```

### Arguments

futime	follow-up time of the subjects in days
status	0 if censored or 1 if dead at futime
age	age in days
sex	"male" or "female"
entry_date	entry date in the study
ratetable	a table of event rates, such as survexp.fr or survexp.us
alpha	determines the confidence level (1-alpha) of the confidence interval

### Details

The SMR is estimated using two different methods.

The classic method is:

$$SMR = O/E$$

where  $O$  is the observed number of deaths and  $E$  is the expected number based on the patients' characteristics (sex, age and entry date in the study).

The SMR is also estimated performing a Poisson model where  $O$  is the dependant variable and  $E$  is an offset.

### Value

A list containing the observed number of deaths, the expected number of deaths, the "classic" SMR (with its confidence interval and its p-value) and the SMR calculated by a Poisson model (with its confidence interval and its p-value)

**Author(s)**

Jean-Philippe Jais and Hugo Varet

**References**

N. Breslow and N. Day, Statistical methods in cancer research, Volume II - The design and analysis of cohort studies, World Health Organization, 1987

**Examples**

```
attach(data.example)
SMR(futime, status, age, sex, entry_date)
```

---

survexp.fr

*French data for the expected survival and person years functions*

---

**Description**

French data for the expected survival and person years functions

**Details**

Death rates are available from 1977 to 2022 for males and females aged from 0 to 99

**Source**

[https://www.ined.fr/fichier/s\\_rubrique/193/fr\\_t68\\_2022.fr.xlsx](https://www.ined.fr/fichier/s_rubrique/193/fr_t68_2022.fr.xlsx)

**References**

Institut national d'études démographiques

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survexp\_plot

*Observed Kaplan-Meier, expected and relative survival curves*

---

**Description**

Displays the observed Kaplan-Meier, expected and relative survival curves

**Usage**

```

survexp_plot(
  futime,
  status,
  age,
  sex,
  entry_date,
  ratetable = survexp.fr::survexp.fr,
  main = "Observed and expected survival",
  xlab = "Time (years)",
  ylab = "Survival",
  col.km = "black",
  lwd.km = 2,
  lty.km = 1,
  conf.int.km = TRUE,
  col.exp = "blue",
  lwd.exp = 2,
  lty.exp = 1,
  main.rel = "Relative survival",
  ylab.rel = "Relative survival",
  col.rel = "black",
  lwd.rel = 2,
  lty.rel = 1,
  times = seq(0, max(futime, na.rm = TRUE)/365.241, length = 6)[-1],
  alpha = 0.05,
  xscale = 365.241,
  ...
)

```

**Arguments**

<code>futime</code>	follow-up time of the subjects in days
<code>status</code>	0 if censored or 1 if dead at <code>futime</code>
<code>age</code>	age in days
<code>sex</code>	"male" or "female"
<code>entry_date</code>	entry date in the study
<code>ratetable</code>	a table of event rates, such as <code>survexp.fr</code> or <code>survexp.us</code>
<code>main</code>	main title of the Kaplan-Meier and expected survivals plot
<code>xlab</code>	x-label of the plot
<code>ylab</code>	y-label of the plot
<code>col.km</code>	color of the observed survival curve
<code>lwd.km</code>	line width of the observed survival curve
<code>lty.km</code>	line type of the observed survival curve
<code>conf.int.km</code>	TRUE to display the confidence interval of the observed survival

<code>col.exp</code>	color of the expected survival curve
<code>lwd.exp</code>	line width of the expected survival curve
<code>lty.exp</code>	line type of the expected survival curve
<code>main.rel</code>	main title of the relative survival plot
<code>ylab.rel</code>	y-label of the relative survival plot
<code>col.rel</code>	color of the relative survival curve
<code>lwd.rel</code>	line width of the relative survival curve
<code>lty.rel</code>	line type of the relative survival curve
<code>times</code>	times to draw the confidence intervals of the relative survival
<code>alpha</code>	determines the confidence level (1-alpha) of the confidence intervals for the relative survival
<code>xscale</code>	see the <code>xscale</code> argument in <a href="#">plot.survfit</a>
<code>...</code>	other arguments to be passed in <a href="#">plot.survfit</a>

### Details

This function displays the observed and expected survivals, and the relative survival which is defined as:

$$r(t) = \exp(-\exp(\beta) \times t)$$

where  $\exp(\beta)$  is the excess risk by time unit estimated by an additive Poisson model.

### Value

A matrix containing the values of relative survivals and their confidence intervals for each time of `times`

### Author(s)

Hugo Varet

### References

M. Pohar and J. Stare, Making relative survival analysis relatively easy, *Computers in Biology and Medicine*, 2007

M. Pohar and J. Stare, Relative survival analysis in R, *Computers Methods and Programs in Biomedicine*, 2006

### Examples

```
attach(data.example)
survexp_plot(futime, status, age, sex, entry_date)
```



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