Package ‘LARisk’

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Type Package

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| incid2010 | Cancer incidence table of Korea 2010 |

Description

A dataset containing the crude incidence rate of death by age, cancer site and gender.

Usage

incid2010

Format

A data frame with 1919 rows and 4 variables:

- Site  cancer site
- Age  age
- Rate_m  crude incidence rate for male
- Rate_f  crude incidence rate for female

Source

A dataset containing the crude incidence rate of death by age, cancer site and gender.

Usage

incid2018

The dataset contains the following variables:

- **Site**: cancer site
- **Age**: age
- **Rate_m**: crude incidence rate for male
- **Rate_f**: crude incidence rate for female

Source

KOSIS(Ministry of Health and Welfare, Cancer Registration Statistics) [https://kosis.kr/](https://kosis.kr/)

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LAR

*Estimate Lifetime Attributable Risk for one person*

Usage

LAR(
  data,
  basedata,
  sim = 300,
  seed = 99,
  current = as.numeric(substr(Sys.Date(), 1, 4)),
  ci = 0.9,
  weight = NULL,
  DDREF = TRUE,
  basepy = 1e+05
)

Description

LAR is used to estimate lifetime attributable radiation-related cancer risk for data with one person.
Arguments

data frame containing demographic information and exposure information. See 'Details'.

basetable a list of the data of lifetime table and incidence rate table. The first element is lifetime table and the second is incidence rate table.

sim number of iteration of simulation.

seed a random seed number.

current a current year. default is year of the system time.

ci confidence level of the confidence interval.

weight a list containing the value between 0 and 1 which is a weight on ERR model. See 'Details'.

DDREF logical. Whether to apply the dose and dose-rate effectiveness factor.

basepy number of base person-years

Details

The maximum age in LAR is set as 100. If the data contains birth which makes attained age (=current - birth) exceed 100, the result has no useful value.

data should include information which includes gender, year of birth, year of exposure, sites where exposed, exposure rate, distribution of dose and dose parameters of exosed radiation. The name of each variables must be sex, birth, exposure, site, exposure_rate, dosedist, dose1, dose2, dose3.

For some variables, there is a fixed format. sex can have the component 'male' or 'female'. site can have the component 'stomach', 'colon', 'liver', 'lung', 'breast', 'ovary', 'uterus', 'prostate', 'bladder', 'brain/cns', 'thyroid', 'remainder', 'oral', 'oesophagus', 'rectum', 'gallbladder', 'pancreas', 'kidney', 'leukemia'. exposure_rate can have the component 'acute' or 'chronic'. dosedist can have the component 'fixedvalue', 'lognormal', 'normal', 'triangular', 'logtriangular', 'uniform', 'loguniform'.

dose1, dose2, dose3 are parameters of dose distribution. The parameters for each distribution are that:

fixedvalue dose value (dose1)

lognormal median (dose1), geometric standard deviation (dose2)

normal mean (dose1), standard deviation (dose2)

triangular or logtriangular minimum (dose1), mode (dose2), maximum (dose3)

uniform or loguniform minimum (dose1), maximum (dose2)

weight

Value

LAR returns an object of "LAR" class.

An object of class "LAR" is a list containing the following components:

LAR Lifetime attributable risk (LAR) from the time of exposure to the end of the expected lifetime.
F_LAR  Future attributable risk from current to the expected lifetime.
LBR   Lifetime baseline risk.
BFR   Baseline future risk.
LFR   Lifetime fractional risk.
TFR   Total future risk.
ci    Current year.

ci    Confidence level.
info  Information of the person.

References


See Also

LAR_batch, LAR_group

Examples

```r
## example with lifetime and incidence rate table in 2010 Korea.
organ2 <- split(organ, organ$ID)[[1]]  ## data of one person.

## default
lar1 <- LAR(organ2, basedata = list(life2010, incid2010))
summary(lar1)

## change the weight for ERR and EAR models
weight_list <- list("rectum" = 0.5)
lar2 <- LAR(organ2, basedata = list(life2010, incid2010), weight = weight_list)
summary(lar2)

## change the DDREF option (DDREF=FALSE)
lar3 <- LAR(organ2, basedata = list(life2010, incid2010), DDREF = FALSE)
summary(lar3)
```
LAR_batch

Estimate Lifetime Attributable Risk for several people

Description

LAR_batch is used to estimate lifetime attributable radiation-related cancer risk for data with several people.

Usage

LAR_batch(
  data,  
  pid,   
  basedata,  
  sim = 300,  
  seed = 99,  
  current = as.numeric(substr(Sys.Date(), 1, 4)),  
  ci = 0.9,  
  weight = NULL,  
  DDREF = TRUE,  
  basepy = 1e+05
)

Arguments

data          data frame containing demographic information and exposure information. See 'Details'.

pid           a vector which distinguish each person.

basedata      a list of the data of lifetime table and incidence rate table. The first element is lifetime table and the second is incidence rate table.

sim           number of iteration of simulation.

seed          a random seed number.

current       a current year. default is year of the system time.

weight        a list containing the value between 0 and 1 which is a weight on ERR model. See 'Details'.

DDREF         logical. Whether to apply the dose and dose-rate effectiveness factor.

basepy        number of base person-years

Value

LAR_batch returns an object of multiple classes "LAR_batch", "LAR". An object of class LAR_batch is a list of LAR class objects which names of elements are ID of each person.
References


See Also

LAR, LAR_group

Examples

```r
## example with lifetime and incidence rate table in 2010 Korea.
lar1 <- LAR_batch(nuclear, pid=nuclear$ID, basedata = list(life2010, incid2010))
summary(lar1)
```

<table>
<thead>
<tr>
<th>LAR_group</th>
<th>Average Estimated Lifetime Attributable Risk by Group</th>
</tr>
</thead>
</table>

Description

LAR_group is used to estimate lifetime attributable radiation-related cancer risk by group.

Usage

```r
LAR_group(
  data,
  pid,
  group,
  basedata,
  sim = 300,
  seed = 99,
  current = as.numeric(substr(Sys.Date(), 1, 4)),
  ci = 0.9,
  weight = NULL,
  DDREF = TRUE,
  basepy = 1e+05
)
```
Arguments

data       data frame containing demographic information and exposure information. See 'Details'.
pid       a vector which distinguish each person.
group       a vector or list of vectors which distinguish each group.
basedata       a list of the data of lifetime table and incidence rate table. The first element is lifetime table and the second is incidence rate table.
sim       number of iteration of simulation.
seed       a random seed number.
current       a current year. default is year of the system time.
ck       confidence level of the confidence interval.
weight       a list containing the value between 0 and 1 which is a weight on ERR model. See 'Details'.
DDREF       logical. Whether to apply the dose and dose-rate effectiveness factor.
basepy       number of base person-years

Value

LAR_group returns an object of multiple classes "LAR_group". "LAR". An object of class LAR_group is a list of LAR class objects which names of elements are group of each groups.

References


Examples

```r
## example with lifetime and incidence rate table in 2010 Korea.
lar1 <- LAR_group(nuclear, pid=nuclear$ID, group=nuclear$distance, 
       basedata = list(life2010, incid2010))
summary(lar1)

lar2 <- LAR_group(nuclear, pid=nuclear$ID, group=list(nuclear$sex, nuclear$distance), 
       basedata = list(life2010, incid2010))
summary(lar2)
```
life2010  
*Lifetime table of Korea 2010*

**Description**

A dataset containing the probability of death by age and gender.

**Usage**

life2010

**Format**

A data frame with 101 rows and 3 variables:

- **Age**  
- **Prob_d_m**  probability of death for male  
- **Prob_d_f**  probability of death for female

**Source**

KOSIS(Statistics Korea, Life Tables By Province) [https://kosis.kr/](https://kosis.kr/)

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life2018  
*Lifetime table of Korea 2018*

**Description**

A dataset containing the probability of death by age and gender.

**Usage**

life2018

**Format**

A data frame with 101 rows and 3 variables:

- **Age**  
- **Prob_d_m**  probability of death for male  
- **Prob_d_f**  probability of death for female

**Source**

KOSIS(Statistics Korea, Life Tables By Province) [https://kosis.kr/](https://kosis.kr/)
**nuclear**

*Simulated data of organ radiation exposure dose*

**Description**

*nuclear* is simulated dataset for acute exposure event. The scenario assumes that the people exposure the radiation at 2011.

**Usage**

*nuclear*

**Format**

A data frame with 100 observation of 11 variables:

- **ID**: person ID.
- **sex**: gender
- **birth**: birth-year
- **exposure**: exposed year to radiation
- **site**: organ where exposed to radiation
- **exposure_rate**: exposure rate
- **dosedist**: distribution of dose
- **dose1**: dose parameter
- **dose2**: dose parameter
- **dose3**: dose parameter
- **distance**: distance from the hyper

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**organ**

*Simulated data of organ radiation exposure dose*

**Description**

*organ* is simulated dataset from the data of workers at interventional radiology departments.

**Usage**

*organ*
Format

A data frame with 971 observation of 11 variables:

ID  person ID.
sex  gender
birth birth-year
exposure exposed year to radiation
site  organ where exposed to radiation
exposure_rate exposure rate
dosedist  distribution of dose
dose1  dose parameter
dose2  dose parameter
dose3  dose parameter
occup  occupation

References


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**print.LAR**

*Print estimated Lifetime Attributable Risk for one person*

**Description**

`print.LAR` is the basic function for printing class "LAR".

**Usage**

```r
## S3 method for class 'LAR'
print(x, digits = 4, ...)

## S3 method for class 'LAR_batch'
print(x, digits = 4, max.id = 50, ...)

## S3 method for class 'LAR_group'
print(x, digits = 4, max.id = 50, ...)
```

**Arguments**

- `x` : 'LAR', 'LAR_batch' or 'LAR_group' object.
- `digits` : the number of decimal points to print.
- `...` : further arguments to be passed from or to other methods.
- `max.id` : the number of maximum of printing LAR results.
**summary.LAR**

*Summarize estimated Lifetime Attributable Risk for one person*

**Description**

`summary.LAR` is the function for printing class "LAR".

**Usage**

```r
## S3 method for class 'LAR'
summary(object, digits = 4, ...)  
## S3 method for class 'LAR_batch'
summary(object, digits = 4, max.id = 50, ...)  
## S3 method for class 'LAR_group'
summary(object, digits = 4, max.id = 50, ...)  
```

**Arguments**

- `object`: object of class 'LAR_batch' or LAR'.
- `digits`: the number of decimal points to print.
- `...`: further arguments to be passed from or to other methods.
- `max.id`: the number of maximum of printing LAR results.

**write_LAR**

*Write a LAR object*

**Description**

Write 'LAR' object to CSV file

**Usage**

```r
write_LAR(x, filename)  
## S3 method for class 'LAR'
write_LAR(x, filename)  
## S3 method for class 'LAR_batch'
write_LAR(x, filename)  
## S3 method for class 'LAR_group'
write_LAR(x, filename)  
```
write_LAR

Arguments

x       a `LAR` object.
filename a string naming the file to save (.csv file)

Methods (by class)

- LAR: write an `LAR` class object
- LAR_batch: write an `LAR_batch` class object
- LAR_group: write an `LAR_group` class object
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