Package: zscorer (via r-universe)

November 2, 2024

Type Package

Title Child Anthropometry z-Score Calculator

Version 0.3.1.9000

Description A tool for calculating z-scores and centiles for
weight-for-age, length/height-for-age,
weight-for-length/height, BMI-for-age, head
circumference-for-age, age circumference-for-age, subscapular
skinfold-for-age, triceps skinfold-for-age based on the WHO
Child Growth Standards.

Depends R (>= 2.10)

Imports shiny

Suggests testthat, knitr, rmarkdown, shinythemes, covr, spelling

License AGPL-3

Encoding UTF-8

LazyData true

Language en-GB

RoxygenNote 7.1.1

Roxygen list(markdown = TRUE)

URL https://nutriverse/zscorer/, https://github.com/nutriverse/zscorer

BugReports https://github.com/nutriverse/zscorer/issues

VignetteBuilder knitr

Repository https://nutriverse.r-universe.dev

RemoteUrl https://github.com/nutriverse/zscorer

RemoteRef HEAD

RemoteSha c9ae0c96a7b3aaf9679fab029eb13ad615e66af7

1

Contents

---

anthro1   *Anthropometric data from a SMART survey in Kabul, Afghanistan.*

Description

Anthropometric data from a SMART survey in Kabul, Afghanistan.

Usage

    anthro1

Format

A data frame with 873 observations and 11 variables

Variable	Description
psu	Primary sampling unit
age	Age of child (months)
sex	Gender of child
weight	Weight of child (kgs)
height	Height of child (cm)
muac	Mid-upper arm circumference (mm)
oedema	Presence or absence of oedema
haz	Height-for-age z-score
waz	Weight-for-age z-score
whz	Weight-for-height z-score
flag	Data quality flag

Examples

```
head(anthro1)
```

---

anthro2	*Anthropometric data from a single state from a Demographic and Health Survey (DHS) of a West African country.*

Description

Anthropometric data from a single state from a Demographic and Health Survey (DHS) of a West African country.

Usage

```
anthro2
```

Format

A data frame with 796 observations and 6 variables

Variable	Definition
psu	Primary sampling unit
age	Age (months)
sex	Gender
wt	Weight (kg)
ht	Height (cm)
oedema	Presence or absence of oedema

Examples

```
head(anthro2)
```

---

anthro3	*Anthropometric data from a Rapid Assessment Method (RAM) survey from Burundi.*

Description

Anthropometric data from a Rapid Assessment Method (RAM) survey from Burundi.

Usage

```
anthro3
```

Format

A data frame with 221 observations and 7 variables

Variable	Definition
psu	Primary sampling unit
age	Age (months)
sex	Gender
weight	Weight (kg)
height	Height (cm)
muac	Mid-upper arm circumference (cm)
oedema	Presence or absence of oedema

Examples

```
head(anthro3)
```

---

anthro4	*A subset of mid-upper arm circumference data from study conducted to create MUAC-for-age z-scores*

Description

A subset of mid-upper arm circumference data from study conducted to create MUAC-for-age z-scores

Usage

```
anthro4
```

Format

A data.frame with 257 observations and 4 variables

Variable	Definition
pk_serial	Unique identifier
muac	Mid-upper arm circumference in centimetres
agemons	Age in months
sex	Sex; 1 = Male; 2 = Female

Source

Mramba Lazarus, Ngari Moses, Mwangome Martha, Muchai Lilian, Bauni Evasius, Walker A Sarah et al. A growth reference for mid upper arm circumference for age among school age children and adolescents, and validation for mortality: growth curve construction and longitudinal cohort study BMJ 2017; 358 :j3423 https://doi.org/10.1136/bmj.j3423

Examples

```
head(anthro4)
```

---

getAllWGS	*Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a single child data.*

Description

Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a single child data.

Usage

```
getAllWGS(data = NULL, sex, weight, height, age, index)
```

Arguments

data	Data frame containing corresponding data on `sex`, `weight`, `height`, and age of children. Default is NULL. If specified, parameters for `sex`, `weight`, `height` and age should be provided as character values of the names of variables in `data` corresponding to the parameters required.
sex	Either numeric values (1 = male; 2 = female) indicating sex of child (default) or character value (if `data` is specified) indicating variable name in `data` containing information on sex of child/children (1 = male; 2 = female).
weight	Either numeric values for weight in kg with at least 1 decimal place (default) or character value (if `data` is specified) indicating variable name in `data` containing information on weight of child/children.
height	Either numeric values for height in cm with at least 1 decimal place (default) or character value (if `data` is specified) indicating variable name in `data` containing information on height of child/children.
age	Either numeric values for age in whole months (default) or character value (if `data` is specified) indicating variable name in `data` containing information on age of child/children.
index	One of *"wfh"*, *"hfa"*, *"wfa"* (specifies the required index) or *"all"* to calculate all three indices

Value

Either a single numeric value for z-score of the anthropometric index selected if data is for single child or a data frame of numeric values for z-scores of each anthropometric index if data is for multiple children and more than one anthropometric index selected.

The function fails messily when `secondPart` is outside of the range given in the WGS reference (i.e. 45 to 120 cm for height and 0 to 60 months for age). It is up to you to check the ranges of your data.

The reference data for W/H assumes supine length is used for children with a standing height below 85cm

Heights should be specified in cm to the nearest mm (i.e. to 1 d.p.)

Ages should be specified in whole months

Weights should be specified in kg to available precision

The function requires reference data wgsData included in this package

Examples

```
# apply getAllWGS to a make believe 52 month old male child with weight of
# 14.6 kg and height of 98.0 cm
waz <- getAllWGS(sex = 1,         # 1 = Male / 2 = Female
                 weight = 14.6,   # Weight in kilograms
                 height = 98,     # Height in centimetres
                 age = 52,        # Age in whole months
                 index = "wfa")   # Anthropometric index (weight-for-age)
waz

haz <- getAllWGS(sex = 1,
                 weight = 14.6,
                 height = 98,     # Height in centimetres
                 age = 52,
                 index = "hfa")   # Anthropometric index (height-for-age)
haz

whz <- getAllWGS(sex = 1,
                 weight = 14.6,
                 height = 98,
                 age = 52,
                 index = "wfh")   # Anthropometric index (weight-for-height)
whz

# apply getAllWGS to anthro1 dataset
waz <- getAllWGS(data = anthro1,
                 sex = "sex",
                 weight = "weight",
                 height = "height",
                 age = "age",
                 index = "wfa")
waz

haz <- getAllWGS(sex = anthro1$sex,
                 weight = anthro1$weight,
                 height = anthro1$height,
                 age = anthro1$age,
                 index = "hfa")
haz

all <- getAllWGS(data = anthro1,
                 sex = "sex",
                 weight = "weight",
```

```
                          height = "height",
                          age = "age",
                          index = "all")
        all
```

---

getCDC   *Calculate CDC Growth Reference z-score for given anthropometric*
                          measurement/s.

Description

The first function, [getCDC()](), is usually called by the [addCDC()]() function but could be used as a
stand-alone calculator for getting z-score for a given anthropometric measurement.

Usage

```
getCDC(sex, firstPart, secondPart, thirdPart = NA, index = NA, standing = NA)

addCDC(
  data,
  sex,
  firstPart,
  secondPart,
  thirdPart = NA,
  index = NA,
  standing = NULL,
  output = paste(index, "z", sep = ""),
  digits = 2
)
```

Arguments

sex
:   A vector specifying the sex of the subject or a character value for the name of
    the variable in data specifying the sex of the subject. This must be coded as 1 =
    male and 2 = female. Give a quoted variable name as in (e.g.) "sex".

firstPart
:   A vector or a character value for the name of the variable in data specifying:

    - Weight (kg) for BMI/A, W/A, W/H, or W/L
    - Head circumference (cm) for HC/A
    - Height (cm) for BMI/A for H/A
    - Length (cm) for L/A

    If name of variable in data, give a quoted variable name as in (e.g.) "weight".
    Be careful with units (weight in kg; height, length, head circumference in cm).

secondPart
:   A vector or a character value for the name of variable in data specifying:

    - Age (days) for H/A, HC/A, or L/A

- Height (cm) BMI/A or W/H
- Length (cm) for W/L

If name of variable in `data`, give a quoted variable name as in (e.g.) `"age"`. Be careful with units (age in months; height and length in cm).

thirdPart   A vector or a character value for the name of variable in `data` specifying age (in months) for BMI/A. If name of variable in `data`, give a quoted variable name as in (e.g.) `"age"`. Be careful with units (age in months).

index   The index to be calculated. One of:

Index	Definition
bfa	BMI for age
hca	Head circumference for age
hfa	Height for age
lfa	Length for age
wfa	Weight for age
wfh	Weight for height
wfl	Weight for length

Give a quoted index name as in (e.g.) `"wfh"`.

standing   A vector or a character value for name of variable in `data` specifying how stature was measured. If NULL then age (for `"hfa"` or `"lfa"`) or height rules (for `"wfh"` or `"wfl"`) will be applied. This must be coded as 1 = Standing; 2 = Supine; 3 = Unknown. All other values will be recoded to 3 = Unknown. If name of variable in `data`, give a quoted variable name as in (e.g.) `"measured"` or a single value (e.g. `"measured = 1"`). If no value (or NULL) is specified then age rules will be applied.

data   A survey dataset as a data.frame object

output   The name of the column containing the specified index to be added to the dataset. This is an optional parameter. If you do not specify a value for output then the added column will take the name of the specified index with a `"z"` appended.

digits   The number of decimal places for `output`. Defaults to 2 d.p.

Details

[addCDC()](#) adds the CDC Growth Reference z-scores to a data frame of anthropometric data for weight, height or length, head circumference, and body mass index (BMI)

Value

A data.frame of the survey dataset with the calculated z-scores added.

Examples

```
# Given a male child 10 months old with a weight of 5.7 kgs, height of 64.2
# cms, and MUAC of 125 mm:
#
```

```
# Calculate weight-for-height
getCDC(sex = 1,
       firstPart = 5.7,
       secondPart = 64.2,
       index = "wfh",
       standing = 3)

# calculate weight-for-age
getCDC(sex = 1,
       firstPart = 5.7,
       secondPart = 10,
       index = "wfa",
       standing = 3)

# calculate height-for-age
getCDC(sex = 1,
       firstPart = 64.2,
       secondPart = 10,
       index = "hfa",
       standing = 3)

# Calculate weight-for-height (wfh) for the anthro3 dataset
addCDC(data = anthro3,
       sex = "sex",
       firstPart = "weight",
       secondPart = "height",
       index = "wfh")

# Calculate weight-for-age (wfa) for the anthro3 dataset
addCDC(data = anthro3,
       sex = "sex",
       firstPart = "weight",
       secondPart = "age",
       index = "wfa")

# Calculate height-for-age (hfa) for the anthro3 dataset
addCDC(data = anthro3,
       sex = "sex",
       firstPart = "height",
       secondPart = "age",
       index = "hfa")
```

---

getCohortWGS   *Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a cohort or sample of children.*

Description

Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a cohort or sample of children.

Usage

```
getCohortWGS(data, sexObserved, firstPart, secondPart, index)
```

Arguments

data	Data frame containing the variables needed for calculation
sexObserved	Sex of child (1 = Male; 2 = Female)
firstPart	Weight (kg; for WHZ and WAZ) or height (cm; for HAZ)
secondPart	Age (months; for HAZ and WAZ) or height (cm; for WHZ)
index	One of "wfh", "hfa", "wfa" (specifies the required index)

Value

Numeric vector of z-scores of the anthropometric index selected

The function fails messily when secondPart is outside of the range given in the WGS reference (i.e. 45 to 120 cm for height and 0 to 60 months for age). It is up to you to check the ranges of your data.

The reference data for W/H assumes supine length is used for children with a standing height below 85cm

Heights should be specified in cm to the nearest mm (i.e. to 1 d.p.)

Ages should be specified in whole months

Weights should be specified in kg to available precision

The function requires reference data wgsData included in this package

Examples

```
# apply getWGS to first child in sample data anthro1
wazAll <- getCohortWGS(data = anthro1,
                       sexObserved = "sex",
                       firstPart = "weight",
                       secondPart = "age",
                       index = "wfa")
wazAll

hazAll <- getCohortWGS(data = anthro1,
                       sexObserved = "sex",
                       firstPart = "height",
                       secondPart = "age",
                       index = "hfa")
hazAll

whzAll <- getCohortWGS(data = anthro1,
                       sexObserved = "sex",
                       firstPart = "weight",
                       secondPart = "height",
                       index = "wfh")
whzAll
```

---

getWGS	*Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a single child data.*

Description

Calculate z-scores for WHZ, HAZ, WAZ using the WHO Growth Reference (2006) for a single child data.

Usage

```
getWGS(sexObserved, firstPart, secondPart, index)
```

Arguments

sexObserved	Sex of child (1 = Male; 2 = Female)
firstPart	Weight (in kg for WHZ and WAZ) or height (in cm for HAZ)
secondPart	Age (in months for HAZ and WAZ) or height (in cm for WHZ)
index	One of "wfh", "hfa", "wfa" (specifies the required index)

Value

z-score of the anthropometric index selected

Warning

The function fails messily when secondPart is outside of the range given in the WGS reference (i.e. 45 to 120 cm for height and 0 to 60 months for age). It is up to you to check the ranges of your data.

Reminders

The reference data for W/H assumes supine length is used for children with a standing height below 85cm

Heights should be specified in cm to the nearest mm (i.e. to 1 d.p.)

Ages should be specified in whole months

Weights should be specified in kg to available precision

The function requires reference data wgsData included in this package

Note

This is a legacy function from the first CRAN release of zscorer which focused mainly on the calculation of z-scores for weight-for-age, weight-for-height and height-for-age. This function has been kept in the package to ensure that existing analysis workflows implemented using the function continue to work.

Examples

```
# apply \code{getWGS()} to a make believe 52 month old male child with
# weight of 14.6 kg and height of 98.0 cm
waz <- getWGS(sexObserved = 1,      # 1 = Male / 2 = Female
              firstPart = 14.6,     # Weight in kilograms
              secondPart = 52,      # Age in whole months
              index = "wfa")        # Anthropometric index (weight-for-age)
waz

haz <- getWGS(sexObserved = 1,
              firstPart = 98,       # Height in centimetres
              secondPart = 52,
              index = "hfa")        # Anthropometric index (height-for-age)
haz

whz <- getWGS(sexObserved = 1,
              firstPart = 14.6,
              secondPart = 98,
              index = "wfh")        # Anthropometric index (weight-for-height)
whz
```

---

getWGSR	*Calculate WHO Growth Reference z-score for given anthropometric measurement/s.*

Description

The first function, getWGSR(), is usually called by the addWGSR() function but could be used as a stand-alone calculator for getting z-score for a given anthropometric measurement.

Usage

```
getWGSR(sex, firstPart, secondPart, thirdPart = NA, index = NA, standing = NA)

addWGSR(
  data,
  sex,
  firstPart,
  secondPart,
  thirdPart = NA,
  index = NA,
  standing = NULL,
  output = paste(index, "z", sep = ""),
  digits = 2
)
```

Arguments

sex	Name of variable specifying the sex of the subject. This must be coded as 1 = male and 2 = female. Give a quoted variable name as in (e.g.) ″sex″.
firstPart	Name of variable specifying:

- Weight (kg) for BMI/A, W/A, W/H, or W/L
- Head circumference (cm) for HC/A
- Height (cm) for BMI/A for H/A
- Length (cm) for L/A
- MUAC (cm) for MUAC/A
- Sub-scapular skinfold (mm) for SSF/A
- Triceps skinfold (mm) for TSF/A

Give a quoted variable name as in (e.g.) ″weight″. Be careful with units (weight in kg; height, length, head circumference, and MUAC in cm, skinfolds in mm).

secondPart	Name of variable specifying:

- Age (days) for H/A, HC/A, L/A, MUAC/A, SSF/A, or TSF/A
- Height (cm) BMI/A or W/H
- Length (cm) for W/L

Give a quoted variable name as in (e.g.) ″age″. Be careful with units (age in days; height and length in cm).

thirdPart	Name of variable specifying age (in days) for BMI/A. Give a quoted variable name as in (e.g.) ″age″. Be careful with units (age in days).
index	The index to be calculated and added to data. One of:

Index	Definition
bfa	BMI for age
hca	Head circumference for age
hfa	Height for age
lfa	Length for age
mfa	MUAC for age
ssa	Sub-scapular skinfold for age
tsa	Triceps skinfold for age
wfa	Weight for age
wfh	Weight for height
wfl	Weight for length

Give a quoted index name as in (e.g.) ″wfh″.

standing	Variable specifying how stature was measured. If NULL then age (for ″hfa″ or ″lfa″) or height rules (for ″wfh″ or ″wfl″) will be applied. This must be coded as 1 = Standing; 2 = Supine; 3 = Unknown. All other values will be recoded to 3 = Unknown. Give a quoted variable name as in (e.g.) ″measured″ or a single value (e.g. ″measured = 1″). If no value (or NULL) is specified then height and age rules will be applied.
data	A survey dataset as a data.frame object

output   The name of the column containing the specified index to be added to the dataset.
                This is an optional parameter. If you do not specify a value for output then the
                added column will take the name of the specified index with a "z" appended.

digits   The number of decimal places for output. Defaults to 2 d.p.

Details

addWGSR() adds the WHO Growth Reference z-scores to a data frame of anthropometric data for
weight, height or length, MUAC, head circumference, sub-scapular skinfold, triceps skinfold, and
body mass index (BMI).

Value

A data.frame of the survey dataset with the calculated z-scores added.

Examples

```
# Given a male child 10 months old with a weight of 5.7 kgs, height of 64.2
# cms, and MUAC of 125 mm:
#
# Calculate weight-for-height
getWGSR(sex = 1,
        firstPart = 5.7,
        secondPart = 64.2,
        index = "wfh",
        standing = 3)


# calculate weight-for-age
getWGSR(sex = 1,
        firstPart = 5.7,
        secondPart = 10,
        index = "wfa",
        standing = 3)


# calculate height-for-age
getWGSR(sex = 1,
        firstPart = 64.2,
        secondPart = 10,
        index = "hfa",
        standing = 3)


# Calculate MUAC-for-age z-score for a girl
getWGSR(sex = 1,
        firstPart = 20,
        secondPart = 62 * (365.25 / 12),
        index = "mfa")


# Calculate weight-for-height (wfh) for the anthro3 dataset
addWGSR(data = anthro3,
        sex = "sex",
        firstPart = "weight",
        secondPart = "height",
```

```
        index = "wfh")

# Calculate weight-for-age (wfa) for the anthro3 dataset
addWGSR(data = anthro3,
        sex = "sex",
        firstPart = "weight",
        secondPart = "age",
        index = "wfa")

# Calculate height-for-age (hfa) for the anthro3 dataset
addWGSR(data = anthro3,
        sex = "sex",
        firstPart = "height",
        secondPart = "age",
        index = "hfa")

# Calculate MUAC-for-age (mfa) for the anthro4 dataset

## Convert age in anthro4 from months to days
testData <- anthro4
testData$age <- testData$agemons * (365.25 / 12)

addWGSR(data = testData,
        sex = "sex",
        firstPart = "muac",
        secondPart = "age",
        index = "mfa")
```

---

nhanes	*A subset of data from the National Health and Nutrition Examination Survey*

Description

A subset of data from the National Health and Nutrition Examination Survey

Usage

```
nhanes
```

Format

A data.frame with 339 observations and 10 variables

Variable	Definition
cid	Unique child identifier
sex	Sex of child. 1 = male; 2 = female
agemos	Age in months

weight	Weight in kilograms
height	Height in centimetres
headcir	Head circumference in centimetres
waz	Weight-for-age z-score
bmiz	BMI-for-age z-score

Examples

```
head(nhanes)
```

---

run_zscorer   *Initialise built-in Shiny application*

Description

Initialise built-in Shiny application

Usage

```
run_zscorer()
```

Examples

```
if(interactive()) run_zscorer()
```

---

wgsData   *World Health Organization (WHO) Growth Reference (2006) data*

Description

World Health Organization (WHO) Growth Reference (2006) data

Usage

```
wgsData
```

Format

A data frame with 6 columns and 2338 rows.

Variable	Description
indicator	One of weight-for-age (waz), height-for-age (haz), or weight-for-height (whz) anthropometric indicators
sex	Sex of child (1 = Male; 2 = Female)
given	Variable to which standardisation is to be made. For waz and haz, given is age in months. For whz, given is heigh
l	L component of the LMS method for normalising growth centile standards. L is the trend in the optimal power to c
m	M component of the LMS method for normalising growth centile standards. M is the trend in the mean
s	S component of the LMS method for normalising growth centile standards. S is the trend in the coefficient of varia

Source

World Health Organization. WHO Child Growth Standards: Length/Height-for-age, Weight-for-age, Weight-for-length, Weight-for-height, and Body Mass Index-for age: Methods and Development. 1st ed. World Health Organization; 2006.

Examples

```
head(wgsData)
```

---

zscorer-deprecated   *Deprecated functions in zscorer*

Description

These functions still work but will be removed (defunct) in the next version.

Details

- getWGS()
- getCohortWGS()
- getAllWGS()

Index