

# Package ‘MUACz’

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**Type** Package

**Title** Generate MUAC z-Scores for School Children Aged 5-19 Years Old

**Version** 1.0.0

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**Description** Generates mid upper arm circumference (MUAC) for age z-scores for children and adolescents aged 5 to 19 years that can be used to assess nutritional and health status and define risk of adverse health events.

The standard growth reference constructed by Mramba et. al (2017) (<doi:10.1136/bmj.j3423>) smoothly join the WHO (2005) standards at age 5 years (<[https://www.who.int/childgrowth/standards/Technical\\_report.pdf](https://www.who.int/childgrowth/standards/Technical_report.pdf)>) and has been validated against mortality risk among children and adolescents in Kenya, Uganda and Zimbabwe.

**License** GPL-3

**Encoding** UTF-8

**LazyData** true

**Depends** R (>= 3.6.0)

**Imports** epiDisplay, ggplot2, dplyr

**SystemRequirements** GNU make

**RoxygenNote** 6.1.1

**NeedsCompilation** no

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**Repository** CRAN

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## R topics documented:

indivmuaczs . . . . .	2
muaczs . . . . .	3
plotref . . . . .	4

<b>Index</b>	<b>6</b>
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indivmuaczs	<i>Generate MUAC z scores for age for single individuals given their age, sex and muac values.</i>
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### Description

Generates MUAC z Scores for an individual subject by entering their age (in months), sex and muac (in cm) directly. This is useful for children and adolescents aged 5 to 19 years to assess their nutritional and health status, and define risk of adverse health events.

### Usage

```
indivmuaczs(age = 60, sex = 1, muac = 10, verbose = FALSE)
```

### Arguments

age	a numeric value (in months) between 60 and 300.
sex	preferably numeric (1 = Male, 2 = Female). Strings can also be used.
muac	a numeric value in cm between 5 and 50.
verbose	Is FALSE by default. If set to TRUE, 'notes' will be printed on the console about the nature, range of variables allowed and number of records processed.

### Value

A DataFrame with MUAC z scores.

### References

Mramba L., Ngari M., Mwangome M., Muchai L., Bauni E., Walker A.S., Gibb D.M., Fegan G. and Berkley J.A. (2017) *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 <doi:10.1136/bmj.j3423> <<https://www.bmj.com/content/358/bmj.j3423>> <[https://www.who.int/childgrowth/standards/Technical\\_report.pdf](https://www.who.int/childgrowth/standards/Technical_report.pdf)> <[https://www.who.int/childgrowth/standards/ac\\_for\\_age/en/](https://www.who.int/childgrowth/standards/ac_for_age/en/)>

### See Also

[muaczs](#) and [plotref](#).

### Examples

```
## Provide values for one individual for age, sex and muac
test1 <- indivmuaczs(age=62, sex=1, muac=20)
test2 <- indivmuaczs(age=65, sex=2, muac=12.5)
test3 <- indivmuaczs(age=70, sex="Female", muac=15.8)
test4 <- indivmuaczs(age=92, sex="Male", muac=5.3)
# test5 <- indivmuaczs(age=92, sex="Male", muac=5.3, verbose=TRUE) # Prints NOTES
```

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muaczs	<i>Generate MUAC z scores for age for children/adolescents in a dataset given their age, sex, and muac values.</i>
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### Description

Generates mid upper arm circumference (MUAC) for age z scores for children and adolescents aged 5 to 19 years that can be used to assess nutritional and health status, and define risk of adverse health events from a given dataset.

### Usage

```
muaczs(Datafm, verbose = FALSE)
```

### Arguments

Datafm	A DataFrame with variables including pid (unique subject identification), age (in months), sex (1, 2 or "Male", "Female"), muac (numeric: in cm).
verbose	Is FALSE by default. If set to TRUE, 'notes' will be printed on the console about the nature, range of variables allowed and number of records processed.

### Value

A DataFrame with MUAC z scores

### References

Mramba L., Ngari M., Mwangome M., Muchai L., Bauni E., Walker A.S., Gibb D.M., Fegan G. and Berkley J.A. (2017) *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 <doi:10.1136/bmj.j3423> <<https://www.bmj.com/content/358/bmj.j3423>> <[https://www.who.int/childgrowth/standards/Technical\\_report.pdf](https://www.who.int/childgrowth/standards/Technical_report.pdf)> <[https://www.who.int/childgrowth/standards/ac\\_for\\_age/en/](https://www.who.int/childgrowth/standards/ac_for_age/en/)>

### See Also

[indivmuaczs](#) and [plotref](#).

### Examples

```
## Example 1: Generate data and calculate muac Z-scores

dat1 <- data.frame(age = c(60,65,90,120,250),
sex = c("Male","Female","Male","Male","Female"),
muac = c(8.7, 13.3, 15.4, 17.8, 25.1))
ans1 <- muaczs(Datafm = dat1)
# ans1 <- muaczs(Datafm = dat1, verbose=TRUE) # Prints NOTES
```

```
## Example 2: Hypothetical longitudinal data with unique patient identification numbers (pid)

dat2 <- data.frame(pid = c(1, 1, 1, 2, 2, 2, 3, 3, 3, 4, 4, 4, 5, 5, 5),
  age = c(60, 72, 84, 70, 84, 96, 90, 102, 114, 100, 112, 124, 200, 212, 224),
  sex = c(1, 1, 1, 2, 2, 2, 1, 1, 1, 2, 2, 2, 2, 2, 2),
  muac= c(10.1, 13.4, 16.9, 15.3, 16.6, 18.1, 13.2, 15.3, 17.5, 15.7, 17.1, 19.8, 14.1, 16.4, 19.4))
ans2 <- muaczs(Datafm = dat2) # saves results in ans2
# ans2[order(ans2$pid),] # sorts the data by pid

## Example 3: Data with single observations

sex <- c(1)
age <- c(190)
muac <- c(15)
data1 <- data.frame(age = age, sex = sex, muac = muac)
ans3 <- muaczs(Datafm = data1)
# ans4 <- muaczs(Datafm = data1, verbose=TRUE) # Prints NOTES
```

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plotref

*Plots individual's z-scores and percentiles on references curves.*

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## Description

Plots individual's z-scores and percentiles on standardized reference curves for children and adolescents aged 5 to 19 years to assess nutritional and health status, and define risk of adverse health events for the given individual.

## Usage

```
plotref(age = 10, sex = 1, muac, graphtype = "z-scores")
```

## Arguments

age	a numeric value (in years) between 5 and 19.
sex	preferably numeric (1 = Male, 2 = Female). Strings can also be used.
muac	a numeric value in cm between 5 and 50.
graphtype	requires the user to specify the type of the reference curves to be plotted. Arguments can be "z-scores" or "percentiles".

## Value

Plots z-scores or percentiles with a mark indicating where the individual person lies within the standardized reference curves.

## References

Mramba L., Ngari M., Mwangome M., Muchai L., Bauni E., Walker A.S., Gibb D.M., Fegan G. and Berkley J.A. (2017) *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 <doi:10.1136/bmj.j3423> <<https://www.bmj.com/content/358/bmj.j3423>> <[https://www.who.int/childgrowth/standards/Technical\\_report.pdf](https://www.who.int/childgrowth/standards/Technical_report.pdf)> <[https://www.who.int/childgrowth/standards/ac\\_for\\_age/en/](https://www.who.int/childgrowth/standards/ac_for_age/en/)>

## See Also

[indivmuaczs](#) and [muaczs](#).

## Examples

```
## Plot individual's z-scores and percentiles on standardized reference curves.  
p1 <- plotref(age=13, sex=1, muac=25) # Boy's Z-score  
p2 <- plotref(age=13, sex=1, muac=25, graphtype="percentiles") # Boy's Percentile  
p3 <- plotref(age=12, sex=2, muac=22) # Girl's Z-score  
p4 <- plotref(age=12, sex=2, muac=22, graphtype="percentiles") # Girl's Percentile
```

# Index

indivmuaczs, [2](#), [3](#), [5](#)

muaczs, [2](#), [3](#), [5](#)

plotref, [2](#), [3](#), [4](#)