

Package ‘eq5d’

April 6, 2020

Type Package

Title Methods for Calculating 'EQ-5D' Utility Index Scores

Version 0.7.0

Description EQ-5D is a popular health related quality of life instrument used in the clinical and economic evaluation of health care. Developed by the EuroQol group <<https://www.euroqol.org>>, the instrument consists of two components: health state description and evaluation. For the description component a subject self-rates their health in terms of five dimensions; mobility, self-care, usual activities, pain/discomfort, and anxiety/depression using either a three-level (EQ-5D-3L, <<https://www.euroqol.org/eq-5d-instruments/eq-5d-3l-about>>) or a five-level (EQ-5D-5L, <<https://www.euroqol.org/eq-5d-instruments/eq-5d-5l-about>>) scale. Frequently the scores on these five dimensions are converted to a single utility index using country specific value sets, which can be used in the clinical and economic evaluation of health care as well as in population health surveys. The eq5d package provides methods to calculate index scores from a subject's dimension scores. 25 TTO and 11 VAS EQ-5D-3L value sets including those for countries in Szende et al (2007) <[doi:10.1007/1-4020-5511-0](https://doi.org/10.1007/1-4020-5511-0)> and Szende et al (2014) <[doi:10.1007/978-94-007-7596-1](https://doi.org/10.1007/978-94-007-7596-1)>, 20 EQ-5D-5L EQ-VT value sets from the EuroQol website, and the EQ-5D-5L crosswalk value sets developed by van Hout et al. (2012) <[doi:10.1016/j.jval.2012.02.008](https://doi.org/10.1016/j.jval.2012.02.008)> are included. Additionally, a shiny web tool is included to enable the calculation, visualisation and automated statistical analysis of EQ-5D index values via a web browser using EQ-5D dimension scores stored in CSV or Excel files.

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Encoding UTF-8

LazyData true

Depends R (>= 3.5.0)

Suggests testthat, shiny, DT, mime, readxl, ggplot2, ggiraph, ggiraphExtra, shinycssloaders, shinyWidgets, FSA, PMCMRplus, knitr, rmarkdown, covr

URL <https://github.com/fragla/eq5d>

BugReports <https://github.com/fragla/eq5d/issues>

RoxygenNote 6.1.1

VignetteBuilder knitr

Language en-GB

NeedsCompilation no

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Repository CRAN

Date/Publication 2020-04-06 09:52:09 UTC

R topics documented:

CW	2
eq5d	3
eq5d3l	4
eq5d5l	5
eq5dcw	5
eq5dds	6
getHealthStates	7
shiny_eq5d	7
splitHealthStates	8
TTO	8
valuesets	10
VAS	10
VT	11
Index	14

CW	<i>EQ-5D-5L Crosswalk data</i>
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Description

Crosswalk index value calculation table to calculate EQ-5D-3L indices from EQ-5D-5L data for Denmark, France, Germany, Japan, Netherlands, Spain, Thailand, UK, USA and Zimbabwe.

Usage

CW

Format

An object of class `data.frame` with 3125 rows and 10 columns.

Source

van Hout B, Janssen MF, et al. Interim scoring for the EQ-5D-5L: Mapping the EQ-5D-5L to EQ-5D-3L value sets. *Value in Health* 2012 Jul-Aug;15(5):708-15. doi: 10.1016/j.jval.2012.02.008. [PubMed](#)

[EQ-5D-5L Crosswalk Index Value Calculator](#)

eq5d	<i>Calculate EQ-5D index scores</i>
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Description

Wrapper for eq5d3l and eq5d5l. Calculate EQ-5D index scores for EQ-5D-3L and EQ-5D-5L. Available value sets can be viewed using the function valuesets.

Usage

```
eq5d(scores, version, type, country, ignore.incomplete, ...)
```

Arguments

scores	numeric or data.frame with names/colnames MO, SC, UA, PD and AD representing Mobility, Self-care, Usual activities, Pain/discomfort and Anxiety/depression. Alternatively an EQ-5D score can be provided in five digit format e.g. 12321.
version	string of value "3L" or "5L" to indicate instrument version.
type	string specifying method type used in deriving value set scores. Options are TTO or VAS for EQ-5D-3L, VT for EQ-5D-5L or CW for EQ-5D-5L crosswalk conversion valuesets.
country	string of value set country name used.
ignore.incomplete	logical to indicate whether to ignore dimension with missing data.
...	character vectors, specifying "dimensions" column names or "five.digit" column name. Defaults are "MO", "SC", "UA", "PD" and "AD" for dimensions and "State" for five.digit.

Value

a numeric vector of utility index scores.

Examples

```
eq5d(scores=c(MO=1,SC=2,UA=3,PD=4,AD=5), type="VT",
      country="Indonesia", version="5L")
eq5d(scores=c(MO=3,SC=2,UA=3,PD=2,AD=3),
      type="TTO", version="3L", country="Germany")

scores.df <- data.frame(
```

```

MO=c(1,2,3,4,5), SC=c(1,5,4,3,2),
UA=c(1,5,2,3,1), PD=c(1,3,4,3,4), AD=c(1,2,NA,2,1)
)
eq5d(scores.df, country="Canada", version="5L", type="VT", ignore.incomplete=TRUE)

eq5d(scores=12321, type="TTO", version="3L", country="UK")

scores.df2 <- data.frame(
  state=c(11111,12121,23232,33333)
)

eq5d(scores=scores.df2, type="TTO", version="3L", country="UK", five.digit="state")

eq5d(scores=scores.df2$state, type="TTO", version="3L", country="UK")

```

eq5d3l

Calculate EQ-5D-3L index scores

Description

Calculate indices for EQ-5D-3L value sets. Available value sets can be viewed using the function `valuesets`.

Usage

```
eq5d3l(scores, type = "TTO", country = "UK")
```

Arguments

<code>scores</code>	numeric with names MO, SC, UA, PD and AD representing Mobility, Self-care, Usual activities, Pain/discomfort and Anxiety/depression.
<code>type</code>	3L values set type. Either TTO or VAS.
<code>country</code>	value set country.

Value

calculated utility index score.

Examples

```

eq5d3l(scores=c(MO=1,SC=2,UA=3,PD=1,AD=3), type="VAS", country="UK")
eq5d3l(scores=c(MO=3,SC=2,UA=3,PD=2,AD=3), type="TTO", country="Germany")

```

eq5d5l	<i>Calculate EQ-5D-5L index scores</i>
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Description

Calculate indices for EQ-5D-5L value sets. Available value sets can be viewed using the function valuesets.

Usage

```
eq5d5l(scores, country = "England")
```

Arguments

scores	numeric with names MO, SC, UA, PD and AD representing Mobility, Self-care, Usual activities, Pain/discomfort and Anxiety/depression.
country	value set country.

Value

calculated utility index score.

Examples

```
eq5d5l(scores=c(MO=1,SC=2,UA=3,PD=4,AD=5), country="England")
eq5d5l(scores=c(MO=3,SC=2,UA=5,PD=2,AD=3), country="Netherlands")
```

eq5dcw	<i>Calculate EQ-5D-5L crosswalk index scores</i>
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Description

Calculate indices for EQ-5D-5L indices by mapping them onto EQ-5D-3L value sets. Available value sets can be viewed using the function valuesets.

Usage

```
eq5dcw(scores, country = "UK")
```

Arguments

scores	numeric with names MO, SC, UA, PD and AD representing Mobility, Self-care, Usual activities, Pain/discomfort and Anxiety/depression.
country	value set country.

Value

calculated utility index score.

Examples

```
eq5dcw(scores=c(M0=1,SC=2,UA=5,PD=1,AD=3), country="UK")
eq5dcw(scores=c(M0=3,SC=5,UA=5,PD=2,AD=3), country="Germany")
```

 eq5dds

Analyse the descriptive system of an EQ-5D dataset

Description

Analyses the descriptive components of an EQ-5D dataset producing summary information either as counts or as percentages.

Usage

```
eq5dds(data, version, counts = FALSE, by = NULL)
```

Arguments

data	data.frame with names MO, SC, UA, PD and AD representing Mobility, Self-care, Usual activities, Pain/discomfort and Anxiety/depression.
version	string of value "3L" or "5L" to indicate instrument version.
counts	logical show absolute counts in the summary table. Default is FALSE, which shows percentages for each EQ-5D dimension.
by	character specifying the column in the data.frame by which to group the results.

Value

a data.frame or list of data.frames of counts/percentages. Columns contain dimensions names and rows the EQ-5D score.

Examples

```
dat <- data.frame(
  matrix(
    sample(1:3,5*12, replace=TRUE),12,5,
    dimnames=list(1:12,c("M0","SC","UA","PD","AD"))
  ),
  Sex=rep(c("Male", "Female"))
)

eq5dds(dat, version="3L")
eq5dds(dat, version="3L", counts=TRUE)
```

```
eq5dds(dat, version="3L", by="Sex")
```

getHealthStates	<i>Get all five digit health state scores</i>
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Description

Get all five digit health state scores for either EQ-5D-3L or EQ-5D-5L.

Usage

```
getHealthStates(version)
```

Arguments

version the EQ-5D version. Either 3L or 5L.

Value

A character vector of five digit health states.

Examples

```
getHealthStates("3L")  
getHealthStates("5L")
```

shiny_eq5d	<i>Launch shiny EQ-5D interface</i>
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Description

shiny_eq5d launches a shiny interface for browser based EQ-5D calculations.

Usage

```
shiny_eq5d(display.mode = "normal")
```

Arguments

display.mode The display mode to be passed to [runApp](#)

Examples

```
shiny_eq5d()  
shiny_eq5d(display.mode="normal")
```

splitHealthStates	<i>Split five digit health states</i>
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Description

Split five digit health states into their individual dimension scores.

Usage

```
splitHealthStates(scores, ignore.invalid = TRUE, version = "5L")
```

Arguments

scores	a vector of five digit scores
ignore.invalid	whether to ignore invalid scores. TRUE returns NA, FALSE throws an error.
version	3L or 5L. Used for validating scores when ignore.invalid is FALSE.

Value

A data.frame of individual dimension scores.

Examples

```
splitHealthStates(c("12345", "54321"), version="5L")
```

TTO	<i>EQ-5D-3L TTO value set data</i>
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Description

Coefficients for the estimation of the EQ-5D-3L index values based on TTO valuation studies for Argentina, Australia, Brazil, Canada, Chile, China, Denmark, France, Germany, Italy, Japan, Netherlands, Poland, Portugal, Singapore, South Korea, Spain, Sri Lanka, Sweden, Taiwan, Thailand, Trinidad and Tobago, UK, USA and Zimbabwe.

Usage

```
TTO
```

Format

An object of class data.frame with 63 rows and 25 columns.

Source

Szende, A., Oppe, M., & de Charro, F. (2007), Comparative review of Time Trade-Off value sets. In Szende, A., Oppe, M., & Devlin, N. (Ed.), *EQ-5D Value Sets: Inventory, Comparative Review and User Guide* (pp. 27-28). Dordrecht, The Netherlands: Springer.

Janssen, B., Szende, A., & Ramos-Goñi JM. (2014), Data and Methods. Szende, A., Janssen, B., & Cabasés, J. (Ed.), In *Self-Reported Population Health: An International Perspective based on EQ-5D* (p 13). Dordrecht, The Netherlands: Springer.

Australia: Viney R, Norman R, King MT, Cronin P, Street DJ, Knox S, Ratcliffe J. Time trade-off derived EQ-5D weights for Australia. *Value Health*. 2011 Sep-Oct;14(6):928-36. doi: 10.1016/j.jval.2011.04.009. [PubMed](#)

Brazil: Viegas Andrade M, Noronha K, Kind P, Maia AC, Miranda de Menezes R, De Barros Reis C, Nepomuceno Souza M, Martins D, Gomes L, Nichele D, Calazans J, Mascarenhas T, Carvalho L, Lins C. Societal Preferences for EQ-5D Health States from a Brazilian Population Survey. *Value in Health Regional Issues* 2013;2(3):405–412. [PubMed](#)

Canada: Bansback N, Tsuchiya A, Brazier J, Anis A. Canadian valuation of EQ-5D health states: preliminary value set and considerations for future valuation studies. *PLoS One*. 2012;7(2):e31115. [PubMed](#)

Chile: Zarate V, Kind P, Valenzuela P, Vignau A, Olivares-Tirado P, Munoz A. Social valuation of EQ-5D health states: the Chilean case. *Value in Health*. 2011 Dec;14(8):1135-41. [PubMed](#)

China: Liu GG, Wu H, Li M, Gao C, Luo N. Chinese time trade-off values for EQ-5D health states. *Value Health*. 2014 Jul;17(5):597-604. doi: 10.1016/j.jval.2014.05.007. Epub 2014 Jul 23. [PubMed](#)

Poland: Golicki D, Jakubczyk M, Niewada M, Wrona W, Busschbach JJ. Valuation of EQ-5D health states in Poland: first TTO-based social value set in Central and Eastern Europe. *Value in Health*. 2010;13(2):289-97. [PubMed](#)

Portugal: Ferreira LN, Ferreira PL, Pereira LN, Oppe M. The valuation of the EQ-5D in Portugal. *Qual Life Res*. 2014 Mar;23(2):413-23. doi: 10.1007/s11136-013-0448-z. Epub 2013 Jun 8. [PubMed](#)

Singapore: Luo N, Wang P, Thumboo J, Lim YW, Vrijhoef HJ. Valuation of EQ-5D-3L health states in Singapore: modeling of time trade-off values for 80 empirically observed health states. *Pharmacoeconomics*. 2014 May;32(5):495-507. doi: 10.1007/s40273-014-0142-1. [PubMed](#)

Sri Lanka: Kularatna S, Whitty JA, Johnson NW, Jayasinghe R, Scuffham PA. Valuing EQ-5D health states for Sri Lanka. *Qual Life Res*. 2015 Jul;24(7):1785-93. doi:10.1007/s11136-014-0906-2. Epub 2014 Dec 28. [PubMed PMID: PubMed](#)

Sweden: Burström K, Sun S, Gerdtham UG, Henriksson M, Johannesson M, Levin LÅ, Zethraeus N. Swedish experience-based value sets for EQ-5D health states. *Qual Life Res*. 2014 Mar;23(2):431-42. doi: 10.1007/s11136-013-0496-4. [PubMed](#)

Taiwan: Lee HY, Hung MC, Hu FC, Chang YY, Hsieh CL, Wang JD. Estimating quality weights for EQ-5D (EuroQol-5 dimensions) health states with the time trade-off method in Taiwan. *J Formos Med Assoc*. 2013;112(11):699-706. [PubMed](#)

Thailand: Tongsir S, Cairns J. Estimating population-based values for EQ-5D health states in Thailand. *Value Health*. 2011 Dec;14(8):1142-5. doi: 10.1016/j.jval.2011.06.005. [PubMed](#)

Trinidad and Tobago: Bailey H, Stolk E, Kind P. Toward Explicit Prioritization for the Caribbean: An EQ-5D Value Set for Trinidad and Tobago. Value Health Reg Issues. 2016 Dec;11:60-67. doi: 10.1016/j.vhri.2016.07.010. [PubMed](#)

valuesets

Get the available EQ-5D value sets.

Description

valuesets returns a data.frame of the available EQ-5D value sets in the eq5d package.

Usage

```
valuesets(type = NULL, version = NULL, country = NULL)
```

Arguments

type	string EQ-5D value set type. TTO or VAS for EQ-5D-3L, VT for EQ-5D-5L or CW for EQ-5D-5L crosswalk conversion dataset.
version	string either 3L or 5L.
country	string one of the countries for which there is a value set.

Value

A data.frame containing the EQ-5D version, value set type and country

Examples

```
valuesets()
valuesets(type="TTO")
valuesets(version="5L")
valuesets(country="UK")
```

VAS

EQ-5D-3L VAS value set data

Description

Coefficients for the estimation of the EQ-5D-3L index values based on VAS valuation studies for Belgium, Denmark, Europe, Finland, Germany, Iran, Malaysia, New Zealand, Slovenia, Spain and UK.

Usage

```
VAS
```

Format

An object of class `data.frame` with 21 rows and 11 columns.

Source

Oppe, M., Szende, A., & de Charro, F. (2007), Comparative review of Visual Analogue Scale value sets. In Szende, A., Oppe, M., & Devlin, N. (Ed.), *EQ-5D Value Sets: Inventory, Comparative Review and User Guide* (pp. 37-38). Dordrecht, The Netherlands: Springer.

Iran: Goudarzi R, Zeraati H, Akbari Sari A, Rashidian A, Mohammad K. Population-Based Preference Weights for the EQ-5D Health States Using the Visual Analogue Scale (VAS) in Iran. *Iran Red Crescent Med J.* 2016 Feb 13;18(2):e21584. doi: 10.5812/ircmj.21584. [PubMed](#)

Malaysia: Yusof FA, Goh A, Azmi S. Estimating an EQ-5D value set for Malaysia using time trade-off and visual analogue scale methods. *Value Health.* 2012 Jan-Feb;15(1 Suppl):S85-90. doi: 10.1016/j.jval.2011.11.024. [PubMed](#)

 VT

EQ-5D-5L VT value set data

Description

EQ-5D-5L VT value set calculation data for Canada, China, England, France, Germany, Hong Kong, Indonesia, Ireland, Japan, Malaysia, Netherlands, Poland, Portugal, South Korea, Spain, Taiwan, Thailand, Uruguay and USA.

Usage

VT

Format

An object of class `data.frame` with 34 rows and 20 columns.

Source

1. **Canada:** Xie F, Pullenayegum E, Gaebel K, Bansback N, Bryan S, Ohinmaa A, Poissant L, Johnson JA. A Time Trade-off-derived Value Set of the EQ-5D-5L for Canada. *Med Care.* 2016;54(1):98-105. [PubMed](#)
2. **China:** Luo N, Liu G, Li M, Guan H, Jin X, Rand-Hendriksen K. Estimating an EQ-5D-5L Value Set for China. *Value in Health.* 2017 Apr;20(4):662-669. doi: 10.1016/j.jval.2016.11.016. Epub 2017 Feb 9. [PubMed](#)
3. **England:** Devlin N, Shah K, Feng Y, Mulhern B, van Hout B. Valuing health-related quality of Life: An EQ-5D-5L Value Set for England. *Health Economics.* 2018 Jan;27(1):1-22 [PubMed](#)
4. **Ethiopia:** Welie AG, Gebretekla GB, Stolk E, Mukuria C, Krahn MD, Enquoselassie F, Fenta TG. Valuing Health State: An EQ-5D-5L Value Set for Ethiopians. *Value Health Reg Issues.* 2019 Nov 1;22:7-14. doi: 10.1016/j.vhri.2019.08.475. [PubMed](#)

5. **France:** Andrade LF, Ludwig K, Goni JMR, Oppe M, de Pouvourville G. A French Value Set for the EQ-5D-5L. *Pharmacoeconomics*. 2020 Jan 8. doi: 10.1007/s40273-019-00876-4. [PubMed](#)
6. **Germany:** Ludwig K, Graf von der Schulenburg JM, Greiner W. German Value Set for the EQ-5D-5L. *Pharmacoeconomics*. 2018 Feb;36(6):663-674. doi: 10.1007/s40273-018-0615-8. [PubMed](#)
7. **HongKong:** Wong ELY, Ramos-Goñi JM, Cheung AWL, Wong AYK, Rivero-Arias O. Assessing the Use of a Feedback Module to Model EQ-5D-5L Health States Values in Hong Kong. *Patient*. 2018 Apr;11(2):235-247. doi: 10.1007/s40271-017-0278-0. [PubMed](#)
8. **Indonesia:** Purba FD, Hunfeld JAM, Iskandarsyah A, Fitriana TS, Sadarjoen SS, Ramos-Goñi JM, Passchier J, Busschbach JJ. The Indonesian EQ-5D-5L Value Set. *Pharmacoeconomics*. 2017 Nov;35(11):1153-1165. doi: 10.1007/s40273-017-0538-9. [PubMed](#)
9. **Ireland:** Hobbins A, Barry L, Kelleher D, Shah K, Devlin N, Ramos Goñi JM, O'Neill C. Utility Values for Health States in Ireland: A Value Set for the EQ-5D-5L. *Pharmacoeconomics*. 2018 Nov;36(11):1345-1353. doi: 10.1007/s40273-018-0690-x. [PubMed](#)
10. **Japan:** Shiroiwa T, Ikeda S, Noto S, Igarashi A, Fukuda T, Saito S, Shimozuma K. Comparison of Value Set Based on DCE and/or TTO Data: Scoring for EQ-5D-5L Health States in Japan. *Value in Health*. 2016 Jul-Aug;19(5):648-54. [PubMed](#)
11. **Malaysia:** Shafie AA; Vasan Thakumar A; Lim CJ; Luo N; Rand-Hendriksen K; Yusof FA. EQ-5D-5L Valuation for the Malaysian Population. *Pharmacoeconomics*. 2019 May;37(5):715-725. doi: 10.1007/s40273-018-0758-7. [PubMed](#)
12. **Netherlands** Versteegh MM, Vermeulen KM, Evers SM, de Wit GA, Prenger R, Stolk EA. Dutch Tariff for the Five-Level Version of EQ-5D. *Value in Health*. 2016 Jun;19(4):343-52. doi: 10.1016/j.jval.2016.01.003. [PubMed](#)
13. **Poland** Golicki D, Jakubczyk M, Niewada M, Wrona W, Busschbach JJ. Valuation of EQ-5D health states in Poland: first TTO-based social value set in Central and Eastern Europe. *Value Health*. 2010 Mar-Apr;13(2):289-97. doi: 10.1111/j.1524-4733.2009.00596.x. [PubMed](#)
14. **Portugal** Ferreira PL, Antunes P, Ferreira LN, Pereira LN, Ramos-Goñi JM. A hybrid modelling approach for eliciting health state preferences: the Portuguese EQ-5D-5L value set. *Qual Life Res*. 2019 Jun 14. doi: 10.1007/s11136-019-02226-5. [PubMed](#)
15. **South Korea** Kim SH, Ahn J, Ock M, Shin S, Park J, Luo N, Jo MW. The EQ-5D-5L valuation study in Korea. *Qual Life Res*. 2016 Jul;25(7):1845-52. doi: 10.1007/s11136-015-1205-2. [PubMed](#)
16. **Spain:** Ramos-Goñi JM, Craig B, Oppe M, Ramallo-Fariña Y, Pinto-Prades JL, Luo N, Rivero-Arias O. Handling data quality issues to estimate the Spanish EQ-5D-5L Value Set using a hybrid interval regression approach. *Value in Health* 2018 May;21(5):596-604. doi: 10.1016/j.jval.2017.10.023. [PubMed](#)
17. **Taiwan:** Lin HW, Li CI, Lin FJ, Chang JY, Gau CS, Luo N, Pickard AS, Ramos Goñi JM, Tang CH, Hsu CN. Valuation of the EQ-5D-5L in Taiwan. *PLoS One*. 2018; 13(12):: e0209344. doi: 10.1371/journal.pone.0209344. [PubMed](#)
18. **Thailand** Pattanaphesaj J, Thavorncharoensap M, Ramos-Goñi JM, Tongsir S, Ingsrisawang L, Teerawattananon Y. The EQ-5D-5L Valuation study in Thailand. *Expert Review of Pharmacoeconomics & Outcomes Research*. 2018 Oct;18(5):551-558. doi: 10.1080/14737167.2018.1494574 [PubMed](#)

19. **Uruguay:** Augustovski F, Rey-Ares L, Irazola V, Garay OU, Gianneo O, Fernández G, Morales M, Gibbons L, Ramos-Gofii JM. An EQ-5D-5L value set based on Uruguayan population preferences. *Qual Life Res.* 2016 Feb;25(2):323-33. doi: 10.1007/s11136-015-1086-4. [PubMed](#)
20. **USA:** Pickard AS, Law EH, Jiang R, Pullenayegum E, Shaw JW, Xie F, Oppe M, Boye KS, Chapman RH, Gong CL, Balch A, Busschbach JJV. United States Valuation of EQ-5D-5L Health States Using an International Protocol. *Value in Health.* 2019 Aug;22(8):931-941. doi: 10.1016/j.jval.2019.02.009. [PubMed](#)

Index

*Topic **datasets**

CW, [2](#)

TTO, [8](#)

VAS, [10](#)

VT, [11](#)

CW, [2](#)

eq5d, [3](#)

eq5d3l, [4](#)

eq5d5l, [5](#)

eq5dcw, [5](#)

eq5dds, [6](#)

getHealthStates, [7](#)

runApp, [7](#)

shiny_eq5d, [7](#)

splitHealthStates, [8](#)

TTO, [8](#)

valuesets, [10](#)

VAS, [10](#)

VT, [11](#)