

Package ‘mpindex’

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Type Package

Title Multidimensional Poverty Index (MPI)

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Description A set of easy-to-use functions for computing the Multidimensional Poverty Index (MPI).

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R topics documented:

compute_mpi	2
define_deprivation	5
define_mpi_specs	6
df_household	8
df_household_roster	9
save_mpi	10
Index	12

 compute_mpi

Compute Multidimensional Poverty Index (MPI)

Description

This function uses the Alkire-Foster (AF) counting method developed by Sabina Alkire and James Foster. It requires a deprivation profile created using the ([define_deprivation](#)) function containing all indicators defined in the specification files.

Usage

```
compute_mpi(
  .data,
  .deprivation_profile,
  ...,
  .mpi_specs = getOption("mpi_specs"),
  .include_deprivation_matrix = TRUE,
  .generate_output = FALSE,
  .formatted_output = TRUE,
  .output_filename = NULL,
  .include_table_summary = TRUE,
  .include_specs = FALSE
)
```

Arguments

.data	A tidy data frame where each observation is the unit of analysis defined in define_mpi_specs .
.deprivation_profile	list of deprivation profile created using define_deprivation .
...	Grouping columns (supports tidymodels), e.g. area (country, urbanity, region, province), sex, ethnic group, etc.
.mpi_specs	MPI specifications defined in define_mpi_specs .
.include_deprivation_matrix	Whether to include deprivation matrix in the output.
.generate_output	Whether to generate an output (Excel file) as side effect.
.formatted_output	NOT YET IMPLEMENTED. Whether formatting is to be applied to the output.
.output_filename	Output filename.
.include_table_summary	NOT YET IMPLEMENTED. Whether to include summary information in the generated output.
.include_specs	NOT YET IMPLEMENTED. Whether to include MPI specification in the generated output.

Value

Returns list of objects: index (the MPI), contribution (contribution by dimension), headcount_ratio (censored and uncensored), and deprivation_matrix (censored and uncensored). If poverty_cutoffs defined in [define_mpi_specs](#) contain more than one (1) value, index and contribution object will output each cutoff in a separate table.

References

[Alkire-Foster Method](#)
[How to Apply the Alkire-Foster Method](#)

See Also

[define_mpi_specs](#), [define_deprivation](#), [save_mpi](#)

Examples

```
# -----
# Load MPI specs from the built-in specs file
specs_file <- system.file("extdata", "global-mpi-specs.csv", package = "mpindex")
mpi_specs <- define_mpi_specs(specs_file, .uid = 'uuid')
options(mpi_specs = mpi_specs)

# -----
# Create an empty list to store deprivation profile for each indicator
deprivation_profile <- list()

deprivation_profile$nutrition <- df_household_roster |>
  define_deprivation(
    .indicator = nutrition,
    .cutoff = undernourished == 1 & age < 70,
    .collapse = TRUE
  )
deprivation_profile$child_mortality <- df_household |>
  define_deprivation(
    .indicator = child_mortality,
    .cutoff = with_child_died == 1
  )
deprivation_profile$year_schooling <- df_household_roster |>
  define_deprivation(
    .indicator = year_schooling,
    .cutoff = completed_6yrs_schooling == 2,
    .collapse = TRUE
  )
deprivation_profile$school_attendance <- df_household_roster |>
  define_deprivation(
    .indicator = school_attendance,
    .cutoff = attending_school == 2 & age %in% c(5:24),
    .collapse = TRUE
  )
deprivation_profile$cooking_fuel <- df_household |>
```

```

define_deprivation(
  .indicator = cooking_fuel,
  .cutoff = cooking_fuel %in% c(4:6, 9)
)
deprivation_profile$sanitation <- df_household |>
define_deprivation(
  .indicator = sanitation,
  .cutoff = toilet > 1
)
deprivation_profile$drinking_water <- df_household |>
define_deprivation(
  .indicator = drinking_water,
  .cutoff = drinking_water == 2
)
deprivation_profile$electricity <- df_household |>
define_deprivation(
  .indicator = electricity,
  .cutoff = electricity == 2
)
deprivation_profile$housing <- df_household |>
define_deprivation(
  .indicator = housing,
  .cutoff = roof %in% c(5, 7, 9) | walls %in% c(5, 8, 9, 99) == 2 | floor %in% c(5, 6, 9)
)
deprivation_profile$assets <- df_household |>
dplyr::mutate_at(dplyr::vars(dplyr::starts_with('asset_')), ~ dplyr::if_else(. > 0, 1L, 0L)) |>
dplyr::mutate(
  asset_phone = dplyr::if_else(
    (asset_telephone + asset_mobile_phone) > 0,
    1L,
    0L
  )
) |>
dplyr::mutate(
  with_hh_conveniences = (
    asset_tv + asset_phone + asset_computer +
    asset_animal_cart + asset_bicycle +
    asset_motorcycle + asset_refrigerator) > 1,
  with_mobility_assets = (asset_car + asset_truck) > 0
) |>
define_deprivation(
  .indicator = assets,
  .cutoff = !(with_hh_conveniences & with_mobility_assets)
)

# -----
# Compute the MPI
mpi_result <- df_household |>
  compute_mpi(deprivation_profile)

# -----
# You may also save your output into an Excel file
## Not run:

```

```
save_mpi(mpi_result, .filename = 'MPI Sample Output')

## End(Not run)
```

```
define_deprivation    Define deprivation cutoffs
```

Description

A deprivation cutoff must be set for each indicator defined in the MPI specifications. This step establishes the first cutoff in the methodology where every person/household (defined as the unit of analysis) can be identified as deprived or non-deprived with respect to each indicator.

For each indicator, 0 will be used to indicate "not deprived", 1 if deprived, and NA if missing or non-response. Additional column containing the product of the value of the indicator obtained and its corresponding weight will also be computed for convenience.

Usage

```
define_deprivation(
  .data,
  .indicator,
  .cutoff,
  .mpi_specs = getOption("mpi_specs"),
  .collapse = FALSE,
  .collapse_condition = NULL
)
```

Arguments

<code>.data</code>	A data frame or tibble
<code>.indicator</code>	Name of indicator defined in MPI specs (must exactly match the specs).
<code>.cutoff</code>	A conditional logic that defines the poverty line to determine whether deprived or not.
<code>.mpi_specs</code>	MPI specifications defined in define_mpi_specs .
<code>.collapse</code>	A boolean indicating whether to collapse the data frame or not. This is useful, for instance, if the original data where the <code>.cutoff</code> argument above applies to an individual person but your unit of analysis in household.
<code>.collapse_condition</code>	NOT YET FULLY IMPLEMENTED. ONLY WORKS WITH DEFAULT. A condition when <code>.collapse</code> is set to TRUE. If NULL, <code>max()</code> will be used as default.

Value

A data frame of deprivation value for the indicator (`.*_unweighted`): 0 for "not deprived", 1 for deprived, and NA for missing and non-response; and product of `.*_unweighted` and its corresponding weight (`.*_weighted`).

References

[How to Apply the Alkire-Foster Method](#)

See Also

[define_mpi_specs](#)

Examples

```
# Use sample specs file included in the package
specs_file <- system.file(
  "extdata",
  "global-mpi-specs.csv",
  package = "mpindex"
)
specs <- define_mpi_specs(specs_file, .uid = 'uuid')
options(mpi_specs = specs)

# Using built-in dataset
df_household |>
  define_deprivation(
    .indicator = drinking_water,
    .cutoff = drinking_water == 2
  )

df_household_roster |>
  define_deprivation(
    .indicator = school_attendance,
    .cutoff = attending_school == 2,
    .collapse = TRUE
  )
```

define_mpi_specs

Define MPI specifications: dimensions, indicators, and weights

Description

Use to define MPI dimensions, indicators and its corresponding weights using any of the accessible file types: .xlsx (Excel), .json, .csv, or .txt (TSV). You can also set the poverty cutoff or list of poverty cutoffs (to achieve gradient list of MPIs) that will be used in the computation of MPI.

Usage

```
define_mpi_specs(
  .mpi_specs_file,
  .poverty_cutoffs = 1/3,
  .unit_of_analysis = "households",
  .aggregation = NULL,
```

```
.uid = NULL,
.source_of_data = NULL,
.names_separator = ">"
)
```

Arguments

.mpi_specs_file
Accepts .xlsx (Excel), .json, .csv, or .txt (TSV) file format. This file should contain the following columns/variables: Dimension, Indicator, Variable, Weight, and Description (optional). See example below.

.poverty_cutoffs
Accepts single value or a vector of poverty cutoffs. This parameter (usually denoted by k) reflects the minimum level of deprivations or deprivation score an individual or household must be suffering simultaneously to be considered poor. See example below.

.unit_of_analysis
e.g. individuals, families, households, or communities. Default value is households.

.aggregation Column name in the dataset that defines an aggregation level.

.uid Column name containing unique ID of the observation which defines the lowest level of disaggregation (usually unit of analysis).

.source_of_data Source of data used in the computation. This will be used in the footnote of the table when generating an output.

.names_separator Column separator that defines the hierarchy of the column header.

Value

A list of objects containing MPI specifications needed by [compute_mpi](#) function.

See Also

[compute_mpi](#)

Examples

```
# Use sample specs file included in the package
specs_file <- system.file(
  "extdata",
  "global-mpi-specs.csv",
  package = "mpindex"
)
# To see other sample specs file (with different supported file format)
system.file("extdata", package = "mpindex") |>
  list.files()

# OPTIONS:
```

```
# 1. Pass this `specs` object to `compute_mpi` function
#
specs <- define_mpi_specs(specs_file)

# 2. Make it available globally (recommended approach)
options(mpi_specs = specs)
```

df_household

Sample dataset of households

Description

This is a synthetic dataset containing household information primarily used for demonstration purposes on how to use the `mpindex` package.

Usage

```
df_household
```

Format

A tibble with 198 rows and 21 variables:

uuid Unique ID

class Urbanity: Rural or Urban

drinking_water Access to drinking water: 1 - improved; 2 - unimproved

toilet Service level of toilet or sanitation facility: 1 - basic; 2 - limited; 3 - unimproved; 4 - open defecation

with_child_died With at least one (1) child died in the last five (5) years: 1 - with child died; 2 - without child died

roof Main construction material of the roof: 1 - galvanized iron/aluminum; 2 - concrete/clay tile; 3 - half galvanized iron and half concrete; 4 - wood/bamboo; 5 - cogon/nipa/anahaw; 6 - asbestos; 7 - makeshift/salvaged/improvised materials; 9 - other construction material

walls Main construction material of the outer walls: 1 - concrete/brick/stone; 2 - wood; 3 - half concrete/brick/stone and half wood; 4 - Galvanized iron/aluminum; 5 - bamboo/sawali/cogon/nipa; 6 - asbestos; 7 - glass; 8 - makeshift/salvaged/improvised materials; 9 - none; 10 - concrete hollow blocks; 11 - concrete hollow blocks/wood; 12 - shear walls; 99 - other construction material

floor Main construction material of the floor: 1 - concrete; 2 - wood; 3 - coconut lumber; 4 - bamboo; 5 - earth/sand/mud; 6 - makeshift/salvaged/improvised materials; 9 - other construction material

electricity Access to electricity: 1 - with access to electricity; 2 - without access to electricity

cooking_fuel Fuel use for cooking: 1 - electricity; 2 - kerosene (gaas); 3 - liquified petroleum gas (LPG); 4 - charcoal; 5 - wood; 6 - none; 9 - other cooking fuel such as dung, agricultural crop, or shrubs

asset_radio Number of working radio owned by the household
asset_tv Number of working television owned by the household
asset_telephone Number of working telephone owned by the household
asset_mobile_phone Number of working mobile phone owned by the household
asset_computer Number of working computer owned by the household
asset_animal_cart Number of animal carts owned by the household
asset_bicycle Number of bicycle owned by the household
asset_motorcycle Number of motorcycle owned by the household
asset_refrigerator Number of working refrigerator owned by the household
asset_car Number of car owned by the household
asset_truck Number of trucks owned by the household

See Also

[df_household_roster](#)

Examples

```
df_household
```

df_household_roster *Sample dataset of household members*

Description

This dataset contains a many-to-one relationship with the [df_household](#) dataset. Hence, you can apply joins using the `uuid`.

Usage

```
df_household_roster
```

Format

A tibble with 905 rows and 8 variables:

uuid Unique ID
line_number Number identifier for each member within the household
class Urbanity: Rural or Urban
sex Sex of the household member
age Age of the household member
attending_school Whether the household member (aged 5-24 years old) is currently attending school: 1 - currently attending; 2 - currently not attending
completed_6yrs_schooling Whether completed at least six (6) years of schooling: 1 - completed; 2 - not completed
undernourished Whether the household member (aged below 70 years old) is undernourished: 1 - undernourished; 2 - not undernourished

See Also

[df_household](#)

Examples

```
df_household_roster
```

save_mpi

Save MPI Output

Description

Save the MPI output into an Excel file format.

Usage

```
save_mpi(  
  .mpi_output,  
  .mpi_specs = getOption("mpi_specs"),  
  .filename = NULL,  
  .formatted_output = TRUE,  
  .include_table_summary = TRUE,  
  .include_specs = FALSE  
)
```

Arguments

`.mpi_output` An object derived from [compute_mpi](#).

`.mpi_specs` MPI specifications defined in [define_mpi_specs](#).

`.filename` Output filename

`.formatted_output` Whether formatting is to be applied to the output.

`.include_table_summary` NOT YET IMPLEMENTED. Whether to include summary information in the generated output.

`.include_specs` NOT YET IMPLEMENTED. Whether to include MPI specification in the generated output.

Value

Returns the file location of the output generated.

Examples

```
## Not run:  
# It requires an MPI output (list type) in the first argument  
save_mpi(mpi_result, .filename = 'MPI Sample Output')  
  
## End(Not run)
```

Index

* datasets

df_household, 8

df_household_roster, 9

compute_mpi, 2, 7, 10

define_deprivation, 2, 3, 5

define_mpi_specs, 2, 3, 5, 6, 6, 10

df_household, 8, 9, 10

df_household_roster, 9, 9

save_mpi, 3, 10