

Working with World Health Organization ICD codes and national editions, and different languages

icd 4.0+ offers some international support.

- World Health Organization (WHO) codes for 2016 in English, the latest release.
- World Health Organization (WHO) codes for 2008 in French, the latest available online data.
- ICD-10-FR in French, with modifications as used in France.
- Translations of the US ICD-10-CM codes in French and Dutch, which are used in Belgium.

All of this should be considered beta quality, and I would much appreciate testing and bug reports. I would especially be interested if someone has experience internationalizing an R package like this.

Function and variable names are likely to change in the future. The current versions are more consistent with naming of data files.

WHO

Surprisingly, there are potential copyright restrictions on redistributing the WHO ICD-9 and ICD-10 definitions, which form the basis of ICD code systems around the world. These definitions are themselves also used as the internationally standard way to codify morbidity and mortality for public health.

icd now includes the ability to work with these codes more easily via the companion `icd.data` package. `icd` asks the user whether they wish to download the data from the WHO web site, whereupon it is made available as functions, named similarly to existing data, e.g., `get_icd10who2016()`, which is the latest ICD-10 release from the WHO at the time of writing. For French codes, `get_icd10fr2016()`, with the localized synonym `get_cim10fr2016()` having internationalized column names, but this would duplicate the data making package storage and loading bigger, which is increasingly a problem as more data is included.

```
# if not already done, set up the downloaded data cache:
setup_icd_data()
# or setup and optionally download everything at once (currently ~350 MB)
# and a few minutes to generate the data structures.
download_all_icd_data()
```

```
get_icd10who2016()[1:5, ]
#>   code leaf                                desc
#> 1  A00 FALSE                                Cholera
#> 2 A000 TRUE Cholera due to Vibrio cholerae 01, biovar cholerae
#> 3 A001 TRUE Cholera due to Vibrio cholerae 01, biovar eltor
#> 4 A009 TRUE                                Cholera, unspecified
#> 5  A01 FALSE Typhoid and paratyphoid fevers
#>   three_digit          major sub_sub_chapter
#> 1           A00           Cholera           <NA>
#> 2           A00           Cholera           <NA>
#> 3           A00           Cholera           <NA>
#> 4           A00           Cholera           <NA>
#> 5           A01 Typhoid and paratyphoid fevers <NA>
#>                sub_chapter                chapter
#> 1 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 2 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 3 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 4 Intestinal infectious diseases Certain infectious and parasitic diseases
```

```
#> 5 Intestinal infectious diseases Certain infectious and parasitic diseases
get_icd10fr2019()[1:5, ]
```

```
#>   code                               short_desc
#> 1  A00                                CHOLERA
#> 2  A000 CHOLERA A VIBRIO CHOLERAЕ 01, BIOVAR CHOLERAЕ
#> 3  A001  CHOLERA A VIBRIO CHOLERAЕ 01, BIOVAR EL TOR
#> 4  A009                                CHOLERA, SAI
#> 5  A01                                FIEVRES TYPHOIDE ET PARATYPHOIDE
```

```
#>                               long_desc
#> 1                                Choléra
#> 2 Choléra à Vibrio cholerae 01, biovar cholerae
#> 3  Choléra à Vibrio cholerae 01, biovar El Tor
#> 4                                Choléra, sans précision
#> 5                                Fièvres typhoïde et paratyphoïde
```

```
#>                               major three_digit
#> 1                                Choléra          A00
#> 2                                Choléra          A00
#> 3                                Choléra          A00
#> 4                                Choléra          A00
#> 5 Fièvres typhoïde et paratyphoïde      A01
```

```
summary(get_icd10who2016())
```

```
#>   code          leaf          desc          three_digit
#> Length:12187   Mode :logical Length:12187   A04      : 11
#> Class1:icd10who FALSE:1580   Class :character A06      : 11
#> Class2:icd10   TRUE :10607   Mode  :character A15      : 11
#> Class3:character                                     A66      : 11
#> Mode  :character                                     B20      : 11
#>                                                         B37      : 11
#>                                                         (Other):12121
```

```
#>   major          sub_sub_chapter  sub_chapter
#> Length:12187   Length:12187       Length:12187
#> Class :character Class :character  Class :character
#> Mode  :character Mode  :character  Mode  :character
```

```
#>   chapter
#> Length:12187
#> Class :character
#> Mode  :character
```

```
#>   code leaf          desc
#> 1  A00 FALSE          Cholera
#> 2  A000 TRUE Cholera due to Vibrio cholerae 01, biovar cholerae
#> 3  A001 TRUE Cholera due to Vibrio cholerae 01, biovar eltor
#> 4  A009 TRUE          Cholera, unspecified
#> 5  A01 FALSE          Typhoid and paratyphoid fevers
#>   three_digit          major sub_sub_chapter
#> 1             A00          Cholera          <NA>
```

```

#> 2          A00                Cholera          <NA>
#> 3          A00                Cholera          <NA>
#> 4          A00                Cholera          <NA>
#> 5          A01 Typhoid and paratyphoid fevers  <NA>
#>                sub_chapter                    chapter
#> 1 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 2 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 3 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 4 Intestinal infectious diseases Certain infectious and parasitic diseases
#> 5 Intestinal infectious diseases Certain infectious and parasitic diseases
#>  code                short_desc
#> 1  A00                CHOLERA
#> 2  A000 CHOLERA A VIBRIO CHOLERAЕ 01, BIOVAR CHOLERAЕ
#> 3  A001  CHOLERA A VIBRIO CHOLERAЕ 01, BIOVAR EL TOR
#> 4  A009                CHOLERA, SAI
#> 5  A01                FIEVRES TYPHOIDE ET PARATYPHOIDE
#>                long_desc
#> 1                Choléra
#> 2 Choléra à Vibrio cholerae 01, biovar cholerae
#> 3  Choléra à Vibrio cholerae 01, biovar El Tor
#> 4                Choléra, sans précision
#> 5                Fièvres typhoïde et paratyphoïde
#>                major three_digit
#> 1                Choléra          A00
#> 2                Choléra          A00
#> 3                Choléra          A00
#> 4                Choléra          A00
#> 5 Fièvres typhoïde et paratyphoïde  A01
#>  code                leaf                desc                three_digit
#> Length:12187        Mode :logical        Length:12187        A04 : 11
#> Class1:icd10who    FALSE:1580          Class :character    A06 : 11
#> Class2:icd10       TRUE :10607         Mode  :character    A15 : 11
#> Class3:character                                     A66 : 11
#> Mode :character                                     B20 : 11
#>                                                         B37 : 11
#>                                                         (Other):12121
#>  major                sub_sub_chapter    sub_chapter
#> Length:12187        Length:12187        Length:12187
#> Class :character    Class :character    Class :character
#> Mode  :character    Mode  :character    Mode  :character
#>
#>
#>
#>  chapter
#> Length:12187
#> Class :character
#> Mode  :character
#>
#>
#>
#>

```

French edition of ICD-10

ICD-10-FR is significantly different from the WHO version, and is used by official bodies and health systems in France. As with all the features in this document, this is an early attempt at the complex problem of providing all the codes, transtatlanguages,

```
fr <- get_icd10fr2019()
fr[fr$code == "C43", ]
#>      code          short_desc          long_desc
#> 1149  C43 MELANOME MALIN DE LA PEAU Mélanome malin de la peau
#>
#>      major three_digit
#> 1149 Mélanome malin de la peau      C43
```

Working with different ICD-10-CM annual versions

There is an initial beta-quality mechanism for selecting a particular version of ICD-10-CM to use. This is a US coding system, but Belgian authorities provide translations into French and Dutch, and appear to have made no modifications.

```
# get the active version string
get_icd10cm_active_year()
#> [1] "2019"
# get the data itself:
devnull <- get_icd10cm_active()
#set the active version, and check it is the one we expected
set_icd10cm_active_year("2015")
identical(get_icd10cm_active(), get_icd10cm2015())
#> [1] TRUE
```

The function `with_icd10cm_version` allows temporarily using a particular data set for a computation, analogous to the functions in the `withr` package:

```
# The code "C4311" goes from being a leaf in 2018, to a parent in 2019
with_icd10cm_version(ver = "2018",
                     is_leaf(as.icd10cm("C4311")))
)
#> [1] TRUE
with_icd10cm_version(ver = "2019",
                     is_leaf(as.icd10cm("C4311")))
)
#> [1] FALSE
# In 2018 the following code was not even defined, but in 2019 was a new child
# code of "C4311"s
with_icd10cm_version(ver = "2018",
                     {
                       print(is_defined(as.icd10cm("C4311")))
                       print(is_leaf(as.icd10cm("C4311")))
                     })
)
#> [1] TRUE
#> [1] TRUE
with_icd10cm_version(ver = "2019",
                     is_leaf("C43111"))
)
#> [1] TRUE
```