

APC assignment

The following is an assignment that each student should complete and mail to Bendix Carstensen, b@bxc.dk.

1. Load mortality data (1×1 tiles of the Lexis diagram, *both* for men and women) from the HMD. Before you start should choose:
 - Country
 - Age-range
 - Period-range

One possibility is to use Tim Riffe's `HMDHFDplus` package, but presumably there are other packages too.

It has a function that lists the countries available, and a function that lists the items (data files) available for a given country. For the latter you must have a HMD user-id and password. It is good practise to store these in variables so that they do not appear in your code:

```
> library(HMDHFDplus)
> getHMDcountries()

 [1] "AUS"      "AUT"      "BEL"      "BGR"      "BLR"      "CAN"      "CHL"      "HRV"
 [9] "CHE"      "CZE"      "DEUTNP"   "DEUTE"    "DEUTW"    "DNK"      "ESP"      "EST"
[17] "FIN"      "FRATNP"   "FRACNP"   "GRC"      "HUN"      "IRL"      "ISL"      "ISR"
[25] "ITA"      "JPN"      "KOR"      "LTU"      "LUX"      "LVA"      "NLD"      "NOR"
[33] "NZL_NP"   "NZL_MA"   "NZL_NM"   "POL"      "PRT"      "RUS"      "SVK"      "SVN"
[41] "SWE"      "TWN"      "UKR"      "GBR_NP"   "GBRTENW"  "GBRCENW"  "GBR_SCO"  "GBR_NIR"
[49] "USA"

> getHMDitemavail( CTRY = "DNK", username = .HMDusr, password = .HMDpwd )

 [1] "Births"                                     "./C:%5cnppdf32Log%5cdebuglog"
 [3] "Deaths_1x1"                                 "Deaths_1x5"
 [5] "Deaths_1x10"                               "Deaths_5x1"
 [7] "Deaths_5x5"                                 "Deaths_5x10"
 [9] "Deaths_lexis"                              "E0coh"
[11] "E0coh_1x5"                                  "E0coh_1x10"
[13] "E0per"                                       "E0per_1x5"
[15] "E0per_1x10"                                 "Exposures_1x1"
[17] "Exposures_1x5"                             "Exposures_1x10"
[19] "Exposures_5x1"                             "Exposures_5x5"
[21] "Exposures_5x10"                           "Exposures_lexis"
[23] "Mx_1x1"                                     "Mx_1x5"
[25] "Mx_1x10"                                   "Mx_5x1"
[27] "Mx_5x5"                                    "Mx_5x10"
[29] "Population"                                "Population5"
[31] "bltcoh_1x1"                                "bltcoh_1x5"
[33] "bltcoh_1x10"                              "bltcoh_5x1"
[35] "bltcoh_5x5"                                "bltcoh_5x10"
[37] "bltper_1x1"                                "bltper_1x5"
[39] "bltper_1x10"                              "bltper_5x1"
[41] "bltper_5x5"                                "bltper_5x10"
[43] "cExposures_1x1"                           "cExposures_1x5"
[45] "cExposures_1x10"                         "cExposures_5x1"
[47] "cExposures_5x5"                           "cExposures_5x10"
[49] "cMx_1x1"                                   "cMx_1x5"
```

```

[51] "cMx_1x10"          "cMx_5x1"
[53] "cMx_5x5"           "cMx_5x10"
[55] "fltcoh_1x1"        "fltcoh_1x5"
[57] "fltcoh_1x10"       "fltcoh_5x1"
[59] "fltcoh_5x5"        "fltcoh_5x10"
[61] "fltper_1x1"        "fltper_1x5"
[63] "fltper_1x10"       "fltper_5x1"
[65] "fltper_5x5"        "fltper_5x10"
[67] "mltcoh_1x1"        "mltcoh_1x5"
[69] "mltcoh_1x10"       "mltcoh_5x1"
[71] "mltcoh_5x5"        "mltcoh_5x10"
[73] "mltper_1x1"        "mltper_1x5"
[75] "mltper_1x10"       "mltper_5x1"
[77] "mltper_5x5"        "mltper_5x10"

```

You must resort to the website of the HMD to determine what is what. For Denmark you might for example do:

```

> DK.D <- readHMDweb( CNTRY = "DNK", item="Deaths_1x1",
+                   username = .HMDusr, password = .HMDpwd )
> DK.Y <- readHMDweb( CNTRY = "DNK", item="Exposures_1x1",
+                   username = .HMDusr, password = .HMDpwd )
> head( DK.D)

```

	Year	Age	Female	Male	Total	OpenInterval
1	1835	0	3315.00	4376.00	7691.00	FALSE
2	1835	1	865.94	963.70	1829.64	FALSE
3	1835	2	582.06	657.30	1239.36	FALSE
4	1835	3	366.21	387.87	754.08	FALSE
5	1835	4	242.79	236.13	478.92	FALSE
6	1835	5	202.00	199.12	401.12	FALSE

```

> head( DK.Y)

```

	Year	Age	Female	Male	Total	OpenInterval
1	1835	0	17789.32	18477.69	36267.01	FALSE
2	1835	1	15431.99	15730.77	31162.75	FALSE
3	1835	2	14136.94	14373.96	28510.90	FALSE
4	1835	3	13247.14	13446.53	26693.67	FALSE
5	1835	4	12985.10	13186.90	26172.00	FALSE
6	1835	5	12973.28	13199.79	26173.07	FALSE

Remember to be very clear about whether you get population data (*size* of the population) at a given *date*, or exposure data (*person-time*) for a given *period*. If you get population size data you must derive the exposure data.

2. Do an age-period-cohort analysis of male and female mortality rates separately, and show the results as curves in the same display.

Remember to clearly state what assumptions you are making, and how you choose your parametrization(s).

3. Provide a verbal description of mortality patterns separately for men and women.
4. Graph the M/F mortality rate-ratio in an `apc.frame`. You may want to consult the function `ci.ratio` from the `Epi` package.
5. Provide a verbal description of patterns of the M/F rate ratios.

The assignment is due on 11th April 2019 by mail to `b@bxc.dk`.

It should be submitted as a `.pdf` document with at least 12pt font and a maximum of 10 pages, including figures and complete code documentation (`Sweave` or `Rmarkdown` are preferable).