Iron Age : Hallstatt period life tables de

Providing and presenting data on human age at death.

Christoph Rinne* Nils Müller-Scheeßel†

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Contents

Introduction

The dataset contains mortality data of humans taken from the literature. Therefore, the data is heterogeneous in many respects, especially with regard to the quality of the anthropological information. However, the data is simplified and classified to fit into a limited number of columns, e.g. a general archaeological dating.

In the current version, the data is taken exclusively from the database of the following work and the providet tables from the original database:

Müller-Scheeßel 2006: N. Müller-Scheeßel, Untersuchungen zum Wandel hallstattzeitlicher Bestattungssitten in Süd- und Südwestdeutschland (Datenbank) (Eberhard Karls Universität 2006). http://hdl.handle.net/10900/47101 (Zugriff: 19.10.2023).

Due to the large number of tables, the data was first processed semi-automatically and transferred to an SQLITE database (https://github.com/chrinne/digging.digital.data). From this, the data was transferred to the schema presented here and supplemented with the literature in BibTeX format.

Important note: Most anthropologists will reject extrapolations, especially of life expectancy, based on this data. The attribute "(archaeological) culture" serves as a label for a number of features related to the way of life, e.g. houses, settlement structure, economy and burial practices. It is taken from the Neolithic tablets and thus to a certain extent an atavism in the context of the Hallstatt period. This is why the column here remains empty. The attribute "period" is based on typological dating and the related relativ chronology. It must be placed in an archaeological framework and a current absolute dating, depending on the research question. Please bear in mind that e.g. burial mounts can have a complex stratigraphy and burials with multuiple inhumation do not necessarily represent a 'closed find'.

The data is provided as a sqlite database in a very simple form, not normalised or as implemented relations. This documentation is provided as an R-markdown with a resulting pdf to give a first overview of the data in the database. At the same time, a simple workflow for data processing in R with the R package [mortAAR] (https://cran.r-project.org/web/packages/mortAAR/index.html) for calculating life tables is described. The literature used and cited is provided *a priori* as a Bibtex file but provides simple text as well.

*Kiel University, crinne@ufg.uni-kiel.de
†Kiel University, nils.mueller-scheessel@ufg.uni-kiel.de

The data collection is available via the LandMan portal of CRC 1266[1]. Subproject: "Regional and Local Patterns of 3rd Millennium Transformations of Social and Economic Practices in the Central German Mountain Range (D2)". https://gepris.dfg.de/gepris/projekt/316739879]

Data presentation

All code chunks will be visible, this is part of the reproducibility. The documentation uses some R packages:

```
knitr::opts_chunk$set(echo = TRUE, include = TRUE)
require(pacman) || install.packages("pacman")
```

```
## Lade nötiges Paket: pacman
```

```
## [1] TRUE
```

```
pacman::p_load(dplyr, ggplot2, knitr, mortAAR, RSQLite)
```

Please set the working directory to the folder with the data, e.g.:

```
setwd('d:/data/folder/')
```

Set up the database connection.

```
db01 <- dbConnect(RSQLite::SQLite(), dbname = "./de_lifetable_haz.sqlite")
```

Data structure

The data is provided in three tables – two tables for individual and tabled mortality data and one with cooridinates for the nearby places.

```
select name  as 'table name' from sqlite_master where type = 'table' order by 1;
```

Table 1: 5 records

table name
citations
lifedata_ind
lifedata_tbl
metadata
places

Import the data into the R environment.

```
tables<- dbGetQuery(db01, "select name from sqlite_master
                    where type = 'table' order by 1;")[,1]
for (tbl in tables){
  assign(tbl, dbReadTable(db01, tbl))
}
```

Most sqlite columns are set to TXT due to type affinity in sqlite, one exception is 'count'. You might need to adjust this (sb).

citations

This table contains all 761 literature citations of the dissertation and data collection of Nils Müller-Scheeßel in BibTeX format. To facilitate the search for the respective literature reference, we added a view supplemented by the columns author and year. The sql-statement is given below but limited to the first data record, whereby the line breaks in the BibTeX cause the incorrect display in this text.

[1] "Scales of Transformation - Human-Environmental Interaction in Prehistoric and Archaic Societies." Deutsche Forschungsgemeinschaft (DFG) - project number 290391021 https://gepris.dfg.de/gepris/projekt/290391021

```
-- CREATE VIEW auto_jahr_bibtex as
select
  substr(bibtex,instr(bibtex, 'author = {')+10,
    instr (substr(bibtex,instr(bibtex, 'author = {')+10,100),'},')-1) as autor,
  substr(bibtex,instr(bibtex, 'year = {')+8,
    instr (substr(bibtex,instr(bibtex, 'year = {')+8,100),'},')-1) as jahr,
  bibtex
from citations
limit 1;
```

Table 2: 1 records

autor	jahr	bibtex
Fischer, H. Thomas	1981	@Article{ref_715, author = {Fischer, H. Thomas}, title = {{Archäologische Funde der römischen Kaiserzeit und der Völkerwanderungszeit aus der Oberpfalz (nördlich der Donau)}}, journal = {{Verhandlungen des Historischen Vereins für Oberpfalz und Regensburg}}, volume = {121}, number = {}, doi = {}, pages = {349–388}, year = {1981}, abstract = {}, location = {}, keywords = {Deutschland; Süddeutschland; Mitteleuropa; Europa; Oberpfalz}} |

lifetable_ind and lifetable_tbl

The structure of the mortality data tables for individual and tabled data is identical for the easy combination (*rbind()*). The column names are self-explanatory in general.

```
paste(colnames(get(tables[2])), collapse = ", ")
```

[1] "place, site, grave, sex, sex2, from, to, ageclass.orig, count, culture, period, literature, comment"

The column 'count' is always 1 for individual data and can provide a float for tabled data due to interpolation in the original life tables. The column 'sex2' provides a simplified English version of the original sex determination in the column 'sex'. The columns 'from' and 'to' are derived from the original age classification in 'ageclass.orig' to fulfil the needs of mortAAR.

places

The table 'places' provides coordinates (WGS84) of nearby places to allow spatial differentiation. The 'id' is related to 'places' in the lifetables.

```
paste(colnames(get(tables[5])), collapse = ", ")
```

[1] "id, name, latitude, longitude"

Content of places

The nearby places are distributed within Baden-Württemberg and Bavaria. This area can be app. outlined by the cities of Frankfurt Main, Bamberg, Passau, Hallstatt and Freiburg im Breisgau. In total there are places with related inhumations and anthropological data.

```
cities <- rbind.data.frame(
    c("Freiburg i. Br.", 48.004, 7.825),
    c("Passau", 48.567, 13.432),
    c("Hallstatt", 47.562, 13.650),
    c("Frankfurt a.M.", 50.111, 8.682),
    c("Bamberg", 49.900, 10.903)
)
colnames(cities) <-c("name", "lat", "lon")
```

```
cities$lat<-as.numeric(cities$lat)
cities$lon<-as.numeric(cities$lon)
plot(places$longitude, places$latitude, pch = 19, cex = 0.3,
     xlab = "Longitude", ylab = "Latitude",
     xlim = c(7.5,14), ylim = c(47.6,50.4));
     text(cities$lon, cities$lat, cities$name, cex = 0.6)
```

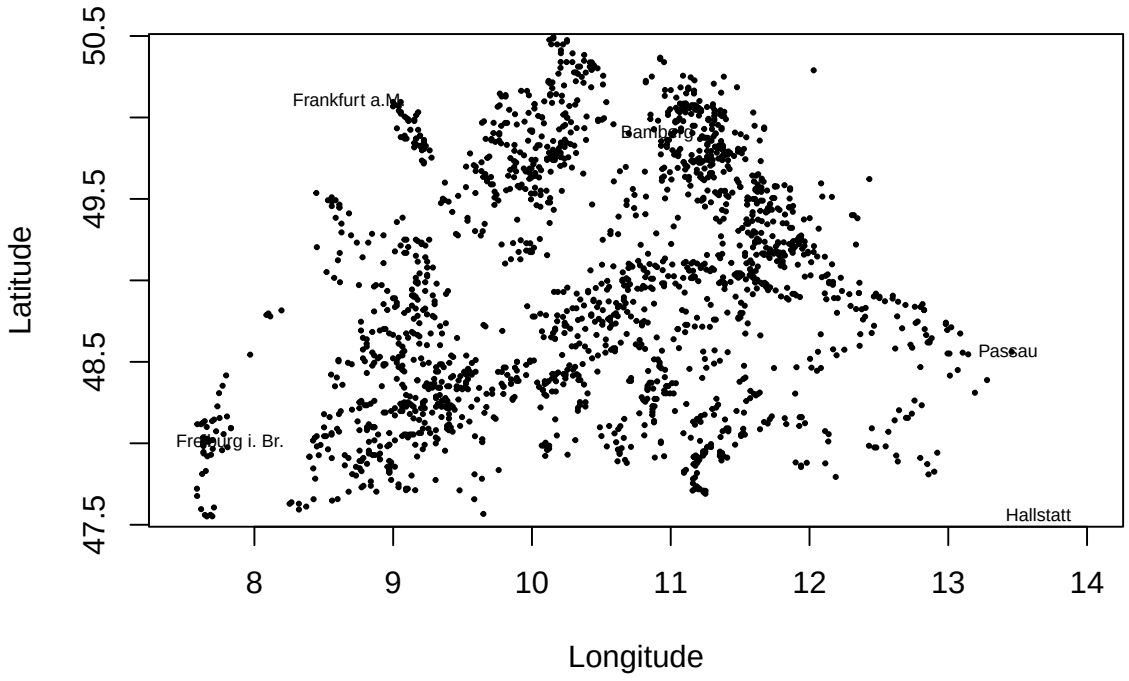


Figure 1: Plot of nearby places.

```
length(places$id)
```

```
## [1] 1877
```

Content of life tables

The general overview is comprised of two tables for individual and tabled data.

```
ld <- rbind(lifedata_ind, lifedata_tbl)
ld$from <- as.numeric(ld$from)
ld$to <- as.numeric(ld$to)
```

Periods are abbreviated: **Ha**llstatt and the additional phases and can be combined due to imprecise dating or to express the transition.

```
ld$period <- factor(ld$period,
                    levels = c("Hallstattzeit", "HaC", "HaC/D1", "HaC1",
                               "HaC2", "HaC2/D1", "HaC2/D", "HaD", "HaD1",
                               "HaD1/D2", "HaD2", "HaD2/D3", "HaD3",
                               "Latènezeit", "Unklar", "indet"))
ld %>%
  group_by(., period) %>%
  summarise(count = sum(count)) %>%
```

```
  knitr::kable(caption = "Number of individuals in each period.",
               col.names = c("Period", "Count"))
```

Table 3: Number of individuals in each period.

Period	Count
Hallstattzeit	167
HaC	112
HaC/D1	46
HaC1	35
HaC2	109
HaC2/D1	79
HaC2/D	31
HaD	210
HaD1	422
HaD1/D2	22
HaD2	37
HaD2/D3	61
HaD3	97
Latènezeit	19
Unklar	29
indet	83

Number of individuals per simplified sex determination. The high proportion of undetermined sex results from the tabular data and the subadult individuals.

```
ld %>%
  group_by(., sex2) %>%
  summarise(count = sum(count)) %>%
  knitr::kable(caption = "Number of individuals per sex.",
               col.names = c("Sex", "Count"))
```

Table 4: Number of individuals per sex.

Sex	Count
female	362
indet	748
male	449

The comment provides information on the burial practice (inhumation, cremation).

```
ld %>%
  group_by(., comment) %>%
  summarise(count = sum(count)) %>%
  knitr::kable(caption = "Number of individuals per comment (burial practice).",
               col.names = c("burial practice", "Count"))
```

Table 5: Number of individuals per comment (burial practice).

burial practice	Count
Brandbestattung	578
Körperbestattung	680
mehrfach Brandbestattung	120
mehrfach Körperbestattung	181

The age ranges depend mainly on the traditional age groups and the usual 5-year-intervals in life tables. Two different illustrations can show the dependence between the determined age at death and the accuracy of the age range.

```
ld %>%
  select(., from, to) %>%
  filter(., !is.na(from)) %>%
  filter(., !is.na(to)) %>%
  mutate(., range = to - from) %>%
  mutate(., agegroup = ifelse(to < 20, 'subadult', 'adult')) %>%
  arrange(., from, to) -> ages
id <- seq(nrow(ages))
plot(c(0,100), c(0,nrow(ages)),
     xlab = "Age from to", ylab = "Individual", type = "n") +
 segments(ages$from[id], id, ages$to[id], id)
```

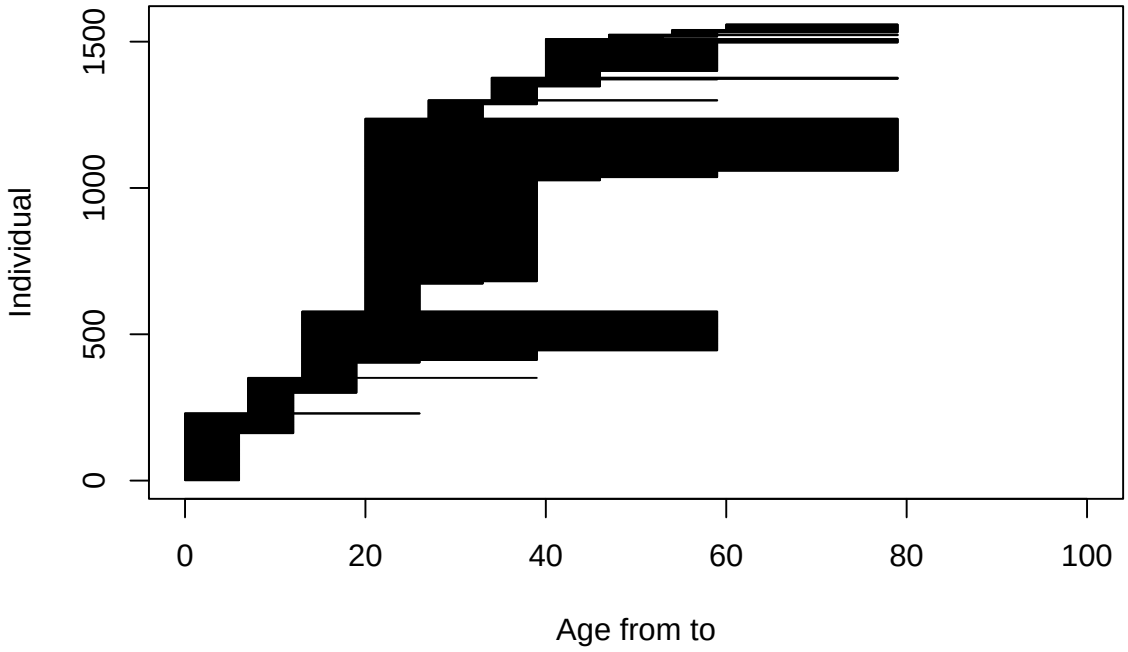


Figure 2: Age range per individual.

```
## integer(0)
```

```
boxplot(range~agegroup, data = ages, xlab = "Age group", ylab = "Age range")
```

Overview of age at death (dx).

The following plots are created with the R-package mortAAR[2] without an interpolation (method = standard) for various groupings.

[2]If you observe strange plot lines in the ggplots of mortAAR, please consider the installation of the latest version of mortAAR from github.

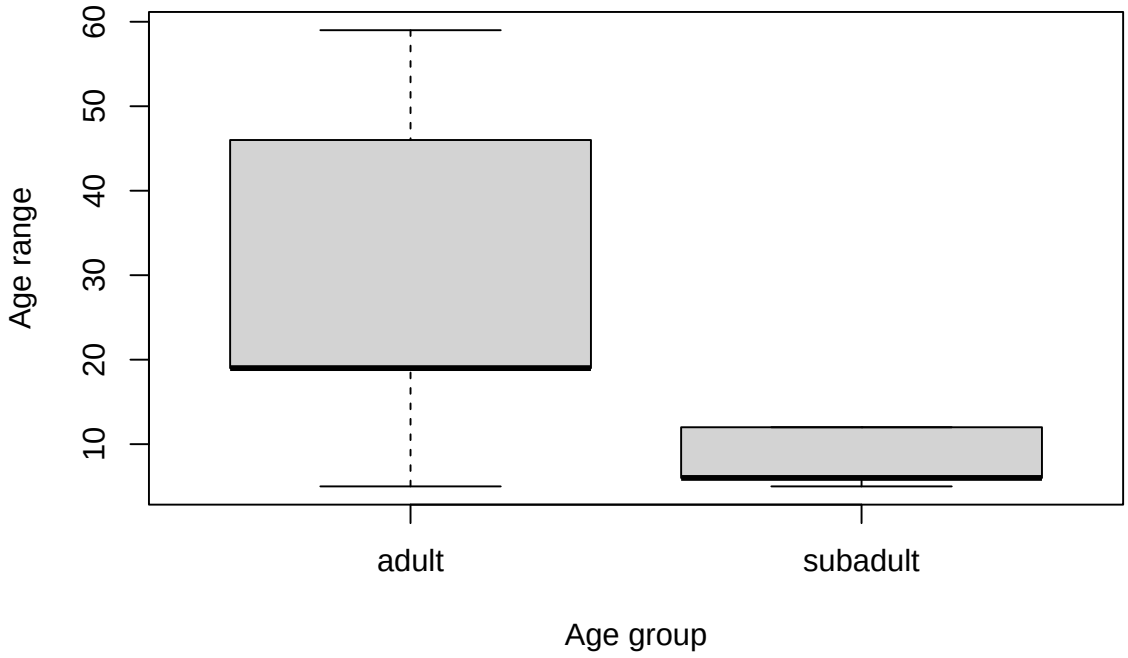
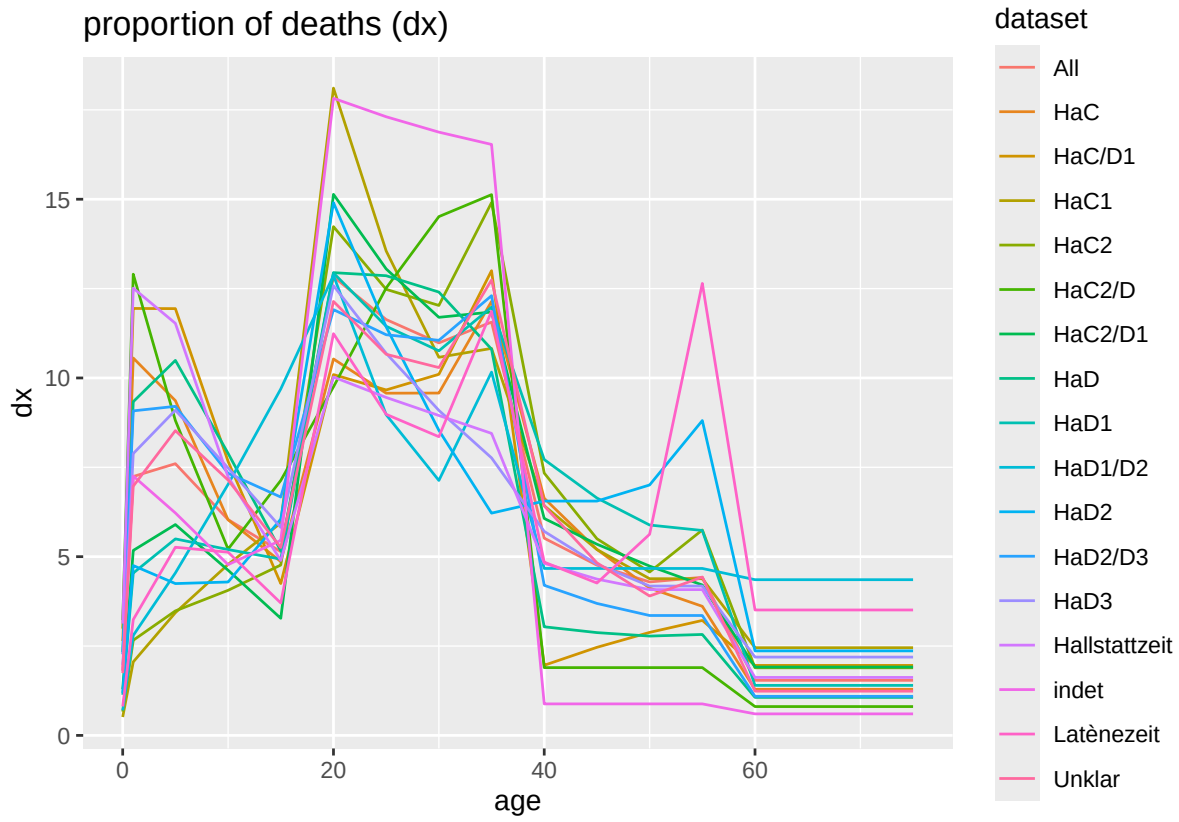


Figure 3: Age range for subadult (< 20) and adult individuals.

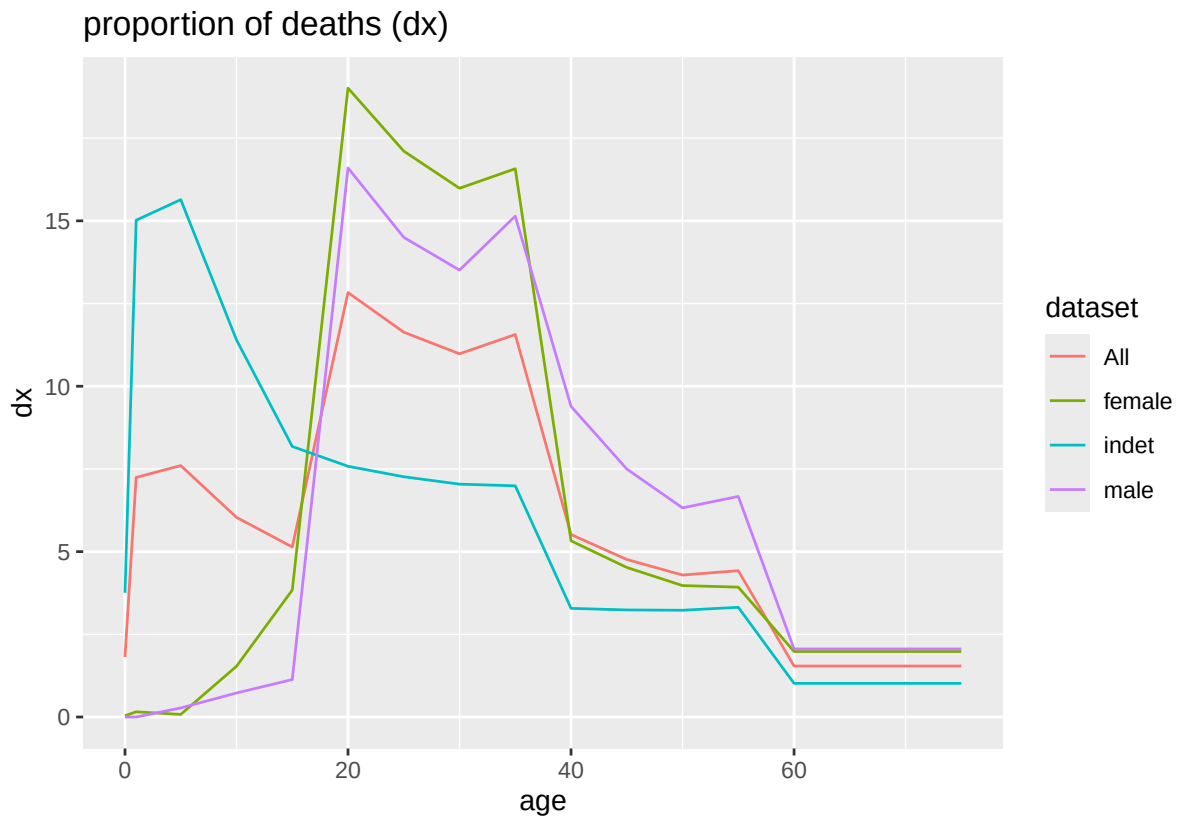
Periods

```
prep.life.table(ld, dec = "count", agebeg = "from", ageend = "to",
  group = "period", method = "standard", agerange = "included") %>%
  life.table(.) %>%
  plot(., display = c("dx"), line_vis="color")
```



Sex

```
prep.life.table(ld, dec = "count", agebeg = "from", ageend = "to",
  group = "sex2", method = "standard", agerange = "included") %>%
  life.table(.) %>%
  plot(., display = c("dx"), line_vis="color")
```


proportion of deaths (dx)
dx
15
10
5
0
0
20
40
60
age
dataset
All
female
indet
male