Who reach 105 years and survive above among Belgian oldest ?

Michel POULAIN, Dany CHAMBRE and Anne HERM

10 May 2022

Context

The proportion of centenarians reaching 105 is low as about one out of six centenarians with succeed.

Many scientific researches investigated the factors associated with extreme longevity with a large interest on centenarians. Therefore, they used survey and compared the characteristics of centenarians with similar ones observed in younger generations or following cohorts of old people and considering those who died and those who survived, opposing their characteristics. Both approaches present important limitations as, in the first one, the two groups of persons compared did not face the same circumstances along their long life whereas, for the second, the observation period should be ongoing during one or two decades with an important drop-off of people during such long observation period. Moreover, both approaches are subject to problem of sampling, no acceptance to be interviewed or no response for various reasons so that the biases might be important and the latter favour healthy centenarians.

The difficulty of a survey to capture the characteristics of Semi-supercentenarians and how they survive above 105 years of age is the main reason why we know so few about extreme survival except age and sex. Nevertheless, a more in-depth analysis of the survival above 105 is needed when considering the existence of a possible mortality plateau at these ages but also the absence of improvement in mortality rates observed since several decades already.

In conclusion, alternative method of investigation are needed to study these topics and other types of data sources might be very informative.

Research questions

Q1. Which individual characteristics are associated with survival to 105 years?

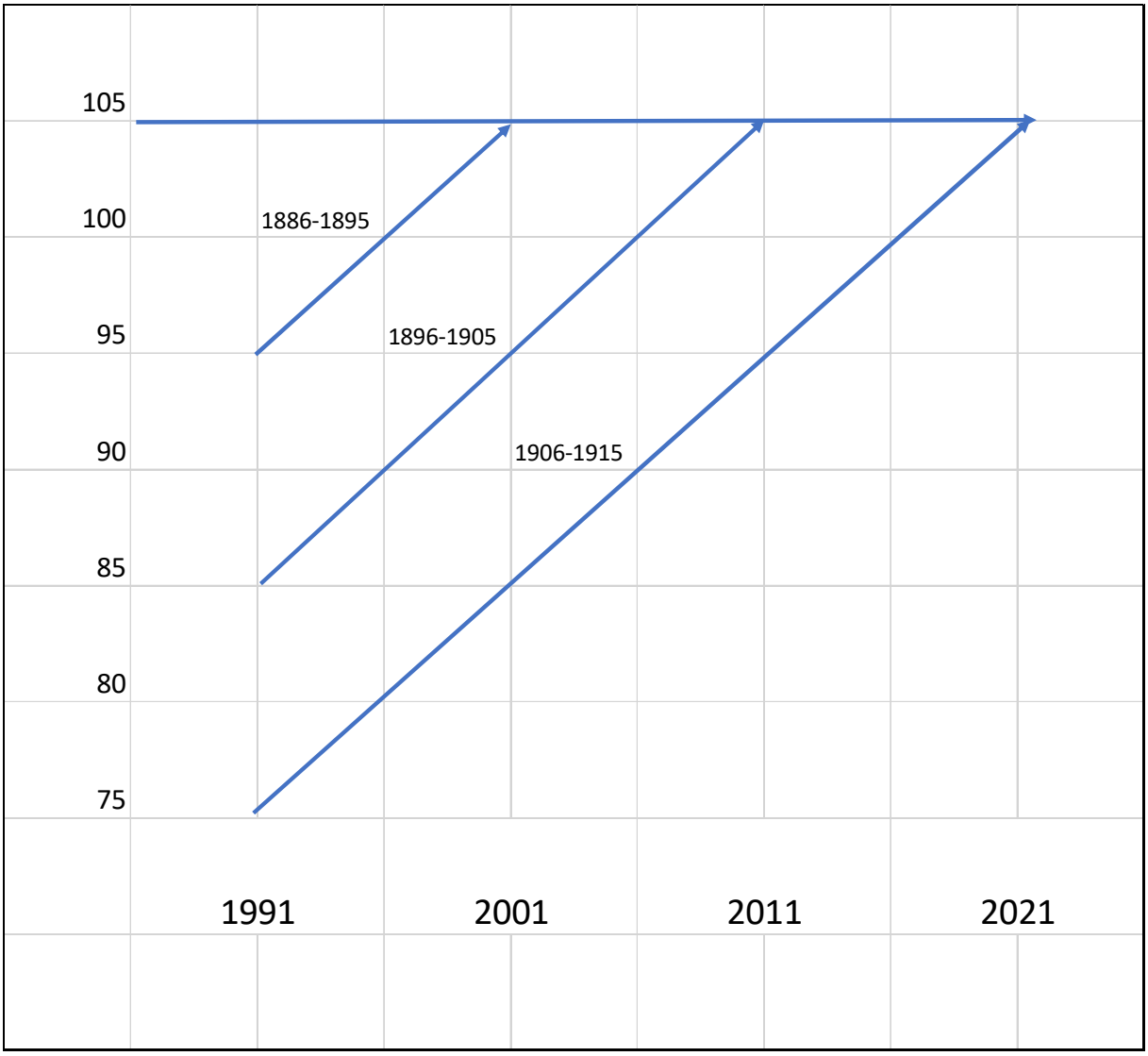
Q2. Which individual characteristics are associated with a longer survival above 105 years?

Q3. Are the same factors associated with living to 105 and better survival beyond 105 years?

Data used

We consider all persons born in Belgium (or in Europe) during the years **1885 to 1915** included and who died in Belgium after 1991 or still survive in Belgium nowadays (1/1/2021). Such data collection included exhaustively 1261 SSC and among these 40 are surviving.

Lexis diagram



For each of them the following information was collected through the continuous population registration system (completeness : 98%):

1. Date and place of birth (used to selection)
2. Sex
3. Religious or not
4. Ever-married or never-married (religious excluded, for both gender)
5. Difference of age between spouse at last marriage

6. Living Arrangement trajectory (in couple, alone, with children or in institution)
7. Age at widowhood
8. Age at entry in institution

From the 1991 census data, we collected the following information (completeness 98% 1227/1261)

9. For women, number of children, age at first and last child
10. Age at end of education
11. Living conditions: housing characteristics + auto + garden and precarity

From the 2001 census data, on those surviving at the time of census (824 out of 1261), we added in the analysis an information on the following points:

12. Health conditions
13. Level of optimism
14. Level of income

All variables 2 – 14 are dichotomised (e.g. age at end of education more than 14 or maximum 14)

Method used

Method 1 to address Q1.

For each characteristic we observe the share as reported at 1991 census for the same group of generations. For example, we compute the proportion of people born from 1885 to 1915 enumerated in the 1991 census who reported an end of scholarship above 14. The same proportion is computed on the base of the 1261 SSC. The two proportions are compared and the corresponding p-value is computed. A similar investigation is done for the 11 first characteristics whereas the situation at 2001 census is considered for the characteristics 12 to 14.

The differences between corresponding proportions will be ranked to identify which characteristics is the more associated with the possibility to reach 105.

Method 2 to address Q2

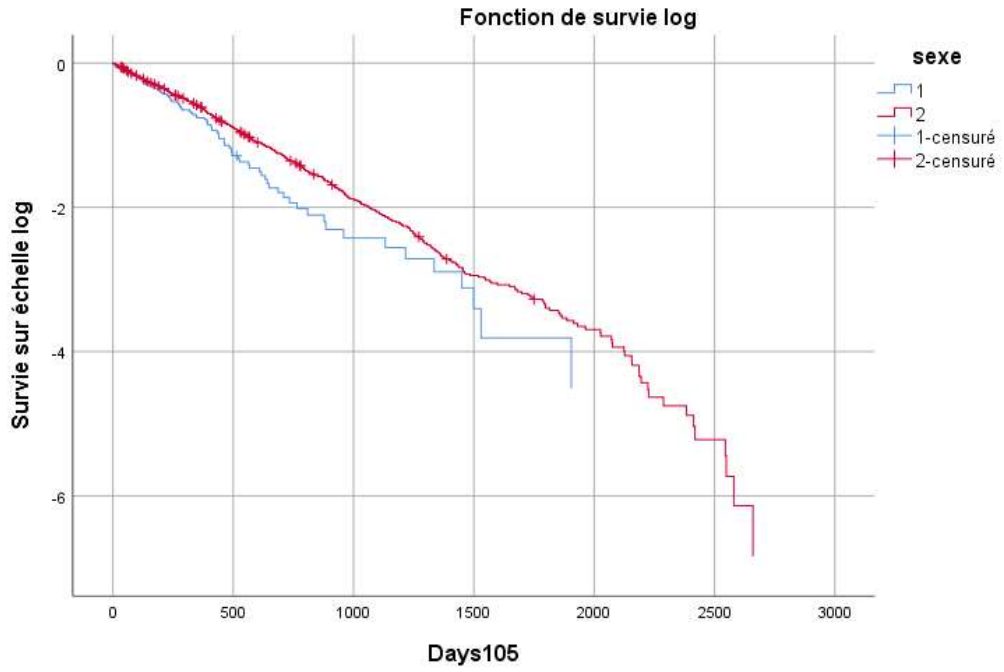
The Kaplan Meier method is applied on the 1261 SSC to take on board the 40 SSC still surviving to identify which characteristics is more favourable to survive above 105. For each of them we compute the mean and median number of days survived above 105. We will use preferably the median and compute the difference between the two groups in number of survival days.

To answer Q3, a graph crossing the difference in the proportion to reach 105 and the difference in the median number of days survived above 105 for a given variable will be proposed and the conclusion will be made considering the deviation with the diagonal that indicate an equal impact of the variable considered in reaching 105 and surviving above 105.

Preliminary results

Gender

- Among 221.492 men alive on 1.1.1991 and born from 1885 to 1915 included, 94 reached 105 years of age (0.42 per thousand) compared to 1058 women reaching 105 out of 439.451 (2.41 per thousand). The survival is more than 5 times higher for women compared to men at older age. Difference between men and women is 2.41 – 0.42 = 1.99 per thousand.
- As far as the survival above 105 is concerned, men survived in average 438 days whereas women survived 541 days. The respective median is 327 for men and 394 for women. The difference between the two medians is 67 days.



Religious status

- Being part of a religious community is an advantage to reach 105. Among the 678 religious men born from 1885 to 1915 who were alive on 1/1/1991, 3 reached 105 (4.4 per thousand, largely above 0.42 per thousand in the non-religious population) whereas 53 religious women out of 4347 survived (12.2 per thousand, also far above 2.41 per thousand in the non-religious population). The difference is of 3.98 per thousand for men and 9.79 for women.
- For survival above 105, we consider only women with an average survival of 566 days for the 53 religious compared to 539 days for all others SSC of the same generations (1005 women). Medians are respectively of 409 and 393 days. By

evidence being religious helps to reach 105 but the advantage disappears largely for the survival above. Only considering women the advantage in term of median survival is only 16 days.

Never or ever-married

Further, to be able to compare men and women with statistically significant data , we will consider men aged at 104 and their survival and distinctly women starting at age 105. Religious are excluded in the analysis.

In 1991, 6.60% of men were never married and the same proportion is of 8.00% among those reaching 104 years. Among women, 7.397% were never married in 1991 and 10.85% at 105 . These figures show a better survival for never-married people up to 104/105.

Survival to 105/104 for ever-married and never-married (excluding religious)

1991	never	ever
MEN	14628	206863
WOMEN	38037	401405
MEN 104	13	184
Women 105	56	896
Rate Men	0,889	0,889
Rate women	1,472	2,232

The difference between the proportion is null for men (occasionally) and 0.76 per thousand for women

The same characteristics are found for survival above 104/105 with 304 days for men never married compared to 245 days for ever-married, an advantage of 59 days for ever-married men. Among women the survival is of 511 days for never-married and 385 for ever-married, a disadvantage of 126 days for ever-married women. Moreover, very amazingly women never married survive before above 105 than religious women (511 days compared to 409).

FOR MORE RESULT AND DISCUSSION SEE YOU ON NEXT TUESDAY

AND MANY THANKS FOR YOUR VALUABLE SUPPORT