Hungarian Society for the History of Pharmacy
www.gyogyszeresztortenet.hu
2016. 05. 09.

Analysis of the lifespan of Hungarian male doctors and pharmacists born between 1800 and 1925

Szabolcs Dobson[1], Károly Kapronczay[2], László Szmodits[3], Júlia Singer[4]

[1,2,3]Hungarian Society for the History of Pharmacy; [4]Accelsiors Ltd.

Abstract: Introduction: *Morbidity and mortality studies (in non-representative samples) performed in Hungary from 1964 to 2010 have unanimously indicated , that the mortality of Hungarian medical doctors aged 40 years or more surpassed the mortality observed in relevant age groups of the general population. This phenomenon is explained in the literature by the burnout syndrome on the ground of stress factors associated with the medical profession, such as unresolved, continuous stress situations, role conflicts, duties, permanent alertness and financial problems.* ***Aims:*** *We aimed to conduct a comparative historical demographic study on the lifespan of Hungarian male doctors and pharmacists born between 1800 and 1925.* ***Results:*** *We demonstrated opposite trends in the average lifespan of the doctors and pharmacists from the end of the 19th century; the lifespan of pharmacists grew to 75 years of age in the first quarter of the 20th century, while that of the doctors decreased to slightly more than 67 years of age. Hungarian doctors born between 1920 and 1924 lived approximately as long as their colleagues born more than 100 years earlier, between 1810 and 1814. The comparative mortality rates show, that it was caused by an increased mortality of doctors aged between 40 and 60 years.* ***Conclusions:*** *Our data supports the literature accounts of a significant gradual reduction of lifespan of Hungarian doctors born between 1885/1889 and 1925. Our observations are compatible with the burnout syndrom theory, owing to the fact that the reduction of lifespan of the Hungarian doctors coincides with the start of the era of mass health care service fuelled by the expansion of health insurance.*

Introduction

Morbidity and mortality studies (in non-representative samples) performed in Hungary from 1964 to 2010 have unanimously indicated, that mortality/morbidity data of Hungarian medical doctors aged 40 years and over were unfavourable and their mortality surpassed that observed in the relevant age groups of the general population (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13).

This phenomenon is explained in the literature by the burnout syndrome on the ground of stress factors associated with the medical profession, such as unresolved, continuous stress situations, role conflicts, duties, permanent alertness and financial problems.

On the contrary to doctors, up to now, to the best of our knowledge neither the international, nor the Hungarian literature published mortality (and/or morbidity) data on pharmacists, i.e. another academic health care profession.

Therefore, we aimed to conduct a comparative historical demographic study on the lifespan of Hungarian male doctors and pharmacists born between 1800 and 1925. As a cut-off point, year 1925 was chosen, because, with the exception of very few individuals, people born in a given year pass away within 90

years, making it possible to perform statistical assessments on proportions and mortality rates of specific age groups in the function of ages of death.

Methods

The majority of data (n=1083) on the lifespan of medical doctors (n=1134) has been obtained from the Biographical Lexicon of Hungarian Doctors (written and edited by *Károly Kapronczay*) (14). Owing to the fact, that the contents of this book conclude by the year 2000, we searched for additional data on doctors born up to 1925 and died between 2000 and 2015. We used Medline, websites of all the three Hungarian Medical Schools and the Hungarian Academy of Science, in additon to obituaries published in professional journals, personal communications and other data from the internet. By these means we managed to identify relevant data on an additional 51 Hungarian medical doctors.

Data on Hungarian pharmacists (n=412) was obtained from the regularly up-dated, on-line Lexicon of Famous Hungarian Pharmacists (written by *László Szmodits*) (15), together with further data from the personal communication of *László Szmodits*.

We included in our analyses only male professionals who, to the best of our knowledge, passed away due to natural causes (i.i. female professionals and those who committed suicide or became victims of wars, the Holocaust or accidents were excluded).

Our data is not representative. We restricted our analyses to famous or at least well-known Hungarian doctors and pharmacists. Accordingly, age groups below 40 years of age are very under-represented. No precise definition can be given to the term ’famous’, because our sample includes professionals from many different fields, from professional public life to theoretical research, university education and everyday professional practice. Due to the lack of representative data, it is not known, to what extent our data is biased by the above characteristics.

Statistical methods

Data in *Table 1.*, presenting descriptive statistics of lifespan for each profession, which were calculated, in a breakdown of date of birth grouped into time intervals of 5 years. N and mean values, and 95% confidence intervals (CIs) of the mean are presented for each time interval, along with the slope of the linear regression (representing the trend in the given interval) and the P-value testing of the null hypothesis of no trend at all. P-values were interpreted descriptively, with no adjustment for multiplicity.

In order to evaluate long term trends, a piecewise linear regression was fitted to the lifespan of each profession, with knots at each of the 20 year-long periods (1820, 1840, 1860, 1880, 1900). These knots were pre-defined, and within the full model added slopes (compared to the first period 1800-1820) were

estimated for each time interval, in addition to the interaction between the added slope and profession. In the restricted piecewise regression model for time intervals with a non-significant interaction term, equal slopes were assumed, and the corresponding interaction terms were left out from the model.

Mortality rates for each profession were estimated and short-term fluctuations were smoothed out by calculating moving averages for 5-year intervals, by profession and by categories for age at death.

All calculations were performed in SAS version 9.4.

Results

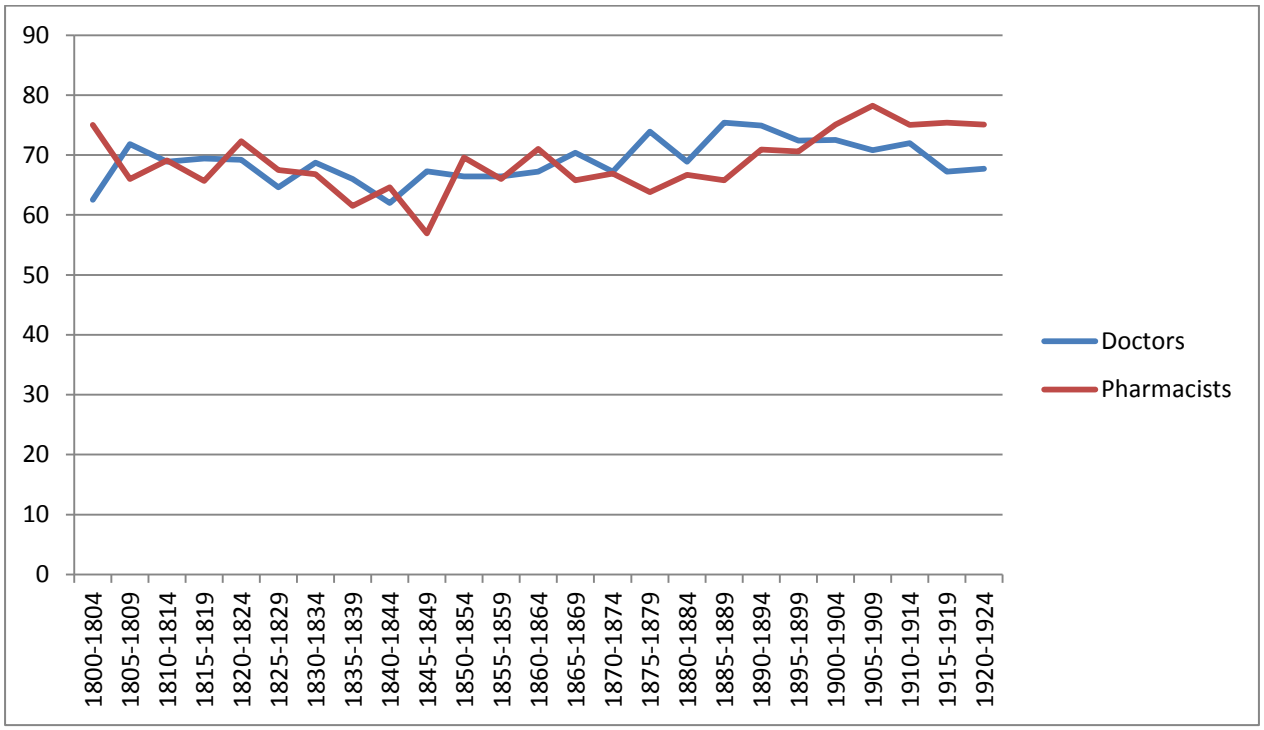
Descriptive statistics of lifespan for each 5-year intervals is presented in *Table 1.* and *Figure 1*.

Table 1. *Descriptive statistics of lifespans of Hungarian doctors and pharmacists (in years), in a breakdown of professions and intervals of birth between 1800 and 1925*

Interval of birth	Physicians					Pharmacists					Glob.P[d]
	N	Mean	CI[(a)]	b[(b)]	P[(c)]	N	Mean	CI[(a)]	b[(b)]	P[(c)]	
1800-1804	12	62.5	55.5 - 69.5	-3.20	0.177	3	75.0	22.8 - 127	-1.50	0.750	0.369
1805-1809	20	71.8	65.3 - 78.2	2.69	0.183	7	66.0	57.3 - 74.7	-2.06	0.727	0.382
1810-1814	28	68.9	63.7 - 74.0	1.55	0.374	8	69.1	59.5 - 78.8	-4.85	0.092	0.171
1815-1819	30	69.4	64.5 - 74.2	-0.49	0.789	9	65.7	53.7 - 77.6	-0.70	0.871	0.954
1820-1824	19	69.2	64.4 - 74.0	2.14	0.305	9	72.3	61.8 - 82.9	1.64	0.452	0.438
1825-1829	20	64.6	55.9 - 73.3	-5.82	0.033	11	67.5	57.0 - 78.1	-6.80	0.064	0.031
1830-1834	15	68.7	60.3 - 77.0	-1.35	0.528	18	66.8	61.8 - 71.7	0.54	0.790	0.803
1835-1839	19	66.0	58.7 - 73.3	-2.58	0.266	13	61.5	54.1 - 68.8	1.00	0.818	0.482
1840-1844	22	62.0	57.4 - 66.5	-0.63	0.711	13	64.6	58.0 - 71.2	0.91	0.672	0.856
1845-1849	32	67.3	62.4 - 72.1	5.33	0.001	9	56.9	44.2 - 69.5	-1.56	0.510	0.004
1850-1854	20	66.4	59.8 - 73.0	0.92	0.710	16	69.6	63.0 - 76.1	1.70	0.608	0.805
1855-1859	31	66.4	62.3 - 70.6	1.65	0.251	17	66.0	60.3 - 71.7	-0.60	0.729	0.509
1860-1864	38	67.2	63.5 - 70.8	1.51	0.214	24	71.0	66.3 - 75.6	-1.29	0.480	0.373
1865-1869	41	70.4	66.7 - 74.1	-0.60	0.646	26	65.8	60.6 - 71.0	1.34	0.378	0.617
1870-1874	42	67.2	63.8 - 70.7	-0.20	0.889	20	66.9	58.5 - 75.2	0.01	0.996	0.991
1875-1879	40	73.9	69.9 - 77.8	1.40	0.278	20	63.8	57.2 - 70.3	-2.39	0.266	0.299
1880-1884	45	68.9	64.5 - 73.3	-0.05	0.973	21	66.7	60.8 - 72.6	-1.16	0.610	0.872
1885-1889	55	75.4	71.8 - 78.9	-0.51	0.714	24	65.8	59.3 - 72.2	1.89	0.313	0.570
1890-1894	93	74.9	72.5 - 77.4	-1.13	0.236	17	70.9	63.0 - 78.7	1.13	0.737	0.445
1895-1899	94	72.4	70.0 - 74.7	-0.23	0.778	11	70.6	60.4 - 80.9	2.49	0.267	0.521
1900-1904	107	72.5	70.3 - 74.7	-0.19	0.815	29	75.1	70.1 - 80.0	-0.55	0.737	0.920
1905-1909	85	70.8	68.6 - 72.9	-0.84	0.288	13	78.2	72.3 - 84.2	-1.28	0.491	0.457
1910-1914	97	72.0	69.7 - 74.3	-1.19	0.142	31	75.0	70.7 - 79.3	0.38	0.820	0.334
1915-1919	58	67.2	64.2 - 70.2	1.02	0.273	13	75.4	68.1 - 82.6	-0.59	0.806	0.530
1920-1924	57	67.7	63.9 - 71.6	0.41	0.737	29	75.1	70.1 - 80.1	1.28	0.470	0.727

a) The 95% CI of mean; b) Slope of the linear regression; c) P-value corresponding to the null hypothesis b=0; d) P-value corresponding to the null hypothesis of equality of the two slopes for the two professions

Figure 1. *Lifespan diagram of Hungarian doctors and pharmacists born between 1800 and 1925 (5 year intervals of birth versus average lifespan values)*



The mean lifespan values of the doctors mostly remained below 70 years of age in the period between 1800 and 1885. The mean values decreased from 69.2 years to 62.0 years between 1824 and 1845. This was followed by an important increase from 67.2 to 75.4 years between 1864 and 1889, which continued with a decrease of similar extent from 75.4 to 67.2 years between 1885 and 1919. Then, this remained stagnant until 1924 (67.5 years).

Until 1860 no difference can be seen between the two professions in terms of mean lifespan (for instance, in the 1855-1859 period, mean values were 66.4 and 66.0 years for physicians and pharmacists, respectively). Starting from 1860, differences can be seen between the two professions. First the doctors achieved higher mean lifespans with an increasing trend, whereas the mean lifespan of pharmacists was almost constant. In the period between 1885 and 1889 the mean lifespan of the pharmacists was 65.8 years, while the mean lifespan of the doctors was 75.4.

After this, in the years between 1890 and 1909 there was an important increase in mean lifespan for pharmacists, from 65.8 to 78.5 years, with a slight decrease until 1924, to mean values around 75 years.

Results of the full piecewise regression model are summarized in *Table 2*.

Table 2.: *P values of the full piecewise regression model*

Effect	P value
Profession	0.690
Common slope for all data. for the whole period 1800-1925	0.599
Slopes by profession for the whole period 1800-1925	0.690
Added slope for the period after 1820	0.116
Added slope for the period after 1840	0.003
Added slope for the period after 1860	0.084
Added slope for the period after 1880	0.042
Added slope for the period after 1900	0.004
Interaction term between the added slope and profession after 1820	0.869
Interaction term between the added slope and profession after 1840	0.541
Interaction term between the added slope and profession after 1860	0.026
Interaction term between the added slope and profession after 1880	<0.001
Interaction term between the added slope and profession after 1900	0.414

As indicated by the P values, differences between the two professions became statistically significant from 1860 to 1900, therefore, only these interaction terms were left in the restricted model, assuming equal slopes for the other periods. Coefficients of the restricted models are presented in *Table 3*.

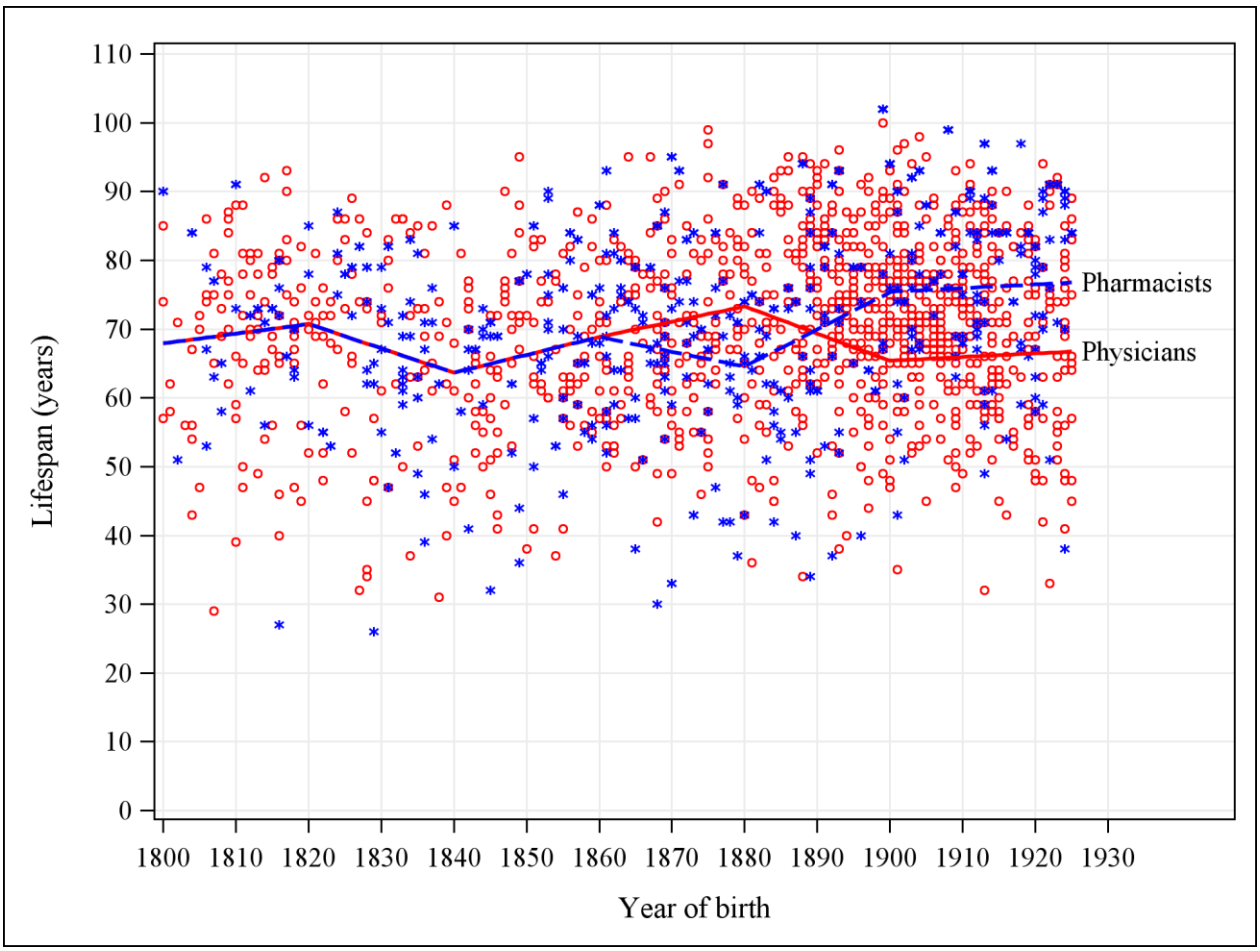
Table 3. *Coefficients estimated within a restricted piecewise regression model framework*

Coefficient	Estimate	SE	P value[a]
Intercept	-185.85	312.47	0.552
Common slope for all data, for the whole period 1800-1925	0.1406	0.1723	0.415
Added slope for the period after 1820	-0.4947	0.2605	0.058
Added slope for the period after 1840	0.6137	0.1971	0.002
Added slope for the period after 1860	-0.4484	0.1776	0.012
Added slope for the period after 1880	0.6603	0.1757	<.001
Added slope for the period after 1900	-0.3598	0.1220	0.003
Added slope for physicians, after 1860	0.3974	0.08637	<.001
Added slope for physicians, after 1880	-0.7978	0.1490	<.001

(a) P-value for testing the null hypothesis of a coefficient equal to 0

As indicated by the P values of the restricted model, the first statistically significant change point occurs in 1840, although the change point showed borderline significance in 1820, as well (P=0.058). Between 1820 and 1839, and after 1900 a decrease occurred in both professions, and there was no significant difference between the trends. The two professions exhibit a statistically significant departure from 1860. For the doctors a slightly increasing trend is followed by a more pronounced decreasing trend, whereas for the pharmacists an opposite trend can be observed, first decreasing and then increasing. Fitted piecewise regression lines are presented in *Figure 2*.

Figure 2. *Piecewise trends for each profession, for 20-year long intervals (restricted piecewise regression framework)* [(a)]



(a) except the last interval which is 25 years long, from 1900 to 1925

Annual mortality rates (smoothed by moving average) are presented by categories of lifespans, for both professions in *Figures 3-7*.

Figure 3. *Mortality rates (moving averages for 5-year intervals) for the lifespan category of ≥ 40 and <50 years of age*

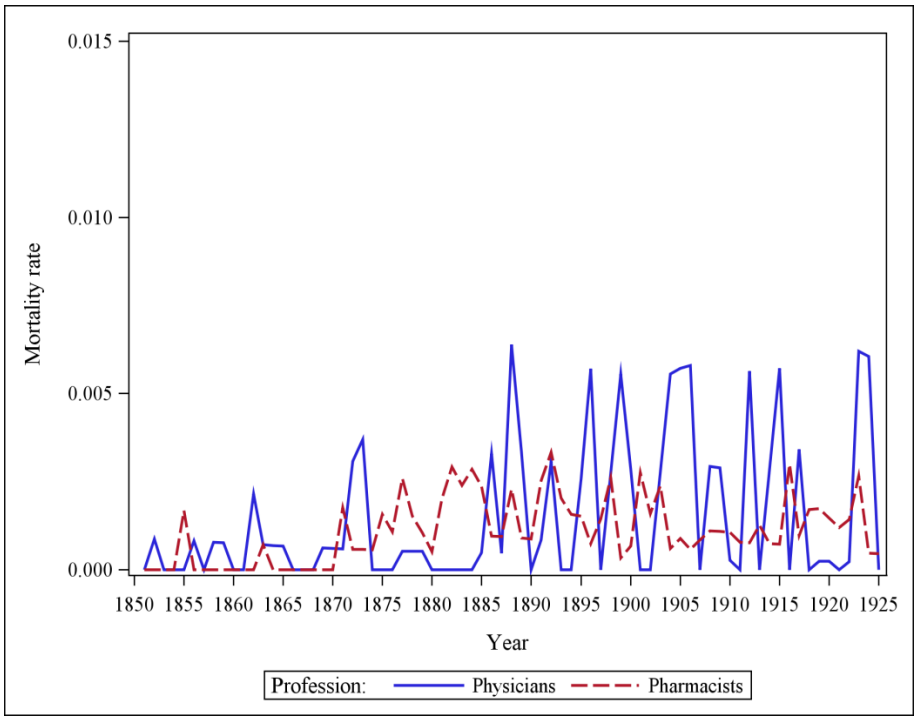


Figure 4. *Mortality rates (moving averages for 5-year intervals) for the lifespan category of ≥ 50 and <60 years of age*

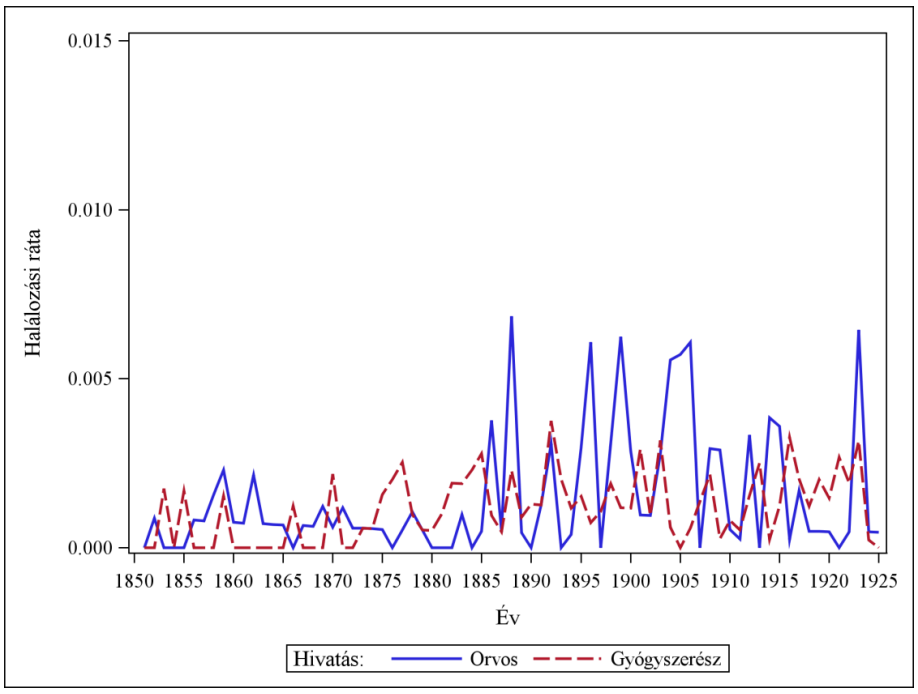


Figure 5. *Mortality rates (moving averages for 5-year intervals) for the lifespan category of ≥ 60 and <70 years of age*

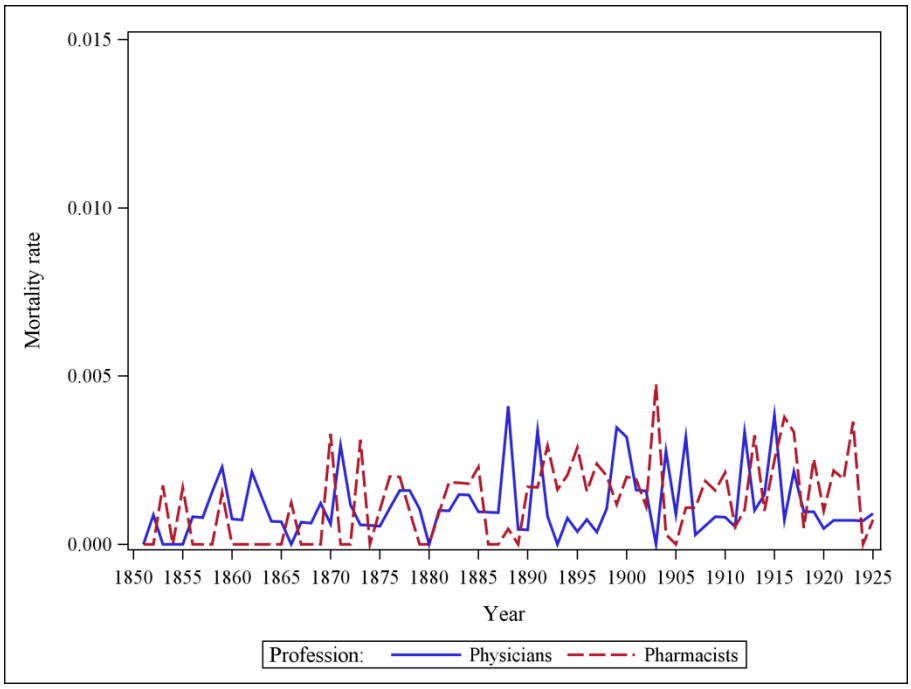


Figure 6. *Mortality rates (moving averages for 5-year intervals) for the lifespan category of ≥ 70 and <80 years of age*

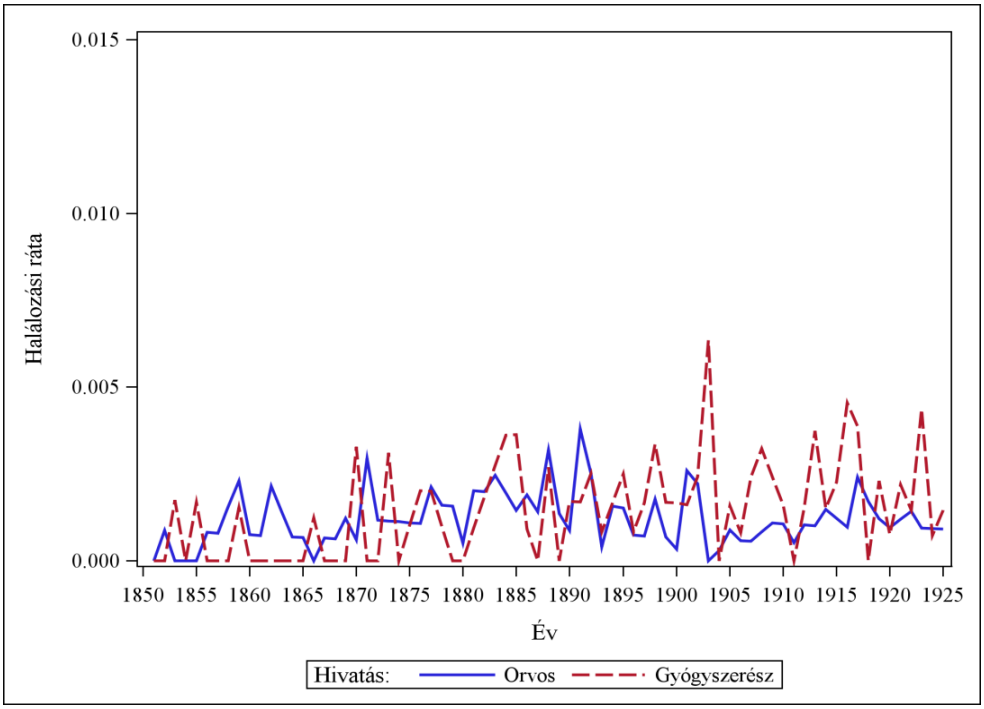
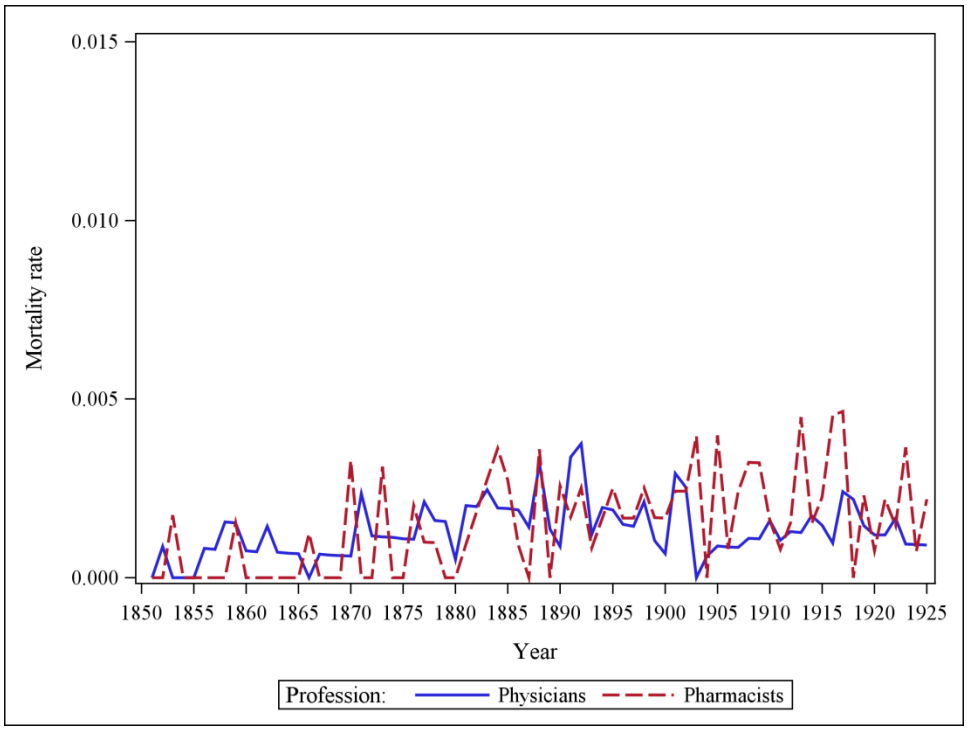


Figure 7. *Mortality rates (moving averages for 5-year intervals) for the lifespan category of ≥80 years of age*



Figures 3.-7. suggest that there is a higher mortality rate for doctors in the younger lifespan categories (between 40 and 59 years), and this phenomenon is reversed in the older lifespan categories, especially above 70 years, where higher mortality rates can be seen for pharmacists. These differences are especially pronounced after 1890.

Discussion

We have performed the first comparative historical demographic study in the literature on the lifespan of (Hungarian) doctors (n=1134) and pharmacists (n=412) born between 1800 and 1925.

Our results show the followings:

1. The mean lifespan values of **Hungarian doctors** mostly remained below 70 years of age in the period between 1800 and 1885. The mean values decreased from 69.2 years to 62.0 years between 1824 and 1845. This was followed by an important increase from 67.2 to 75.4 years between 1864 and 1889, which continued with a decrease of similar extent from 75.4 to 67.2 years between 1885 and 1919. Then, this remained stagnant until 1924 (67.5 years).
2. Until 1860 no difference can be seen between the **Hungarian pharmacists and doctors** in terms of mean lifespan (for instance, in the 1855-1859 period mean values were 66.4 and 66.0 years for doctors

and pharmacists, respectively). Starting from 1860, differences can be seen between the two professions. First, the doctors achieved higher mean lifespans with an increasing trend, whereas the mean lifespan of pharmacists was almost stagnant. In the period between 1885 and 1889 the mean lifespan of the pharmacists was 65.8 years, while the mean lifespan of the doctors was 75.4. After this, in the years between 1890 and 1909 there was an important increase in mean lifespan for pharmacists, from 65.8 to 78.5 years, with a slight decrease until 1924, to mean values around 75 years.

3. Therefore, from the end of the 19th century, opposite trends can be observed for the lifespans of Hungarian doctors and pharmacists: the lifespan of pharmacists increased to 75 years in the first quarter of the 20th century, whereas that of the doctors decreased to slightly more than 67 years of age.
4. Hungarian doctors born between 1920 and 1925 had approximately the same lifespan as their colleagues born more than 100 years earlier, between 1810 and 1914. The comparative mortality rates show, that it was caused by an increased mortality of doctors aged between 40 and 60 years.

Our results are in harmony with those described in the literature. For example, *Balog* studied the mortality of Hungarian doctors between 1960 and 1964 and concluded, that the mortality of male doctors in the age group of 40-59 years and especially the age group of 60-69 years was much higher, than that of the relevant age groups of the general population. According to the author, this was caused mainly by the very high mortality due to myocardial infarction (1). The age group studied by *Balog* essentially corresponds to the age group born between 1890 and 1920. We have also observed a reduced lifespan and increased mortality for this age group in our study, compared to doctors born earlier.

It should be noted, that our data is not representative. We restricted our analyses to famous or at least well-known Hungarian doctors and pharmacists. It is not known, to what extent our data is biased by the potential differences between our sample of famous/well-known doctors and the representative data of Hungarian doctors and pharmacists, it should be noted, that such representative data practically cannot be obtained for the studied 125 year-long period.

In agreement with the literature, a logical explanation for the observed gradual lifespan reduction of Hungarian doctors born from 1885/1890 could be the development of burnout syndrome. Doctors born after 1885/1890 started their professional activity in an era, where increasing numbers of patients had been channeled into the health care system by the expansion of health insurance. Society became increasingly medicalised. The proportion of people with health insurance between 1885 and 1947 is presented in *Table 4.* (16).

Table 4. *Proportion of people with health insurance in Hungary between 1885 and 1947* (16)

Year	Number of insured people (persons)	Number of insured people as a percentage of the population
1885	147,000[1]	0.9%
1891	447,000	2.6%
1900	594,000	3.1%
1903	634,000	3.3%
1911	1,155,000	5.5%
1913	1,204,000	6.3%
1915[2]	835,000	4.4%
1927[3]	2,000,000	24%
1931	2,200,000	25%
1938	2,800,000	31%
1947	3,000,000	33%

[1]With the exception of the corporate insurance funds; [2]Total number of insured people in 1915 with all sickness insurance funds included; [3]With family members from 1927 on.

The growing importance of social insurance in health care is shown by the fact, that increasing numbers of patients had been treated in the specialised outpatient clinics of the National Institute of Social Insurance (NISI), especially in the capital, Budapest. Here, 517 doctors worked for NISI in 1934, while in 1942 there were already 538 specialised doctors employed by NISI, with a total number of visits growing from 3.6 million to more than 6 million during this period of time. In 1928 general medical care was provided by 1326 doctors and company sickness insurance funds employed 202 doctors. While in the 1920s one general practitioner saw 8 or 9 patients in a one or two-hour long consultation period, at the end of the 1930s he/she had to see 20 to 30 patients. Only 4 to 5 minutes were dedicated to each patient (17).
Doctors born in the second half of the 1880s, reached the age of 50 years or more at the end of the 1930s . This age is associated already with an increased cardiovascular risk. Factors contributing to the burnout syndrome, such as high work intensity and astressful workload, had already been present in the daily life of doctors.

Conclusions

In summary, our data supports literature accounts of a significant gradual reduction of lifespan of Hungarian doctors born between 1885/1889 and 1925. These generations of Hungarian doctors worked and lived in most parts of the 20th century and some of them passed away in the first decade of the 21st century.
Our observations are compatible with the burnout syndrome theory, owing to the fact that the reduction of lifespan of the Hungarian doctors coincides with the start of the era of the mass health care service fuelled by the expansion of health insurance.

Acknowledgements: The authors express their gratitude to Dr. Zsuzsa Molnár for her indispensable help in the digitalisation of the lifespan data of the Hungarian doctors and pharmacists.

References

See the English translations of the Hungarian language titles in italic letters in brackets, after the original.

1. *Balog, J.:* A magyarországi orvosok halálozása 1960-64 években (*Mortality of doctors in Hungary between 1960-1964*). Népegészsgügy 59, 250-259 (1978)

2. *Bánlaky, P.; Kérész, Gy.; Solymosi, Zs.:* Orvosok Magyarországon (*Doctors in Hungary*). Akadémiai Kiadó, Budapest, 1981

3. *Simon, T. et al.:* Data to the mortality of the Hungarian medical specialists in the seventies. Kézirat

4. *Sonneck, G.:* Orvosok öngyilkossága és kiégettsége (*Suicide and burnout syndrome among doctors*). *Szenvedélybetegségek,* 2(1): 28–31 (1982)

5. *Molnár, L. (ed).:* Orvosiszociológia (*Medical sociology*). Medicina, Budapest, 1989

6. *Barna, P.:* A magyar és a külföldi orvosok élettartama a szaklapok halálozási rovatának tükrében (*Lifespan data of Hungarian and foreign doctorsbased on the obituaries of professional papers*). Orvosi Hetilap 131 (34), 1893 (1990)

7. *Molnár L.–Mezey M.:* Az orvosok megbetegedéséről és halandóságáról. I.-III. (*On the morbidity and mortality of doctors I.-III.*) *Lege Artis Medicinae,* 1(8): 524–528.; (9–10): 640–644; (11): 966–970 (1991)

8. *Rucinski, J.; Cybulska, E.:* Az orvosok mentális zavarai (*Mental disorders of doctors*). *Psychiatria Hungarica,* 1993. február,8(1): 49–60 (1993)

9. *Győrffy, Zs.; Ádám, Sz.:* Az egészségi állapot, a munkastressz és a kiégés alakulása az orvosi hivatásban (*Health status, work-related stress and the development of burnout syndrome in the medical profession*). Szociológiai Szemle 3, 107-127 (2004)

10. *Tislér, A:* Az orvos hipertóniája (*Hypertension of the doctors*). Praxis, 15(3), 25-28 (2006)

11. *Major, J., Ress, K., Hulesh, B., et al.:* A kiégés jelensége az orvosi hivatásban (*The burnout syndrome in the medical profession*). Lege Artis Med. 16 (4), 367-373 (2006)

12. *Kopp, M.* (ed.): Magyar Lelkiállapot (*Phychological status in Hungary*). Semmelweis Kiadó, Budapest, 2008.

13. *Guseo, A.; Hertelendi, A.:* Mentsük meg nővéreinket, orvosainkat (*Save our nurses and doctors*). Orvosi Hetilap 155 (52), 2082-2092 (2014)

14. *Kapronczay Károly (közrem. Tóth Magda):* Magyar orvoséletrajzi lexikon (*Biographical Lexicon of Hungarian Doctors*). Mundus Magyar Egyetemi Kiadó, Budapest, 2004.

15. *Szmodits László:* Híres magyar gyógyszerészek lexikona (Lexicon of Famous Hungarian Pharmacists). www.gyogyszeresztortenet.hu (date of last download: 31. 03. 2015.)

16. *Kempler K:* A magyarországi gyógyszerészet a századfordulón (Hungarian pharmacy at the turn of the 19th – 20th centuries) (1888-1914). ISSN Ol33-946X, Budapest, 1984

17. *Bánóné Fleischmann M.:* A társadalombiztosítás fejlődése Magyarországon 1945-ig (*The development of health insurance in Hungary up to 1945*). Gyógyszerészet 34, 649-655 (1990)