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Descriptive Finding

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Abstract

BACKGROUND
A historical perspective on socioeconomic inequalities in lifespan provides insights into their persistence and potential for reduction. However, relevant administrative data prior to the 1970s are often unavailable, necessitating the use of alternative sources.

OBJECTIVE
We aim to study the historical development of lifespan inequalities in the post-war period in Vorarlberg, Austria, using data collected from newspaper obituaries.

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METHODS
We extracted data from all obituaries published in a monopolist newspaper, at 5-year intervals (1946–1981, n = 10,254). Lifespan was the outcome, and we used four indicators of socioeconomic position: obituary size (a financial proxy), tertiary education, blue/white-collar occupation, and honorary service. We estimated inequalities in lifespan using linear and quantile regressions.

RESULTS
The mean lifespan was 60 years in 1946 and 71 years in 1981. In 1946, individuals with medium-sized obituaries lived 5.90 years longer than those with small obituaries (95% CI: 1.33–10.48). Obituary coverage was below 40% before the 1960s but had risen to 45% by 1961, when medium and large obituaries were associated with longer lifespans of 4.34 years (95% CI: 1.27–7.42) and 8.51 years (95% CI: 0.23–16.80) respectively. By 1981 (coverage: 84%), differences had narrowed to +2.50 years for medium-sized obituaries (95% CI: 0.83–4.17).

CONTRIBUTION
Using obituary data – an underexplored, yet rich data source for studying population health – we found that lifespan inequalities narrowed in the immediate post-war period, mainly driven by increasing lifespan in disadvantaged groups. Comparisons with available registry data illustrate that obituary data effectively capture mortality patterns and may help improve the understanding of the evolution of health inequalities when administrative data are limited.

1. Introduction

Socioeconomic status is a key determinant of physical and mental health across the life course and, ultimately, of mortality (Mackenbach 2019). Understanding and tackling the causes of these inequalities has been a central societal concern ever since the Industrial Revolution. Yet, despite impressive advances, socioeconomic inequalities in mortality stubbornly persist, which has been called "one of the great disappointments of public health" (Mackenbach 2012: 761). Understanding the conditions that shape the observed socioeconomic inequalities in the general population requires longitudinal lifespan data (Mielck and Wild 2021). Yet, for much of the 20th century, sufficiently detailed administrative data are scarce (Mackenbach 2019; Kang-Auger et al. 2021). Exceptions include studies of adult mortality in Southern Sweden (1913–2015) (Bengtsson, Dribe, and Helgertz 2020), in England and Wales (1921–1972) (Pamuk 1985), and in selected European countries after 1970 (e.g., Mackenbach et al. 2003; de Gelder et al. 2017).

Overall, the socioeconomic–mortality relationship, especially in the post-war population, remains poorly understood in Europe (Bengtsson, Dribe, and Helgertz 2020).

To address this research gap, previous work has largely used tombstone-derived mortality data (e.g., Smith et al. 1992; Wilson et al. 2018; O'Donovan et al. 2024). By contrast, newspaper obituaries have rarely been used to study health inequalities in the historical context (Kang-Auger et al. 2021). Where they have, including in statistical analyses of idiosyncratic sub-populations (e.g., Oscar winners: see Redelmeier and Singh 2022), they offer little population-level insight. To validate obituaries as a data source for historical inequality research, a recent proof-of-concept study (Mayer, Berger, and Oberndorfer 2023) collected data for 2022, a period that can be compared to official statistics. For 2022, the study shows that in Vorarlberg, Austria, newspaper obituaries covered 82% of deaths, with almost identical sex distribution in both data sources. The mean obituary-based lifespan was 1.9 years longer than the death registry figures. This analysis draws on several socioeconomic markers, including education, occupation, and obituary size. The underlying assumption is that obituaries present the deceased's life favourably ('de mortuis nihil nisi bene'), embedding socioeconomic cues. Obituary size, correlating with the obituary price, reflects the financial means of the deceased and their families, and can thus be used as symbolic social status differentiation. This is supported by other conceptual and descriptive research that finds obituaries to be an expensive means of making sense of a social event (Togonu-Bickersteth 1986) and treat obituary length and presentation as socially meaningful features shaped by, e.g., status, gender, and occupation (Roniger 1994; Maybury 1996; Phillips 2007). Obituaries as a data source to assess population-level mortality inequalities thus seem promising, but have not yet been used in historical trend analyses.

According to the previous Austrian proof-of-concept study (Mayer, Berger, and Oberndorfer 2023), in 2022, individuals with medium-sized obituaries lived 6.02 years (95% CI: 4.19, 7.85) and individuals with the largest obituaries 12.04 years (95% CI: 7.04, 17.04) longer than individuals with small obituaries, while blue-collar workers lived 10.50 years (95% CI: –14.51, –6.49) years shorter than individuals with no (reported) occupation. These findings are in line with other Austrian registry-based studies (1981–2021) (Doblhammer, Rau, and Kytir 2005; Schwarz 2005; Klotz 2007; Rau et al. 2008; Mackenbach et al. 2019; Statistik Austria 2023).

2. Aim of this study

With the development of socioeconomic inequalities in mortality between the 1950s and 1970s – the immediate post-war period characterised by recovery and welfare state expansion – being largely a black box, this study aims to estimate the extent and trend of

socioeconomic differences in lifespan using obituary data from a regional newspaper with a long-term monopoly. A historical perspective on socioeconomic lifespan inequalities provides insights into their persistence over time, and, in comparison to current data, indicates the scope for achievable reductions in the future. Vorarlberg, Austria – a developed, predominantly rural region whose historical context is not fully representative of Austria as a whole – serves as our case study to estimate lifespan inequalities between 1946 and 1981.

3. Materials and methods

3.1 Data

We draw on obituaries published in the daily regional newspaper, Vorarlberger Nachrichten (VN). Since being re-established in September 1945 following World War II, VN has functioned as Vorarlberg's de facto monopoly newspaper (Seethaler 2005), maintaining the largest regional circulation (Russmedia GmbH 2022) and the majority daily readership (Vorarlberg Chronik n.d.). The dataset includes all obituaries from 1 January to 31 December in 1946, 1951, 1956, 1961, 1966, 1971, 1976, and 1981. We manually retrieved the data from daily-edition PDF scans received from the Vorarlberg State Library and double-checked each extracted data entry. Examples of published obituaries are presented in Figures A-1–A-3 in the online appendix. The year 1981 was selected as the study endpoint because it marks the beginning of a period for which registry-based studies are available for Austria, and because extending the manual data extraction beyond this point would have exceeded the feasible scope of this study. To validate the coverage and accuracy of the collected data, we used Statistics Austria's regional death registry reports (1946–1981) (Österreichisches Statistisches Zentralamt 1947, 1953, 1958; Statistik Austria 2022).

3.2 Variables

From each obituary, we extracted information on the deceased's name (to identify multiple obituaries published for the same person), year of birth, year of death and/or age at death, sex, the originator of the obituary, and number of obituaries per deceased. As our main proxy for socioeconomic position, we used obituary size. As the price of an obituary scales with size, it captures the financial wealth of the deceased and their family (Roniger 1994; Maybury 1996; Eid 2002; Phillips 2007; Barth, van Hoof, and Beldad 2013) and thus symbolic status differentiation (Ergin 2009; Barth, van Hoof, and Beldad

2013). To account for shifts in standard sizes over time, obituary sizes (area in cm^2) were mapped into three categories for each year, differentiating between sizes clustering around small, medium, and large frame areas. While VN distinguishes five main sizes and prices in 2022 (Mayer, Berger, and Oberndorfer 2023), exact prices after 1946 are unknown. VN was not able to report these: however, the historical practice of pricing by obituary frame size was confirmed by a regional mortician. Obituaries are paid by the originator, which in Vorarlberg is most commonly the family (Mayer, Berger, and Oberndorfer 2023). In the case of multiple obituaries, the size of the family-placed obituary was used in the analysis.

Regarding additional markers of socioeconomic status, although less reliable than obituary size due to limited reporting, we largely followed the preceding proof-of-concept study (Mayer, Berger, and Oberndorfer 2023). First, where academic titles were provided, we coded educational attainment using ISCED (International Standard Classification of Education) as a binary variable: tertiary education (ISCED levels 6–8) versus lower and none/none reported. Second, when the deceased's formal occupation at the time of death or prior to retirement was stated, we followed ISCO-88 COM (International Standard Classification of Occupations 1988) and grouped it as blue-collar profession (ISCO codes 6–9, e.g., farmers, craft workers, factory workers) or white-collar profession (ISCO codes 1–5, e.g., merchants, teachers, notaries), as compared to no formal (reported) profession. Stating the deceased's job in an obituary is an important means of determining the social status of both the deceased and those associated with the deceased (Ergin 2009). Third, mentions of a badge of honour for special achievements, honorary titles, longstanding membership, or volunteer activities, hereafter referred to as 'honorary service', was included as a binary indicator for social integration and connectedness (Ergin 2009).

3.3 Statistical analysis

Lifespan in years, if not reported in the obituary, was calculated as the difference between year of death and year of birth. To ensure comparability with official data, we excluded individuals with missing lifespan and cases where the reported date of death preceded the obituary year (primarily soldiers).

As a first step, we compared mean and median lifespans in our obituary data with the available aggregated register-based data to assess the potential selection bias in obituaries. Second, we estimated lifespan differences by obituary size, education, occupation, and honorary service using separate multivariable linear regressions for each socioeconomic indicator and year. We adjusted the regression models for sex and for multiple obituaries, as a short lifespan may lead to larger and multiple obituaries and may

bias the association between obituary size and lifespan downward (Mayer, Berger, and Oberndorfer 2023). This may be because deaths at young ages might be perceived as more tragic and the stronger bereavement expressed in larger obituaries. Similarly, dying while employed or shortly after retiring may lead to multiple obituaries, as employers might publish obituaries for their former employees.

As sensitivity analyses, we repeated our analysis: (1) estimating median lifespan and differences in median lifespans by quantile regressions, (2) restricting the analyses to adults (> 18 and above years) to allow for a more valid comparison with contemporary estimates, (3) conducting sex-stratified analyses, (4) pooling medium and large obituaries into a single category compared to small obituaries, and (5) including reporting of the husband's profession in a female's obituary as an additional category in the occupational variable to account for implied social status.

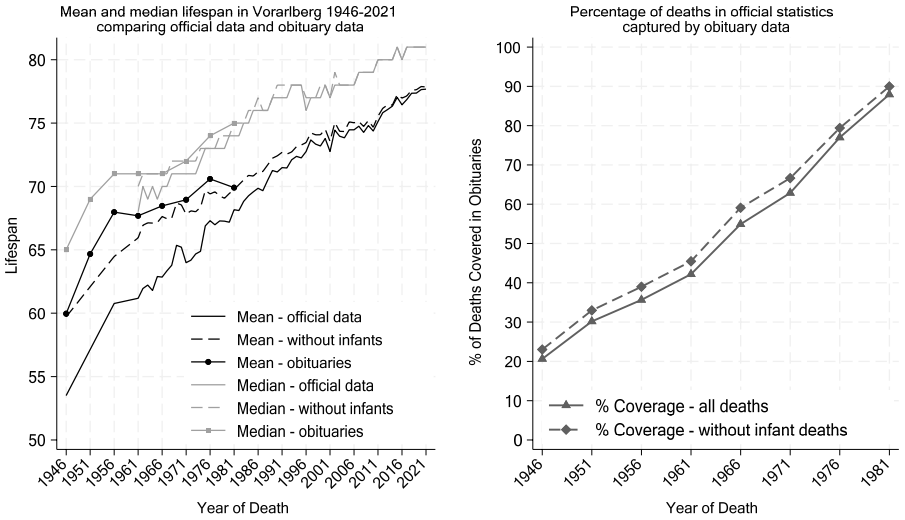
MsExcel (2016) was used for data extraction and preparation, and Stata 19 for the statistical analysis. The anonymized dataset and the software code for the main analyses are available online (Oberndorfer 2025).

4. Results

From 10,254 extracted obituaries we retrieved demographic and socioeconomic information for 9,544 deceased, and excluded 190 whose deaths predated the obituary year. Of the remaining 9,354, 95% (n = 8,914) had complete lifespan data and were included in our analysis. Relative to registry counts, obituary coverage of annual deaths rose from 23% (1946) to 45% (1961) and 84% (1981) (Figure 1, Table A-1 in the online appendix).

In Figure 1, we show the mean (connected black dots) and median (connected grey squares) annual lifespans calculated from our obituary data. As a comparison, we use available aggregated data from Statistics Austria to calculate the annual mean (solid black line; 1946, 1956, 1961–2021) and median (solid grey line; 1961–2021) lifespan for Vorarlberg. We include post-1981 data to illustrate the stability of developments in lifespan in later years. In 1946, the mean lifespan in our obituary data was higher (60.04 vs. 53.50 years) than in the register-based data. This difference decreases over time (1981: 70.71 vs. 67.42 years). However, the overestimation of the median lifespan in the obituary data is much smaller than the overestimation of the mean. As evident in Figure 2, this overestimation stems almost entirely from missing infant mortality in the obituary data; accordingly, Figure A-4 in the online appendix presents the data for adults aged 18 and above only. Otherwise, the obituaries closely match registry distributions.

Figure 1: Comparing mean and median age-at-death from obituary data with available aggregated register-based data



Note: Vertical axis (right panel) shows the percentage of official deaths covered in newspaper obituaries. Note that register-based data in 1946 and 1956 were reported in 5-year age brackets. Additionally, the category for the oldest age groups has become increasingly detailed over the years. While in 1946 the oldest reported category is '70 and above', it increased to '80 and above' in 1956. In 1961 and 1966 the oldest age category was again raised, to '95 and above', and then again to '99 and above' from 1970 to 2016. As of 2017 the highest category is '100 and above'. We use the mid-point of the 5-year age bands (e.g., 62.5 for ages 60 to 65) to calculate the mean and median ages. As the oldest age bracket in 1946 and 1956 is very broadly defined, we use the age distribution of the 1961 year of death to approximate an average age at death in these categories.

Descriptive information on the study population is presented in Table 1. The unadjusted mean lifespan was 60.04 years in 1946 and had increased to 70.71 years by 1981. Placing multiple obituaries became more common over the years (1946: 1.27%, 1981: 8.70%). Obituaries were mostly small-sized (e.g., 71.39% in 1946), followed by medium (e.g., 25.32% in 1946) and large sizes (e.g., 3.29% in 1946).

Figure 3 shows the development of the mean lifespans by obituary size (small, medium, large). The adjusted estimates indicate systematic social inequalities in lifespan by obituary size, except in 1956. Mean lifespans increased for all individuals especially in the immediate post-war period; however, after the mid-1960s, lifespan growth slowed down for all groups and reductions in mean lifespan differences appear to widen again (Figure A-5 in the online appendix). For the other socioeconomic markers, the findings of the adjusted regression analyses are illustrated in Figure 4. In 1946, compared to individuals with no (reported) profession, blue-collar work was associated with a 16.02-year longer lifespan (95% CI: 9.98, 22.06) and a white-collar profession with a 12.77-

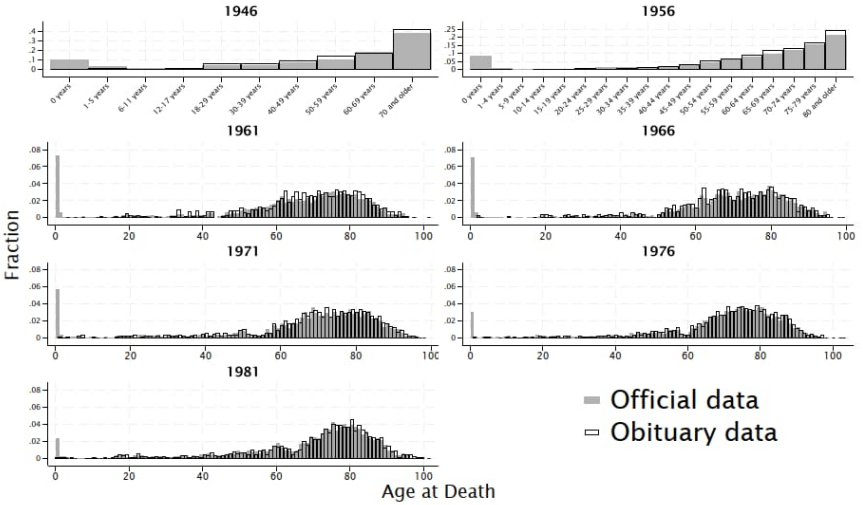
year longer lifespan (95% CI: 7.82, 17.72). In 1961, a white-collar profession was linked to 4.56 additional years (95% CI: 1.54, 7.62), and honorary service to an increase of 8.92 years (95% CI: 4.22, 13.63). In 1981, white-collar occupation and honorary service were associated with a longer lifespan of 3.27 (95% CI: 1.14, 5.40) and 10.18 (95% CI: 7.26, 13.10) years respectively.

Table 1: Demographic and sociodemographic characteristics of deceased with published obituaries in Vorarlberg: 1946–1981

	1946		1951		1956		1961		1966		1971		1976		1981	
	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%	N	Mean (SD)/%
Lifespan	395	60.04 (20.11)	578	65.30 (16.19)	721	68.25 (15.70)	876	67.75 (16.34)	1,151	68.99 (15.31)	1,431	69.45 (16.59)	1,796	71.10 (15.48)	1,966	70.71 (17.15)
Sex																
Male	223	56.46	347	60.03	402	55.76	529	60.39	650	56.47	783	54.72	973	54.18	1,052	53.51
Female	172	43.54	231	39.97	319	44.24	347	39.61	501	43.53	648	45.28	823	45.82	914	46.49
Multiple obituaries	5	1.27	30	5.19	43	5.96	51	5.82	76	6.60	105	7.34	115	6.40	171	8.70
Originator																
Family	395	100.00	573	99.13	710	98.47	860	98.17	1,133	98.44	1,410	98.53	1,763	98.16	1,937	98.52
Employer/others	0	0.00	5	0.87	11	1.53	16	1.83	18	1.56	21	1.47	33	1.84	29	1.48
Obituary size																
Small	282	71.39	492	85.12	592	82.11	723	82.53	958	83.23	1,177	82.25	1,385	77.12	1,435	72.99
Medium	100	25.32	76	13.15	115	15.95	137	15.64	160	13.90	238	16.63	390	21.71	503	25.58
Large	13	3.29	10	1.73	14	1.94	16	1.83	33	2.87	16	1.12	21	1.17	28	1.42
Tertiary education	4	1.01	13	2.25	18	2.50	18	2.05	29	2.52	25	1.75	33	1.84	33	1.68
Blue/white collar																
None (reported)	217	54.94	281	48.62	356	49.38	458	52.28	626	54.39	838	58.56	1,124	62.58	1,224	62.26
Blue collar	63	15.95	128	22.15	175	24.27	201	22.95	213	18.51	313	21.87	344	19.15	375	19.07
White collar	115	29.11	169	29.24	190	26.35	217	24.77	312	27.11	280	19.57	328	18.26	367	18.67
Honorary service	9	2.28	30	5.19	41	5.69	50	5.71	120	10.43	98	6.85	134	7.46	135	6.87

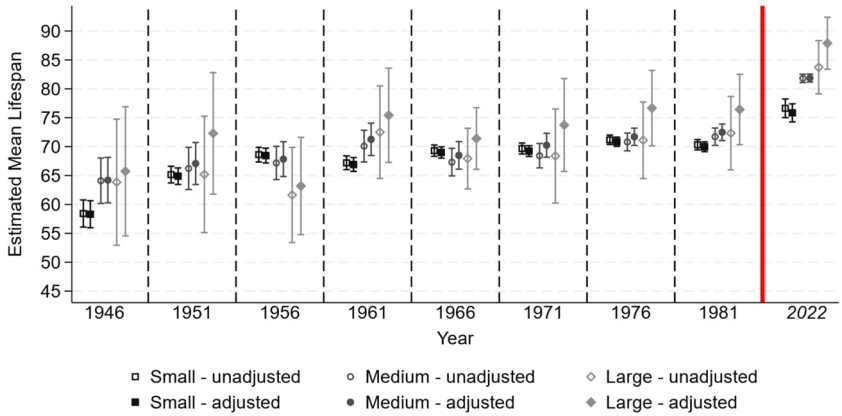
Note: Individuals without data on lifespan and death prior to the year of newspaper publication were excluded.

Figure 2: Comparison of annual lifespan distributions in obituaries and register-based data for 1946, 1956, 1961, 1966, 1971, 1976, and 1981



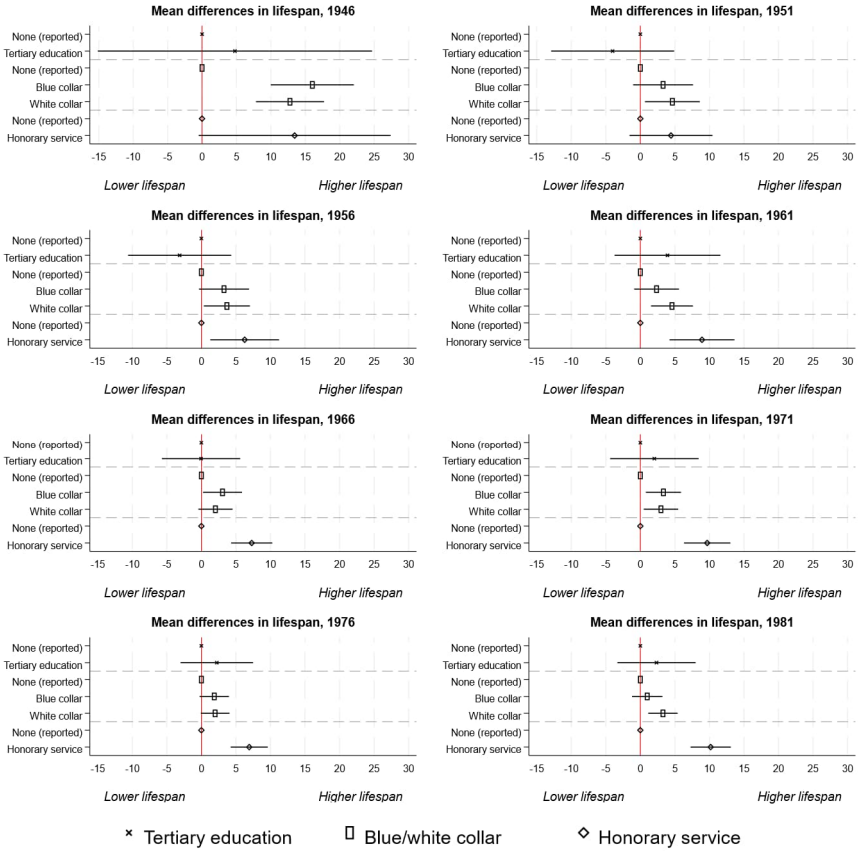
Note: The vertical axis refers to the fraction of the population. The register-based data reports in 1946 and 1956 provide data in 5-year age bands with slightly different age definitions.

Figure 3: Development of unadjusted and adjusted mean lifespan for small, medium, and large-sized obituaries



Note: Means are separately estimated for each year by linear regression. Adjusted estimates are controlled for sex and multiple obituaries.
Source: Data for 2022 (Q3 and Q4) has been previously published in Mayer, Berger, and Oberndorfer (2023); note that this data point is 41 years after the last data point in the series.

Figure 4: Differences in mean lifespan by different social and socioeconomic indicators collected from obituaries



Note: Differences are estimated by separate linear regressions adjusted for sex and multiple obituaries.

In the quantile regression sensitivity analysis (Figures A-5–A-7 in the online appendix), inequalities in median lifespan were smaller than those in mean lifespan; after a period of narrowing, the socioeconomic gradient did not clearly re-emerge until 1981. The results of the additional sensitivity analyses are presented in the supplementary material.

5. Discussion

We show that, overall, the differences in lifespan between individuals with larger and smaller obituaries narrowed in Vorarlberg – a developed, predominantly rural Austrian region – between 1946 and 1981. Most of this decrease occurred in the late 1940s and early 1950s because of the increase in the lifespans of those with small obituaries. This progress had started to slow down by the late 1960s. From the 1960s to the 1980s – a period of higher obituary coverage and potentially more representative data – our estimates suggest that lifespan inequalities widened again. Running the analysis with the other obituary-based socioeconomic indicators – education, profession, and honorary service – confirmed these trends.

Comparing the socioeconomic gradient in 1981 with the findings of the obituary study drawing on 2022 data from Vorarlberg (Mayer, Berger, and Oberndorfer 2023), socioeconomic inequalities appear to have been less pronounced four decades ago. The lifespan difference between small and large-sized obituaries was 6.44 years (95% CI: 0.29, 12.59) in 1981, but 12.04 years (95% CI: 7.04, 17.04) in 2022. Other studies likewise reported rising mortality inequalities in Austria after 1980 (e.g., Rau et al. 2008) and stagnation in more recent periods (Mackenbach et al. 2019). Comparisons with other countries are limited by the modest availability of historical research, but they align with our findings. Swedish analyses of adult mortality indicate that the socioeconomic gradient emerged only after 1950 for women and after 1970 for men (Bengtsson, Dribe, and Helgertz 2020). A Finnish study using population register data from 1971–2014 (van Raalte, Sasson, and Martikainen 2018) finds rising life expectancy across all socioeconomic groups, with partly slower improvements among lower groups. In England and Wales, mortality differentials between low and high occupational classes widened after 1950 and by 1970 – among employed/retired men and married women – exceeded those at the century's start (Pamuk 1985). An analysis of the employed Austrian population (1951–1953) identifies a higher death rate among the working-class compared to those with middle- and upper-class occupations, consistent with our findings for 1951 (Hansluwka 1963 in Antonovsky 1967). This occupational gradient is further reflected in an analysis of occupational accidents in Vienna for 1958, grouped by industry, which ranks construction, metal working, and the stone, clay and glass sector as the three industries with the highest accident rates per 1,000 employed workers (Popper 1961: Table 16).

Comparison with the death registry data shows that obituary data effectively capture the age-at-death distribution in Vorarlberg, except for infant deaths (<1 year). For instance, in 1946 the difference in mean lifespan between the two sources decreases from 6.54 years to 0.33 years once infant deaths are excluded from the register data. Moreover, as the obituary data show an increasingly similar sex composition to the death registry

data, we conclude that obituary data adequately represent mortality patterns for the purposes of historical analyses.

6. Limitations

The obituary data used in this study have several limitations. First, coverage is incomplete: not all deaths in Vorarlberg during the study years were accompanied by a published obituary. The post-World War II shift from local town-crier announcements to paid newspaper obituaries, together with the growing geographic dispersion of families, likely increased the propensity to publish obituaries over time, as reflected in the rising population coverage. The costs of placing even small obituaries likely posed a financial barrier. Thus, the extent of inequalities is potentially underestimated, especially in the earlier years with lower coverage. Infant deaths are almost completely missing from the obituary data, indicating that such deaths were typically mourned without public announcements. Excluding infant deaths to compare lifespans conditional on survival to age 1 did not change our main results. Nevertheless, if infant mortality was higher among disadvantaged families, which is likely, our estimates are underestimations. Accordingly, our results are best interpreted as inequalities in lifespan conditional on surviving the first year of life.

Second, the time-consistent ability of obituary sizes to distinguish between different relative socioeconomic positions (through affordability/symbolic status differentiation) over a 35-year period requires assumptions. Despite extensive efforts to recover historical prices (through contacts with the newspaper and regional morticians), exact obituary prices remain unknown. We therefore need to assume that potential changes in the affordability of obituaries over time were small enough to not fundamentally compromise their ability to distinguish relative socioeconomic positions or to function as symbolic status differentiation. We consider this assumption plausible. Importantly, this assumption is not specific to obituary size: any indicator of socioeconomic position used to estimate social inequalities in health outcomes across time (especially long periods) or across space (within the same time period) is relational and context-dependent (Galobardes et al. 2006a, 2006b). For example, education-based health inequalities may shift over time as credential attainability and the meaning of a degree change; the same degree may carry different social value and thus has different effects on health outcomes in 1946 compared to 1981, or in 2000 compared to 2026. The same concern applies to occupation, as occupation titles, working conditions, occupational exposure, and social prestige may also change over time and space, implying that the same occupational category does not necessarily represent the same relative socioeconomic position over time and space. With regards to tertiary education, it is also worth mentioning that it is

gender-biased, and rare in the study population overall. Although we controlled for sex in the regressions, and described the samples (Tables A-3 and A-4 in the online appendix) and ran the regressions for males and females separately (Figures A-10 and A-11 in the online appendix), the estimates for tertiary education should be interpreted with caution.

Third, obituaries include several socioeconomic markers besides obituary size. Marital status, which could also provide insights into mortality differences, was not extracted for the current study. Fourth, all main analyses were conducted for both sexes jointly. Sex-stratified sensitivity analyses are hampered by the small cell sizes in the current dataset – especially for large obituaries. Fifth, as Vorarlberg is a relatively small federal state with a distinctive geography, the findings should be interpreted as evidence from a specific regional historical setting rather than as necessarily representative of Austria in general. Lastly, manual extraction of obituaries was resource-intensive. Future work could try automated data extraction (see, e.g., Violo and Ouellette 2025) for a more cost-effective collection of a complete time series of the historical data (Ladoy et al. 2021).

7. Declarations

Ethics approval and consent to participate: The Medical University of Vienna's ethics committee has confirmed that this study does not require ethics approval.

Consent of publication: Not applicable.

Data availability: The anonymized dataset together with the statistical software code for the main analyses are available online [1].

Competing interests: SM, MB, PM, PC, MH, TCM, and MO confirm that there are no relevant financial or non-financial competing interests to report.

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