Coverage and Generalisability of Death Data in the DeSC Database in Japan

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Background

- Accurate capture of death data from secondary data sources in Japan is challenging as it is often limited to inpatients.[1-3]
- In real-world evidence research, particularly in pharmacoepidemiologic studies, mortality, including overall survival or progression-free survival, is often an important outcome in oncology.
- The DeSC database (DeSC Healthcare, Inc., Tokyo, Japan), a claims database in Japan, can link its data with death records collected from local municipalities using death flags. This enables the collection of additional death data, supplementing the information available from claims data alone.
- While the generalisability of DeSC database to the general Japanese population in terms of demographics has already been demonstrated,[4] the generalisability of its death data has not been assessed.
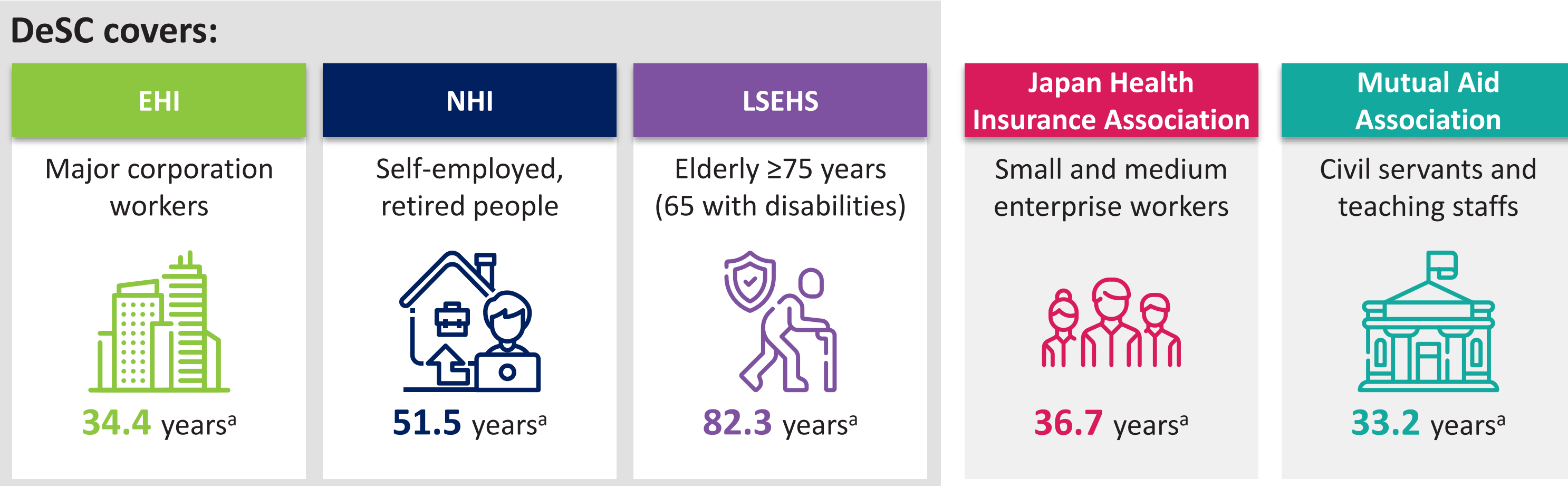
Objectives

- The study aimed to assess the generalisability of the mortality rates in DeSC data to the Japanese population.
- Information on deaths from the DeSC database, by age and sex, was compared with the general population using the mortality statistics from the Ministry of Health, Labour and Welfare (MHLW), a ministry of the Japanese government.

Methods

- The DeSC database includes anonymised data collected from inpatient and outpatient claims, annual health checkups, and enrolment information.
- Among the several health insurances available in Japan,[5] the DeSC database covers Employee Health Insurance (EHI), National Health Insurance (NHI) and Late-Stage Elderly Healthcare System (LSEHS) (**Figure 1**).

Figure 1. Universal Data Coverage by Insurance Types in Japan: DeSC Database[5]

DeSC covers:

EHI	NHI	LSEHS	Japan Health Insurance Association	Mutual Aid Association
Major corporation workers	Self-employed, retired people	Elderly ≥75 years (65 with disabilities)	Small and medium enterprise workers	Civil servants and teaching staffs
34.4 years[a]	51.5 years[a]	82.3 years[a]	36.7 years[a]	33.2 years[a]

[a]The summarised age represents the mean age of individuals covered by the insurance.
Abbreviations: EHI = Employee Health Insurance; LSEHS = Late-Stage Elderly Healthcare System; NHI = National Health Insurance

- As of August 2023, the DeSC database covers 15.2 million people, comprising 1.2 million from EHI, 8.6 million from NHI and 5.4 million from LSEHS (**Table 1**).

Table 1. Individuals' Characteristics from April 2014 to August 2023

	Overall		EHI		NHI		LSEHS	
	n	%	n	%	n	%	n	%
N of individuals	15,208,051		1,190,674		8,592,267		5,425,110	
Sex								
Female	8,227,359	54.1	589,265	49.5	4,486,514	52.2	3,151,580	58.1
Male	6,980,692	45.9	601,409	50.5	4,105,753	47.8	2,273,530	41.9

Abbreviations: EHI = Employee Health Insurance; LSEHS = Late-Stage Elderly Healthcare System; NHI = National Health Insurance

- The DeSC database features "death flags", which allow for accurate death recording independent of claims information.
- Death flags are available for 70% of NHI and 90% of LSEHS data in DeSC, sourced from authorised municipalities.
  - The DeSC receives the death information as the reason for leaving insurance, which then serves as the basis for assigning the death flag.
  - Deaths flags are not available for EHI, as the data comes from health insurance unions where death reporting is not required.
- **Figure 2** demonstrates that the cross-reference with external sources is key to accurately identify deaths as almost 40% of deaths cannot be identified in claims.

Figure 2. Death Data Collected by Death Flags vs. Claims

- Death confirmed only by death flag — 38%
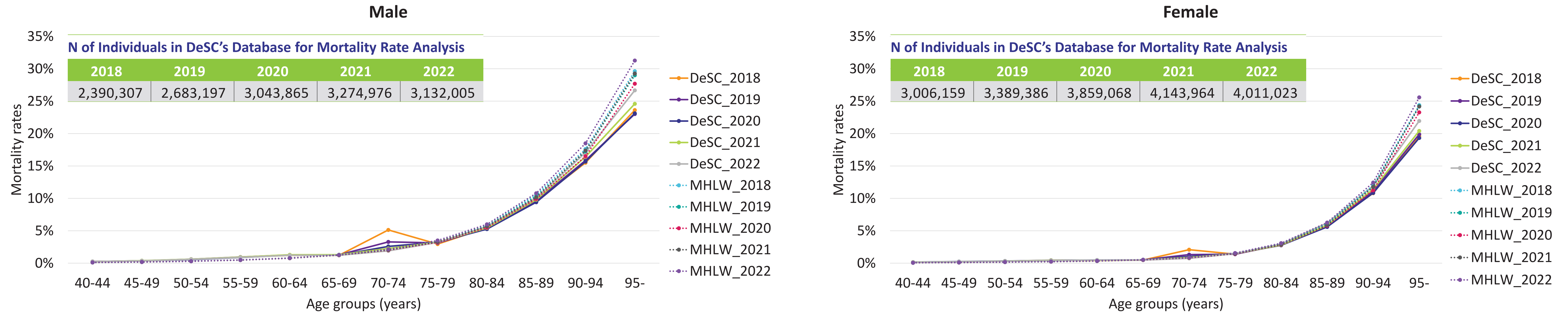- Death confirmed by claims and death flags — 62%
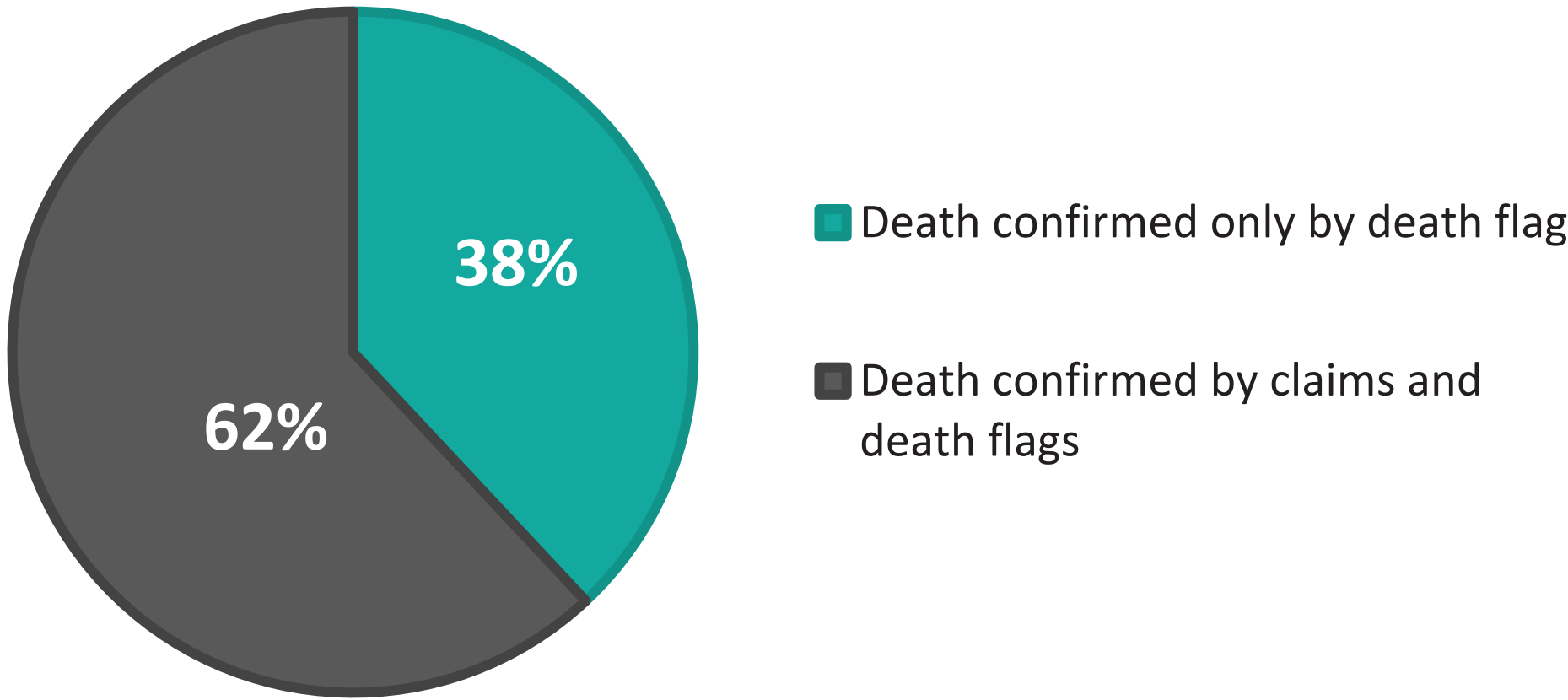
- To describe the generalisability of death data in the DeSC database, this study used NHI and LSEHS files from April 2018 to March 2023.[a]
- Mortality rates were calculated by dividing the number of deaths by the total individuals covered, stratified by sex and age in 2018–2022.
- The following individuals were excluded from the analysis:
  - Individuals with the unclear month of death and no claim data.
  - Individuals whose observational period could not be confirmed between April 2018 and March 2023.
- The rate was compared with MHLW data for the same period.[6-10]
- All the analyses were descriptively performed using statistical software SAS version 9.4.

[a]The year was summarised using Japanese fiscal years, which run from April to March of the following year.

Results

- The number of individuals included in the analysis from the DeSC database was as follows: 5.4 million in 2018, 6.1 million in 2019, 6.9 million in 2020, 7.4 million in 2021 and 7.1 million in 2022.
- Between 2018 and 2022, mortality rates stratified by sex and age groups in NHI and LSEHS files of the DeSC database showed similar trends to those reported by MHLW, for both sexes and all age groups (**Figure 3**) .
  - There was almost no difference observed in mortality rates when comparing the DeSC and MHLW across all study periods and sexes. The only marked difference was observed in males aged ≥95 years in 2018 and 2019, with mortality rates of 23.6% and 29.6% in 2018 and 23.0% and 29.0% in 2019, for DeSC and MHLW, respectively. This difference could be attributed to the small sample size in that age group.
  - Similar patterns of mortality rates for DeSC and MHLW were observed in younger age groups (<40 years) – results can be provided upon request.

Figure 3. Mortality Rates Stratified by Sex and Age from Fiscal Year 2018 to 2022 in DeSC and MHLW [a]

Male

N of Individuals in DeSC's Database for Mortality Rate Analysis

2018	2019	2020	2021	2022
2,390,307	2,683,197	3,043,865	3,274,976	3,132,005

Female

N of Individuals in DeSC's Database for Mortality Rate Analysis

2018	2019	2020	2021	2022
3,006,159	3,389,386	3,859,068	4,143,964	4,011,023

[a] The figures only include individuals aged 40 years or older, as the mortality difference between DeSC and MHLW for those aged 39 years or younger was either 0% or 0.1% between 2018 and 2022.
Abbreviations: MLHW = Ministry of Health, Labour and Welfare

Discussion

- Mortality rates in the DeSC and MHLW showed similar trends.
- The slight difference in the mortality rates shown in older age groups may be partially due to small sample sizes.

Conclusions

- Comprehensive death data, including the deaths occurring in community (outside of hospitals) is essential for accurate estimation of real-world mortality outcomes. Previous studies in Japan have faced challenges in assessing mortality, having access to data on death occurring in the inpatient setting.
- DeSC data are linked to municipal death records, providing more comprehensive mortality coverage.
- We demonstrated that mortality rates in NHI and LSEHS files in DeSC data align with MHLW trends across sexes and age groups, indicating the accuracy of the death information included in DeSC's data.
- The accuracy of this information allows robust assessment of death as an outcome, including overall survival in pharmacoepidemiology studies and the generalisability of these outcomes to the general Japanese population.

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