

Original Article

# Exploring Population Age as a Utilization Variable in Medical Assistance in Dying in British Columbia, Canada

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**Abstract** - Since the legalization of medical assistance in dying (MAiD) in Canada in 2016, more than 4,674 British Columbians (BC) have chosen this end-of-life option (1). Among the BC Health Authorities (HA), the 2020 MAiD utilization rate ranged from 1.92 – 6.61%. Island HA has consistently had the highest utilization rate. Our research question: Could population age differences for regional health authorities be contributing to these differences in MAiD utilization rates? We used descriptive statistics and the direct method to calculate age-standardized MAiD mortality rates for Island HA. Age-specific Island HA mortality rates were then used for extrapolation to other BC HA. We used age-standardized rates to predict age-adjusted 2019 MAiD deaths per HA and found a considerable difference between the actual MAiD deaths of all deaths and projected percentages for each of the other four HA. Differences in population ages between BC HA are unlikely to be a significant reason for the differences in MAiD percentage of deaths. Differences may be due to HA variation in the provision of MAiD services or other socio-demographic characteristics. Further research is needed to understand better assisted dying utilization variability.

**Keywords** - Assisted death, Utilization variability, Health/medical resource utilization, Medical Assistance in Dying, Population based study.

## 1. Introduction

Medical Assistance in Dying (MAiD) is a relatively new and fundamentally unique service provided by the Canadian health system and enshrined in federal legislation that decriminalized assisted death on June 17, 2016 (2). Known as Bill C-14, the law enabled medically assisted voluntary euthanasia and medically assisted suicide under the umbrella term of MAiD and established eligibility criteria, safeguards, and reporting requirements. The service is delivered through provincial and territorial health systems. For example, in British Columbia (BC), MAiD is provided independently by five health authorities (HA) and overseen by the BC Ministry of Health. While the service delivery model, operation, and resourcing of MAiD programs in B.C. are not standardized, all required MAiD forms are standardized provincially (3) and act as data collection sources that enable each HA to meet reporting compliance. Reporting also includes the submission of a death certificate to the provincial Vital Statistics Agency that includes: a) Service Reporting: MAiD; b) reporting the underlying illness/disease, and c) reporting the manner of death as "natural." The quality and reliability of data are managed as a statutory accountability of the health authorities and provincial government. Beyond this, more specific data may be collected within an individual health

region as a function of service delivery. The mandated data subset is submitted to the provincial ministry and the federal health minister.

In Canada in 2019, 2% of all deaths were MAiD deaths (4), whereas MAiD deaths accounted for 3.3% of all deaths in BC and 6.29% of all deaths within Island HA. Utilization of MAiD programs in other countries varies. In the Netherlands, the rate of MAiD in 2019 was 4.2% of all deaths and rose to this level over more than 15 years following legalization (5). In Oregon, which has a long history of assisted death, 0.15% of all deaths were assisted in 2019 (6). Groenewoud et al. (5) found that regional differences in euthanasia in the Netherlands could be attributed to younger ages (45-64), non-churchgoing, progressive political views, lack of available voluntary workers, higher income, and a good self-experience of health.

A Canadian study from Ontario offered some insights, finding that those opting for the assisted dying were wealthier, younger, more likely to be married, and less likely to live in long-term care than those who die naturally (7). In reviewing MAiD data in BC (2016 – 2020), there



was a difference in utilization rates across the five regional HA. Consistently, Island HA has a greater percentage of deaths attributed to MAiD. In the most recent 2020 data, the percentage of MAiD deaths was 6.61% for Island HA compared to a range of 1.92 – 4.08% for other BC HA. Many believe this trend was “because there are so many older people who retire and live there.” As nurse scientists, we asked, “Why is the MAiD utilization rate higher for Island Health compared to other BC health authorities?” Our study explored population age distribution for BC HAs using reported assisted deaths.

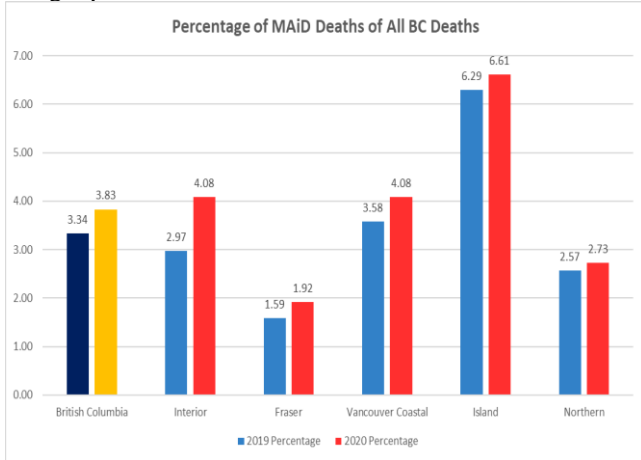


Fig. 1 Percentage of MAiD Deaths of all BC Deaths in 2020

## 2. Methods

This exploratory, retrospective, descriptive study examined characteristics of Island HA patients receiving MAiD between June 2016 to September 2020 in relation to the population age and mortality distribution for the other BC health authorities. The research protocol was approved by the Island Health Authority Research Ethics Board (H20-00073).

### 2.1. Data Sources

We drew on two data sources for the study. The first was a subset of the Island HA MAiD Database, containing information only on patients who had assisted death. Patient identifiers such as name, dates, address, and personal health numbers were not included. Calculated variables such as age at the time of death and number of days between request and service were included. Due to changes in provincial reporting requirements, data related to palliative care and disability service use was only available for a portion of the dataset. The second data source, the publicly available BC Stats website (8), was used to retrieve age population data and mortality data for 2019 for each BC health authority. Population age and mortality data are available publicly from the BC Stats website.

### 2.2. Statistical Analysis: Age and other variables

Five-year aggregated age groups were created to match the age groupings used in BC population data reporting. Due to anticipated small numbers, all patients under 45 years of age were aggregated into a single group, as were all 90 years plus.

Descriptive statistics were used to analyze age-related data for Island HA. SAS 9.4 (SAS Institute Inc.) and Excel 2016 (Microsoft Corporation) was used in the data analysis. Data from 2019 were used for mortality rate calculations, comparisons and projections. An age-standardized mortality rate for Island HA was calculated using the direct method (13). Using age-specific mortality rates from Island HA, we projected the number of potential MAiD deaths for other health authorities based on population age distributions for each. We then extrapolated the potential percentage of MAiD deaths of all deaths for each HA and compared the projections to the actual number of MAiD deaths for each. We used descriptive statistics for all other demographic and service use variables for Island HA (June 2016 – September 2019).

## 3. Results

Between June 2016 and September 2020, 1681 Island HA patients received MAiD services. There was a gender balance for MAiD recipients during this time (50% male, 50% female).

### 3.1. Age

The mean age for MAiD recipients at the time of request between 2016 and 2020 was 77.45 years (n = 1641, Mdn = 78.1, SD = 11.94, range 22.4 -105.1) (Table 1). The mean age for MAiD recipients at the time of death between 2016 and 2020 was 77.57 years (n = 1681, Mdn = 78.1, SD = 11.93, range = 22.4-105.2). Between 2016-2020, 85% of Island HA MAiD recipients were over the age of 65, and 73% were over the age of 70 at death (Table 2).

Table 1. Age at Request Descriptive Statistics by Year

	<i>M</i>	<i>Mdn</i>	<i>SD</i>	<b>Range</b>
2016 <sup>a</sup>	76.34	76.65	11.48	48.9-105.1
2017	76.60	76.9	12.11	30.9-101.2
2018	76.05	76.4	11.93	34.2-102.5
2019	78.59	79.15	11.81	41.3-100.1
2020 <sup>b</sup>	78.58	79.15	11.92	22.4-102.6

<sup>a</sup> This is a partial year (June – December 2016)

<sup>b</sup> This is a partial year (January – September 2020)

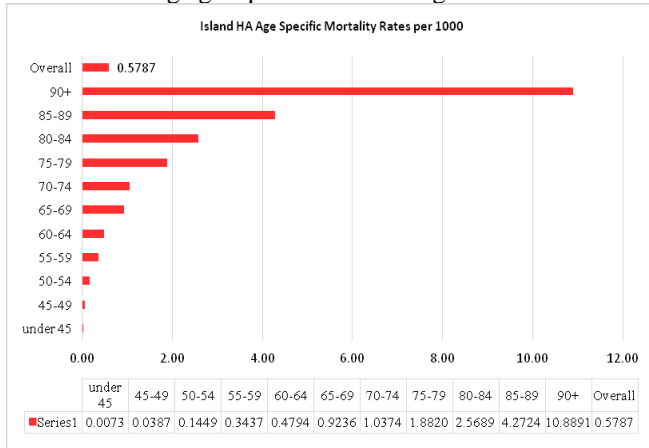
**Table 2. Age at Death Descriptive Statistics by Year**

	<i>M</i>	<i>Mdn</i>	<i>SD</i>	Range
2016 <sup>a</sup>	76.43	76.6	11.41	48.9-105.2
2017	76.77	77.1	12.09	31.2-101.2
2018	76.22	76.65	11.88	34.2-102.5
2019	78.72	79.3	11.78	41.8-100.2
2020 <sup>b</sup>	78.64	79.3	11.91	22.4-102.6

<sup>a</sup>This is a partial year (June – December 2016)  
<sup>b</sup>This is a partial year (January – September 2020)

**3.2. Age-Related Mortality Rates**

Data for 2019 were selected for the calculation of age-specific mortality rates and comparisons because it was the most recent complete year of data at the time of collection. The total number of deaths for Island HA was 8,232 and for BC was 38,379 (8). The age-adjusted mortality rate for Island HA for 2019 is 0.58 per 1000. Age-specific mortality rates for each age group are shown in Figure 2.



**Fig. 2 2019 Island Health Authority Age-Specific Mortality Rates per 1000**

Combining the age-specific mortality rates from Island HA and the age population distribution for other BC HA in 2019, we projected the number of potential MAiD deaths. The calculated numbers were rounded to whole numbers.

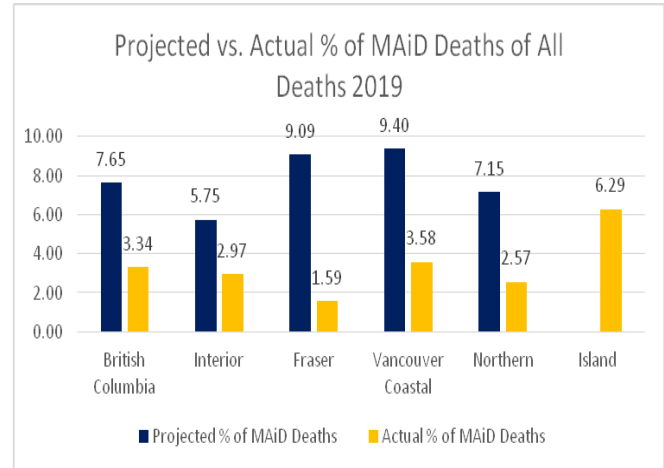
The projected numbers of MAiD deaths were used to calculate a projected percentage of MAiD deaths based on the number of deaths per health authority in 2019. The projected percentages were then compared against the actually reported percentages of MAiD deaths of all deaths by a health authority (Figure 3).

**Table 3. 2019 Projected MAiD Deaths by Health Authority by Age Group**

HA	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90+	Overall projected deaths
V Island	3	2	8	23	33	61	57	69	60	66	115	497
Interior	3	2	8	24	34	57	52	64	58	59	90	479
Fraser	8	5	19	46	57	90	82	100	92	98	159	1104
V Coastal	5	3	12	29	37	61	54	67	64	73	126	691
Northern	1	1	3	7	9	14	11	13	11	11	18	165

**3.3 Days Between MAiD Request and MAiD Death**

The mean number of days between the MAiD request and MAiD death between 2016 – 2020 was 48.69 days (n = 1641, Mdn = 15, SD 91.64, range 0 – 1169). About two-thirds (67%) of MAiD recipients had 30 days, or less, between their request and death, and 80% were less than 60 days between request and death.



**Fig. 3 2019 Projected vs Actual % of MAiD Deaths by Health Authority**

Source: Study data set - Island Health Authority MAiD Program; <https://bcstats.shinyapps.io/popApp/>

**Table 4. Days Between Request and Death by Year**

	<i>M</i>	<i>Mdn</i>	<i>SD</i>	Range
2016 <sup>a</sup>	34.66	14	49.17	0-266
2017	61.91	17	122.73	0-1169
2018	63.32	17	111.99	0-926
2019	47.87	16	80.53	0-571
2020 <sup>b</sup>	25.82	12	35.87	0-345

<sup>a</sup>This is a partial year (June – December 2016)  
<sup>b</sup>This is a partial year (January – September 2020)

**3.4. Palliative Care Use**

Between November 2018 and September 2020, 662 of 879 MAiD recipients (75.31%) indicated receiving or receiving palliative care services. The percentage of MAiD recipients with palliative care use was consistent across most age groups, with a range of 58.86 – 100%.

The average age at death for those receiving palliative services was 77.5 years (Mdn = 78.3, SD = 11.52, range = 22.4 - 100.2) in comparison to an average of 81.5 years for MAiD recipients who did not have palliative care (Mdn = 83.5, SD = 12.5, range = 41.8 - 101.2). There were also differences in the average number of days between request and death for MAiD recipients with palliative care (M = 37.5, Mdn = 13, SD = 70.88, range = 0-571) and those MAiD recipients without palliative care (M = 48.3, Mdn = 19, SD = 66.87, range = 0 - 336).

### 3.5. Disability Services

Between November 2018 and September 2020, 39% of MAiD recipients needed disability services, 39% did not need disability services, and the needs were unknown for 22%. Of those who needed disability services, 83% received disability services, 10% did not, and for 6%, it was unknown if services were received. There was no significant difference in the number of days between MAiD request and death based on disability services using a one-way ANOVA [ $F(2, 834) = 0.15, p=0.8645$ ]. The average number of days between request and death for MAiD recipients needing disability services was 37.7 days (Mdn = 13, SD = 69.2, range = 0 - 560) in comparison to those who did not need disability services (M = 4.4, Mdn = 16, SD = 62.8, range = 0 - 434) and those with unknown disability needs (M = 40.1, Mdn = 12, SD 71.3, range 0 - 571).

## 4. Discussion

Why is the MAiD utilization rate higher for Island HA than other BC health authorities? Before this study, it was speculated that Island HA had an older patient population, which was a leading factor in the large difference in MAiD utilization rate compared to other BC HA. This study does not support that hypothesis. Using age-adjusted rates rather than raw data, we could compare HA populations independent of their age structures. We conclude that differences in population ages are unlikely to be a significant reason for the differences in MAiD percentage of deaths among HA, as another HA appears to have populations with older age structures.

In comparing 2019 data, Island HA has a slightly larger percentage of MAiD deaths for patients 65 and over (86%) than nationally (80%). Nationally, MAiD by age category peaks for ages 65-70 and slowly declines with older age groups. Island HA has a different pattern with a substantial peak for the age group of 90 and above. These findings differ from other recent studies (5, 7), suggesting that younger ages are more associated with higher rates of MAiD utilization.

The percentage of Island HA MAiD patients receiving palliative care is slightly lower than the national figures (75.31% vs 82.1%). The percentage of those MAiD patients needing disability services is similar between Island HA (39%) and Canada (41.2%), but the percentage of those people actually receiving disability services is slightly lower for Island HA (83%) than Canada (89.8%) (1).

One limitation of the study was that due to the COVID-19 pandemic, only Island HA data and BC population data were available.

## 5. Conclusion

We are cognizant that MAiD is emergent in Canada, as evident by the recent legislation expansion of eligibility criteria in March 2021 (10). Access to assisted dying is also being actively debated or legislated in other countries. As we traverse the social, ethical, and clinical aspects of access to and delivery of this end-of-life care option, we must be alert to and better understand influential factors at play for those who seek assisted dying in what can often feel like an extremely complex and seemingly fragmented healthcare service. This study debunks an unhelpful assumption that “the rate is higher because the population is older.” What other factors might be at play if population age does not account for this difference? In terms of service access and equity, are some groups over-served and others underserved? Only through further in-depth and informed understanding of utilization variables related to assisted dying in Canada can we ensure quality care and equitable access. To this end, we put forth the following recommendations for future research: complete a more comprehensive correlative analysis using individual record-level detail from the MAiD process and individual characteristic data; replicate the Netherlands study (5) in Canada in order to understand socio-geographical variation better; and lastly, complete a detailed analysis of health authority MAiD processes in BC as has been done in the provinces of Nova Scotia (11) and Alberta (12).

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