



## Health Analytics and Vital Records

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# Alaska Facts and Figures

## 1918 Pandemic Influenza Mortality in Alaska

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### Background

The 1918 Pandemic Influenza (“Spanish Flu” or flu) in Alaska developed later than other areas of the US. Alaska appears to have been spared from the first wave that occurred in other areas in the summer of 1918. The first cases in Alaska were identified in the late fall of 1918, concurrent with the second wave in the Lower 48 and Canada, follow by an additional wave in the spring of 1919. Estimates of the numbers of deaths during the epidemic vary; the vast majority of deaths were among Alaska Native people.<sup>1,2</sup> Death certificates for the 1918 and 1919 pandemic flu in Alaska have not been examined to date. This data brief is the first analysis of these certificates.

### Methods

- Alaska death certificates from 1918 and 1919 were entered into the Alaska Electronic Vital Records System (EVRS).
- For all deaths from January 1, 1918 to December 31, 1919:
  - Literal text for cause of death, both underlying and contributory, was examined for words associated with influenza. Terms included “Influenza”, “Epidemic Influenza”, “Spanish Influenza”, “Flue”, and “La Grippe” as well as variations in spelling of these terms. Pneumonia deaths without mention of influenza were not included.
  - Sex, age, and race of the decedent and the location of death were examined.
  - Location of death was classified by Alaska Public Health Regions. Most locations were first assigned a census area/borough by EVRS using lookup tables built into the system. For locations EVRS was not able to assign, a combination of USGS Geographic Names Information System<sup>4</sup> searches, Google searches, and the Alaska Dictionary of Place Names<sup>5</sup> were used to estimate census area/borough. If the location or residence was still unknown, the precinct of death or the recording precinct on the death certificate was used as an estimate.
  - Population size serves as the denominator for calculating rates; however, Alaska census data is not available for the years 1917-1919. Statewide and regional census data, provided by the Department of Labor (DOL), Research & Analysis Section, were used to estimate the pre-pandemic population size in 1917 by adding the number of all-cause deaths from 1918 & 1919 to the 1920 population count (similar method used by Mamelund et al.).<sup>1</sup> The same method was used to calculate population size by quarter per year.<sup>1</sup>
    - For statewide age-adjusted (AA) rates of influenza death in 1918 and 1919, a similar method was used. However, 1920 census counts<sup>3</sup> by age plus the number of all cause deaths by age were used to calculate the denominator and adjust to the 2000 US Standard population.
- Projected impact for an infectious disease like pandemic flu was ascertained using statewide AA rates of 1918 & 1919 influenza deaths applied to the 2016 Alaska population.

### Results

#### Pandemic Overview

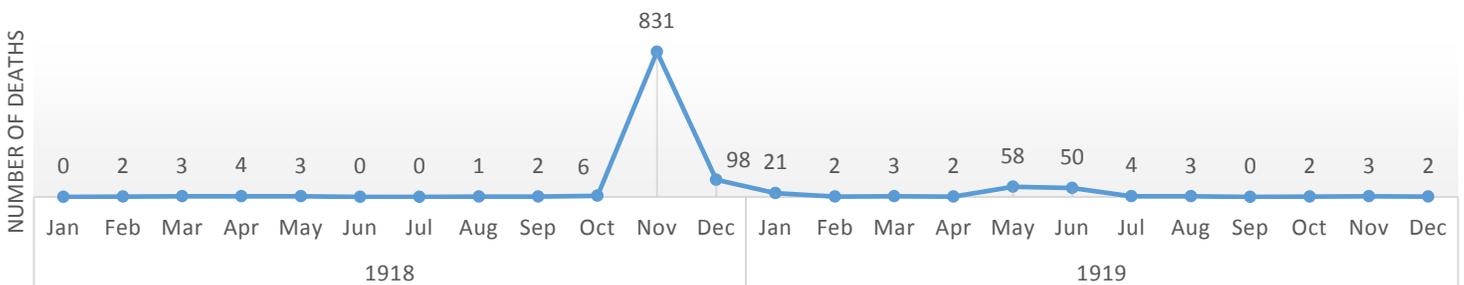
- There were 2,198 deaths from all causes in 1918 and 789 deaths in 1919. Prior to the pandemic there were approximately 956 deaths in 1917.
  - 1,113 influenza deaths occurred during the 2-year pandemic period (51% of all deaths; Tables 1 & 2); 962 in 1918, and 151 in 1919.
  - The monthly number of deaths peaked sharply at 831 in November 1918, followed by a smaller peak of 108 deaths in May/ June 1919 (Figure 1).

- Compared to mortality estimates from 1917, Alaska experienced 1,672 excess deaths per 100,000 population in 1918 (excluding 283 deaths from the sinking of the SS Princess Sophia in October 1918).<sup>‡</sup>
- More females (56%) than males (44%) died of influenza in 1918 to 1919 (Table 1).
- The largest proportion of influenza deaths from 1918 to 1919 were in persons aged 30 to 44 years (30%), followed by those aged 0 to 14 years (24%; Table 1).
- The vast majority (81.7%) of deaths were Alaska Native people; white individuals comprised an additional 10.7% of decedents (Table 1).

**Table 1. Influenza Deaths by Sex, Age, and Race, 1918–1919**

Characteristics	Deaths	
	Count	Percent
Sex		
Male	490	44.0
Female	618	55.5
Missing	5	0.4
Age		
0 to 14 years	267	24.0
15 to 29 years	243	21.8
30 to 44 years	333	29.9
≥ 45 years	254	22.8
Missing	16	1.4
Race		
White	119	10.7
Alaska Native	909	81.7
Other	5	0.5
Missing	80	7.2
<b>Total</b>	<b>1,113</b>	<b>100.0</b>

**Figure 1. Number of Influenza Deaths by Date, Alaska, 1918–1919**



**Pandemic Location and Timeframe**

- There were two epidemic waves in Alaska from 1918 to 1919, with the highest number of influenza deaths occurring during the 1<sup>st</sup> wave (Figure 1). The 1<sup>st</sup> wave primarily occurred within the 4<sup>th</sup> quarter of 1918 (Q4, Oct–Dec) and extended into January 1919, and the 2<sup>nd</sup>, smaller wave primarily occurred within the 2<sup>nd</sup> quarter of 1919 (Q2, Apr–Jun).

<sup>‡</sup> Data not shown

- Nearly two-thirds of influenza deaths occurred in the Nome Census Area, which is a part of the Northern Public Health Region (Tables 2 & 3).
  - During the 1<sup>st</sup> epidemic wave, 72% of influenza deaths occurred in the Nome Census Area.
- The Southwest and Gulf Coast Public Health Regions were the next most affected by pandemic flu (Table 3).
  - During the 2<sup>nd</sup> wave, 94% of influenza deaths occurred in the Aleutians West Census Area, Bristol Bay Borough, Dillingham Census Area, and the Lake and Peninsula Borough, which are all located in the Southwest Public Health Region (Tables 2 & 3).

**Table 2. Influenza Deaths by Region and Census Area or Borough, 1918–1919**

Characteristics	Deaths	
	Count	Percent
<i>Northern Region</i>		
North Slope Borough	2	0.2
Northwest Arctic Borough	.	.
Nome Census Area	709	63.7
<i>Interior Region</i>		
Denali Borough	.	.
Fairbanks North Star Borough	3	0.3
Southeast Fairbanks Census Area	.	.
Yukon-Koyukuk Census Area	3	0.3
<i>Anchorage Matsu Region</i>		
Matanuska-Susitna Borough	23	2.1
Municipality of Anchorage	21	1.9
<i>Southwest Region</i>		
Aleutians East Borough	.	.
Aleutians West Census Area	47	4.2
Bethel Census Area	5	0.4
Bristol Bay Borough	41	3.7
Dillingham Census Area	10	0.9
Kusilvak Census Area	24	2.2
Lake & Peninsula Borough	20	1.8
<i>Gulf Coast Region</i>		
Kenai Peninsula Borough	57	5.1
Kodiak Island Borough	46	4.1
Valdez-Cordova Census Area	18	1.6
<i>Southeast Region</i>		
City and Borough of Sitka	13	1.2
City and Borough of Juneau	31	2.8
Haines Borough	2	0.2
Hoonah-Angoon Census Area & Municipality of Skagway	4	0.4
Ketchikan Gateway Borough	8	0.7
Petersburg Borough & City and Borough of Wrangell	3	0.3
Prince of Wales-Hyder Census Area	10	0.9
Yakutat Borough	5	0.4
<i>Unknown</i>	8	0.7
<b>Total</b>	<b>1,113</b>	<b>100</b>

**Table 3. Influenza Deaths and Crude Rates by Region and Quarter, 1918–1919 and 2016 Projection**

Public Health Region	Pre-1918 Population <sup>1</sup>	1918 All Deaths	1918 All Flu Deaths	1918 Flu Rate per 100,000					2016 Impact using 1st Wave (Q4) Epidemic Rate	
				Q1	Q2	Q3	Q4	All Year	2016 Pop <sup>2</sup>	2016 Flu Deaths
<i>Anchorage/Mat-Su</i>	3,290	80	42	0	0	0	1287.6	1,276.6	401,491	5,169
<i>Gulf Coast</i>	8,373	274	109	0	24.0	0	1297.3	1,301.8	81,108	1,052
<i>Interior</i>	9,585	127	3	0	0	0	31.6	31.3	113,202	36
<i>Northern</i>	7,899	854	704	0	0	38.3	8843.5	8,912.5	27,808	2,459
<i>Southeast</i>	18,270	624	66	0	0	0	364.7	361.2	73,827	269
<i>Southwest</i>	10,514	178	30	47.6	47.8	0	192.3	285.3	42,273	81
<b>Alaska</b>	<b>57,931</b>	<b>2,137</b>	<b>954</b>	<b>8.6</b>	<b>12.1</b>	<b>5.2</b>	<b>1618.1</b>	<b>1,646.8</b>	<b>739,709</b>	<b>11,970</b>

Public Health Region	Pre-1919 Population <sup>1</sup>	1919 All Deaths	1919 All Flu Deaths	1919 Flu Rate per 100,000					2016 Impact using 2nd Wave (Q2) Epidemic Rate	
				Q1	Q2	Q3	Q4	All Year	2016 Pop <sup>2</sup>	2016 Flu Deaths
<i>Anchorage/Mat-Su</i>	3,210	24	2	31.2	0	0	31.4	62.3	401,491	0
<i>Gulf Coast</i>	8,099	112	12	98.8	12.4	24.9	12.5	148.2	81,108	10
<i>Interior</i>	9,458	76	3	0	21.2	0	10.6	31.7	113,202	24
<i>Northern</i>	7,045	89	7	71.0	14.3	0	0	99.4	27,808	4
<i>Southeast</i>	17,646	244	10	22.7	22.8	5.7	5.7	56.7	73,827	17
<i>Southwest</i>	10,336	213	117	77.4	990.3	39.4	29.6	1,132.0	42,273	419
<b>Alaska</b>	<b>55,794</b>	<b>758</b>	<b>151</b>	<b>46.6</b>	<b>197.9</b>	<b>12.7</b>	<b>12.7</b>	<b>270.6</b>	<b>739,709</b>	<b>1,464</b>

<sup>1</sup>Pre-pandemic statewide and Public Health Region population estimated by adding 1918 and 1919 all cause deaths to 1920 population data from the DOL; population was also adjusted quarterly for previous quarters deaths.

<sup>2</sup>2016 DOL Research and Analysis Estimates, Vintage 2017.

Note: Population and death counts do not include records with missing region or quarter information.

### Past and Present Impact

- Statewide AA pandemic flu death rates for 1918 and 1919 were 1,606.7 and 273.9 deaths per 100,000 population, respectively.<sup>‡</sup>
  - AA rates are similar to the crude rates (Table 3) for 1918 and 1919 (1,618.1 and 270.6 deaths per 100,000).
- AA rates applied to the 2016 population would represent 11,885 statewide influenza- related deaths during the 1<sup>st</sup> epidemic wave and 2,026 deaths during the 2<sup>nd</sup> epidemic wave.<sup>‡</sup> These are very similar to the 2016 death projections using crude rates (Table 3).
  - Applying the crude rate of influenza death from the 1<sup>st</sup> epidemic wave yields 11,970 deaths statewide in 2016, and using crude rates from the 2<sup>nd</sup> epidemic wave results in 1,464 deaths.
- If the epidemic occurred in 2016 and caused the same mortality rate as in 1918–1919, it would have been the leading cause of death among Alaska residents in 2016. In 2016, there were 974 deaths due to cancer and 815 due to heart disease.<sup>6</sup>

### Discussion

1918 to 1919 was a difficult time for people who resided in the Territory of Alaska. There were almost 58,000 people living in Alaska in 1917. However, 1 out of every 20 persons residing in Alaska died due to pandemic flu, the sinking of the SS Princess Sophia, World War I, and other causes. Half (51%) of all deaths in that 2-year timeframe were attributable to influenza. As with the rest of the U.S., not only were there high death rates among young children and the elderly, but also among young and

<sup>‡</sup> Data not shown

middle aged adults, which was an unusual feature of the 1918–1919 pandemic compared to seasonal influenza and the pandemics of 1957, 1968, and 2009.<sup>1,2</sup>

The proportion of people who died from influenza among those diagnosed (case fatality rate) was >2.5%, which is at least 25 times greater than other modern influenza pandemics (<0.1%).<sup>7,8</sup> Moreover, the overall impact on all-cause death rates in Alaska appears to have outweighed national rates. Compared to all-cause mortalities in 1917, Alaska experienced 1,672 excess deaths per 100,000 population in 1918, which was about double that of U.S. excess deaths (809 excess deaths per 100,000 in 1918 compared to the 1913-1917 average death rate).<sup>9</sup> Pandemic influenza was especially devastating to Alaska Native people,<sup>1,2</sup> accounting for approximately 82% of influenza deaths in Alaska. At the time, Alaska Native people accounted for 48% of Alaska's population.<sup>3</sup>

Death certificates account for 1,113 deaths due to influenza from 1918 to 1919. However, death certificate data only reflects what could be reported at that time; therefore, these numbers are likely an underestimate. Death estimates reported in other studies were not based on analysis of death certificates.<sup>1,2</sup> One study by Mamelund et al. estimated that 1,447 deaths occurred during the 1918–1919 influenza pandemic in Alaska (about 300 deaths higher than the death certificate count).<sup>1</sup> An estimate noted by A.W. Crosby had a larger death estimate of 150 white individuals to about 1,500 to 2,000 Alaska Native individuals.<sup>2</sup> Other sources that have been used by these studies to estimate the number of statewide deaths due to influenza include Government publications (i.e., reports to the secretary of the Territory of AK) and information collected by local teachers, traders, or missionaries in government reports or unofficial sources such as diaries, letters, missionary accounts and newspapers.<sup>1,2</sup>

There are some limitations to consider from these findings. For instance, names were often unknown and there is evidence that race and age were rounded to the nearest 5-year age group for some certificates. Birth data were not available electronically for 1918 and 1919 to correct missing person-level characteristics or to adjust denominators by age for regional rates. Deaths examined from Jan 1, 1918 to Dec 31, 1919 may have included influenza cases that were unrelated to the pandemic; conversely, influenza cases that were misclassified as pneumonia-related deaths that did not mention influenza or deaths from pandemic influenza that occurred outside of this 2-year timeframe are not included in the counts. Furthermore, 2016 projected estimates do not take into consideration changes in population age distributions (except statewide estimates) and other socio-economic factors, general health of the population, and advances in healthcare and other resources. The 2016 projected estimates were generated to provide context if this pandemic were to occur today.<sup>10</sup>

## References

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