Life Tables for Alaska Natives

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LIFE TABLES are used to compare the longevity of different populations. Several measures may be used, the most common being the average duration of life, also called the expectation of life at birth. This measure gives more weight to the relatively large number of deaths occurring in the first year of life. A second measure is to compare the expectation of life remaining to those members of the cohort surviving to age 1 year. A third measure is to compare the median length of life, or the "probable lifetime," which is the age at which half of the original members of the cohort have died. This measure is the age to which exactly 50,000 persons survive when the life table starts with a cohort of 100,000 births.

Abridged life tables 1 and 2 at the end of this paper are for the Native population of Alaska (Aleuts, Eskimos, and Indians) for 1959–61, by sex and ethnic group; they have been calculated by the method Reed and Merrell have described (*1*).

According to the 1960 U.S. Census, there were 42,500 Natives in Alaska, of whom 5,800 were Aleuts, 22,300 Eskimos, and 14,400 Indians. The death rate in Alaska per 1,000 population in 1959–61 was 9.8 (10.8 for males and 8.6 for females). It was 7.6 for Aleuts, 10.0 for Eskimos, and 10.4 for Indians. In 1960, the death rate among the total U.S. white population was 9.5; among the U.S. nonwhite population, it was 10.1 (*2*).

Comparisons With U.S. Population

In 1959–61, the expectation of life at birth for Alaska Natives was 60.4 years, 58.3 years for males and 63.1 years for females. These values indicate that Native females live on the average 4.8 years longer than Native males. The expectation of life for the U.S. population was 69.7 years in 1960, 68.2 years in 1950, and 60.0 years in 1937 (*2*). The present expectation of life of Alaska Natives is comparable to that of the U.S. population in 1937. The following table summarizes the life expectation in years for the two groups from date of birth:

Sex	*Alaska Natives 1959–61*	*U.S. population* [1]		
		1960	*1950*	*1937*
Total	60.4	69.7	68.2	60.0
Male	58.3	66.6	65.2	58.0
Female	63.1	73.4	71.1	62.4

[1] Source of data on U.S. population is reference 2.

The figures on the expectation of life at age 1 for Alaska Natives and for the U.S. population indicate that the Native population lives, on the average, 6 fewer years than the U.S. population. The following table summarizes the expectation of life in years at age 1 for the Native and for the U.S. population:

Sex	*Alaska natives 1959–61*	*U.S. population 1960*
Total	64.4	70.6
Male	63.0	67.6
Female	66.3	73.8

Alaska Natives had a median length of life of 68.3 years in 1959–61, as compared with 74.1 years in 1960 for the U.S. population. These figures indicate that the median length of life

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is longer than the expectation of life for both the Native and the U.S. population. The median length of life for Native females was longer than that for males by 5.2 years; for the U.S. population, the sex difference was 7 years. The following table summarizes the median length of life in years for the two groups.

Sex	*Alaska Natives 1959–61*	*U.S. population 1960*
Total	68. 3	74. 1
Male	65. 4	70. 6
Female	70. 6	77. 6

Comparisons Among Ethnic Groups

Comparison of the expectation of life and the median length of life among the three ethnic groups of Alaska indicates that, on the average, Aleuts at birth have a life expectancy 2.0 years longer than Eskimos and 2.9 years longer than Indians. For Eskimos, the median length of life is 0.7 years longer than for Aleuts and 1.5 years longer than for Indians. The expectation of life at age 1 is also 1 year longer for Eskimos than for Aleuts and 2.4 years longer for Eskimos than for Indians. The following table summarizes the data from table 2 on expectation of life in years for the three Alaskan ethnic groups.

Item	*Total*	*Aleuts*	*Eskimos*	*Indians*
Expectation of life at birth	60. 4	62. 5	60. 5	59. 6
Expectation of life at age 1	64. 4	64. 4	65. 4	63. 0
Median length of life	68. 3	68. 0	68. 7	67. 2

A comparison of the expectation of life of the three ethnic groups at each age interval (see table 2) indicates that Aleuts, on the average, have a longer life expectancy at birth than the other two groups. Eskimos who reach their first birthday have a longer average life expectancy in the period from age 1 until 45 years than Aleuts or Indians. Beginning at age 45, the expected life of Aleuts is slightly longer than that of Eskimos or Indians.

According to the 1950 U.S. census, Alaska's population was 129,000, of which 93,000 persons were white (native whites and foreign born); 34,000 were Alaska Natives (Aleuts, Eskimos, and Indians); 2,000 were from all other groups. Abridged life tables (unpublished) prepared by the National Center for Health Statistics, Public Health Service, indicate that the life expectancy for the total Alaska population in 1949–51 was 62.2–63.4 years for white males, 71.4 years for white females, 47.2 years for nonwhite males, and 48.9 years for nonwhite females. Since 94 percent of the nonwhite population in Alaska in 1950 consisted of Natives, it is assumed that the life expectancy of Alaska Natives and of Alaska nonwhites was the same in 1949–51, or 47.2 years for males and 48.9 for females. The following table summarizes the expectation of life in years for Native males and females for the years 1949–51 and 1959–61:

Item	*Males*		*Females*	
	1959–61	*1949–51* [1]	*1959–61*	*1949–51* [1]
Expectation of life at birth [2]	58. 3	47. 2	63. 1	48. 9
Expectation of life at age 1 [2]	63. 0	51. 7	66. 3	52. 8
Median length of life	65. 4	49. 2	70. 6	50. 8

[1] Source of 1949–51 data is reference 2.

[2] The expectation of life shown is for the nonwhite population of Alaska. The assumption is that the expectation of life in 1949–51 for the Native and the nonwhite population was the same.

Discussion

It is interesting to note that, in the period between 1949–51 and 1959–61, the life expectancy of Alaska Native males increased by 11.1 years and that of Alaska Native females by 14.2 years. In the same period, the life expectancy for Alaska Natives at age 1 increased by 11.3 years for males and by 13.5 years for females; the median length of life increased by 16.2 years for males and by 19.8 years for females. Further, this increase in life expectancy for the Natives exceeds any changes in life expectancy for the U.S. population that have occurred during any period of similar length.

Some of the factors contributing to the gain in life expectancy for the Natives were the availability of medical and allied health services, acculturation factors resulting from better education and welfare, and improved sanitation and water facilities. These factors also were primarily responsible for the reduction in the Natives' infant mortality rate from 94.5 per 1,000 live births in 1950 to 74.8 in 1960 to 52.5 in

1966 (*3*). The tuberculosis mortality rate per 100,000 population also decreased, from 641.1 in 1950 to 43.1 in 1960 to 18.4 in 1964—3-year moving averages (*4*, *5*).

Summary

The life expectancy of Alaska Natives (Aleuts, Eskimos, and Indians) for 1959–61 by sex and ethnic group was calculated by the method described by Reed and Merrell. The Natives' life expectancy at birth was 60.4 years, or 9.3 years less than the estimated life expectancy for the U.S. population in 1960. The increase in life expectancy of the Alaska Natives from 1950 to 1960 exceeds any change that has occurred in the life expectancy of the U.S. population during any period of similar length.

Some of the factors contributing to this gain include the increased awareness among the Native people about health matters, the prevention of certain infectious diseases, especially tuberculosis, reductions in infant mortality, and improved sanitation facilities.

The infant mortality rate decreased from 94.5 per 1,000 live births in 1950 to 74.8 in 1960 to 52.5 in 1966 (*3*). The tuberculosis mortality rate per 100,000 population decreased from 641.1 in 1950 to 43.1 in 1960 to 18.4 in 1964—3-year moving averages.

REFERENCES

(*1*) Reed, J. L., and Merrell, M.: A short method for constructing an abridged life table. Amer J Hyg 30: 34–62, September 1939.

(*2*) National Center for Health Statistics, Public Health Service: Vital statistics of the United States, 1960. U.S. Government Printing Office, Washington, D.C., 1963.

(*3*) Gurunanjappa, B. S.: Alaska Native infant health problems. Alaska Med 9: 88–92, September 1967.

(*4*) Division of Indian Health, Public Health Service: Indian health highlights, 1960. U.S. Government Printing Office, Washington, D.C., October 1960.

(*5*) Division of Indian Health, Public Health Service: Indian health highlights, 1966. Washington, D.C., June 1966.

Key To Column Heads in Abridged Life Tables 1 and 2, pages 68 and 69

COLUMN 1. Age interval (x to $x+n$). The age interval is the period between the two ages indicated. For example, "20-24" means the 5-year interval between the 20th and the 25th birthday.

COLUMN 2. Number of persons living at the beginning of the age interval ($n{}^{l}x$). The survivors to each age of life from 100,000 infants born alive. For example, starting at birth—age 0—and diminishing from age to age in accordance with the mortality experienced during the period 1959–61.

COLUMN 3. Proportion of persons dying ($n{}^{q}x$). This column shows the proportion of persons dying during the specified age interval among those alive in that interval. This is the fundamental column of the life table.

COLUMN 4. Number of persons dying ($n{}^{d}x$). This column shows the number of persons dying in each successive age interval from 100,000 infants born alive. The number in this column is obtained by multiplying the number in column 2 by that in column 3.

COLUMN 5. Σ of ${}^{l}x$ at 5-year intervals from age x to the end of life. The number in this auxiliary column is needed to calculate the number in column 6.

COLUMN 6. Total years of life remaining to persons surviving to year x ($n{}^{T}x$). This auxiliary column, which is used in calculating the expectation of life in column 7, shows the total estimated number of years of life remaining to persons in the age interval shown in column 1.

COLUMN 7. Expectation of life (e_x). The expectation of life at any age is the average number of years of life remaining to those persons surviving to that age. This number is obtained by dividing the number in column 6 by that in column 2.

Table 1. Abridged life tables for the Alaska Native population, 1959–61

Age interval	Number surviving to exact age from 100,000 born alive	Number dying in interval x to $x+n$ from 1,000 alive at age x	Number dying in intervals x to $x+n$	$\sum$ of l_x at 5-year intervals from age x to end of life	Total years of life remaining to survivors at age x	Average years of life remaining to survivors at age x
x to $x+n$	${}_nl_x$	${}_{1,000}{}_nq_x$	${}_nd_x$	$\sum_{a=0}^{\infty} {}_5l_{x+5a}$	${}_nT_x$	${}_n\mathring{e}_x$
Both sexes						
Under 1 year	100,000	76.51	7,651		6,040,256	60.4
1–4	92,349	19.97	1,844		5,945,795	64.4
5–9	90,505	9.95	900		5,581,269	61.7
10–14	89,605	8.46	758		5,131,257	57.3
15–19	88,847	7.97	708	981,518	4,685,167	52.7
20–24	88,139	20.31	1,790	892,671	4,242,487	48.1
25–29	86,349	21.78	1,881	804,532	3,806,023	44.1
30–34	84,468	33.96	2,932	718,183	3,378,742	40.0
35–39	81,536	32.99	2,690	633,715	2,963,564	36.3
40–44	78,846	36.86	2,906	552,179	2,562,614	32.5
45–49	75,940	43.60	3,311	473,333	2,175,520	28.6
50–54	72,629	65.91	4,787	397,393	1,803,705	24.8
55–59	67,842	67.79	4,599	324,764	1,452,260	21.4
60–64	63,243	109.55	6,928	256,922	1,124,101	17.8
65–69	56,315	130.44	7,346	193,679	824,634	14.6
70–74	48,969	201.47	9,866	137,364	560,812	11.4
75–79	39,103	240.78	9,415	88,395	340,201	8.7
80–84	29,688	433.25	12,862	49,292	167,599	5.6
85 and over	16,826	834.87	14,048	19,604		
Male						
Under 1 year	100,000	89.64	8,964		5,831,525	58.3
1–4	91,036	20.72	1,886		5,738,015	63.0
5–9	89,150	11.44	1,020		5,378,813	60.3
10–14	88,130	10.94	964		4,935,912	56.0
15–19	87,166	8.96	781	943,200	4,497,721	51.6
20–24	86,385	26.18	2,262	856,034	4,063,574	47.0
25–29	84,123	32.02	2,694	769,649	3,636,905	43.2
30–34	81,429	33.47	2,725	685,526	3,222,928	39.6
35–39	78,704	34.44	2,710	604,097	2,822,593	35.9
40–44	75,994	41.20	3,131	525,393	2,435,763	32.0
45–49	72,863	40.71	2,966	449,399	2,063,567	28.3
50–54	69,897	68.72	4,803	376,536	1,706,319	24.4
55–59	65,094	76.19	4,960	306,639	1,368,426	21.0
60–64	60,134	137.01	8,239	241,545	1,054,640	17.5
65–69	51,895	124.71	6,472	181,411	774,253	14.9
70–74	45,423	211.98	9,629	129,516	530,668	11.7
75–79	35,794	229.46	8,213	84,093	326,913	9.1
80–84	27,581	345.21	9,614	48,299	168,885	6.1
85 and over	18,237	863.99	15,756	20,718		
Female						
Under 1 year	100,000	62.97	6,297		6,311,989	63.1
1–4	93,703	18.84	1,765		6,216,548	66.3
5–9	91,938	7.97	733		5,846,432	63.6
10–14	91,205	5.49	501		5,388,790	59.1
15–19	90,704	6.98	633	1,032,207	4,934,039	54.4
20–24	90,071	13.91	1,253	941,503	4,481,944	49.8
25–29	88,818	10.45	928	851,432	4,034,661	45.4
30–34	87,890	34.92	3,069	762,614	3,592,512	40.9
35–39	84,821	31.05	2,634	674,724	3,160,379	37.2
40–44	82,187	32.99	2,711	589,903	2,742,934	33.4
45–49	79,476	47.43	3,770	507,716	2,338,540	29.4
50–54	75,706	62.62	4,741	428,240	1,950,162	25.8
55–59	70,965	56.00	3,974	352,534	1,583,442	22.3
60–64	66,991	80.36	5,383	281,569	1,238,418	18.5
65–69	61,608	137.01	8,441	214,578	915,990	14.9
70–74	53,167	187.55	9,971	152,970	628,097	11.8
75–79	43,196	255.39	11,032	99,803	386,649	9.0
80–84	32,164	360.93	11,609	56,607	197,908	6.2
85 and over	20,555	810.83	16,667	24,443		

Table 2. Abridged life tables for three Alaskan ethnic groups, 1959–61

Age interval	Number surviving to exact age from 100,000 born alive	Number dying in interval x to $x+n$ from 1,000 alive at age x	Number dying in intervals x to $x+n$	$\sum$ of l at 5-year intervals from age x to end of life	Total years of life remaining to survivors at age x	Average years of life remaining to survivors at age x
x to $x+n$	${}_nl_x$	${}_{1,000}{}_nq_x$	${}_nd_x$	$\sum_{a=0}^{\infty} {}^{l}x+5a$	${}_nT_x$	${}_n\mathring{e}_x$
Aleuts						
Under 1 year	100,000	44.66	4,466		6,252,393	62.5
1–4	95,534	9.70	927		6,155,626	64.4
5–9	94,607	7.97	754		5,775,917	61.0
10–14	93,853	8.96	841		5,304,980	56.5
15–19	93,012	7.97	741	1,014,136	4,837,820	52.0
20–24	92,271	30.56	2,820	921,124	4,374,201	47.4
25–29	89,451	24.71	2,210	828,853	3,919,590	43.8
30–34	87,241	34.92	3,046	739,402	3,477,812	39.9
35–39	84,195	30.56	2,573	652,161	3,049,147	36.2
40–44	81,622	29.59	2,415	567,966	2,634,736	32.3
45–49	79,207	34.92	2,766	486,344	2,232,623	28.2
50–54	76,441	149.59	11,435	407,137	1,841,624	24.1
55–59	65,006	63.56	4,132	330,696	1,487,722	22.9
60–64	60,874	112.69	6,860	265,690	1,173,975	19.3
65–69	54,014	92.33	4,987	204,816	886,577	16.4
70–74	49,027	291.51	14,292	150,802	627,426	12.8
75–79	34,735	147.43	5,121	101,775	417,993	12.0
80–84	29,614	189.61	5,615	67,040	258,928	8.7
85 and over	23,999	440.50	10,572	37,426		
Eskimos						
Under 1 year	100,000	87.88	8,788		6,056,959	60.5
1–4	91,212	22.59	2,060		5,963,321	65.4
5–9	89,152	9.95	887		5,603,905	62.8
10–14	88,265	8.46	747		5,160,627	58.5
15–19	87,518	5.98	523	988,061	4,721,245	53.9
20–24	86,995	11.44	995	900,543	4,284,911	49.2
25–29	86,000	18.34	1,577	813,548	3,852,204	44.8
30–34	84,423	28.62	2,416	727,548	3,425,851	40.6
35–39	82,007	26.66	2,186	643,125	3,009,649	36.7
40–44	79,821	31.53	2,517	561,118	2,605,058	32.6
45–49	77,304	28.13	2,174	481,297	2,212,248	28.6
50–54	75,130	40.23	3,022	403,993	1,831,058	24.4
55–59	72,108	83.14	5,995	328,863	1,462,166	20.3
60–64	66,113	135.27	8,943	256,755	1,115,380	16.9
65–69	57,170	132.20	7,558	190,642	806,847	14.1
70–74	49,612	183.41	9,099	133,472	539,860	10.9
75–79	40,513	317.62	12,868	83,860	313,441	7.7
80–84	27,645	461.01	12,745	43,347	142,286	5.1
85 and over	14,900	946.16	14,098	15,702		
Indians						
Under 1 year	100,000	69.15	6,915		5,958,088	59.6
1–4	93,085	18.84	1,754		5,863,095	63.0
5–9	91,331	9.95	909		5,495,399	60.2
10–14	90,422	7.97	721		5,041,280	55.8
15–19	89,701	10.94	981	963,113	4,590,958	51.2
20–24	88,720	29.10	2,582	873,412	4,144,518	46.7
25–29	86,138	25.69	2,213	784,692	3,707,116	43.0
30–34	83,925	42.64	3,578	698,554	3,281,751	39.1
35–39	80,347	44.08	3,542	614,629	2,870,794	35.7
40–44	76,805	47.91	3,680	534,282	2,477,893	32.3
45–49	73,125	70.60	5,163	457,477	2,102,730	28.8
50–54	67,962	69.66	4,734	384,352	1,749,793	25.7
55–59	63,228	51.25	3,240	316,390	1,422,219	22.5
60–64	59,988	83.60	5,015	253,162	1,114,120	18.6
65–69	54,973	140.93	7,747	193,174	825,779	15.0
70–74	47,226	195.36	9,226	138,201	569,404	12.0
75–79	38,000	176.32	6,700	90,975	356,557	9.4
80–84	31,300	433.25	13,561	52,975	182,404	5.8
85 and over	17,739	778.10	13,803	21,675		

Program Notes

Compliance With Title VI

Federal Civil Rights Commission authorities met recently with Maryland State Health Department representatives to present the preliminary draft of their findings and recommendations after a 10-day "on site" review of the compliance by both public and private health care facilities in the State with Title VI of the Civil Rights Act of 1964. This pilot review in Maryland was to serve as a basis for the development of satisfactory procedures for use in other States.

To avoid duplication of effort and permit a stepped-up schedule of "on site" visits by State advisers, the Maryland health officials asked for a memorandum of understanding to spell out the respective areas of responsibility of State and Federal representatives for "on site" inspection of hospitals, nursing homes, and extended care facilities in connection with Title VI.

Dr. Edward Davens, Maryland's deputy health commissioner, expressed the health department's desire to carry out not only the intent but also the spirit of the law in all of its jurisdictions.

Consolidation of Health Services

After a 5-year study of health care in Michigan, a citizens committee has recommended sweeping consolidation of State health services and functions under a single State agency. In a 152-page report published by the University of Michigan School of Public Health, this consolidation was given top priority among 61 detailed recommendations.

This citizens group, the Michigan Community Health Service Study, included 246 civic leaders in six regional task forces and a statewide "committee of forty."

Other priorities for action listed by the group include the following:

- Adoption of a standard statewide sanitary code to control environmental health problems.
- Revision of the confusing 40-year-old State public health law.
- Increased State financial aid to local health departments based on a formula of population, economic need, health problems, and health services provided.
- Improvement of personal health services in schools and improved health teaching.
- A requirement that all nonprofit voluntary health and welfare agencies that solicit funds from the public make standardized financial reports so the public can know how they spend their money.
- Adoption of standards for measuring the effectiveness of any voluntary health agency seeking to attract public contributions.
- Studying the prospect of combining similar services of different voluntary health agencies. (There are 19 agencies for helping the blind in the Detroit area alone.)

Coral Snake Antivenin

Coral snake (*Micrurus fulvius*) antivenin has recently been presented by the Wyeth Laboratories of Pennsylvania to the National Communicable Disease Center of the Public Health Service, State health departments, poison control centers, and military bases in the nine States where the snake is found. These States are Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Texas, and South Carolina. The antivenin has also been distributed to selected zoos throughout the country.

When a bite by a coral snake is reported in the nine-State area, the physician or hospital should notify the State health department or the nearest poison control center to arrange for an immediate supply of antivenin. Any emergency request from outside the nine-State area should be directed to the National Communicable Disease Center in Atlanta, Ga.

There have been two bites requiring the antivenin since the program began—one in Florida and one in Georgia.

Wyeth Laboratories was granted the first license to produce the coral snake antivenin for distribution in the United States on September 1, 1967. Development of the antitoxin followed studies conducted on the coral snake's venom by the laboratories and by the Division of Biologic Standards of the National Institutes of Health, Public Health Service.

More Crippled Children's Services

The division of maternal and child health of the Massachusetts Department of Public Health has extended its services for crippled children. New services will include (*a*) complete diagnosis and treatment for children with convulsive or related disorders who are referred from the Massachusetts General Hospital, (*b*) a special 2-day study program to help assess the educational problems of 40 preschool children who are deaf as a result of rubella, (*c*) financial support for the purchase of equipment at two speech and hearing clinics—at St. Luke's Hospital in New Bedford and at a hospital in Springfield—so that the clinics can provide speech and hearing services for children on a regional basis, and (*d*) payments in behalf of children with chronic kidney disease who need kidney dialysis or kidney transplant.

Plans are also being formulated for financial support of a research fellow in chronic renal diseases at the Children's Hospital Medical Center.—*THIS WEEK in Public Health* (Massachusetts Department of Public Health), May 20, 1968.

Items for this page: Health departments, health agencies, and others are invited to share their program successes with others by contributing items for brief mention on this page. Flag them for "Program Notes" and address as indicated in masthead.