



Projected Demand for Long-Term Care Beds in the NWT

NWT Bureau of Statistics

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Projected Demand for Long Term Care Beds

Introduction

Long-term care (LTC) is defined as a range of facility based services that address the health, social and personal care needs of individuals who have reduced or no capacity for self-care. Long-term care facilities in the NWT are designed for people with Levels 3, 4 and 5 care who require professional nursing services and continuing medical supervision 24 hours a day. Levels 3 and 4 involve people who may not be able to get around on their own, who need complex medical support, or might be at risk of harm because of their condition. Level 5 care is available to those clients with the highest and most complex care needs who are considered at high risk of injury to self or others. Level 5 care is provided at Stanton Extended Care Unit only.

The majority of residents in NWT long-term care facilities require Levels 4 and 5 care. As of April 1, 2020, approximately 67% of the long-term care residents in the NWT were receiving Levels 4 and 5 care; however, this varies by region (Appendix – Table A).

As of April 1, 2020, there were 183 beds in the NWT long-term care facilities of which 176 were filled. Each region has one long-term care facility, while the Territorial Dementia Facility (TDF) and Stanton Extended Care Unit (ECU) service the entire NWT. There were 33 people on the NWT waitlist as of June 11, 2020. Norman Wells LTC, Fort Simpson Elders' Care Home and Jimmy Erasmus Seniors Home were under capacity; however, there were three people on the waitlist for the latter two facilities (Table 1).

Table 1. Number of LTC Beds, Occupied Beds and People on Waitlist (as of June 11, 2020) by Region.

Region	Community	Facility	No. of LTC Beds	No. of Occupied Beds	No. of People on Waitlist
Beaufort Delta	Inuvik	Inuvik Hospital LTC Unit	22	22	6
Dehcho	Fort Simpson	Fort Simpson Elders' Care Home	17	15	3
Fort Smith	Fort Smith	Northern Lights Special Care Home	26	26	1
Hay River	Hay River	Woodland Manor	23	23	5
Sahtu	Norman Wells	Norman Wells LTC	16	12	0
Tłı̨chǫ	Behchokǫ	Jimmy Erasmus Seniors Home	16	15	3
Yellowknife	Yellowknife	Aven Manor	27	27	8
Stanton ECU	Yellowknife	Stanton Territorial Hospital ECU	10	10	6
Yellowknife (TDF)	Yellowknife	Territorial Dementia Facility	26	26	1
Total:			183	176	33

The NWT Bureau of Statistics was asked by the Health and Social Services to project demand for long-term care beds in the Northwest Territories over the next 15 years for three scenarios:

- a) Scenario 1 – for those 70 years old and older with Level 3, 4 and 5 care;
- b) Scenario 2 – for those 75 years old and older with Level 3, 4 and 5 care;
- c) Scenario 3 – Level 4 and 5 care for all ages.

This report documents the methodology used for the projections followed by the results, model comparisons, limitations and ends with conclusions. Additional graphs and tables may be found in the Appendix.

Methodology

The Average Flow Model (AFM) was employed using the methodology proposed by Zhang et al. (2012)¹ to project long-term care bed demand. After researching other methodologies, the AFM model was selected as the best option for these projections. The AFM is based on two client flow relationships in a facility:

$$\text{Beds}_{t+1} = \text{Beds}_t - \text{Departures}_t + \text{Arrivals}_t \quad (1)$$

$$\text{Departures}_t = \text{Beds}_t / \text{LOS} \quad (2)$$

Where:

Beds_{t+1} is the number of beds needed next year,

Beds_t is the number of beds needed this year,

Arrivals_t is the number of clients who will arrive this year,

Departures_t is the number of clients who will depart this year, and

LOS is the median length of stay.

Departures (equation 2) are derived by assuming that if residents remain in the system for the median LOS, then each year (1/median LOS) residents leave the system (departure rate). The median LOS was used rather than the mean because the mean LOS can be skewed by having a few residents with very long lengths of stay. Survival analysis was performed to calculate median LOS based on information from those who died/were discharged and those still in the system by facility. An exception was made for Sahtu's Norman Wells LTC and Tłı̄chq's Jimmy Erasmus Seniors Home as those facilities were either recently opened or added new beds resulting in a lower than expected median LOS. The average median LOS of the other facilities excluding Stanton ECU and TDF was used for Tłı̄chq and Sahtu facilities.

In the AFM, the number of beds needed next year (Beds_{t+1}) depends on the number of beds needed this year (Beds_t). The data in Table 1 was used to calculate the current demand for LTC beds (Beds_t) as the sum of the number of occupied beds at the end of 2019-2020 fiscal year plus the number of people on

¹ Zhang Y, Puterman ML, Atkins D. Residential long-term care capacity planning: the shortcomings of ratio-based forecasts. *Healthc Policy*. 2012;7(4):68-81. Accessed: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3359086/>

the waitlist. The median length of stay (LOS) and client arrivals were calculated by region and age category.

The estimates of historical per capita arrival rates were obtained by dividing historical arrivals to the LTC facility by population estimates for 2010-2019 years. These calculations were performed by facility for each age group (70 to 74, 75 to 79, 80 to 84, 85 to 89 and 90 and older) by sex. The 10-year average per capita arrival rate for 70 and older and 75 and older residents were multiplied by population projections for the corresponding age groups by sex to obtain arrivals for the projected period. These rates were applied by region in anticipation that these correspond to the catchment area population. See Appendix – Table D for information on regions with their corresponding communities. For Stanton ECU and Territorial Dementia Facility, the entire NWT population projections were used as these facilities are territorial-wide. Subsequently, the projected client arrivals in each region are the sum of the projected arrivals for each of the age group/sex combinations within a region.

Population projections are produced by the NWT Bureau of Statistics using the Cohort Component Method which incorporates three components of population change – mortality, fertility and migration. Historical trends are used to make future assumptions about the population.

Table 2 shows the current complement of long-term care beds by facility and their associated waitlists by age group for under 70 and 70 and older age groups. As of April 1, 2020 approximately 50 (30%) LTC beds were occupied by those who were younger than 70 years old with the addition of 10 LTC beds needed for people in this age category on the waitlist. As a result of this information, the LTC projections were adjusted to account for the additional utilization of beds by an extra 60 beds. Table B in the Appendix shows the same type of information for those 75 and older age groupings. As of April 1, 2020 approximately 71 (40%) LTC beds were occupied by those who were younger than 75 years old with the addition of 13 LTC beds needed for people in this age category on the waitlist. The adjustment of an extra 84 beds was made to the projected bed demand for those 75 years old and older to reflect the full bed demand.

Table 2. Number of People in the Facility and on Waitlist (70 and Older)

Region	Facility	Current No. of Occupied Beds						Current No. of People on Waitlist					
		Total		Under 70 Years		70 Years and Older		Total		Under 70 Years		70 Years and Older	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Beaufort Delta	Inuvik Hospital LTC Unit	22	100.0	5	22.7	17	77.3	6	100.0	1	16.7	5	83.3
Dehcho	Fort Simpson Elders' Care Home	15	100.0	7	46.7	8	53.3	3	100.0	0	0.0	3	100.0
Fort Smith	Northern Lights Special Care Home	26	100.0	8	30.8	18	69.2	1	100.0	0	0.0	1	100.0
Hay River	H.H. Williams & Woodland Manor	23	100.0	6	26.1	17	73.9	5	100.0	1	20.0	4	80.0
Sahtu	Norman Wells LTC	12	100.0	2	16.7	10	83.3	0	100.0	0	0.0	0	0.0
Tłı̨chǫ	Jimmy Erasmus Seniors Home	15	100.0	3	20.0	12	80.0	3	100.0	1	33.3	2	66.7
Yellowknife	Aven Manor	27	100.0	5	18.5	22	81.5	8	100.0	3	37.5	5	62.5
Stanton ECU	Stanton Territorial Hospital ECU	10	100.0	6	60.0	4	40.0	6	100.0	4	66.7	2	33.3
Yellowknife (TDF)	Territorial Dementia Facility	26	100.0	8	30.8	18	69.2	1	100.0	0	0.0	1	100.0
	Total:	176	100.0	50	28.4	126	71.6	33	100.0	10	30.3	23	69.7

Results

For scenarios 1 and 2, the analyses were performed with the assumption that only those 70 and older for Scenario 1 or 75 and older for Scenario 2 will enter LTC facilities in the next 15 years. Population changes in these age groups are expected to be the main driver of the demand for LTC services in the future.

Table 3 shows projected demand for beds based on AFM for Scenarios 1 and 2. After 15 years, the demand for LTC beds is expected to be 450 for those 70 years old and older and 395 for those 75 years old and older after adjustment for those under the respectable age groups.

Table 3. Projected Demand for LTC Beds for 70 and Older and 75 and Older

Region	Projected Demand for LTC Beds for 70 and Older*			Projected Demand for LTC Beds for 75 and Older**		
	2024-2025	2029-2030	2034-2035	2024-2025	2029-2030	2034-2035
Beaufort Delta	33	34	41	31	32	39
Dehcho	25	32	38	22	25	27
Fort Smith	33	41	50	31	38	45
Hay River	35	45	58	36	44	56
Sahtu	12	12	14	10	10	11
Tłıchq	17	17	18	16	16	16
Yellowknife	60	89	130	51	73	105
Stanton ECU	16	17	19	15	16	17
Yellowknife (TDF)	43	60	82	42	58	79
Total:	274	347	450	254	312	395

*Includes adjustment of 60 beds to account for under 70 years old.

**Includes adjustment of 84 beds to account for under 75 years old.

Projected additional demand for LTC beds is calculated as the differences between the projected demand for LTC beds from Table 3 and the current number of LTC beds and is shown in Table 4. After 15 years, the additional demand for LTC beds is expected to be 267 for Scenario 1 and 212 for Scenario 2.

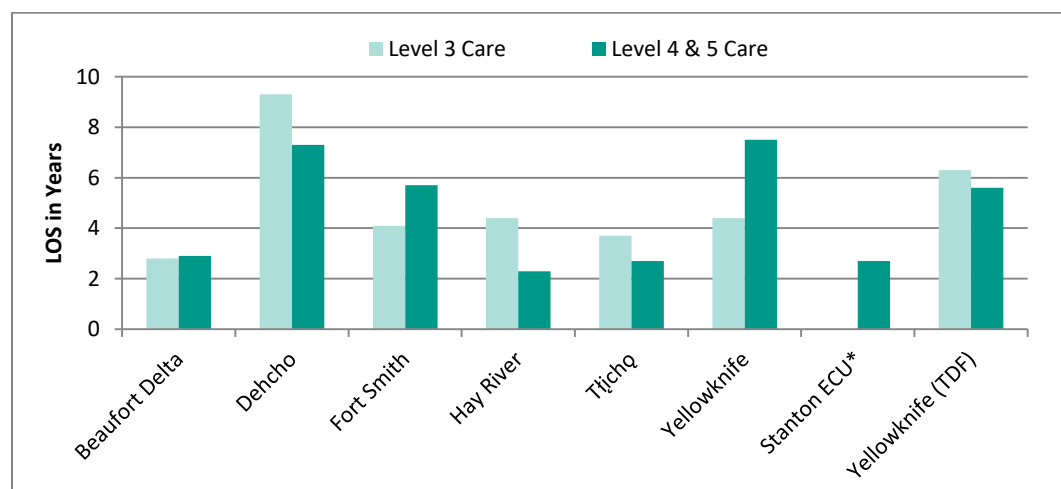
Table 4. Projected Additional Demand for LTC Beds for 70 and Older and 75 and Older

Region	Total Number of LTC Beds	Projected Additional Demand for LTC Beds for 70 and Older			Projected Additional Demand for LTC Beds for 75 and Older		
	2019-2020	2024-2025	2029-2030	2034-2035	2024-2025	2029-2030	2034-2035
Beaufort Delta	22	11	12	19	9	10	17
Dehcho	17	8	15	21	5	8	10
Fort Smith	26	7	15	24	5	12	19
Hay River	23	12	22	35	13	21	33
Sahtu	16	-4	-4	-2	-6	-6	-5
Tłı̨chǫ	16	1	1	2	0	0	0
Yellowknife	27	33	62	103	24	46	78
Stanton ECU	10	6	7	9	5	6	7
Yellowknife (TDF)	26	17	34	56	16	32	53
Total:	183	91	164	267	71	129	212

Similar projections methodology was applied to Scenario 3 with the exception that arrival rates were calculated for all age groups. The assumption was made that the current distribution and the number of people with Level 3 care at the regional level stays the same and only residents with Levels 4 & 5 care will be entering the LTC facilities throughout the projection period. This implies that a small proportion of patients with Level 3 care will be still admitted. The current distribution of the LTC residents by level of care indicates that beds in facilities (except Stanton ECU) are not designed by level of care and can be found in the Table A in the Appendix.

Figure 1 shows that residents with Level 4 & 5 care have longer lengths of stay than those with Level 3 care in Yellowknife and Fort Smith Regions, while lengths of stay of those residents at Dehcho, Hay River, Tłı̨chǫ and Yellowknife (TDF) Regions are longer for Level 3 care residents.

Figure 1. Median Length of Stay by Level of Care



*Stanton ECU only has patients with Level 5 care

After 15 years, the demand for LTC beds for clients with Level 4 & 5 care is expected to be 352 (Table 5).

Table 5. Projected Demand for LTC Beds for People with Level 4 and 5 Care

Region	Projected Demand for LTC Beds for Levels 4 & 5 Care		
	2024-2025	2029-2030	2034-2035
Beaufort Delta	27	30	35
Dehcho	23	26	31
Fort Smith	33	40	50
Hay River	26	33	40
Sahtu	12	12	12
Tłı̨chǫ	18	18	18
Yellowknife	48	65	84
Stanton ECU	21	25	29
Yellowknife (TDF)	33	42	53
Total:	241	291	352

*Includes adjustment of 69 beds to account for LTC beds occupied by clients with Level 3 care with the waitlisted candidates for Level 3 care

The differences between the projected demand for LTC beds for level 4 & 5 care (Table 5) and the current number of beds for each time frame are shown in Table 6. It is estimated that by 2035, the additional demand for LTC beds with Level 4 & 5 care is expected to be 169.

Table 6. Projected Additional Demand for LTC Beds for People with Level 4 & 5 Care

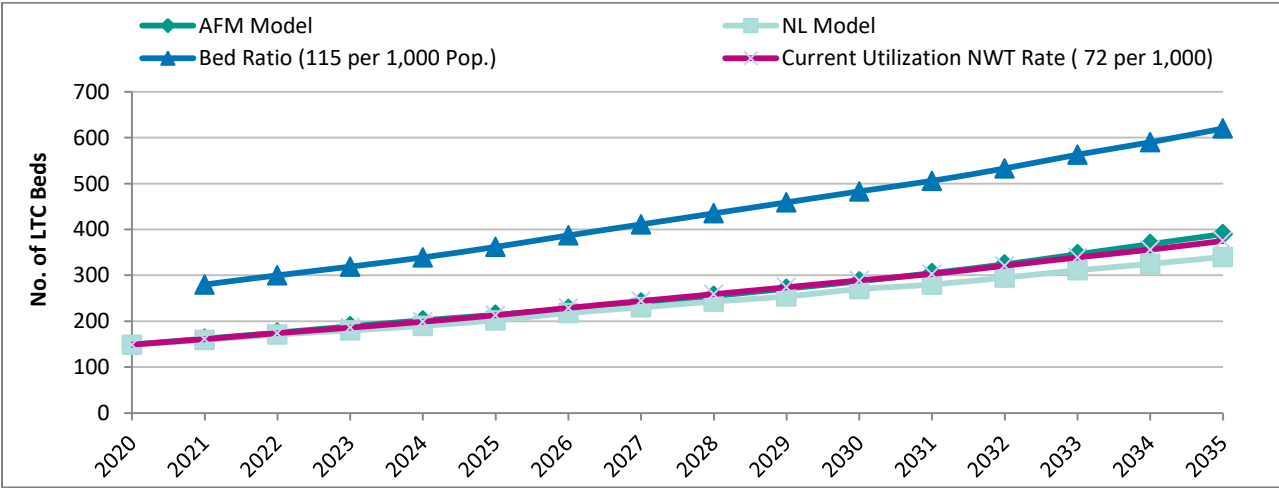
Region	Total Number of LTC Beds	Projected Additional Demand for LTC Beds (Difference from Current No. of LTC Beds)		
	2019-2020	2024-2025	2029-2030	2034-2035
Beaufort Delta	22	5	8	13
Dehcho	17	6	9	14
Fort Smith	26	7	14	24
Hay River	23	3	10	17
Sahtu	16	-4	-4	-4
Tłı̨chǫ	16	2	2	2
Yellowknife	27	21	38	57
Stanton ECU	10	11	15	19
Yellowknife (TDF)	26	7	16	27
Total:	183	58	108	169

All three projection scenarios show that the biggest increases for bed demand are expected to happen for Yellowknife Region and Yellowknife Territorial Dementia Facility, while Sahtu and Tłı̄chq̓ do not require additional beds since they have been running under capacity.

Model Comparisons

As indicated earlier, other models were examined prior to choosing the AFM model for these projections. Results from four alternative methodologies are displayed in Figure 2. The first model was used previously for Health and Social Services and employed a bed ratio approach of 115 beds/1,000 population aged 70 and older. Since the data shows that current utilization rates for the total NWT are around 72 beds/1,000 population aged 70 and older, projections were done using this bed ratio for comparison purposes. Finally, Newfoundland and Labrador’s approach of LTC utilization rates multiplied by population projections was also used to estimate future demand for LTC beds. With the exception of the previous bed ratio using 115 beds, results from all three of the other methods are clustered around each other. This comparative analysis only looks at those 70 years and older and does not include the adjustment factor for the younger residents. If the younger residents were included, it would shift the three lines upwards by approximately 60 LTC beds.

Figure 2. Comparisons of the Results from Different LTC Bed Demand Projections Models



Limitations

As with any model, the accuracy of the projected demand for LTC beds depends on the accuracy of the input data. Historical information on the age distribution of the LTC residents as of the beginning of each fiscal year was not available at the time of the analysis, therefore, keeping the number of those under 70 for Scenario 1 (or those under 75 for Scenario 2) constant means that their proportions are decreasing over time. Keeping the waitlist distribution available as of June 11, 2020 the same throughout projection period, it is possible that the LTC projections might either underestimate or overestimate how many individuals will require LTC services in the future. Also, the accuracy of projections for Scenario 3 depends on the accurate assessment of clients’ levels of care. Variations in population projections can also affect model results.

Conclusion

Population projections show that population is aging and the number of those 70 and older will continue to grow. Based on population aging trends alone, the demand for long-term care beds in the Northwest Territories is expected to increase. Using the AFM, the estimated number of beds required after 15 years is expected to be between 352 and 450. Additional investigation is needed to analyze historical departures and arrivals of those who are under 70 years old and include them into the model. Further work using simulation modelling can be done to refine these estimates.

Appendix

Table A. Number of People in the Facility by Level of Care, April 1, 2020

Region	Facility	Total		Level 3 Care		Levels 4 & 5 Care	
		No.	%	No.	%	No.	%
Beaufort Delta	Inuvik Hospital LTC Unit	21	100.0	5	23.8	16	76.2
Dehcho	Fort Simpson Elders' Care Home	15	100.0	3	20.0	12	80.0
Fort Smith	Northern Lights Special Care Home	26	100.0	6	23.1	20	76.9
Hay River	H.H. Williams & Woodland Manor	23	100.0	5	21.7	18	78.3
Sahtu	Norman Wells LTC	12	100.0	8	66.7	4	33.3
Tłı̨chǫ	Jimmy Erasmus Seniors Home	15	100.0	6	40.0	9	60.0
Yellowknife	Aven Manor	27	100.0	15	55.6	12	44.4
Stanton ECU	Stanton Territorial Hospital ECU	10	100.0	0	0.0	10*	100.0
Yellowknife (TDF)	Territorial Dementia Facility	26	100.0	9	34.6	17	65.4
Total:		175	100.0	57	32.6	118	67.4

*Stanton ECU has only residents with Level 5 care

Figure A. NWT Population Estimates (1996 – 2019) and Population Projections (2020 – 2036) for those 70 Years Old and Older

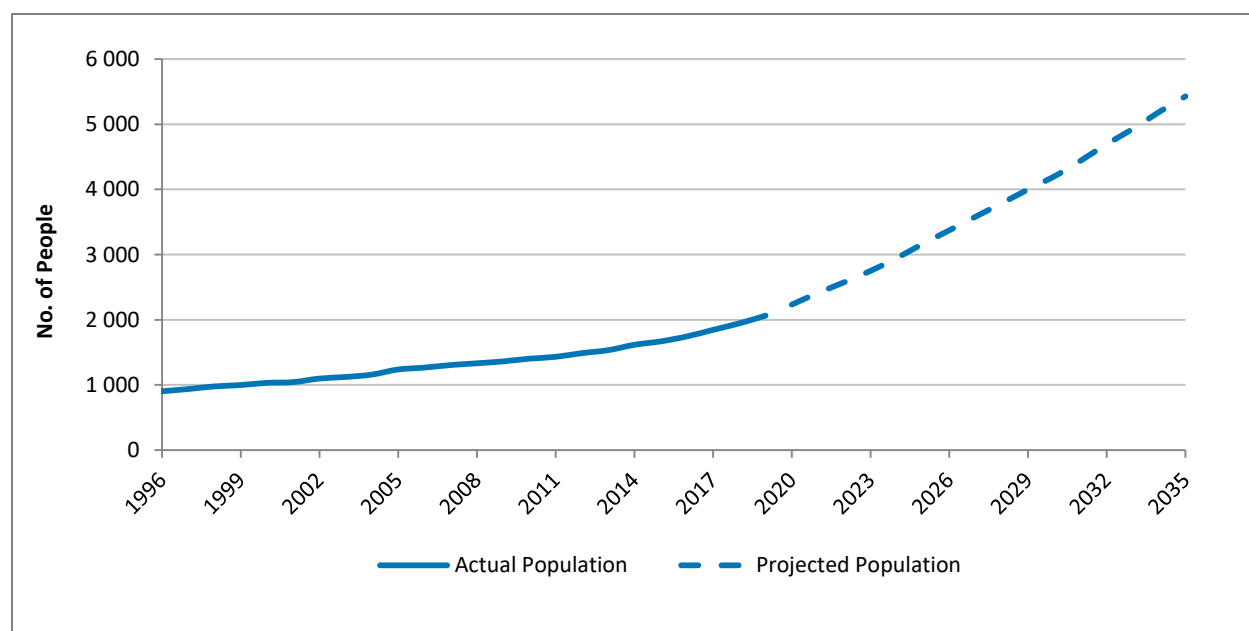


Table B. Number of People in the Facility and on Waitlist (75 and Older), April 1, 2020

Region	Facility	Current No. of Occupied Beds						Current No. of People on Waitlist					
		Total		Under 75 Years		75 Years and Older		Total		Under 75 Years		75 Years and Older	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Beaufort Delta	Inuvik Hospital LTC Unit	22	100.0	6	27.3	16	72.7	6	100.0	2	33.3	4	66.7
Dehcho	Fort Simpson Elders' Care Home	15	100.0	11	73.3	4	26.7	3	100.0	1	33.3	2	66.7
Fort Smith	Northern Lights Special Care Home	26	100.0	8	30.8	18	69.2	1	100.0	0	0.0	1	100.0
Hay River	H.H. Williams & Woodland Manor	23	100.0	10	43.5	13	56.5	5	100.0	1	20.0	4	80.0
Sahtu	Norman Wells LTC	12	100.0	3	25.0	9	75.0	0	100.0	0	0.0	0	0.0
Tłı̨chǫ	Jimmy Erasmus Seniors Home	15	100.0	4	26.7	11	73.3	3	100.0	1	33.3	2	66.7
Yellowknife	Aven Manor	27	100.0	12	44.4	15	55.6	8	100.0	4	50.0	4	50.0
Stanton ECU	Stanton Territorial Hospital ECU	10	100.0	6	60.0	4	40.0	6	100.0	4	66.7	2	33.3
Yellowknife (TDF)	Territorial Dementia Facility	26	100.0	11	42.3	15	57.7	1	100.0	0	0.0	1	100.0
	Total:	176	100.0	71	40.3	105	59.7	33	100.0	13	39.4	20	60.6

Table C. Population Projections for 70 Years Old and Older and for 75 Years Old and Older, 2020 - 2035

Region	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
70 Years Old and Older																
Northwest Territories	2,233	2,412	2,576	2,750	2,947	3,167	3,372	3,581	3,788	3,999	4,199	4,439	4,695	4,929	5,189	5,427
Beaufort Delta	349	361	374	393	416	436	461	486	504	532	534	541	583	611	647	684
Dehcho	218	234	251	253	267	282	289	297	308	315	344	358	368	387	402	425
Fort Smith	196	202	212	214	224	233	239	247	258	274	278	287	289	303	300	301
Hay River	291	314	336	349	379	416	430	458	478	492	524	555	594	621	666	681
Sahtu	147	164	171	181	182	191	206	215	217	218	224	230	242	261	275	301
Tłı̨chǫ	133	133	134	139	142	147	152	164	162	169	172	186	195	192	188	207
Yellowknife	899	1,004	1,098	1,221	1,337	1,462	1,595	1,714	1,861	1,999	2,123	2,282	2,424	2,554	2,711	2,828
75 Years Old and Older																
Northwest Territories	1,192	1,268	1,358	1,445	1,546	1,670	1,814	1,941	2,073	2,214	2,369	2,515	2,688	2,848	3,020	3,171
Beaufort Delta	218	224	229	224	228	233	241	246	261	276	287	306	332	344	358	360
Dehcho	127	137	146	147	143	148	160	171	174	185	202	207	211	220	229	249
Fort Smith	98	109	115	126	131	139	140	149	150	159	165	170	176	183	188	195
Hay River	165	175	187	200	214	224	235	252	261	285	306	315	339	351	372	390
Sahtu	84	91	88	94	99	104	116	126	130	129	134	143	152	153	159	168
Tłı̨chǫ	82	82	77	78	79	79	80	85	86	91	94	96	105	105	102	106
Yellowknife	418	450	516	576	652	743	842	912	1,011	1,089	1,181	1,278	1,373	1,492	1,612	1,703

Figure B. Proportions of Residents by Age Group and Region for all Levels of Care, April 1, 2020

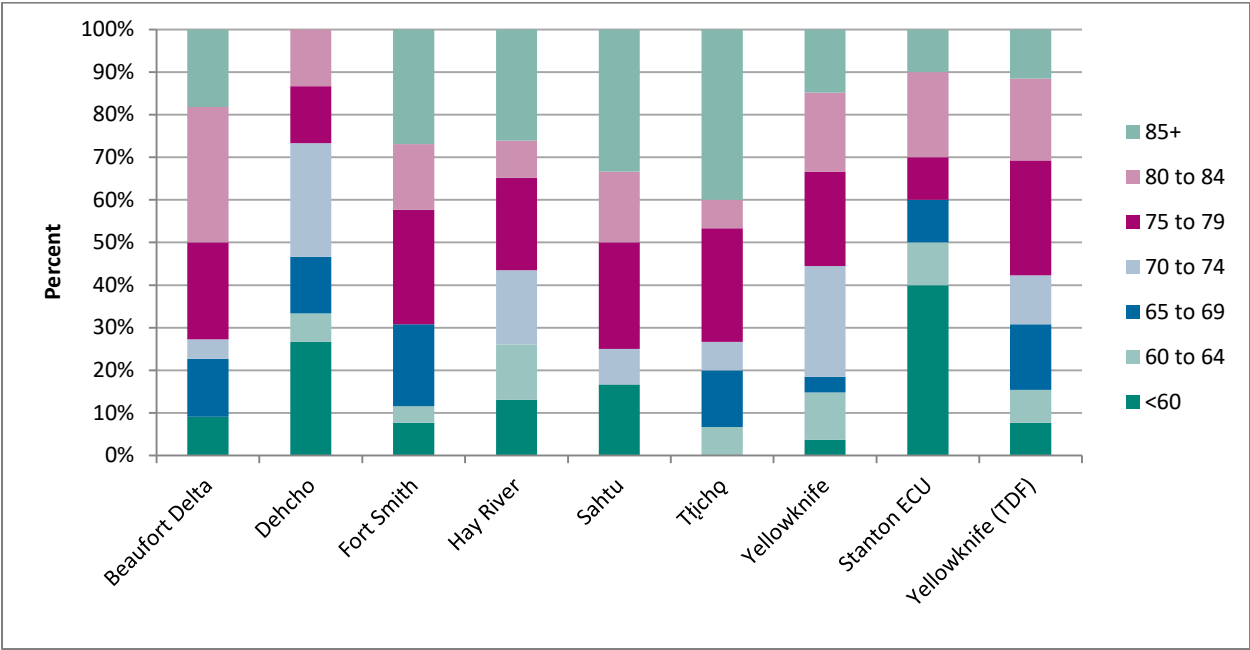


Figure C. Proportions of Residents by Age Group and Region for Levels of Care 4 and 5, April 1, 2020

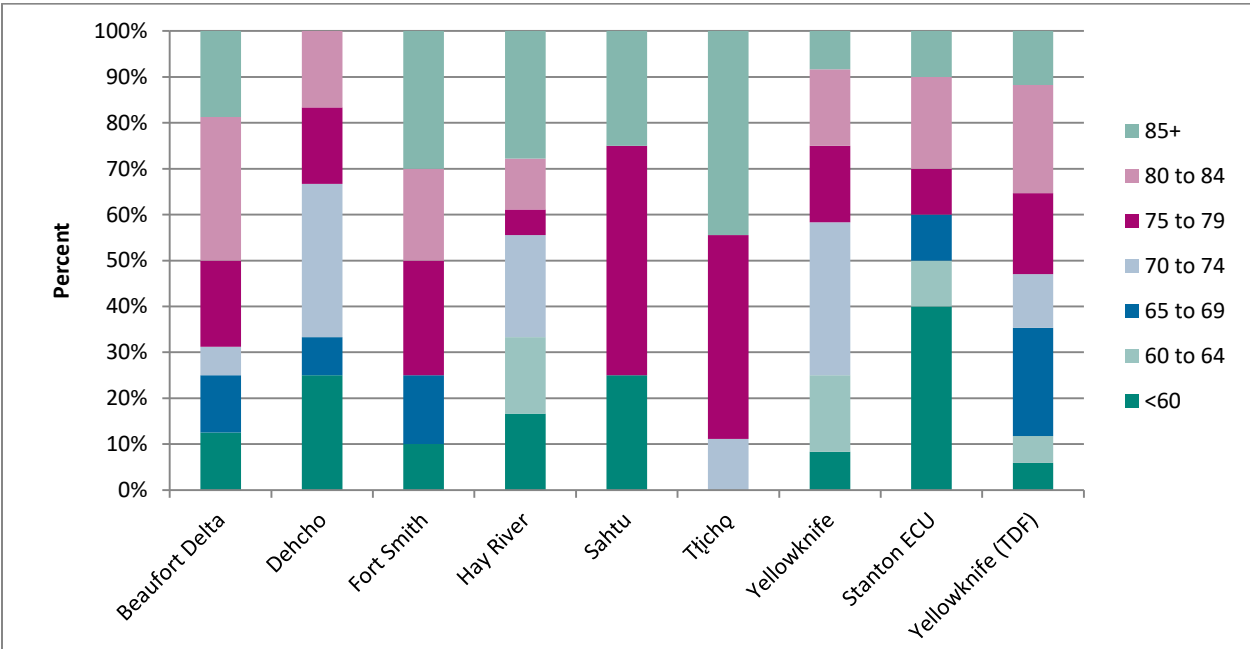


Figure D. Median Length of Stay (LOS) by Region for those Under 75 Years Old and 75 and Older

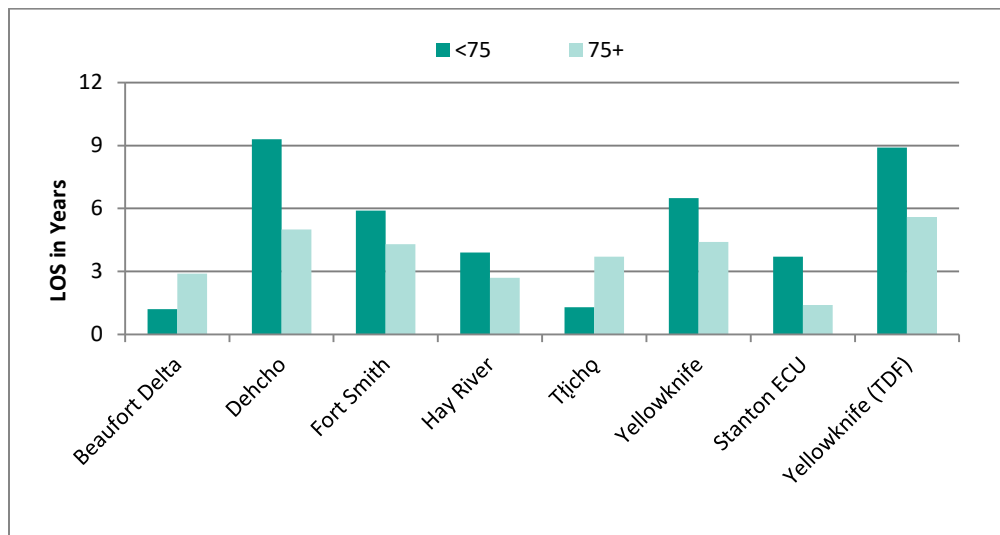


Table D. Regions with Detailed Communities

Regions / Communities	
Beaufort Delta:	Aklavik, Fort McPherson, Ulukhaktok, Inuvik, Paulatuk, Sachs Harbour, Tuktoyaktuk & Tsiigehtchic
Dehcho Region:	Fort Liard, Fort Providence, Fort Simpson, Jean Marie River, Kakisa, Sambaa K'e (Trout Lake), Nahanni Butte, Wrigley & Region 4 Unorganized
Fort Smith Region:	Fort Smith
Hay River Region:	Hay River, Hay River Reserve, Enterprise & Region 5 Unorganized
Sahtu Region:	Colville Lake, Délı̄ne, Fort Good Hope, Norman Wells & Tulita
Tłı̄chq Region:	Behchokò, Whatì, Wekweètì & Gamètì
Yellowknife Region:	Yellowknife, Dettah, Ndilo, Łutselk'e, Fort Resolution & Region 6 Unorganized