

Technical Appendix for Service Projections

Introduction

This document explains the methodology used to estimate the projected numbers of individuals receiving Long-term Services and Supports (LTSS) in the State of Vermont in 2020 and 2030. We project service use for the following four programs:

- Choices for Care (CFC) including Nursing Facility (NF), Enhanced Residential Care (ERC) and Home and Community-based Services (HCBS)
- Developmental Disabilities Services
- Children's Personal Care Services
- Community Rehabilitation and Treatment

The accompanying Excel data book presents the full set of data, and the accompanying slide deck presents a summary of state-level highlights.

Overview

Service projections rely on trends in service use and expected changes in Vermont's population by age group. We projected future service use in two ways:

The **'age trend'** approach estimates future service use based on the expected population size by age group in a future year. This approach assumes that rates of service use remain constant from the base year (2016) to the future projected year.

The **'age + service trends'** approach estimates future service use based on both the expected population size by age group in a future year and expected service use in that year. This approach applies historic trends in service use to project service use rates in the future.

Within the *Choices for Care* program, we further estimate the number of users of Nursing facility (NF), Enhanced Residential Care (ERC) and Home and Community-based Services (HCBS), assuming that there would be no change in the proportion of CFC users in each of these three settings.

Data sources

Variable	Source	Years
Projected number of individuals in age group and county	VT DAIL projections ¹	2020, 2030
Number of service users in 2016	VT MMIS	2016
Population by age group and county	ACS ² Table B01001	2011-2015 (five-year estimate)
Historical service use	ACS Table B01001, VT MMIS	2008-2016

¹ Jones K, Schwartz L (2013) Vermont Population Projections – 2010 - 2030. Vermont Agency of Commerce and Community Development, August 2013. Available at: <http://dail.vermont.gov/dail-publications/publications-general-reports/vt-population-projections-2010-2030>

² United States Census Bureau, American Community Survey

Variable	Source	Years
Population by age group, statewide (for historical trend)	ACS Table B01001	2008-2015

Methodology

Service use rate

The service use rate is the number of individuals who used a service divided by the total population in a single year. We calculate service use rates by service, by age group and by state/county.

Example: 667 individuals aged 18-64 used Choices for Care (CFC) services in 2008, out of a total Vermont population of 405,343 in that age group, producing a service use rate of 0.16%.

Service use trend

The service use trend is the average annual change in service use rates over a number of years. Table 1 provides an example of the calculation of a service use trend for CFC services among individuals aged 18-64 years for the years 2008-2016. Service use trends were calculated using statewide data as county-level historical data was not available. Table 2 shows the service use trends we calculated for each service and age group for the years 2008-2016.

Table 1: Example calculation of service use trend

Service use trend for CFC services among individuals aged 18-64 years is 4.7% per year (statewide).

	2008	2009	2010	2011	2012	2013	2014	2015	2016	Average
Number of individuals using service	667	687	710	723	767	786	818	894	934	
Total population	405,343	405,865	405,068	406,869	403,633	399,842	398,097	395,798	394,800	
Service use rate	0.16%	0.17%	0.18%	0.18%	0.19%	0.20%	0.21%	0.23%	0.24%	
Percent change in service use rate over previous year		+2.9%	+3.6%	+1.4%	+6.9%	+3.4%	+4.5%	+9.9%	+4.7%	+4.7% / year

Table 2. Vermont service use trends

Annual average change in service use rate by service and age group, statewide data for Vermont.

Service	Age Group		
	18-64	65-84	85+
Choices for Care (CFC)	4.67%	-2.76%	-3.62%
Developmental Disability Services (DDS)	4.57%	3.29%	*
Community Rehabilitation and Treatment (CRT)	-0.58%	0.78%	*

* Age category not projected due to small number of individuals currently receiving services (20 or fewer).

Projection method 1: Age trend

This method projects the number of service users in a future year by multiplying the expected population size in that future year by the service use rate in the base year (2016). The calculation was performed separately at the state and county level. This calculation can be expressed by the following formula

$$\text{'Age trend': } Users_{futureyear} = Pop_{futureyear} * Use_rate_{2016}$$

Example: To project the number of CFC users aged 18-64 in Chittenden County in 2020, we multiply the expected population aged 18-64 in Chittenden County in 2020 (103,548) by the countyCFC service use rate among individuals 18-64 in 2016 (0.18%), to produce an estimate of 186 CFC users.

Projection method 2: Age + service trend

This method projects the number of service users in a future year by multiplying the expected population size in that future year by the service use rate in the base year (2016) and applying the historical service use trend. The calculation was performed separately at the state and county level. This calculation can be expressed by the following formula.

$$\text{'Age + service trends': } Users_{2020} = Pop_{2020} * Use_rate_{2016} * (1 + Trend_{use_rate})^{\#yearsfuture}$$

Example: To project the number of CFC users aged 18-64 in Chittenden County in 2020, we multiply the expected population aged 18-64 in Chittenden County in 2020 (103,548) by the county CFC service use rate among individuals 18-64 in 2016 (0.18%) and by the service use trend applied to the period 2016-2020 (1.0467)⁴, to produce an estimate of 223 CFC users.

Choices for Care services

Within the Choices for Care program, we further estimate the number of users of Nursing facility (NF), Enhanced Residential Care (ERC) and Home and Community-based Services (HCBS), by multiplying the total number of projected CFC users by the ratio of users in each service category relative to the overall number of CFC users in 2016, by age group. This calculation can be expressed by the following formula.

$$NFUsers_{2020} = CFCUsers_{2020} * (NFUsers_{2016} / CFCUsers_{2016})$$

Example: To project the number of NF users aged 18-64 in Chittenden County in 2020 using the **'age + service trend'** method, we multiply the projected number of CFC users aged 18-64 in Chittenden County in 2020 (223) by the percentage of CFC users in Chittenden aged 18-64 in 2016 who used NF services (23.9%), to produce an estimate of 53 NF users.

Groupings and filters

Age groups

We projected number of service users in the age categories 0-17, 18-64, 65-84 and 85+.

To calculate the projected number of service users in the age category 65+ and in the total population we added the projected number of service users in the appropriate subcategories:

- **65+ years:** Sum of 65-84 years and 85+ years
- **Total population:** Sum of 0-17 years (where available), 18-64 years, 65-84 years and 85+ years

Counties & Regions

We calculated projections at the county level where we had sufficient data to do so. Because some counties had fewer than 10 participants for some services, we combined smaller counties into larger geographic regions, as follows:

- Franklin and Grand Isle
- Lamoille and Washington
- Caledonia, Essex and Orleans

High and low estimates

The data presented in the slide deck and databook are estimates. Before using these estimates, users should consider the variability for each data point, which are presented using high and low estimates. High and low estimates were calculated following a methodology by Smith and colleagues (2008),³ that uses a 5% per-decade fall or rise in the percentage of individuals in a particular category (age, service, county). Below we review how each estimate was calculated:

- **Midpoint estimate:** Calculated by multiplying the projected number of individuals in each age category and county/statewide in 2020 and 2030 (see ‘Demographic Projections’ workbook) by the percentage of service users in each age group in 2016 (rate of use), adjusted for historical trends in use rate where indicated, using the ‘age trend’ and ‘age + service trends’ methodology explained above.
- **Low estimate:** Service use trend in 2016 reduced by 5% for 2020, and 10% for 2030.
- **High estimate:** Service use trend in 2016 increased by 5% for 2020, and 10% for 2030.

Exclusion of small case sizes

We judged projections to be statistically unreliable if the projection was based on fewer than 50 participants in the base year (2016). This judgment is consistent with data suppression rules used by the U.S. Census Bureau (typically 10-100 or fewer cases). In the accompanying Excel data book, cells that could not be reliably projected due to small case size are shown as ‘*’.⁴

³ Smith SK, Rayer S, Smith EA (2008). Aging and disability: Implications for the housing industry and housing policy in the United States. *Journal of the American Planning Association*; 74:289-306.

⁴ Klein RJ, Proctor SE, Boudreault MA, Turczyn KM (2002). Healthy People 2010 Criteria for Data Suppression. *Healthy People 2010 Statistical Notes*. July 2002, Number 24. Available at: <https://www.cdc.gov/nchs/data/statnt/statnt24.pdf>

Low numbers of participants prevented us from calculating a considerable subset of county-level projections. For this reason, the Excel data book presents county-level projections for only a subset of age groups for some services, and only state-level projections for others. Specifically:

- CFC - Nursing Facility services are presented for all age groups at the state level, but only for the age groups 65+, 65-84 and 85+ at the county level (18-64 not included for counties)
- CFC – Enhanced Residential Care (ERC) services by age group are presented only at the state level, but no data at the county level (no age group break-outs, only ‘Total population’)
- CFC – Home and Community Based Services (HCBS) are presented for all age groups at the state level, but only for the age groups 18-64, 65+ and 65-84 at the county level (85+ not included for counties)
- DDS services are presented for all age groups at the state level, but only for the age group 18-64 at the county level (0-17 and 65-84 not included for counties)
- CRT services are presented for all age groups at the state level, but only for the age group 18-64 at the county level (65-84 not included for counties)

A note on Developmental Disabilities Services (DDS)

Because individuals receiving Developmental Disabilities Services are often eligible to receive these services for the duration of their entire lifespan, we considered adjusting for changes in longevity anticipated in this population. We conducted a literature scan and consulted two subject matter experts.⁵ We found that the life expectancy for individuals with intellectual and developmental disabilities is approximately 20 years below that of the general population.⁶ While life expectancy for this population has increased in parallel with the general population over the past decades,³ the relatively short time span projected here (4 years and 14 years) is not long enough to expect a substantial increase in longevity that would warrant further adjustments. For this reason, we did not include a longevity adjustment specific to the DDS-eligible population.

Abbreviations

ACS	American Community Survey
CFC	Choices for Care
DDS	Developmental Disability Services
CPCS	Children’s Personal Care Services
CRT	Community Rehabilitation and Treatment
NF	Nursing facility
ERC	Enhanced Residential Care
HCBS	Home and community-based services

⁵ Personal communication with Emily Lauer, Director of the Center for Developmental Disabilities Evaluation and Research (CDDER) at the Eunice Kennedy Shriver Center, UMass Medical School, and Dr Hannu Vesala, Researcher at the Finnish Association on Intellectual and Developmental Disabilities.

⁶ Lauer E, McCallion P. Mortality of People with Intellectual and Developmental Disabilities from Select US State Disability Service Systems and Medical Claims Data. *J Appl Res Intellect Disabil*. 2015 Sep;28(5):394-405.