

# Which American Languages are Dying? Quantifying the Demographic Vulnerability of Indigenous Languages in the United States

Population Association of America  
Austin, TX  
4/10/2019-4/13/2019

Stephen Cranney; Social, Economics, and Housing Division; US Census Bureau

## Background

There has been some theoretical discussion regarding the use of demographic tools to measure language vulnerability (Siegel 2018); however, no study has used demographic methods to quantify language vulnerability.

This study uses a variety of aging indicators in the 2013-2017 American Community Survey (For more information on the ACS, see [census.gov/acs](http://census.gov/acs)) to measure demographic vulnerability for the largest indigenous language groups in the US.

The indicators are compared and contrasted; the potential for demographic tools to substantively inform endangered language studies is discussed.

What do different measures tell us about the trajectory of seven of the most widely spoken U.S. indigenous languages?

## Language Vitality and Demographic Forces

The rate of intergenerational language transmission required for stationarity = 1/net reproductive rate

- Fertility**
- Higher fertility = higher vitality.
  - Language communities sometimes exhibit fertility patterns that are vastly different from the background population (Pennsylvania Dutch for Amish, Yiddish for Hasidic Jews).
- Mortality**
- Lower mortality = higher vitality.
  - Language communities sometimes exhibit mortality patterns that are vastly different from the background population (higher mortality for indigenous Americans).

- Migration**
- “Migration” can be conceptualized as population movement (possibly from the critical core of speakers) or movement away from language.

## Types of data used to study language

- US Census
  - Language no longer on decennial census (last census that had language question was 2000 long form).
- Large, National Level Surveys (ACS)
  - Can combine years (e.g. five-year datafiles are produced). Generally able to pick up all but the most severely endangered languages, but confidence intervals can be large. Restricted to one or two indicators.
- Smaller, non-Census Social Surveys (e.g. GSS) /Specialized Language Surveys
  - Smaller N but more construct precision, can be targeted to smaller groups.

## Demographic Indicators

- Population Pyramid:** Total population speaking a language, by age grouping
- Provides most information.
  - Catches cohort-level variations (which can be very atypical for different language groups).
  - Cannot differentiate between changes due to transmission and changes due to natural demographic processes of fertility/mortality.

- Average Age:** Weighted average of ages of language speakers.
- Easy to calculate.
  - Intuitive.
  - Single-item measure hides a lot of the variation from cohort to cohort.
  - May need to impute pre-verbal (non-speaking) cohort (children under five).

- Old Age Dependency Ratio:** Ratio of the number of adults aged 65 and older to the number of working-age adults (15-64).
- Easy to calculate.
  - Can compare to the dependency ratios of ethnic, national, or other groups as a heuristic (e.g. saying that a particular language group has the same dependency ratio as Sweden).
  - Do not have to impute pre-verbal cohort (the people in the population who do not speak yet) because it is based on the working age population.

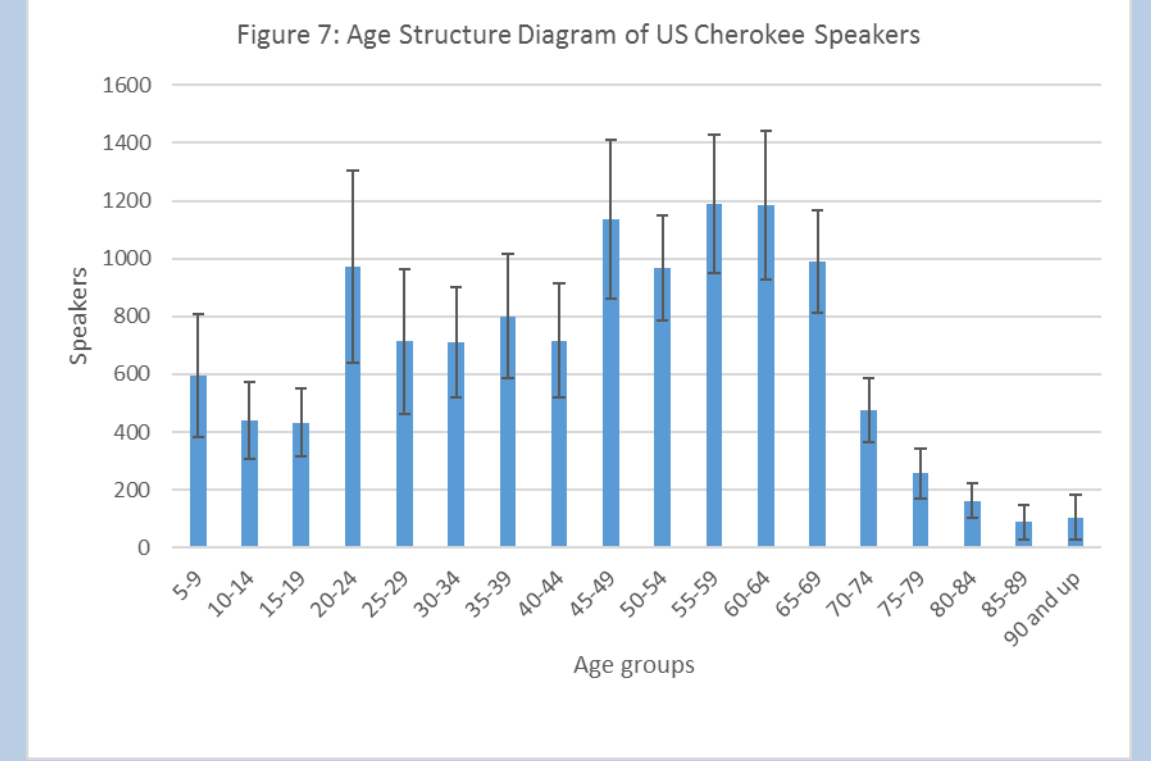
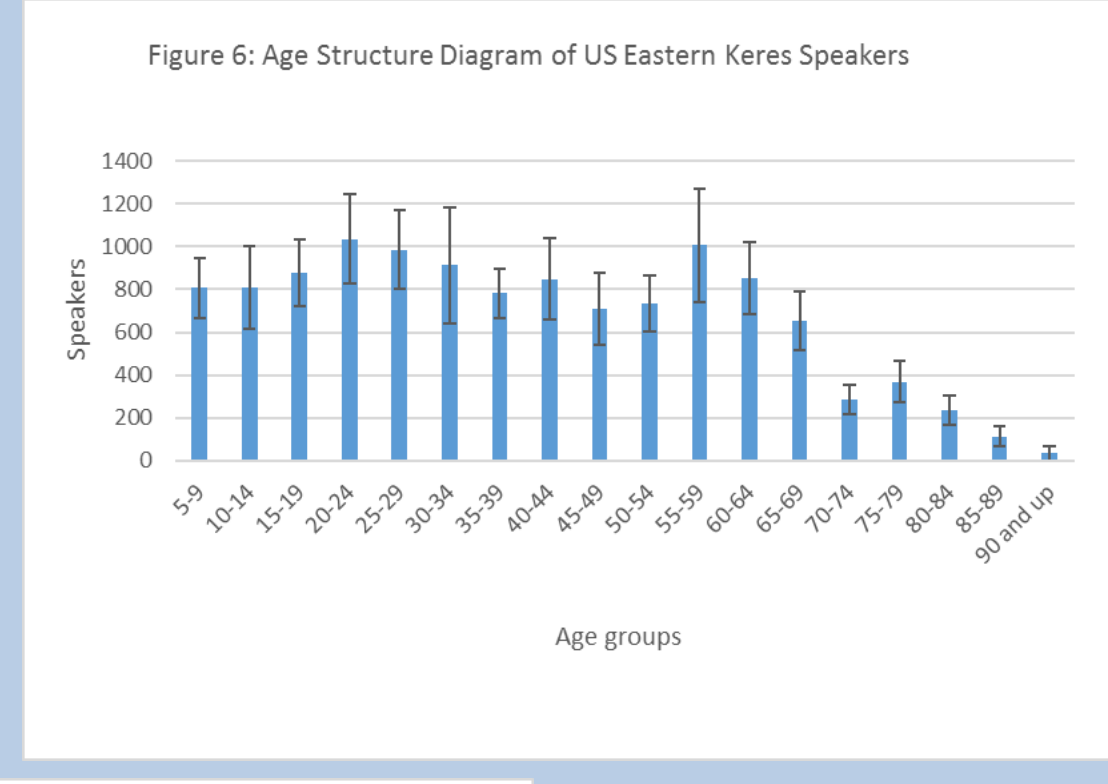
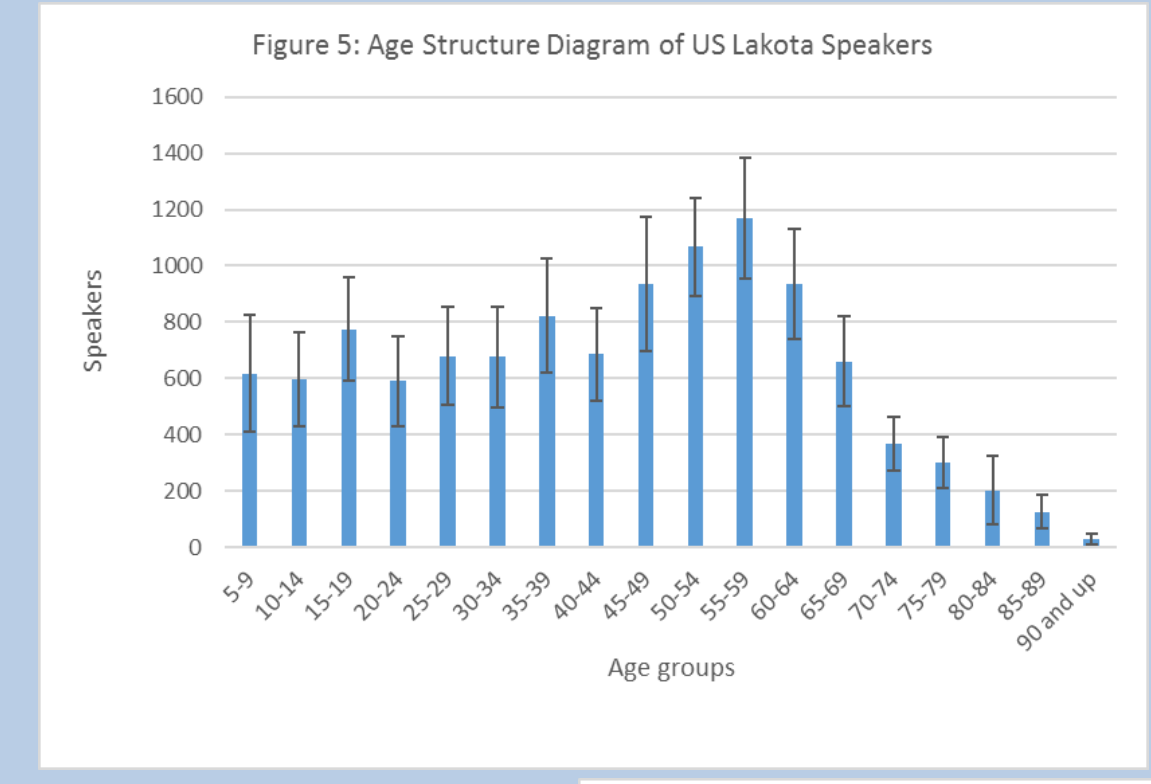
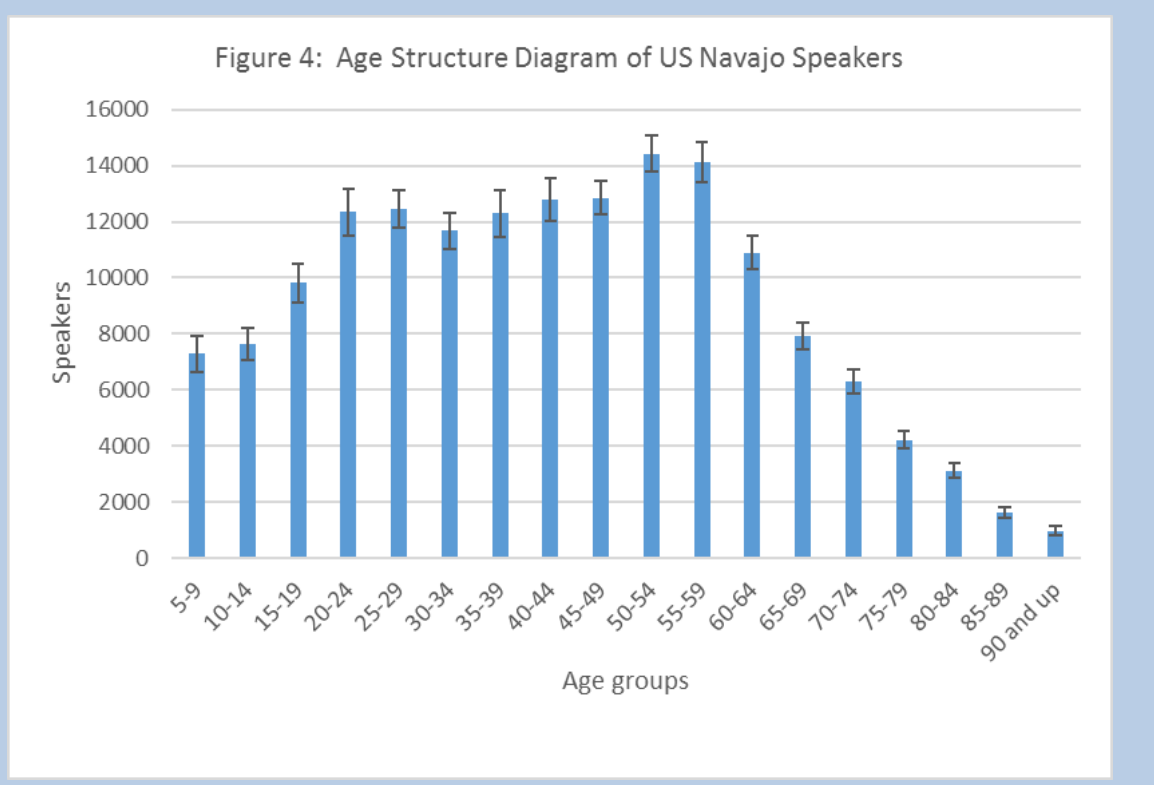
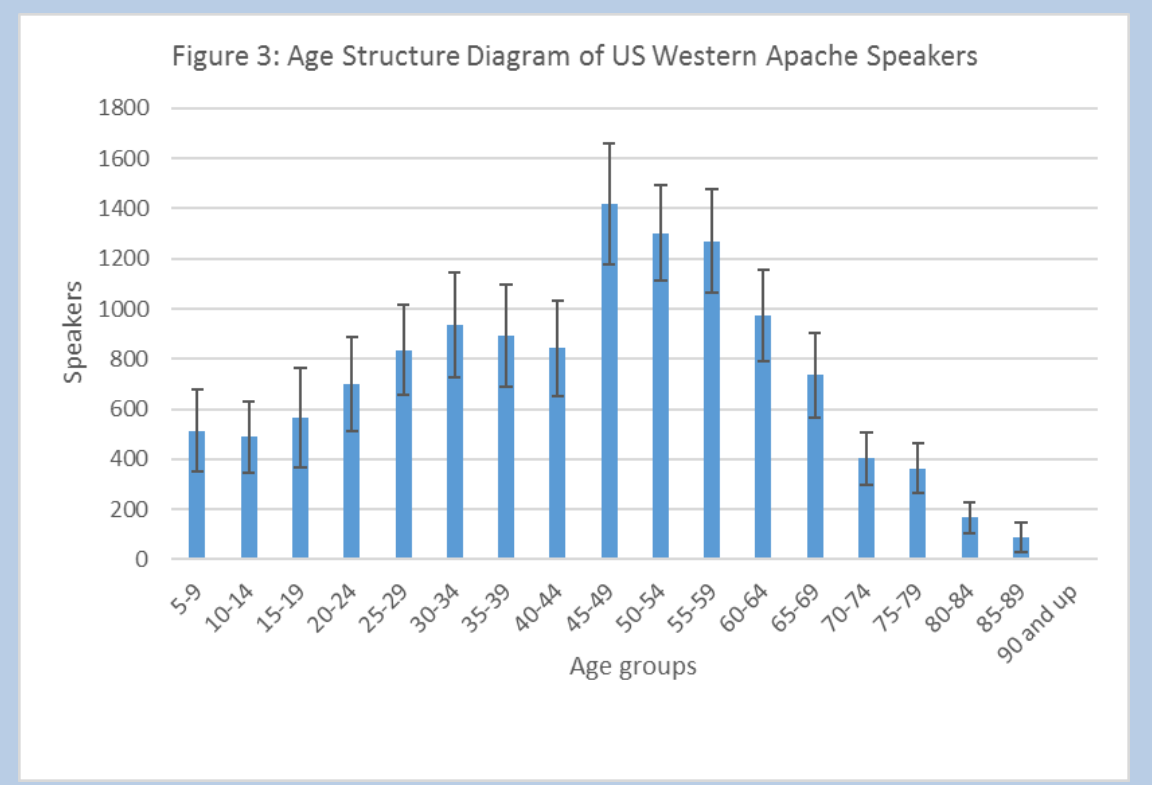
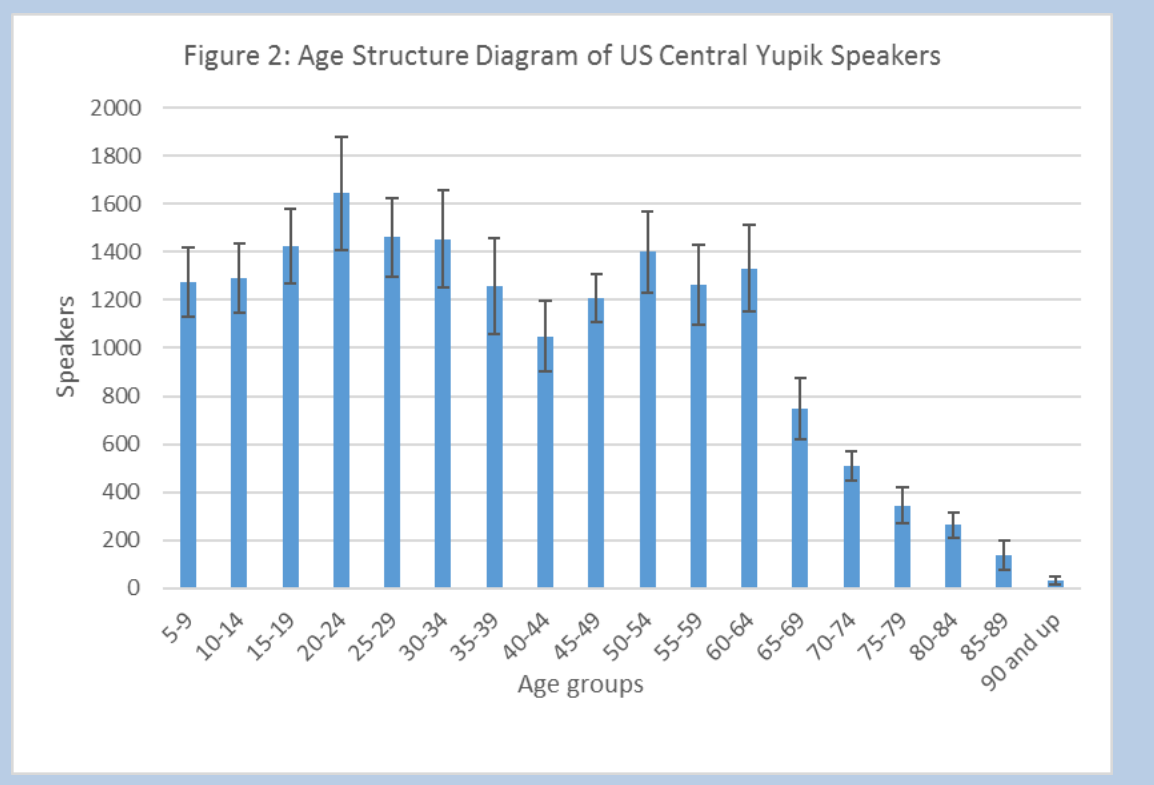
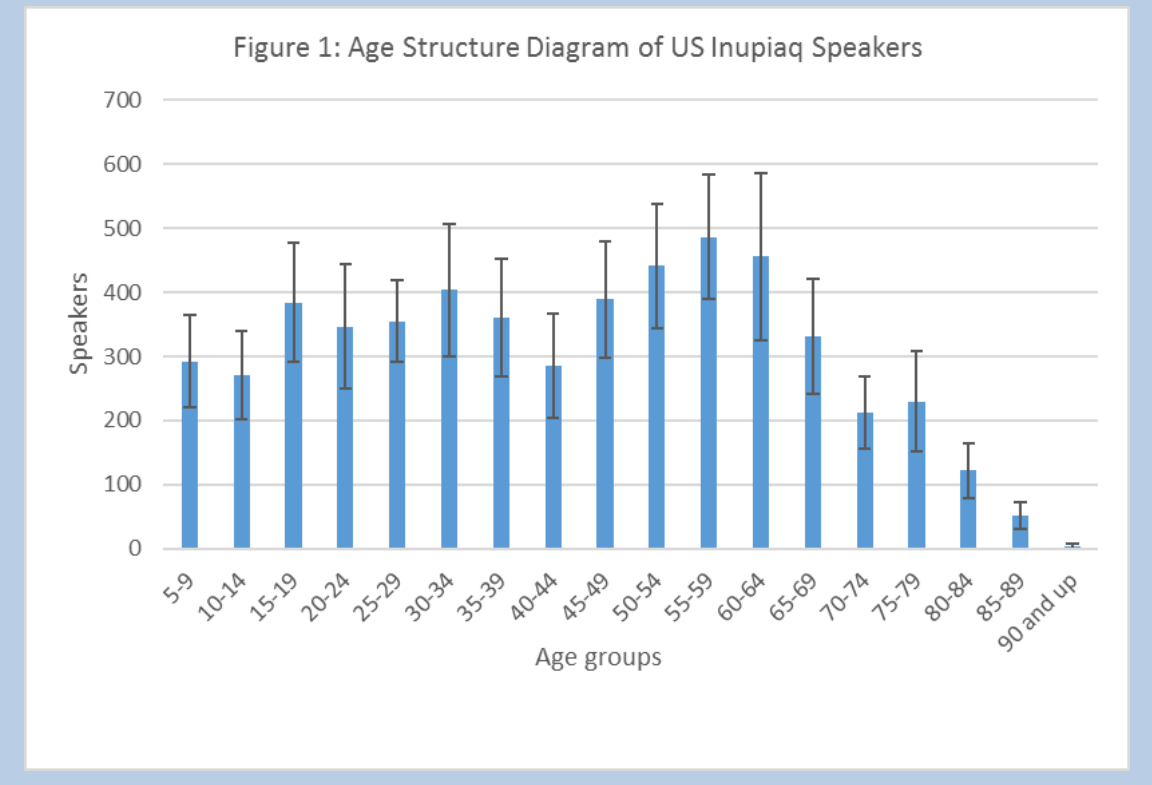
- Population Momentum:** The factor by which the population would grow to before reaching long-term equilibrium if all of its rates (fertility, mortality, and “migration,”) immediately shifted to replacement level.
- Substantively important conceptual meaning (how much potential growth is there in the population structure alone) in one figure.
  - Easily interpretable.
  - A lot of assumptions regarding what the stationary population would look like in terms of age structure.

- Net Reproductive Rate:** The factor by which the population of interest will grow in a generation given its vital rates.
- Parsimoniously describes future growth or decline of a language in one figure.
  - Requires age-specific fertility rates, age-specific mortality rates (and, potentially, age-specific “migration” rates) which are difficult to obtain for endangered language groups.
  - Rates can be derived from previous published rates of similar populations (e.g. ethnicities speaking the language), but these assumptions are a potential source of error.

- Population Projections:** Estimates of future population levels derived from existing age, fertility, and mortality schedules.
- Cohort-component population projections require age-specific switching rates, age-specific fertility rates, and age-specific mortality rates.
  - These data are very difficult to come by, especially age-specific switching rates.
  - Tentative projections could be made based on piggy backing off of other population projections for ethnic groups/Native American tribes given certain assumptions about intergenerational language transmission trends.

**Table 1: Average Age, Old Age Dependency Ratio, and Population Momentum of Seven US Indigenous Languages**

	Average Age	Percentage 15+ Working Age (Old Age Dependency Ratio)	Momentum
<b>Inupiaq</b>	43.1 (41.7-44.5)	80% (78%-82%)	.83 (.82-.84)
<b>Central Yupik</b>	38.4 (37.7-39.1)	87% (86%-88%)	1.05 (1.04-1.06)
<b>Western Apache</b>	43.9 (42.9-44.9)	85% (83%-87%)	.68 (.67-.69)
<b>Navajo</b>	42.4 (42.0-42.8)	84% (83%-85%)	.81 (.81-.81)
<b>Lakota</b>	43.1 (41.8-44.4)	83% (81%-86%)	.79 (.78-.80)
<b>Eastern Keres</b>	39.8 (38.7-40.9)	84% (82%-86%)	1.0 (.99-1.01)
<b>Cherokee</b>	44.9 (43.4-46.4)	81% (79%-83%)	.70 (.69-.71)



## Results

- Many indigenous language groups show mid-heavy population pyramids, with large age cohorts in the middle age range.
- Central Yupik, an Alaskan language, is the only indigenous language examined here that would continue to grow if all the fertility, mortality, and migration rates immediately changed to replacement-level.
- Eastern Keres is approximately stationary, with a population momentum of 1.
- All other indigenous American languages examined here show indications of demographic decline.

## Conclusion

- Indicators from the age structure are helpful in fleshing out the general future picture of the respective language.
- Different indicators are strongly related.
- Cohort-component approaches require more data than is often available.

## References

Abrams, Daniel M., and Steven H. Stragatz. (2003). Linguistics: modeling the dynamics of language death. *Nature* 424(6951): 900.  
 Kaufmann, Eric, Anne Goujon, and Vegard Skirbekk. (2012). American political affiliation, 2003-43: A cohort component projection. *Population studies* 66(1): 53-67.  
 Kenneth L. Rehg and Lyle Campbell (editors) (2018). *The Oxford handbook of endangered languages*. Oxford: Oxford University Press.  
 Naia Huiying Lee and John Van Woy. (2016). Assessing levels of endangerment in the catalogue of endangered languages (ELC) using the language endangerment index (LEI). *Language in Society* 45: 271-292.  
 Preston, Samuel, Heavline, Patrick, and Gullot, Michel. (2011). *Demography: Measuring and modeling population processes*. Oxford, UK: Blackwell Publishers.  
 Ryan, Camille (2013). *Language use in the United States*. (2011). Census Bureau Report ACS-22. Suitland, MD. <https://www.census.gov/library/publications/2013/acs/acs-22.html>.  
 Siegel, Jacob S. (2018). *Demographic and socioeconomic basis of ethnolinguistics*. Cham, Switzerland: Springer.  
 Skirbekk, Vegard, Eric Kaufmann, and Anne Goujon. (2010)“Secularism, fundamentalism, or Catholicism?” The religious composition of the United States to 2043.” *Journal for the Scientific Study of Religion* 49(2): 293-310.  
 UNESCO. *Language Vitality and Endangerment*. (2003). UNESCO Ad Hoc expert group on endangered languages. International expert meeting on UNESCO, Paris, 10-12 March 2003. US Census Bureau. Generated by BLUNDED FOR REVIEW using American FactFinder. <<http://factfinder.census.gov>>. (1 December 2018).

Source: U.S. Census Bureau. 2013-2017 American Community Survey 5-year data. Bars represent estimates and 95% confidence intervals. For more information on the ACS, see [census.gov/acs](http://census.gov/acs).



U.S. Department of Commerce  
Economics and Statistics Administration  
U.S. CENSUS BUREAU  
[census.gov](http://census.gov)

This poster is released to inform interested parties of ongoing research and to encourage discussion. Any views expressed are those of the authors and not necessarily those of the U.S. Census Bureau.