Current and future demographics of the veteran population, 2014–2024

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VA health care assessment

- The Department of Veterans Affairs (VA) provides health care to eligible veterans
- Veterans Access, Choice, and Accountability Act of 2014
  - Improve access to high-quality health care
  - Independent assessment of VA's health care delivery systems and management processes
  - Estimate current and projected demographics of veterans
  - We conducted this study in 2015

Objectives

- Project the veteran population from 2014 to 2024 and their geographic distribution
  - Surveys collect information on veterans
  - No full national accounting since the 2000 Decennial Census
- Describe the demographic characteristics of veterans
  - Age, sex, race/ethnicity, service era, geographic distribution (PUMA level)

Projections for each service era

- Pre-1950
- Korean War: July 1950–January 1955
- Pre-Vietnam: February 1955–July 1964
- Vietnam: August 1964–April 1975
- Post-Vietnam: May 1975–July 1990
- Gulf War: August 1990–August 2001
- Post-9/11: September 2001 or later

Data

- 2000 Decennial Census
  - Baseline of veteran population
  - Age, sex, race/ethnicity, service era
- U.S. Defense Manpower Data Center (DMDC)
  - Age, sex, race/ethnicity, anticipated contract end date
- American Community Survey (ACS)
  - 5-year estimates: 2005–2009; 2009–2013
  - Migration information: PUMA in previous year

ACS specificities

- Undercounts number of veterans
  - We used the 2000 Census and estimated veterans who would be alive in 2013
  - Number is equivalent to 2013 ACS estimates
  - ACS undercounts new veterans from 2000 to 2013
- Captures distribution of veterans by age, sex, race/ethnicity, service era, location
- Determines veteran geographic distribution and migration patterns

Mortality rates

- 2014 veteran population mortality rates
  - Department of Veterans Affairs (VA)
  - By age, sex, but not race/ethnicity
- 2011 rates by age, sex, and race/ethnicity
  - Centers for Disease Control and Prevention (CDC)
- Derive race/ethnicity rates based on CDC that reflect overall VA rates
- Following estimates are done for each sex…

Steps to estimate mortality rates (1/4)

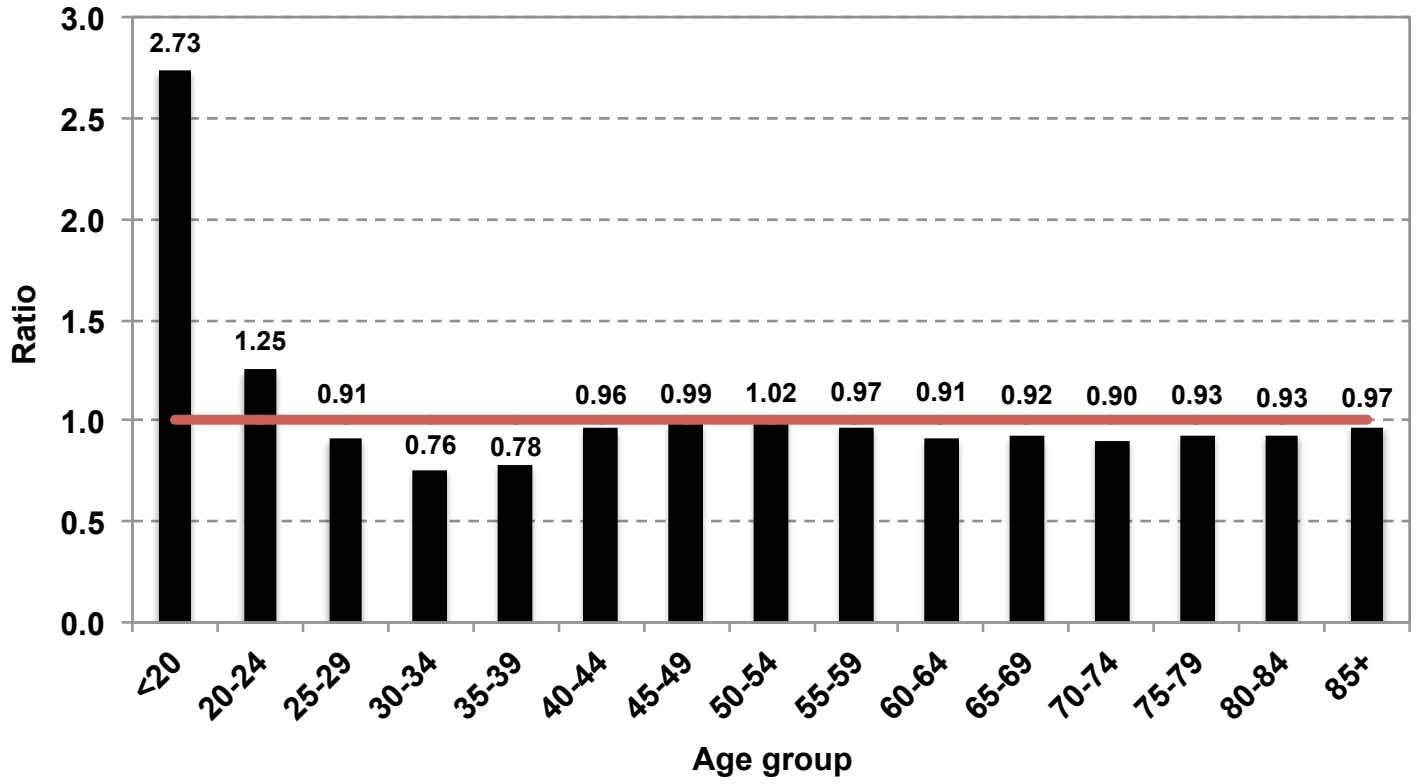
Race/ Ethnicity	Distribution of veterans in each age group					CDC mortality rates					Standardized rates if veterans had same rates as civilians				
	17 to 19	20 to 24	...	80 to 84	85 +	17 to 19	20 to 24	...	80 to 84	85 +	17 to 19	20 to 24	...	80 to 84	85 +
White	a					b					a*b				
Black															
Hispanic															
Asian															
Other															
Total	1.0	1.0	1.0	1.0	1.0	--	--	--	--	--	s	s	s	s	s

Steps to estimate mortality rates (2/4)

Mortality rates	Age group				
	17 to 19	20 to 24	...	80 to 84	85+
Standardized rates if veterans had same rates as civilians	s	s	s	s	s
VA mortality rates	v	v	v	v	v
VA rates / Standardized rates	v/s	v/s	v/s	v/s	v/s

Steps to estimate mortality rates (3/4)

- Ratio of observed veteran mortality rate to the standardized rate



Steps to estimate mortality rates (4/4)

Race/ Ethnicity	CDC mortality rates					Adjusted mortality rates				
	17 to 19	20 to 24	...	80 to 84	85+	17 to 19	20 to 24	...	80 to 84	85+
White	b					b*v/s				
Black										
Hispanic										
Asian										
Other										
Ratio	v/s	v/s	v/s	v/s	v/s	--	--	--	--	--

Assumption: ratio (inflation/deflation factor) by age-sex is the same across race/ethnicity groups

Population projection

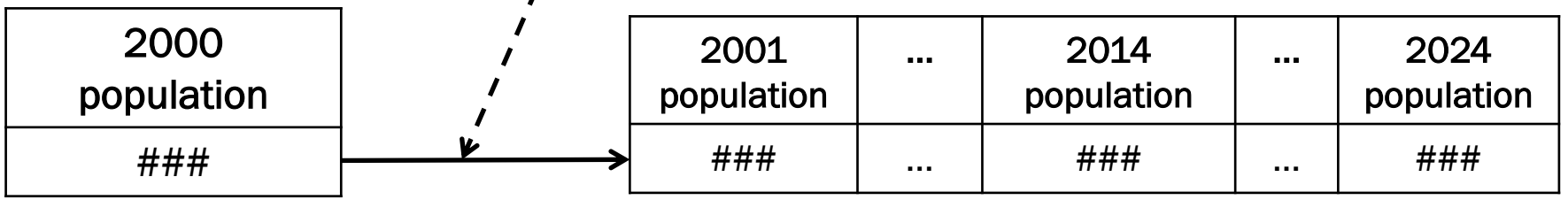
1. Standard cohort component model
   - The Census Bureau's Rural and Urban Projection (RUP) Program
   - 2000 Census provides counts of veterans (*n*=1,406,936)
   - New veterans (DMDC): 2000–2024
   - Apply mortality rates (VA, CDC): 2000–2024
   - Estimate national veteran population: 2005–2024
2. Distribute projections into PUMAs (ACS)
3. Adjust projections by internal migration (ACS)

1. National projection (apply “births” and mortality)

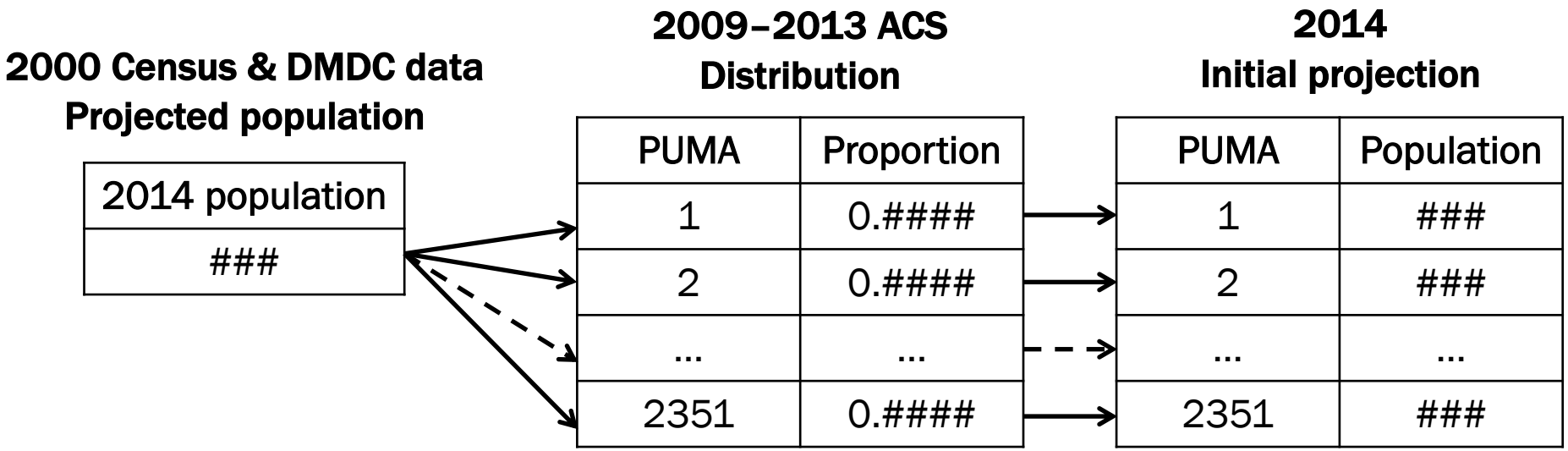
2000 Census & 2000 DMDC Population data

Each cell has number of veterans by 5-year age group, sex, race/ethnicity, service era

- Apply mortality rates from 2000 to 2001
- Add DMDC data in 2001
- Apply mortality rates from 2001 to 2002
- Add DMDC data in 2002
- …



2. Distribute national projection into PUMAs: 2014 example



- Assumption: ACS captures geographic distribution
- By 5-year age group, sex, race/ethnicity, service era

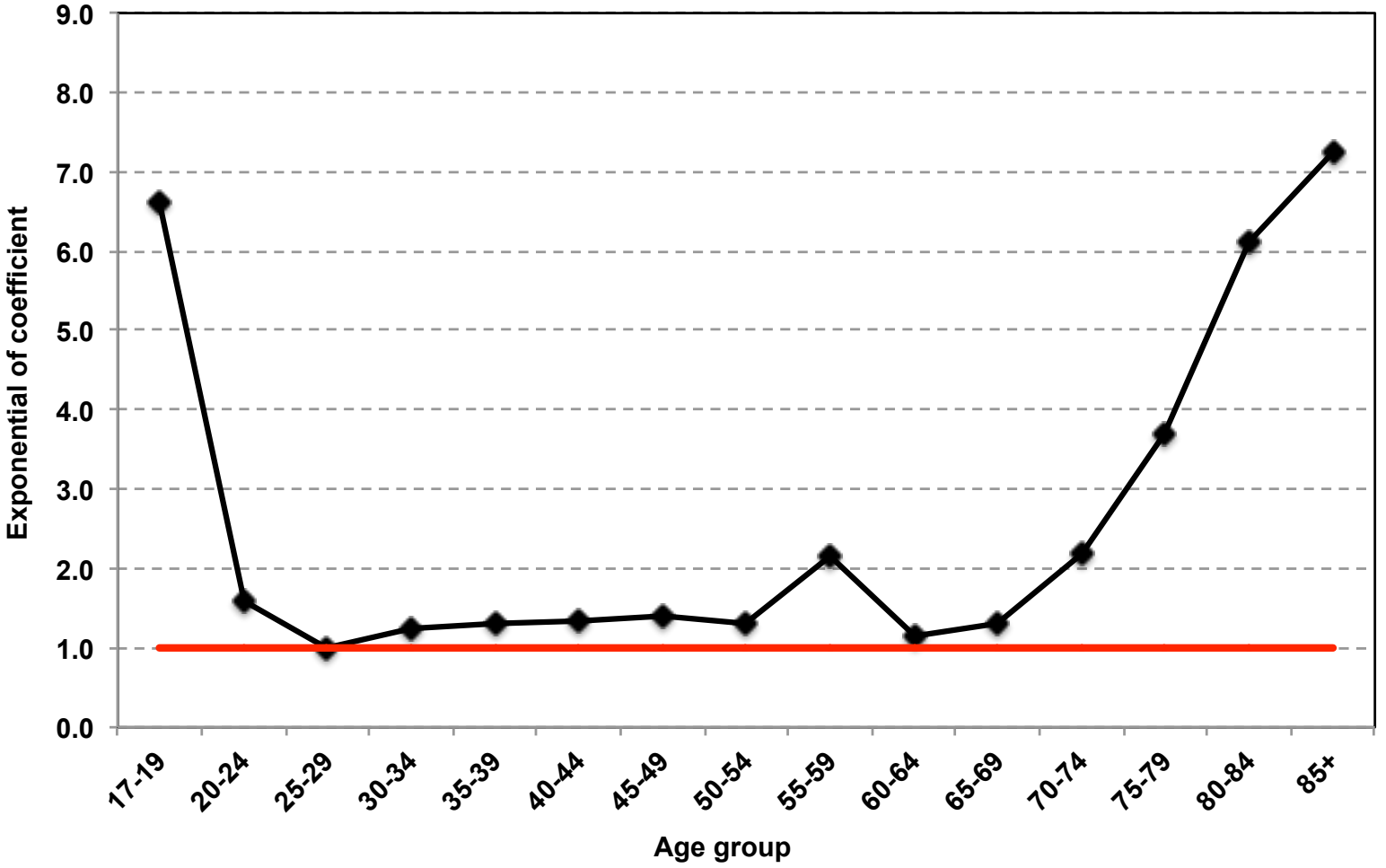
3. Internal migration procedures

- Disaggregate PUMA groups in previous year
  - Correspondence files in IPUMS USA allow us to disaggregate MIGPUMAs into PUMAs
- Convert 2009–2011 PUMAs to 2010 codes
  - Engine by Missouri Census Data Center
- Gravity models (2009–2013)
- Apply predicted rates to 2014 projection

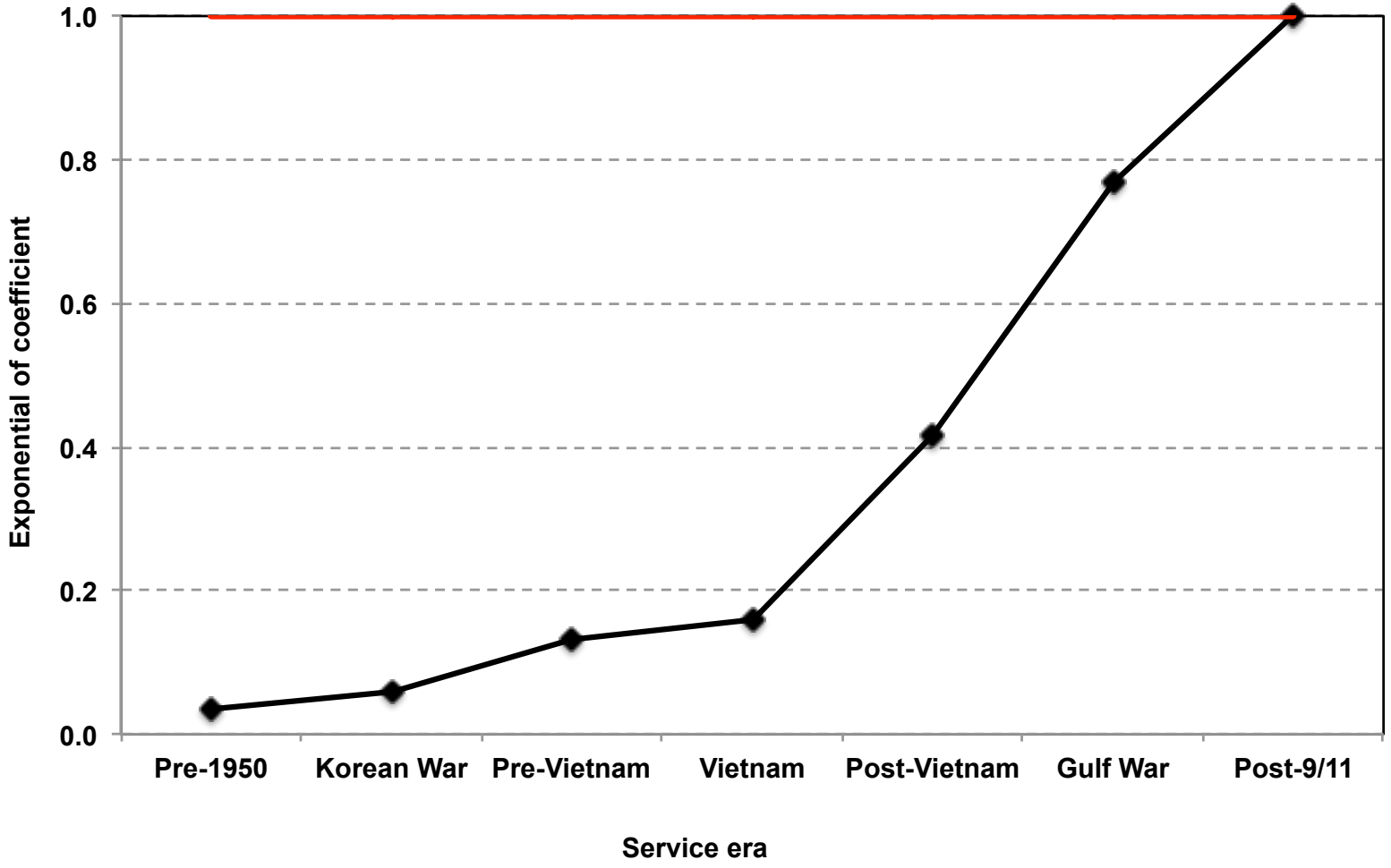
Gravity models (2009–2013)

- These models predict in- and out-migration
  - Distance is expected to play an intervening role on the levels of population flows
- Zero-inflated Poisson regressions
  - Migration as a function of age, sex, race/ethnicity, service era, and distance
  - Dummy indicates whether cell has zero migrants to control for high prevalence of cells with zero counts of migrants
  - Populations of origin/destination as exposure

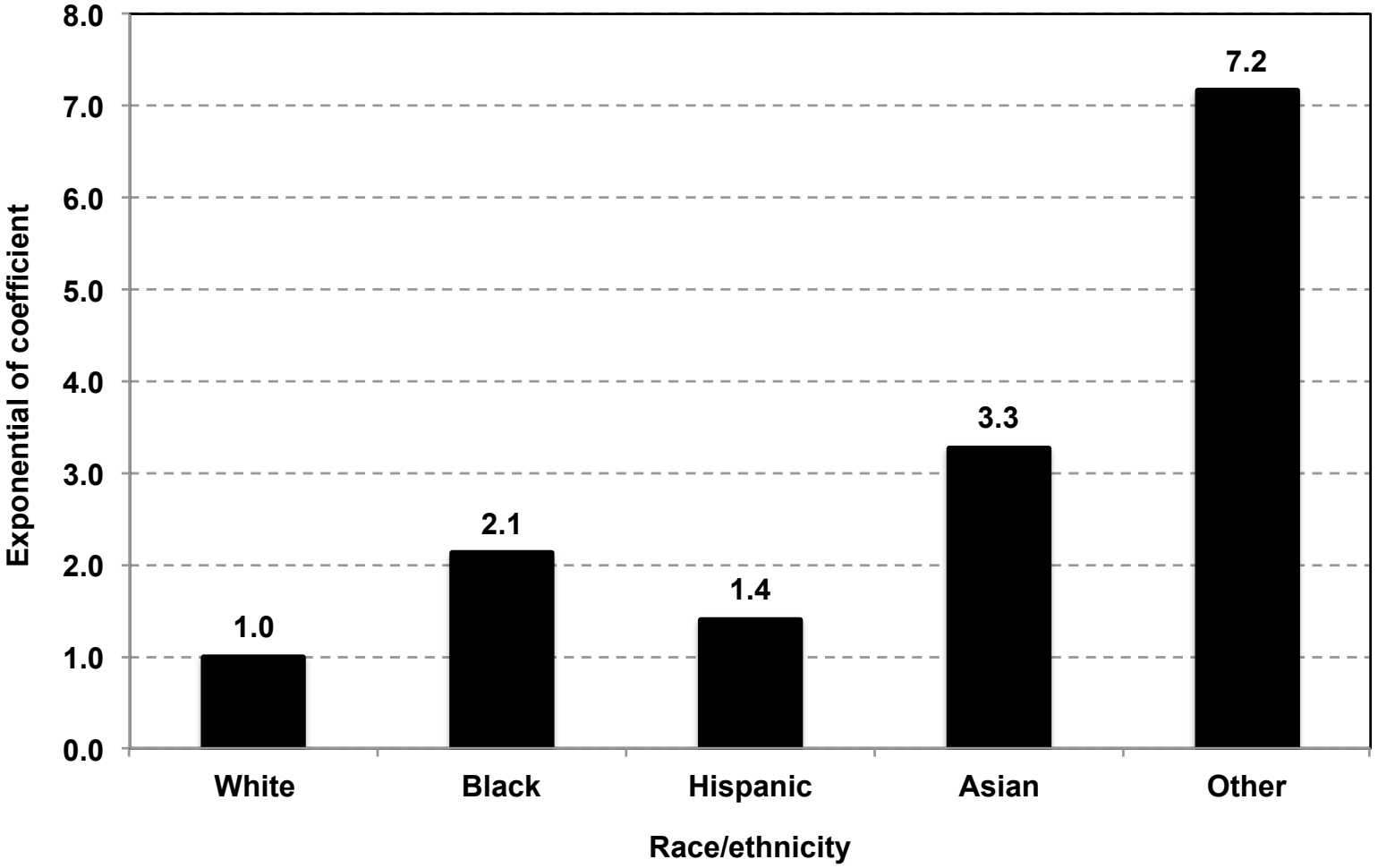
Results of age group for out-migration



Results of service era for out-migration



Results of race/ethnicity for out-migration



Apply predicted rates to 2014

- Apply predicted rates from previous models to 2014 projection
- Generate number of in- and out-migrants
- Adjust in-migrants to generate null net internal migration in each year…

Adjust in-migrants

- Net migration equals zero in each year

Adjusted In-mig = In-mig * Sum out-mig / Sum in-mig

- Assumption: out-migration counts are more accurate than in-migration counts
  - Out-migration: based on residence in previous year (PUMA group)
    - We allocated migrants at the beginning of period from MIGPUMAs into PUMAs
    - This gives higher chances of all cells having migrants
  - In-migration: based on information at PUMA level
    - This might generate more cells with small counts

Migration: final projection

2014

Number of in-migrants

(estimated with ACS rates and initial projection)

PUMA	Number of in-migrants
1	###
2	###
…	…
2351	###

2014

Number of out-migrants

(estimated with ACS rates and initial projection)

PUMA 1-year ago	Number of out-migrants
1	###
2	###
…	…
2351	###

2014

Initial projection

PUMA	Population
1	###
2	###
…	…
2351	###

2014

Final projection

(after migration)

PUMA	Population	Net migration	Population after mig.
1	###	+/- ###	###
2	###	+/- ###	###
…	…	…	…
2351	###	+/- ###	###

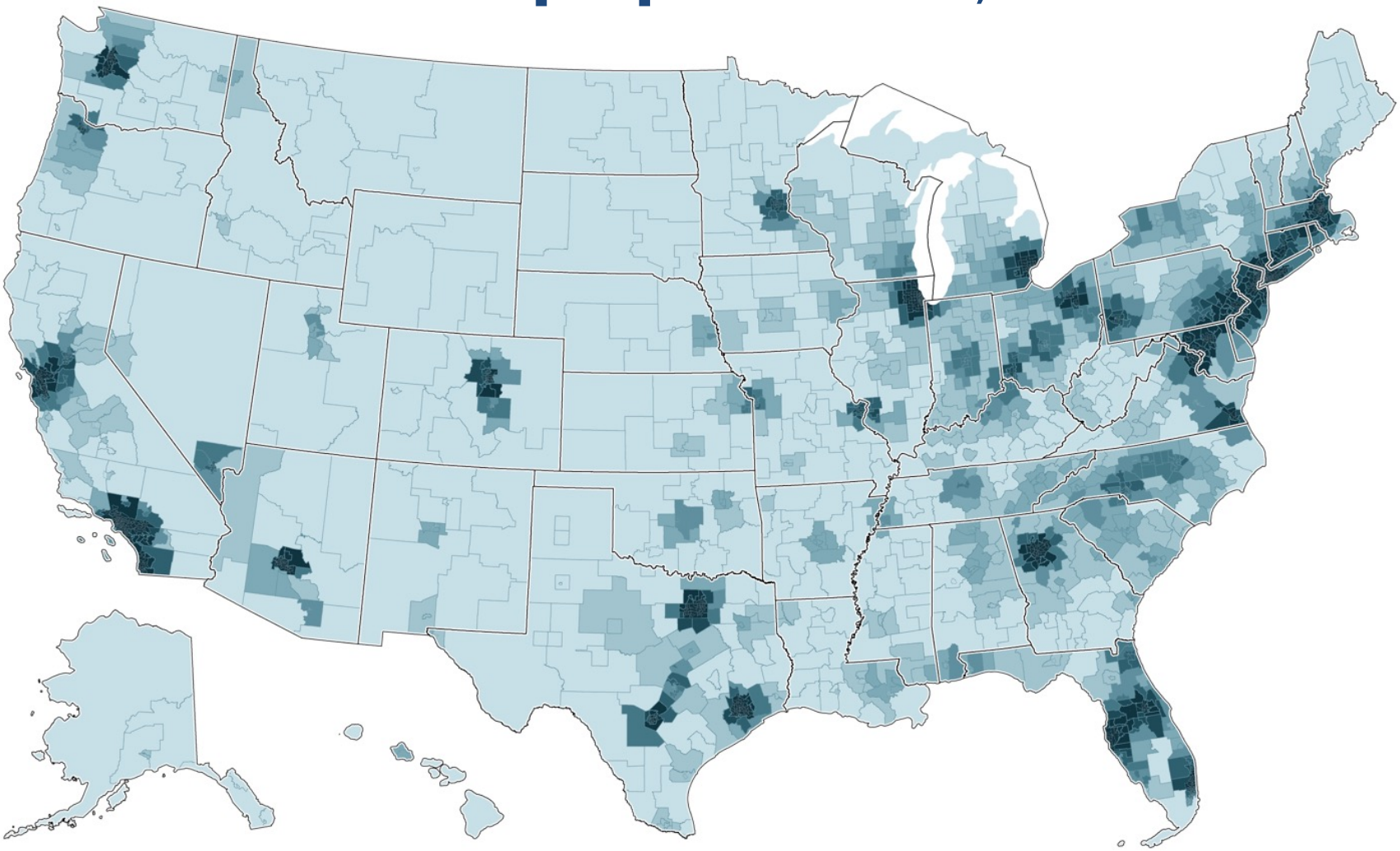
Migration for 2015–2024

- Iterate this process for subsequent years
- Use final 2014 projection as baseline for 2015 national projection
- Apply migration rates to get final 2015 distribution
- Adjust marginal counts with weight calibration to keep national totals
  - Iterative proportional fitting (raking)
- Process continues through 2024

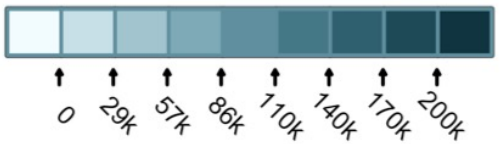
Main results

- Veterans will decrease by 19%
  - 21.6 million (2014), 17.5 million (2024)
- Mean age will increase slightly
  - 65+ years: 49% (2014), 52% (2024)
- Modest changes by sex and race/ethnicity
  - Males: 92% (2014), 89% (2024)
  - White: 80% (2014), 76% (2024)
- Service era composition will change
  - Vietnam: 31% (2014), 29% (2024)
  - Gulf War, Post-9/11: 27% (2014), 42% (2024)

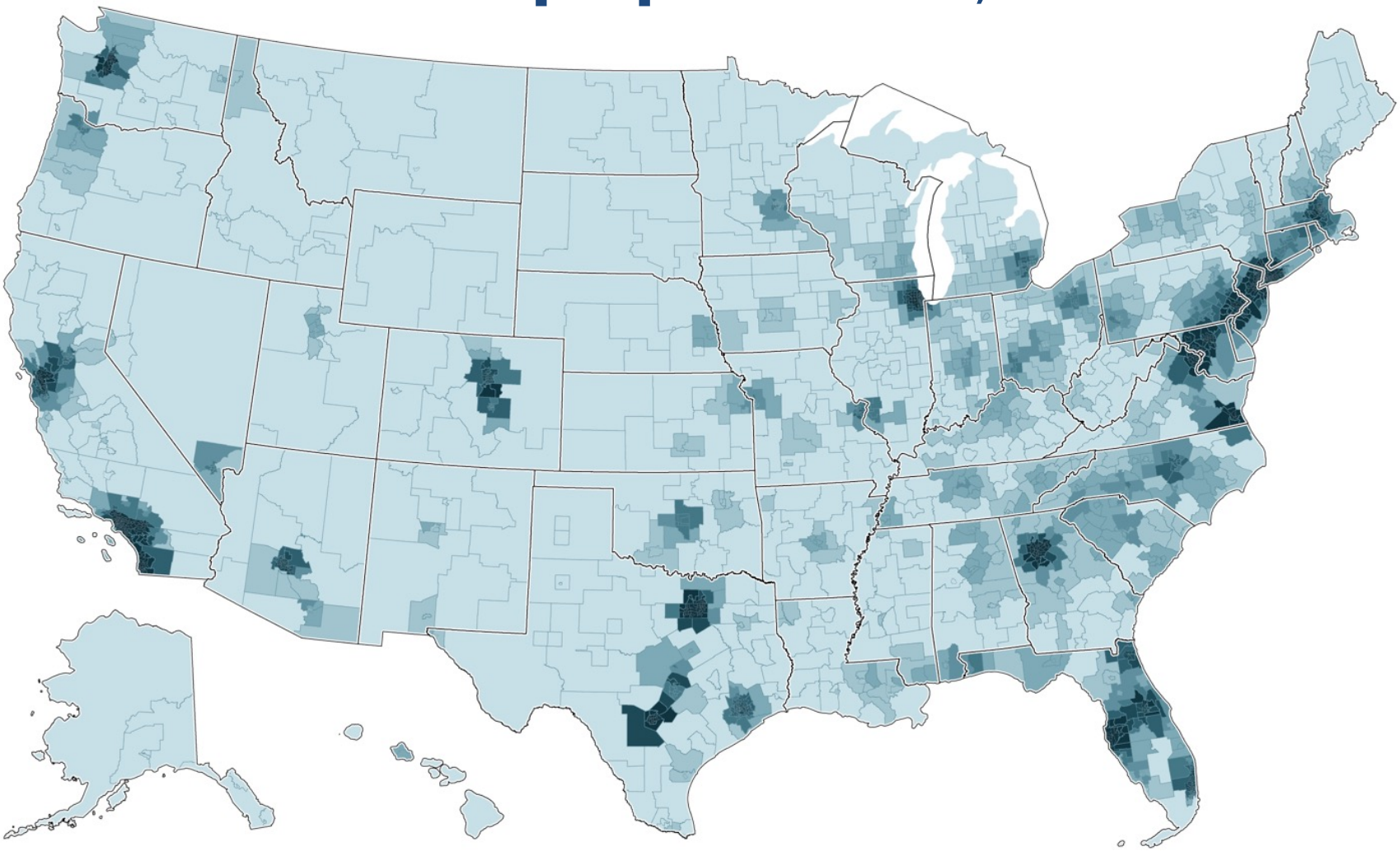
Veteran population, 2014



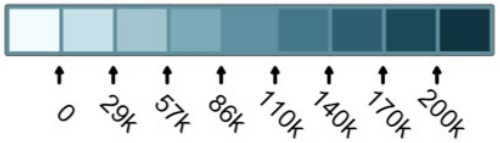
21.6 million veterans overall



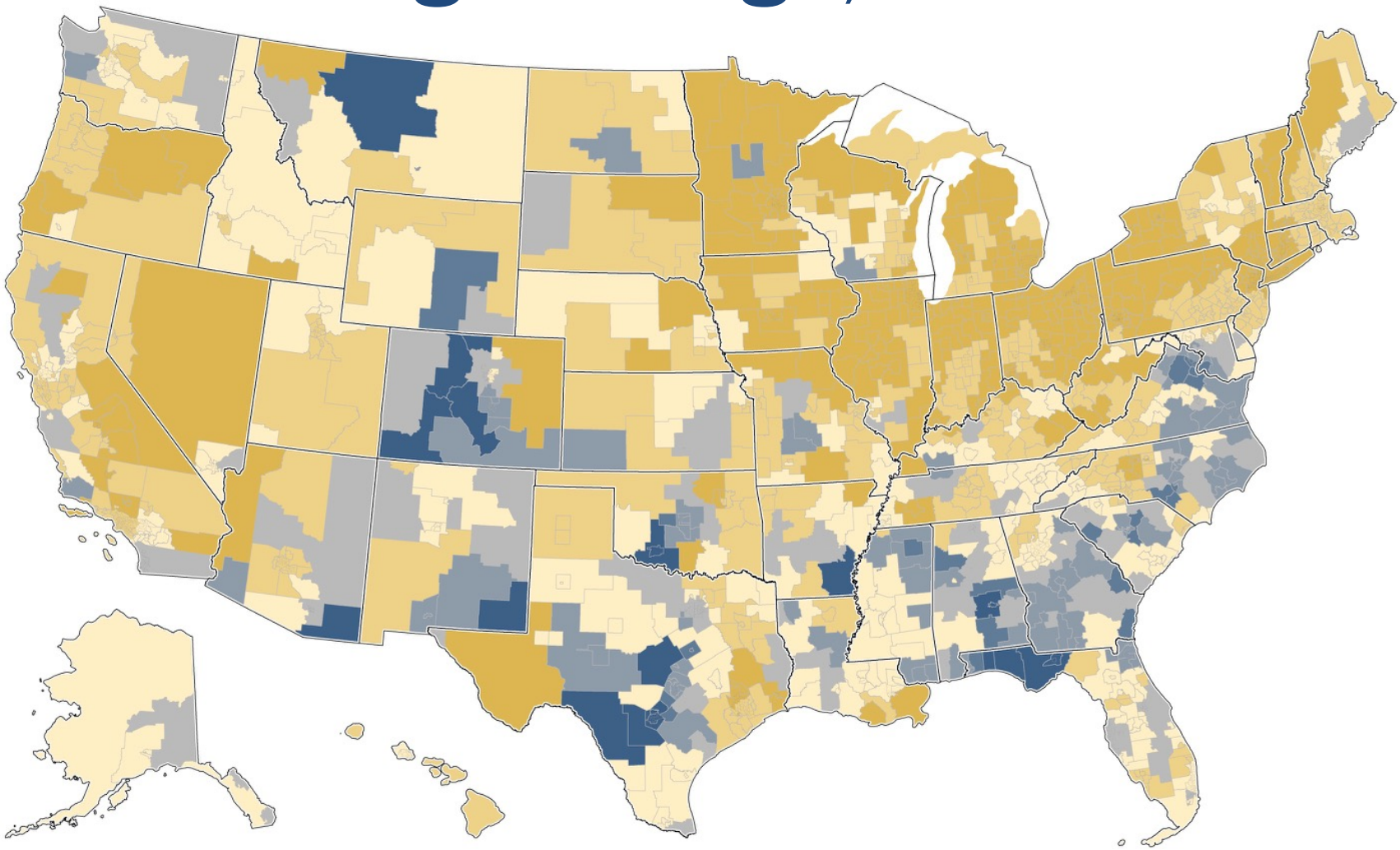
Veteran population, 2024



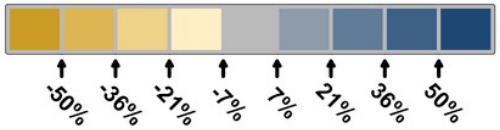
17.5 million veterans overall



Percentage change, 2014–2024



Overall decrease of 19%



Final considerations

- Concentration in urban areas
  - Ohio River Valley and upper Midwest: proportion of veterans will diminish
  - Southwest will not be supported properly by existing VA medical centers
- Migration is less frequent among veterans than non-veterans
  - Will not play substantial role in 2014–2024 geographic distribution
- Projection methods can be applied to other contexts

Policy recommendations: plan for shrinking population

- VA should plan for a shrinking population
- Consider alternative approaches to meeting the needs of its population
- E.g., purchase care from civilian sector even while patient population is growing

Policy recommendations: services for specific age groups

- Overall veteran population will continue to age over the projection horizon
  - Health services for aging will be needed
- Younger veterans (<35) are expected to concentrate in several areas
  - Los Angeles; Dallas; Washington, DC; northern New Jersey; northern California; central Washington state; Midwest; Wyoming; Utah
  - Provide health care services for young adults

Policy recommendations: geographic distribution

- Geographic distribution of veterans will moderately change from 2015–2024
- Areas with adequate VA health services
  - Decline of veterans: Ohio River Valley, upper Midwest
  - Growth of veterans: Washington, DC; San Antonio, Austin, TX
- Areas that need more VA health services
  - Growth of veterans: e.g., Montana, Wyoming, Colorado, Southwest

Current research project

- Factors associated with internal and international migration flows at the local level
  - 1950–2000 Decennial Censuses
  - 2005–2019 American Community Surveys
  - Restricted data at the Texas Research Data Center (TXRDC)

- Autoregressive spatial models
  - Influence of neighboring areas at origin and destination on the likelihood of migrating (Anselin, Rey 2014; LeSage, Pace 2008, 2009)
  - Bayesian statistics approach (LeSage, Fischer 2016; LeSage, Satici 2016)

Bayesian approach

- Use IRS data to determine prior distributions
  - IRS sample size is much larger than ACS
- Then, we can estimate models with ACS
  - More detailed information about socioeconomic and demographic characteristics

Comparison between American Community Survey and IRS county-to-county migration data

Issue	ACS Migration Products	IRS Migration Data
Sample size	Approximately 2 million households per year	116 million+ households
Data universe	Sample is all US households	Universe is tax-filing households
Coverage period	2005–2016	1990–2016
Time period reported	Five-year average	Annual
Demographic characteristics	Each five-year product reports different sociodemographic characteristics (e.g., 2010–2014 contains relationship, household type, and tenure, 2011–2015 contains age/sex/race/Hispanic origin	No demographic characteristics

Source: Hauer, Byars 2019.

Research agenda

- Include a **longitudinal analysis** by linking individuals through time across censuses and surveys (Alexander et al. 2015; Logan, Stults, Xu 2016; Logan, Xu, Stults 2014; Wagner, Layne 2014)
- **Intergenerational mobility** among internal and international migrants (Leibbrand et al. 2019; Leibbrand et al. 2020)
- Estimate effects of our predicted migration flows on local **labor, health, and educational outcomes**
- Integrate **external data sources** to include other covariates
- Investigate **Mexico-U.S. migration** by merging other surveys
- Conduct **immigration policy simulations** to inform policymakers on the impacts of various policy options
- **Simulate future migration flows** under different hypothetical scenarios (Massey, Zenteno 1999; Klabunde, Willekens 2016)

Model migration flows