Current and Future Demographics of the Veteran Population, 2014–2024

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Abstract

We project the population of United States veterans between 2014 and 2024 using a cohort component population projection method that provides estimates by age, sex, race/ethnicity, service era and geographic location. We also analyze distance of the projected veteran population to medical and health centers. Our research strategy integrates several methodological procedures, which can be applied to other subgroups of the American population in order to estimate future demographic trends at the local level. Baseline data for national projections came from the 2000 Census, which was the last census to collect information about veterans. We factored in estimates of mortality, adjusted for demographic characteristics, and added data from the U.S. Department of Defense on veterans entering the population after 2000. We estimated migration flows of veterans within the country using gravity models. Supplementary data came from American Community Surveys and accounted for a variety of factors, including age, sex, race/ethnicity, service era, population size of sending and receiving areas, and distance between areas. We project that the population of U.S. veterans will decrease by 19 percent over the next 10 years: from 21.6 million in 2014 to 17.5 million in 2024. The population will have a slightly higher proportion of older veterans. There will be modest changes in the demographic mix by sex and race/ethnicity. Between 2014 and 2024, the proportion of female veterans will increase 3 percentage points, from 8 to 11 percent. The share of non-Hispanic white males will decrease from 80 to 76 percent over the same period. The service era composition will change in the period. Veterans from the Vietnam conflict will decrease from 31 to 29 percent, while those from the Gulf War and Post-9/11 conflict will increase from 27 to 42 percent between 2014 and 2024. We estimate that, geographically, the veteran population will become more concentrated in urban areas, and the relative proportion of their population in the Ohio River Valley region will diminish.

Keywords

Veterans, component population projection method, migration, gravity models, spatial models

Final publication

Amaral EFL, Pollard MS, Mendelsohn J, Cefalu M. 2018. "Current and future demographics of the veteran population, 2014–2024." ***Population Review***, 57(1): 28–60.
(https://osf.io/w6ebr)

Introduction

The main objectives of this study are to: 1) provide characteristics of the veteran population by age, sex, race/ethnicity, service era and geographic location between 2014 and 2024; 2) analyze the distance of the projected population of veterans to medical and health centers; and 3) explain in detail the integration of methodological procedures used to generate these projections, in order to facilitate their application by other studies. These estimates are intended to be informative in their own right, as well as to support analyses to predict enrollment to the U.S. Department of Veterans Affairs (VA), health care needs, as well as to conduct scenario testing. Our research strategies can be applied to other subgroups of the U.S. population (not only veterans) using censuses and American Community Surveys (ACS).

In terms of our methodological procedures, our first step was to estimate the national veteran population using a standard cohort component population projection model. Cohort component population projection is a method that estimates future population sizes by applying mortality rates specific to age, sex and race/ethnicity to a baseline population. The projection method accounted for new veterans entering the population as they leave the military throughout the projection period. We applied the same mortality rates to them moving forward. We used data from the U.S. Department of Defense (DoD) to determine the number and characteristics of new veterans entering the population from 2000 to 2014. Additionally, in projections of future veterans, DoD separation data were used to identify individuals who separate from the military. We were able to account for years served and whether an individual deployed during his or her time in service, due to the information available in these personal files. We further assumed that total military end-strength would decline and that there would be no significant new conflicts over the projection period. This activity was performed with the U.S. Census Bureau's Rural and Urban Projection software and generated yearly estimates of the national veteran population between 2014 and 2024.

The second stage of our estimates consisted of distributing these national projections into the local level Public Use Microdata Area (PUMA). We utilized the geographical distribution of veterans from the 2009–2013 ACS for this exercise. The third phase relates to the implementation of gravity models to estimate migration flows of veterans through 2024. Gravity models are statistical models of migration that took into account a variety of factors, including age, sex, race/ethnicity, service era, population size of sending and receiving areas, and distance between areas. The fourth activity was to adjust the initial local-level projections by these internal migration flows, in order to generate the final projections at the local level. A final phase was to generate spatial regression models to estimate whether veterans choose to move to areas closer to health facilities.

We provide some background information about the topics related to this study in the next section. A detailed explanation of our data and methodological steps is provided in the subsequent section. We then illustrate our main results and make some final considerations in the following sections.

Background

This project was motivated directly by the Veterans Access, Choice, and Accountability Act of 2014 (Choice Act), which aimed to improve access to VA health care provided to eligible veterans. This Act was motivated by issues faced by VA patients, such as long wait times to receive services, poor patient outcomes, and backlog among veterans waiting for disability claims to be evaluated. The Choice Act required an independent assessment of 12 aspects of VA's health care delivery systems and management processes. The VA engaged a federally funded research and development center (Centers for Medicare and Medicaid Services Alliance to Modernize Healthcare – CAMH), operated by the MITRE Corporation, to develop 11 of the 12 assessments. CAMH subcontracted with the RAND Corporation to conduct three of these assessments: (a) veteran demographics and health care needs; (b) health care capabilities; and (c) authorities and mechanisms for purchasing care (Eibner et al. 2015).

Within these three assessments, our research team within RAND was responsible for estimating current and projected demographics of veterans. Understanding the size, demographic composition, and place of residence of the veteran population is critically important to ensure that the VA has the capacity to meet veterans' health needs in the future. We were required to provide demographic characteristics of veterans by year, age, sex, race/ethnicity, service era, and geographic location. Our baseline estimates consider the veteran population in 2013. To estimate trends over time, we utilized an 11-year time frame from 2014 through 2024. We considered the importance of a long-term understanding of how the veteran population might evolve, as well as the reality that predictive models become less reliable when forecasting far into the future. The selected time period aligns with the time frame used by the Congressional Budget Office (CBO) when scoring legislation.

A limitation of our analysis is that not all veterans are currently eligible to receive care at the VA, not all eligible veterans decide to enroll for services, and not all enrollees receive all or even the majority of their health care from the VA. In order to be eligible to receive VA health benefits and services: (1) a person is considered a veteran when he/she served in the active military service and was separated under any condition other than dishonorable; (2) Reserves or National Guard members should have been called to active duty by a federal order and have completed the full ordered period (those only with active duty for training purposes do not meet the basic eligibility requirement); (3) veterans must have served 24 continuous months or the full period for which they were called to active duty, but there are exceptions such as discharged for a disability incurred or aggravated in the line of duty; (4) some veterans may be afforded enhanced eligibility status in the VA health care system, such as Former Prisoner of War, Purple Heart Medal recipient, Medal of Honor recipient, discharged from the military due to a disability, among others. VA operates an annual enrollment system. Once the application is successfully processed, the veteran is assigned to one out of eight priority groups, in order to receive health care benefits more connected to his/her needs. More detailed information about requirements for veterans to be eligible to use VA health benefits and services is available online.[1]

The databases we utilize for our analysis do not have information on length of service or status of discharge. For example, ACS collects information only on veteran status and eras of active duty. As a result, our study estimates the overall population of veterans, including some that might not qualify for VA health care. As mentioned above, veterans who served less than two years or veterans with "bad paper" discharges (dishonorable discharges, other-than-honorable, and bad conduct discharges) are ineligible for VA services, but they are included in the projection exercise. No federal agency publishes the numbers of "bad paper"

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[1] See https://www.va.gov/healthbenefits/apply/veterans.asp

discharges, but a range of sources suggests that dishonorable discharges represent 1 percent and other "bad paper" discharges are an additional 3 percent of all separations (Carter 2013, Philipps 2013, Wicker 1991).

The VA has several models to estimate the size, characteristics and health care utilization of the veteran population, such as the Veteran Population Projection (VetPop) model and the Enrollee Health Care Cost Projection Model (EHCPM). However, we did not rely on these previous models, and we do not provide an evaluation of the strengths and weaknesses of VA models. Our goal is to provide an independent analysis and suggest new methodological procedures to estimate the characteristics of veterans, as instructed by the Choice Act, instead of evaluating VA's modeling approaches. Our modeling strategies are not meant to replace the well-stablished and sophisticated VA models. The intention is to provide current and projected characteristics of the veteran population using different data sources and methods. These procedures might be useful to the VA when considering updating their models. The outcome of our exercise was the integration of several methodological procedures using data from 2000 Census, ACS and other sources to estimate projections at the local level. A variety of researchers and professionals might benefit from our methodological strategies by implementing them to project characteristics of other sub-groups of the American population (not necessarily related to veterans) for small geographical locations, using censuses and ACS.

Data and methods

3.1. Main definitions

For the population projection exercise, we define veterans consistently with the ACS. The question that allows us to identify whether a person is a veteran changed in 2013, in order to clarify the question and simplify the categories. Prior and up to 2012, the question asked in the ACS was as follows: Has this person ever served on active duty in the U.S. Armed Forces, military Reserves, or National Guard? And five possible answers were presented:

(1) Yes, now on active duty.
(2) Yes, on active duty during the last 12 months, but not now.
(3) Yes, on active duty in the past, but not during the last 12 months.
(4) No, training for Reserves or National Guard only.
(5) No, never served in the military.

In 2013, the main question changed slightly as follows: Has this person ever served on active duty in the U.S. Armed Forces, Reserves, or National Guard? Notice that the word "military" was excluded from "military Reserves." And four possible answers were presented:

(1) Never served in the military.
(2) Only on active duty for training in the Reserves or National Guard.
(3) Now on active duty.
(4) On active duty in the past, but not now.

We identify veterans as having "ever served on active duty in the U.S. Armed Forces, military Reserves or National Guard." Active duty does not include training for the Reserves or National Guard, but does include activation, for example, for the Persian Gulf War. Once an individual has ceased to serve on active duty in any of these capacities, they are considered veterans for the purposes of our projections.

In the American FactFinder website[2], we downloaded microdata from the 2005–2009 and 2009–2013 ACS 5-year estimates. The variable “mil” is related to the question about veteran status. For 2005–2009, veterans are those who answered: (2) Yes, on active duty during the last 12 months, but not now; or (3) Yes, on active duty in the past, but not during the last 12 months. For 2009–2013, veterans are those who answered: (2) Only on active duty for training in the Reserves or National Guard. As a result, these questions are not directly comparable, but they still provide estimations of the veteran population for those years.

We do not have information on length of service (only eras of active duty) or on status of discharge. Thus, not all veterans in the projection exercise may qualify for VA services, as discussed in the previous section.

Throughout our analysis, we use 5-year age groups (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, 45–49, 50–54, 55–59, 60–64, 65–69, 70–74, 75–79, 80–84, 85+), as well as information on sex of veterans (male, female). Race/ethnicity is coded as: non-Hispanic white, non-Hispanic black, Hispanic, non-Hispanic Asian, and non-Hispanic other. In cases where individuals report other multiple race categories they are coded as “non-Hispanic other” as limited by the data.

The analysis defines seven service eras: pre-1950, Korean War (July 1950–January 1955), peacetime pre-Vietnam (February 1955–July 1964), Vietnam (August 1964–April 1975), peacetime post-Vietnam (May 1975–July 1990), Gulf War (August 1990–August 2001), and post-9/11 (September 2001 or later). If individuals report multiple periods of service, they are grouped into the most recent active duty wartime era. If they only served during peacetime, they are grouped into their most recent peacetime era.

For units of geography, we utilized the Public Use Microdata Area (PUMA). Since 2005, the ACS has published information based on PUMAs, which are geographic units used by the U.S. Census Bureau. The state governments drew PUMA boundaries based on the 2000 and 2010 Censuses to allow reporting of detailed data for all areas. There were a total of 2,071 PUMAs based on the 2000 Census classification and 2,351 based on the 2010 Census classification. Because PUMA boundaries changed over time, we generated geographical areas compatible across the surveys, taking the 2010 Census classification as the baseline. The 2012 ACS was the first sample to use the 2010 Census classification for PUMAs. As we detail in following sections, we converted the 2000 Census classification available in the 2009–2011 ACSs into the 2010 Census classification. These comparable areas are used throughout the population projection exercise.

Our use of PUMAs is partly driven by necessity. They are the smallest geographic unit available in the ACS data. However, PUMAs also provide some benefits to our modeling approach. PUMAs are designed to contain populations of 100,000, which ensures that each PUMA contains population sizes amenable to even relatively small cell sizes (older Asian female veterans, for example). More specifically, the U.S. Census Bureau provides a guideline that PUMAs should contain between 100,000 and 200,000 people (in some cases they can exceed 200,000 persons). Due to this guideline, in less populated areas, a single PUMA may

[2] See https://www.census.gov/programs-surveys/acs/data/pums.html

contain an entire county or multiple counties. In more populated areas, one county may consist of a group of PUMAs. Other geographic units, such as county, are not based on population size. As of 2013 there were 3,144 counties and county equivalents in the U.S. It is likely that many counties would have veteran populations too sparse to model reliably.

The use of PUMA does present some special challenges for mapping purposes. Since PUMAs are groups of 100,000 people, they can be geographically small in dense urban areas. In fact, 25 percent of all PUMAs fall within a 40-mile radius of just 10 cities. As such, rather than shading the maps by the population inside each PUMA, we shade them according to the total population near each PUMA. Specifically, we shade each PUMA based on the total population of the PUMAs within 40 miles of each PUMA center.

3.2. Data sources

In this section we describe the databases utilized in our projection exercise. Each one of these files was essential to implement our methodological strategies and generate the projection of veterans at the local level from 2014 to 2024. We analyzed data from: (1) 2000 Census; (2) U.S. Department of Defense (DoD) data, composed by the 2000–2014 Active Duty Master and Loss Files, as well as the 2000–2014 Work Experience (WEX) and Contingency Tracking System (CTS) Files; and (3) 2005–2009 and 2009–2013 ACS 5-year estimates. An overview of each of these data sources is provided below.

The 2000 Census collected information about 115.9 million housing units and 281.4 million people in the United States on April 1, 2000. A more detailed long form survey contained questions including veteran status and periods of service, which was implemented to a 1-in-6 national random sample of housing units and population in group quarters. As a starting point, we used the 5 percent sample 2000 Census data to assess the baseline veteran population in 2000. The 2010 Census did not include a long form and did not collect information on veteran status. The 2010 Census short form included only basic demographic questions (e.g., name, relationship with head of household, sex, age, Hispanic origin, race) and household information (e.g., number of people in the household, whether the home is owned or rented). The 2000 Census long form asked detailed demographic and household questions, including veteran status and era(s) that person served on active duty in the U.S. Armed Forces. As of the 2010 Census, detailed socioeconomic, demographic, and other information is collected only in ACS. Microdata for the 2000 Census is available from the Integrated Public Use Microdata Series (IPUMS) website (https://www.ipums.org/).

Two sources of DoD data are not publicly available: 2000–2014 Active Duty Master and Loss Files; 2000–2014 Work Experience (WEX) and Contingency Tracking System (CTS) Files. These databases were obtained through a partnership that RAND Corporation has with the DoD. The 2000–2014 Active Duty Master and Loss Files provide an inventory of all individuals on active duty (excluding reservists on active duty for training) for the Army, Navy, Marine Corps, Air Force, Coast Guard, Public Health Service, and National Oceanic and Atmospheric Administration Commissioned Corps at a specific time. Relevant personal data elements include date of birth, sex, race and ethnic group. Relevant military data elements include months of service and basic active service date, as well as anticipated service contract end date. The Active Duty Military Personnel Transaction File contains a transaction record for every individual entrance, separation, or reenlistment in the Army, Navy, Air Force, Marine Corps, and Coast Guard within a specific time frame. The active duty loss files are subsets of the Master/Transaction file. We used these data to supplement the 2000 Census from April 2000 to December 2014. Each separation or "loss" indicates an incoming veteran to the civilian population.

The 2000–2014 WEX Files contain a longitudinal record for each individual who has served in the active or reserve forces since September 1990. For those individuals, the WEX includes information on service back to 1975. The file is organized by "transactions." In other words, a new record is generated whenever there is a change in the key variables—service/component/reserve category, pay grade, occupation (primary, secondary, or duty), and unit identification code. The WEX is built from information in Defense Manpower Data Center (DMDC)'s Active Duty Master Personnel Edit File, equivalent reserve files, and the underlying service files. Information on actual deployment can be found in a sequence of "contingency files." The most recent of them is the CTS file. It contains one record for every activation or deployment in support of the conflicts in Iraq and Afghanistan. Using the WEX and CTS Files enables us to identify veterans who have served in the Reserves or National Guard and who were activated at some point and add them to the incoming veteran population each year. Note that the CTS file will not identify Reserves or National Guard who were activated for other conflicts, such as Bosnia, for example, and we acknowledge that the analysis will slightly underestimate the Reserve/National Guard veteran population.

The ACS is an ongoing mandatory survey conducted by the U.S. Census Bureau that collects data each year to bridge intercensal periods and provide detailed information about the population, including veteran status. The ACS also includes information on current location and location in the previous year. The analysis uses the ACS to determine veteran geographic distribution and migration patterns. The ACS was utilized to capture the characteristics of veterans by age, sex, race/ethnicity, service era, and geographical location. Our assumption is that ACS accurately capture the distribution of these veteran characteristics, as well as provides information on migration flows of veterans. More specifically, we used the 2005–2009 and 2009–2013 ACS 5-year estimates available through the Public Use Microdata Sample (PUMS) in the American FactFinder website (see footnote 2). Prior to 2005, ACS does not have information about residence in previous year, which is necessary for migration estimates.

In relation to the estimation of the national population of veterans over time, we produced a set of population projections using a combination of 2000 Census and Department of Defense data (Active Duty Master and Loss Files, as well as WEX and CTS Files). ACS does not accurately estimate the number of veterans in the country. The 2000 Census seems to provide higher estimates of the veteran population than the ACS. For example, we used the 2000 Census to project the number of veterans who would still be living in 2013, without any information on new veterans entering the population. The sample of veterans in the 2000 Census projected to 2013 gives similar estimates of the veteran population provided by the 2013 ACS. That is, ACS underestimates the total number of new veterans who entered the population between 2000 and 2013. The 2000 Census might also have issues related to the estimation of the veteran population, since it was a five-percent sample of people and housing units. However, as expected, the sample size of the 2000 Census (1,406,936 veterans) is larger than the one of the 2009–2013 ACS (1,197,923 veterans). We rely on this larger sample size from the 2000 Census to estimate the baseline population, noting that this data might also have issues of underestimating veterans. In order to deal with this issue, DoD databases provide information on new veterans entering this population for the following years.

3.3. National projection of veterans

The national projection is estimated using a cohort component approach, a standard demographic method of projecting populations based on births and deaths over time (Preston, Heuveline, and Guillot 2001). "Births" in this application of the model are new veterans (who could also be considered akin to international immigrants in typical cohort component models). Once the overall national projection has been estimated, the analysis then considers veteran location and migration through the period. Broadly, we begin with estimates of the veteran population from the 2000 Census. The next step is to add observed new veterans each year through 2014 using DoD data and apply annual age-sex-race/ethnicity specific mortality rates to everyone from 2000–2024. Once the total 2014 population is calculated, the analysis distributes the veteran population geographically according to observed veteran data (along a variety of characteristics). We estimated annual veteran migration, based on observed veteran migratory movements, and applied those migration rates to the estimated 2014 population to derive the final 2014 population and distribution. We then applied the derived 2014 geographic distribution to the 2015 population estimates and applied migration adjustments to derive the 2015 population distribution. This process continues through 2024. Projections are calculated using the U.S. Census Bureau's Rural and Urban Projection software.

The national population projection consists of two main components: baseline veteran population (at 2000) and projected new veterans (through 2024). The analysis begins with a well-measured historical baseline veteran population and adds the number of new veterans entering the civilian population each year afterward. From the initial year that the veteran population is assessed, the baseline and incoming veteran population is progressed through a cohort component projection model in which age-sex-race/ethnicity groups are subjected to age-sex-race/ethnicity specific mortality throughout the projection period (until 2024). Projections begin at age 17; individuals may join the Armed Forces with parental consent at age 17. Once the total veteran population is projected through 2024, we estimate location and migration of veterans each year throughout the period based on observed and projected trends. Projections are produced separately for each service era and combined for national totals.

"Births" in the population projection are assessed using data containing a census of observed transitions to veteran status and are extrapolated for future periods. The majority of new veterans 2000–2014 are measured using the Active Duty Master and Loss Files. We supplement this with the WEX and CTS Files to identify Reserves and National Guard who have been activated at some point (2000–2014). For the 2015–2024 period, we estimate the number of new veterans each year using transition probabilities based on age, sex, race/ethnicity, and branch of service based on total force size derived from WEX. We also assume downsizing of the Armed Forces following announcements by the Army (Tan, 2015) and other information[3] with a total active duty force of 1.25 million by 2018 (89 percent of 2010 strength). Specifically, by 2018 we assume an Army of 445,000 (79 percent of 2010), Air Force of 311,000 (96 percent of 2010), Navy of 311,000 (97 percent of 2010), and Marines of 186,000 (93 percent of 2010). We further assume that there will be no significant future conflicts during the projection period, which also impacts the number of Reserves and National Guard who will be activated during the period.

[3] Personal communication from Air Force Enterprise Readiness Analysis Division (HQ USAF/A1PF) via email, September 9, 2014.

Mortality rates are based on a combination of mortality rates published by the Centers for Disease Control and Prevention (CDC), and mortality rates obtained from the VA Office of the Actuary (OACT). OACT estimates 2014 veteran population mortality using a variety of administrative data, Internal Revenue Service (IRS) data, and Social Security Administration (SSA) data. The veteran-specific rates are available by sex, but not race/ethnicity. Our analysis used the most recent (2011) rates from CDC to derive race/ethnicity specific mortality rates that reflect OACT rates overall, proportionately distributing mortality rates across sex-race/ethnicity groups proportionate to differences observed in the national population. This approach is summarized below:

1. Calculate the proportion of veterans by race/ethnicity in each age group, e.g., for ages 20–24.
2. Multiply the proportion of veterans in each age-race/ethnicity cell by the national mortality rate (deaths per 100,000) for that cell. These standardized rates would be the death rates of veterans if they had the same rates as civilians in each age-race/ethnicity cell.
3. Aggregate these standardized rates by age-sex across race/ethnicity groups (add rates within each age-sex group).
4. Calculate the ratio of overall veteran mortality rates to the standardized rates to get proportional differences (VA rates divided by standardized rates).
5. Multiply the civilian race/ethnicity rates by this ratio at each age-sex. This gives us the same mortality rates as the 2014 VetPop model. However, our estimates are spread proportionately through the race/ethnicity groups based on civilian rates. We assume that the inflation/deflation factor by age-sex is the same for each race/ethnicity.

3.4. Geographic distribution of veterans using ACS

While the ACS undercounts veterans, the analysis assumes that it accurately captures the geographic distribution of veterans. The analysis applies veteran geographic distribution (by 5-year age group, sex, race/ethnicity, service era, and PUMA) from the 2005–2009 and 2009–2013 ACS 5-year estimates to the national veteran populations for 2005–2024 in order to assess initial geographic distribution. There are no multi-year ACS estimates before 2005. There are no multi-year ACS estimates for 2005–2008 because they are available only for 3-year or 5-year periods.

For this study, there is no problem in using the overlapping 5-year estimates of 2005–2009 and 2009–2013. We previously estimated the national population of veterans for each year between 2000 and 2024, using 2000 Census, DoD data, and mortality rates, as explained above. The 2005–2009 ACS 5-year estimates were used to geographically distribute each separated year from our national population estimates between 2005 and 2008. The 2009–2013 ACS 5-year estimates were used to distribute each separated year from our national population estimates between 2009 and 2013. Finally, each year of our national population projections between 2014 and 2024 was geographically distributed with the 2009–2013 ACS.

In the projection method, veterans are assumed to initially enter the civilian population according to historical geographic distribution of veterans with the same age, sex, race/ethnicity and service-era characteristics. The estimation process does not treat the initial entry of veterans to the civilian population as migration. In these projections, migration refers only to movement after the initial entry to the civilian population. We do not include the movement between the initial location of service members when they exit the military and where they are initially distributed as an incoming veteran. We interpret this type of population change as cohort change, rather than change resulting from migration. In this way, some areas may see relatively increasing populations due to cohort change, but negative net migration (i.e., incoming veterans may initially locate in Los Angeles, but subsequently move elsewhere).

3.5. Internal migration flows

After the initial geographic distribution of veterans, we apply migration flows between 2014 and 2024. In order to estimate population flows, it is necessary to use migration information that indicates the location of residence at a specific previous moment. Information about the PUMA of previous residence (where the person was living one year before the survey) is included in the ACS since 2005. This migration information allows the estimation of: (1) the population at the beginning of the period by sex, service era, age group, race/ethnicity, and PUMA; (2) the population at the end of the period by sex, service era, age group, race/ethnicity, and PUMA; and (3) migrants at the end of the period by sex, service era, age group, race/ethnicity, and PUMA of both origin and destination. The steps utilized to take internal migration flows into account are detailed below:

1. Number of migrants (numerator of rates): Calculate number of migrants by 5-year age group, sex, race/ethnicity, service era, PUMA, and PUMA in previous year using 2009–2013 ACS.

2. Population of PUMA of origin at the beginning of the time interval (denominator of out-migration rates): Calculate number of veterans by 5-year age group, sex, race/ethnicity, service era, and PUMA in previous year using 2009–2013 ACS. These data are merged to the number of migrants file.

3. Population of PUMA of destination at the end of the time interval (denominator of in-migration rates): Calculate number of veterans by 5-year age group, sex, race/ethnicity, service era, and PUMA using 2009–2013 ACS. These data are merged to the number of migrants file.

4. Convert groups of PUMA in previous year to the PUMA level: Some PUMAs in previous year are combined in groups of PUMAs in ACS for confidentiality reasons and limitations in coding responses to previous residence. We convert groups of PUMAs back to the PUMA level by disaggregating the number of migrants and population at the beginning of the period. This distribution is performed based on the population at the end of the period as a weight for each combination of 5-year age group, sex, race/ethnicity, service era, PUMA, and group of PUMA in previous year. The files with relationship between aggregated PUMAs of migration and individual PUMAs are available in the Integrated Public Use Microdata Series (IPUMS-USA) website (https://usa.ipums.org/usa/).

5. Convert 2000 PUMAs into 2010 PUMAs: The 2009–2011 PUMA codes are based on the 2000 Census classification. We convert these codes into the 2010 Census classification, based on a geographic correspondence engine developed by the Missouri Census Data Center (2012) (http://mcdc.missouri.edu/). This conversion is applied to both the PUMA of current residence and the PUMA in previous year (after the conversion procedure from the topic above). The 2012–2013 PUMA codes are already available in the 2010 Census classification.

6. Append 2009–2011 and 2012–2013 data and add distance: We append back 2009–2011 and 2012–2013 data, after the 2000–2010 PUMA conversion. Information on distance between PUMAs is estimated

based on shapefiles available in the Census Bureau website (https://www.census.gov/geo/maps-data/data/tiger-line.html). Distance is merged to the 2009–2013 data with migration information.

7. In-migration rates: Calculate in-migration rates of veterans by 5-year age group, sex, race/ethnicity, service era, PUMA, and PUMA in previous year using 2009–2013 ACS. The denominator of these rates is the population of PUMA of destination at the end of the time interval. These annual migration rates were estimated using the overall 2009–2013 ACS 5-year estimates, not each ACS one-year sample for this period.

8. Out-migration rates: Calculate out-migration rates of veterans by 5-year age group, sex, race/ethnicity, service era, PUMA, and PUMA in previous year using 2009–2013 ACS. The denominator of these rates is the population of PUMA of origin at the beginning of the time interval. These annual migration rates were estimated using the overall 2009–2013 ACS 5-year estimates, not each ACS one-year sample for this period.

9. Future in- and out-migration rates (gravity models): We estimated migration rates with Zero-inflated Poisson regression models, based on 2009–2013 ACS, and apply these rates to the 2014–2024 period. More details about these gravity models are presented in the next section.

10. Number of in- and out-migrants: The analysis applies the predicted rates from the Zero-inflated Poisson regression models to the initial 2014 population projection to obtain the number of in- and out-migrants in 2014 for each 5-year age group, sex, race/ethnicity, service era, PUMA, and PUMA in previous year. Then we aggregated information across all PUMAs in previous year, in order to get the number of in- and out-migrants for each 5-year age group, sex, race/ethnicity, service era, and PUMA.

11. Adjustment of the number of in-migrants: We adjusted the number of in-migrants in each cell based on the overall estimates of in-migrants and out-migrants in a specific year. More specifically, the adjusted number of in-migrants equals the original number of in-migrants, multiplied by the overall sum of out-migrants in 2014, divided by the overall sum of in-migrants in 2014. This procedure assures that overall net migration in 2014 equals to zero. The assumption behind this adjustment is that out-migration estimates are more accurate than in-migration estimates. Out-migration cells were estimated based on residence in a previous year, which is a group of PUMAs. We previously allocated both estimates of migrants and population of origin at the beginning of the time interval into the PUMAs within the group of PUMAs. This approach gives a higher chance of all cells at the beginning of the time interval having migrants, because the allocation is based on the population of veterans in the area of destination at the end of the time interval, as described above. In-migration rates were estimated with information already at the PUMA level, which might generate more cells with small sample sizes and affect the overall number of in-migrants.

12. Net migration: We subtracted adjusted in-migrants by out-migrants for each 5-year age group, sex, race/ethnicity, service era, and PUMA cell and applied this net migration to the initial 2014 population, in order to get the final 2014 population.

13. Weight calibration of estimates of veterans: We performed a final adjustment of the estimates of veterans in all cells with a weight calibration procedure known as iterative proportional fitting (raking) of complex survey weights, through the “ipfraking” package in Stata. This procedure ensures that marginal estimates of veterans by 5-year age group, sex, race/ethnicity, and service era at the PUMA level equal the national population projection in each year. The analysis iterates through this process for subsequent years; i.e., use the final 2014 distribution (population after migration) as the baseline for the 2015 national population projection.

Table 1 summarizes the overall estimates of veterans by projected year, number of in-migrants, adjusted in-migrants, out-migrants, and net migration. The final three columns give an idea of the migration rates. As discussed above, we utilized out-migration rates as the standard, which decrease from 2.97 percent in 2014 to 1.61 percent in 2024. This result is consistent with lower mobility through time within the national territory. Based on ACS data, migration between PUMAs is around 4 percent for the American population, which indicates that veterans are less likely to migrate than non-veterans. A previous study about interregional population flows in the United States (Raymer and Rogers 2007) suggests that migration rates are higher among those between ages 20 and 39, which is related to labor migration. Only 11.9 percent of veterans were within this age range in 2014. Thus, migration is relatively small and not likely to be a major factor in veteran demographics. Prior research also suggests that migrating veterans do not have a noticeable impact on VA health care use (Cowper and Longino 1992).

Table 1. Estimates of veterans and migration variables, 2014–2024

Year	Veterans	In-migrants	Adjusted in-migrants	Out-migrants	Net migration	In-migration rate (%)	Adjusted in-migration rate (%)	Out-migration rate (%)
2014	21,579,290	553,963	641,122	641,122	0.0	2.57	2.97	2.97
2015	21,179,305	553,188	612,482	612,482	0.0	2.61	2.89	2.89
2016	20,763,195	545,726	576,489	576,489	0.0	2.63	2.78	2.78
2017	20,346,285	533,323	537,150	537,150	0.0	2.62	2.64	2.64
2018	19,928,403	518,292	495,146	495,146	0.0	2.60	2.48	2.48
2019	19,511,393	503,313	452,512	452,512	0.0	2.58	2.32	2.32
2020	19,097,747	488,767	412,335	412,335	0.0	2.56	2.16	2.16
2021	18,689,523	476,259	374,713	374,713	0.0	2.55	2.00	2.00
2022	18,287,262	464,319	341,120	341,120	0.0	2.54	1.87	1.87
2023	17,888,878	453,210	310,196	310,196	0.0	2.53	1.73	1.73
2024	17,494,154	444,004	281,887	281,887	0.0	2.54	1.61	1.61

Source: RAND analysis of census, ACS, VA, and DoD data.

3.6. Gravity models

We predict migration flows between PUMAs by estimating gravity models. Zero-inflated Poisson statistical regressions can generate gravity models for inter-regional migration flows, with a dependent variable measured in discrete units (integer estimates of migrants) and a discrete probability distribution (Stillwell 2009). These models are appropriate for this analysis because they do not maintain error variances as constant for the different sizes of estimated flows, as is the case of “log-normal” models. The regressions estimate migration based on population in the area of origin at the beginning of the period, population in the area of destination at the end of the period, distance between areas, and other control variables (age, sex, race/ethnicity, and service era).

The implementation of gravity models is consistent with the study of internal migration determinants, which dates back to classical economic development theory, where migration is considered to be a mechanism that establishes regional spatial-economic equilibrium (Ravenstein 1885, 1889). Migrants move from low income to high-income areas and from densely to sparsely populated areas. Population streams are expected to occur between the poorest and wealthiest places and countries. Migration decisions are determined by "push" and "pull" factors in areas of origin and destination. Intervening obstacles (such as distance, physical barriers, and immigration laws), as well as personal factors also influence migration flows (de Haas 2007, 2009, Greenwood et al. 1991, Lee 1966, McDowell and de Haan 1997, Passaris 1989). Economic, environmental, and demographic factors are assumed to drive migrants away from their places of origin and attract them to new places of destination.

Based on the regional equilibrium framework, distance is expected to play an intervening role on the levels of population flows. Previous studies took distances between areas into account by utilizing gravity models to estimate migration (Head 2000, Lowry 1966, Pöyhönen 1963, Tinbergen 1962). Gravity models address the distance between areas, as well as the changing population in the areas over time. The idea behind these models is to use distance between areas and population trends as independent variables to estimate the level of migration, before analyzing the migration rates. Gravity models consider the population in the area of origin at the beginning of the period, the population in the area of destination at the end of the period, distance between areas, and the number of migrants already living in a specific area (dependent variable). Distance is constant over time, but the population at the beginning and end of the period in each area has varying out- and in-migration trends over time. This study utilized a matrix of distances between all PUMA centroids, in order to estimate the distance component in the model.

In the case of migration flows between PUMAs, Zero-inflated Poisson model is recommended because there are a significant number of smaller flows among the areas, as well as a small number of larger migration flows. These models are appropriate when the discrete dependent variable has a high incidence of zeros. We replace cells with no migration flows or no population by zero. Out of 2,909,616 cells in the in-migration model, 2,133,534 have zero migrants (73 percent) and 776,082 have non-zero observations (27 percent). As a way to control for this high prevalence of cells with zero cases of migrants (dependent variable), a dummy variable indicates whether the cell has zero migrants within the "inflate" option in the model.

Some studies have highlighted limitations of gravity models when considering only distance among areas as the main set of independent variables. For instance, when estimating international trade between countries, distance is usually the main independent variable in gravity models. However, gravity models better estimate trends of international trade by adding covariates that influence the dependent variable, such as the existence of national borders barriers (Anderson and Van Wincoop 2003). In the case of our study, national border barriers would not make sense because we are estimating internal migration within the United States. However, we are concerned about other factors (beyond distance among areas) that might influence these population flows (e.g., age, sex, race/ethnicity, service era, population in origin, population in destination), which were included in the estimation of gravity models.

Our approach predicts in- and out-migrants as a function of age, sex, race/ethnicity, service era, and squared distance, using population at risk as exposure. For in-migration, population at risk is located in the PUMA of destination at the end of the time interval, while population in the PUMA of origin at the beginning of the time interval is used as a control variable. For out-migration, population at risk is located in the PUMA of origin at the beginning of the time interval, while population in the PUMA of destination at the end of the time interval is used as a control variable. Regression coefficients from this model are used to predict in- and out-migration rates for 2014–2024 by applying coefficients to projected veteran populations. In effect, the analysis assumes that migration patterns by age, sex, race/ethnicity, and service era remain constant over the next 10 years. Regression models do not include year. Models that included year as a predictor (to capture time trends in migration) indicated that there were not significant time trends. The year effect was orders of magnitude smaller than other predictors and did not contribute meaningfully to predicted migration trends.

The results from Zero-inflated Poisson regression models are illustrated in Table 2 (see Annex 1 to the present document). The first model deals with in-migration, in which population in PUMA of destination at the end of the period is taken as the exposure variable. The model about out-migration utilizes population in PUMA of origin at the beginning of the period as the exposure variable. The general trends of variables are similar between these models. Men have lower chances to migrate, compared to women. On one hand, veterans in older service eras are less likely to migrate, compared to those in post-9/11 Era. On the other hand, older veterans are more likely to migrate, compared to younger veterans (25-29 age group), especially starting at the 70-74 age group. These two results (service era and age) counterbalance each other, since veterans in older service eras (less likely to migrate) are older in age (more likely to migrate). All race/ethnicity groups are more likely to migrate than Whites. As expected, longer distances between PUMAs have negative impacts on the likelihood of migrating. This information was included as squared distance in order to make the variable more spread throughout the national territory, as well as to be consistent with gravity models. For the in-migration model, population in origin at the beginning of the period has a positive effect on migration, as we would expect of more populated areas sending more migrants. For the out-migration model, population in destination at the end of the period has a negative effect on migration, which is contrary to the original hypothesis, but this coefficient is not statistically significant.

In summary, these results suggest that men are less likely to migrate than women, consistent with migration trends in the national population, according to ACS and other data sources. Previous research has linked greater female residential mobility and desire to move to greater residential satisfaction (Mateyka 2012) and notes that women's migration was significantly less affected by the Great Recession than men's (Benetsky and Fields 2015).[4] All else equal, older veterans (especially those 70 and older) are more likely to migrate compared with younger veterans (25–29 age group), probably reflecting retirement moves as in

[4] Mateyka (2012) used data from the Survey of Income and Program Participation, conducted by the U.S. Census Bureau, to identify greater mobility and greater desire to move among women in 2010–2011. Desire to move was measured using the following questions: (1) Are conditions in your home undesirable enough that you would like to move? (2) Overall, is the threat of crime where you live undesirable enough that you would like to move? (3) Is your neighborhood undesirable enough that you would like to move? (4) Are the public services undesirable enough that you would like to move?

the rest of the civilian population. However, all else equal, veterans in older service eras are less likely to migrate compared with those in the 9/11 era. Thus, within each service era, older veterans are more likely to migrate, especially among the most recent service eras. All race/ethnicity groups other than whites are more likely to migrate than whites. Migration is less likely to occur between PUMAs that are farther apart—that is, migration over longer distances is less likely than migration over shorter distances. Longer distances between PUMAs have negative impacts on the likelihood of migrating.

3.7. Spatial regression models

In order to examine the hypothesis that veterans choose to move to areas where they are closer to VA facilities, we used spatial regression models to examine how growth and movement in the veteran population (net migration as the dependent variable) is related to the location of a range of VA health facilities. These models follow the standard linear modeling format except for two cases.

First, observations are weighted so that all cases of approximately the same location have weights that sum to one. For example, there are 19 PUMAs within a 10-mile radius of downtown Chicago. Each PUMA could be given a weight of 1/19th to indicate that all cases are observed veterans located near the same set of VA health facilities. The weighting procedure used here follows this same principle, but without using a hard cut-off. Instead, each observation receives a weight of:

$$\frac{\sum_i 2^{-D_{ij}/k}}{\sum_j \sum_i 2^{-D_{ij}/k}}, \quad (1)$$

where D is a matrix of distances between observations i and j. K is a scaling constant that indicates roughly what distance i and j are far enough away that the location of j only counts as 50 percent the same as the location of i. This weighting allows observations to be scored along a continuum from “same location” to “different location” instead of using a hard cut-off.

Second, net migration of each PUMA (dependent variable) is predicted using the distance between its center and the nearest VA health facility or other geographic feature. When the resulting coefficients are negative, it indicates that distance from a facility corresponds to smaller populations, i.e., more people tend to locate close to facilities. For estimation purposes, these distances are logged, because the effects of distance on behavior are known to be nonlinear. For example, the difference between 10 miles and 20 miles makes a significant impact on population behavior, but the difference between 210 miles and 220 miles has relatively little impact—both are about equally far away.

3.8. Rural-urban area classification

We utilized information on rural status in order to estimate where veterans will be located in the next years, as well as to understand the percentage of veterans living within a given distance to health centers by rural-urban status. The U.S. Department of Agriculture (USDA) Economic Research Service provides rural-urban continuum codes (RUCC), which classify metropolitan counties by population size of their metropolitan areas, as well as nonmetropolitan counties by degree of urbanization and adjacency to a metropolitan area. USDA also provides rural-urban commuting area (RUCA) codes, which classify metropolitan, micropolitan, small town, and rural commuting census tracts, based on the size and direction of the primary commuting flows. USDA provides spreadsheets containing RUCC for each county for 1974, 1983, 1993, 2003, and 2013 (USDA 2016b). Spreadsheets containing RUCA codes are available for each census tract, based on classifications from the 1990 Census, 2000 Census, and 2010 Census (USDA 2016a).

Since we intended to analyze rural-urban classification for the smallest geographical areas available, we utilized RUCA codes for census tracts. The primary 2010 RUCA codes are the following: (1) metropolitan area core: primary flow within an urbanized area (UA); (2) metropolitan area high commuting: primary flow 30 percent or more to a UA; (3) metropolitan area low commuting: primary flow 10 percent to 30 percent to a UA; (4) micropolitan area core: primary flow within an Urban Cluster of 10,000 to 49,999 (large UC); (5) micropolitan high commuting: primary flow 30 percent or more to a large UC; (6) micropolitan low commuting: primary flow 10 percent to 30 percent to a large UC; (7) small town core: primary flow within an Urban Cluster of 2,500 to 9,999 (small UC); (8) small town high commuting: primary flow 30 percent or more to a small UC; (9) small town low commuting: primary flow 10 percent to 30 percent to a small UC; (10) rural areas: primary flow to a tract outside a UA or UC; and (99) not coded: census tract has zero population and no rural-urban identifier information. Basically, census tracts with codes 1 to 9 were classified as urban areas and those with code 10 as rural areas.

The 2010 RUCA codes are based on measures of population density, urbanization, and daily commuting from the 2010 Census and 2006–2010 ACS. As explained in previous sections of our projection exercise, the 2012 ACS was the first sample to use 2010 Census classification. Within the 2009–2013 ACS 5-year estimates, we converted the 2009–2011 PUMA codes from the 2000 Census classification into the 2010 Census classification. Thus, our final projections have estimates of veteran population by age group, sex, race/ethnicity, service era, and geographic location based on the 2010 Census classification. As a result, we can link our projections to the 2010 RUCA codes.

However, we had an additional issue to classify PUMAs as rural or urban areas, because rural and urban census tracts may be simultaneously contained within a single PUMA. PUMAs are not necessarily 100 percent rural or 100 percent urban. We used information about the 2010 population of each census tract, as well as their RUCA codes, available in the USDA spreadsheets. We took the percentage distribution of the 2010 population by census tracts within each PUMA as the baseline. Then, we applied this distribution to our projections and were able to estimate the population living in rural or urban census tracts within each PUMA from 2014 to 2024. Our analyses about rural-urban status assumes that these classifications will remain the same in 2024 as they were in the 2010 RUCA codes. Thus, 2024 results may be best interpreted as "based on areas that were rural or urban in 2010." The following section illustrates the results of our projections, geographic distribution of veterans, distance to health centers and clinics, and comparisons of our estimates to the VetPop model.

Results

4.1. Projections

The overall results of our projection exercise are illustrated in Table 3 (see Annex 1 to the present document). We highlight main features of the results. We estimate that the U.S. veteran population will shrink over the next decade—declining from 21.6 million in 2014 to 17.5 million by 2024, a 19-percent decrease. Over a longer time frame, VA estimates that the total number of veterans will continue to decline, by 37 percent between 2008 and 2033 (USGAO 2009) due to the continued aging of the veteran population and military downsizing. This projected decrease suggests that in 2032, there will be fewer than 15 million living veterans (McGeary et al. 2007).

We estimate that the age structure of veterans will shift between 2014 and 2024. We estimate that the share of veterans ages 40–64 will decline from around 40 percent to 37 percent of the veteran population, while the share of older veterans will increase. The share of veterans age 65+ will increase from 49 percent to 52 percent by 2024. The share of all veterans at the oldest ages (85+) will increase from 9 percent to 10 percent (not shown). Veterans' mean age will increase slowly between 2014 and 2024: from 63 to 64 among males and from 52 to 55 among females (not shown). Male veterans' mean age will rise much more slowly than female veterans' mean age, although female veterans are substantially younger than male veterans overall and will continue to be so during the projection period.

We also examined the age profile of newly separated active component service members (not shown). While the number of service members who are projected to separate between 2015 and 2024 is relatively constant for those in age groups 35–44 and 45+, the number of new veterans under age 35 is expected to decrease throughout the 10-year projection horizon. In 2015, we estimate that 146,000 new veterans will be under age 35, and that number is expected to decrease to 123,000 by 2024. A profile of the current age structure indicates that in 2014, the largest conflict-era cohort—Vietnam-era veterans—averaged 67 years of age, while the second-largest conflict-era cohort—Gulf War-era veterans—averaged 47 years of age.

We estimate that the proportion of male veterans will decline from 92 percent to 89 percent by 2024. Based on the growth trend observed since 2000, the total number of female veterans is projected to increase very slightly at the same time, leading to a 38 percent increase in the relative share of female veterans, from 8 percent to 11 percent of the veteran population by 2024. Despite this increase, the veteran population remains predominately male throughout the projection period.

Our estimates are in line with the existing literature on this topic, which confirms that the majority of veterans will continue to be men, but the proportion of women is growing (USGAO 2009). In 2008, 15 percent of active duty military and 7.7 percent (1.8 million) of veterans were women (NCVAS 2011, Census 2014). Approximately 33 percent of female veterans were minorities in 2012 (NCVAS 2014a). Female veterans were more likely than non-veterans to be non-Hispanic black (19 percent versus 12 percent) or non-Hispanic white (69 percent versus 67 percent) (NCVAS 2011).

We estimate that the total number of new service members who separate from the active component to become veterans will decrease from approximately 192,000 in 2015 to 162,000 in 2024 (not shown). The decrease in the total number of new veterans is driven mostly by separations of male service members, down from 164,000 in 2015 to 138,000 in 2024. We note that new veterans from the active component represented approximately one percent of all veterans in 2014 (roughly 224,000 out of 21.6 million).

We estimate that the proportion of veterans who are non-Hispanic white will decline slightly, from 80 percent in 2014 to 76 percent by 2024. The literature shows that the racial and ethnic composition of the veteran population varies by age. Older veterans are primarily non-Hispanic white, while younger veterans are more likely to be racially and ethnically diverse (Lee and Beckhusen 2012). Gulf War-era veterans are more racially and ethnically diverse than prior cohorts of veterans (Holder 2014). In 2012, minorities accounted for 20 percent of the male veteran population and 38 percent of male non-veterans (NCVAS 2014b). Among veterans, the two largest minority groups were veterans who were black or Hispanic (NCVAS 2011, 2014a). Like VA estimates, our results suggest that the largest minority groups represented in the veteran population are those who are black (around 12 percent in 2014 and 13 percent in 2024) or Hispanic (six percent in 2014 and seven percent in 2024).

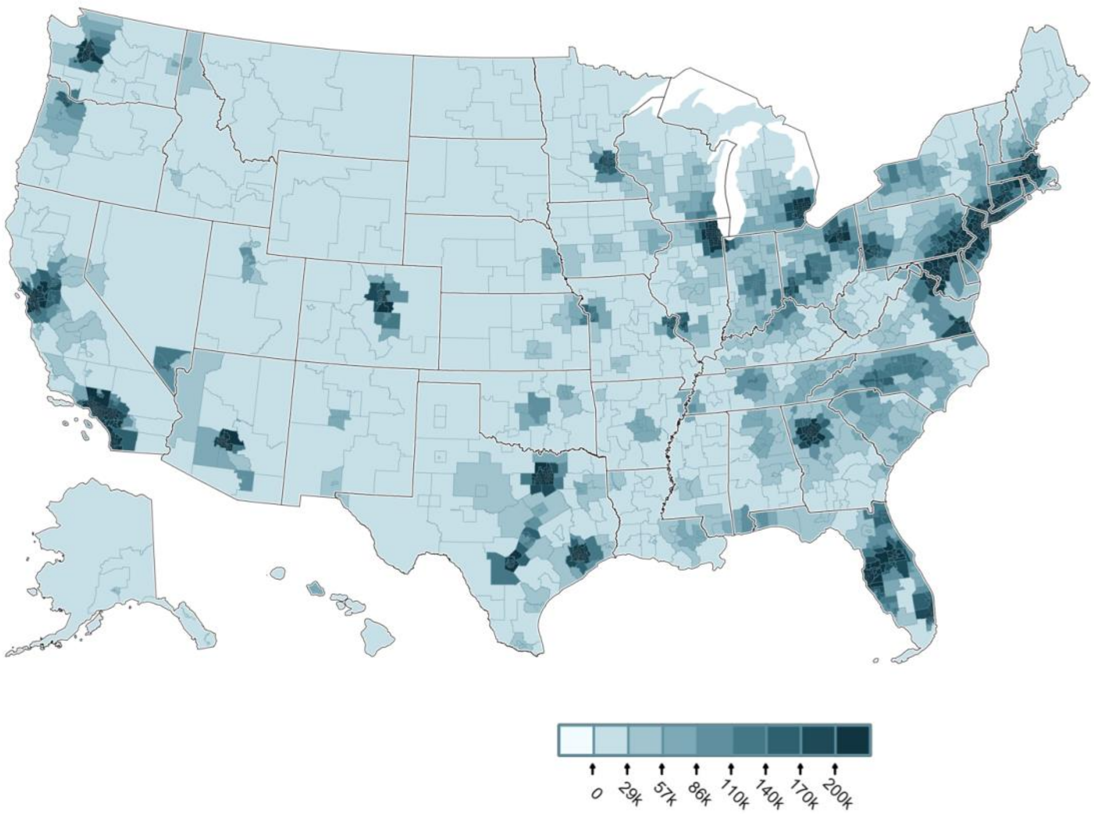
We estimate that pre-Vietnam-era veterans constituted 27 percent of the total veteran population in 2014, but by 2024, their share is projected to fall to 13 percent of the total. The analysis also estimates that the share of Vietnam-era veterans (1964–1975) will decline slightly from 31 percent to 29 percent of the veteran population by 2024. These estimates are consistent with earlier numbers. In 2000, Vietnam-era veterans were estimated to account for 31.7 percent of the veteran population (Richardson and Waldrop 2003). We estimate that the proportion of Gulf War–era and post-9/11-era veterans will grow from 27 percent to 42 percent of the total veteran population by 2024. These projections highlight the rapid proportional growth of the post-9/11 era. Post-9/11 veterans alone will increase from 12 percent of all veterans in 2014 to 24 percent in 2024.

4.2. Geographic distribution of veterans

The following step is the analysis of the geographic distribution of the U.S. veteran population in 2014 and 2024. Understanding the geographic distribution of veterans is an important consideration for policies that attempt to align the availability of health care services with the veteran population. We report geographic detail using Public Use Microdata Areas (PUMAs), which respect state borders, but not necessarily county or municipality borders. Shading in each map indicates the total number of veterans living in all PUMAs within 40 miles of the center of the shaded PUMA. The text in the lower left corner reports the total number of veterans depicted in the map, as well as the percentage of the total veteran population they represent. The bar chart on the lower right serves the dual purpose of reporting how each shade corresponds to the number of veterans, as well as what portion of the depicted population lives in the PUMA shaded with each color.

Figure 1 (next page) depicts the geographic distribution of the veteran population as a whole in 2014. Veteran estimates include all veterans living in a PUMA within 40 miles of the named city centers. Total population estimates include the entire metropolitan population, not just the population of the following cities used as examples. Like the U.S. population as a whole, the majority of veterans are concentrated in a small number of heavily urbanized regions. The “Bos-Wash” corridor, a stretch of heavily urbanized area that runs from Boston, Massachusetts, to Washington, D.C., contains 30–50 million people and 1.43 million veterans. Southern California, including the Los Angeles, Riverside, and San Diego metropolitan areas, contains more than 20.97 million people and one million veterans. Other large cities, such as Chicago (population: 9.55m, veterans: 423k), Dallas (6.95m, 360k), Houston (6.49m, 332k), Atlanta (5.61m, 405k), Miami (5.93m, 262k), and the San Francisco Bay Area (6.55m, 346k), account for another 41.08 million people, including 2.08 million veterans. Taken together, these eight urbanized regions account for 35 percent of the American population and 20 percent of the veteran population.

Figure 1. Estimates of total veteran population by Public Use Microdata Area (PUMA), 2014

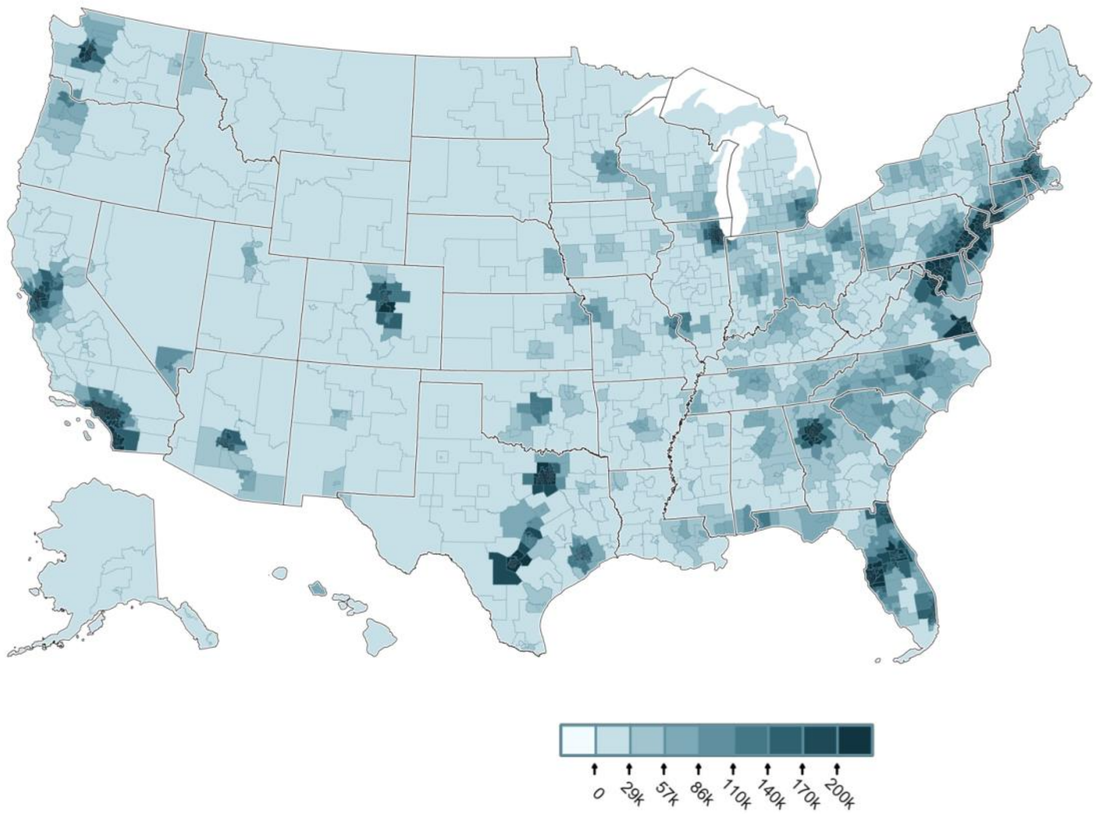


Note: 21.6 million veterans overall. Lambert conformal conic projection. Alaska was rendered at one-third scale.
Source: RAND analysis of census, ACS, VA, and DoD data.

Of the 318.9 million people residing in the United States in 2014, 21.6 million, or 6.8 percent, were veterans. Slightly more veterans than expected based on this national average live in Virginia Beach (14 percent), Boston (14 percent), central Florida (10 percent), Cleveland (10 percent), Washington, D.C. (9 percent), and San Antonio (9 percent). Slightly fewer veterans than expected live in Chicago (4 percent), Miami (4 percent), Dallas (5 percent), Los Angeles (5 percent), Houston (5 percent), San Francisco (5 percent), Minneapolis (5 percent), and New York City (3 percent).

Figure 2 (next page) displays how the veteran population is expected to look in 2024. Overall, we expect the population to decline to 17.5 million as older cohorts of veterans experience high rates of age-related mortality. For the most part, these losses will not change the geographic distribution of veterans. However, we estimate that the share of veterans in the Ohio River Valley cities, including Buffalo, Cincinnati, Cleveland, Columbus, Detroit, Indianapolis, and Pittsburgh, will decline.

Figure 2. Estimates of total veteran population by Public Use Microdata Area (PUMA), 2024



Note: 17.5 million veterans overall. Lambert conformal conic projection. Alaska was rendered at one-third scale.
Source: RAND analysis of census, ACS, VA, and DoD data.

Over time, there will be more diversity in the geographic distribution of veterans by age (not shown). veteran mean age will grow older over time, but the increases in the proportion of veterans at both the younger and older ages will alter the geographic distribution of veterans by age. We estimate that veterans under age 35 will be concentrated in areas surrounding Los Angeles; Dallas; Washington, D.C.; and northern New Jersey by 2024. Over time, veterans under age 35 will constitute a greater proportion of the population in Northern California, central Washington state, the Midwest, and Wyoming and Utah. Other portions of the Southwest and much of the Southeastern seaboard, from Virginia Beach through the coast of Georgia, will see a decrease in the proportion of the population that is under age 35.

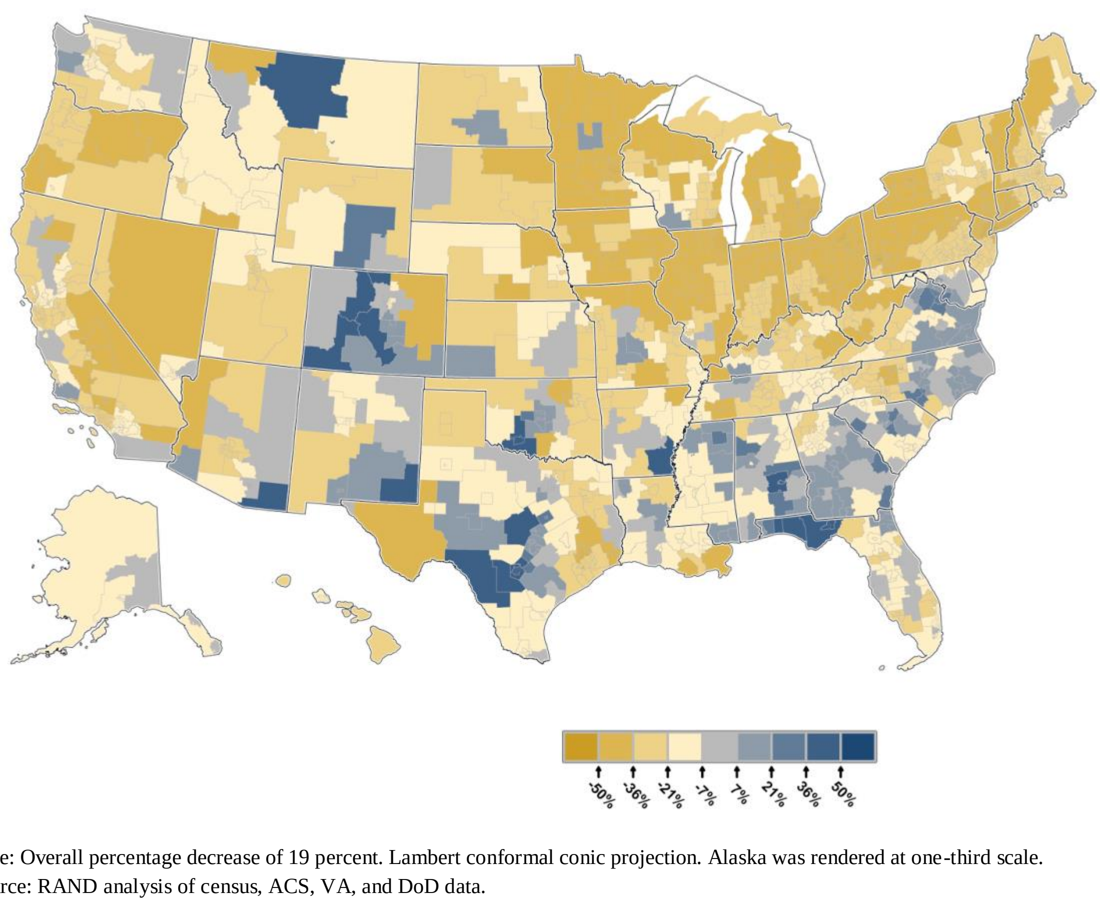
Concentration of older veterans in areas of current higher prevalence will continue to 2024 (not shown). San Francisco; Los Angeles; Denver; southwestern Texas; much of Florida; Washington, D.C.; western Pennsylvania; northern New Jersey; New York City; and western Massachusetts are currently places in which the share of older veterans is high, and they are predicted to remain high through 2024. At the same time, we estimate that the share of older veterans living in much of the Northeast and Florida (especially the panhandle), the Midwest, Wyoming, Utah, and southwestern Alabama will decline.

Trends in geographic distribution by age are likely to reflect cohort changes in where veterans reside, rather than trends in migration per se. Areas where older veterans decline in proportion are most likely to be areas where they are not being replaced by incoming cohorts of veterans. Similarly, areas with proportionate growth in veterans over age 65 are likely areas where currently middle-aged veterans live and will continue to live as they age. Florida is an exception to this, as older veterans will also tend to migrate there (although in relatively low numbers in comparison with the local populations).

Areas with the highest net migration are in Texas, Arizona, Utah, southern Colorado, Wyoming, western Montana, Idaho, Washington state (except the interior), coastal Oregon, Northern California, and northwestern and southwestern Florida (not shown). Areas with greater negative net migration are in the interior of Washington state; Southern California; Phoenix, Arizona; San Antonio, Houston, and Dallas, Texas; and Jacksonville, Florida. By 2024, Nevada is also expected to experience general negative net migration, and Southern California will see marginal net in-migration, although net migration overall is low.

While the majority of the country will see shrinking veteran populations between 2014 and 2024, some areas will lose proportionately more than others, and several areas are projected to see growth in the number of veterans. Figure 3 provides information about the regions which will face particularly steep population declines or growth between 2014 and 2024. More specifically, we present the projected percent change in veteran population size for each PUMA between 2014 and 2024.

Figure 3. Estimates of percentage change of veteran population by Public Use Microdata Area (PUMA), 2014–2024



Note: Overall percentage decrease of 19 percent. Lambert conformal conic projection. Alaska was rendered at one-third scale.
Source: RAND analysis of census, ACS, VA, and DoD data.

Population loss is the norm, but the greatest population losses over time are expected in the Ohio River Valley and upper Midwest areas, as well as rural regions of the West. However, several regions are expected to see population gains. Washington, D.C.; Charlotte, North Carolina; Columbia, South Carolina; Tallahassee/Panama City, Florida; San Antonio and Austin, Texas; and Montgomery, Alabama, are all particularly notable, as population gains are projected for the cities themselves, whereas most other population growth is projected to occur in areas encircling cities.

Overall, fewer veterans are going to be located in rural areas in the next years, reflecting both the overall national population trend of movement away from rural areas and absence of younger veterans replacing older rural veterans (not shown). However, northwestern Washington state, a belt running through Montana to Wisconsin, parts of Northern Michigan, much of Maine, Alaska, and northern Texas (Amarillo outskirts) will remain areas of rural veteran populations by 2024.

4.3. Distance to health centers and clinics

We analyzed the percentage of veterans living within a given distance to VA medical centers (VAMC) and community-based outpatient clinics (CBOC), as a strategy to understand the proximity of this population to health service units. The VA medical system relies primarily on VAMC and CBOC. VAMCs are full-service medical centers, offering both primary care and specialty care. CBOCs are satellite clinics that provide primary, preventative, and behavioral health services. While VAMCs are the heart of the system, CBOCs provide a cost-effective way to increase access to basic services in rural areas, reduce travel time to primary care services, and serve as a flexible option for adapting to changes in demand for VA services.

Results in Table 4 indicate that veterans tend to move farther away from VAMC and CBOC. Distances to VAMC and CBOC have significant positive associations with net migration, indicating that veterans are moving to PUMAs that are farther from health facilities. This suggests that veterans' migration decisions are not strongly driven by the presence of VA facilities. Indeed, they are choosing to move to areas that are not as well covered with VA facilities. As demonstrated before, migration is only a small contributor to how veterans are distributed around the country. Although net migration patterns suggest movement away

Table 4. Coefficients and standard errors estimated with spatial regression models for net migration as a function of VA medical centers (VAMC) and community-based outpatient clinics (CBOC), 2014

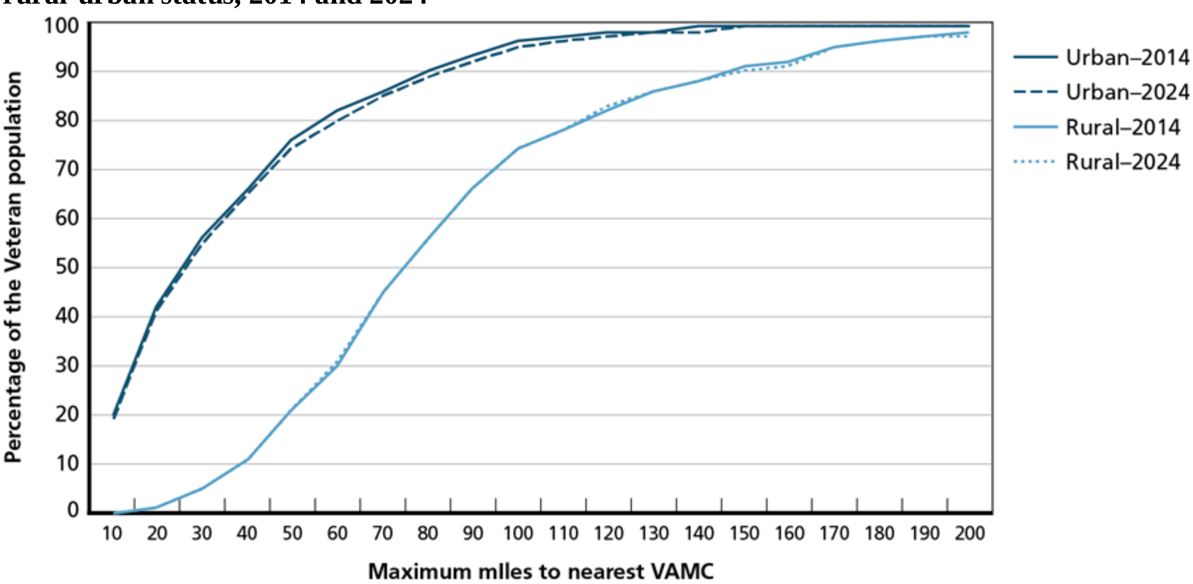
Independent variables	Model 1	Model 2	Model 3	Model 4	Model 5
Constant	79.78 (4.55)	-132.59 (64.22)	-156.40 (23.35)	-264.25 (37.54)	-289.74 (48.47)
VAMC			59.28 (5.75)	53.71 (5.94)	52.59 (6.74)
CBOC		64.22 (10.56)		39.33 (10.74)	37.85 (11.17)
City with at least two million inhabitants					2.29 (6.11)
Southwest region					3.72 (4.99)

Note: Standard errors are reported in parentheses.
Source: RAND analysis of census, ACS, VA, and DoD data.

from VA health facilities, this does not mean an overall trend of veterans being farther from facilities. Overall distance to facilities is not likely to change substantially between 2014 and 2024. The same positive associations are verified with distances to cities with at least two million inhabitants and the Southwest region.

VAMCs are more prevalent and closer spaced in the Northeast. Most veterans live within a relatively short distance of their nearest facility. However, coverage is uneven by region, especially the more sparsely populated noncoastal Western states. Figure 4 shows the percentages of the veteran population living in PUMAs within a given distance of the nearest VAMC in 2014, for veterans living in urban and rural areas. The darker lines indicate the percentage of the veteran population living in urban areas, while the lighter lines indicate the percentage of veterans living in rural areas. The solid lines report the percentages for 2014, while the dashed lines indicate the percentages for 2024, based on our projections. In 2014, 70 percent of the urban veteran population lives within 40 miles of the nearest VAMC and 90 percent live within 80 miles. By 2024, this distribution is projected to change relatively little, with perhaps a 1–2 percentage point increase in those living farther away from the nearest VAMC. As expected, the rural veteran population tends to be much farther from the nearest VAMC. While more than 70 percent of urban veterans live within 40 miles of a VAMC, less than 20 percent of rural veterans do. The differences persist when we consider a much wider radius. While nearly all urban veterans live within 100 miles of a VAMC, less than 80 percent of rural veterans live within a similar radius. Many of these veterans live in relatively remote areas. Just under 40 percent live more than 200 miles from the nearest large city (greater than two million inhabitants)—mostly in the Great Plains and the Southwest.

Figure 4. Percentage of veterans living within a given distance to a VA medical center (VAMC) by rural-urban status, 2014 and 2024

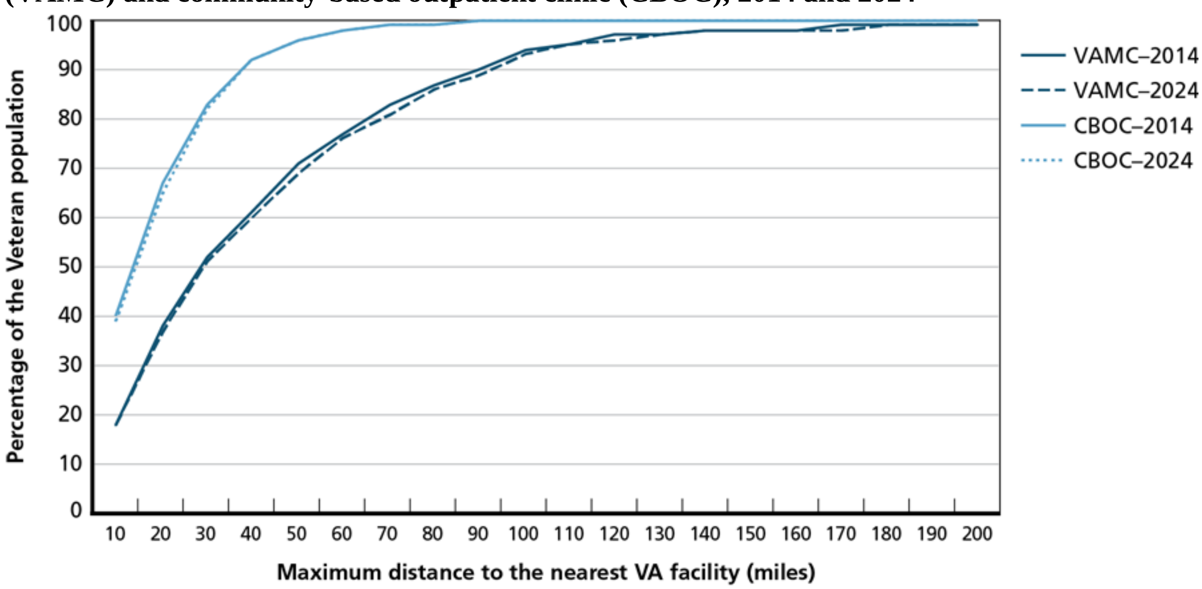


Source: RAND analysis of census, ACS, VA, and DoD data.

For the most part, the urban veteran population is projected to stay closely aligned with the location of current VAMC and population distribution. However, the veteran population in the Southwest has the most uneven alignment and most risk of future misalignment. In 2014, 10 percent more Southwestern veterans lived within 40 miles of a VAMC, but 10 percent less lived within 75 miles. By 2024, the situation is not projected to improve. The Southwest has witnessed particularly strong population growth rates in recent decades, including growth in the veteran segments. New centers of population have emerged, and the construction of VAMCs has not yet caught up. Moreover, because VAMCs in the Southwest are far more widely spaced apart, emerging population centers in the Southwest are less likely to fall within a short distance of an existing facility, and less likely to have an alternative VAMC in proximity. This is in marked contrast to the Ohio River Valley region. The Ohio River Valley is also experiencing significant shifts in the distribution of the population but spacing of VAMCs generally means that emerging population centers still fall within a short distance of a facility. This combination of factors—above-average rates of population change and wider spacing of VA facilities—places Southwestern VAMCs at higher risk of becoming geographically misaligned with the veteran population.

Figure 5 illustrates the percentage of the veteran population living in PUMAs within a given radius from different types of VA facilities. While VAMCs offer a wide array of medical services, CBOCs offer the most commonly used basic services—primary, preventive, and counseling services. The darker line reports the maximum distance to the nearest VAMC, while the lighter line reports the equivalent statistics for the nearest CBOC. More than 90 percent of all veterans live in a PUMA that falls within 40 miles of a CBOC, compared with just under 70 percent for a VAMC. Because of the wider geographic coverage of the CBOC network, this pattern is unlikely to change by 2024, despite projected change in the distribution of the veteran population. That is, while veterans may be closest to a different set of CBOCs in 2024, they will still be relatively close to a CBOC.

Figure 5. Percentage of veterans living within a given distance of the nearest VA medical center (VAMC) and community-based outpatient clinic (CBOC), 2014 and 2024



Source: RAND analysis of census, ACS, VA, and DoD data.

4.4. Comparison to VetPop model

A primary public source of information regarding current and projected veteran population is the 2016 Veteran Population Projection (VetPop2016) model, produced by the Office of the Actuary (OACT) at the U.S. Department of Veterans Affairs (VA). This model provides veteran population projections by age, sex, service era, and race/ethnicity at the county level. We highlight ways in which our approach differs methodologically from the VetPop model and how our projection results differ. Documentation for the VetPop model is scarce, and we rely on information contained in online documents[5] and discussions with the VetPop team at OACT. As a result, we do not assess the quality of the VetPop model here.

The comparisons provided below refer to the VetPop2014 model, available at the time of our analysis. However, the overall modeling approach in VetPop2016 is consistent with the VetPop2014 model.[6] The main differences relate to: (1) new data on separations (new veterans) from the DoD; (2) baseline estimation using latest data from the ACS, DoD, and VA; (3) projected separations from DoD were used as the main source of new entrants to the veteran population; (4) mortality rates were updated using latest data from the SSA, VA, and DoD; (5) inclusion of projected veterans by congressional district for the 114th Congress; and (6) updated data on race/ethnicity, rank (office/enlisted), branch of service, and period of service.

Broadly speaking, the VetPop model shares a similar projection approach to our model: Mortality rates are applied to a baseline population, new veterans are added to the baseline population over time, and veterans migrate throughout the projection period. The original baseline population for the VetPop model was the 2000 Census, as with our projections. Main differences between the VetPop model and our model are in data inputs and in migration modeling. VetPop model applies age- and sex-specific mortality rates derived from mortality data that include: (1) Veteran-specific information from VA administrative data; and (2) U.S. population data from the SSA and the IRS. VetPop model assumes a slight mortality improvement for older veterans due to longevity improvement, although by 2024 this is negligible. The VetPop model does not incorporate race/ethnic-specific mortality rates. Our model differs here in that we apply race/ethnic-specific rates, in addition to age- and sex-specific rates. The mortality rates we use are a modification of the VetPop rates we originally obtained from OACT that also incorporates the national race/ethnic differences in mortality reported by the Centers for Disease Control and Prevention (CDC). We do not assume any improvement in mortality through the projection period.

VetPop model projects annual separations by age and sex, and by active and reserve component, using data from DoD. This VA model assumes that conflicts in the Gulf end by 2018, and that there are no other major conflicts in the next 30 years. Our model uses individual-level DoD administrative data to derive separation rates by age, sex, race/ethnicity, service era, and active and reserve status. Our projected separations reflect branch-specific trends in sex composition and separation rates, which is not reflected in VetPop model to our knowledge. Our separations also assume no future major conflicts, but we also assume downsizing of the various branches by 2018, following announcements by the Army and our internal estimates for the other branches. It is not clear whether VetPop model similarly assumes downsizing. Our model also excludes separations from the reserves and National Guard if they have not served any active duty time

[5] National Center for Veterans Analysis and Statistics (https://www.va.gov/vetdata/veteran_population.asp).

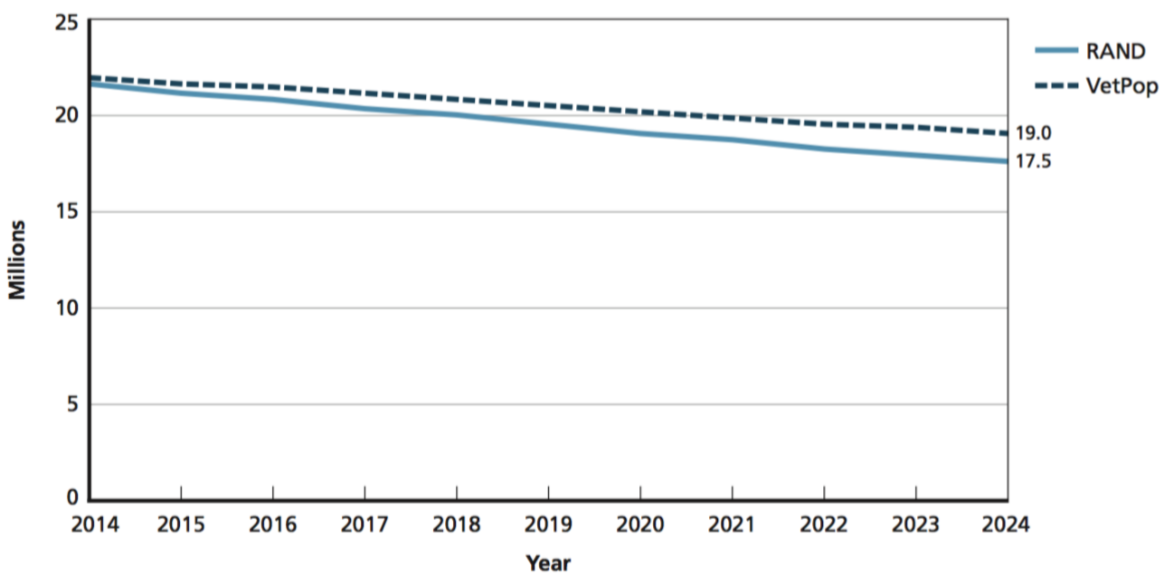
[6] Overview, Veteran Population Projection Model 2016 (https://www.va.gov/vetdata/docs/Demographics/New_Vetpop_Model/Vetpop16_Overview.pdf).

(either in the other branches, or while in the reserves/National Guard). This exclusion is based on the need for consistency with the way ACS measures veterans, as well as the requirement for active duty in order to qualify for VA access. We do not know whether VetPop model similarly excludes reserve and National Guard personnel that are no longer active. Unlike the VetPop model, our model does not derive geography-based separation rates, but rather geographically distributes new veterans according to the veteran age, sex, race/ethnicity, and service era distribution observed in the country at the time.

Finally, VetPop model estimates migration at the county level using historical data from the Internal Revenue Service (IRS), VA, and the ACS. Predictive migration models are developed for various five-age groups and sex cohorts. While we do not know more about the VetPop migration models, this is where our models likely differ most. Our migration models are based only on data from the ACS, but the gravity models we use to predict migration from 2014 through 2024 reflect a wider range of veteran characteristics: 15 age groups, sex, race/ethnicity, and service era—as well as distance and origin/destination population sizes. All of these characteristics were significant predictors of migration in our models. However, migration plays a relatively minor role in overall population distribution in our models. We do not know how significant the role of migration is in the VetPop model.

Figure 6 compares our projections of the number of Veterans with those from VetPop2014. Despite the differences between VetPop2014 and our model, the 2014 and 2024 Veteran populations are relatively similar in size. In 2014, 21.9 million from the VetPop2014 model and 21.6 million from our model. In 2024, 19 and 17.5 million, respectively. Sex composition is also similar in both models: 11 percent female.

Figure 6. Comparison of projections of veteran population from RAND estimates and the 2014 VetPop model, 2014–2024



Source: RAND analysis of census, ACS, VA, and DoD data. 2014 VetPop model.

However, there are differences in terms of race/ethnic composition of the Veteran population (Table 5). VetPop2014 predicts slightly higher percentages of black and Hispanic Veterans, while we predict higher percentages of white and Asian Veterans. This is most likely a result of our differing mortality rates: white and Asian veterans have lower mortality rates than black and Hispanic veterans in our model, consistent with national mortality rates.

Table 5. Projected race/ethnicity percentage distribution of veteran population, 2024

Race/ethnicity	Our estimates	2014 VetPop model
White	75.8	73.4
Black	12.7	13.9
Hispanic	7.3	8.6
Asian	2.3	1.8
Other	1.9	2.3
Total (population size)	**100.0 (19,000,000)**	**100.0 (17,500,000)**

Source: RAND analysis of census, ACS, VA, and DoD data. 2014 VetPop model.

As the Veteran population is projected to grow more diverse over time, we suggest that the VetPop model considers race/ethnicity differences in mortality rates. We also encourage detailed methodological documentation of the VetPop model to provide transparency regarding the assumptions and methodology used for VA's projections.

Final considerations

The population of U.S. veterans will decrease by 19 percent between 2014 and 2024. The veteran population has been decreasing for more than three decades, and this trend will continue. According to the U.S. Census, in 1970, there were 28.1 million veterans; in 1990, there were 27.5 million veterans. We estimate that there were 21.6 million veterans in 2014. Our projections, drawing on census, ACS, and DoD data, show that the veteran population will decline to 17.5 million by 2024. These results are related to declines in the size of the total military end-strength since the 1980s. The large cohorts that served prior to the all-volunteer military in 1973 are aging and dying off. The newer veterans entering the system reflect smaller, all-volunteer service eras.

Vietnam veterans will no longer constitute the largest service era by 2024. The share of Vietnam-era veterans (1964–1975), currently the largest service era, will decline slightly from 31 percent of the veteran population in 2014 to 29 percent by 2024. Pre-Vietnam-era veterans constituted 27 percent of the total veteran population in 2014, but by 2024, their share is projected to fall to 13 percent. The proportion of veterans from the Gulf War and post-9/11 eras will grow from 27 percent in 2014 to 42 percent of the total veteran population by 2024. Post-9/11 veterans alone will account for 24 percent of veterans in 2024.

One consequence of the declining service era replacement is that the age composition among veterans will shift slightly between 2014 and 2024. Veterans will become somewhat older on average. This is particularly pronounced for female veterans. Middle-age veterans will decline in share. Veterans aged 40–64 will decline from 40 percent to 37 percent of the veteran population, while the share of older veterans will increase.

Another consequence of the changing cohort composition will be that the race/ethnicity mix of the veteran population will change modestly. The proportion of veterans who are non-Hispanic white will decline slightly from 80 percent in 2014 to 76 percent by 2024, while all other race/ethnic groups will see slight increases in proportion (with the largest gain among Hispanics).

Another consequence of the changing cohort composition will be that the veteran population will shift away from the largest cities of the Ohio River Valley region, while becoming more concentrated in the major urban centers in other regions. However, migration is less frequent among veterans than non-veterans and will not play a substantial role in the geographic distribution of veterans between 2014 and 2024. While migration rates vary with a range of demographic characteristics, the overall trend is one of slow decline in migration rates generally.

Despite the decline of the veteran population over time, the 2024 geographic distribution will not be drastically different from the current distribution, and we do not project that overall distance to existing VA facilities will increase substantially. The existing CBOC coverage puts almost all veterans (92 percent) within 40 miles of some type of VA facility in 2024.

Annex 1

Table 2. Coefficients and robust standard errors estimated with Zero-inflated Poisson regression models for number of migrants as the dependent variable, 2009–2013

Independent variables	**In-migration model**	**Out-migration model**
Constant	-2.25	-1.80
	(0.02)	(0.01)
Age group		
17–19 years	1.06	1.89
	(0.08)	(0.08)
20–24 years	0.57	0.46
	(0.02)	(0.02)
25–29 years	ref.	ref.
30–34 years	0.17	0.22
	(0.02)	(0.02)
35–39 years	0.24	0.26
	(0.02)	(0.02)
40–44 years	0.24	0.30
	(0.02)	(0.02)
45–49 years	0.32	0.33
	(0.02)	(0.02)
50–54 years	0.25	0.27
	(0.02)	(0.02)
55–59 years	0.76	0.76
	(0.03)	(0.03)
60–64 years	-0.18	0.14
	(0.04)	(0.03)
65–69 years	0.07^{+}	0.28
	(0.04)	(0.03)
70–74 years	0.77	0.78
	(0.04)	(0.04)
75–79 years	1.41	1.31
	(0.05)	(0.04)
80–84 years	2.05	1.81
	(0.05)	(0.05)
85+ years	2.09	1.98
	(0.06)	(0.06)
Sex		
Female	ref.	ref.
Male	-1.17	-1.32
	(0.01)	(0.01)

(continue)

Independent variables	In-migration model	Out-migration model
Race/ethnicity		
White	ref.	ref.
Black	0.69	0.75
	(0.01)	(0.01)
Hispanic	0.29	0.34
	(0.01)	(0.01)
Asian	0.82	1.19
	(0.03)	(0.02)
Other	1.72	1.97
	(0.02)	(0.02)
Service era		
Post-9/11	ref.	ref.
Gulf War	-0.31	-0.26
	(0.02)	(0.02)
Peacetime Post-Vietnam	-0.93	-0.87
	(0.02)	(0.02)
Vietnam	-2.01	-1.84
	(0.03)	(0.03)
Peacetime Pre-Vietnam	-2.24	-2.03
	(0.04)	(0.04)
Korean War	-3.24	-2.84
	(0.05)	(0.05)
Pre-1950	-3.75	-3.36
	(0.06)	(0.06)
Squared distance	-0.000000022	-0.000000012
	(0.000000002)	(0.000000002)
Population in origin at the beginning of period	0.000963 (0.00002)	
Population in destination at the end of period		-0.000004^{ns} (0.00002)
Exposure variable	Pop. in destination at the end of period	Pop. in origin at the beginning of period
Inflate model		
Constant	-31.38	-33.88
	(0.00)	(0.00)
Indicator of cells without migrants	62.55 (0.00)	67.48 (0.00)
Non-zero observations	776,082	776,082
Zero observations	2,133,534	1,132,194
Total observations	2,909,616	1,908,276

^{ns} Non-significant.

$^{+}$ Coefficient significant at p<0.1. All other coefficients are significant at p<0.01.

Note: Robust standard errors are reported in parentheses.

Source: 2009–2013 ACS five-year estimates.

Table 3. Percentage distribution of veterans by sex, service era, age group, and race/ethnicity, 2014–2024

Variables	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Age group											
17–29 years	3.38	3.34	3.27	3.19	3.10	3.00	2.90	2.84	2.81	2.81	2.82
30–39 years	8.49	8.61	8.73	8.79	8.86	8.91	8.91	8.86	8.77	8.66	8.59
40–49 years	12.67	12.36	12.16	12.05	11.94	11.85	11.77	11.68	11.71	11.87	12.06
50–64 years	26.82	26.02	25.59	25.42	25.26	25.37	25.48	25.55	25.47	25.26	25.05
65+ years	48.63	49.67	50.25	50.55	50.83	50.86	50.94	51.08	51.24	51.40	51.48
Sex											
Female	8.38	8.58	8.78	8.99	9.20	9.42	9.65	9.88	10.11	10.35	10.60
Male	91.62	91.42	91.22	91.01	90.8	90.58	90.35	90.12	89.89	89.65	89.40
Race/ethnicity											
White	79.58	79.22	78.85	78.48	78.11	77.74	77.36	76.98	76.6	76.21	75.82
Black	11.46	11.58	11.71	11.83	11.95	12.07	12.19	12.32	12.43	12.55	12.67
Hispanic	5.84	5.98	6.12	6.26	6.41	6.55	6.70	6.84	6.99	7.14	7.30
Asian	1.80	1.84	1.89	1.93	1.98	2.02	2.07	2.12	2.17	2.22	2.27
Other	1.32	1.38	1.44	1.50	1.56	1.62	1.68	1.74	1.81	1.87	1.94
Service era											
Post-9/11	11.93	13.11	14.25	15.41	16.59	17.79	19.03	20.3	21.60	22.93	24.30
Gulf War	15.03	15.24	15.46	15.68	15.91	16.14	16.37	16.59	16.82	17.04	17.25
Peacetime Post-Vietnam	15.14	15.31	15.5	15.68	15.86	16.05	16.22	16.4	16.56	16.72	16.86
Vietnam	31.21	31.17	31.13	31.04	30.92	30.75	30.53	30.26	29.91	29.49	28.99
Peacetime Pre-Vietnam	9.82	9.63	9.42	9.18	8.91	8.60	8.26	7.88	7.47	7.01	6.52
Korean War	9.27	8.72	8.14	7.55	6.95	6.35	5.74	5.15	4.60	4.10	3.66
Pre-1950	7.59	6.81	6.10	5.45	4.86	4.32	3.85	3.42	3.05	2.71	2.42
Population size	**21,579,290**	**21,179,305**	**20,763,195**	**20,346,285**	**19,928,403**	**19,511,393**	**19,097,747**	**18,689,523**	**18,287,262**	**17,888,878**	**17,494,154**

Source: RAND analysis of census, ACS, VA, and DoD data.

References

Anderson, JE, and E Van Wincoop. 2003. "Gravity with gravitas: A solution to the border puzzle." *The American Economic Review* 93 (1):170-192.

Benetsky, M. J., and A. Fields. 2015. "Millennial migration: How has the Great Recession affected the migration of a cohort as it came of age?" *U.S. Census Bureau, SEHSD Working Paper* 2015-1.

Carter, Philip. 2013. "The Vets we reject and ignore." *The New York Times*, November 10, 2013. http://www.nytimes.com/2013/11/11/opinion/the-vets-we-reject-and-ignore.html?_r=1.

Census. 2014. Census data 2010. Washington, DC.

Cowper, D. C., and C. F. Jr. Longino. 1992. "Veteran interstate migration and VA health service use." *The Gerontologist* 32 (1):44-50.

de Haas, H. 2007. *The myth of invasion: Irregular migration from West Africa to the Maghreb and the European Union*. Oxford: International Migration Institute, University of Oxford.

de Haas, H. 2009. "Migration transitions A theoretical and empirical inquiry into the developmental drivers of international migration." International Population Conference, Marrakech.

Eibner, Christine, Heather Krull, Kristine Brown, Matthew Cefalu, Andrew W. Mulcahy, Michael Pollard, Kanaka Shetty, David M. Adamson, Ernesto F. L. Amaral, Philip Armour, Trinidad Beleche, Olena Bogdan, Jaime L. Hastings, Kandice A. Kapinos, Amii M. Kress, Joshua Mendelsohn, Rachel Ross, Carolyn M. Rutter, Robin M. Weinick, Dulani Woods, Susan D. Hosek, and Carrie M. Farmer. 2015. Current and Projected Characteristics and Unique Health Care Needs of the Patient Population Served by the Department of Veterans Affairs. Santa Monica: RAND Corporation.

Greenwood, M. J., G. L. Hunt, D. S. Rickman, and G. I. Treyz. 1991. "Migration, regional equilibrium, and the estimation of compensating differentials." *The American Economic Review* 81 (5):1382-1390. doi: 10.2307/2006927.

Head, K. 2000. "Gravity for beginners." Rethinking the Line: The Canada-U.S. Border Conference, Vancouver, British Columbia.

Holder, K. 2014. "Employment status and occupations of Gulf War-Era Veterans." *American Community Survey Briefs* 13-22.

Lee, E. S. 1966. "A theory of migration." *Demography* 3 (1):47-57. doi: 10.2307/2060063.

Lee, J. H., and J. B. Beckhusen. 2012. Veterans' racial and ethnic composition and place of birth: 2011. In *American Community Survey Briefs*.

Lowry, I. S. 1966. *Migration and metropolitan growth: Two analytical models*. San Francisco: Chandler Pub. Co.

Mateyka, P. 2012. "Who's dissatisfied? Race and ethnic differences in residential dissatisfaction and migration, 2010–2011." *U.S. Census Bureau, SEHSD Working Paper Number* 2015-2.

McDowell, C., and A. de Haan. 1997. "Migration and sustainable livelihoods: A critical review of the literature." *Institute of Development Studies (IDS) Working Paper* 65.

McGeary, M., M. A. Ford, S. R. McCutchen, and D. K. Barnes. 2007. *A 21st century system for evaluating Veterans for disability benefits*. Washington, DC: Board on Military and Veterans Health, Institute of Medicine.

NCVAS. 2011. America's women Veterans: Military service history and VA benefit utilization statistics. edited by National Center for Veterans Analysis and Statistics. Washington, DC.

NCVAS. 2014a. 2012 minority Veterans report. edited by National Center for Veterans Analysis and Statistics. Washington, DC.

NCVAS. 2014b. Profile of Veterans 2012. edited by National Center for Veterans Analysis and Statistics. Washington, DC.

Passaris, C. 1989. "Immigration and the evolution of economic theory." *International Migration* 27 (4):525-542. doi: 10.1111/j.1468-2435.1989.tb00469.x.

Philipps, Dave. 2013. "Disposable: Surge in discharges includes wounded soldiers." *The Gazette*, May 19, 2013.

Preston, S. H., P. Heuveline, and M. Guillot. 2001. *Demography: Measuring and modeling population processes*. Malden: Blackwell Publishers, Inc.

Pöyhönen, P. 1963. "A tentative model for the volume of trade between countries." *Weltwirtschaftliches Archives* 90:93-100. doi: 10.2307/40436776.

Ravenstein, E. G. 1885. "The laws of migration." *Journal of the Statistical Society of London* 48 (2):167-235. doi: 10.2307/2979181.

Ravenstein, E. G. 1889. "The laws of migration." *Journal of the Royal Statistical Society* 52 (2):241-305. doi: 10.2307/2979333.

Raymer, J., and A. Rogers. 2007. "Using age and spatial flow structures in the indirect estimation of migration streams." *Demography* 44 (2):199-223.

Richardson, C., and J. Waldrop. 2003. *Veterans: 2000. Census 2000 Brief*. Washington, DC: U.S. Census Bureau.

Stillwell, J. 2009. "Inter-regional migration modelling: A review." In *Migration and Human Capital*, edited by Jacques Poot, Brigitte Waldorf and Leo van Wissen, 29-48. Cheltenham: Edward Elgar Publishing.

Tinbergen, J. 1962. *Shaping the World Economy: Suggestions for an International Economic Policy*. New York: Twentieth Century Fund.

USDA. 2016a. Rural-urban commuting area codes. Washington, DC: U.S. Department of Agriculture (USDA), Economic Research Service.

USDA. 2016b. Rural-urban continuum codes. Washington, DC: U.S. Department of Agriculture (USDA), Economic Research Service.

USGAO. 2009. VA health care: Preliminary findings on VA's provision of health care services to women Veterans. Washington, DC: U.S. Government Accountability Office.

Wicker, Tom. 1991. "In the nation: Ghosts of Vietnam." *The New York Times*, January 26, 1991. http://www.nytimes.com/1991/01/26/opinion/in-the-nation-ghosts-of-vietnam.html.