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# Food Insecurity Among Working-Age Veterans

Matthew P. Rabbitt and Michael D. Smith





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# Food Insecurity Among Working-Age Veterans

Matthew P. Rabbitt and Michael D. Smith

## Abstract

This report documents the extent and severity of food insecurity among working-age veterans, ages 18–64, who made up 76 percent of the United States' veteran population in 2019. Food insecurity occurs when individuals have limited or uncertain access to enough food because they lack economic resources. In 2015–19, 11.1 percent of working-age veterans lived in food-insecure households, and 5.3 percent lived in households with very low food security, the most severe range of food insecurity where households report reductions in food intake. Food insecurity varies among working-age veteran subpopulations defined by age, area of residence, disability status, educational attainment, gender, geographic region, household composition, income, labor force participation status, race and ethnicity, and military service history. The report compares food insecurity among working-age veterans and nonveterans to examine the association between military service and food insecurity. After adjusting for observable differences between working-age veterans and nonveterans, we find veterans are 7.4 percent more likely to live in a food-insecure household.

**Keywords:** food insecurity, military service, poverty, veterans, well-being, working-age adults

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# Food Insecurity Among Working-Age Veterans

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## What Is the Issue?

Many veterans face challenges with mental and physical health and finding and maintaining employment after completing their military service. The U.S. Department of Veterans Affairs reports that 1.5 million veterans live in poverty, and their poverty rates are rising. Increasing poverty among veterans has profound implications for their food security and health since access to enough food for an active, healthy life is essential to maintaining well-being.

In 2019, 17.4 million veterans lived in the United States, of whom three-fourths were of working age (i.e., between the ages of 18 and 64). Veterans face many challenges to maintaining their health and well-being due to circumstances related to their military service and unique demographic composition. One of the fastest growing and youngest groups of veterans—those who served after September 11, 2001—is more likely to have a service-connected disability than veterans from other service periods. These factors suggest working-age veterans are vulnerable to issues with food insecurity. Understanding food insecurity among working-age veterans compared with working-age nonveterans can provide useful information for maintaining a healthy veteran population well into the future.

This report considers the substantial observable differences among veterans regarding food insecurity, examining their socioeconomic, demographic, and military characteristics.

## What Did the Study Find?

In 2015–19, 11.1 percent of working-age veterans lived in food-insecure households, and 5.3 percent lived in households with very low food security, meaning the food intake of some household members is reduced and normal eating patterns disrupted due to limited resources.



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Food insecurity among working-age veterans living in food-insecure households during 2015–19 differed by their most recent period and length of military service, educational attainment, metropolitan status, labor force participation status, disability status, and household composition.

- Food insecurity was more prevalent among working-age veterans who served between May 1975 and July 1990 (12.6 percent) than among those who served during the Pre-9/11 Gulf War (August 1990 to August 2001 [9.5 percent]) and Post-9/11 Gulf War (September 2001-present [10.7 percent]) eras. However, the rates were similar to working-age veterans of the Vietnam War era (12.5 percent). Food insecurity rates were similar for working-age veterans of the Pre- and Post-9/11 Gulf War eras, but rates were more prevalent among working-age Vietnam War era veterans compared with working-age veterans of the Pre-9/11 era.
- Food insecurity among working-age veterans declined with the number of periods of active duty military service.
- Food insecurity was higher among disabled (33.6 percent), unemployed (20.0 percent), and female (13.5 percent) working-age veterans.
- Food insecurity among working-age veterans declined with educational attainment.
- Food insecurity was higher among working-age veterans living in households in nonmetropolitan areas (13.9 percent) than metropolitan areas (10.6 percent) and in suburbs/exurbs and other metropolitan areas outside principal cities (8.7 percent).
- Before adjusting for observable differences in the characteristics of working-age veterans and nonveterans, we found that food insecurity was similar among working-age veterans (11.1 percent) and nonveterans (11.2 percent). The prevalence of very low food security was also similar between working-age veterans and nonveterans.
- After adjusting for observable differences in working-age veterans and nonveterans using regression analysis, we found that veterans have a 7.4-percent greater risk for food insecurity. The elevated risk is concentrated among veterans whose most recent period of military service was during the pre-9/11 Gulf War era (August 1990 to August 2001) and the interwar period between May 1975 and July 1990.

## How Was the Study Conducted?

The report used data from the 2005–19 Current Population Survey Food Security Supplement (CPS-FSS) to examine food insecurity among working-age veterans. We examined differences in food insecurity rates by several socioeconomic and demographic characteristics. For the first time, we included military characteristics from the most recent 5-year period (2015–19) to ensure adequate sample sizes for veteran subpopulations. Where possible, we compared veterans with nonveterans to provide additional context and to highlight the association between military service and food insecurity. Regression analysis was applied to data from 2005 to 2019 and adjusted for differences in veterans and nonveterans characteristics, which allowed a better understanding of the association between veteran status and food insecurity.

# Food Insecurity Among Working-Age Veterans

## Introduction

The U.S. Department of Agriculture (USDA) defines food security as access by all people at all times to enough food for an active, healthy life. As of 2019, 89.5 percent of all U.S. households were food secure (289 million people living in 116 million households) (Coleman-Jensen et al., 2020a). In 2019, 10.5 percent of all households experienced food insecurity at some point during the previous 12 months (35 million people living in 14 million households) (Coleman-Jensen et al., 2020a). Food insecurity occurs when people have limited or uncertain access to enough food because of a lack of economic resources. Alleviating food insecurity among the U.S. population is essential to maintaining the health and well-being of all, as food insecurity is associated with many negative health outcomes (Gregory and Coleman-Jensen, 2017; Gundersen et al., 2011; Seligman and Berkowitz, 2019).

Several socioeconomic and demographic characteristics are associated with food insecurity in the United States.<sup>1</sup> Coleman-Jensen et al. (2020a) described variation in the prevalence and severity of food insecurity by income, household structure, race and ethnicity, and geographic location. While most studies focus on food insecurity among the U.S. civilian population, the number of studies on food insecurity among U.S. veterans is rising for at least two reasons.

First, veterans are a subpopulation of interest for public policy in general and food and nutrition assistance programs in particular. Veterans are those who served in the U.S. Armed Forces and no longer serve on active duty, having left military service under conditions other than dishonorable (U.S. Department of Veterans Affairs, 2012). Long after their military service, veterans can face economic and employment challenges that may be partly ameliorated by USDA's food and nutrition assistance programs. In a recent survey of veterans, 27 percent reported experiencing challenges since their return to civilian life (Morin, 2011). This rate increased to 44 percent for veterans who served after September 11, 2001 (Morin, 2011). However, only 7 percent of veterans (1.3 million) are estimated to have participated in the USDA's largest food and nutrition assistance program, the Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp Program), between 2016 and 2018 (Keith-Jennings and Cai, 2020).

Second, a growing body of research finds that veterans are different in important ways from the civilian population. Veterans receive extensive training due to their military service. These investments in human capital—through military training and formal education—can affect their earnings, which in turn can affect their food insecurity. The socioeconomic effects of serving in the military have been studied often (Angrist and Krueger, 1994; Kleykamp, 2013; Teachman and Tedrow, 2004; Teachman, 2011). However, much of the evidence is mixed. Food insecurity among veterans may also be affected by a service-connected disability that affects their ability to work in the civilian labor force. In August 2019, 25 percent of veterans (4.7 million) had a service-connected disability, and the labor force participation rate for these veterans was 47.5 percent (U.S. Bureau of Labor Statistics, 2020). It is important to examine evidence concerning veterans with disabilities that create health and work challenges that are more severe or in greater proportion than found in the nonveteran population (Bedard and Deschênes, 2006; Buckman et al., 2011; Coleman-Jensen and Nord, 2013; Dobkin and Shabani, 2009; MacLean and Elder, 2007; London and Wilmoth, 2006).

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<sup>1</sup>For a review of the determinants of food insecurity, see Gundersen et al. (2011).



This report examines food insecurity among veterans between the ages of 18 and 64 using nationally representative data from the Current Population Survey Food Security Supplement (CPS-FSS). We focused on working-age veterans for several reasons:

- Three-fourths (75.7 percent) of veterans were of working age in 2019 (U.S. Bureau of the Census, 2020), and working-age veterans are projected to remain the largest age group of veterans until 2031 (National Center for Veterans Analysis and Statistics, 2019). Therefore, report findings will likely influence the understanding of food insecurity among veterans well into the future.
- Working-age veterans have the highest labor force participation rates and have higher unemployment rates compared with elderly veterans. In 2019, working-age veterans had the highest labor force participation rates and represented the majority of unemployed veterans (U.S. Bureau of Labor Statistics, 2020).
- Working-age veterans are more demographically diverse than elderly veterans, with greater shares of women and minorities (Farrigan and Cromartie, 2013; Farrigan, 2017).
- Working-age veterans are more likely to live in urban areas compared with elderly veterans, who are more likely to live in rural areas (Farrigan and Cromartie, 2013; Farrigan, 2017).
- Working-age veterans are more likely to be uninsured and receiving compensation for a service-connected disability and less likely to use the U.S. Department of Veterans Affairs (VA) health care system than elderly veterans (Holder and Day, 2017; U.S. Office of Data Governance and Analytics, 2020).

Together, these factors suggest working-age veterans are more vulnerable to food insecurity than elderly veterans. This report is the first to consider veterans as a distinct subpopulation with considerable heterogeneity indicated by their demographic and socioeconomic characteristics.

We introduce two military service characteristics into the analysis of food insecurity that capture differences among veterans' experiences while serving in the U.S. Armed Forces. First, veterans differ in terms of their most recent period of military service. Some veterans near the upper limit of the age range served in the Vietnam War, while others served in the pre-9/11 Gulf War era (August 1990 to August 2001) or post-9/11 Gulf War era (September 2001 to present). Second, the number of military service periods (when a veteran served in the U.S. Armed Forces) can differ across veterans. These differences in military service histories may contribute to differences in veterans' food insecurity.

Prior research showed that younger veterans were more likely than their older peers to be food-insecure (Miller et al., 2015). However, limited information is available on individual-level differences in food insecurity among veterans and how their food insecurity changed over time based on nationally representative data.<sup>2</sup> We documented the extent and severity of food insecurity among veterans through descriptive analyses similar to those presented in the USDA's annual food security report. We provided detailed food insecurity

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<sup>2</sup>Miller et al. (2015) also examines differences in food insecurity among veterans based on their most recent period of military service; however, this article defines veteran status for the household rather than examining differences in veterans' food security at the individual level. This report examines differences in veterans' food insecurity at the individual level, allowing careful alignment of veterans' individual characteristics, such as their military service history, with their household's food insecurity status. This is particularly important for households with multiple veterans, where military service histories may vary among individual veterans. Between 2005 and 2019, 10.4 percent of veterans between the ages of 18 and 64 lived in a household with at least one other veteran. It is also noteworthy that this rate increases from 7.7 percent in 2005 to 13.4 percent in 2019. Moreover, unlike Miller et al. (2015), this report uses the food insecurity status of adults rather than the household because it more closely aligns with food insecurity among veterans in a household and increases the comparability of food insecurity rates for veterans living in households with and without children.

prevalence estimates for veteran subpopulations—defined by individual- and household-level socioeconomic and demographic characteristics—using data from the most recent 5-year period (2015–19).

We also used regression analyses to estimate the association between food insecurity and veteran status while holding the socioeconomic and demographic characteristics of veterans and nonveterans (and their households) constant. Using regression is important because although veterans represent approximately 7 percent of the U.S. adult population (U.S. Bureau of the Census, 2019), their socioeconomic and demographic characteristics differ substantially from those of nonveterans. For example, 90 percent of veterans are male, while 55 percent of nonveterans are female (U.S. Bureau of the Census, 2019). Regression analyses held these characteristics constant because many are also related to food insecurity. Therefore, we obtained an estimate of the association between food insecurity and veteran status that more closely reflects the influence of military service on food insecurity.

The food-insecurity statistics in this report represent the most detailed nationally representative information on food insecurity among veterans to date, allowing for better targeting of food and nutrition assistance interventions for veterans. This information may also be useful to healthcare providers at VA facilities who treat veterans suffering from health conditions that can be exacerbated by food insecurity.

# Factors Associated with Food Insecurity Among Veterans

Previous research on the socioeconomic and health effects of military service and the potential causes of food insecurity among veterans point to two mechanisms for food insecurity among veterans. First, military service affects earnings and educational attainment. Second, military service increases the likelihood of poor health and disability and corresponding medical expenses. These factors are associated with a higher likelihood of economic hardship and food insecurity (Coleman-Jensen and Nord, 2013; Gregory and Coleman-Jensen, 2017; Gundersen et al., 2011).

## The Association Between Military Service and Earnings and Human Capital

The effects of military service are complex, often depending on the individual's demographic characteristics (i.e., gender, birth cohort, and race and ethnicity) but also their service era and the characteristics of an individual's occupation while in the military, combat exposure, and departure from military service (Angrist, 1990; Angrist and Krueger, 1994; Tamborini et al., 2019; Teachman and Tedrow, 2007; Wilmoth and London, 2013).

Research suggests that service era, race, and ethnicity are significant in determining the effect of military service on future earnings.<sup>3</sup> Veterans of World War II and the Korean War earned more after leaving military service than nonveterans (Fredland and Little,<sup>4</sup> 1985; MacLean and Elder 2007). However, the earnings of White veteran men from the Vietnam War were lower than comparable nonveterans (Angrist, 1990; Angrist et al., 2011).

Results were mixed regarding the effect of military service on employment outcomes for the all-volunteer force (AVF) era, which began after the draft was withdrawn in 1973 (Kleykamp, 2013; Tamborini et al., 2019; Teachman and Tedrow, 2007). For these veterans, race plays a critical role. Military service in the AVF era decreased the civilian incomes of White veteran men, compared with similar nonveterans (Angrist, 1998; Teachman and Tedrow, 2007). However, military service in the AVF era increased the earnings and human capital of non-White veterans, compared with similar nonveterans (Angrist, 1998; Greenberg et al., 2007; Kleykamp, 2013; Sampson and Laub, 1996; Teachman and Tedrow, 2007; Teachman, 2007).

One reason for improved outcomes for non-White veterans is that military service may provide people from disadvantaged backgrounds with expanded social networks and occupational skills at a crucial time in their life (Kleykamp, 2013; Sampson and Laub, 1996; Teachman and Tedrow, 2004; 2007; Tamborini et al., 2019). However, male veterans who left active duty service after September 2001 had higher unemployment and lower labor force participation rates than comparable nonveterans (Congressional Budget Office, 2017). Higher unemployment among younger veterans can stem from limited work experience outside their military service, a mismatch of skills among available jobs—which can lead to job dissatisfaction and turnover—the time needed to search for a new job, poor health, or discrimination and uncooperativeness by employers toward veterans with disabilities (Congressional Budget Office, 2017; Loughran, 2008; Maury et al., 2014; National Research Council, 2013; Stern, 2017).

Research also found that race and ethnicity and service era influenced veterans' human capital investment decisions following their military service. Stanley (2003) showed the G.I. Bill increased the level of education

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<sup>3</sup>Military service periods can reflect differences in recruitment and selection processes and attitudes toward hiring veterans (MacLean and Kleykamp, 2016; Tamborini et al., 2019).

<sup>4</sup>However, later research found that these income premiums may have been driven primarily by the selection process into military service (Angrist and Krueger, 1994; Teachman and Tedrow, 2004; Teachman, 2011).

World War II veterans obtained. In particular, the G.I. Bill had a positive impact on the educational attainment of White and Black veterans born outside of the South but little impact on Black veterans born in the South (Turner and Bound, 2003). However, White veterans of the AVF era received less education than comparable White nonveterans (Cohen et al., 1995; Teachman, 2007). Conversely, military service increased educational attainment for non-White veterans from disadvantaged backgrounds (Teachman, 2005, 2007). This is primarily due to the financial assistance the Federal Government provides veterans toward education-related expenses such as the Servicemen's Readjustment Act of 1944 (G.I. Bill) and the Post-9/11 Veterans Educational Assistance Act of 2008 (Tamborini et al., 2019).<sup>5</sup>

Individuals with lower socioeconomic status are more likely to experience food insecurity (Coleman-Jensen et al., 2020a) due to lower earnings and investments in human capital.

## The Association Between Military Service and Poor Health and Disability

Military service might have different kinds of effects on health. The screening process that selects veterans into military service suggests they should be healthier than nonveterans (Teachman and Tedrow, 2013). Random drug screening and practices institutionalized by the military in the 1980s reduced drug use among veterans across their lives compared to nonveterans (Miech et al., 2013). However, military service may directly alter health and mental health or lead to changes in behaviors that affect health at a subsequent time (Teachman, 2011). For example, the use of tobacco and alcohol learned in the military may negate any positive selection effects (Teachman and Tedrow, 2013). The health effects of military service also vary by gender. Wilmoth et al. (2011) found female veterans had an increased risk of experiencing a work-limiting disability than comparable male veterans.

Veterans (especially those who experienced combat) had a higher likelihood of experiencing poor health and a work-limiting disability than comparable nonveterans (Bedard and Deschênes, 2006; Black et al., 2004; Heflin et al., 2012; MacLean and Elder, 2007; Teachman, 2011). This can place them at a disadvantage in the civilian labor market (MacLean, 2010). Veterans who were exposed to combat are more likely to be disabled and unemployed throughout their work life than veterans who did not serve in combat (MacLean, 2010). However, Wilmoth et al. (2010) found that male veterans reported better health around the retirement age of 66 relative to comparable nonveteran men but experienced greater age-related changes in their health as they age. Similarly, London and Wilmoth (2006) found younger veterans reported better health than nonveterans but had higher mortality rates later in life. Dobkin and Shabani (2009) found that Vietnam veterans had more activity limitations and reported worse health than comparable nonveterans, and their health deteriorated more quickly as they grew older.

Combat exposure is associated with negative health effects, such as Post-Traumatic Stress Disorder (PTSD), for every military-service era (Dobkin and Shabani, 2009; Jacobson et al., 2008). Military service is also associated with an increased likelihood of tobacco use (London et al., 2017) and higher rates of binge drinking and substance abuse in later life (London et al., 2020). Increased tobacco use resulted in an increased likelihood of lung cancer and heart disease among World War II and Korean War veterans (Bedard and Deschênes, 2006). Veterans in transition from active duty to less active civilian lifestyles are at greater risk of being overweight and obese (Smith et al., 2009; Teachman and Tedrow, 2013) and poor diets (Dong et al., 2019). Military service is associated with lower Healthy Eating Index scores—a measure of how well diets align with key Federal recommendations developed by USDA and the National Cancer Institute—for overall diet quality (Dong et al., 2019). In 2017, around 40 percent of veterans who served after September 2001 reported having a service-related disability, which is associated with lower labor force participation rates than those without a disability (Congressional Budget Office 2017).

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<sup>5</sup>For a detailed overview of the changes to the G.I. Bill from 1944 to 2009, see Bennett and McDonald (2013).

Research suggested that poor health and the presence of a disability increase medical expenses and the likelihood of experiencing food insecurity (Brucker and Coleman-Jensen, 2017; Coleman-Jensen and Nord, 2013; Heflin et al., 2019). If military service is associated with these characteristics, then we hypothesized that military service is associated with an increased likelihood of food insecurity among veterans.

# Food Insecurity and Food Assistance Program Receipt Among Veterans

Examining the prevalence and determinates of food insecurity among veterans is crucial since veterans make up about 7 percent of the U.S. population, a nontrivial portion (U.S. Bureau of the Census, 2019). Veterans also have a unique gender composition in that about 90 percent are male (U.S. Bureau of the Census, 2019). Given that food insecurity is a risk factor for poor health outcomes (Berkowitz et al., 2014; Berkowitz et al., 2014; Gregory and Coleman-Jensen, 2017; Gundersen and Ziliak, 2015; Berkowitz et al., 2017), knowledge of the prevalence and determinants of food insecurity among veterans may help manage veteran health and develop appropriate public health interventions for the broader U.S. population.

Prior research generated a range of estimates of the prevalence of food insecurity among veterans. Appendix, table A1 provides an overview and summarizes previous studies. Differences are primarily driven by the methodology used to sample veterans. Studies that rely on samples of veterans using Veterans Affairs (VA) healthcare services (Narain et al., 2018; Wang et al., 2015; Widome et al. 2014) generate estimates of the prevalence of food insecurity nearly four times higher than estimates that used representative samples of the larger veteran population (Brostow et al., 2017; Pooler et al., 2018; Miller et al., 2015; Wilmoth et al., 2015). This is particularly problematic for studies of veterans' food insecurity because veterans who use VA healthcare services are disproportionately disadvantaged (Wilmoth and London, 2020) and have an increased risk of mortality (Landes et al., 2018).

A wide array of public and private food and nutrition assistance programs designed to alleviate food insecurity is available to veterans. The main source of assistance is USDA's Supplemental Nutrition Assistance Program (SNAP, formerly the Food Stamp Program). For 2016–18, an annual average of almost 1.3 million veterans lived in households that participated in SNAP at some point during the previous year (Keith-Jennings and Cai, 2020). However, veterans participated in SNAP at a considerably lower rate (7.1 percent for veterans whose service was recent and 6.5 percent for long-term veterans) than the rate (approximately 15 percent) in the general population (London and Heflin, 2015). Veterans who participated in SNAP tended to be younger, less educated, or unemployed (London and Heflin, 2015). A large network of private and semi-private food assistance programs is available through local food banks, pantries, and shelters. However, Weinfeld et al. (2014) found that only about 20 percent of low-income households that received help through charitable food and nutrition assistance programs included a veteran.

Veterans are also eligible for VA disability benefits that can affect food insecurity. The Disability Compensation (DC) Program offers veterans a monthly tax-free payment if they were injured during military service. Benefits are scaled based on the degree of disability, which ranges from 0 percent to 100 percent in increments of 10 percent. Qualifying injuries include physical and mental illnesses developed before, during, or after military service. Disabled veterans are not precluded from receiving SNAP benefits. Veterans are considered disabled under SNAP rules if they received benefits based on a 100-percent disability rating (Carlson et al., 2017). Most veterans receiving DC benefits have a work-limiting disability but are not paid for a total disability (U.S. Department of Veterans Affairs, 2020). Under SNAP rules, a veteran's disability benefit is factored into the veteran's SNAP unit's income when determining eligibility for program benefits based on net and gross income.

A few veteran food insecurity pilot studies were conducted over the last few years. In 2015, a screening program was piloted in six VA primary care clinics for homeless and formerly homeless veterans (O'Toole et al., 2017). Among 270 veterans sampled, 48.5 percent reported experiencing food insecurity in the previous 3 months; 22 percent relied on soup kitchens and food pantries; and 47.3 percent received SNAP benefits. Veterans experiencing food insecurity were referred to social workers who helped them find supplemental

food sources. Screenings for food insecurity among patients in clinical settings were well received by patients and health care providers. The VA has since integrated a food insecurity screener into its health record reminder system to increase provider awareness of veterans' food insecurity (Cohen et al., 2020).

The Reaching Rural Veterans (RRV) pilot program sought to connect food-insecure rural, low-income veterans with additional resources. Five rural food pantries in Indiana and Kentucky were trained in cultural competence and held monthly outreach events to offer food and services to low-income veterans. Wright et al. (2018) evaluated the RRV program and found the likelihood of veteran households experiencing food insecurity decreased, as did their enrollment in public assistance programs such as the Temporary Assistance for Needy Families (TANF) and Supplemental Security Income (SSI).

## Data Sources

This report uses data from the 2005–19 Current Population Survey Food Security Supplement (CPS-FSS) to examine food insecurity among veterans and nonveterans ages 18 to 64. Each month, the CPS collects nationally representative information on the labor force participation status of U.S. households. Additional information on a variety of topics is collected as monthly supplements to CPS, with the Food Security Supplement fielded each December since 2001.<sup>6</sup> The CPS-FSS includes roughly 40,000 households each year and represents the State and national levels of the civilian, noninstitutionalized population. Each year the USDA releases official food-insecurity statistics for the U.S. population using the CPS-FSS in its annual Household Food Security in the United States report. For the most recent report, see Coleman-Jensen et al. (2020a).

### Assigning Food Security Status to Households and Adult Members

The majority of the USDA’s food-insecurity statistics are for households. Here, the focus is to explore differences in food insecurity among individual veterans and comparing their food insecurity with other individual nonveterans.<sup>7</sup> Food insecurity is measured using responses to a series of questions about food hardships households typically experience when they have difficulty acquiring adequate food. Each question asks whether food hardships occurred during the previous 12 months and specifies a lack of money or other resources for food as the cause of the hardship. The series includes 10 questions about food hardships of the household as a whole and the food intake of adults in the household. An additional eight questions about children’s food intake and eating patterns are included if children are present. But, to ensure individual veterans’ food security is comparable to households with and without children, child-related responses are not considered (table 1). Focusing on adult food insecurity is more closely aligned with the food insecurity of individual veterans.

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<sup>6</sup>The Food Security Supplement was fielded in several different months between 1995 and 2001.

<sup>7</sup>The Household Food Security Survey Module (HFSSM) is designed to measure food insecurity at the household level. While it is informative to examine persons living in food-insecure households, these statistics should be interpreted carefully. Within a food-insecure household, each household member may be affected differently by the household’s food insecurity. Some members (usually young children) may experience only mild effects or none at all, while adults are more severely affected. It is more precise to describe these statistics as representing “persons living in food-insecure households” rather than as representing “food-insecure persons.”



Table 1

**Assessing the food security of adults in the Current Population Survey Food Security Supplement**

		Food security status	Raw score	Rasch score	Food security survey module questions
		Increasing severity of adult food insecurity	Food secure	High food security	0
Marginal food security	1			1.72	We worried whether our food would run out before we got money to buy more.
	2			3.10	The food that we bought just didn't last and we didn't have money to get more.
Food-insecure			3	4.23	We couldn't afford to eat balanced meals.
	Low food security		4	5.23	In the last 12 months, did you or other adults in the household ever cut the size of your meals?
			5	6.16	How often did this happen?
			6	7.07	In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?
	Very low food security		7	8.00	In the last 12 months, were you ever hungry, but didn't eat because there wasn't enough money for food?
			8	8.98	In the last 12 months, did you lose weight because there wasn't enough money for food?
			9	10.15	In the last 12 months, did you or other adults in your household ever not eat for a whole day because there wasn't enough money for food?
	10	11.05	How often did this happen?		

Notes: Raw score = the count of affirmative responses to food insecurity questions. Affirmative responses to the food insecurity questions are "often," "sometimes," "almost every month," "some months but not every month," or "yes". Rasch score = Measures of the household's latent severity of adult food insecurity from the Rasch measurement model calculated using the household's responses to the food security questions. See Bickel et al. (2000) for more details on how the Rasch scores were calculated.

Source. USDA, Economic Research Service using data from the 2019 Current Population Survey Food Security Supplement.

The food security status of adults for each household is determined by the number of food hardships the respondent reports. Households are classified as food secure if they report two or fewer affirmative responses to food insecurity questions. Households are classified as food insecure if they report three or more affirmative responses to food insecurity questions.

Food-insecure households can be further classified as having either low food security or very low food security. Low food secure households reported three to five affirmative responses to food insecurity questions. Those with low food security reported worrying about food stocks, juggling the quantity of food consumed, and eating less nutritious foods. Households are classified as very low food secure if they report six or more affirmative responses to food insecurity questions. The category very low food security identifies households in which the food intake of one or more members was reduced and eating patterns were disrupted because of insufficient money and other resources (Coleman-Jensen et al., 2020a). For descriptive and regression analyses of food insecurity among veterans and nonveterans, we assigned individual veterans and individual nonveterans a status based on their household's adult food security.

## Determining the Veteran Status and Military Service Characteristics of Adults

In the monthly CPS, a household member reports veteran status for any household member age 17 or older in response to the question: "Did you (or he/she) ever serve on active duty in the U.S. Armed Forces?" Any adult is considered a veteran if they or the household respondent indicated that they previously served on active duty in the U.S. Armed Forces.

The CPS also asked when the household member served on active duty. The respondent can report up to four separate periods of military service for themselves or any other veteran in the household (see box, "Questions Used to Assess the Military Service History of Veterans in the CPS").

Reports of each veteran's military service history are used to construct variables indicating their most recent period of service and number of service periods. The former is a measure of the veteran's military service cohort and may capture specific effects related to their service while the latter is a measure of the veteran's military career, proxying for military tenure or potential eligibility for military retirement benefits.<sup>8</sup> The number of military service periods can span no more than four, due to data collection methods used in the CPS, spanning roughly 25 years of potential military service. Historically, an active duty service member was eligible for military retirement after completing 20 years of service (Congressional Research Service 2019).

For the regression analysis, we constructed an additional variable that captures the presence of an elderly veteran (age 65 or older) in the household. This allowed us to control for eligibility for veteran benefits among elderly veteran household members, which might bias the association between food insecurity and veteran status among young adults.

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<sup>8</sup>Between 2015 and 2019, the average age for a veteran in this sample with three or more periods of service was 55.

## Questions Used to Assess the Military Service History of Veterans in the Current Population Survey (CPS)

Veterans represent a diverse population distinguished by their periods of military service. In the CPS, veterans' military service history is measured using self or proxy reports to the question: "When did you (or he/she) serve?" Respondents are provided with the following options:

- September 2001 or later
- August 1990 to August 2001
- May 1975 to July 1990
- Vietnam Era (August 1964 to April 1975)
- February 1955 to July 1964
- Korean War (July 1950 to January 1955)
- World War II (December 1941 to December 1946)
- November 1941 or earlier

The respondent can report up to four periods of service for each veteran member.

While several periods of service occurred during periods of war, reports of service during a wartime period do not indicate combat service. This information is not available in the monthly CPS.

For this report, we grouped working-age veterans by the most recent period of service as follows:

Most recent period of service category	Reported periods of service
Post-9/11 Gulf War era	September 2001 or later
Pre-9/11 Gulf War era	August 1990 to August 2001
Vietnam War era	Vietnam era (August 1964 to April 1975)
Other service periods	May 1975 to July 1990

Periods of service before August 1964 were not considered because veterans from these periods were older than age 64 in 2015-19.

## Additional Explanatory Variables for Regression Analyses of Comparisons of Food Insecurity Between Veterans and Nonveterans

The monthly CPS also collects information on variables commonly considered as determinants of food insecurity. Economic, demographic, and geographic characteristics related to food insecurity are measured at the individual and household levels. Individual-level variables capture gender, age, race and ethnicity, immigration and citizenship status, and labor force participation status of individual veteran and nonveteran adults. The following variables are included in the regression analyses:

- whether the adult is female;
- age of the adult (and its square to account for the non-linear relationship between age and food insecurity);
- whether the adult is non-Hispanic White (reference group), non-Hispanic Black, non-Hispanic Other Race, or Hispanic;
- whether the adult is an immigrant or a non-citizen immigrant; and
- whether the adult is employed full time (reference group), employed part time, unemployed, retired, disabled, or not in the labor force.

Several variables captured the household's total income, homeownership status, labor force participation statuses of all other adults in the household, educational attainment of the highest educated adult, household composition, presence of an elderly member, number of adults and children, area of residence, and the State unemployment rate. Household-level variables follow:

- total household income relative to the Federal poverty line (and its square to account for the non-linear relationship between income and food insecurity);
- whether someone in the household owns or is currently purchasing their home;
- whether one or more adults in the household are employed full time; one or more adults are employed part time and no other adults employed full time; one or more other adults are disabled, and no other adults are employed; one or more adults are retired, and no other adults are employed or disabled; one or more adults are unemployed, and no other adults are employed, disabled, or retired; or no other adults are employed, unemployed, retired, or disabled;
- whether the highest educated adult has less than a high school diploma, a high school diploma or equivalent (reference group), some college or an associate degree, or a bachelor's degree or higher;
- whether the household consists of a married couple with children, a single male with children, a single female with children, or other types of households with children, multiple adults without children, a single male without children, or a single female without children;
- whether the household has at least one elderly member;
- number of adults and number of children in the household;
- whether the household is located in a principal city of a metropolitan area (reference group), suburban metropolitan area, unidentified metropolitan area, or a nonmetropolitan (rural) area; and
- the State unemployment rate.

State and year fixed effects are included in the regression analyses to control for underlying policy changes and shocks that are constant across States and change at a constant rate over time.

## Analysis Samples

Descriptive analyses pool the 2015–19 CPS-FSS to ensure adequate sample sizes. It included 13,852 veterans and 257,217 nonveteran adults between the ages of 18 and 64, living in 134,990 households. Separate descriptive analyses were completed for the veteran and nonveteran populations and weighted using the person weights calculated by the U.S. Bureau of the Census to indicate how many people were represented in each household that responded to the survey. All food insecurity statistics were calculated by applying CPS-FSS weights to responses by the surveyed households and are nationally representative. Unless otherwise noted, statistical differences described in the report are significant at the 90-percent confidence level or higher.<sup>9</sup>

The sample for regression analyses of veterans and nonveterans food insecurity initially consisted of 957,338 adults between the ages of 18 and 64 surveyed between 2005 and 2019. We restricted the sample to adults living in households with valid responses to the Household Food Security Survey Module (HFSSM, excluding 20,139 adults) and the veteran status question for all household adults (excluding 12,002 adults). Households that also did not provide valid information for the economic (excluding 133,181 adults<sup>10</sup>), demographic (excluding zero adults), and geographic (excluding zero adults) explanatory variables were also excluded from the analysis sample, resulting in a final sample of 792,016 adults. Of these adults, 51,011 were veterans, and 741,005 were nonveterans.<sup>11</sup>

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<sup>9</sup>Standard errors of the adult-food-insecurity statistics in these descriptive analyses were calculated as the square root of  $p \cdot q \cdot \text{deff} / N$ , where  $p$  is the estimated percentage,  $q$  is  $(100-p)$ ,  $\text{deff}$  is an assumed design effect of 1.6, and  $N$  is the unweighted number of households represented by the adults in the denominator of the percentage. This calculation of sample size accounts for food insecurity being measured at the household level and is the same for all household members. For more details on the calculation of standard errors for food-insecurity statistics, see (Cohen et al., 2002; Hamilton et al., 1997).

<sup>10</sup>These are all households with missing income information. Households with imputed income were not included in the analyses.

<sup>11</sup>Standard errors from the regression analyses are heteroskedasticity robust and clustered at the household level to account for the fact that adults within a household have the same food security status.

## Regression Methodology

A series of censored regression models of the severity of adult food insecurity are estimated to explore how holding the socioeconomic and demographic characteristics of veterans and nonveterans constant affects the estimated relationship between food insecurity and veteran status. The severity of adult food insecurity is a measure of food insecurity of adult household members derived from the measurement model USDA uses to develop and refine the U.S. food insecurity scale. Higher values of the severity of adult food insecurity measure correspond to greater hardship associated with food insecurity. For example, the lowest value on the scale corresponds to households with adults who are not experiencing any form of food insecurity, while the highest value represents households with adults who are going without food for days at a time.

Censoring occurs with the severity of adult food insecurity measure because a large number of households containing veterans and nonveterans do not affirm any of the food insecurity questions.<sup>12</sup> These households are assigned a severity of zero for their adult food insecurity measure.<sup>13</sup> However, this may not represent the true value of the severity of adult food insecurity for these households (Rabbitt, 2018). Some households may experience a less severe form of food insecurity, resulting in a negative value for their severity of adult food insecurity measure that we cannot observe. We account for this censoring at the lower level in the regression framework.<sup>14</sup>

The primary drawback to using the severity of adult food insecurity as a measure of food insecurity for veterans and nonveterans is that results from the regression models must be transformed before they are directly comparable with changes in the probability of experiencing food insecurity or very low food security. We used the average marginal associations framework developed by Rabbitt et al. (2020) for food insecurity research to ensure results describe how marginal changes in the probability of food insecurity or very low food security are associated with marginal changes in the explanatory variables.

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<sup>12</sup>Households may also affirm all the food insecurity questions at the upper level of the latent continuum of adult food insecurity (i.e., those with the most severe type of very low food security). However, they are less prevalent in the Current Population Survey Food Security Supplement. Between 2005 and 2019, 0.8 percent of veterans in the sample lived in households that affirmed all the food insecurity questions. These households may also be censored depending on the methodology used to estimate the Rasch scale scores. For statistics on the distribution of response patterns to the food-insecurity questions in the general population, see the Statistical Supplement to Household Food Security in the United States series (e.g., Coleman-Jensen et al., 2020b). For simplicity, we assume censoring at this point is negligible. This is consistent with the approach USDA uses for the U.S. adult food insecurity scale (Bickel et al., 2000).

<sup>13</sup>The scaling of the severity of adult food insecurity measure is determined by USDA's food insecurity measurement system which assumes the U.S. food insecurity scales have a mean of 7 (Nord, 2012).

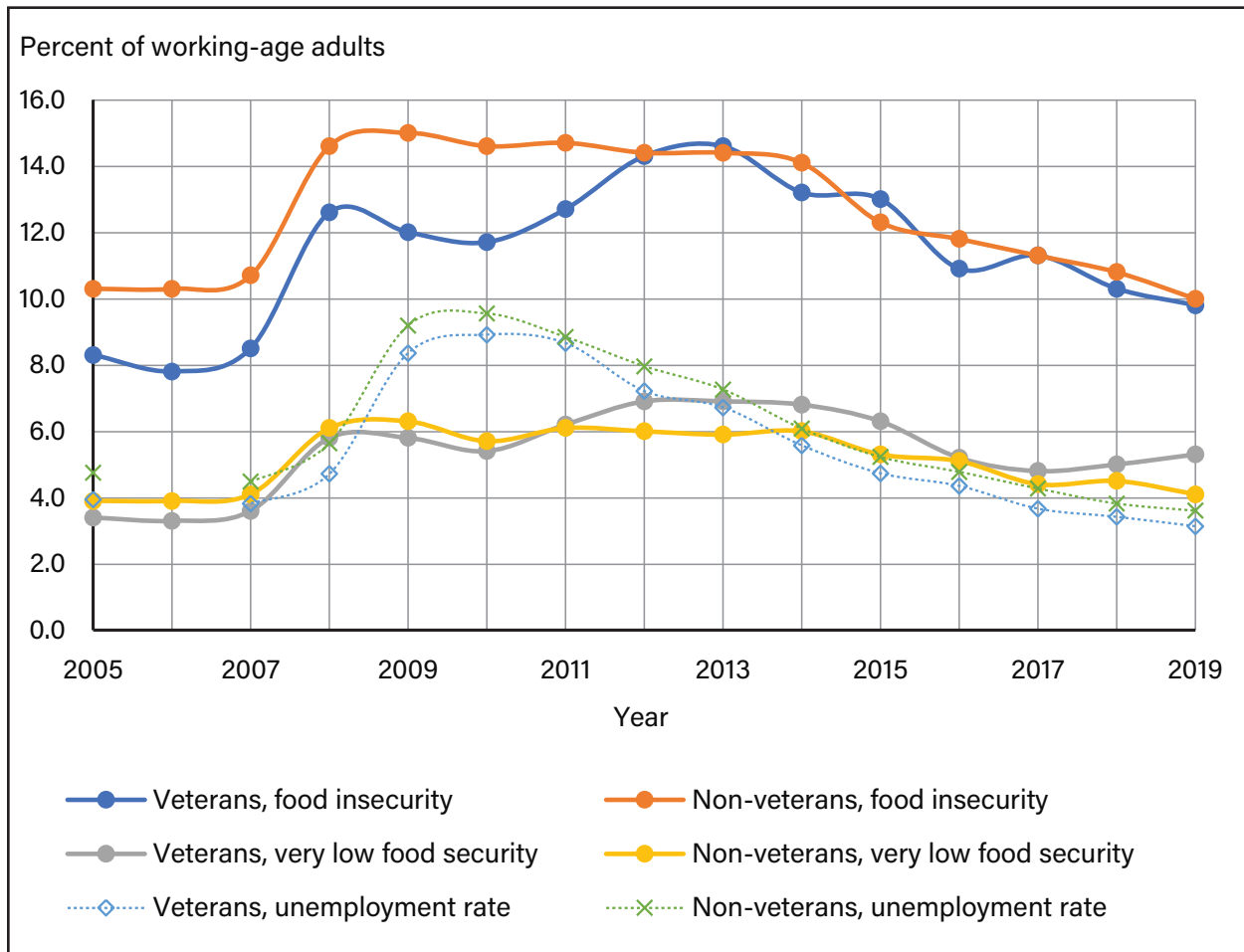
<sup>14</sup>See appendix B for the technical details of our regression methodology.

# Documenting the Prevalence and Severity of Food Insecurity Among Working-Age Veterans

## National Trends of Food Insecurity Among Working-Age Veterans

Food insecurity and very low food security prevalence rates for veterans and nonveterans were calculated separately for each year between 2005 and 2019. The prevalence of food insecurity (very low food security) was generally lower (similar) among veterans than their peers who did not serve in the U.S. Armed Forces from 2005 to 2019 (figure 1). Prior to 2012, prevalence rates of food insecurity were consistently lower among veterans compared with nonveterans. During this same period, very low food security rates were similar between veterans and nonveterans. After 2012, rates of food insecurity and very low food security were similar between veterans and nonveterans.

Figure 1  
**Trends in food insecurity and very low food security for working-age veterans and nonveterans, 2005-19**



Note: The Employment Situation of Veterans was updated biannually prior to 2007; therefore, unemployment statistics are omitted from 2006.

Source: USDA, Economic Research Service calculations using data from the Current Population Survey Food Security Supplement.

The prevalence of food insecurity among veterans generally followed national trends in the U.S. labor market from 2005 to 2019. The unemployment rate for veterans and nonveterans increased as the U.S. labor market contracted with the onset of the 2007 recession, peaking in 2010 at 8.9 percent for veterans and 9.5 percent for nonveterans, and then declined between 2011 and 2019. Food insecurity among veterans increased with the unemployment rate from 8.5 percent in 2007 to 12.6 percent in 2008. Between 2009 and 2015, food insecurity among veterans was essentially unchanged. That is, changes were within the range that could have resulted from sampling variation in the CPS-FSS. Food insecurity among veterans decreased with the unemployment rate, from 2015 (13.0 percent) to 2016 (10.9 percent) and was unchanged from 2017 to 2019. The prevalence of food insecurity among veterans declined from 2015 to 2016 and remained constant in 2017–19; it did not return to the pre-recession level of 8.5 percent until 2018–19.

From 2005 to 2019, the prevalence of very low food security among veterans followed national trends in food insecurity among adults and the U.S. labor market. Very low food security among veterans was unchanged from 2005 to 2007 and increased with the unemployment rate from 2007 (3.6 percent) to 2008 (5.8 percent) as the 2007 recession set in. Thereafter, the prevalence of very low food security among veterans remained unchanged. The prevalence of very low food security among veterans returned to a rate similar to the 2007 pre-recessionary level of 3.6 percent in 2017–18 and then increased to 5.3 percent in 2019.

Figure 1 reveals one additional noteworthy pattern. Even though the unemployment rate for veterans returned to its pre-2007 recession level in 2017, veterans' food insecurity did not return to the pre-recession level of 8.5 percent until 2018–19. Moreover, while very low food security among veterans declined to its pre-recessionary level of 3.6 percent in 2017–18, it increased to 5.3 percent in 2019.

## Food Insecurity Among Working-Age Veterans by Selected Household Level Characteristics

Combined CPS-FSS data from 2015 to 2019 provided adequate sample sizes for analyses of differences in the prevalence and severity of food insecurity among veteran subpopulations based on the socioeconomic and demographic characteristics of their households (table 2). For veterans living in households with incomes above 185 percent of the Federal poverty line, food insecurity prevalence rates were lower than the all-veterans rate (6.1 versus 11.1 percent). The same was true for married-couple families with children (7.6 percent) and multiple-adult households without children (9.0 percent). Food insecurity was more prevalent among veterans living in households with incomes below 185 percent of the Federal poverty line (33.1 percent), households with children headed by a single male (14.6 percent) or a single female (23.9 percent), other households with children (26.4 percent), men living alone (18.6 percent), women living alone (19.1 percent), and households with children under age 6 (13.9 percent).

The prevalence of food insecurity among veterans also varied across residential classifications in 2015–19. Food insecurity rates were lower than the national average for all veterans living in households in suburbs/exurbs and other metropolitan areas outside principal cities (8.7 percent) and higher than the national average for veterans living in households in rural areas (13.9 percent) and households in principal cities of metropolitan areas (13.1 percent). When comparing veteran households directly, food insecurity was higher among veterans living in households in rural areas than metropolitan areas (10.6 percent) and the suburbs/exurbs and other metropolitan areas outside principal cities. However, food insecurity was higher for veterans in principal cities than in the suburbs/exurbs.

Regionally, the prevalence of food insecurity for veterans living in the Midwest (12.0 percent) was higher than in the West (10.0 percent) and not statistically different from the South (11.4 percent) or the Northeast (10.3 percent). The prevalence of food insecurity among veterans living in the Northeast was not statistically different from the West or the South.



Table 2

**Working-age veterans by food security status and selected household characteristics, 2015–19**

Category	Food-insecure								
	Total <sup>1</sup>	Food secure		All		With low food security		With very low food security	
		1,000	1,000	Per-cent	1,000	Per-cent	1,000	Per-cent	1,000
<b>All working-age veterans</b>	9,136	8,121	88.9	1,015	11.1	528	5.8	487	5.3
<b>Household composition:</b>									
With children < 18 years old	3,216	2,876	89.4	340	10.6	194	6.1	146	4.5
With children < 6 years old	1,211	1,043	86.1	168	13.9	96	8.0	72	5.9
Married-couple families	2,459	2,272	92.4	187	7.6	113	4.6	74	3.0
Female head, no spouse	376	286	76.1	90	23.9	44	11.7	46	12.2
Male head, no spouse	309	264	85.4	45	14.6	27	8.8	18	5.8
Other household with child <sup>2</sup>	72	53	73.6	19	26.4	NA	NA	NA	NA
With no children < 18 years old	5,919	5,245	88.6	674	11.4	334	5.6	340	5.7
More than one adult	4,467	4,063	91.0	404	9.0	222	4.9	182	4.1
Women living alone	235	190	80.9	45	19.1	12	5.1	33	14.0
Men living alone	1,218	992	81.4	226	18.6	100	8.3	126	10.3
With elderly	803	717	89.3	86	10.7	53	6.6	33	4.1
<b>Household income-to-poverty ratio:</b>									
Under 1.00	566	324	57.2	242	42.8	100	17.7	142	25.1
Under 1.30	834	500	60.0	334	40.0	142	17.0	192	23.0
Under 1.85	1,514	1,013	66.9	501	33.1	228	15.1	273	18.0
1.85 and over	5,755	5,406	93.9	349	6.1	206	3.6	143	2.5
Income unknown	1,866	1,702	91.2	164	8.8	94	5.0	70	3.8
<b>Area of residence:<sup>3</sup></b>									
Inside metropolitan area	7,779	6,953	89.4	826	10.6	430	5.5	396	5.1
In principal cities <sup>4</sup>	2,185	1,898	86.9	287	13.1	143	6.5	144	6.6
Not in principal cities	4,155	3,792	91.3	363	8.7	189	4.5	174	4.2
Outside metropolitan area	1,357	1,168	86.1	189	13.9	98	7.2	91	6.7
<b>Census geographic region:</b>									
Northeast	1,092	979	89.7	113	10.3	51	4.6	62	5.7
Midwest	1,853	1,631	88.0	222	12.0	115	6.2	107	5.8
South	4,249	3,763	88.6	486	11.4	263	6.2	223	5.2
West	1,942	1,748	90.0	194	10.0	99	5.1	95	4.9

NA = not reported; fewer than 10 households with veteran adults in the survey with this characteristic had low or very low food security.

<sup>1</sup>Totals exclude veteran adults for whom food security status is unknown because they did not give a valid response to any of the questions in the food security survey module. On average during the study period (2015–19), these exclusions represented 24,000 veteran adults (0.3 percent of all veteran adults).

<sup>2</sup>Adults living in households with children in complex living arrangements, e.g., children of other relatives or unrelated roommate or boarder.

<sup>3</sup>Metropolitan area residence is based on 2013 Office of Management and Budget delineation. Prevalence rates by area of residence are comparable with those for 2014 and later years but not precisely comparable with those of earlier years.

<sup>4</sup>Veteran adults living in households within incorporated areas of the largest cities in each metropolitan area. Residence inside or outside of principal cities is not identified for about 18 percent of veterans living in households in metropolitan statistical areas.

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Over 2015–19, the prevalence of very low food security among veterans followed a similar pattern to food insecurity. Very low food security rates were lower than the national average for all veterans (5.3 percent) for veterans living in households with incomes above 185 percent of the Federal poverty line (2.5 percent) and married-couple families with children (3.0 percent). Very low food security rates were higher than the national average for veterans living in households with incomes below 185 percent of the Federal poverty line (18.0 percent), men living alone (10.3 percent), women living alone (14.0 percent), and households with children headed by a single female (12.2 percent).

The food insecurity prevalence estimates from table 1 can also be used to examine the distribution of food insecurity among veterans across subpopulations represented by the “All” column for food insecurity in table 1—the frequency of a subpopulation’s occurrence in the food-insecure population for veterans—based on household-level characteristics.<sup>15</sup> For all food-insecure veterans, most lived in households without children (66.4 percent). Roughly half (49.4 percent) lived in households with incomes below 185 percent of the poverty line. Veterans living in households in metropolitan areas made up 81.4 percent of all food-insecure veterans. Nearly half of all food-insecure veterans lived in the South, 47.9 percent.

## Food Insecurity Among Working-Age Veterans by Individual-Level Characteristics

The prevalence and severity of food insecurity among veterans also varied by individual characteristics (table 3). Food-insecurity prevalence rates were higher than the national average for all veterans (11.1 percent) for the following veteran subpopulations:

- veterans with a disability (33.6 percent),
- veterans with less than a high school diploma (24.0 percent),
- veterans with a high school diploma (14.4 percent),
- veterans with some college or an associate degree (12.7 percent),
- female veterans (13.5 percent),
- non-Hispanic Black veterans (13.8 percent),
- non-Hispanic other race veterans (13.6 percent);
- veterans who are employed part time (16.5 percent),
- veterans who are out of the labor force (20.9 percent),
- veterans who are unemployed (20.0 percent), and
- veterans who are not retired or disabled (17.6 percent).

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<sup>15</sup>The frequency of food-insecure veterans living in households without children, for example, was calculated as the number of food-insecure veterans living in households without children divided by the number of food-insecure veterans  $(674/1,015)*100 = 66.4$  percent.

Table 3

**Working-age veterans by food security status and selected individual characteristics, 2015–19**

Category	Total <sup>1</sup>	Food-insecure							
		Food secure		All		With low food security		With very low food security	
		1,000	Per-cent	1,000	Per-cent	1,000	Per-cent	1,000	Per-cent
All working-age veterans	9,136	8,121	88.9	1,015	11.1	528	5.8	487	5.3
<b>Age:</b>									
18 to 24 years	191	168	88.0	23	12.0	NA	NA	NA	NA
25 to 34 years	1,272	1,108	87.1	164	12.9	83	6.5	81	6.4
35 to 44 years	1,791	1,584	88.4	207	11.6	113	6.4	94	5.2
45 to 54 years	2,628	2,384	90.7	244	9.3	131	5.0	113	4.3
55 to 64 years	3,253	2,877	88.4	376	11.6	187	5.8	189	5.8
<b>Gender:</b>									
Male	7,719	6,895	89.3	824	10.7	441	5.7	383	5.0
Female	1,417	1,226	86.5	191	13.5	87	6.2	104	7.3
<b>Race and ethnicity:</b>									
White, non-Hispanic	6,173	5,555	90.0	618	10.0	321	5.2	297	4.8
Black, non-Hispanic	1,545	1,332	86.2	213	13.8	110	7.1	103	6.7
Hispanic	903	787	87.2	116	12.8	70	7.7	46	5.1
Other, non-Hispanic	515	445	86.4	70	13.6	28	5.4	42	8.2
<b>Educational attainment:</b>									
Less than a high school diploma	200	152	76.0	48	24.0	29	14.5	19	9.5
High school graduate, no college	2,521	2,159	85.6	362	14.4	192	7.7	170	6.7
Some college or associate degree	3,618	3,159	87.3	459	12.7	224	6.2	235	6.5
Bachelor's degree or higher	2,796	2,650	94.8	146	5.2	83	2.9	63	2.3
<b>Labor force participation status:</b>									
Full time	6,208	5,778	93.1	430	6.9	260	4.2	170	2.7
Part time	564	471	83.5	93	16.5	42	7.5	51	9.0
For economic reasons	442	388	87.8	54	12.2	24	5.4	30	6.8
For non-economic reasons	122	83	68.0	39	32.0	18	14.8	21	17.2
Unemployed	300	240	80.0	60	20.0	26	8.7	34	11.3
Out of the labor force	2,064	1,632	79.1	432	20.9	200	9.7	232	11.2
Retired	743	670	90.2	73	9.8	39	5.2	34	4.6
Disabled	798	530	66.4	268	33.6	116	14.6	152	19.0
Not retired or disabled	523	431	82.4	92	17.6	46	8.8	46	8.8

NA = not reported; fewer than 10 households with veteran adults in the survey with this characteristic had low or very low food security.

<sup>1</sup>Totals exclude veteran adults for whom food security status is unknown because they did not give a valid response to any of the questions in the food security survey module. On average during the study period (2015–19), these exclusions represented 24,000 veteran adults (0.3 percent of all veteran adults).

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Food insecurity among veterans was lower than the national average for veterans with a bachelor's degree or higher (5.2 percent), veterans between the ages of 45 and 54 (9.3 percent); and veterans employed full time (6.9 percent).

Food insecurity among veterans differed by their gender, age, and educational attainment. Female veterans (13.5 percent) were more likely to be food-insecure than males (10.7 percent). Veterans between the ages of 45 and 54 (9.3 percent) had lower rates of food insecurity than veterans ages 25-34 (12.9 percent), 35-44 (11.6 percent), or 55-64 (11.6 percent). In addition, veterans with a bachelor's degree or higher (5.2 percent) had lower rates of food insecurity than veterans with less than a high school diploma (24.0 percent), a high school diploma (14.4 percent), or some college or an associate degree (12.7 percent).

The prevalence of very low food security among veterans followed a similar pattern to food insecurity among veterans based on individual characteristics. Very low food security rates for veterans were lower than the national average for all veterans (5.3 percent), for veterans with a bachelor's degree or higher (2.3 percent), and veterans who were employed full time (2.7 percent). Very low food security was more common among veterans with a disability (19.0 percent), or less than a high school diploma (9.5 percent), female (7.3 percent), and non-Hispanic other race (8.2 percent). It was also more common for veterans who were employed part time for non-economic reasons (17.2 percent), out of the labor force (11.2 percent), unemployed (11.3 percent), or not retired or disabled (8.8 percent).

Differences in the prevalence of very low food security among veterans by gender, age, and educational attainment followed patterns like those of food insecurity with a few exceptions. As with food insecurity, very low food security was less prevalent among veterans with greater educational attainment and males. Very low food security among veterans was more common among veterans ages 25-34 (6.4 percent) and 55-64 (5.8 percent) than those ages 45-54 (4.3 percent).

The food-insecurity prevalence estimates in table 3 can also be used to examine how the distribution of food insecurity among veterans varies by subpopulations based on their individual characteristics. Most food-insecure veterans were between the ages of 45 and 64 (61.1 percent). While food insecurity was more prevalent among female veterans, 81.2 percent of all food-insecure veterans were male. Nearly two-thirds (60.9 percent) of all food-insecure veterans were White (non-Hispanic), and roughly one-fifth (21.0 percent) were Black (non-Hispanic). Almost half of all food-insecure veterans (45.2 percent) had some college education or an associate degree, and a third had a high school diploma (35.7 percent). Among all food-insecure veterans, 42.4 percent were employed full time, 42.6 percent were out of the labor force, 26.4 percent were disabled, 9.2 percent were employed part time, and 5.9 percent were unemployed.

## Food Insecurity Among Working-Age Veterans by Selected Military Service Characteristics

In 2015–19, the prevalence of food insecurity among veterans varied by their military service characteristics (table 4). The prevalence of food insecurity among veterans was lower than the national average for all veterans (11.1 percent) and for veterans with two military service periods (9.0 percent) or three or more military service periods (4.8 percent).

Table 4

**Working-age veterans by food security status and military service characteristics, 2015–19**

Category	Food-insecure								
	Total <sup>1</sup>	Food secure		All		With low food security		With very low food security	
		1,000	1,000	Percent	1,000	Percent	1,000	Percent	1,000
<b>All working-age veterans</b>	9,136	8,121	88.9	1,015	11.1	528	5.8	487	5.3
<b>Most recent period of service:</b>									
Post-9/11 Gulf War	3,266	2,916	89.3	350	10.7	185	5.6	165	5.1
Pre-9/11 Gulf War	2,390	2,164	90.5	226	9.5	121	5.1	105	4.4
Vietnam War	536	469	87.5	67	12.5	41	7.6	26	4.9
Other service periods <sup>2</sup>	2,944	2,572	87.4	372	12.6	181	6.1	191	6.5
<b>Number of periods of service:</b>									
1 period of service	7,025	6,181	88.0	844	12.0	434	6.2	410	5.8
2 periods of service	1,629	1,482	91.0	147	9.0	80	4.9	67	4.1
3 or more periods of service	482	459	95.2	23	4.8	NA	NA	NA	NA

NA = not reported; fewer than 10 households with veteran adults in the survey with this characteristic had low or very low food security.

<sup>1</sup>Totals exclude veteran adults for whom food security status is unknown because they did not give a valid response to any of the questions in the food security survey module. On average during the study period (2015–19), these exclusions represented 24,000 veteran adults (0.3 percent of all veteran adults).

<sup>2</sup>Veterans of other service periods are adults who were on active duty in the U.S. Armed Forces between May 1975 and July 1990.

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Very low food security among veterans followed the patterns observed for food insecurity among all veterans based on their military service characteristics. Very low food security prevalence rates were lower than the national average for all veterans (5.3 percent) and for veterans who served in 2 military service periods (4.1 percent).

The prevalence of food insecurity among veterans also varied by their most recent period of military service. Food insecurity was more prevalent among veterans who served in other military service periods (spanning May 1975 to July 1990; 12.6 percent) compared with veterans serving in the pre-9/11 Gulf War era (9.5 percent) and post-9/11 Gulf War era (10.7 percent) but similar to veterans of the Vietnam War (12.5 percent). Food insecurity rates were higher for veterans of the Vietnam War than those of the pre-9/11 era but similar to those of the post-9/11 era.

Food insecurity rates among veterans decreased with their length of military service. Veterans who served for one military service period (12.0 percent) had higher rates of food insecurity than those who served in 2 periods (9.0 percent) or 3 or more periods (4.8 percent).

Among all food-insecure veterans, 83.2 percent had only one military service period, 14.5 percent served in 2 periods, and 2.3 percent served in 3 or more periods. The majority of food-insecure veterans reported their most recent period of military service was during the other military service periods (36.7 percent), followed by the post-9/11 Gulf War era (34.5 percent), pre-9/11 Gulf War era (22.3 percent), and the Vietnam War (6.6 percent).

## Comparisons of Food Insecurity Between Working-Age Veterans and Nonveterans

National-level food insecurity rates were similar for veterans (11.1 percent) and nonveterans (11.2 percent) (figure 2). Food insecurity rates were lower for veterans when compared to nonveterans for veterans living in households with children and households of women living alone. The prevalence of food insecurity was higher among veterans than nonveterans for veterans living in households without children, households with elderly members, households with income below 185 percent of the Federal poverty line, multiple-adult households without children, and households of men living alone.

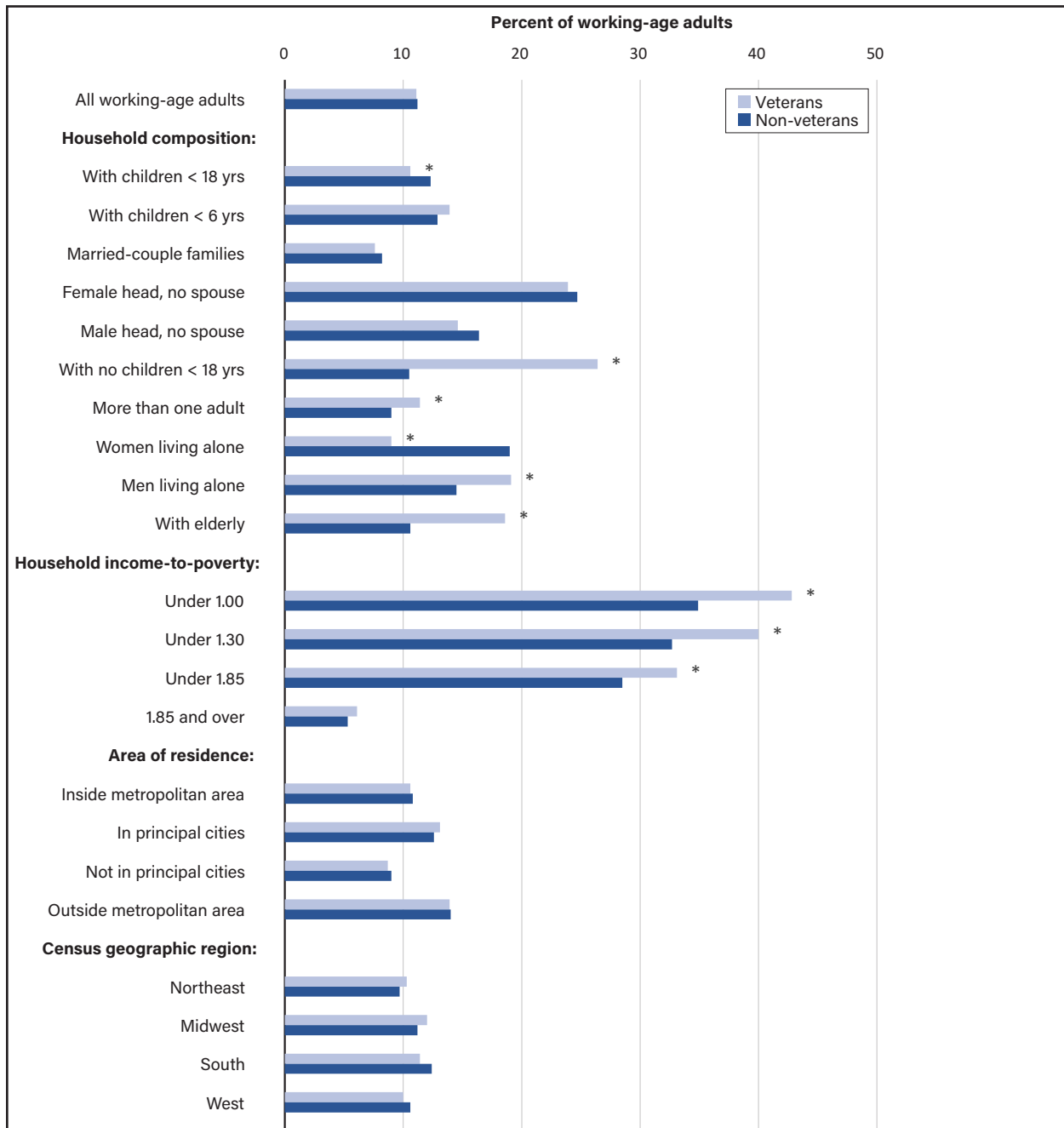
Figure 3 shows very low food security was higher among veterans than nonveterans for veterans living in households with income below 185 percent of the Federal poverty line, men living alone and women living alone, households in principal cities, and households in the Northeast.

Over this same period, food insecurity rates were lower among unemployed, non-Hispanic Black, and Hispanic veterans compared with nonveterans (figure 4). Food insecurity rates were higher among veterans than nonveterans for veterans employed part time, out of the labor force, not retired or disabled, or retired; non-Hispanic other race, and non-Hispanic Black veterans; veterans age 55-64; and veterans with a bachelor's degree or higher.

Very low food security by individual-level characteristics followed a similar pattern to food insecurity for veterans compared with nonveterans (figure 5). Very low food security was more prevalent among veterans who were employed part time, out of the labor force, not retired or disabled, or retired; female and non-Hispanic other race veterans; and veterans with some college or an associate degree.

Figure 2

**Prevalence of food insecurity for working-age veterans and nonveterans by household-level characteristics, 2015–19**



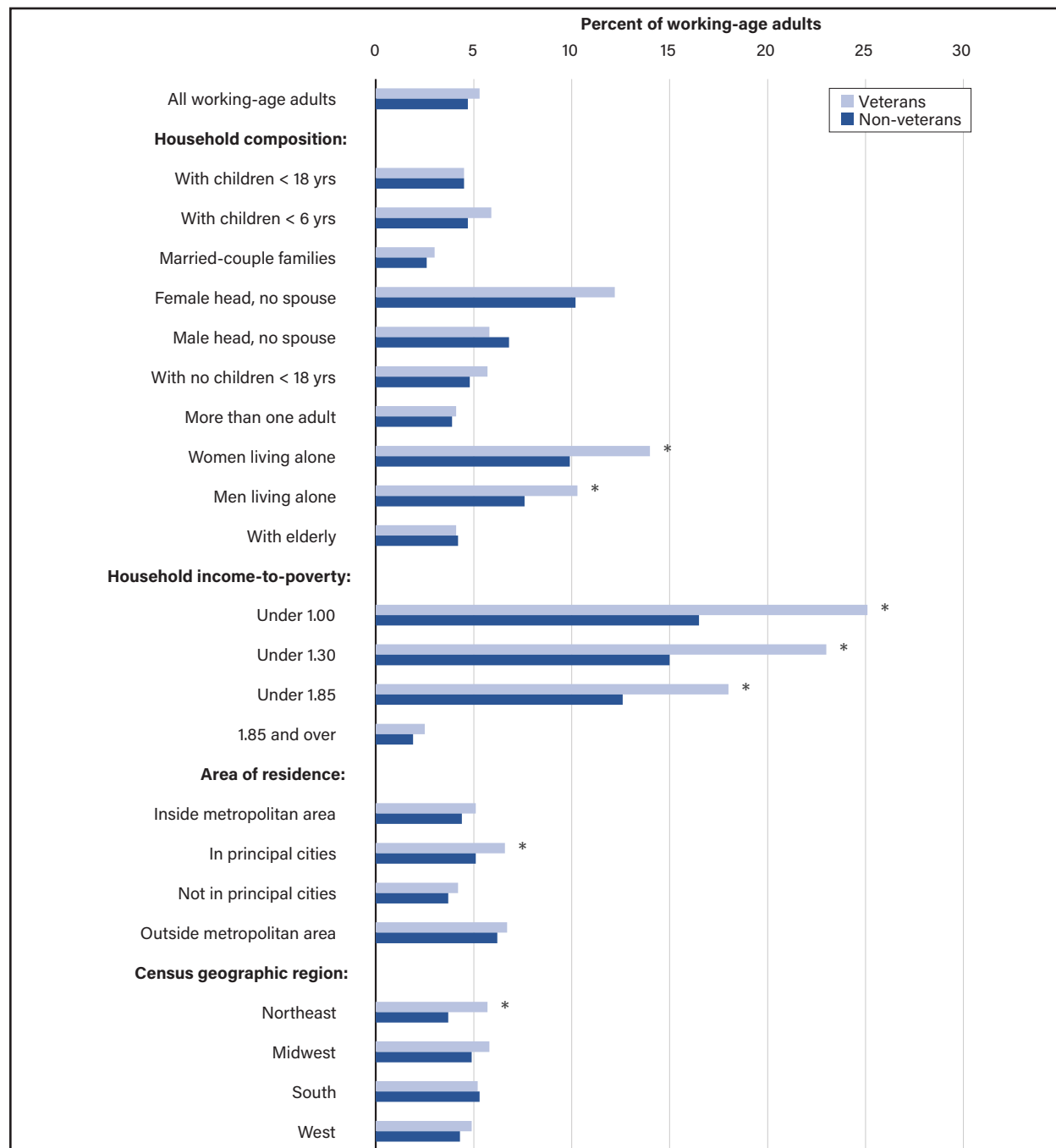
\* Difference in the prevalence of food insecurity between veteran and nonveteran adults was statistically significantly different at the 90-percent confidence level or better ( $t > 1.645$ ).

Metropolitan area of residence is based on 2013 Office of Management and Budget delineation.

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Figure 3

**Prevalence of very low food security for working-age veterans and nonveterans by household-level characteristics, 2015-19**



\* Difference in the prevalence of very low food security between veteran and nonveteran adults was statistically significantly different at the 90-percent confidence level or better ( $t > 1.645$ ).

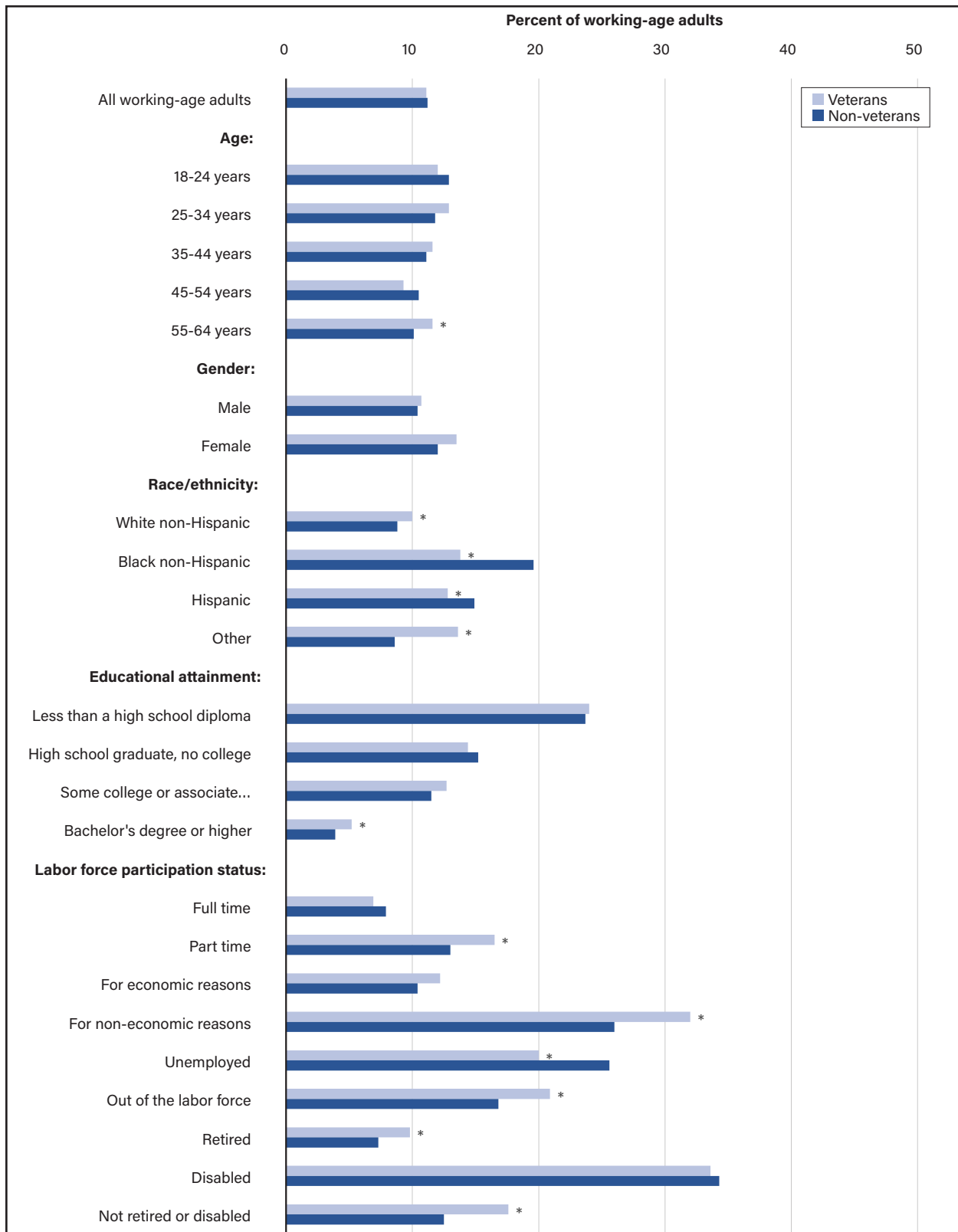
Metropolitan area of residence is based on 2013 Office of Management and Budget delineation.

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.



Figure 4

**Prevalence of food insecurity for working-age veterans and nonveterans by individual-level characteristics, 2015–19**

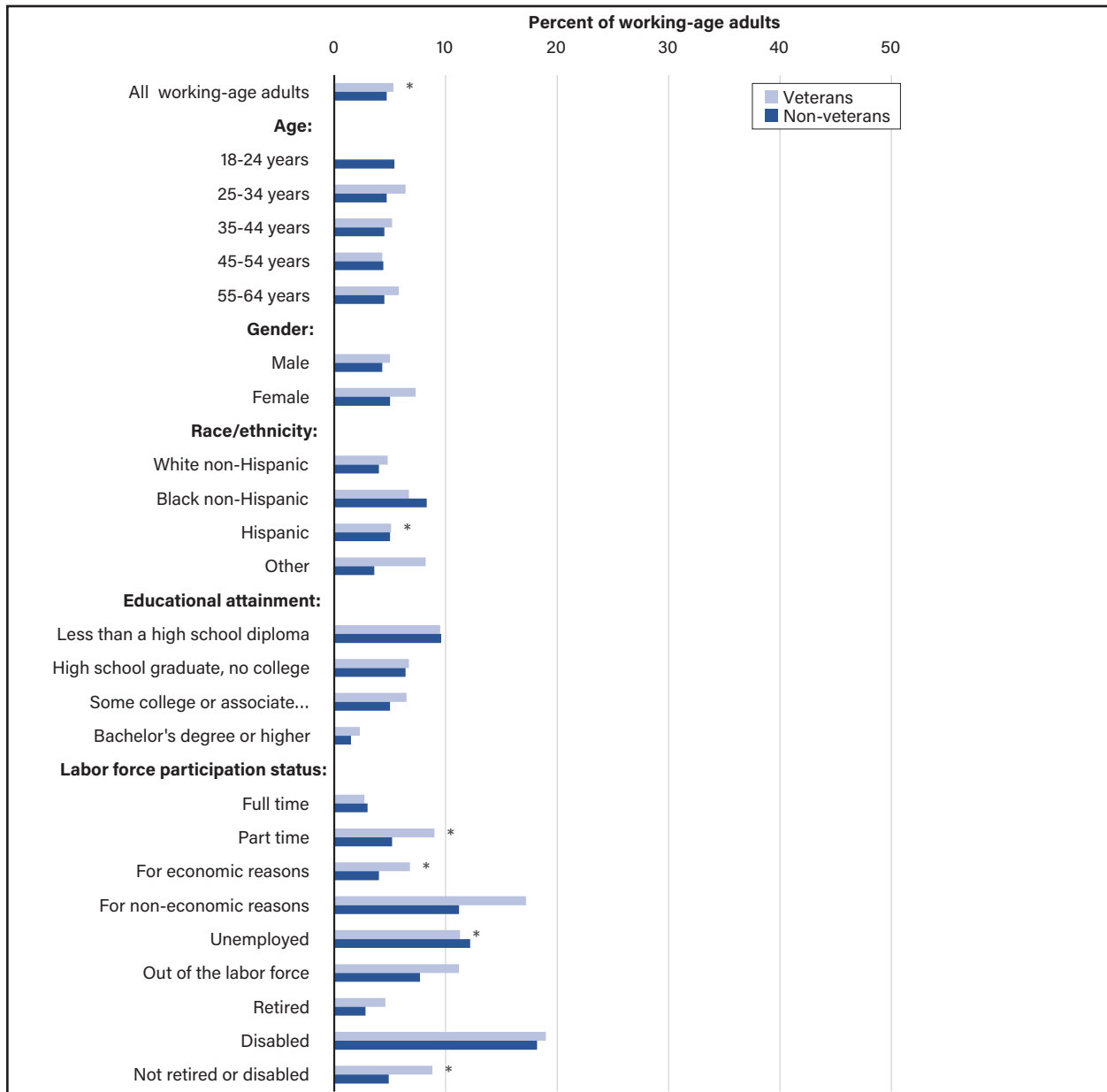


\* Difference in the prevalence of food insecurity between veteran and nonveteran adults was statistically significantly different at the 90-percent confidence level or better ( $t > 1.645$ ).

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Figure 5

**Prevalence of very low food security for working-age veterans and nonveterans by individual-level characteristics, 2015–19**



\* Difference in the prevalence of very low food security between veteran and nonveteran adults was statistically significantly different at the 90-percent confidence level or better ( $t > 1.645$ ).

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

## Exploring Differences in Food Insecurity Between Working-Age Veterans and Nonveterans Using Regression

Comparisons of the measures of food insecurity in table 5 show that veterans were less likely to live in households with food insecurity than nonveterans. In 2005–19, 12.0 percent of veterans lived in food-insecure households compared with 13.5 percent of nonveterans. Veterans were also less likely to live in households that reported greater levels of severity of adult food insecurity than nonveterans. Moreover, veterans were more likely to live in households that reported no issues with food insecurity. However, when the sample includes only veterans and nonveterans living in households that reported at least some issues with food insecurity, veterans appeared more likely to live in households with food insecurity than nonveterans, suggesting food insecurity for veterans is more severe when they do experience food insecurity.

Table 5  
**Characteristics of working-age adults and their households by veteran status, 2005–19**

Variable	Working-age veteran	Working-age non-veteran	Difference
<b>Food insecurity characteristics</b>			
Severity of adult food insecurity	0.995 (2.302)	1.093 (2.313)	-0.098***
Severity of adult food insecurity greater than zero	4.833 (2.681)	4.602 (2.527)	0.231***
Severity of adult food insecurity equal to zero	79.416 % (40.432)	76.245 % (42.558)	3.171***
Severity of adult food insecurity equal to maximum	0.775 % (8.769)	0.640 % (7.977)	0.135**
Food insecurity among household adults	12.018 % (32.518)	13.466 % (34.136)	-1.448***
Very low food security among household adults	5.694 % (23.173)	5.560 % (22.914)	0.134
<b>Working-age adult veteran characteristics</b>			
Working-age veteran	100.000 %	0.000 %	
<b>Most recent period of service</b>			
Post-9/11 Gulf War	20.504 % (40.373)	0.000 %	
Pre-9/11 Gulf War	23.106 % (42.152)	0.000 %	
Vietnam War or earlier	25.231 % (43.435)	0.000 %	
Other service periods (May 1975 to July 1990)	31.158 % (46.315)	0.000 %	
<b>Working-age adults characteristics</b>			
Female	11.471 % (31.867)	53.023 % (49.909)	-41.552***
Age	48.913 (11.274)	39.943 (13.226)	8.970***
<b>Race and ethnicity</b>			
White, non-Hispanic (reference group)	73.053 % (44.369)	63.341 % (48.187)	9.711***
Black, non-Hispanic	14.285 % (34.993)	11.576 % (31.994)	2.709***

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Other race, non-Hispanic	4.609 % (20.969)	7.995 % (27.121)	-3.385***
Hispanic	8.053 % (27.211)	17.088 % (37.640)	-9.035***
Immigrant	5.120 % (22.041)	18.755 % (39.035)	-13.635***
Noncitizen immigrant	0.478 % (6.900)	9.977 % (29.969)	-9.498***
<b>Labor force participation status</b>			
Employed full time (reference group)	66.855 % (47.074)	60.149 % (48.959)	6.705***
Employed part time	6.574 % (24.783)	12.774 % (33.380)	-6.200***
Unemployed	4.468 % (20.661)	4.775 % (21.323)	-0.306*
Retired	9.097 % (28.757)	3.417 % (18.166)	5.680***
Disabled	8.449 % (27.812)	5.362 % (22.526)	3.087***
Not in labor force	4.557 % (20.856)	13.524 % (34.198)	-8.966***
<b>Household characteristics</b>			
Household income relative to the poverty line	4.168 (2.681)	3.714 (2.665)	0.454***
Home owned by a household member	73.869 % (43.935)	66.050 % (47.354)	7.819***
<b>Labor force participation status of other adult(s)</b>			
Employed full time (reference group)	47.956 % (49.959)	59.236 % (49.140)	-11.280***
Employed part time	11.014 % (31.307)	8.777 % (28.296)	2.238***
Unemployed	2.480 % (15.551)	2.491 % (15.585)	-0.011
Retired	7.641 % (26.566)	4.614 % (20.978)	3.028***
Disabled	4.313 % (20.316)	3.422 % (18.179)	0.891***
Not in labor force	8.824 % (28.365)	6.782 % (25.144)	2.042***
<b>Educational attainment of highest educated adult</b>			
Less than high school	1.301 % (11.333)	5.005 % (21.804)	-3.703***
High school graduate or equivalent (reference group)	18.492 % (38.823)	19.781 % (39.835)	-1.289**
Some college or an associate degree	39.932 % (48.976)	30.690 % (46.121)	9.242***
Bachelor's degree or higher	40.275 % (49.046)	44.525 % (49.699)	-4.250***
<b>Household composition</b>			
Married couple with child(ren) (reference group)	26.800 % (44.292)	32.140 % (46.702)	-5.340***

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Single female with child(ren)	3.473 % (18.309)	8.756 % (28.266)	-5.283***
Single male with child(ren)	3.094 % (17.317)	2.935 % (16.879)	0.159
Other household with child(ren)	0.752 % (8.637)	0.675 % (8.188)	0.077
Multiple adults without children	50.196 % (50.000)	44.339 % (49.679)	5.857***
Female living alone	13.881 % (34.575)	5.676 % (23.137)	8.205***
Male living alone	1.804 % (13.311)	5.479 % (22.757)	-3.675***
At least one elderly member in household	18.284 % (38.654)	11.706 % (32.150)	6.577***
At least one elderly veteran in household	1.511 % (12.197)	1.800 % (13.296)	-0.290**
Number of adults	2.143 (0.855)	2.346 (1.015)	-0.203***
Number of children	0.624 (1.040)	0.841 (1.157)	-0.217***
<b>Area of residence<sup>1</sup></b>			
Principal city metropolitan area (reference group)	22.955 % (42.055)	28.732 % (45.251)	-5.777***
Suburban metropolitan area	43.318 % (49.552)	43.569 % (49.585)	-0.251
Unidentified metropolitan area	16.287 % (36.925)	13.223 % (33.874)	3.064***
Nonmetropolitan (rural) area	17.440 % (37.946)	14.476 % (35.185)	2.965***
State unemployment rate	6.150 % (2.260)	6.154 % (2.269)	-0.004
Number of working-age adults	51,011	741,005	

Note: Statistically significant differences in means between working-age veterans and nonveterans are indicated by the following. Standard deviations are in parenthesis.

\* Significant at 0.1 level.      \*\* Significant at 0.05 level. \*\*\* Significant at 0.01 level.

<sup>1</sup>Metropolitan area residence is based on 2013 Office of Management and Budget delineation.

Source: USDA, Economic Research Service calculations using data from the 2005–2019 Current Population Survey Food Security Supplements.

Veterans were more likely to live in households with greater economic resources than nonveterans. In 2005–19, veterans lived in households that had incomes that were nearly 0.5 times higher than the Federal poverty line when compared with nonveterans. Veterans were also more likely than nonveterans to live in a household where a household member owned or was in the process of purchasing their home.

Participation of veterans and nonveterans and other adults in their households in the U.S. labor market differed considerably in 2005–19. The labor force participation status was more favorable for veterans when compared with nonveterans during this period; however, veterans were more likely to live with other adults who had less favorable labor force participation statuses than nonveterans. Veterans were, for example, more likely to be employed full time but also more likely to live with other adults who were less likely to be

employed full time than nonveterans. Yet, veterans were also more likely to be retired and live with other adults who were retired than nonveterans. Unemployment rates for veterans were statistically significantly lower but similar to nonveterans. Veterans were also more likely to have a work-limiting disability and more likely to live with other adults with a work-limiting disability than nonveterans.

Veterans and nonveterans differed considerably in demographic characteristics in 2005-19. Veterans were less likely than nonveterans to be:

- female,
- Hispanic,
- naturalized U.S. citizens or noncitizen immigrants,
- live in a household where the highest educated adult has a high school diploma or lower or a college degree or higher,
- live in a household with children or a male living alone,
- live with elderly (age 65 or older) veterans, and
- live in households in principal cities.

Veterans were more likely than nonveterans to be

- older,
- White (non-Hispanic),
- Black (non-Hispanic),
- live in a household where the highest educated adult has some college for an associate degree,
- live in a household with multiple adults,
- live in a household with a female living alone,
- live in a household with elderly members,
- live in smaller households with fewer adults and children, and
- live in households in nonmetropolitan areas.

Regression analyses explored differences in the prevalence and severity of food insecurity between veterans and nonveterans. Regression allows for estimation of the association between veteran status and food insecurity while holding the characteristics of veterans and nonveterans that also affect food insecurity observable in the data constant. Without regression, we cannot be confident that the estimate of the association between veteran status and food insecurity reflected the relationship between military service and food insecurity. This is due to several characteristics associated with food insecurity also being associated with the likelihood of serving in the military. Adult males were, for example, more likely than females to serve in the military but less likely to be food insecure. Therefore, bivariate comparisons of food insecurity among veterans and nonveterans do not reflect the sole effect of military service on food insecurity. Estimates of the association between veteran status and food insecurity are not causal as we cannot control for other characteristics of veterans and nonveterans that were not available in the data, such as mental and physical health status. However, by controlling for differences in as many of the characteristics of veterans and nonveterans as

possible through regression, we obtained an estimate of the association between food insecurity and veteran status that more closely reflects the influences of veteran status on food insecurity.

Estimates of the association between the severity of adult food insecurity and veteran status from a series of censored regression models are listed in table 6.<sup>16</sup> The estimated average marginal associations describe how changes in the probability of an adult living in a household with food insecurity (or very low food security) are associated with changes in the adult's veteran status. For simplicity, ease of interpretation, and comparability with prior studies, we only discuss results using estimates of the average marginal associations.<sup>17</sup>

Table 6

**Estimates of the association between the severity of adult food insecurity and veteran status among working-age adults, 2005-19**

Variables	No controls	+ Economic characteristics	+ Economic and demographic characteristics	+ Economic, demographic, and geographic characteristics
<b>Coefficients of interest</b>				
<b>Working-age veteran</b>	-0.626***	0.249***	0.325***	0.305***
	(0.060)	(0.050)	(0.052)	(0.052)
<b>Average marginal associations of interest</b>				
<b>Working-age veteran</b>				
Probability(food insecurity)	-0.016***	0.007***	0.009***	0.008***
	(0.001)	(0.001)	(0.001)	(0.001)
Probability(very low food security)	-0.009***	0.004***	0.005***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
<b>Predicted probabilities</b>				
<b>Probability of food insecurity</b>				
Conditional on being a working-age veteran	0.098	0.121	0.123	0.122
	(0.001)	(0.001)	(0.001)	(0.001)
Conditional on being a working-age nonveteran	0.114	0.114	0.114	0.114
	(0.001)	(0.000)	(0.000)	(0.000)
<b>Probability of very low food security</b>				
Conditional on being a working-age veteran	0.044	0.056	0.057	0.057
	(0.001)	(0.001)	(0.001)	(0.001)
Conditional on being a working-age nonveteran	0.053	0.052	0.052	0.052
	(0.000)	(0.000)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	No	No	No	Yes
Log-likelihood	-165,797.47	-145,895.10	-145,488.14	-145,367.64
Number of working-age adults	792,016	792,016	792,016	792,016

Note: All standard errors (in parentheses) are robust to heteroskedasticity and clustered by state of residence.

\* Significant at 0.1 level.      \*\* Significant at 0.05 level. \*\*\* Significant at 0.01 level.

Source: USDA, Economic Research Service calculations using data from the 2005-2019 Current Population Survey Food Security Supplements.

<sup>16</sup>Estimated average marginal associations and their standard errors for all the variables in our regression models are listed in appendix tables C.4 and C.5. Estimates of the regression model coefficients and their standard errors are available from the authors upon request.

<sup>17</sup>Similar conclusions can also be drawn from the estimated coefficients, albeit determining the magnitude of the findings would be challenging, making it difficult to compare our findings with prior studies.

The first censored regression model is the baseline descriptive model. This includes variables for the adult's veteran status, the presence of an elderly veteran in the household, and year-fixed effects. The average marginal associations from the baseline model suggest that veteran status is linked to a 1.6 (0.9) percentage point reduction in the likelihood of living in a household with food insecurity (very low food security).

Adding variables that capture the adult's and their household's economic characteristics (labor force participation status, income, homeownership, educational attainment, and State unemployment rate) in the second model results in the sign on the veteran status average marginal associations for food insecurity and very low food security switching from negative (decreased likelihood of food insecurity) to positive (increased likelihood of food insecurity). This suggests veteran status is now associated with an increased likelihood of living in a food-insecure household. The average marginal associations suggest that veteran status is linked to a 0.7 (0.4) percentage point increase in the likelihood of living in a household with food insecurity (very low food security), on average. Thus, the economic characteristics of adults and their households account for the differential risk in food insecurity and very low food security among veterans.

The remaining two models add variables that capture the adult's and their household's demographic (gender, age, race and ethnicity, immigration and citizenship status, household composition, presence of elderly members, number of adults, and number of children in the household) and geographic (area of residence and State fixed effects) characteristics. Adding these characteristics to the models had no effect on food insecurity and very low food security average marginal associations for veteran status when compared with the model that included economic characteristics. Thus, the demographic and geographic characteristics of veterans and nonveterans (and their households) do not account for any differential in food insecurity (and very low food security) between veterans and nonveterans after controlling for their economic characteristics.

Next, we extend the exploration of differences in the prevalence and severity of food insecurity between veterans and nonveterans by separately interacting the adult's veteran status with their work-limiting disability status, gender, and race and ethnicity; and for veterans, by their most recent period of military service. Interacting veteran status with these characteristics allows examination of whether the association between veteran status and food insecurity also depends on the veteran's other characteristics. This allows us to estimate the food insecurity differentials for all groups under consideration. For example, analysis of the interaction effect of disability status on veteran status allows estimation of the differences in food insecurity for four groups: disabled veterans, non-disabled veterans, disabled nonveterans, and non-disabled nonveterans. Similar interpretations follow for the interaction effects of the most recent period of military service, gender, and race and ethnicity with veteran status. Estimates of food insecurity and very low food security average marginal associations and their standard errors are listed in table 7. All models include controls for the adult's and their household's economic, demographic, and geographic characteristics.



Table 7

**Heterogeneity analysis of the association between the probability of adult food insecurity and veteran status among working-age adults, 2005-19**

Variables	Most recent period of service	Disability status	Gender	Race and ethnicity
Working-age veteran X Post-9/11 Gulf War	0.003 (0.003)			
Working-age veteran X Pre-9/11 Gulf War	0.015*** (0.003)			
Working-age veteran X Vietnam or earlier	-0.002 (0.003)			
Working-age veteran X Other service periods <sup>1</sup>	0.015*** (0.002)			
Working-age veteran X Disabled		0.005 (0.004)		
Working-age veteran X Female			0.004 (0.004)	
Working-age veteran X Black non-Hispanic				-0.010*** (0.004)
Working-age veteran X Other race non-Hispanic				0.025*** (0.007)
Working-age veteran X Hispanic				0.004 (0.005)
Working-age veteran		0.008*** (0.002)	0.008*** (0.002)	0.009*** (0.002)
Disabled		0.067*** (0.002)		
Female			0.002*** (0.001)	
Black non-Hispanic				0.025*** (0.002)
Other race non-Hispanic				-0.000 (0.002)
Hispanic				0.013*** (0.002)
Year fixed effects	Yes	Yes	Yes	Yes
State fixed effects	Yes	Yes	Yes	Yes
Log-likelihood	-145,365.45	-145,367.40	-145,367.47	-145,363.48
Number of working-age adults	792,016	792,016	792,016	792,016

<sup>1</sup>Other service periods covered the interwar period between May 1975 and July 1990.

Note: FI = food insecurity; VLFS = very low food security; All models include controls for economic, demographic, and geographic characteristics. All standard errors (in parentheses) are robust to heteroskedasticity and clustered by state of residence.

\* Significant at 0.1 level. \*\* Significant at 0.05 level. \*\*\* Significant at 0.01 level.

Source: USDA, Economic Research Service calculations using data from the 2005-2019 Current Population Survey Food Security Supplements.

Interacting veterans' most recent period of military service with veteran status demonstrates that our finding that veteran status is associated with an increased likelihood of living in a food-insecure household varies by veterans whose most recent period of military service was during the pre-9/11 Gulf War era or in the other military-service periods (spanning May 1975 to July 1990). Being a veteran whose most recent period of military service was during these two periods is associated with a 1.5 percentage point increase in the likelihood of living in a food-insecure household. Veterans whose most recent period of military service was during the post-9/11 Gulf War era or Vietnam War had statistically similar likelihoods of living in households with food insecurity as nonveterans.

We also interacted working-limiting disability status and gender with veteran status in separate models to explore food insecurity differentials by disability status and gender. The estimated average marginal associations suggest that disabled veterans and female veterans have statistically similar risks for living in a food-insecure household when compared with non-disabled nonveterans and nonveteran males. Disabled nonveterans and female nonveterans (as indicated by the food insecurity average marginal associations for disability status and female gender) appear to be at a greater risk for living in households with food insecurity relative to non-disabled nonveterans and male nonveterans. However, being a non-disabled or male veteran (as indicated in the respective models) is associated with an increased risk of living in a food-insecure household.

Finally, we considered the possibility that the association between food insecurity and veteran status differs by race and ethnicity through interactions of veteran status with race and ethnicity. Minority veterans appear less likely to live in households with food insecurity than similar nonveterans. In particular, being a Black (non-Hispanic) veteran is associated with a 1.0 percentage point decrease in the likelihood of living in a food-insecure households compared to similar Black (non-Hispanic) nonveterans. White (non-Hispanic) and other race (non-Hispanic) veterans, however, appear more likely to live in food-insecure households than similar White (non-Hispanic) and other race (non-Hispanic) nonveterans, while Hispanic veterans and nonveterans have statistically similar likelihoods of living in households with food insecurity. Results also suggest that being a minority nonveteran is associated with an increased likelihood of living in a food-insecure household.

## Sensitivity Analyses

The finding that veteran status is associated with an increased risk of living in a food-insecure household is contrary to the findings of prior studies of veterans' food insecurity (e.g., Miller et al., 2015). While this finding is likely because our analyses more carefully consider the alignment of veteran status and food insecurity by examining differences in food insecurity among individual veterans and individual nonveterans, it is important to ensure results are robust to other methodological approaches, particularly those used by prior studies. Therefore, we reconducted the regression analyses using two alternative approaches that focus on food insecurity at the household- rather than the individual-level as is common in prior studies.

All household-level sensitivity analyses of food insecurity among veterans and nonveterans were based on 2005-19 data, the same data used for the primary regression analyses. Households were classified as veteran households if they contained at least one member who was a veteran between the ages of 18 and 64. All other households were classified as nonveteran households. Because many of the households in the sample had more than one veteran, veteran characteristics were assigned to each household using two different approaches. Under the first approach, we used the characteristics of the youngest veteran and nonveteran in a household between the ages of 18 and 64 to assign individual-level characteristics to the household. This is similar to the approach used by Miller et al. (2015) to address cases where more than one veteran resided in a household. For the second approach, we used the characteristics of adults between the ages of 18 and 64 with the closest relationship to the reference person to assign the relevant characteristics to the household. Coleman-Jensen and Nord (2013) used this approach to examine the relationship between food insecurity and disability status among the general population.

Comparisons of the average marginal associations from each of these approaches with the primary regression models suggest that the findings are robust to the way the sample of veterans and nonveterans was constructed. All the average marginal associations were statistically similar, increasing confidence that the report findings are not due to the new methodological approach to examining food insecurity among veterans and nonveterans.

## Discussion and Conclusions

This report examines food insecurity among veterans ages 18 to 64 using data from the 2005–19 Current Population Survey Food Security Supplement (CPS-FSS). We documented the extent and severity of food insecurity among veterans using similar methodology to that found in the U.S. Department of Agriculture’s annual *Household Food Security in the United States* report (Coleman-Jensen et al., 2020a) because of the limited information on food insecurity among veterans.

Findings based on this descriptive analysis suggest that 11.1 percent of veterans lived in food-insecure households in 2015–19. Notably, our estimate of the prevalence of food insecurity among veterans is higher than estimates from prior studies that use nationally representative data but is lower than estimates from studies that use selective samples of veterans accessing care from the U.S. Department of Veterans Affairs. Relatively few veterans use VA health-care services, and those who do are generally minorities, have lower educational attainment, higher rates of unemployment, lower incomes, and are in poor health (Wilmoth and London, 2020). These differences can be attributed to differences in methodology. This report focuses on individual veterans rather than veteran households to better align food insecurity with veterans and account for clustering among veterans in households.

Findings also suggest that there is considerable heterogeneity in food insecurity among veteran subpopulations not documented until now. The risk factors for food insecurity among veterans are similar to those in the general population that include several household- and individual-level demographic and socioeconomic characteristics. A notable exception is the race and ethnicity of an adult. Minority veterans are less likely to live in food-insecure households than minority nonveterans, even after controlling for several characteristics through regression. This may indicate that military service provides veterans from disadvantaged backgrounds with increased social networks and occupational skills—a factor we cannot observe in the data—at a crucial time in their life. (Kleykamp, 2013; Sampson and Laub, 1996; Teachman and Tedrow, 2004, 2007; Tamborini et al., 2019). These social networks may lead to improved employment prospects and higher earnings in the civilian labor market following military service (Angrist, 1998; Greenberg et al., 2007; Kleykamp, 2013; Sampson and Laub, 1996; Teachman and Tedrow, 2007; Teachman, 2007).

Regression analyses examine the association between food insecurity and veteran status between 2005 and 2019, allowing new insights into how military service may influence food insecurity. Findings from the preferred regression model that adjusts for differences in the observable economic, demographic, and geographic characteristics of veterans and nonveterans suggest that veteran status is associated with the probability of living in a food-insecure household. Specifically, veteran status is associated with a 7.4-percent increase in the likelihood of living in a household with food insecurity and a 9.2-percent increase in the likelihood of living in a household with very low food security.

This raises the question of why veteran status is associated with an increased likelihood of living in a food-insecure household, given that veterans have resources available to them that are not accessible to nonveterans. This veteran disadvantage is not the result of differences in traditional economic and demographic factors associated with food insecurity because the regression models adjust for differences in a broad range of characteristics between veterans and nonveterans. The regression methodology employed in the analysis is not causal, so we cannot rule out the possibility that this finding is driven by differences in the unobservable characteristics of veterans and nonveterans that influence their capacity to generate economic resources or seek food and nutrition assistance.

Two plausible explanations exist for why veteran status can be positively associated with food insecurity. First, veterans use food and nutrition assistance at lower rates than similar nonveterans. Even though the participation rate for veterans in SNAP grew faster than the nonveteran participation rate between 2009 and 2012,

veterans participate in SNAP at lower rates than nonveterans (London and Hefflin, 2015; National Center for Veterans Analysis and Statistics, 2015). This is further exacerbated by the fact that less than one-third of food-insecure veterans live in households receiving SNAP benefits, and only 40 percent of veterans in households with incomes below the Federal poverty line received SNAP benefits (Pooler et al., 2018).

Second, younger veterans are at an increased risk of having a work-limiting disability compared with nonveterans. This is due to improvements in battlefield medicine and an increased exposure to improvised explosive devices resulting in veterans surviving more wounds that would have been mortal in previous eras (Wilmoth and London, 2020). Given that poor mental and physical health and working-limiting disabilities are associated with greater economic hardship and higher rates of food insecurity (Coleman-Jensen and Nord, 2013; Gregory and Coleman-Jensen, 2017; Gundersen et al., 2011), this could drive the increased risk of food insecurity among veterans. However, while the poverty rate of veterans with a work-limiting disability is higher than the rate for nonveterans, veterans who receive a Service-Connected Disability benefit from the VA have significantly lower poverty rates compared with nonveterans (National Center for Veterans Analysis and Statistics, 2015).

Several limitations to the analyses should be noted:

- We do not attempt to estimate the causal effect of veteran status on food insecurity. Rather, we explore the association between veteran status and food insecurity using regression models that do not correct for unobservable characteristics of veterans and nonveterans. Therefore, the finding should not be interpreted as causal.
- The data on veterans is based on self-reported veteran status, so measurement error may exist in the analyses. If this is non-classical measurement error, the estimates of the association between veteran status and food insecurity will be biased. In this report, non-classical measurement error occurs when measurement error in the reporting of veteran status is also correlated with food insecurity.
- Finally, we were not able to control for several characteristics related to a veteran's military service because they were not collected in the data. These include whether a veteran has a service-connected disability, received any VA benefits, the year a veteran completed military service, deployment history, or training records. These factors can affect veterans' food insecurity.

Future research should consider supplementing veterans' food insecurity and SNAP data with administrative data from the VA to better understand the relationship between veteran status and food insecurity and their participation in SNAP. Matching VA data with food insecurity data would also open new avenues for research on the determinants of veterans' food insecurity and allow initial studies of SNAP participation dynamics among veterans.

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## Appendix A. Summary of Literature Examining Food Insecurity Among Veterans

Table A.1

**Studies that examine the prevalence of food insecurity and food insufficiency among veterans**

Study	Data source	Population (sample size)	Measure(s) of food security (survey module)	Measure of veteran status	Food security/sufficiency prevalence estimates
Narain et al. (2018)	2014–2015 Women Veterans' Health Utilization and Experience Survey	Female veterans who had at least three primary care or women's health visits to VA Healthcare System (n = 818)	12-month food insufficiency <sup>1</sup>	Veteran status determined by VA	27.6 percent of female veterans were food insufficient
Pooler et al. (2018)	2011–2017 National Health Interview Survey	Veterans age 21 older (n = 25,000)	30-day adult food security	Self-reported veteran status	6.5 percent of veterans were food-insecure
Brostow, Gunzburger, and Thomas (2017)	2012 Health and Retirement Survey 2013 Health Care Nutrition Main Survey	Male veterans (n = 1,254)	12-month adult food security survey module (5-items with non-standard coding and category labeling)	Self-reported veteran status	6.4 percent of male veterans were food insecure
Miller et al. (2015)	2005–2013 CPS Food Security Supplement	U.S. households (n = 388,680)	12-month household food insecurity and very low food security (18-item Household Food Security Survey Module)	Households with at least one veteran (self or proxy reported)	8.4 percent of veterans were food-insecure and 3.3 percent had very low food security
Wang et al. (2015)	2002–2008 Veterans Aging Cohort Study	Veterans who are HIV negative with at least one health care visit in the VA Healthcare System (n = 6,709)	12-month food insufficiency question <sup>1</sup>	Veteran status determined by VA	24 percent of veterans were food insufficient
Wilmoth, London, and Heflin (2015)	2001 and 2004 panels of the Survey of Income and Program Participation	U.S. households (n = 9,528)	12-month food insufficiency question <sup>1</sup>	Veteran households (self or proxy reported)	Zero percent of non-disabled veterans were food insufficient and 0.86 percent of disabled veteran households were food sufficient

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Widome et al. (2014)	2012 survey of Minneapolis VA Health-care System	Veterans of the U.S. wars in Iraq and Afghanistan with at least one outpatient health care visit in the Minneapolis VA Health-care System and with a telephone number listed in the record (n = 865)	12-month adult food insecurity and very low food security (6-item Short Form Food Security Survey Module)	Veteran status determined by VA	26.8 percent of veterans were food-insecure and 12.1 percent had very low food security
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<sup>1</sup>Food insufficiency, in this context, is defined by the survey question “concern about having enough food for you or your family in the past month.” Food insufficiency is a more severe condition than food insecurity and measures whether a household generally has enough to eat. In this way, food insufficiency is closer in severity to very low food security than to overall food insecurity.

Source: USDA, Economic Research Service

## Appendix B. Detailed Description of Regression Methodology

For our regression analyses of food insecurity among veterans and nonveterans, we estimate censored regression models of the severity of adult food insecurity—a quasi-continuous measure of an adult household member’s latent severity of food insecurity based on the Rasch measurement model (Rasch 1960/1980)<sup>18</sup> to determine the association between veteran status and adult food insecurity while adjusting for differences in the economic, demographic, and geographic characteristics of the household and its members.<sup>19</sup> Specifically, we assume the severity of adult food insecurity (i.e., Rasch score),  $\theta_i$ , is related to the latent index of the severity of adult food insecurity, such that

$$\hat{\theta}_i = \begin{cases} \theta_i = \beta_{\text{Veteran}} \text{Veteran}_i + X_i' \beta_X + e_i, & \text{if } \beta_{\text{Veteran}} \text{Veteran}_i + X_i' \beta_X + e_i > c \\ c, & \text{if } \beta_{\text{Veteran}} \text{Veteran}_i + X_i' \beta_X + e_i \leq c \end{cases}$$

$$\hat{\theta}_i = \max(c, \theta_i)$$

where  $\theta_i$  is adult  $i$ 's latent severity of adult food insecurity,  $\text{Veteran}_i$  is an indicator for whether adult  $i$  is a veteran,  $X_i$  is a vector of observable control variables (described in the main text of the report),  $\beta_{\text{Veteran}}$  is a scalar coefficient that represents the association between veteran status and adult food insecurity, and  $\beta_X$  is a vector of coefficients that capture the associations between adult food insecurity and the other socioeconomic, demographic, and geographic determinants of adult food insecurity (described in the main text of the report).<sup>20</sup>

Censoring at the lower level of the continuum of the severity of adult food insecurity is denoted by  $c$ <sup>21</sup>, and  $e_i$  is assumed to be normally distributed with a mean of zero and variance  $\sigma^2$ . The lower value of the censoring is determined by the scaling of the continuum, which determines the severity of the adult food insecurity score assigned to each adult’s household that responds negatively to all the food insecurity questions (i.e., those with high food security). USDA assigns these households a score value of zero, therefore,  $c$  is zero here.<sup>22</sup> The resulting model is consistent with a Tobit model with lower-level censoring at zero (Tobin, 1958). We estimate the model parameters using maximum likelihood methods.

Estimated coefficients from the censored regression models of the severity of adult food insecurity can be used to construct average marginal changes in the severity of adult food insecurity that describe how marginal changes in the probability of food insecurity and very low food security are associated with changes in the explanatory variables (Rabbitt et al., 2020). Specifically, we use the following AME estimator proposed by Rabbitt et al. (2020) for use with food-insecurity Rasch scores

<sup>18</sup>See Bickel et al. (2000), Nord (2012), Rabbitt and Coleman-Jensen (2017), and Rabbitt et al. (2020) for more information on food insecurity measurement using the Rasch measurement model.

<sup>19</sup>For an in-depth treatment of the use of Rasch scores for empirical food insecurity research, see Rabbitt et al. (2020).

<sup>20</sup>Estimating a regression model using the Rasch score as a dependent variable is conceptually equivalent to the behavioral Rasch model (Moffitt and Ribar, 2016; Rabbitt, 2014; 2018; Rabbitt et al., 2020); however, there are limitations to this approach, which are discussed in detail in Moffitt and Ribar (2016), Rabbitt (2018), and Rabbitt et al. (2020).

<sup>21</sup>Households may also affirm all the food insecurity questions at the upper level of the latent continuum of adult food insecurity (i.e., those with the most severe type of very low food security); however, they are less prevalent in the Current Population Survey Food Security Supplement. Between 2005 and 2019, 0.8 percent of veterans in our sample lived in households that affirmed all the food insecurity questions. These households may also be censored depending on the methodology used to estimate the Rasch scale scores. For statistics on the distribution of response patterns to the food insecurity questions in the general population, see the Statistical Supplement to Household Food Security in the United States series (e.g., Coleman-Jensen et al., 2020b). For simplicity, we assume censoring at this point is negligible.

<sup>22</sup>This is consistent with the approach used by USDA for the U.S. adult food insecurity scale (Bickel et al., 2000).

$$\begin{aligned}
AME_i &= P(\hat{\theta}_i > \tau | Veteran_i = 1, X_i) - P(\hat{\theta}_i > \tau | Veteran_i = 0, X_i) \\
&= \Phi\left(\frac{\tau - (X_i'\beta)}{\sigma}\right) - \Phi\left(\frac{\tau - (\beta_{Veteran} + X_i'\beta)}{\sigma}\right),
\end{aligned}$$

where  $\Phi(\cdot)$  is the standard normal cumulative distribution function, and  $\tau$  is the threshold value determined by locating the appropriate cutoffs on the continuum of adult severity of food insecurity. We follow the USDA methodology, using the midpoint of the score values immediately above and below the food security status category of interest (food insecurity and very low food security here) to determine the threshold values for food insecurity and very low food security (see box, “Assessing the Food Security of Adults in the CPS Food Security Supplement” for the score values).

## Appendix C. Additional Results for Food Insecurity Among Working-Age Veterans and Nonveterans

Table C.1

**Working-age veterans and nonveterans by food insecurity and very low food security status, 2005–19**

Year	Veterans				Nonveterans			
	Food-insecure		Very low food security		Food-insecure		Very low food security	
	1,000	Percent	1,000	Percent	1,000	Percent	1,000	Percent
2005	1,157	8.3	469	3.4	17,306	10.3	6,564	3.9
2006	1,053	7.8	447	3.3	17,548	10.3	6,699	3.9
2007	839	8.5	351	3.6	13,989	10.7	5,336	4.1
2008	1,575	12.6	732	5.8	25,573	14.6	10,716	6.1
2009	1,464	12.0	705	5.8	26,500	15.0	11,086	6.3
2010	1,363	11.7	636	5.4	25,994	14.6	10,230	5.7
2011	1,437	12.7	708	6.2	26,383	14.7	11,019	6.1
2012	1,567	14.3	750	6.9	26,042	14.4	10,932	6.0
2013	1,465	14.6	699	6.9	26,370	14.4	10,773	5.9
2014	1,326	13.2	681	6.8	26,048	14.1	11,000	6.0
2015	1,237	13.0	599	6.3	22,852	12.3	9,795	5.3
2016	987	10.9	469	5.2	22,014	11.8	9,499	5.1
2017	1,054	11.3	446	4.8	21,134	11.3	8,285	4.4
2018	929	10.3	453	5.0	20,275	10.8	8,394	4.5
2019	867	9.8	467	5.3	18,820	10.0	7,743	4.1

Source: USDA, Economic Research Service calculations using data from the 2005–2019 Current Population Survey Food Security Supplements.



Table C.2

**Working-age nonveterans by food security status and selected household characteristics, 2015-19**

Category				Food-insecure					
	Total <sup>1</sup>	Food secure		All		With low Food security		With very low Food security	
		1,000	1,000	Percent	1,000	Percent	1,000	Percent	1,000
All working-age nonveterans	187,316	166,297	88.8	21,019	11.2	12,276	6.6	8,743	4.7
<b>Household composition:</b>									
With children < 18 years	77,647	68,120	87.7	9,527	12.3	6,044	7.8	3,483	4.5
With children < 6 years	33,285	28,992	87.1	4,293	12.9	2,717	8.2	1,576	4.7
Married-couple families	55,090	50,585	91.8	4,505	8.2	3,099	5.6	1,406	2.6
Female head, no spouse	15,755	11,864	75.3	3,891	24.7	2,278	14.5	1,613	10.2
Male head, no spouse	5,719	4,783	83.6	936	16.4	549	9.6	387	6.8
Other household with child <sup>2</sup>	1,083	888	82.0	195	18.0	118	10.9	77	7.1
With no children < 18 years	109,669	98,177	89.5	11,492	10.5	6,232	5.7	5,260	4.8
More than one adult	89,057	81,003	91.0	8,054	9.0	4,588	5.1	3,466	3.9
Women living alone	9,938	8,046	81.0	1,892	19.0	912	9.1	980	9.9
Men living alone	10,673	9,127	85.5	1,546	14.5	732	6.9	814	7.6
With elderly	19,678	17,591	89.4	2,087	10.6	1,256	6.4	831	4.2
<b>Household income-to-poverty ratio:</b>									
Under 1.00	17,797	11,579	65.1	6,218	34.9	3,283	18.4	2,935	16.5
Under 1.30	24,865	16,741	67.3	8,124	32.7	4,394	17.7	3,730	15.0
Under 1.85	40,100	28,666	71.5	11,434	28.5	6,387	15.9	5,047	12.6
1.85 and over	104,157	98,619	94.7	5,538	5.3	3,558	3.4	1,980	1.9
Income unknown	43,058	39,010	90.6	4,048	9.4	2,331	5.4	1,717	4.0
<b>Area of residence<sup>3</sup>:</b>									
Inside metropolitan area	163,277	145,628	89.2	17,649	10.8	10,387	6.4	7,262	4.4
In principal cities <sup>4</sup>	56,184	49,079	87.4	7,105	12.6	4,233	7.5	2,872	5.1
Not in principal cities	83,873	76,355	91.0	7,518	9.0	4,397	5.3	3,121	3.7
Outside metropolitan area	24,038	20,668	86.0	3,370	14.0	1,889	7.8	1,481	6.2
<b>Census geographic region:</b>									
Northeast	33,294	30,062	90.3	3,232	9.7	1,997	6.0	1,235	3.7
Midwest	38,939	34,574	88.8	4,365	11.2	2,458	6.3	1,907	4.9
South	69,780	61,150	87.6	8,630	12.4	4,960	7.1	3,670	5.3
West	45,302	40,510	89.4	4,792	10.6	2,860	6.3	1,932	4.3

<sup>1</sup>Totals exclude nonveteran adults for whom food security status is unknown because they did not give a valid response to any of the questions in the food security survey module. On average during the study period (2015-19), these exclusions represented 525,000 nonveteran adults (0.3 percent of all nonveteran adults).

<sup>2</sup>Adults living in households with children in complex living arrangements, e.g., children of other relatives or unrelated roommate or boarder.

<sup>3</sup>Metropolitan area residence is based on 2013 Office of Management and Budget delineation. Prevalence rates by area of residence are comparable with those for 2014 and later years but not precisely comparable with those of earlier years.

<sup>4</sup>Nonveteran adults living in households within incorporated areas of the largest cities in each metropolitan area. Residence inside or outside of principal cities is not identified for about 14 percent of nonveterans living in households in metropolitan statistical areas.

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Table C.3

**Working-age nonveterans by food security status and selected individual characteristics, 2015–19**

Category	Total <sup>1</sup> 1,000	Food secure 1,000    Percent		Food-insecure					
				All		With low food security		With very low food security	
				1,000	Percent	1,000	Percent	1,000	Percent
All working-age nonveterans	187,316	166,297	88.8	21,019	11.2	12,276	6.5	8,743	4.7
<b>Age:</b>									
18 to 24 years	28,865	25,153	87.1	3,712	12.9	2,162	7.5	1,550	5.4
25 to 34 years	42,796	37,725	88.2	5,071	11.8	3,075	7.1	1,996	4.7
35 to 44 years	38,466	34,199	88.9	4,267	11.1	2,520	6.6	1,747	4.5
45 to 55 years	38,758	34,684	89.5	4,074	10.5	2,351	6.1	1,723	4.4
55 to 64 years	38,431	34,537	89.9	3,894	10.1	2,167	5.6	1,727	4.5
<b>Gender:</b>									
Male	88,822	79,614	89.6	9,208	10.4	5,396	6.1	3,812	4.3
Female	98,494	86,682	88.0	11,812	12.0	6,880	7.0	4,932	5.0
<b>Race and ethnicity:</b>									
White, non-Hispanic	112,285	102,460	91.2	9,825	8.8	5,368	4.8	4,457	4.0
Black, non-Hispanic	23,204	18,665	80.4	4,539	19.6	2,619	11.3	1,920	8.3
Hispanic	34,737	29,553	85.1	5,184	14.9	3,430	9.9	1,754	5.0
Other, non-Hispanic	17,090	15,620	91.4	1,470	8.6	859	5.0	611	3.6
<b>Educational attainment:</b>									
Less than high school diploma	19,564	14,935	76.3	4,629	23.7	2,759	14.1	1,870	9.6
High school graduate, no college	51,202	43,434	84.8	7,768	15.2	4,511	8.8	3,257	6.4
Some college or associate degree	53,466	47,296	88.5	6,170	11.5	3,474	6.5	2,696	5.0
Bachelor's degree or higher	63,084	60,633	96.1	2,451	3.9	1,531	2.4	920	1.5
<b>Employment status:</b>									
Full time	113,874	104,856	92.1	9,018	7.9	5,645	4.9	3,373	3.0
Part time	22,746	19,791	87.0	2,955	13.0	1,772	7.8	1,183	5.2
For economic reasons	18,936	16,972	89.6	1,964	10.4	1,207	6.4	757	4.0
For non-economic reasons	3,810	2,819	74.0	991	26.0	565	14.8	426	11.2
Unemployed	6,046	4,501	74.4	1,545	25.6	809	13.4	736	12.2
Out of the labor force	44,649	37,148	83.2	7,501	16.8	4,050	9.1	3,451	7.7
Retired	7,788	7,220	92.7	568	7.3	349	4.5	219	2.8
Disabled	10,682	7,017	65.7	3,665	34.3	1,724	16.1	1,941	18.2
Not retired or disabled	26,179	22,912	87.5	3,267	12.5	1,976	7.6	1,291	4.9

<sup>1</sup>Totals exclude nonveteran adults for whom food security status is unknown because they did not give a valid response to any of the questions in the food security survey module. On average during the study period (2015–19), these exclusions represented 525,000 nonveteran adults (0.3 percent of all nonveteran adults).

Source: USDA, Economic Research Service calculations using data from the 2015, 2016, 2017, 2018, and 2019 Current Population Survey Food Security Supplements.

Table C.4

**Average marginal associations for food insecurity from Tobit regressions of the severity of adult food insecurity among working-age adults, 2005-19**

Variables	P(Food insecurity)			
	No controls	+ Economic characteristics	+ Economic and demographic characteristics	+ Economic, demographic, and geographic characteristics
<b>Working-age adult veteran characteristics</b>				
Working-age veteran	-0.016*** (0.001)	0.007*** (0.001)	0.009*** (0.001)	0.008*** (0.001)
<b>Working-age adult characteristics</b>				
Female			0.002*** (0.001)	0.002*** (0.001)
Age			0.003*** (0.000)	0.003*** (0.000)
Age squared			-0.000*** (0.000)	-0.000*** (0.000)
<b>Race and ethnicity</b>				
Black, non-Hispanic			0.023*** (0.002)	0.024*** (0.002)
Other race, non-Hispanic			0.002 (0.002)	0.001 (0.002)
Hispanic			0.015*** (0.001)	0.013*** (0.002)
Immigrant			-0.014*** (0.001)	-0.013*** (0.002)
Noncitizen immigrant			-0.007*** (0.002)	-0.007*** (0.002)
<b>Labor force participation status</b>				
Employed part time		0.009*** (0.001)	0.012*** (0.001)	0.012*** (0.001)
Unemployed		0.060*** (0.002)	0.061*** (0.002)	0.061*** (0.002)
Retired		-0.026*** (0.002)	-0.016*** (0.002)	-0.016*** (0.002)
Disabled		0.066*** (0.001)	0.067*** (0.002)	0.067*** (0.002)
Not in labor force		-0.009*** (0.001)	-0.004*** (0.001)	-0.004*** (0.001)
<b>Household characteristics</b>				
Household income relative to the poverty line		-0.057*** (0.001)	-0.053*** (0.001)	-0.053*** (0.001)
Household income relative to the poverty line squared		0.002*** (0.000)	0.002*** (0.000)	0.002*** (0.000)
Home owned or being purchased by a household member		-0.042*** (0.001)	-0.038*** (0.001)	-0.038*** (0.001)
Labor force participation status of other adult(s)				
Employed part time		0.003*** (0.001)	0.009*** (0.001)	0.009*** (0.001)
Unemployed		0.054*** (0.002)	0.058*** (0.002)	0.058*** (0.002)

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Retired		-0.023*** (0.001)	-0.015*** (0.002)	-0.015*** (0.002)
Disabled		0.052*** (0.002)	0.058*** (0.002)	0.058*** (0.002)
Not in labor force		-0.016*** (0.001)	-0.010*** (0.001)	-0.010*** (0.001)
<b>Educational attainment of highest educated adult</b>				
Less than high school		0.007*** (0.002)	0.009*** (0.002)	0.009*** (0.002)
Some college or an associate degree		0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)
Bachelor's degree or higher		-0.041*** (0.001)	-0.039*** (0.001)	-0.039*** (0.001)
<b>Household composition</b>				
Single female with child(ren)			0.032*** (0.002)	0.032*** (0.002)
Single male with child(ren)			0.009*** (0.003)	0.009*** (0.003)
Other household with child(ren)			0.014*** (0.005)	0.014*** (0.005)
Multiple adults without children			0.006*** (0.002)	0.006*** (0.002)
Female living alone			0.010*** (0.002)	0.011*** (0.002)
Male living alone			0.038*** (0.003)	0.038*** (0.003)
At least one elderly member in household			-0.009*** (0.002)	-0.009*** (0.002)
At least one elderly veteran in household	-0.043*** (0.003)	-0.016*** (0.003)	-0.010*** (0.004)	-0.010*** (0.004)
Number of adults			0.003*** (0.001)	0.003*** (0.001)
Number of children			0.001** (0.001)	0.001* (0.001)
<b>Area of residence<sup>1</sup></b>				
Suburban metropolitan area				0.003*** (0.001)
Unidentified metropolitan area				0.003** (0.002)
Nonmetropolitan (rural) area				-0.005*** (0.001)
State unemployment rate		0.067* (0.036)	0.045 (0.036)	0.313*** (0.060)
State fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes
Log-likelihood	-165,797.47	-145,895.10	-145,488.14	-145,367.64
Number of working-age adults	792,016	792,016	792,016	792,016

Note: All standard errors (in parentheses) are robust to heteroskedasticity and clustered by state of residence.

\* Significant at 0.1 level. \*\* Significant at 0.05 level. \*\*\* Significant at 0.01 level.

<sup>1</sup>Metropolitan area of residence is based on 2013 Office of Management and Budget delineation.

Source: USDA, Economic Research Service calculations using data from the 2005–2019 Current Population Survey Food Security Supplements.

Table C.5

**Average marginal associations for very low food security from Tobit regressions of the severity of adult food insecurity among working-age adults, 2005-19**

Variables	P(Very low food security)			
	No controls	+ Economic characteristics	+ Economic and demographic characteristics	+ Economic, demographic, and geographic characteristics
<b>Working-age adult veteran characteristics</b>				
Working-age veteran	-0.009*** (0.001)	0.004*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
<b>Working-age adult characteristics</b>				
Female			0.001*** (0.000)	0.001*** (0.000)
Age			0.002*** (0.000)	0.002*** (0.000)
Age squared			-0.000*** (0.000)	-0.000*** (0.000)
<b>Race and ethnicity</b>				
Black, non-Hispanic			0.013*** (0.001)	0.014*** (0.001)
Other race, non-Hispanic			0.001 (0.001)	0.001 (0.001)
Hispanic			0.009*** (0.001)	0.008*** (0.001)
Immigrant			-0.008*** (0.001)	-0.007*** (0.001)
Noncitizen immigrant			-0.004*** (0.001)	-0.004*** (0.001)
<b>Labor force participation status</b>				
Employed part time		0.005*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
Unemployed		0.036*** (0.001)	0.036*** (0.001)	0.036*** (0.001)
Retired		-0.014*** (0.001)	-0.009*** (0.001)	-0.009*** (0.001)
Disabled		0.039*** (0.001)	0.040*** (0.001)	0.040*** (0.001)
Not in labor force		-0.005*** (0.001)	-0.002*** (0.001)	-0.002*** (0.001)
<b>Household characteristics</b>				
Household income relative to the poverty line		-0.032*** (0.000)	-0.030*** (0.000)	-0.030*** (0.000)
Household income relative to the poverty line squared		0.001*** (0.000)	0.001*** (0.000)	0.001*** (0.000)
Home owned or being purchased by a household member		-0.023*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)

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<b>Labor force participation status of other adult(s)</b>				
Employed part time		0.002*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
Unemployed		0.032*** (0.001)	0.035*** (0.001)	0.035*** (0.001)
Retired		-0.013*** (0.001)	-0.008*** (0.001)	-0.008*** (0.001)
Disabled		0.031*** (0.001)	0.034*** (0.001)	0.034*** (0.001)
Not in labor force		-0.009*** (0.001)	-0.005*** (0.001)	-0.006*** (0.001)
<b>Educational attainment of highest educated adult</b>				
Less than high school		0.004*** (0.001)	0.005*** (0.001)	0.005*** (0.001)
Some college or an associate degree		0.000 (0.001)	0.000 (0.001)	-0.000 (0.001)
Bachelor's degree or higher		-0.022*** (0.001)	-0.021*** (0.001)	-0.021*** (0.001)
<b>Household composition</b>				
Single female with child(ren)			0.018*** (0.001)	0.018*** (0.001)
Single male with child(ren)			0.005*** (0.001)	0.005*** (0.001)
Other household with child(ren)			0.008*** (0.003)	0.008*** (0.003)
Multiple adults without children			0.004*** (0.001)	0.004*** (0.001)
Female living alone			0.006*** (0.001)	0.006*** (0.001)
Male living alone			0.022*** (0.002)	0.022*** (0.002)
At least one elderly member in household			-0.005*** (0.001)	-0.005*** (0.001)
At least one elderly veteran in household	-0.022*** (0.002)	-0.009*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)
Number of adults			0.002*** (0.000)	0.002*** (0.000)
Number of children			0.001** (0.000)	0.001* (0.000)

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<b>Area of residence<sup>1</sup></b>				
Suburban metropolitan area				0.002*** (0.001)
Unidentified metropolitan area				0.002** (0.001)
Nonmetropolitan (rural) area				-0.003*** (0.001)
State unemployment rate		0.038* (0.020)	0.025 (0.020)	0.176*** (0.034)
State fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes
Log-likelihood	-165,797.47	-145,895.10	-145,488.14	-145,367.64
Number of working-age adults	792,016	792,016	792,016	792,016

Note: All standard errors (in parentheses) are robust to heteroskedasticity and clustered by state of residence.

\* Significant at 0.1 level.      \*\* Significant at 0.05 level.      \*\*\* Significant at 0.01 level.

<sup>1</sup>Metropolitan area of residence is based on 2013 Office of Management and Budget delineation.

Source: USDA, Economic Research Service calculations using data from the 2005–2019 Current Population Survey Food Security Supplement.