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Food Insecurity among UK Veterans

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Keywords. Food security, hunger, armed forces compensation, veteran aid, veteran transition

Biographies.

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Margaret Anne Defeyter is a professor of psychology at the University at Northumbria in Newcastle (UK). She is Director of Healthy Living and teaches and conducts research on issues of food security, public voice and school food. Professor Defeyter serves on various non-profit boards, including Feeding Britain and has published over 100 papers and government reports. Her most recent book published in 2021 with Michael Long and Paul Stretesky (Routledge) is entitled *Holiday Hunger in the UK: Local Responses to Childhood Food Insecurity* and examines increasing trends in UK food insecurity among children and state responses to those trends.

Food Insecurity among UK Veterans

Abstract

This research compares food insecurity for UK veterans and non-veterans using the USDA 10-item Adult Food Security Survey Module (AFSSM) for a sample of 1,492 participants. We find 1 in 10 veterans are living in a food insecure household, but that veteran status is not related to food insecurity. In addition, income and housing benefits are correlated with food insecurity for veterans and for non-veterans, but disability benefits are correlated with food insecurity among veterans only. Specifically, veterans with disability benefits averaged 1.12 (95% CI, 0.42-1.82) more points (indicating more food insecurity) on the AFSSM than veterans without those benefits. These findings raise concerns that low-income disabled veterans with housing needs are a unique population at risk of living in food insecurity. Given the absence of research on food insecurity among UK veterans it is necessary to study this population in greater detail and implement screening protocols where possible.

Keywords: Food security, hunger, veteran aid, veteran transition, Armed Forces Covenant, Veterans' Strategy Action Plan

Introduction

Food insecurity is unevenly distributed within the UK population and disproportionately affects people because of their race, ethnicity, gender, age, income, disability status and the area of residence.¹ What is missing from these distributional studies of food insecurity is an analysis of military veterans and whether they are more likely to be food insecure than non-veterans.² The paucity of UK veteran research on food insecurity is notable given (1) the UK government's emphasis on the physical and mental wellbeing of veterans, especially as emphasized in recent initiatives by the Armed Forces Covenant and the Office of Veterans' Affairs (2) the disproportionate number of military personnel who come from socio-economic hardship often characterized by food insecurity prior to enlisting and (3) the high prevalence of conditions in the veteran population that are often associated with food insecurity such as poor mental health, drug/alcohol addiction and/or physical disabilities.³ As a result, we suggest that food insecurity among the veteran population deserves additional study.

From a policy standpoint, food insecurity among veterans is important to understand because it is often correlated with problems that may be prevalent when leaving military service. For instance, Forces in the Mind Trust (2013) estimates that transitioning from military to civilian life costs the UK government roughly £100 million annually as veterans face alcohol misuse (£35 million), mental health problems (£26 million), are unable to find employment (£21 million), become homelessness (£5.5 million) and often cope with family breakdown (£16 million). To address the health concerns associated with food insecurity the UK's National Health Service (NHS, 2019:119) states that they will 'expand support for all veterans as they transition out of the armed forces' by 2023-2024 fiscal year as part of The Long Term Plan. To ensure the Plan is a success, Fadeeva et al., (2022) contend decision-makers need to better document evidence that may contribute to health challenges. As Lieutenant General Richard Nugee of the Ministry of Defence recently pointed out, 'policy

makers and service providers [must] consider the Armed Forces community from an evidence-based position' (Cited in Doherty, Robson and Cole, 2020, iv). We propose that part of this evidence-based must include an investigation into veterans' food insecurity.

The present study addresses three important questions about veteran food insecurity. First, how prevalent is food insecurity among UK veterans and how does it compare to the non-veteran population? Second, is veteran status correlated with UK food insecurity while controlling for other potential explanations of food insecurity? Third, what variables, if any, are uniquely correlated with food insecurity scores in the UK veteran population when compared to the non-veteran population? Prior to describing the methods used to answer these three questions we explore the definition of food insecurity and its hypothesized relationship to veteran status in greater detail.

Prior Research on Veterans and Food Insecurity

We begin our study of veterans and food insecurity by defining what it means to be food secure. Food security exists when 'all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their food preferences and dietary needs for an active and healthy life' (Food and Agricultural Organization, 2002:190). Individuals who are not food secure are food insecure, a situation that affects approximately 1 in 6 adults in England, Wales and Northern Ireland (Armstrong et al., 2021a; 2021b, see also Pool & Dooris, 2022). Food insecurity is correlated with a number of adverse health related conditions such as anemia, poor mental health, depression, anxiety, suicidal ideation, drug and alcohol addiction, tooth decay and other oral health problems, diabetes, high hypertension and obesity (Boateng et al., 2020; Bruker, 2017; Cook et al., 2004; Garthwaite et al., 2015; Gundersen and Ziliak 2015; Kamdar, Horning et al., 2021; Lee et al., 2012; McIntyre et al., 2013; Martinez et al., 2019; Seligman et al., 2007; Whitaker et al., 2006). As previously noted, existing data sources on food insecurity and veteran status are non-existent in the UK (except see Sharp et al., 2021). The two major UK surveys that collect data on food

insecurity are the *Food and You* survey (<https://www.food.gov.uk/research/food-and-you>) conducted in England, Wales and Northern Ireland by the Food Standards Agency and the *Family Resources Survey* (<https://www.gov.uk/government/statistics/family-resources-survey-financial-year-2019-to-2020>) carried out by the UK Department of Work and Pensions. These two national surveys do not include a data field on veteran status.

Consequently, researchers cannot use these conventional datasets to study the prevalence of food insecurity in the veteran population. This omission of veteran status in large national studies that measure food insecurity may help explain why there is a lack of research on veteran status and food insecurity in the UK. To be sure, research on the prevalence and predictors of food insecurity among veterans does exist in countries outside of the UK where secondary data on food insecurity and veteran status are more readily available. As a result, we draw upon this existing literature to create two tentative hypotheses about food insecurity among UK veterans.

Outside of the UK, existing research on the prevalence of food insecurity suggests that between 2% and 26% of U.S. military veterans are food insecure (Brostow, Gunzburger and Thomas, 2017; Miller et al., 2016; Pooler et al., 2021; Rabbitt and Smith, 2021). For instance, Brostow, Gunzburger and Thomas (2017) found that 6.4% of the 2,560 male veterans they studied were food insecure compared to 11.9% of the non-veteran males. In a study of 388,680 US households in the *US Population Survey – Food Security Supplement*, Miller et al. (2016) also found that veterans were less likely to live in food insecure households (11.7% of the sample) than non-veterans (19.8% of the sample). In another study of food insecurity Kamdar et al., (2021) compared 155 veterans to 310 non-veterans and found that veteran-status and food insecurity were unrelated. Nevertheless Kamdar et al., report that veterans who were food insecure tended to be classified as ‘severely food insecure’ while non-veterans who were food insecure tended to be classified as ‘moderately food insecure’, suggesting that food insecurity may be more serious when veterans

experience that condition. Rabbitt and Smith (2021) conducted one of the few studies that supplies evidence that veterans may have a higher risk of food insecurity than non-veterans. They point out that food insecurity among veterans who served in 911 Gulf War have higher levels of food insecurity than non-veterans (see also Widome et al., 2015).

Overall, except in the case of post-911 Gulf War, studies of food insecurity among the US veteran population suggest that veterans have equivalent or lower levels of food insecurity than non-veterans. This finding is not necessarily unexpected as military service can improve educational attainment and therefore lead to more ‘human capital’ and better financial wherewithal to withstand problems associated with financial hardships (Wang, Elder and Spence, 2012). An increase in human capital could therefore reduce food insecurity later in life when transitioning from the military to civilian life. Military service can also improve economic and personal gains after leaving the service and therefore reduce the probability of being food insecure (Spiro, Settersten and Aldwin, 2016). Finally, retired veterans that stay in service long enough often benefit from significant pension income and can have more financial resources than non-veterans – improving financial access to food after they retire from service (Tamborini, Purcell and Olsen, 2016). Based on this research we hypothesize that the prevalence of food insecurity is lower among the UK veteran population than among the UK non-veteran population.

Researchers have also examined factors that influence food insecurity in veterans only samples. Brostow et al. (2017) established that younger veterans had higher levels of food insecurity than older veterans. Miller et al., (2016) also found higher levels of food insecurity among younger veterans and recommends that food insecurity interventions should therefore target this unique population. Pooler et al., (2021) found that 22.5% of the 5,146 low-income veterans they studied reported elevated levels of food insecurity. Moreover, veterans who were unemployed and/or receiving benefits were more likely to be food insecure than those who were employed and not on benefits (see also Wang et al., 2015). Research on the impact

of gender, veteran status and food insecurity is also revealing. Female veterans have higher levels of food insecurity than male veterans (Narain et al., 2018; Yasmin et al., 2020). These persistent gender findings exist despite controls for income. Pooler et al. (2021) found that low-income female veterans had higher levels of food insecurity than low-income male veterans (29.6% vs 21.8%). Research is also clear that disabled veterans are more likely than non-disabled veterans to experience food insecurity. Pooler et al. (2021) observed that about 1 in 4 disabled veterans are food insecure (vs. 17.2% for non-disabled veterans) while Wilmoth, London and Heflin (2015) estimate that disabled veterans are 3.72 times more likely to be food insecure than non-disabled veterans.

In sum, and as Cohen et al.'s (2022) research illustrates, food insecurity is highest among those veterans who are racial/ ethnic minorities, women, low-income, single, disabled, and/ or that lack adequate housing. It is likely that many of these factors are also related to food insecurity in the non-veteran population (Department for Environment, Food and Rural Affairs, 2021). Given the current state of research on veterans' characteristics associated with food insecurity we hypothesize that UK veterans with the highest levels of food insecurity will be those that are (1) low-income (2) racial/ ethnic minorities (3) working age (4) female (5) unemployed (6) physically or mentally disabled and/ or (7) on benefits.

While research on the prevalence of food insecurity in the UK veteran population is virtually non-existent, one important UK-based study did account for veteran's food insecurity as an independent variable. Sharp et al. (2021:1) found that 'a [unique] group of [UK] veterans need mental health and alcohol treatment services.' Among the factors Sharp et al. (2021) identify as potentially *indicative* of vulnerable veteran status is food insecurity. Sharp found that 2% (or n=31) of the 1,562 UK veterans in the sample agreed that they 'had difficulty accessing enough food.' This food insecurity (vs. no food insecurity) in the veteran population was associated with an increase in the odds of (1) experiencing a common mental disorder by a factor of 2.32, (2) engaging in hazardous drinking by a factor of 1.64 and (3) an

increase in feeling lonely by a factor of 3.91. As a result, Sharp et al.'s study gives researchers an important first glimpse into the prevalence of food insecurity among UK veterans. Thus, the current study builds on Sharp et al.'s (2021) findings to focus on food insecurity in the UK veteran population as a dependent variable.

Methods

Sample

The present study employed a cross-sectional survey design to study veterans in UK, non-veterans and food insecurity. We relied on YouGov (www.YouGov.com) to collect survey data in June 2022. YouGov is an international research data and analytics group that engages in marketing research. YouGov recruited the participants for this study from their online survey platform consisting of over one million adults living in England, Scotland and Wales.⁴ The company used stratified random sampling methodology on their representative participant platform to create a group of veterans and a group of non-veterans that could be compared for the purposes of this study. YouGov accomplished this by taking two samples. The first sample is a stratified random sample (proportionate to size) of n=1,000 UK adults aged 18 and older that YouGov selected according to age, gender, social class, education and country of residence (i.e., England, Scotland or Wales). A total of n=927 non-veterans and n=73 veterans come from this sample. The n=73 veterans made up 7.3% of the that sample, an estimate of the proportion of the UK veteran population that is only slightly greater than the Ministry of Defence (2019) estimate of 5% in England, Wales and Scotland. To increase the number of veterans in this study, YouGov obtained an additional random sample of military veterans. Participants in this second sample were screened into the sample according to veteran status using the question *'have you previously served in the armed forces? (i.e., British Army, Royal Navy, Royal Air Force, the Royal Marines).'*' A total of n=492 veterans make up that second sample.

Our sampling strategy consisted of combining veterans (n=565) and non-veterans (n=927) to compare food insecurity between and within these two groups. Because veterans had a greater probability of being included in the joint sample, adjustments were needed so that estimates are unbiased (Tracy & Carkin, 2014). As a result, when we analyzed veterans and non-veterans together (i.e., all n=1,492 cases) we utilized post-estimation weights to account for the over-representation of veterans in the sample. We did not, however, weight cases when veterans and non-veterans were analyzed separately. In that case both groups were treated as separate samples chosen randomly to accurately reflect their respective target populations.

YouGov collected data on food security and combined it with existing demographic data held in their platform. YouGov informed all survey respondents that their participation in the food security study was voluntary and that their answers would be kept confidential and only presented to others in aggregate. In addition, YouGov anonymized data so it could not be used to identify individuals who completed the survey. The Northumbria University Ethics Panel (Submission no. 45803) approved our use of the YouGov data used in this study on 4 May 2022.

Variables

Food Insecurity

There are two primary food insecurity variables used in this research. Both variables are created using items that compose the United States Department of Agriculture (USDA) 10-item Adult Food Security Survey Module or AFSSM (USDA, 2013). The AFSSM is a well-known source for measuring food insecurity and items in the module have been confirmed (Nord, Andrews, & Carlson, 2009). Importantly, both measures of food insecurity used in this study are created using scoring protocols set out in the AFSSM by the USDA that have been used in research on food insecurity around the globe (Baer et al., 2015; Ding et al., 2015; Kelly and Pemberton, 2016; Nicolaus, Ellison and Nickols-Richardson,

2019). Also, in the UK the AFSSM is also used by the UK's Department of Work and Pensions in their *Family Resource Survey* to get an official government measure of food insecurity. We also use the AFSSM to create two different food insecurity variables because Kamdar et al. (2021) suggests that changing the way food insecurity is operationalized can produce different results. Consistency across these variables would therefore help to provide additional evidence that the AFSSM is a reliable and valid indicator of food insecurity in the present study.

We labeled the first food insecurity variable the *Food Insecurity Scale*. This variable is a measure of the level of food insecurity in households over the past 30 days and is summarized on a scale of '1' (no food insecurity) to '10' (high food insecurity) in the participants household during the past 30 days. To create the scale each affirmative answer to an item (see Appendix A for the 10 items) shows a greater amount of food insecurity. The scores on the scale were calculated by assigning "1" point to each affirmative answer and then summing those points up for the overall measure.

The second food insecurity variable is dichotomous and labeled *Food Insecurity Indicator*. Participants who answered affirmatively to 3 or more of the 10 items on the AFSSM were classified as living in a 'food insecure' household and assigned a score of '1' while participants who answered affirmatively to 2 or fewer AFSSM items were assigned a score of '0' and classified as not living in a food insecure household. This scoring system is consistent with the AFFSM scoring categories that assign scores of 3 or above on the AFSSM as having low or very low food security.

Veteran Status

Veterans Status identifies whether a participant served in the UK military (scored '1' for 'yes' and '0' for 'no'). We used *Veteran Status* to examine the prevalence of food insecurity among the veteran population and determine the impact of veteran status on food insecurity while controlling for other variables that may influence food insecurity.

Control Variables

In addition to veteran status, basic demographic variables referenced in the veteran food security literature and believed to potentially impact food insecurity were obtained from YouGov. Gender, BAME (Black/Asian/Minority/Ethnic) status, age, education, relationship status, number of dependent children, annual income, employment status, receipt of benefits and country of residence were all included in this analysis of food security. *Gender* indicates whether the participant is female (scored '1' for 'yes' and '0' for 'no'); *Race/Ethnicity* measures whether the participant is classified as BAME by the UK government and scored '1' for BAME and '0' for non-BAME. *Education* measures the participant's education level at the UK General Certificate of Secondary Education (or equivalent in Scotland) or below (scored '1' for 'yes' and '0' for 'no'). *Divorced/Separated* is scored '1' for those who are divorced or separated and '0' for those who are not divorced/separated. *Age* is a four-category ordinal variable ('1' = '18 to 24'; '2' = '25 to 39'; '3' = '40 to 54'; and '4' = '55+'). Finally, *No. Dependent Children* is a count of the number of dependent children living in the participant's household. Resource related variables that might impact income also include *Annual Gross Household Income* which is an ordinal variable composed of 15 income categories ranging from '£0 - £5,000' (scored '1') to '£150,000 and Over' (scored '15'); *Employment Status* is a dummy variable that compares employed (full time or part time) participants (omitted category) to those who are classified as 'Retired' (scored "1" if retired and '0' if not retired) or 'Unemployed/Not Working' (scored '1' if unemployed/not working and '0' if not unemployed/working). *Universal Credit*, *Disability Benefits* and *Housing Benefits*, are all dichotomous variables and are scored '1' if the participant receives that benefit and '0' if the participant does not receive that benefit. As previously noted, disabilities may be an important predictor of veteran food insecurity (Wilmoth, London & Heflin, 2015). Finally, *County* is a dummy variable where England (omitted category) is compared to *Scotland* ('1' if participant lives in Scotland and '0' if not) and *Wales* (scored '1'

if participant lives in Wales and '0' if not). The minimum values, maximum values, means, proportions, medians and number of missing values are included in Appendix B for all variables in this analysis.

Analytic Procedure

The aims of the present study were to (1) estimate and compare the prevalence of food insecurity among UK veterans and non-veterans, (2) determine if veteran status is associated with food security while controlling for potential confounders and (3) identify any unique risk factors associated with food insecurity in the veteran population. First, we estimated the prevalence of food insecurity among UK veterans for the *Food Insecurity Scale* and the *Food Insecurity Indicator*. We did this by computing the mean *Food Insecurity Scale* score for veterans and non-veterans (and compared them using t-tests for independent samples) and the proportion of veterans and non-veterans who are identified as food insecure according to the *Food Insecurity Indicator* (and compared them using a z-test for proportions)

Second, we examine the relationship between veteran status and food insecurity using multivariate regression to control for other variables that may be correlated with food insecurity. We use Ordinary Least Squares Regression (OLSR) for the dependent variable *Food Insecurity Scale* and Logistic Regression (LR) for the dichotomous dependent variable *Food Insecurity Indicator*. As previously noted, veterans were oversampled so weights are used to account for the disproportionate number of veterans in the sample. Third, we identify any unique risk factors associated with food insecurity in the veteran population by using multivariate analyses to separately analyze food insecurity among the veteran and non-veteran groups. We then compared the results of those analyses to decide if predictors of food insecurity differed across the two groups. All analyses are carried out using STATA (v.15).

A total of n=327 (i.e., 21.8%) participants were excluded from the analysis using listwise deletion because they are missing YouGov observations on *Gross Household*

Income. There is a risk that participants who did not respond to the income question are different from those that did respond. These differences could therefore produce biased estimates. To investigate this issue in greater detail, Appendix C contains replicated models for all multivariate analysis, except that *Gross Household Income* is removed from the analysis to determine the impact it may have on other model coefficients when all the case are analyzed. Removing income from the model decreases the percentage of missing participants to less than 10% in the veteran sample without substantively changing coefficients or confidence intervals for variables remaining in the model. Thus, as indicated in Appendix C, missing data on income do not appear to substantively alter the correlations between food insecurity, veteran status and/or other variables in the models. Moreover, when we estimated the missing observations for income by imputing them using the ‘*Mi Impute*’ command in STATA (not shown) the relationship for income and remaining variables in the models also do not change. Thus, missing data are likely to be randomly missing and therefore are not likely to systematically bias the results.

Results

Prevalence of Food Insecurity by Veteran Status

Table 1 shows the distribution of food insecurity by veteran status. First, information in Table 1 supplies modest evidence that the UK veteran and non-veteran population have similar prevalence of food insecurity. For the variable *Food Insecurity Indicator*, 10.0% (95% CI, 7.6% to 12.5%) of veterans answered in a way that suggests that they were living in food insecure households during the previous 30 days compared to 18.3% (95% CI, 15.9% to 20.9%) of non-veterans. These results fall just short of statistical significance at $\alpha=0.05$ (i.e., $p=0.055$). Results do, however, show that for the variable *Food Insecurity Scale* veterans answer affirmatively to fewer of AFSSM items, on average, than non-veterans. Veterans answer affirmative to an average of $\bar{x} = 0.69$ (95% CI, 0.54 to 0.86) questions (i.e., scoring an average of 0.69 on the *Food Insecurity Scale*) while non-veterans give an affirmative

response to an average of $\bar{x} = 1.26$ (95% CI, 1.09 to 1.42) questions (i.e., scoring an average of 1.26 on the *Food Insecurity Scale*). These results concerning the *Food Insecurity Scale* are statistically significant. Taken together, then, Table 1 contains evidence that if veteran and non-veteran populations have different magnitudes of food insecurity it is veterans who have lower average Food Insecurity Scale scores.

[Table 1 About Here]

Overall, two important findings may be gleaned from Table 1. First, as a group, UK veterans appear to have lower than average food insecurity scores than non-veterans on the food insecurity scale. This finding is consistent with that produced by Sharp et al. (2021) using their one item measure of food insecurity among veterans. Second, veterans have the same, if not lower, prevalence of food insecurity as non-veterans. While findings for the variable *Food Insecurity Indicator* fall short of statistical significance the results do not contradict findings of previous literature on veteran status and food insecurity (Brostow et al., 2017; Miller et al., 2016). While Table 1 contains evidence that veterans and non-veterans are not that different when it comes to food insecurity, the bivariate analyses did not adjust for other factors that might influence the distribution of food security across the two groups. As previous literature indicates, controlling for other variables while examining the correlation between veteran status and food insecurity matters and can alter findings (Rabbitt and Smith 2021). Therefore, the next step in the study explored whether veteran status is correlated with the *Food Insecurity Scale* and/ or the *Food Insecurity Index* while adjusting for other variables previously identified as important in the veteran food security literature.

Regression of Food Insecurity by Veteran Status

Multivariate regression results for *Food Insecurity Scale*, *Food Insecurity Indicator*, *Veteran Status* and control variables are shown in Table 2. That table contains regression coefficients (‘coef.’ – for the OLSR), odds ratios (‘OR’ – for the LR) and 95% confidence intervals (95% CI). As expected, the set of predictor variables in Table 2 are consistent across

Models 1 and 2 as they represent alternative measures of the concept food insecurity. Models 1 and 2 also explain a modest amount of variance in food insecurity, implying that both models are specified correctly. Model 1, for instance, explains 29% of the variance in the *Food Insecurity Scale* while Model 2 explains 23% of the variance (i.e., Cox-Snell R^2) in the *Food Insecurity Indicator*.

[Table 2 About Here]

Turning to Table 2 and the analyses of veteran status on food security while controlling for added predictors we find little evidence that veteran and non-veteran populations are different. This is the case because (1) *Veteran Status* and the *Food Insecurity Scale* are not correlated (Model 1) and (2) *Veterans Status* and *Food Insecurity Indicator* are not correlated (Model 2). It does not appear that veterans are any more food insecure than the non-veterans. These findings confirm previous findings in the US by Kamdar et al. (2021).

While veteran status is not correlated with food insecurity, other variables in Table 2 do stand out as potentially important. As *Age* increases across the sample, for instance, food insecurity decreases (Model 1). Retirement status (vs. employed full/ part time) is also correlated with food insecurity. Being retired is associated with answering affirmative to between 0.42 and 1.19 fewer questions on the AFFSM when compared to being employed. Being retired is also associated with a decrease in the odds of living in a food insecure household by a factor 0.21 (OR 95% CI, 0.12 to 0.40). Table 2 also contains evidence that income and food insecurity are correlated. As income increases across the sample, food insecurity decreases ($b=-0.12$ [95% CI, -0.21 to -0.11]). The most substantial predictors of food insecurity in Table 2 are for the variables *Universal Credit* and *Housing Benefit*. Receipt of *Universal Credit* is associated with an increase in the *Food Insecurity Scale* by 2.99 points (95%CI, 2.29 to 3.69) across the sample while receipt of *Housing Benefit* is associated with an increase in *Food Insecurity Scale* by 2.60 points (95%CI, 2.79 to 3.49) across the sample. Both variables also are correlated with the *Food Insecurity Indicator*, increasing the odds of

living in a food insecure household by a factor of 6.17 (95% CI, 2.83 to 13.44) for *Universal Credit* and a factor of 12.27 (95% CI, 5.45 to 27.65) for *Housing Benefit*. In sum, while veteran status does not appear to be correlated with food insecurity, economic conditions are, as might be expected, especially important in predicting the *Food Insecurity Scale* and the *Food Security Indicator* among the entire UK population.

Regression of Food Insecurity Across Veterans and Non-Veterans

We utilized multivariate regression to analyze veterans and non-veterans separately. Those results are shown in Table 3 (Models 3 and 4). Table 3 shows that the coefficients for the veteran and non-veteran samples are similar for *Gross Household Income* and *Employment Status*. The correlation between *Housing Benefits* and the *Food Insecurity Scale* is also analogous between the two groups in that receiving housing benefit (vs. not receiving a housing benefit) is associated with an increase of 1.27 points (95% CI, 0.51 to 2.02) on the *Food Insecurity Scale* among veterans and an increase of 2.88 points (95% CI, 1.97 to 3.78) in the *Food Insecurity Scale* across non-veterans.

There are, however, also differences between veterans and non-veterans. Model 4 shows that *Age* is negatively correlated with food insecurity among non-veterans. Thus, younger civilians are more likely to live in a food insecure household than older civilians. Moreover, being in receipt of *Universal Credit* is significantly and positively correlated with the *Food Insecurity Scale* for non-veterans only (b=3.02 [CI 95%, 2.13 to 3.90]).

[Table 3 About Here]

Another notable difference between the veterans and non-veterans is for the variable *Disability Benefits*. In the case of veterans, *Disability Benefits* are positive and statistically significant. Veterans who receive disability benefits have higher levels of food insecurity on the *Food Insecurity Scale* than those who are not receiving such benefits (i.e., b=1.12 [CI 95%, 0.42 to 1.82]). *Disability Benefits*, however, are unrelated to food insecurity scores for non-veterans (i.e., b=0.55 [CI 95%, -0.22, 1.31]). This finding implies that in the UK disabled

veterans are a potentially unique population at risk of food insecurity. This correlation between disability benefits and food insecurity among UK veterans is notably comparable to findings in the US by Wilmoth et al. (2015). Thus, the analysis of food insecurity among UK veterans shows there are some differences in risk factors among veterans and non-veterans.

Table 4 repeats the analysis in Table 3, except that the outcome variable is now *Food Insecurity Indicator* and modeled using LR. Table 4 correlations replicate the correlations in Table 3 in that similar predictor variables are statistically significant across veterans and non-veterans. For instance, increased income (Model 5: OR=0.64 [95% CI 0.54 to 0.77]; Model 6: OR=0.8, [95% CI, 0.74 to 0.87]) and retirement (Model 5: OR=0.34, [95% CI 0.12 to 0.91]; Model 6: OR=0.21 [95% CI, 0.09 to 0.45]) decrease the odds of experiencing food insecurity.

[Table 4 About Here]

Table 4, like Table 3, also shows some differences between veterans and non-veterans. However, while disability benefits were a significant predictor of food insecurity in Table 3 it falls just short of statistical significance in Table 4. That is, veterans receiving disability benefits are more likely to be food insecure (OR=2.07 [$p < 0.10$; 95% CI, 0.72 to 5.99]) only when $\alpha = 0.10$. These results are, nevertheless, similar to the findings in Table 3 that show disability benefits are correlated with an increase in the level of food insecurity across the sample (Model 3). In addition, *Universal Credit* is associated with an increase in the odds that non-veterans will experience food insecurity by a factor of 6.32 (95% CI, 2.37 to 16.85). However, *Universal Credit* is not associated with *Food Insecurity Indicator* in veterans. Finally, non-veterans receiving housing benefit are more likely to live in food insecure households (Model 6: OR=13.62, 95% [4.7 to 39.4]). This same correlation only occurs in the veteran sample when $\alpha = 0.10$ (i.e., Model 5: OR=2.50). Thus, disabled veterans appear to be a unique population in that Tables 3 and 4 provide evidence that they are more likely to be food insecure than non-veterans who are more likely to be food insecure if they

face conditions that are associated with universal credit. We focus on the implications of these findings in the next section.

Conclusions

In this study we focus on the prevalence of food insecurity among veterans in the UK. We estimate that 1 in 10 UK veterans live in a food insecure household. While bivariate associations show that veterans have lower levels of food insecurity than non-veterans, these differences do not hold up under multivariate analyses. Despite our finding that veteran status and food security are uncorrelated, one potential group of veterans – those who are receiving disability benefits – appear to be uniquely at risk of food insecurity. That is, veterans who are in receipt of benefits for a mental and/or physical disability are more likely to live in a food insecure household. This finding is not replicated in the non-veteran population. The implication of this finding is that veteran status may moderate the association between disability benefits and food insecurity. One reason for this finding might be that disabilities among veterans tend to be, on average, more physically/mentally limiting than disabilities in non-veterans (See, for example, Saadat et al., 2010; Tsai & Cao, 2019). If this is the situation, when compared to the civilian population, accessing food may be much more difficult for disabled veterans than disabled non-veterans. It might also be the case that disabled veterans seek lower levels of state aid than non-veterans who are disabled. Thus, the UK veteran population may have unmet needs not found in the civilian population. This interpretation of the data is compatible with observations by Gerber (2003:899) who points out that “disabled veterans are frequently wary of excessive dependence on the state as limiting the attainment of normalization.” Given the uniqueness of this difference between veterans and non-veterans we recommend more research be carried out on disability status, service related disability, and food insecurity among veterans.

Our investigation also discovered income and housing benefits are correlated with food insecurity in an analogous way for veterans and non-veterans. Both groups are more

likely to live in food insecure households if they are receiving housing benefit and/or have lower incomes. Retired veterans, just like retired non-veterans, have lower levels of food insecurity than veterans who are employed. This finding suggests that veterans face the same struggles with low wage employment as non-veterans. In short, veterans and non-veterans appear to be alike when it comes to basic economic struggles such as employment, low income and housing. Contradictory to earlier research we did not find that veteran food insecurity is correlated with race/ ethnicity or gender.

Our findings suggest four policy recommendations. First, policymakers who wish to prioritise the matter of food insecurity among veteran households should consider increasing financial aid to charities such as the Armed Forces Covenant Fund Trust. This funding may be directed toward understanding veteran food insecurity through funding mechanisms like the Transformational Grants programme that currently prioritizes veteran needs that have largely gone unnoticed (such as food insecurity). Moreover, while the UK government supplied £15 million to Armed Forces charities in 2021 (Office for Veterans' Affairs, 2022, p.2) this amount could also be increased to help provide more resources to those third sector organisations. Our findings are clear in that organisations that support veterans with respect to disabilities, housing needs and employment are particularly important when it comes to attenuating food insecurity (e.g., Walking with the Wounded). These findings suggest that funding streams may need to be directed to these priorities to better serve veterans who live in food insecure households.

Second, a government agency such as Office for Veterans' Affairs should ensure a strong network of collaboration to better examine the problem of food insecurity among UK veterans. Such a network could include the central government (i.e., Ministry of Defence), local authorities that are often coordinate social work practitioners and local food aid efforts, academics studying food insecurity and veteran needs, and the large network of third sector organizations that provide various types of food aid such as the Trussell Trust and Feeding

Britain as well as veterans aid, especially Soldiers, Sailors, Airmen and Families Association (SAFA) who interact with a relatively large number of UK veterans.

Third, given that third sector organizations can only work with those veterans who come to their attention, more screening efforts and incentives to seek help are needed. As is noted in the literature, veterans are sometimes reluctant to seek support for their problems (Hoge, Auchterlonie, Milliken, 2006; Vaughn, 2019) and may resist what they perceive as too much support. Nevertheless, communication with veterans in need about these issues appears to be an important factor in help seeking behaviors (Kulesza et al., 2015). As a result, another way policy makers could help attenuate veteran food insecurity is to expand the reach of veteran screening tools for those at risk of food insecurity so that they can be signposted to (and encouraged to contact) services where they can receive help (see Fortney et al., 2016). Such an approach is consistent with MacLean et al.'s (2014) recommendations on identifying problems veterans face when leaving military life (MacLean et al., 2014). This emphasis on screening could be easily implemented as training within the recently established NHS 'Veteran Aware' initiative that has already helped educate 1,200 health professionals working in general practitioner (GPs) offices on veterans' issues and could be linked to innovative medical training from NHS Health Education England North East on how to identify food insecurity (see for example <https://www.youtube.com/watch?v=YuU6JcsopII>). These combined resources would support health professionals to use their knowledge about veterans' wellbeing and food insecurity to help identify food insecure veterans and provide them with treatment and referrals to appropriate services.

Finally, we suggest that the government make better use of existing survey data sources by including a measure of veteran status in those surveys. For example, the Department of Work and Pensions (DWP) could easily include an indicator of veteran status in their Family Resource Survey. Such information would allow researchers to gain a great deal of information about veterans' food insecurity for little cost. This recommendation to

include a veterans indicator in major population surveys is consistent with the call for better administrative data in the Veterans Strategy Action Plan for 2022-2024 (Office for Veterans' Affairs, 2022).

While the current study is the first in the UK to compare rates of food insecurity among veteran and non-veteran households there are a few limitations to this research. First, this is a cross-sectional study, and the findings cannot establish causality. Thus, it is not possible to describe how food security may change over time or how disability status can be mitigated to reduce future food insecurity. Second, and importantly, while disability and housing benefit are correlated with food security these are indirect measures of disability and housing challenges and only represent veterans who have been successful in obtaining these benefits. Third, this study excludes individuals who do not have access to the world wide web or are digitally illiterate and may not have been able to fill out an online questionnaire. As a result, our estimates of the prevalence of food insecurity may be higher than what we have found in this study.

In the end, addressing food insecurity is a national priority (Barker and Russell, 2020; Food Foundation, 2022; Garthwaite, Collins and Bamba 2015). As former Prime Minister Boris Johnson (Office for Veterans' Affairs, 2022, p. 2) points out in the Veterans' Strategy Action Plan, "we are determined [to make] the United Kingdom the best place in the world to be a veteran by 2028." Part of that effort relies on finding and helping veteran populations at risk. We find low-income disabled veterans in receipt of housing benefits are at particular risk of food insecurity. We suggest that future studies replicate these findings and prioritize two more areas of research. First, there is need for a greater understanding of the ways in which housing and disability aid could alter veteran food insecurity over time. As a result, future research might focus on longitudinal changes in levels of food insecurity, housing aid and disability aid to decide if and how this type of help can mitigate food insecurity. Second, future studies of veteran food insecurity might also consider those factors that predict

whether veterans engage in help seeking behaviours regarding food insecurity. Finding those veterans who are more or less likely to seek help and better understand the impact of that help on food insecurity will be critical to attenuating food insecurity in this population. We hope that this research has not only supplied a justification for better screening among veterans but can also serve as a starting point for future research on veterans and food insecurity in the UK.

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Table 1. Prevalence of Food Insecurity by Veteran Status (n = 1,486)

	Veterans (95% CI) (n=561)	Non-Veterans (95% CI) (n=925)	alpha=0.05 p-value*
<i>Food Insecurity Indicator (%)</i>	10% (7.6, 12.5)	18.4% (15.9, 20.9)	p=0.055 (a)
<i>Mean Food Insecurity Scale Score</i>	0.69 (0.54, 0.86)	1.26 (1.09, 1.42)	p=0.050 (b)

(a) Difference in proportions (π) for independent samples (i.e., $H_0: \pi$ [veteran] - π [non-veteran] = 0)

(b) Difference in means (μ) for independent samples (i.e., $H_0: \mu$ [veteran] - μ [non-veteran] = 0)

*2-tailed; weighted sample

Table 2. Regression of Food Insecurity by Veteran Status, 2022 (Weighted Sample)

	Model 1: Food Insecurity Scale (0 to 10)			Model 2: Food Insecurity Indicator (Yes/No)		
	Coef.	95% CI	Sig.	OR	95% CI	Sig
<i>Veteran Status (1=Yes)</i>	-0.23	(-0.96 , 0.51)		0.70	(0.20 , 2.43)	
<i>Gender (1=Female)</i>	-0.10	(-0.39 , 0.19)		1.16	(0.78 , 1.71)	
<i>Race/ Ethnicity (1=BAME)</i>	-0.15	(-0.85 , 0.56)		0.69	(0.28 , 1.75)	
<i>Age</i>	-0.35	(-0.58 , -0.12)	**	0.81	(0.61 , 1.07)	
<i>Annual Gross Household Income</i>	-0.16	(-0.21 , -0.11)	***	0.80	(0.75 , 0.86)	***
<i>Employment Status (vs. Employed)</i>						
Retired	-0.81	(1.195 , -0.42)	***	0.22	(0.12 , 0.40)	***
Unemployed	-0.05	(0.577 , 0.469)		0.58	(0.31 , 1.12)	
<i>Education (1=No Formal Education)</i>	0.53	(-0.13 , 1.21)		1.73	(0.76 , 3.94)	
<i>Divorced/ Separated</i>	0.49	(-0.02 , 1.00)		1.66	(0.91 , 3.03)	
<i>No. Dependent Children</i>	0.00	(-0.22 , 0.22)		1.20	(0.92 , 1.55)	
<i>Universal Credit</i>	2.99	(2.29 , 3.69)	***	6.17	(2.83 , 13.44)	***
<i>Disability Benefit</i>	0.58	(-0.01 , 1.17)		1.53	(0.74 , 3.15)	
<i>Housing Benefit</i>	2.79	(2.086 , 3.485)	***	12.23	(5.45 , 27.65)	***
<i>Country (vs. England)</i>						
Scotland	0.06	(-0.35 , 0.48)		0.80	(0.43 , 1.49)	
Wales	-0.45	(-1.05 , 0.16)		0.54	(0.21 , 1.39)	
Constant	3.69			2.14		
Mean VIF	1.21			1.21		
Weighted n	998			998		
Adjusted R-Square	0.29			0.23		

*p<0.05; **p<0.01; ***p<0.001

Table 3. Regression of Food Insecurity Scale Scores For Veterans and Non-Veterans, 2022

	Model 3: Veteran <i>Food Insecurity Scale (0 to 10)</i>			Model 4: Non-Veteran <i>Food Insecurity Scale (0 to 10)</i>		
	Coef.	95% CI	Sig.	Coef.	95% CI	Sig.
<i>Gender (1=Female)</i>	0.36	(-0.18 , 0.90)		-0.11	(-0.48 , 0.26)	
<i>Race/ Ethnicity (1=BAME)</i>	1.35	(-0.71 , 3.41)		-0.16	(-1.05 , 0.74)	
<i>Age</i>	-0.24	(-1.04 , 0.56)		-0.35	(-0.64 , -0.05)	*
<i>Annual Gross Household Income</i>	-0.18	(-0.24 , -0.11)	***	-0.16	(-0.22 , -0.10)	***
<i>Employment Status (vs. Employed)</i>						
Retired	-0.54	(-0.99 , -0.09)	**	-0.83	(-1.33 , -0.32)	***
Unemployed	0.21	(-0.68 , 1.09)		-0.06	(-0.73 , 0.61)	
<i>Education (1=No Formal Education)</i>	-0.06	(-0.66 , 0.55)		0.59	(-0.29 , 1.47)	
<i>Divorced/ Separated</i>	-0.09	(-0.67 , 0.49)		0.52	(-0.13 , 1.18)	
<i>No. Dependent Children</i>	0.26	(-0.10 , 0.63)		-0.01	(-0.29 , 0.28)	
<i>Universal Credit</i>	0.44	(-1.39 , 2.28)		3.02	(2.13 , 3.90)	***
<i>Disability Benefit</i>	1.12	(0.42 , 1.82)	***	0.55	(-0.22 , 1.31)	
<i>Housing Benefit</i>	1.09	(0.33 , 1.85)	***	2.88	(1.97 , 3.78)	***
<i>Country (vs. England)</i>						
Scotland	0.01	(-0.53 , 0.58)		0.07	(-0.47 , 0.60)	
Wales	-0.45	(-1.12 , 0.29)		-0.45	(-1.23 , 0.33)	
Constant	3.07			3.67		
Mean VIF	1.23			1.24		
n	425			613		
Adjusted R-Square	0.20			0.29		

*p≤0.05; **p≤0.01; ***p≤0.001

Table 4. Logistic Regression of Food Insecurity Indicator For Veterans and Non-Veterans, 2022

	Model 5: Veteran Food Insecurity Indicator (Yes/No)			Model 6: Non-Veteran Food Insecurity Indicator (Yes/No)		
	OR	95% CI	Sig.	OR	95% CI	Sig.
<i>Gender (1=Female)</i>	1.28	(0.48 , 3.42)		1.16	(0.71 , 1.90)	
<i>Race/ Ethnicity (1=BAME)</i>	1.29	(0.03 , 65.17)		0.68	(0.21 , 2.19)	
<i>Age</i>	1.56	(0.27 , 8.98)		0.81	(0.57 , 1.16)	
<i>Annual Gross Household Income</i>	0.64	(0.54 , 0.77)	***	0.80	(0.74 , 0.87)	***
<i>Employment Status (vs. Employed)</i>						
Retired	0.34	(0.12 , 0.91)	*	0.21	(0.09 , 0.45)	***
Unemployed	0.40	(0.08 , 2.04)		0.58	(0.26 , 1.32)	
<i>Education (1=No Formal Education)</i>	0.97	(0.33 , 2.86)		1.78	(0.62 , 5.15)	
<i>Divorced/ Separated</i>	0.81	(0.31 , 2.13)		1.70	(0.79 , 3.67)	
<i>No. Dependent Children</i>	1.60	(0.80 , 3.19)		1.19	(0.86 , 1.66)	
<i>Universal Credit</i>	2.72	(0.21 , 35.62)		6.32	(2.37 , 16.85)	***
<i>Disability Benefit</i>	2.07	(0.72 , 5.99)	(a)	1.49	(0.59 , 3.79)	
<i>Housing Benefit</i>	2.50	(0.93 , 6.75)	(a)	13.62	(4.70 , 39.47)	***
<i>Country (vs. England)</i>						
Scotland	1.31	(0.46 , 3.75)		0.78	(0.35 , 1.74)	
Wales	0.34	(0.04 , 2.77)		0.54	(0.16 , 1.80)	
Constant	0.43			2.06		
Mean VIF	1.23			1.24		
n	426			614		
Adjusted R-Square	0.14			0.24		

* $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

(a) $p \leq 0.10$

Appendix A. US Adult Food Security Module

Item	Affirmative Response	Percent of Veterans With Affirmative Response (n)	Percent of Non-Veteran's With Affirmative Response (n)
“(I/We) worried whether (my/our) food would run out before (I/we) got money to buy more.”	Sometimes True or Often True	11.8 (66)	22.1 (205)
“The food that (I/we) bought just didn’t last, and (I/we) didn’t have money to get more.”	Sometimes True or Often True	9.3 (52)	17.3 (160)
“(I/we) couldn’t afford to eat balanced meals.”	Sometimes True or Often True	13.0 (72)	23.1 (212)
In the last 30 days, did (you/you or other adults in your household) ever cut the size of your meals or skip meals because there wasn't enough money for food?	Yes	7.4 (42)	13.1 (119)
[IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?	3 days or more	7.0 (40)	13.0 (118)
In the 30 days, did you ever eat less than you felt you should because there wasn't enough money for food?	Yes	8.1 (45)	14.8 (136)
In the last 30 days, were you every hungry but didn't eat because there wasn't enough money for food?	Yes	4.9 (28)	10.4 (96)
In the last30 days, did you lose weight because there wasn't enough money for food?	Yes	4.0 (23)	6.9 (63)
In the last 30 days, did (you/you or other adults in your household) ever not eat for a whole day because there wasn't enough money for food?	Yes	2.0 (12)	3.7 (34)
[IF YES ABOVE, ASK] In the last 30 days, how many days did this happen?	3 days or more	2.0 (12)	4.0 (33)
Affirmative response to 1 question or more		17.3 (97)	28.4 (241)

Appendix B. Descriptive Statistics (Weighted Sample), n=1,492

Variable	Minimum Value	Maximum Value	Mean/ Proportion	Median	No. Missing Observations	% Missing Observations
<i>Food Insecurity Scale</i>	0	10	1.24	0	6	0.40%
<i>Food Insecurity Indicator</i>	0	1	0.11	0	6	0.40%
<i>Veteran Status (1 = Veteran)</i>	0	1	0.04	0	0	0.00%
<i>Gender (1=Female)</i>	0	1	0.48	0	0	0.00%
<i>Race/ Ethnicity (1=BAME)</i>	0	1	0.05	0	18	1.20%
<i>Age</i>	1	4	3.35	4 (55+ Yrs Old)	0	0.00%
<i>Gross Household Income</i>	1	14	7.98	7 (30k to 35k)	327	21.80%
<i>Retired</i>	0	1	0.33	0	18	1.20%
<i>Unemployed</i>	0	1	0.13	0	18	1.20%
<i>Education (1=No Formal Education)</i>	0	1	0.04	0	32	2.13%
<i>Divorced/ Separated</i>	0	1	0.08	0	23	1.53%
<i>No. Dependent Children</i>	0	5	0.33	0	100	6.67%
<i>Universal Credit</i>	0	1	0.05	0	85	5.67%
<i>Disability Benefit</i>	0	1	0.08	0	85	5.67%
<i>Housing Benefit</i>	0	1	0.05	0	85	5.67%
<i>Country</i>						
<i>England</i>	0	1	0.81	1	0	0.00%
<i>Scotland</i>	0	1	0.13	0	0	0.00%
<i>Wales</i>	0	1	0.06	0	0	0.00%

Table C1. Regression of Veteran Status by Food Insecurity, Excluding *Annual Gross Income*

	Model 7: <i>Food Insecurity Scale (0 to 10)</i>			Model 8: <i>Food Insecurity Indicator (Yes/No)</i>		
	Coef.	95% CI	Sig.	OR	95% CI	Sig
<i>Veteran Status (1=Yes)</i>	-0.20	(-0.86 , 0.47)		0.70	(0.45 , 1.08)	
<i>Gender (1=Female)</i>	0.10	(-0.16 , 0.36)		1.42	(0.98 , 2.05)	
<i>Race/ Ethnicity (1=BAME)</i>	-0.21	(-0.81 , 0.41)		0.83	(0.35 , 1.99)	
<i>Age</i>	-0.34	(-0.54 , -0.14)	***	0.78	(0.59 , 1.03)	
<i>Employment Status (vs. Employed)</i>						
Retired	0.386	(-0.73 , -0.05)	**	0.62	(0.39 , 0.98)	**
Unemployed	0.28	(-0.15 , 0.705)		1.05	(0.61 , 1.82)	
<i>Education (1=No Formal Education)</i>	0.77	(0.15 , 1.38)	**	1.74	(0.91 , 3.34)	
<i>Divorced/ Separated</i>	0.83	(0.36 , 1.29)	***	2.19	(1.34 , 3.59)	**
<i>No. Dependent Children</i>	-0.07	(-0.27 , 0.13)		1.06	(0.83 , 1.37)	
<i>Universal Credit</i>	2.97	(2.36 , 3.58)	***	5.98	(2.97 , 12.02)	***
<i>Disability Benefit</i>	0.54	(0.01 , 1.08)	*	1.80	(1.01 , 3.20)	*
<i>Housing Benefit</i>	2.84	(2.20 , 3.49)	***	6.89	(3.73 , 12.75)	***
<i>Country (vs. England)</i>						
Scotland	-0.10	(-0.47 , 0.275)		0.91	(0.54 , 1.53)	
Wales	-0.37	(-0.91 , 0.167)		0.64	(0.28 , 1.48)	
Constant	2.11			0.31		
Mean VIF	1.18			1.18		
Weighted n	1297			1297		
Adjusted R-Square	0.22			0.13		

*p<0.05; **p<0.01; ***p<0.001

Table C2. Ordinary Least Squares Regression of Food Insecurity Scale Scores For Veterans and Non-Veterans, Excluding *Annual Gross Income*

	Model 9: Veteran Food Insecurity Scale (0 to 10)			Model 10: Non-Veteran Food Insecurity Scale (0 to 10)		
	Coef.	95% CI	Sig.	Coef.	95% CI	Sig.
<i>Gender (1=Female)</i>	0.28	(-0.21 , 0.78)		0.09	(0.09 , 0.43)	
<i>Race/ Ethnicity (1=BAME)</i>	1.12	(-0.71 , 2.94)		-0.22	(-0.22 , 0.57)	
<i>Age</i>	-0.08	(-0.83 , 0.67)		-0.34	(-0.34 , -0.08)	**
<i>Employment Status (vs. Employed)</i>						
Retired	-0.17	(-0.57 , 0.24)		-0.40	(-0.40 , 0.05)	
Unemployed	0.47	(-0.36 , 1.29)		0.27	(0.27 , 0.83)	
<i>Education (1=No Formal Education)</i>	0.11	(-0.47 , 0.69)		0.81	(0.81 , 1.63)	
<i>Divorced/ Separated</i>	0.47	(-0.06 , 1.01)		0.85	(0.85 , 1.46)	
<i>No. Dependent Children</i>	0.20	(-0.14 , 0.55)		-0.07	(-0.07 , 0.19)	
<i>Universal Credit</i>	-0.05	(-1.58 , 1.49)		3.00	(3.00 , 3.79)	***
<i>Disability Benefit</i>	1.12	(0.49 , 1.76)	***	0.51	(0.51 , 1.21)	***
<i>Housing Benefit</i>	1.65	(0.92 , 2.38)	***	2.91	(2.10 , 3.75)	
<i>Country (vs. England)</i>						
Scotland	0.29	(-0.21 , 0.77)		-0.11	(-0.11 , 0.38)	
Wales	-0.10	(-0.73 , 0.54)		-0.39	(-0.39 , 0.32)	
Constant	0.74			2.11	(0.00 , 0.00)	
Mean VIF	1.20			1.20		
n	519			768		
Adjusted R-Square	0.12			0.23		

*p≤0.05; **p≤0.01; ***p≤0.001

Table C3. Logistic Regression of Food Insecurity Indicator For Veterans and Non-Veterans, Excluding Annual Gross Income

	Model 11: Veteran Food Insecurity Indicator (Yes/No)			Model 12: Non-Veteran Food Insecurity Indicator (Yes/No)		
	OR	95% CI	Sig.	OR	95% CI	Sig.
<i>Gender (1=Female)</i>	1.59	(0.70 , 3.62)		1.36	(0.9 , 2.07)	
<i>Race (1=BAME)</i>	1.45	(0.08 , 26.67)		0.74	(0.29 , 1.89)	
<i>Age</i>	1.23	(0.30 , 5.14)		0.81	(0.6 , 1.08)	
<i>Employment Status (vs. Employed)</i>						
Retired	0.87	(0.38 , 1.98)		0.44	(0.44 , 0.82)	**
Unemployed	1.14	(0.30 , 4.35)		1.04	(0.56 , 1.93)	
<i>Education (1=No Formal Education)</i>	1.23	(0.44 , 3.47)		2.04	(0.82 , 5.06)	
<i>Divorced/ Separated</i>	2.09	(0.93 , 4.71)	*	2.47	(1.3 , 4.71)	**
<i>No. Dependent Children</i>	1.23	(0.68 , 2.23)		1.04	(0.78 , 1.39)	
<i>Universal Credit</i>	1.48	(0.18 , 12.40)		7.58	(3.45 , 16.6)	***
<i>Disability</i>	2.18	(0.87 , 5.49)	*	1.49	(0.69 , 3.22)	
<i>Housing</i>	4.73	(1.86 , 12.04)	***	9.63	(3.99 , 23.2)	***
<i>Region (vs. England)</i>						
Scotland	1.46	(0.62 , 3.47)		0.75	(0.39 , 1.46)	
Wales	0.75	(0.17 , 3.35)		0.59	(0.21 , 1.61)	
Constant	-3.53			0.31		
Mean VIF	1.20			1.20		
n	519			769		
Adjusted R-Square	0.07			0.22		

*p≤0.05; **p≤0.01; ***p≤0.001

¹ Department for Environment, Food and Rural Affairs (2017). See also Brucker (2017); Long, Defeyter and Stretesky (2021); Loopstra, Reeves and Tarasuk (2019); Pool and Dooris (2022); Purdam, Esmail and Garratt (2019).

² Except see Short et al. (2021) who include one item on food insecurity in their study of UK veteran needs.

³ For research on veteran backgrounds prior to enlisting see Burdett et al. (2021); Cooper (2016); Oster et al. (2017). For the prevalence of veteran's health conditions see Brewin et al. (2010); Dighton et al. (2018); Iversen et al. (2007); Murphy et al. (2019); Short et al. (2021). See also the Veterans' Strategy Action Plan 2022-2024 (Office of Veterans' Affairs, 2022) and the Armed Forces Covenant and Veterans Annual Report 2022 (Armed Forces Covenant, 2022).

⁴ YouGov asks that people take part in the questionnaire because of their desire to share opinions. However, the company also offers reward points for the time it takes to supply information. These reward points can be redeemed for cash and gift cards.