2015 Workplace and Equal Opportunity Survey of Reserve Component Members

Nonresponse Bias Analysis Report

2015 WORKPLACE AND EQUAL OPPORTUNITY SURVEY OF RESERVE COMPONENT MEMBERS NONRESPONSE BIAS ANALYSIS REPORT

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Acknowledgments

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[1] Prior to 2016, the Defense Research Surveys, and Statistics Center (RSSC) resided within the Defense Manpower Data Center (DMDC). In 2016, the Defense Human Resource Activity (DHRA) reorganized and moved RSSC under the newly established Office of People Analytics (OPA) in DHRA.

Table of Contents

List of Tables

2015 WORKPLACE AND EQUAL OPPORTUNITY SURVEY OF RESERVE COMPONENT MEMBERS NONRESPONSE BIAS ANALYSIS REPORT

Introduction

In 2006 the Office of Management and Budget recommended that a nonresponse bias (NRB) analysis be completed for any government survey with a response rate below 80%. The purpose of NRB analysis is to determine whether survey estimates are biased due to nonresponse of some sample members. Office of People Analytics (OPA) conducted a series of statistical analyses to determine whether those who did not respond to the survey would have provided significantly different answers than those who did respond. Because the response rate for the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members* (*2015 WEOR*) was 19% based on the American Association of Public Opinion Research response rate calculation (AAPOR Response Rate 4), a NRB analysis was initiated.

Survey nonresponse has the potential to introduce bias in the estimates of key outcomes. To the extent that nonrespondents and respondents differ on observed characteristics, OPA can use weights to adjust the sample so the weighted respondents match the full population on the most critical characteristics. This eliminates the portion of NRB associated with those observed variables if these variables are strongly associated with the behaviors being estimated. When all NRB can be eliminated in this manner, the missingness is called *ignorable* or *missing at random* (Little & Rubin, 2002). The more observable demographic variables that were incorporated into the weights, the more plausible it is to assume that the weights eliminate any NRB.

The objective of this research was to assess the extent of nonresponse bias (NRB) for the estimated rate of Racial/Ethnic Harassment/Discrimination (henceforth this rate will be referred to as Racial Discrimination) in the Reserve component. The purpose of the Racial Discrimination rate was to provide the policy offices and the Department with an overall estimate of Reserve component members who experienced behaviors aligned with racial/ethnic harassment and/or discrimination. The level of nonresponse bias can vary for every question on the survey, but OPA focused on the Racial Discrimination rate because this is the central question on the survey. Nonresponse bias occurs when survey respondents are systematically different from the nonrespondents. Statistically, the bias in a respondent mean (e.g., Racial Discrimination rate) is a function of the response rate and the relationship (covariance) between response propensities and the estimated statistics (i.e., Racial Discrimination rate), and takes the following form:

$$Bias\ (\bar{y}_r) = \frac{\sigma_{yp}}{\bar{p}} = \left(\frac{\rho_{yp}}{\bar{p}}\right)\sigma_y\sigma_p,\ \text{where:}$$

$\bar{y}$ = estimated racial discrimination rate

σ_{yp} = covariance between *y* and response propensity,

$\bar{p}$ = mean propensity over the sample,

ρ_{yp} = correlation between y and p,

σ_y = standard deviation of y,

σ_p = standard deviation of p

NRB can occur with high or low survey response rates, but the decrease in overall survey response rates within the Department as well as civilian studies in the past decade has resulted in a greater focus on potential NRB. OPA investigated the presence of NRB using several different methods, and this report summarizes the following methods and results:

1. Evaluate composition of sample compared with survey respondents,

2. Evaluate weighted point estimates of latent variables with population values

2015 WEOR Survey

The *2015 WEOR* survey sample size was 80,194 Reserve component members selected from 819,208 Reserve component members on the August 2015 Reserve Components Common Personnel Data System (RCCPDS) Master File. The frame included Army National Guard (ARNG), US Army Reserve (USAR), US Navy Reserve (USNR), US Marine Corps Reserve (USMCR), Air National Guard (ANG) and US Air Force Reserve (USAFR) Reserve component members who were ranked E1–O6. OPA selected a stratified random sample using the following three characteristics to define the stratification dimensions:

- Race/ethnicity (Hispanic, White, Black, American Indian/Alaskan Native, Asian, Hawaiian/Pacific Islander, Multi Race),

- Reserve component (ARNG, USAR, USNR, USMCR, ANG, USAFR), and

- Paygrade grouping (E1-E4, E5-E6, E7-E9, W1-W5, O1-O3, O4-O6).

Completed surveys were returned by 13,536 eligible sampled members, resulting in a 19% weighted response rate. These respondents were weighted to the full Reserve component member population using standard weighting-class methods. The four-step weighting process is described below.

1. Assigning a base weight determined by the inverse of the probability of selection,

2. Adjusting the base weight by distributing the weights from the cases of unknown eligibility to the cases of known eligibility,

3. Adjusting the weight from step 2 by distributing the weights from incomplete cases to the complete cases, and

4. Poststratifying the step 3 weights to known population totals for race/ethnicity, Reserve component, and paygrade group

SAS® was used for many of the statistical steps including sampling and weighting. For more information about the sampling frame, sampling design and weighting procedure refer to the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members*: *Statistical Methodology Report* (DMDC, 2016c). For information about the survey design, survey instruments and administration refer to the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members: Administration, datasets, and codebook* (DMDC, 2016a). For tabulation of responses refer to the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members: Tabulations of Responses* (DMDC, 2016b).

Summary of Findings

Studies of NRB can be accomplished either by 1) conducting a follow-up survey of nonrespondents or 2) by using the survey responses and characteristics of the respondents to assess NRB. The latter is the approach that was used in this report. Two survey outcomes are critical in assessing NRB: response rates and the expected difference between respondents and nonrespondents on survey estimates.

It is common that survey quality is judged by response rates; they are the most visible measure of survey quality. However, response rates do not necessarily provide an accurate measure of survey bias. Low response rates are only indicative of the possibility of survey bias. A number of research studies have found little relationship between level of nonresponse and bias (e.g., Keeter, Miller, Kohut, Groves, & Presser, 2000). Where bias is found, adjusting survey weights for nonresponse and poststratification using variables that are correlated with the response characteristics can significantly reduce that bias.

The *2015 WEOR* NRB analysis was investigated by using two different methods, and this paper summarizes the following studies and results:

1. **Evaluate the composition of the survey respondents relative to the sample and population**—The *2015 WEOR* sample composition demographically differs from the Reserve component member population distribution due to intentional sampling strategies that allow OPA to make precise estimates for small subgroups. The respondent composition differs from the sample distribution in predictable ways due to subgroups (e.g., junior enlisted members) responding at different rates. This analysis assesses whether survey respondents possess similar observable characteristics (e.g., Component, paygrade, and race) to survey non-respondents. OPA found that the distribution of survey respondents was statistically significantly different from survey nonrespondents for three of the four characteristics analyzed. Although poststratified weights reduce nonresponse bias for unobservable characteristics that are correlated with the poststratification variables, the differences on observable characteristics presents mild NRB concerns. The relationship between observable and unobservable characteristics is unknown, and therefore the most desirable outcome would be where respondents and nonrespondents match on observable characteristics, something

3

OPA does not find in *2015 WEOR*. Therefore, OPA interprets this study as presenting some concerns that NRB may be present in estimates.

2. **Evaluate weighted point estimates of variables with known population values**—OPA assessed the robustness of survey weights by estimating two known population quantities not directly used in weighting: 1) Number of days activated and 2) Number of days deployed in the past 12 months. An independent one sample t-test indicated that at the total level, number of days activated and number of days deployed were not systematically different for respondents than nonrespondents after controlling for potential demographic differences. OPA concludes that this study provides little evidence of NRB because the weighted estimates for number of days activated and deployed in the past 12 months do not differ significantly from the known population values.

Section 1: Evaluate Composition of Sample

OPA considered whether, and how, survey nonresponse (unit nonresponse), affects NRB for this survey. In this section OPA evaluates the composition of the respondents and nonrespondents based on a set of demographic variables. Key demographics were identified based on the survey response and OPA's experience in military surveys. Previous studies conducted by OPA indicate that variables such as member's age, paygrade, and Reserve Component are critical in predicting military survey response. OPA draws optimized samples to reduce survey burden on members as well as produce high levels of precision for important domain estimates by using known information about the military population and their response propensity. It is important to note that OPA samples are often not proportional to their respective population. Depending on specific subgroups, OPA will over or under sample a specific group (e.g., E1-E4 US Army Reserve) to obtain enough expected responses to make statistically accurate estimates. While the sample and the number of responses might look out of alignment with the population, this is by design. OPA is able to use its military personnel data to weight the respondents in order to make survey estimates representative of the entire Reserve component population. The demographics considered in this analysis include: Race/ethnicity, Component, paygrade grouping, and gender. Component, paygrade, and race/ethnicity were directly controlled for in the poststratification stage and thus match the known population values exactly.

Table 1 shows the breakdown by race/ethnicity. Minority members typically have lower response rates because they are composed of more junior enlisted. For the *2015 WEOR*, minorities were significantly oversampled considering they are disproportionately victims of Racial Discrimination. All minority groups are oversampled (Table 1: columns b and d). For example, American Indian/Alaskan Native make up 1% of the Reserve component population but 7% *2015 WEOR* sample. The final weighted population pulls the respondents back into alignment with race/ethnicity composition in the Reserve component to ensure final weighted estimates are not over-representing minorities.

OPA performed base weighted Chi-square test of independence was performed to examine the relationship between survey response and survey nonresponse (data not shown). A survey respondents is complete eligible (n=13,536) or self/proxy report ineligible (n=395). A survey nonrespondent is defined as an incomplete eligible (n=764), refusal (n=277), blank return (n=114), not locatable (n=9,076), or nonrespondent (n=55,098). Record ineligibles (n=934) are not included in the analysis. The relationship between race/ethnicity and survey response was significant, χ^2 (df=6, n= 79,260) = 429.0[2], p < 0.0001. The results indicate that different race/ethnicities respond at different rates and unweighted respondents are prone to nonresponse bias if not adjusted. For example, Black (moved from 18 to 13 percent), White (33 to 41 percent), and Hispanic (15 to 12 percent) have different sample and respondent percentages.

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[2] The weighted Chi-square was generated using the PROC SURVEYFREQ with a weight statement within SAS 9.3 and SAS/STAT 12.1. The Rao-Scott correction to the Chi-square test was used since the data comes from a complex sample survey (Scott, 2015).

Table 1.
2015 WEOR Population, Sample Design, and Respondent Distribution for Race/Ethnicity

Race/Ethnicity	Population		Sample		Respondents		Weighted Estimates (Final Weights)	
	Frequency (a)	Percent (b)	Frequency (c)	Percent (d)	Frequency (e)	Percent (f)	Frequency (g)	Percent (h)
American Indian/ Alaskan Native	5,868	1	5,676	7	884	7	5,868	1
Asian	29,574	4	8,756	11	1,549	11	29,574	4
Black	131,026	16	14,413	18	1,818	13	131,026	16
White	547,568	67	26,371	33	5,529	41	547,568	67
Hispanic	90,149	11	11,895	15	1,570	12	90,149	11
Hawaiian/Pacific Islander	5,103	1	4,833	6	796	6	5,103	1
Multi Race	9,920	1	8,250	10	1,390	10	9,920	1
Total	**819,208**	**100**	**80,194**	**100**	**13,536**	**100**	**819,208**	**100**

Table 2 shows the breakdown of the population, sample, and respondent distributions by Reserve component. Based on historically different response rates and the need to make estimates for each Component, OPA oversampled the US Marine Corps Reserves, and under sampled the Army National Guard (Table 2: columns b and d). For instance, Army National Guard is 43% of Reserve component members but since they are so large in comparison to other Components they were only 28% of the *2015 WEOR* sample. There are fairly large differences between the unweighted sample size and unweighted respondents percentages, especially with Army National Guard (28 of the sample and only 21 percent of the respondents; Table 2: columns d and f), US Marine Corps Reserve (19 to 9 percent), Air National Guard (14 to 24 percent), and US Air Force Reserves (14 to 21 percent)[3]. Finally, OPA uses post-survey weighting procedures (described in DMDC 2016-036) to adjust the 21% of Army National Guard respondents to make them representative of the Army National Guard's true 43% proportion of the overall Reserve component members. The final weighting procedure aligns respondent proportions back with the military population for Component. Component was controlled in post stratification so the final weighted estimate is equal to the population (Table 2: columns b and h). Post-stratified weights are likely to reduce nonresponse bias for outcomes that are correlated with the post-stratification variables, but we still need to explore whether the nonrespondents are different than respondents on other latent variables and this will be explored in future sections.

OPA performed base weighted Chi-square test of independence on respondents and nonrespondents by Component. The relationship between Component and survey response was significant, χ^2 (df=5, n= 79,260) = 1,280.3, p < 0.0001. The results indicate that different

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[3] These observations are similar to those reported in the nonresponse bias analysis section of the Status of Forces of the Reserve Component 2016 survey (OPA, 2016-047).

Components respond at different rates and unweighted respondents are prone to nonresponse bias if not adjusted.

Table 2.
2015 WEOR Population, Sample Design, and Respondent Distributions for Component

Reserve Component	Population		Sample		Respondents		Weighted Estimates (Final Weights)	
	Frequency (a)	Percent (b)	Frequency (c)	Percent (d)	Frequency (e)	Percent (f)	Frequency (g)	Percent (h)
Army National Guard	349,482	43	22,073	28	2,908	21	349,374	43
US Army Reserve	198,619	24	11,886	15	1,803	13	198,510	24
US Naval Reserve	57,464	7	9,151	11	1,579	12	57,611	7
Marine Corps Reserve	39,423	5	15,378	19	1,244	9	39,494	5
Air National Guard	105,569	13	10,859	14	3,211	24	105,569	13
US Air Force Reserve	68,651	8	10,847	14	2,791	21	68,651	8
Total	**819,208**	**100**	**80,194**	**100**	**13,536**	**100**	**819,208**	**100**

Table 3 shows the breakdown of the population, sample, and respondent percentage distributions by the five level paygrade grouping. Based on historically different response rates and the need to make estimates for each paygrade, OPA only slightly oversampled the junior enlisted members and under sampled senior enlisted members (Table 3: columns b and d). For instance, senior enlisted members make up 42% of the Reserve component but only 37% of the *2015 WEOR* sample. On the other hand, junior enlisted are slightly oversampled in proportion to their population (43% population, 49% sample). The basis for this approach is seen clearly in the differences between respondent percentages. The senior enlisted members, despite making up only 37% of the sample account for 52% of the respondents, while the junior enlisted members made up nearly half the sample (49%) of the sample, yet they represented only 22% of the respondents. These differences are adjusted based on known characteristics in post-survey weighting procedures, which aligned the respondent proportions equal to the military population for paygrade (Table 3: columns b and h).

OPA performed base weighted Chi-square test of independence for paygrade grouping. The relationship between paygrade grouping and survey response was significant, χ^2 (df=4, n= 79,260) = 2,375.1, p < 0.0001. The results indicate that different paygrade groupings respond at different rates and unweighted respondents are prone to nonresponse bias if not adjusted.

Table 3.
2015 WEOR Population, Sample Design, and Estimation for Paygrade

Paygrade Grouping	Population		Sample		Respondents		Final Weighted Estimates	
	Frequency (a)	Percent (b)	Frequency (c)	Percent (d)	Frequency (e)	Percent (f)	Frequency (g)	Percent (h)
E1-E4	349,982	43	39,073	49	3,001	22	350,008	43
E5-E9	340,170	42	29,876	37	7,055	52	340,159	42
W1-W5	12,167	1	867	1	314	2	12,167	1
O1-O3	60,941	7	4,449	6	1,132	8	61,257	7
O4-O6	55,948	7	5,929	7	2,034	15	55,616	7
Total	**819,208**	**100**	**80,194**	**100**	**13,536**	**100**	**819,208**	**100**

Table 4 shows the breakdown by gender. Based on historical response rates, male and female members with similar characteristics respond at similar rates. Based on this information, OPA did not explicitly over or under sample either group, and the sample closely reflects their true population values. Additionally, weighted estimates are equal to their population percent without any additional controls. This result indicates that post-survey adjustment techniques may have reduced potential bias that might have existed from gender. OPA performed base weighted Chi-square test of independence. The relationship between gender and survey response was significant, χ^2 (df=1, n= 79,260) = 1.3, p < 0.25. The results indicate that different genders respond at different rates and unweighted respondents are prone to nonresponse bias if not adjusted.

Table 4.
2015 WEOR Population, Sample Design, and Estimation for Gender

Gender	Population		Sample		Respondents		Estimates (Final Weights)	
	Frequency (a)	Percent (b)	Frequency (c)	Percent (d)	Frequency (e)	Percent (f)	Frequency (g)	Percent (h)
Male	663,482	81	63,918	80	10,583	78	667,681	82
Female	155,726	19	16,276	20	2,953	22	151,527	18
Total	**819,208**	**100**	**80,194**	**100**	**13,536**	**100**	**819,208**	**100**

Summary of Sample Composition Compared With Survey Respondents

The purpose of this section of the NRB analysis was to determine whether there were differences between respondents and nonrespondents for four observable characteristics (race/ethnicity, Component, paygrade grouping, and gender). OPA found that the distribution of

survey respondents was statistically significantly different from survey nonrespondents for three of the four characteristics.

Differences between respondents and nonrespondents may suggest NRB. However, survey weighting effectively adjusts for these observable characteristics. Survey weighting also reduces any biases associated with unobservable characteristics (e.g., military satisfaction) that are correlated with the observable characteristics.

Comparing survey respondents with the survey sample cannot definitively detect NRB. For example, if the respondents and nonrespondents look similar on observable characteristics, there is no evidence of NRB. However, if the respondents and nonrespondents look different on observable characteristics, OPA reduces or eliminates this source of NRB during survey weighting. Therefore, neither of these two outcomes has the capability of detecting NRB. The relationship between observable and unobservable characteristics is unknown, and therefore the most desirable outcome would be where respondents and nonrespondents match on observable characteristics, something OPA does not find in *2015 WEOR*. **Therefore, OPA interprets this study as presenting some mild concerns that NRB may exist in *2015 WEOR* estimates**.

Section 2: Comparison of Weighted Sample Estimates with Frame Characteristics

To assess total survey error, one common method is to compare a known parameter to a weighted estimate from the survey. If OPA's sampling, measurement, weighting, and analysis methods performed well, estimated confidence intervals should frequently contain the true parameters. If these intervals fail to contain the known parameter, this likely indicates NRB problems. OPA methods make extensive use of demographic variables in every stage of weighting to reduce NRB given the differences in response rates across demographics. This analysis assesses the effectiveness of OPA's post-survey adjustments by comparing the estimated number of days activated and deployed with the administrative data.

1. Number of days activated in the past 12 months, and

2. Number of days deployed in the past 12 months.

The number of days activated (DAYS_ACTIVE12) was determined using the Time on Active Duty File (TOAD) from July 2014 through July 2015. Using the TOAD file, OPA was able to determine the number of days a member was activated (values range from 0 to 365). The number of days deployed (DAYS_DEPLOY12) was determined using the Contingency Tracking System Deployment File (CTS) from July 2014 through July 2015. The Contingency Tracking System Deployment File tracks overseas contingency operations for individuals supporting 1) Operation Iraqi Freedom (OIF), 2) Operation Enduring Freedom (OEF), or 3) Operation New Dawn (OND). Using the CTS file, OPA was able to determine the number of days a member was deployed (values range from 0 to 365). Table 5 shows the unweighted estimates, weighted estimates (with margin of error for a 95 percent confidence interval), known population values, and the difference between the weighted estimate and population value for these two variables.

9

Table 5 shows that OPA's weighting methods move DoD-level estimates closer to the true parameter for the number of days activated but not for number of days deployed. For example, the unweighted estimate of days activated in past 12 months from the respondents was 70.1 and the weighted estimates is 55.3, which is closer to the true mean of 55.9. Additionally the unweighted estimates highlight just how different the unadjusted respondent sample is from the population, and how effective OPA methods adjust to true values. Furthermore, the margin of errors (column d) around the estimates includes the true population values for days activated and days deployed in past 12 months.

Table 5.
Selected Variables by Population Value and Weighted Estimates[4]

Population Variable (a)	Variable Name (b)	Unweighted Estimate (c)	Weighted Estimate (d)	Population Value (e)	Difference (percentage points) (d-e)
Days activated in past 12 months	DAYS_ACTIVE12	70.1	55.3 ±2.8	55.9	-0.6
Days deployed in past 12 months	DAYS_DEPLOY12	5.2	5.2±0.9	5.6	-0.4

Table 6 breaks out the number of days activated by paygrade group, Reserve component, race/ethnicity, and Reserve program. For paygrade, the estimated average number of days activated and corresponding confidence intervals contain the true average days activated. For Reserve component, the estimated confidence intervals contain the population values with the exception of the Navy Reserve (population is 80.5 and the confidence interval around the estimate ranges from 59.5 to 79.9). For race/ethnicity, all population values fall within the estimated confidence interval with the exception of the Hawaiian/Pacific Islander (population is 45.9 and the confidence interval around the estimates ranges from 46.2 to 64.2). For Reserve program, all population values fall within the estimated confidence interval. Based on this analysis, the weighted estimates show low NRB because they closely match most population values. In addition, OPA's weighting generally moves the estimates toward the true population values.

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[4] The weighted estimates were generated using PROC DESCRIPT within the software SUDAAN Release 11.0.1, Build 326.

Table 6.

Comparison of Population Values to Weighted Estimates for Number of days Activated in the Past 12 months

Variables (a)	Unweighted Estimates (b)	Weighted Estimates (c)	Population Value (d)	Difference (percentage points) (c-d)
Paygrade				
E1-E4	47.2	35.1 ± 4.3	36.1	-1.0
E5-E9	83.2	70.1 ± 4.2	72.0	-1.9
W1-W5	108.0	101.8 ± 20.2	96.8	5.0
O1-O3	48.5	53.5 ± 12.6	53.1	0.4
O4-O6	64.3	83.2 ± 10.7	76.6	6.6
Reserve Component				
Army National Guard	96.3	61.4 ± 5.3	63.4	-2.0
US Army Reserve	68.0	43.0 ± 5.2	42.6	0.4
US Navy Reserve	86.3	69.7 ± 10.2	80.5	-10.8
US Marine Corps Reserve	76.2	57.1 ± 9.2	51.6	5.5
Air National Guard	68.5	62.3 ± 4.9	58.0	4.3
US Air Force Reserve	34.0	36.9 ± 5.1	35.5	1.4
Race/Ethnicity				
American Indian/Alaskan Native	81.3	60.8 ± 8.4	57.3	3.5
Asian	53.6	47.3 ± 5.7	46.1	1.2
Black	73.8	52.0 ± 5.8	55.4	-3.4
White	67.9	55.1 ± 3.8	56.6	-1.5
Hispanic	80.3	62.2 ± 7.7	55.3	6.9
Hawaiian/Pacific Islander	72.4	55.2 ± 9.0	45.9	9.3
Multi Race	72.2	66.3 ± 6.6	64.1	2.2
Reserve Program				
TPU/Unknown	36.0	34.0 ± 2.9	34.6	-0.6
AGR/TAR	272.1	265.2 ± 9.4	271.6	-6.5
Military Technicians	20.8	22.5 ± 4.4	23.4	-0.9
IMA	37.2	37.0 ± 4.8	37.1	-0.1

Table 7 shows the same data for the number of days deployed in the past 12 months. For paygrade, the estimated average number of days deployed and corresponding confidence interval contains the true average days deployed with the exception of W1-W5 and O4-O6. For Reserve component, all population values fall within the estimated confidence interval with the exception of the Navy Reserve and Marine Corps Reserve. For race/ethnicity, all population values fall within the estimated confidence interval with the exception of Black. For Reserve program, all population values fall within the estimated confidence interval. In general, the weighted estimates show more NRB than desired because they are less similar to the population than

estimates from most OPA surveys. For all paygrade groupings, the weighted estimates moved the unweighted closer to the population values with the exception of W1-W5 and O1-O3. For the Reserve Component, Navy Reserve and Marine Corps Reserve experienced the estimate moving away from the population value. For race/ethnicity only Asian and Black moved further from the population value. For reserve program, all four categories moved the unweighted estimate further away from the population the true population value, which provides additional NRB concern.

Table 7.
Comparison of Population Values to Weighted Estimates for Number of days Deployed in the Past 12 months

Variables (a)	Unweighted Estimates (b)	Weighted Estimates (c)	Population Value (d)	Difference (percentage points) (c-d)
Paygrade				
E1-E4	2.9	3.1 ± 1.6	3.7	-0.6
E5-E9	6.1	6.6 ± 1.3	7.1	-0.5
W1-W5	15.7	22.1 ± 10.9	10.3	11.8
O1-O3	6.6	8.2 ± 3.4	6.8	1.4
O4-O6	3.1	3.2 ± 1.2	6.5	-3.3
Reserve Component				
Army National Guard	5.9	5.2 ± 1.7	5.3	-0.1
US Army Reserve	5.6	5.8 ± 2.1	6.2	-0.4
US Navy Reserve	8.1	5.2 ± 1.6	7.8	-2.6
US Marine Corps Reserve	2.3	0.4 ± 0.3	1.7	-1.3
Air National Guard	5.2	5.5 ± 1.3	6.0	-0.5
US Air Force Reserve	4.0	5.9 ± 2.4	5.7	0.2
Race/Ethnicity				
American Indian/Alaskan Native	6.4	5.3 ± 2.0	5.1	0.2
Asian	4.6	5.2 ± 2.0	4.7	0.5
Black	3.9	2.9 ± 1.1	5.1	-2.2
White	5.1	5.6 ± 1.3	5.8	-0.2
Hispanic	6.4	6.0 ± 2.0	5.6	0.4
Hawaiian/Pacific Islander	7.0	6.9 ± 3.8	4.9	2.0
Multi Race	5.1	5.9 ± 2.1	4.6	1.3
Reserve Program				
TPU/Unknown	5.8	5.2 ± 1.1	5.8	-0.6
AGR/TAR	4.1	3.8 ± 1.3	4.2	-0.4
Military Technicians	6.1	7.6 ± 2.5	6.3	1.4
IMA	2.7	2.5 ± 1.1	2.7	-0.2

Summary of Comparison of Weighted Sample Estimates with Frame Characteristics

Most of OPA's weighted estimates and corresponding confidence intervals contained the true value for days activated and deployed. For activations, 21 of 23 intervals (91%) contained the true population value. For deployments, 18 of 23 intervals (78%) contained the true population value. In expectation, 95% of confidence intervals should cover the population value, so coverage of 91% and 78% is lower than desired. OPA interprets this analysis as these estimates likely contain residual NRB not corrected for during weighting, and the amount of NRB for days deployed is a concern.

Our primary concern is not whether estimated number of days deployed is biased. However, if the number of days deployed is correlated with key survey measures like harassment and discrimination, then those estimates may include an undesirable level of NRB as well. OPA tested this by comparing the estimated average number of days deployed for members who did and did not experience harassment. The estimated average number of days deployed for members who indicated experiencing **harassment** was 7.4 (95% confidence interval ranges from 3.9 to 6.0) compared to the average of 4.9 (95% confidence interval ranges from 4.8 to 10.1) for those who did not experience harassment. The T-statistic of (-1.7) fails to be significant at 95% confidence, but it is large enough that it's unlikely due purely to chance. OPA also tested the estimated average number of days deployed for members who did and did not experience **discrimination**. The estimated average number of days deployed for members who indicated experiencing discrimination was 10.4 (95% confidence interval ranges from 0.9 to 20.0) compared to the average of 5.1 (95% confidence interval ranges from 4.1 to 6.1) for those who did not experience discrimination. The T-statistic of (-1.1) fails to reach statistical significance. OPA's interpretation of these tests is that our weighting procedures may have left an undesirable level of NRB in the estimates of harassment and discrimination. Further study is required to determine why the behavior of days activated and deployed is different from most OPA NRB studies.

In addition, the weighting moved the unweighted estimates in the wrong direction relative to the population value twice for activations, but 11 of 23 times for days deployed. The ineffectiveness of the weighting in reducing the NRB on OPA's estimate for days deployed is unusual, and this result is more prominent here than in other OPA surveys. OPA may consider both of these variables in future survey weighting.

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