Defense Research, Surveys, and Statistics Center (RSSC)

2015 Workplace and Equal Opportunity Survey of Reserve Component Members

Statistical Methodology Report

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2015 WORKPLACE AND EQUAL OPPORTUNITY SURVEY OF RESERVE COMPONENT MEMBERS: STATISTICAL METHODOLOGY REPORT

Defense Research, Surveys, and Statistics Center (RSSC)

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Defense Manpower Data Center (DMDC) is indebted to numerous people for their assistance with the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members* which was conducted on behalf of the Office of the Under Secretary of Defense for Personnel and Readiness (OUSD[P&R]). The survey program is conducted under the leadership of Dr. Elizabeth P. Van Winkle, Director of the *Defense Research, Surveys, and Statistics Center for Health and Resilience* (RSSC[H&R]).

DMDC's RSSC (H&R) survey, under the guidance of Dr. Maia Hurley, is responsible for the development and analysis of this survey. The lead survey design analyst was Ms. Natalie Namrow, Fors Marsh Group, LLC. Ms. Namrow, with Mr. Michael Siebel, Fors Marsh Group, LLC, designed the unique presentation of complex items used in this tabulation volume. Ms. Margaret Coffey, Team Lead of Survey Operations, is responsible for the survey database construction and archiving. The lead operations analyst on this survey was Mr. Michael Siebel who used DMDC's Statistical Analysis Macros to calculate the estimates presented in this tabulation volume.

RSSC's Statistical Methods Branch, under the guidance of David McGrath, Branch Chief, is responsible for the all statistical aspects of this survey, including, sampling, weighting, nonresponse bias (NRB) analysis, imputation, and the implementation of statistical hypothesis testing used in the survey program. Eric Falk, RSSC, supervised the sampling and weighting process and provided consultation. The lead statistician was Jeff McLeod, Fors Marsh Group, who used the DMDC Sampling Tool to design the sample. He also developed the weights for this survey. Sue Reinhold, RSSC, provided the data processing support. Eric Falk and Jeff McLeod wrote this methodology report.

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Introduction

This report describes the statistical methodologies for the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members* (*2015 WEOR*). The first section describes the sample design and selection of the sample. The second section is a brief description of the survey administration issues. The third section describes weighting and variance estimation. The fourth section describes the statistical tests used by RSSC on their surveys. The final section describes the calculation of response, location, and completion rates for the full sample and population subgroups. Survey estimates for all questions are found in the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members: Tabulations of Responses* (DMDC, 2016b).

Sample Design and Selection

Target Population

The *2015 WEOR* was designed to represent individuals meeting the following criteria:

- Members of the Selected Reserve who are in Reserve Unit, Active Guard/Reserve (AGR/FTS/AR; Title 10 and Title 32), and Individual Mobilization Augmentee (IMA) programs from:
  - Army National Guard (ARNG),
  - US Army Reserve (USAR),
  - US Navy Reserve (USNR),
  - US Marine Corps Reserve (USMCR),
  - Air National Guard (ANG), or
  - US Air Force Reserve (USAFR);
- Up to and including paygrade O6 as of August 2015; Reserve component members who entered the Service after August 2015 are excluded from the population.
- The sampling frame was developed four months prior to fielding the survey so the sampling population included those that had been in the Selected Reserve for at least four months.
- Data were collected on the web between December 28, 2015 and May 31, 2016.

Sampling Frame

The sampling frame consisted of 819,208 Reserve component members using the August 2015 Reserve Components Common Personnel Data System (RCCPDS) Master File. Auxiliary frame data was obtained from the following files:

- August 2015 Reserve Family Database File (contains the member's family information, (e.g. marital status and children)),
- August 2015 Contingency Tracking System (CTS) File (contains deployment information),
- September 2015 Defense Enrollment Eligibility Reporting System (DEERS) Medical Point-In-Time Extract (PITE) (contains personnel information), and
- July 2015 Time on Active Duty (TOAD) File (contains activation information)

In addition, after selecting the sample, DMDC performed additional checks to verify the member was still eligible before the survey fielded. Any ineligible member in the sample was excluded from any further mailings and notifications; this saved additional costs associated with the survey process. Using the September 2015 RCCPDS, DMDC determined 934 sample members (1.2% unweighted) were record ineligible and excluded them from mailings and notifications (see Table 3).

Sample Design

The sample for the *2015 WEOR* survey used a single-stage stratified design. Three population characteristics defined the stratification dimensions for the *2015 WEOR* sample:

- 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)

Table 1 shows these three variables and associated variable levels. DMDC partitioned the population frame of 819,208 members into 156 strata that were initially determined by a full cross-classification of the three stratification variables. DMDC attempted to collapse levels when there were less than 200 members in the stratum, usually for paygrade grouping. After collapsing the strata, there were still a few strata that were under 200, with the smallest being 174 members. Dimensions within race/ethnicity and reserve component were always preserved. The Individual Mobilization Augmentees (IMAs) for USAR, USNR, USMCR, and USAFR were put into their own separate strata since IMA's are a relatively small group and would have affected the overall efficiency of the sample design.

DMDC selected individuals with equal probability and without replacement within each stratum. However, because allocation was not proportional to the size of the strata, selection

probabilities varied among strata and individuals were not selected with equal probability overall. To achieve adequate sample sizes for all domains (reporting categories) DMDC used a non-proportional allocation.

Sample Allocation

DMDC determined the total sample size based on precision requirements for the 80 reporting domains (DMDC, 2016b). Given estimated variable survey costs and anticipated eligibility and response rates, DMDC used an optimization algorithm to determine the minimum-cost allocation that simultaneously satisfied the domain precision requirements. DMDC used a combination of the 2*014 Status of Forces Survey of Reserve Component Members* (*2014 SOFR*) and the *2011 Workplace and Equal Opportunity Survey of Reserve Component Members* (*2011 WEOR*) to estimate eligibility and response rates for each of the 156 *WEOR1501* strata.

DMDC accomplished the sample allocation using the DMDC Sample Planning Tool (SPT), Version 2.1. This application is based on the method originally developed by J. R. Chromy (1987) and described in Mason, Wheeless, George, Dever, Riemer, and Elig (1995). The SPT defines domain variance equations in terms of unknown stratum sample sizes and user-specified precision constraints. A cost function is defined in terms of the unknown stratum sample sizes and the per-unit cost of data collection, editing, and processing. The variance equations are solved simultaneously, subject to the constraints imposed, for the sample size that minimizes the cost function. Eligibility rates modify the estimated prevalence rates used in the variance equations, thus affecting the allocation; response rates inflate the allocation, thus affecting the final sample size. Prevalence rates refer to a percentage that is used in determining the estimated variance used for the calculation of the sample size. For example, DMDC used an estimated prevalence rate of 50 percent because it is most conservative and yields the largest estimated sample size.

There were 80 reporting domains defined for the *2015 WEOR* and the goal was to achieve below 5 percent precision on estimates. Generally, the precision requirement for each domain was based on an estimated prevalence rate of 0.5 with a 95 percent confidence interval half-width no greater than 0.05. Given the maximum sample size constraints of 80,250 in the contract, DMDC was unable to design a sample to achieve an estimated precision of 5 percent for all domains, so precisions were relaxed on most race/ethnicity groups within Reserve component.

The final *2015 WEOR* total sample size was 80,194; Table 2 provides the sample sizes by stratification variables.

Table 1.
Variables for Stratification

Variable	Variable Name	Categories
Race/Ethnicity	CRACEETH	1 - American Indian/Alaskan Native
		2 - Asian
		3 - Black
		4 - White
		5 - Hispanic
		6 - Hawaiian/Pacific Islander
		7 - Multi Race
Reserve Component	RORG_CD	1. ARNG
		2. USAR
		3. USNR
		4. USMCR
		5. ANG
		6. USAFR
Paygrade Grouping	RPAYGRP8	1. E1-E4
		2. E5-E6
		3. E7-E9
		4. W1-W5
		5. O1-O3
		6. O4-O6

Table 2.
Sample Size by Stratification Variables

Stratification Variable	Total	ARNG	USAR	USNR	USMCR	ANG	USAFR
Sample	80,194	22,073	11,886	9,151	15,378	10,859	10,847
Race/Ethnicity							
American Indian/ Alaskan Native	5,676	2,294	1,107	1,045	270	623	337
Asian	8,756	2,263	1,871	1,004	1,466	972	1,180
Black	14,413	3,266	2,320	1,856	3,617	1,521	1,833
White	26,371	9,046	2,552	1,105	5,264	4,285	4,119
Hispanic	11,895	2,422	2,028	1,476	4,111	818	1,040
Hawaiian/Pacific Islander	4,833	345	2,008	421	287	964	808
Multi Race	8,250	2,437	0	2,244	363	1,676	1,530
Paygrade Grouping							
E1-E4	39,073	11,563	6,150	3,999	10,005	4,072	3,284
E5-E6	22,676	6,600	2,984	3,569	2,309	3,944	3,270
E7-E9	7,200	1,657	1,124	410	768	1,703	1,538
W1-W5	867	554	194	10	109	0	0
O1-O3	4,449	1,192	851	525	711	468	702
O4-O6	5,929	507	583	638	1,476	672	2,053

Survey Administration

Information about administration of the survey and detailed documentation of the survey dataset are found in the *2015 Workplace and Equal Opportunity Survey of Reserve Component Members: Administration, Datasets, and Codebook* (DMDC, 2016a).

Weighting

Analytical weights for the *2015 WEOR* were created to account for unequal probabilities of selection and varying response rates among population subgroups. Sampling weights were computed as the inverse of the selection probabilities and then adjusted for nonresponse (eligibility and completion). DMDC then poststratified the adjusted weights to match population totals and to reduce bias unaccounted for by the previous weighting steps.

Case Dispositions

As the first step in the weighting process, case dispositions were assigned based on eligibility for the survey and on completion of the questionnaire. Execution of the weighting process and computation of response rates both depended on this classification.

Final case dispositions for weighting were determined using information from personnel records, field operations (as recorded in the Survey Control System [SCS]), and returned

questionnaires. No single source of information is entirely complete and correct for determining the case disposition; inconsistencies among sources were resolved according to the order of precedence shown in Table 3. This order of execution is critical to resolving case dispositions. For example, suppose an individual in the sample refused the survey, with the reason that it was too long; in the absence of any other information, the disposition would be "eligible nonrespondent." Another example would be if we were provided a proxy report that the sample member had been hospitalized and was unable to complete the survey; in this instance the disposition would be "ineligible."

Case disposition counts for the *2015 WEOR* are shown in Table 3.

Table 3.
Case Dispositions for Weighting

Case Disposition (SAMP_DC)	Information Source	Conditions	Eligibility Known	Sample Size
1.Record ineligible	Personnel record	DMDC determined whether sampled members had a record in the DEERS point-in-time extract (PITE) prior to fielding the survey. No record in DEERS indicated the member either separated from the military, passed away, etc.	Yes	934
2.Ineligible by self- or proxy-report	Survey Control System (SCS)	The sampled member or a proxy reported that member was ineligible due to such reasons as "Retired," "Ill," "Incarcerated," "No longer employed by DoD," or "Deceased."	Yes	63
3.Ineligible by survey self-report	Survey eligibility questions	The sampled member was determined to be ineligible based on answering "No, I separated or retired on or before December 28, 2015" to the question "Were you a member of the National Guard/Reserve on December 28, 2015?"	Yes	332
4.Eligible, complete response	Item response rate	Respondents needed to answer at least 50% of base questions and answered at least one of the racial/ethnic harassment/discrimination questions (Questions 31-42 or Questions 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100 or 102).	Yes	13,536
5.Eligible, incomplete response	Item response rate	Survey is not blank but item response is less than 50% or the [sampled] member[s] failed to answer at least one of the racial/ethnic harassment/discrimination questions (Questions 31-42 or Questions 80, 82, 84, 86, 88, 90, 92, 94, 96, 98, 100, or 102).	Yes	764
8.Active refusal	SCS	Survey is returned blank due to such reasons as "Refused-too long," "Refused-inappropriate/ intrusive," "Refused-other," "Unreachable at this address," "Refused by current resident," "Refused additional e-mails," or "Concerned about security/ confidentiality."	No	277
9.Blank return	SCS	Blank questionnaire returned with no reason given.	No	114
10.PND	SCS	Postal non-deliverable or original address is non-locatable.	No	9,076
11.Non-respondent	Remainder	Remaining sampled members did not respond to survey.	No	55,098
Total				**80,194**

Table 4 shows the 13,536 complete eligible respondents (SAMP_DC=4) by stratification variables: race/ethnicity, Reserve component, and paygrade group.

Table 4.
Complete Eligible Respondents by Stratification Variables

Stratification Variable	Total	ARNG	USAR	USNR	USMCR	ANG	USAFR
Sample	13,536	2,908	1,803	1,579	1,244	3,211	2,791
Race/Ethnicity							
American Indian/ Alaskan Native	884	252	168	180	13	194	77
Asian	1,549	275	284	235	125	318	312
Black	1,818	324	316	266	214	353	345
White	5,529	1,498	528	268	592	1,370	1,273
Hispanic	1,570	242	261	243	240	301	283
Hawaiian/Pacific Islander	796	41	246	75	15	254	165
Multi Race	1,390	276	0	312	45	421	336
Paygrade Grouping							
E1-E4	3,001	644	404	361	393	750	449
E5-E6	4,303	996	520	624	253	1,164	746
E7-E9	2,752	582	397	144	169	859	601
W1-W5	314	207	71	6	30	0	0
O1-O3	1,132	257	200	200	104	161	210
O4-O6	2,034	222	211	244	295	277	785

Nonresponse Adjustments and Final Weights

After case dispositions were resolved, the sampling weights were adjusted for nonresponse. First, the sampling weights for cases of known eligibility (SAMP_DC = 2, 3, 4, 5) were adjusted to account for cases of unknown eligibility (SAMP_DC = 8, 9, 10, 11). Second, the eligibility adjusted weights for eligible respondents (SAMP_DC = 4) were adjusted to account for eligible sample members who returned an incomplete survey (SAMP_DC = 5).

Weighting adjustment factors for eligibility and completion were computed as the inverse of model-predicted probabilities. First, a logistic regression model was used to predict the probability of eligibility for the survey (known eligibility vs. unknown eligibility). A second logistic regression model was used to predict the probability of response among eligible sample members (complete response vs. incomplete response). CHAID (Chi-squared Automatic Interaction Detection), a decision tree technique based on chi-square tests, was used to determine the best predictors for each logistic model. The models were weighted by the sampling weight for both eligibility and completion. Predictors included the following population characteristics: Paygrade grouping, Reserve component, Reserve program, race/ethnicity, education, family status, age grouping, deployment status, combat status, gender, years of service, activated status, marital status, AFQT score grouping, email bounce, and postal non-deliverable status.

Table 5 shows the variables and the levels used for eligibility and completion adjustment to the weights.

Table 5.
Variables Used for the Eligibility and Completion Adjustments

Variable Description	Variable Name	Categories
Paygrade Grouping	RPAYGRP9	1 - E1-E4
		2 - E5-E9
		3 - W1-W5
		4 - O1-O3
		5 - O4-O6
Organization Code	RORG_CD	1 - ARNG
		2 - USAR
		3 - USNR
		4 - USMCR
		5 - ANG
		6 - USAFR
Reserve Program	RPROG1	1 - TPU
		2 - AGR/TAR
		3 - Military Technicians
		4 - IMA
Race/Ethnicity	CRACEETH	1 - American Indian/Alaskan Native
		2 - Asian
		3 - Black
		4 - White
		5 - Hispanic
		6 - Hawaiian/Pacific Islander
		7 - Multi Race
Education	CEDUC	1 - No College
		2 - Some College
		3 - 4-year Degree
		4 - Grad/Prof Degree
Family Status	FAMSTAT	1 - Single with kids/unknown
		2 - Single with no kids
		3 - Married with kids
		4 - Married with no kids
Age Grouping	AGE_5	1 - 18-24
		2 - 25-29
		3 - 30-34
		4 - 35-44
		5 - 45+

Table 5. (continued)

Variable Description	Variable Name	Categories
Deployment	DEPLOY12	0 - Deployed in the last 12 months (includes currently deployed)
		1 - Not deployed in last 12 months
Combat Occupation Code	COMBAT	0 - non-combat
		1 - combat
Gender	RSEX2	1 - Male/unknown
		2 - Female
Years of Service	CYOS	0 - unknown
		1 – Less than 1 year
		2 – 1 to less than 5 years
		3 - 6 to less than 8 years
		4 – 9 to less than 11 years
		5 – 12 to less than 14 years
		6 – 15 years and above
Activated	ACTIVE12	0 - Not activated in the past 12 months
		1 - Activated in the past 12 months
Marital Status	RMARITAL	1 - Married
		2 - Not married/Unknown
AFQT Score	AFQT_SCR	. - Missing/Officers
		1 - 0-25
		2 - 26-50
		3 - 51-75
		4 - 76-100
Email Bounce	EMAIL_BOUNCE	Y - Email bounced back
		N - Email did not bounce back
Postal Non-Deliverable	POSTAL_ND	Y - Postal was delivered
		N - Postal was not delivered

Finally, the weights were poststratified to match population totals and to reduce bias unaccounted for by the previous weighting adjustments. Poststratification cells were defined by the cross-classification of race/ethnicity, Reserve organization, and paygrade grouping. Within each post-stratification cell, the non-response-adjusted weights for eligible respondents and self-reported ineligibles (SAMP_DC = 2, 3, 4) were adjusted to match population counts. Table 6 shows the three variables used for poststratification.

Table 6.
Variables used for Post-stratification

Variable	Variable Name	Categories
Race/Ethnicity	CRACEETH	1 - American Indian/Alaskan Native
		2 - Asian
		3 - Black
		4 - White
		5 - Hispanic
		6 - Hawaiian/Pacific Islander
		7 - Multi Race
Reserve Organization	RORG_CD	1. ARNG
		2. USAR
		3. USNR
		4. USMCR
		5. ANG
		6. USAFR
Paygrade Grouping	RPAYGRP9	1. E1-E4
		2. E5-E9
		3. W1-W5
		4. O1-O3
		5. O4-O6

Table 7 provides summaries of the distributions of the sampling weights, intermediate weights, final weights, and adjustment factors by eligibility status. Eligible respondents were those individuals who were 1) eligible to participate in the survey, 2) completed 50% of the survey items asked of all respondents and 3) answered one of the harassment/racial discrimination items (SAMP_DC=4). Self/Proxy ineligibles were those determined to be ineligible (SAMP_DC = 2 or 3) during the survey, while the non-respondents include the incomplete eligibles, refusals, returned blank surveys, unreachables and other nonrespondents (SAMP_DC = 5 through 11). Record ineligible individuals (SAMP_DC=1) were those who were not eligible to participate in the survey according to administrative records; no final weights were computed for these cases.

Table 7.
Distribution of Weights and Adjustment Factors by Eligibility Status

Eligibility Status	Statistic	Sampling Weight	Eligibility Status Adjusted Weight	Complete Eligible Response Adjusted Weight	Final Weight With Non-response and Poststrati-fication Factors	Eligibility Status Factor	Complete Eligible Response Factor	Post-strati-fication Factor
Eligible Respondents	N	13,536	13,536	13,536	13,536	13,536	13,536	13,536
	MIN	1.0	1.6	1.7	1.2	1.6	1.0	0.6
	MAX	72.8	1,437.6	1,554.1	1,539.1	78.0	1.5	1.8
	MEAN	11.0	55.3	58.6	59.2	5.4	1.1	1.0
	STD	11.9	109.9	118.1	117.7	5.8	0.0	0.1
	CV	1.1	2.0	2.0	2.0	1.1	0.0	0.1
Self/Proxy Ineligibles	N	395	395	395	395	395	0.0	395
	MIN	1.0	1.6	1.6	1.5	1.6		0.6
	MAX	66.7	662.2	662.2	655.8	78.0		1.6
	MEAN	7.7	43.3	43.3	44.3	7.4		1.0
	STD	10.5	79.8	79.8	80.7	8.4		0.1
	CV	1.4	1.8	1.8	1.8	1.1		0.1
Non-respondents	N	65,329	65,329	65,329	65,329	65,329	764	0.0
	MIN	1.0	0.0	0.0	0.0	0.0	0.0	
	MAX	72.8	739.7	0.0	0.0	49.3	0.0	
	MEAN	10.1	0.7	0.0	0.0	0.1	0.0	
	STD	12.2	12.9	0.0	0.0	1.0	0.0	
	CV	1.2	19.1			12.9		
Record Ineligibles	N	934	934	934	934	0.0	0.0	0.0
	MIN	1.0	1.0	1.0	0.0			
	MAX	72.8	72.8	72.8	0.0			
	MEAN	9.3	9.3	9.3	0.0			
	STD	12.0	12.0	12.0	0.0			
	CV	1.3	1.3	1.3				

Table 8.
Sum of Weights by Eligibility Status

Eligibility Category	Sum of Sampling Weights	Sum of Eligibility Status Adjusted Weights	Sum of Complete Eligible Response Adjusted Weights	Sum of Final Weights With Nonresponse and Poststratification Adjustments
1.Eligible weighted	149,280	749,048	793,408	801,699
2.Ineligible weighted	3,045	17,119	17,119	17,509
3.Non-response unweighted	658,237	44,395	0	0
4.Record ineligible unweighted	8,646	8,646	8,646	0
Total	**819,208**	**819,207**	**819,173**	**819,208**

Variance Estimation

Sampling error is the uncertainty associated with an estimate that is based on data gathered from a sample of the population rather than the full population. Note that sample-based estimates will vary depending on the particular sample selected from the population. Measures of the magnitude of sampling error, such as the variance and the standard error (the square root of the variance), reflect the variation in the estimates over all possible samples that could have been selected from the population using the same sampling methodology. Analysis of the *2015 WEOR* data required a variance estimation procedure that accounted for the weighting procedures. The final step of the weighting process was to define strata for variance estimation by Taylor series linearization. The *2015 WEOR* variance estimation strata corresponded closely to the three variables used for stratification (race/ethnicity, Reserve organization, and paygrade grouping); however, it was necessary to collapse some sampling strata containing fewer than 25 complete eligible responses with non-zero final weights with similar strata. 135 variance estimation strata were defined for the *2015 WEOR*.

Multiple Comparison Section

When statistically comparing groups (e.g., USAR vs. USNR estimates of overall satisfaction with the military way of life), a statistical hypothesis whether there are no differences (null hypothesis) versus there are differences (alternative hypothesis) is tested. DMDC uses two-independent samples t-tests for its statistical tests. The conclusions are usually based on the p-value associated with the test-statistic. If the p-value is less than the critical value, then the null hypothesis is rejected. Any time a null hypothesis is rejected (conclude that estimates are significantly different), it is possible this conclusion is incorrect. In reality, the null hypothesis may have been true, and the significant result may have been due to chance. A p-value of 0.05 means there is a five percent chance of finding a difference as large as the observed result if the null hypothesis were true.

In survey research there is interest in conducting multiple comparisons. For example, 1) testing whether retention for USAR enlisted men is the same as retention for all enlisted men for all other Reserve components, and 2) satisfaction with the military life is the same for the USNR versus USMCR. When performing multiple independent comparisons on the same data, the question becomes: "Does the interpretation of the p-value for a single statistical test hold for multiple comparisons?" If 200 independent statistical (significance) tests were conducted at the 0.05 significance level, and the null hypothesis is supported for all, 10 of the tests would be expected to be significant at the p-value < 0.05 level simply due to chance. These 10 tests would have incorrectly been concluded as statistically significant—known as false positives or false discoveries. When a single significance test is conducted, the error rate—the probability of false discoveries—is the p-value itself. When more than one significance test is conducted, the probability of false discoveries increases (i.e., the more tests that are conducted, the greater the number of false discoveries).

This problem is known in the statistical literature as the "multiple comparisons problem." Therefore, it is important to control the false discoveries when performing multiple independent tests to reach more accurate conclusions. Numerous techniques have been developed to control the false positive error rate associated with conducting multiple statistical testing (multiple comparisons). It should be noted that there is no universally accepted approach for dealing with the problem of multiple comparisons.

DMDC typically uses a method to control for false discoveries known as the False Discovery Rate correction (FDR) developed by Benjamini and Hochberg (1995). FDR is defined as the expected percentage of erroneous rejections among all rejections. The idea is to control the false discovery rate which is the proportion of "discoveries" (significant results) that are actually false positives. The approach can be summarized as follows:

- determine the number of comparisons (tests) of interest, call it *m*;
- determine the tolerable False Discovery Rate (FDR), call it α;
- calculate the p-value for each statistical test;
- sort the individual p-values from smallest to largest and rank them; call the rank *k*.
- For each ranked p-value, calculate the FDR-adjusted *alpha* (threshold) which is defined as $\frac{k * \propto}{m}$;
- Determine the cutoff delineating statistically significant results from non-significant results in the sorted file as follows: Look for the maximum rank (*k*) such that the ordered p-value is less than the FDR-adjusted *alpha* (i.e., look for the maximum *k* after which the p-value becomes greater than the threshold), call this maximum *k* the cutoff. Any comparison (p-value) with rank less than the cutoff is considered statistically significant.

RSSC computed the FDR thresholds (FDR adjusted alpha) separately for the two types of comparisons—current year and trends. For both types of tests, RSSC implemented the FDR

Multiple Comparison corrections to control the expected rate of false discoveries (Type I errors) at $\propto = 0.05$. For the current year estimates from the *2015 WEOR*, RSSC performed 19,593 separate statistical tests (e.g., Racial/Ethnic Harassment/Discrimination Prevalence rates between Air National Guard and the aggregate of other Reserve components). Of the 19,593 current year statistical tests, 3,483 were statistically significant. In addition, RSSC performed another 1,901 separate statistical tests to compare estimates from the *2015 WEOR* to the *2011 WEOR* (i.e., trends). For trends, 770 of the 1,901 statistical tests were significant.

Contact, Cooperation, and Response Rates

Contact, cooperation, and response rates were calculated in accordance with the recommendations of the American Association for Public Opinion Research (AAPOR, 2016 Standard Definitions), which estimates the proportion of eligible respondents among cases of unknown eligibility (SAMP_DC = 10 and 11).

The *contact rate* uses the concepts of AAPOR standard formula CON2 and is defined as

$$CON2 = \frac{(I+P)+R+O-e(O)}{(I+P)+R+O+NC-e(NC+O)} = \frac{\text{adjusted contacted sample}}{\text{adjusted eligible sample}} = \frac{N_L}{N_E}.$$

The *cooperation rate* uses the concepts of AAPOR standard formula COOP2 and is defined as

$$COOP2 = \frac{(I+P)}{(I+P)+R+O-e(O)} = \frac{\text{complete eligibles}}{\text{adjusted contacted sample}} = \frac{N_R}{N_L}.$$

The *response rate* (RR) uses AAPOR standard formula RR4 and is defined as

$$RR4 = \frac{(I+P)}{(I+P)+R+O+NC-e(NC+O)} = \frac{\text{complete eligibles}}{\text{adjusted eligible sample}} = \frac{N_R}{N_E}.$$

Where:

I = Fully complete responses according to RR4 are greater than 80% complete (SAMP_DC=4)

P = Partially complete responses according to RR4 are between 50 – 80% complete (SAMP_DC=4)

R = Refusal and break-off according to RR4 are less than < 50% complete (SAMP_DC=5, 8, and 9)[1]

[1] RSSC considers these all cases of known eligibility

NC = Non-contact (SAMP_DC =10)

O = Other (SAMP_DC = 11)[2]

e(O) = Estimated ineligible nonrespondents

e(NC) = Estimated ineligible PND

N_L = Adjusted contacted sample

N_E = Adjusted eligible sample

N_R = Complete eligibles[3]

Table 9 shows the corresponding sample disposition codes associated with the response categories.

Table 9.
Disposition Codes for Response Rates

Response Category	SAMP_DC Values
Eligible Sample	4, 5, 8, 9, 10, 11
Contacted Sample	4, 5, 8, 9, 11
Complete Eligibles	4
Not Returned	11
Eligibility Determined Cases	2, 3, 4, 5, 8, 9
Self Report Ineligible Cases	2, 3

Ineligibility Rate

The ineligibility rate (IR) is defined as the following and needs to be calculated for both weighted and unweighted:

IR = Self Report Ineligible/Eligibility Determined.

Estimated Ineligible Postal Non-Deliverable/Not Contacted Rate

The estimated ineligible postal non-deliverable or not contacted (IPNDR) is defined as:

IPNDR = (Eligible Sample - Contacted Sample) * IR.

---

[2] These are all nonrespondents which RSSC considers cases of unknown eligibility
[3] Complete eligibles is an RSSC term that applies to self-administered surveys in comparison to the terms complete and partial interviews used by AAPOR

Estimated Ineligible Nonresponse

The estimated ineligible nonresponse (EINR) is defined as:

EINR = (Not Returned) * IR.

Adjusted Contact Rate

The adjusted contact rate (ACR) is defined as:

ACR = (Contacted Sample - EINR)/(Eligible Sample - IPNDR - EINR).

Adjusted Cooperation Rate

The adjusted cooperation rate (ACOR) is defined as:

ACOR = (Eligible Response)/(Contacted Sample - EINR).

Adjusted Response Rate

The adjusted response rate (ARR) is defined as:

ARR = (Eligible Response)/(Eligible Sample - IPNDR - EINR).

Table 10 shows the weighted sampled counts used to compute the overall response rates.

The final response rate is the product of the location rate and the completion rate. Table 11 shows both weighted and unweighted location, completion, and response rates for the *2015 WEOR*.

Finally, Table 12 shows weighted location, completion, and response rates for the full sample by the stratification variables.

Table 10.
Comparison of the Final Weighted Respondents Relative to the Drawn Sample

Case Disposition Categories	Sample Counts		Weighted Estimates	
	Sample Size	Percent	Sample Size	Percent
Drawn sample and population	**80,194**	**100%**	**819,208**	**100%**
Ineligible on master files	-934	1.2%	-8,646	1.1%
Self-reported ineligible	-395	0.5%	-3,045	0.4%
Total: Ineligible	-1,329	1.7%	-11,691	1.4%
Eligible sample	**78,865**	**98.3%**	**807,517**	**98.6%**
Not located (estimated ineligible)	-238	0.3%	-1,494	0.2%
Not located (estimated eligible)	-8,838	11.0%	-78,748	9.6%
Total not located	-9,076	11.3%	-80,242	9.8%
Located sample	**69,789**	**87.0%**	**727,275**	**88.8%**
Requested removal from survey mailings	-277	0.3%	-2,968	0.4%
Returned blank	-114	0.1%	-1,118	0.1%
Skipped key questions	-764	1.0%	-7,118	0.9%
Did not return a survey (estimated ineligible)	-1,443	1.8%	-10,554	1.3%
Did not return a survey (estimated eligible)	-53,655	66.9%	-556,237	67.9%
Total: Nonresponse	-56,253	70.1%	-577,995	70.6%
Eligible responses	**13,536**	**16.9%**	**149,280**	**18.2%**

Table 11.
Location, Completion, and Response Rates

Type of Rate	Computation	Unweighted	Weighted
Location	Adjusted located sample/Adjusted eligible sample	88.5%	90.1%
Completion	Eligible responses/Adjusted located sample	19.8%	20.8%
Response	Eligible responses/Adjusted eligible sample	17.5%	18.8%

Table 12.
Rates for Full Sample and Stratification and Key Domain Levels

Key Domain Variables	Domain Level	Sample Size	Eligible Responses	Sum of Sampling Weights	Location Rate	Completion Rate	Response Rate
Sample	Sample	80,194	13,536	819,208	90%	21%	19%
Service	ARNG	22,073	2,908	349,482	89%	16%	14%
	USAR	11,886	1,803	198,619	90%	19%	17%
	USNR	9,151	1,579	57,464	84%	28%	24%
	USMCR	15,378	1,244	39,423	86%	9%	8%
	ANG	10,859	3,211	105,569	96%	34%	32%
	USAFR	10,847	2,791	68,651	94%	28%	26%
Gender	Male/Unknown	63,918	10,583	663,742	90%	21%	19%
	Female	16,276	2,953	155,466	90%	20%	18%
Marital Status	Married	33,167	8,270	363,123	93%	29%	27%
	Unmarried/Unknown	47,027	5,266	456,085	88%	14%	12%
Race/ Ethnicity	Am Indian/Alaskan Native	5,676	884	5,875	86%	19%	17%
	Asian	8,756	1,549	29,533	91%	22%	20%
	Black	14,413	1,818	131,060	86%	17%	15%
	White/Unknown	26,371	5,529	547,641	92%	22%	20%
	Hispanic	11,895	1,570	90,066	85%	18%	16%
	Hawaiian/Pacific Islander	4,833	796	5,110	90%	20%	18%
	Multi Race	8,250	1,390	9,922	88%	22%	19%
Program	TPU/Unknown	62,907	8,081	669,666	89%	16%	14%
	AGR/TAR	6,485	2,063	75,800	93%	41%	38%
	Military Technicians	4,751	1,811	61,580	97%	41%	40%
	IMA	6,051	1,581	12,162	96%	31%	30%
Paygrade	E1-E4/Enlisted Unknown	39,073	3,001	349,982	86%	9%	7%
	E5-E6	22,676	4,303	246,298	91%	21%	19%
	E7-E9	7,200	2,752	93,769	96%	42%	40%
	W1-W5/Warrant Unknown	867	314	12,225	97%	40%	38%
	O1-O3/Officer Unknown	4,449	1,132	60,901	92%	27%	25%
	O4-O6	5,929	2,034	56,033	97%	41%	40%

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This report describes the statistical methodologies for the 2015 Workplace and Equal Opportunity Survey of Reserve Component Members (2015 WEOR). The first section describes the sample design and selection of the sample. The second section is a brief description of the survey administration issues. The third section describes weighting and variance estimation. The fourth section describes the statistical tests used by RSSC on their surveys. The final section describes the calculation of response, location, and completion rates for the full sample and population subgroups.

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