



CITY OF URBANA
Human Resources Division

MEMORANDUM

To: Todd Rent, Chief Examiner and the Civil Service Commission
From: Human Resources staff
Re: Passing Score for Police Services Representative/Administrative Assistant II
Date: October 28, 2015

INTRODUCTION

Staff requests that the Civil Service Commission set a passing score for Office Skills Test at 50% for the average score. This test will be used to establish a register which can be used for both the Police Services Representative (PSR) and Administrative Assistant II positions. If approved, this will result in a register consisting of 224 individuals with no adverse impact.

BACKGROUND

The positions of PSR and Administrative Assistant II were opened for applications from July 31 to August 28, 2015. The Administrative Assistant II positions received 272 applications and the PSR position received 216 applications. Most were not discrete applications, as many applicants applied twice, once for each position. A total of 371 applicants met the minimum qualifications for one or both positions and were invited to test.

A total of 36 applicants were found to not meet the qualifications of the position and were therefore not invited to test. Seven applicants for the PSR position were not referred on to the test and 29 applicants for the Administrative Assistant II position were not referred.

Of the 371 invited to test, 240 applicants (65%) attended one of the exams offered.

Exam Attendees					
Male	49	20.4%	Non-Minority	176	73.3%
Female	188	78.3%	Minority	58	24.2%
N/A	3	1.3%	N/A	6	2.5%
Total	240	100%	Total	240	100%

Attendees were evaluated on the Ergometrics Office Skills™ Test Battery, which is comprised of the following elements:

Office Skills™ Test Battery Components	# of Items
Applicant Job Match Questionnaire	28
Proofreading	19
Spelling	32
Written Expression	6
Checking	32
Filing	19
Coding	35
Basic Math	12
Business Math	12
Total	195

This exam battery was written and scored by Ergometrics & Applied Personnel Research, Inc., and has been professionally validated and have been shown to consistently have lower adverse impact than written tests.

A composite score for each candidate was tabulated by scoring each of the components reference above (except for the Applicant Job Match Questionnaire) and averaging the total. Each component was given the same weight.

Highest score: 92.06%

Mean score: 68.84%

Lowest score: 0.00%

Based on statistical analyses of applicant demographics, City staff recommends the passing score be established at 50% as the average score across the above components. This will result in a Civil Service Register of 224 candidates. Adverse and disparate impacts are not found at this proposed passing point. A demographic analysis is as follows:

50% Passing Score							
Gender	#	% of Total	% of Like Group	Race	#	% of Total	% of Like Group
Male	46	20.5%	93.9%	Non-Minority	167	74.6%	94.9%
Female	175	78.1%	93.1%	Minority	51	22.8%	87.9%
N/A	3	1.3%	100%	N/A	6	2.7%	100%
Total	224	100%		Total	224	100%	

REQUESTED ACTION

Staff requests the Civil Service Commission establish a passing point as discussed above to establish a register for Police Services Representative and Administrative Assistant II.

Attachments: Disparate impact reports at the 70%, 60% and 50% passing points.

Disparate Impact Analysis

(an On-Line Internet based application)



Instructions: Please fill out the information into the form below. Once you have entered your data below, you may select the types of analysis to be conducted by checking the appropriate boxes. Then press the compute button at the bottom of the form to view the results.

Select the type of employment decision: Selection ▼			
Enter a title for your report: 70.0% Passing Score (Office Skills)			
Number of Male <input style="width: 40px;" type="text" value="49"/> Applicants <input style="width: 40px;" type="text" value="24"/> Selected	Number of Non-Minority <input style="width: 40px;" type="text" value="176"/> Applicants <input style="width: 40px;" type="text" value="101"/> Selected	Number of Younger <input style="width: 40px;" type="text"/> Applicants <input style="width: 40px;" type="text"/> Selected	Number of Non-Disabled <input style="width: 40px;" type="text"/> Applicants <input style="width: 40px;" type="text"/> Selected
Number of Female <input style="width: 40px;" type="text" value="188"/> Applicants <input style="width: 40px;" type="text" value="90"/> Selected	Number of Minority <input style="width: 40px;" type="text" value="58"/> Applicants <input style="width: 40px;" type="text" value="11"/> Selected	Number of Older <input style="width: 40px;" type="text"/> Applicants <input style="width: 40px;" type="text"/> Selected	Number of Disabled <input style="width: 40px;" type="text"/> Applicants <input style="width: 40px;" type="text"/> Selected
<input checked="" type="checkbox"/> -Adverse Impact <input checked="" type="checkbox"/> -Chi-Square <input checked="" type="checkbox"/> -Standard Deviation <input checked="" type="checkbox"/> -Confidence Intervals <input checked="" type="checkbox"/> Probability Distribution	Select the Statistical Tests you wish to execute by checking or unchecking the boxes on the left. Then press the 'Compute' button below.		
Compute			
Display: <input checked="" type="checkbox"/> Description of Statistic <input checked="" type="checkbox"/> Interpretation of Results			

70.0% Passing Score (Office Skills)

Adverse-Impact Report

Adverse Impact and the "four-fifths rule." - A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5ths) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact. [Uniform Guidelines on Employee Selection Procedures](#)

Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio for Females	Adverse Impact Ratio for Males
(90/ 188) = 0.4787	(24/ 49) = 0.4898	(0.4787/ 0.4898)= 0.98	(0.4898/ 0.4787)= 1.02
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio for Minorities	Adverse Impact Ratio for Non-Minorities
(11/ 58) = 0.1897	(101/ 176) = 0.5739	(0.1897/ 0.5739)= 0.33	(0.5739/ 0.1897)= 3.03
The Adverse Impact Ratio for Minorities is less than 0.80. Minorities Applicants are Selected at a rate less than 80% (4/5ths) of the rate that Non-Minorities Applicants are Selected.			

Chi-Square Report

Observed	Selected	Not Selected	Row Totals
Males	24 23.5696	25 25.4304	49
Females	90 90.4304	98 97.5696	188
Column Total	114	123	237
Chi-Square = 0.0191			
The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.			

Observed Expected	Selected	Not Selected	Row Totals
Non-Minorities	101 84.2393	75 91.7607	176
Minorities	11 27.7607	47 30.2393	58
Column Total	112	122	234

Chi-Square = 25.8055

The value of the statistic is greater than 6.635. This indicates that there is a less than 1 percent chance that these results would have been obtained absent any form of bias. Therefore, you may conclude that these results may have been the result of bias.

Standard-Deviation Report

The difference between the proportion of the protected class Selected and the proportion of all Applicants Selected has a normal distribution with a mean and standard deviation. The statistic is shown below:

$$(x / n) - p$$

$$\text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Analysis of proportion of Females Selected where:

- r = number of Females Selected.
- n = number of Selected (Females and Males).
- p = proportion of Applicants that are Females.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Males	24	25	49
Females	90	98	188
Column Total	114	123	237

$$r = 90$$

$$n = 114$$

$$p = 188 / 237 = 0.793$$

$$q = (90 + 24) / (188 + 49) = 0.481$$

Standard Deviation Statistic = -0.138

These results show that the proportion of Females Selected is -0.138 standard deviations below the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Analysis of proportion of Minorities Selected where:

- r = number of Minorities Selected.
- n = number of Selected (Minorities and Non-Minorities).
- p = proportion of Applicants that are Minorities.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Non-Minorities	101	75	176
Minorities	11	47	58
Column Total	112	122	234

$$r = 11$$

$$n = 112$$

$$p = 58 / 234 = 0.248$$

$$q = (11 + 101) / (58 + 176) = 0.479$$

Standard Deviation Statistic = -5.08

These results show that the proportion of Minorities Selected is more than two standard deviations below the proportion of Applicants (Minorities plus Non-Minorities) Selected.

Confidence Interval Report

The proportion of the protected class Selected has an expected value that would fall within a specified confidence interval. The statistic is shown below:

$$\text{Observed value} = (r / n)$$

$$\text{Expected value} = p$$

$$\text{Standard Deviation} = \text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Confidence Interval:

Lower Bound = $p - 1.96 * Std Dev$

Upper Bound = $p + 1.96 * Std Dev$

Analysis of proportion of Females Applicants Selected where:

- **r = number of Females Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Females among those Selected.**
- **q = proportion of Applicants Selected.**

r = 90

n = 114

p = $(188/(188+49))=0.793$

q = $((90 + 24)/(188 + 49))=0.481$

(r/n)= $90/114=0.7895$

The lower bound of the confidence interval is: $0.793 - (1.96 * 0.027) = 0.7397$

The upper bound of the confidence interval is: $0.793 + (1.96 * 0.027) = 0.8468$

Confidence Interval = 0.7397 to 0.8468

These results show that the proportion of Females Females (r/n=0.7895) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Analysis of proportion of Minorities Applicants Selected where:

- **r = number of Minorities Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Minorities among those Selected.**
- **q = proportion of Applicants Selected.**

r = 11

n = 112

p = $(58/(58+176))=0.248$

q = $((11 + 101)/(58 + 176))=0.479$

(r/n)= $11/112=0.0982$

The lower bound of the confidence interval is: $0.248 - (1.96 * 0.029) = 0.1901$

The upper bound of the confidence interval is: $0.248 + (1.96 * 0.029) = 0.3056$

Confidence Interval = 0.1901 to 0.3056

These results show that the proportion of Applicants Selected who were Minorities (r/n=0.0982) is not contained in the confidence interval. Therefore a finding of disparate impact is supported by this data.

Probability Distribution Report

Please note:

Due to the large number selected, the results will be shown in increments of 2 which may have an effect on the probability distributions.

All computed probabilities will be multiplied by the increment of 2. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Females Selected	Number Males Selected	Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio of Females	Adverse Impact against Females ?	Probability	Cumulative Probability
65	49	(65/188)	(49/49)	0.3457	YES	0	0
67	47	(67/188)	(47/49)	0.3715	YES	0	0
69	45	(69/188)	(45/49)	0.3996	YES	0	0
71	43	(71/188)	(43/49)	0.4304	YES	0	0
73	41	(73/188)	(41/49)	0.4641	YES	0	0
75	39	(75/188)	(39/49)	0.5012	YES	0.000001	0.000001
77	37	(77/188)	(37/49)	0.5424	YES	0.00002	0.000021

Disparate Impact analysis: a program by hr-software.net to analyze employment decisions for a variety of EE...

79	35	(79/188)	(35/49)	0.5883	YES	0.000292	0.000313
81	33	(81/188)	(33/49)	0.6397	YES	0.002632	0.002945
83	31	(83/188)	(31/49)	0.6978	YES	0.015138	0.018083
85	29	(85/188)	(29/49)	0.7639	YES	0.056661	0.074744
87	27	(87/188)	(27/49)	0.8398	NO	0.139836	0.21458
89	25	(89/188)	(25/49)	0.9279	NO	0.229332	0.443912
91	23	(91/188)	(23/49)	1.0312	NO	0.250772	0.694684
93	21	(93/188)	(21/49)	1.1543	NO	0.182676	0.87736
95	19	(95/188)	(19/49)	1.3032	NO	0.088188	0.965548
97	17	(97/188)	(17/49)	1.4872	NO	0.027935	0.993483
99	15	(99/188)	(15/49)	1.7202	NO	0.005717	0.9992
101	13	(101/188)	(13/49)	2.025	NO	0.000739	0.999939
103	11	(103/188)	(11/49)	2.4405	NO	0.000058	0.999997
105	9	(105/188)	(9/49)	3.0408	NO	0.000003	1
107	7	(107/188)	(7/49)	3.984	NO	0	1
109	5	(109/188)	(5/49)	5.6819	NO	0	1
111	3	(111/188)	(3/49)	9.6436	NO	0	1
113	1	(113/188)	(1/49)	29.4521	NO	0	1

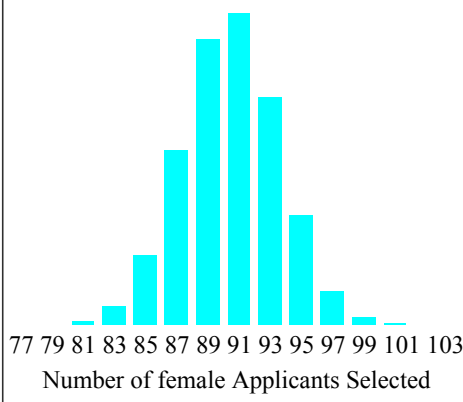
Given that 114 were Selected from a pool of 49 Males and 188 Females it was possible to have Selected from 65 to 114 Females.

Adverse Impact would be found if you Selected approximately 85 or fewer Females. The word "approximately" was used since the results are shown in increments of 2.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.0747 (the sum of the probabilities of having Selected 85 or fewer Females).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Females Selected.

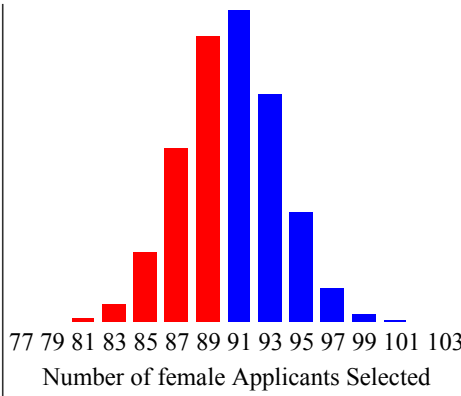


The probability distribution of having Selected from 65 to 114 Females is displayed above. The graph above is shown starting with 77 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 91 female Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of female Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer female Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more female Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of female and male Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 65 to 114 female Applicants, the individual probabilities of having Selected each number of female Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of female and male Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Females Selected' would have a lower bound of 85 and an upper bound of 95.

The significance of having Selected 90 or fewer Females is graphically displayed below.



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 85 or fewer female Applicants.

The word "approximately " was used since the results were computed in increments of 2.

You have Selected 90 female Applicants. The probability of having Selected 90 or fewer Females is equal to the cumulative probability for having Selected 90 Females Applicants. The cumulative probability of having Selected 90 female Applicants is 0.4439 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 90 or fewer female Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Please note:

Due to the large number selected, the results will be shown in increments of 2 which may have an effect on the probability distributions.

All computed probabilities will be multiplied by the increment of 2. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Minorities Selected	Number Non-Minorities Selected	Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio of Minorities	Adverse Impact against Minorities ?	Probability	Cumulative Probability
0	112	(0/58)	(112/176)	0	YES	0	0
2	110	(2/58)	(110/176)	0.0552	YES	0	0
4	108	(4/58)	(108/176)	0.1124	YES	0	0
6	106	(6/58)	(106/176)	0.1718	YES	0	0
8	104	(8/58)	(104/176)	0.2334	YES	0	0
10	102	(10/58)	(102/176)	0.2975	YES	0	0
12	100	(12/58)	(100/176)	0.3641	YES	0.000002	0.000002
14	98	(14/58)	(98/176)	0.4335	YES	0.000032	0.000034
16	96	(16/58)	(96/176)	0.5057	YES	0.000384	0.000418
18	94	(18/58)	(94/176)	0.5811	YES	0.002964	0.003381
20	92	(20/58)	(92/176)	0.6597	YES	0.015255	0.018636
22	90	(22/58)	(90/176)	0.7418	YES	0.053169	0.071805
24	88	(24/58)	(88/176)	0.8276	NO	0.126976	0.198781
26	86	(26/58)	(86/176)	0.9174	NO	0.209493	0.408274
28	84	(28/58)	(84/176)	1.0115	NO	0.24002	0.648294
30	82	(30/58)	(82/176)	1.1102	NO	0.191423	0.839717
32	80	(32/58)	(80/176)	1.2138	NO	0.106245	0.945962
34	78	(34/58)	(78/176)	1.3227	NO	0.040921	0.986883
36	76	(36/58)	(76/176)	1.4374	NO	0.010876	0.997759
38	74	(38/58)	(74/176)	1.5582	NO	0.001977	0.999736
40	72	(40/58)	(72/176)	1.6858	NO	0.000243	0.999979
42	70	(42/58)	(70/176)	1.8207	NO	0.00002	0.999999
44	68	(44/58)	(68/176)	1.9635	NO	0.000001	1
46	66	(46/58)	(66/176)	2.1149	NO	0	1
48	64	(48/58)	(64/176)	2.2759	NO	0	1
50	62	(50/58)	(62/176)	2.4472	NO	0	1
52	60	(52/58)	(60/176)	2.6299	NO	0	1

54	58	(54/58)	(58/176)	2.8252	NO	0	1
56	56	(56/58)	(56/176)	3.0345	NO	0	1
58	54	(58/58)	(54/176)	3.2593	NO	0	1

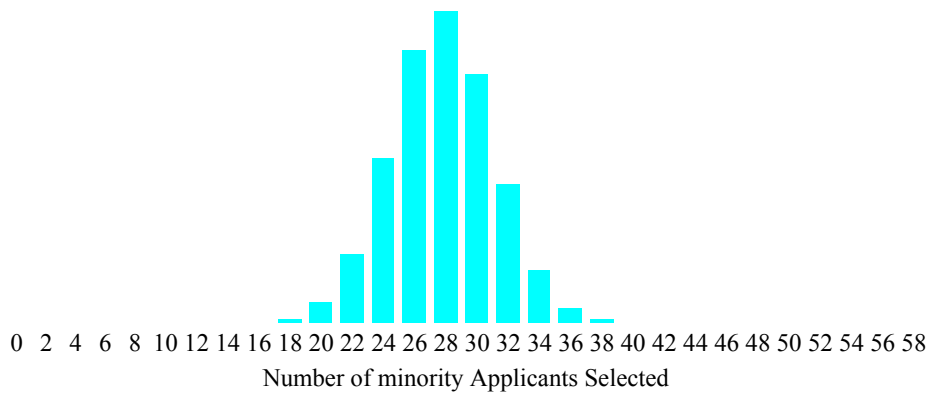
Given that 112 were Selected from a pool of 176 Non-Minorities and 58 Minorities it was possible to have Selected from 0 to 58 Minorities.

Adverse Impact would be found if you Selected approximately 22 or fewer Minorities. The word "approximately" was used since the results are shown in increments of 2.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.0718 (the sum of the probabilities of having Selected 22 or fewer Minorities).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Minorities Selected.

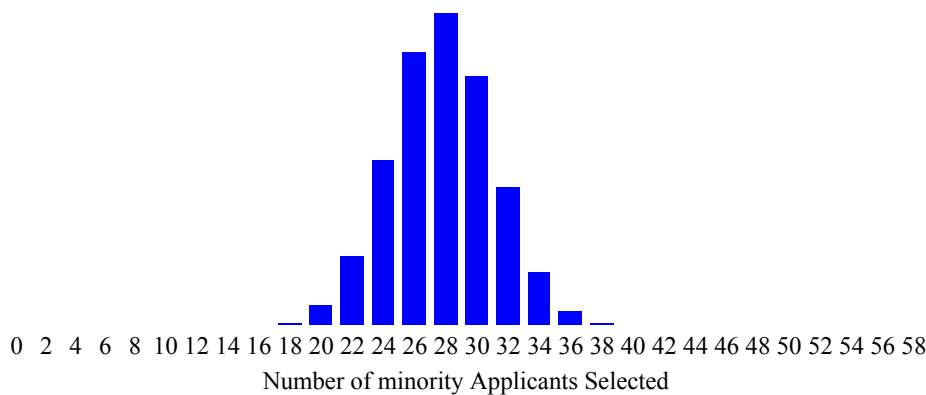


The probability distribution of having Selected from 0 to 58 Minorities is displayed above. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 28 minority Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of minority Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer minority Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minority Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 0 to 58 minority Applicants, the individual probabilities of having Selected each number of minority Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Minorities Selected' would have a lower bound of 22 and an upper bound of 34.

The significance of having Selected 11 or fewer Minorities is graphically displayed below.



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 22 *or fewer* minority Applicants.

The word "approximately " was used since the results were computed in increments of 2.

You have Selected 11 minority Applicants. The probability of having Selected 11 *or fewer* Minorities is equal to the cumulative probability for having Selected 11 Minorities Applicants. The cumulative probability of having Selected 11 minority Applicants is 0 and is graphically displayed, in red, above.

Since the probability is less than 10%, we must reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that the result 11 minority Applicants were Selected supports (based on statistics) a finding of Adverse Impact.

[View Source Code](#)

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Send questions or comments to webmaster@hr-guide.com. Thank you.

Disparate Impact Analysis

(an On-Line Internet based application)



Instructions: Please fill out the information into the form below. Once you have entered your data below, you may select the types of analysis to be conducted by checking the appropriate boxes. Then press the compute button at the bottom of the form to view the results.

Select the type of employment decision: Selection <input type="button" value="v"/>			
Enter a title for your report: 60.0% Passing Score (Office Skills Test)			
Number of Male <input type="text" value="49"/> Applicants <input type="text" value="40"/> Selected	Number of Non-Minority <input type="text" value="176"/> Applicants <input type="text" value="153"/> Selected	Number of Younger <input type="text"/> Applicants <input type="text"/> Selected	Number of Non-Disabled <input type="text"/> Applicants <input type="text"/> Selected
Number of Female <input type="text" value="188"/> Applicants <input type="text" value="153"/> Selected	Number of Minority <input type="text" value="58"/> Applicants <input type="text" value="37"/> Selected	Number of Older <input type="text"/> Applicants <input type="text"/> Selected	Number of Disabled <input type="text"/> Applicants <input type="text"/> Selected
<input checked="" type="checkbox"/> -Adverse Impact <input checked="" type="checkbox"/> -Chi-Square <input checked="" type="checkbox"/> -Standard Deviation <input checked="" type="checkbox"/> -Confidence Intervals <input checked="" type="checkbox"/> Probability Distribution		Select the Statistical Tests you wish to execute by checking or unchecking the boxes on the left. Then press the 'Compute' button below.	
		<input type="button" value="Compute"/>	
Display: <input checked="" type="checkbox"/> Description of Statistic <input checked="" type="checkbox"/> Interpretation of Results			

60.0% Passing Score (Office Skills Test)

Adverse-Impact Report

Adverse Impact and the "four-fifths rule." - A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5ths) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact. [Uniform Guidelines on Employee Selection Procedures](#)

Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio for Females	Adverse Impact Ratio for Males
$(153 / 188) = 0.8138$	$(40 / 49) = 0.8163$	$(0.8138 / 0.8163) = 1$	$(0.8163 / 0.8138) = 1$
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio for Minorities	Adverse Impact Ratio for Non-Minorities
$(37 / 58) = 0.6379$	$(153 / 176) = 0.8693$	$(0.6379 / 0.8693) = 0.73$	$(0.8693 / 0.6379) = 1.36$
The Adverse Impact Ratio for Minorities is less than 0.80. Minorities Applicants are Selected at a rate less than 80% (4/5ths) of the rate that Non-Minorities Applicants are Selected.			

Chi-Square Report

Observed	Expected	Selected	Not Selected	Row Totals
Males		40 39.903	9 9.097	49
Females		153 153.097	35 34.903	188
Column Total		193	44	237
Chi-Square = 0.0016				
The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.				

Observed Expected	Selected	Not Selected	Row Totals
Non-Minorities	153 142.906	23 33.094	176
Minorities	37 47.094	21 10.906	58
Column Total	190	44	234

Chi-Square = 15.2978

The value of the statistic is greater than 6.635. This indicates that there is a less than 1 percent chance that these results would have been obtained absent any form of bias. Therefore, you may conclude that these results may have been the result of bias.

Standard-Deviation Report

The difference between the proportion of the protected class Selected and the proportion of all Applicants Selected has a normal distribution with a mean and standard deviation. The statistic is shown below:

$$(x / n) - p$$

$$\text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Analysis of proportion of Females Selected where:

- r = number of Females Selected.
- n = number of Selected (Females and Males).
- p = proportion of Applicants that are Females.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Males	40	9	49
Females	153	35	188
Column Total	193	44	237

$$r = 153$$

$$n = 193$$

$$p = 188 / 237 = 0.793$$

$$q = (153 + 40) / (188 + 49) = 0.814$$

Standard Deviation Statistic = -0.04

These results show that the proportion of Females Selected is -0.04 standard deviations below the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Analysis of proportion of Minorities Selected where:

- r = number of Minorities Selected.
- n = number of Selected (Minorities and Non-Minorities).
- p = proportion of Applicants that are Minorities.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Non-Minorities	153	23	176
Minorities	37	21	58
Column Total	190	44	234

$$r = 37$$

$$n = 190$$

$$p = 58 / 234 = 0.248$$

$$q = (37 + 153) / (58 + 176) = 0.812$$

Standard Deviation Statistic = -3.911

These results show that the proportion of Minorities Selected is more than two standard deviations below the proportion of Applicants (Minorities plus Non-Minorities) Selected.

Confidence Interval Report

The proportion of the protected class Selected has an expected value that would fall within a specified confidence interval. The statistic is shown below:

$$\text{Observed value} = (r / n)$$

$$\text{Expected value} = p$$

$$\text{Standard Deviation} = \text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Confidence Interval:

Lower Bound = $p - 1.96 * Std Dev$

Upper Bound = $p + 1.96 * Std Dev$

Analysis of proportion of Females Applicants Selected where:

- **r = number of Females Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Females among those Selected.**
- **q = proportion of Applicants Selected.**

r = 153

n = 193

p = $(188/(188+49))=0.793$

q = $((153 + 40)/(188 + 49))=0.814$

(r/n)= $153/193=0.7927$

The lower bound of the confidence interval is: $0.793 - (1.96 * 0.013) = 0.7686$

The upper bound of the confidence interval is: $0.793 + (1.96 * 0.013) = 0.8179$

Confidence Interval = 0.7686 to 0.8179

These results show that the proportion of Females Females (r/n=0.7927) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Analysis of proportion of Minorities Applicants Selected where:

- **r = number of Minorities Selected.**
- **n = number of Applicants Selected.**
- **p = proportion of Minorities among those Selected.**
- **q = proportion of Applicants Selected.**

r = 37

n = 190

p = $(58/(58+176))=0.248$

q = $((37 + 153)/(58 + 176))=0.812$

(r/n)= $37/190=0.1947$

The lower bound of the confidence interval is: $0.248 - (1.96 * 0.014) = 0.2212$

The upper bound of the confidence interval is: $0.248 + (1.96 * 0.014) = 0.2745$

Confidence Interval = 0.2212 to 0.2745

These results show that the proportion of Applicants Selected who were Minorities (r/n=0.1947) is not contained in the confidence interval. Therefore a finding of disparate impact is supported by this data.

Probability Distribution Report

Please note:

Due to the large number selected, the results will be shown in increments of 3 which may have an effect on the probability distributions.

All computed probabilities will be multiplied by the increment of 3. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Females Selected	Number Males Selected	Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio of Females	Adverse Impact against Females ?	Probability	Cumulative Probability
144	49	(144/188)	(49/49)	0.766	YES	0.000034	0.000034
147	46	(147/188)	(46/49)	0.8329	NO	0.015761	0.015795
150	43	(150/188)	(43/49)	0.9092	NO	0.231316	0.247111
Selected-> 153	40	(153/188)	(40/49)	0.9969	NO	0.489838	0.73695
156	37	(156/188)	(37/49)	1.0989	NO	0.231991	0.968941
159	34	(159/188)	(34/49)	1.2189	NO	0.029892	0.998833
162	31	(162/188)	(31/49)	1.362	NO	0.001152	0.999984

165	28	(165/188)	(28/49)	1.5359	NO	0.000014	0.999998
168	25	(168/188)	(25/49)	1.7515	NO	0	0.999998
171	22	(171/188)	(22/49)	2.0259	NO	0	0.999998
174	19	(174/188)	(19/49)	2.3869	NO	0	0.999998
177	16	(177/188)	(16/49)	2.8833	NO	0	0.999998
180	13	(180/188)	(13/49)	3.6088	NO	0	0.999998
183	10	(183/188)	(10/49)	4.7697	NO	0	0.999998
186	7	(186/188)	(7/49)	6.9255	NO	0	0.999998

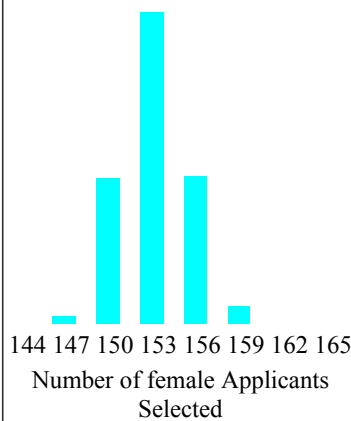
Given that 193 were Selected from a pool of 49 Males and 188 Females it was possible to have Selected from 144 to 188 Females.

Adverse Impact would be found if you Selected approximately 144 or fewer Females. The word "approximately" was used since the results are shown in increments of 3.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0 (the sum of the probabilities of having Selected 144 or fewer Females).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Females Selected.

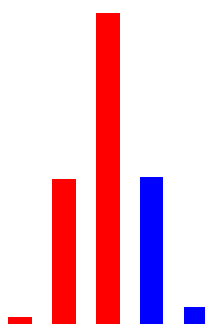


The probability distribution of having Selected from 144 to 188 Females is displayed above. The graph above is shown starting with 144 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 153 female Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of female Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer female Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more female Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of female and male Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 144 to 188 female Applicants, the individual probabilities of having Selected each number of female Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of female and male Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Females Selected' would have a lower bound of 150 and an upper bound of 156.

The significance of having Selected 153 or fewer Females is graphically displayed below.



144 147 150 153 156 159 162 165

Number of female Applicants
Selected

As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 144 *or fewer* female Applicants.

The word "approximately " was used since the results were computed in increments of 3.

You have Selected 153 female Applicants. The probability of having Selected 153 *or fewer* Females is equal to the cumulative probability for having Selected 153 Females Applicants. The cumulative probability of having Selected 153 female Applicants is 0.7369 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 153 or fewer female Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Please note:

Due to the large number selected, the results will be shown in increments of 3 which may have an effect on the probability distributions.

All computed probabilities will be multiplied by the increment of 3. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Minorities Selected	Number Non-Minorities Selected	Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio of Minorities	Adverse Impact against Minorities ?	Probability	Cumulative Probability
14	176	(14/58)	(176/176)	0.2414	YES	0	0
17	173	(17/58)	(173/176)	0.2982	YES	0	0
20	170	(20/58)	(170/176)	0.357	YES	0	0
23	167	(23/58)	(167/176)	0.4179	YES	0	0
26	164	(26/58)	(164/176)	0.4811	YES	0	0
29	161	(29/58)	(161/176)	0.5466	YES	0	0
32	158	(32/58)	(158/176)	0.6146	YES	0	0
35	155	(35/58)	(155/176)	0.6852	YES	0.000024	0.000024
38	152	(38/58)	(152/176)	0.7586	YES	0.00153	0.001554
41	149	(41/58)	(149/176)	0.835	NO	0.032099	0.033654
44	146	(44/58)	(146/176)	0.9145	NO	0.219319	0.252973
47	143	(47/58)	(143/176)	0.9973	NO	0.458477	0.71145
50	140	(50/58)	(140/176)	1.0837	NO	0.257952	0.969402
53	137	(53/58)	(137/176)	1.1739	NO	0.0302	0.999602
56	134	(56/58)	(134/176)	1.2681	NO	0.000398	1

Given that 190 were Selected from a pool of 176 Non-Minorities and 58 Minorities it was possible to have Selected from 14 to 58 Minorities.

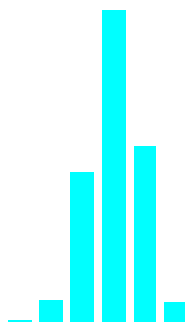
Adverse Impact would be found if you Selected approximately 38 or fewer Minorities.

The word "approximately" was used since the results are shown in increments of 3.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0.0016 (the sum of the probabilities of having Selected 38 or fewer Minorities).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Minorities Selected.



14 17 20 23 26 29 32 35 38 41 44 47 50 53 56

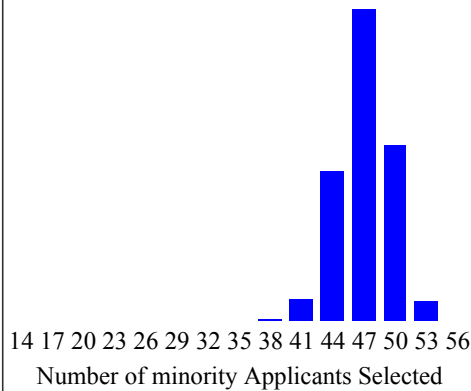
Number of minority Applicants Selected

The probability distribution of having Selected from 14 to 58 Minorities is displayed above. The graph above is shown starting with 14 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 47 minority Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of minority Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer minority Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minority Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 14 to 58 minority Applicants, the individual probabilities of having Selected each number of minority Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Minorities Selected' would have a lower bound of 44 and an upper bound of 50.

The significance of having Selected 37 or fewer Minorities is graphically displayed below.



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 38 *or fewer* minority Applicants.

The word "approximately " was used since the results were computed in increments of 3.

You have Selected 37 minority Applicants. The probability of having Selected 37 *or fewer* Minorities is equal to the cumulative probability for having Selected 37 Minorities Applicants. The cumulative probability of having Selected 37 minority Applicants is 0 and is graphically displayed, in red, above.

Since the probability is less than 10%, we must reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that the result 37 minority Applicants were Selected supports (based on statistics) a finding of Adverse Impact.

[View Source Code](#)

Disparate Impact Analysis

(an On-Line Internet based application)



Instructions: Please fill out the information into the form below. Once you have entered your data below, you may select the types of analysis to be conducted by checking the appropriate boxes. Then press the compute button at the bottom of the form to view the results.

Select the type of employment decision: Selection			
Enter a title for your report: 50.0% Passing Score (Office Skills)			
Number of Male <input type="text" value="49"/> Applicants <input type="text" value="46"/> Selected	Number of Non-Minority <input type="text" value="176"/> Applicants <input type="text" value="167"/> Selected	Number of Younger <input type="text"/> Applicants <input type="text"/> Selected	Number of Non-Disabled <input type="text"/> Applicants <input type="text"/> Selected
Number of Female <input type="text" value="188"/> Applicants <input type="text" value="175"/> Selected	Number of Minority <input type="text" value="58"/> Applicants <input type="text" value="51"/> Selected	Number of Older <input type="text"/> Applicants <input type="text"/> Selected	Number of Disabled <input type="text"/> Applicants <input type="text"/> Selected
<input checked="" type="checkbox"/> -Adverse Impact <input checked="" type="checkbox"/> -Chi-Square <input checked="" type="checkbox"/> -Standard Deviation <input checked="" type="checkbox"/> -Confidence Intervals <input checked="" type="checkbox"/> Probability Distribution		Select the Statistical Tests you wish to execute by checking or unchecking the boxes on the left. Then press the 'Compute' button below.	
		<input type="button" value="Compute"/>	
Display: <input checked="" type="checkbox"/> Description of Statistic <input checked="" type="checkbox"/> Interpretation of Results			

50.0% Passing Score (Office Skills)

Adverse-Impact Report

Adverse Impact and the "four-fifths rule." - A selection rate for any race, sex, or ethnic group which is less than four-fifths (4/5ths) (or eighty percent) of the rate for the group with the highest rate will generally be regarded by the Federal enforcement agencies as evidence of adverse impact. [Uniform Guidelines on Employee Selection Procedures](#)

Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio for Females	Adverse Impact Ratio for Males
(175/ 188) = 0.9309	(46/ 49) = 0.9388	(0.9309/ 0.9388)= 0.99	(0.9388/ 0.9309)= 1.01
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio for Minorities	Adverse Impact Ratio for Non-Minorities
(51/ 58) = 0.8793	(167/ 176) = 0.9489	(0.8793/ 0.9489)= 0.93	(0.9489/ 0.8793)= 1.08
Adverse impact as defined by the 4/5ths rule was not found in the above data.			

Chi-Square Report

Observed Expected	Selected	Not Selected	Row Totals
Males	46 45.692	3 3.308	49
Females	175 175.308	13 12.692	188
Column Total	221	16	237

Chi-Square = 0.0388
 The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.

Observed Expected	Selected	Not Selected	Row Totals
Non-Minorities	167 163.9658	9 12.0342	176
Minorities	51 54.0342	7 3.9658	58
Column Total	218	16	234

Chi-Square = 3.313

The value of the statistic is less than 3.841. This indicates that there is a 95 percent chance that these results have been obtained absent any form of bias. Therefore, you may conclude that these results fall within normal random variations and are not the result of bias.

Standard-Deviation Report

The difference between the proportion of the protected class Selected and the proportion of all Applicants Selected has a normal distribution with a mean and standard deviation. The statistic is shown below:

$$(r / n) - p$$

$$\text{-----}$$

$$\text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Analysis of proportion of Females Selected where:

- r = number of Females Selected.
- n = number of Selected (Females and Males).
- p = proportion of Applicants that are Females.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Males	46	3	49
Females	175	13	188
Column Total	221	16	237

r = 175
n = 221
p = 188 / 237 = 0.793
q = (175 + 46) / (188 + 49) = 0.932

Standard Deviation Statistic = -0.197

These results show that the proportion of Females Selected is -0.197 standard deviations below the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Analysis of proportion of Minorities Selected where:

- r = number of Minorities Selected.
- n = number of Selected (Minorities and Non-Minorities).
- p = proportion of Applicants that are Minorities.
- q = proportion of Applicants Selected.

	Selected	Not Selected	Row Totals
Non-Minorities	167	9	176
Minorities	51	7	58
Column Total	218	16	234

r = 51
n = 218
p = 58 / 234 = 0.248
q = (51 + 167) / (58 + 176) = 0.932

Standard Deviation Statistic = -1.82

These results show that the proportion of Minorities Selected is -1.82 standard deviations below the proportion of Applicants Selected. A result of less than 2 standard deviations is generally considered non-significant.

Confidence Interval Report

The proportion of the protected class Selected has an expected value that would fall within a specified confidence interval. The statistic is shown below:

Observed value = (r / n)

Expected value = p

$$\text{-----}$$

$$\text{Standard Deviation} = \text{sqrt}(p * (1-p) / n) * \text{sqrt}(1-q)$$

Confidence Interval:

Lower Bound = p - 1.96 * Std Dev

Upper Bound = p + 1.96 * Std Dev

Analysis of proportion of Females Applicants Selected where:

- r = number of Females Selected.
- n = number of Applicants Selected.
- p = proportion of Females among those Selected.
- q = proportion of Applicants Selected.

r = 175
n = 221
p = (188/(188+49))=0.793
q = ((175 + 46)/(188 + 49))=0.932
(r/n)=175/221=0.7919

The lower bound of the confidence interval is: $0.793 - (1.96 * 0.007) = 0.7794$
The upper bound of the confidence interval is: $0.793 + (1.96 * 0.007) = 0.8071$

Confidence Interval = 0.7794 to 0.8071

These results show that the proportion of Females Females (r/n=0.7919) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Analysis of proportion of Minorities Applicants Selected where:

- r = number of Minorities Selected.
- n = number of Applicants Selected.
- p = proportion of Minorities among those Selected.
- q = proportion of Applicants Selected.

r = 51
n = 218
p = (58/(58+176))=0.248
q = ((51 + 167)/(58 + 176))=0.932
(r/n)=51/218=0.2339

The lower bound of the confidence interval is: $0.248 - (1.96 * 0.008) = 0.2329$
The upper bound of the confidence interval is: $0.248 + (1.96 * 0.008) = 0.2629$

Confidence Interval = 0.2329 to 0.2629

These results show that the proportion of Minorities Minorities (r/n=0.2339) is contained in the confidence interval. Therefore a finding of disparate impact is not supported by this data.

Probability Distribution Report

Please note:

Due to the large number selected, the results will be shown in increments of 3 which may have an effect on the probability distributions. *All* computed probabilities will be multiplied by the increment of 3. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Females Selected	Number Males Selected	Rate of Females Applicants Selected	Rate of Males Applicants Selected	Adverse Impact Ratio of Females	Adverse Impact against Females ?	Probability	Cumulative Probability
172	49	(172/188)	(49/49)	0.9149	NO	0.064175	0.064175
Selected-> 175	46	(175/188)	(46/49)	0.9916	NO	0.754151	0.818326
178	43	(178/188)	(43/49)	1.0789	NO	0.177138	0.995464
181	40	(181/188)	(40/49)	1.1794	NO	0.003213	0.998677
184	37	(184/188)	(37/49)	1.2961	NO	0.000005	0.998682
187	34	(187/188)	(34/49)	1.4335	NO	0	0.998682

Given that 221 were Selected from a pool of 49 Males and 188 Females it was possible to have Selected from 172 to 188 Females.

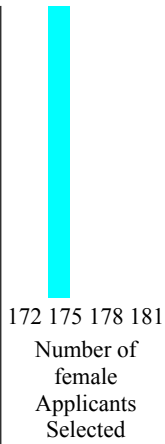
Adverse Impact would be found if you Selected approximately 0 or fewer Females. The word "approximately" was used since the results are shown in increments of 3.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0 (the sum of the probabilities of having Selected 0 or fewer Females).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Females Selected.



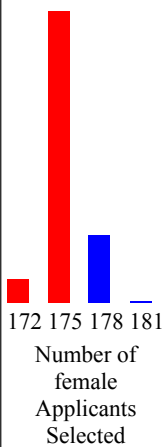


The probability distribution of having Selected from 172 to 188 Females is displayed above. The graph above is shown starting with 172 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 175 female Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of female Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer female Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more female Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of female and male Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 172 to 188 female Applicants, the individual probabilities of having Selected each number of female Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of female and male Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Females Selected' would have a lower bound of 172 and an upper bound of 178.

The significance of having Selected 175 or fewer Females is graphically displayed below.



As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 0 or fewer female Applicants. The word "approximately " was used since the results were computed in increments of 3.

You have Selected 175 female Applicants. The probability of having Selected 175 or fewer Females is equal to the cumulative probability for having Selected 175 Females Applicants. The cumulative probability of having Selected 175 female Applicants is 0.8183 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 175 or fewer female Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

Please note:

Due to the large number selected, the results will be shown in increments of 3 which may have an effect on the probability distributions. *All* computed probabilities will be multiplied by the increment of 3. The use of the increment was necessary to reduce the processing load on our web server which has to compute all of the input{Distribution} probabilities.

Number Minorities Selected	Number Non-Minorities Selected	Rate of Minorities Applicants Selected	Rate of Non-Minorities Applicants Selected	Adverse Impact Ratio of Minorities	Adverse Impact against Minorities ?	Probability	Cumulative Probability
42	176	(42/58)	(176/176)	0.7241	YES	0	0

Disparate Impact analysis: a program by hr-software.net to analyze employment decisions for a variety of EE...

	45	173	(45/58)	(173/176)	0.7893	YES	0.000004	0.000004
	48	170	(48/58)	(170/176)	0.8568	NO	0.002594	0.002597
Selected->	51	167	(51/58)	(167/176)	0.9267	NO	0.143132	0.14573
	54	164	(54/58)	(164/176)	0.9992	NO	0.699872	0.845602
	57	161	(57/58)	(161/176)	1.0743	NO	0.151771	0.997372

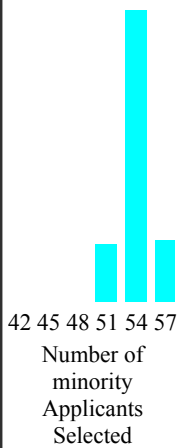
Given that 218 were Selected from a pool of 176 Non-Minorities and 58 Minorities it was possible to have Selected from 42 to 58 Minorities.

Adverse Impact would be found if you Selected approximately 45 or fewer Minorities. The word "approximately" was used since the results are shown in increments of 3.

The probability of Adverse Impact occurring even if the employment decisions were random (i.e. unbiased) is 0 (the sum of the probabilities of having Selected 45 or fewer Minorities).

Since the probability of Adverse Impact occurring even if the selection was random (i.e. unbiased) is less than 10%, an observed Adverse Impact may be significant since there is a low probability that Adverse Impact would have occurred by chance.

Probability Distribution of the variable: Number of Minorities Selected.

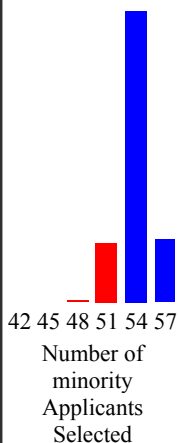


The probability distribution of having Selected from 42 to 58 Minorities is displayed above. The graph above is shown starting with 42 since the probabilities below this point are near zero. As can be seen, the most likely event (highest probability) to have occurred by chance (or decisions not affected by any form of bias) is to have Selected 54 minority Applicants. This represents the mean of the probability distribution. Approximately half of the probability distribution is above this point and approximately half is below this point. The total area contained in the probability distribution is equal to 1. Thus, probabilities for each number of minority Applicants Selected are a fraction of the total probability distribution. The larger areas of the distribution represent higher probabilities of occurrence. Adding the individual probabilities up to a certain point enable you to compute the probability of having Selected that many or fewer minority Applicants. Adding the individual probabilities from a certain point and higher enable you to compute the probability of having Selected that many or more minority Applicants.

The characteristics of the probability distribution--its mean and standard deviation--are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected. Though it is possible to have Selected from 42 to 58 minority Applicants, the individual probabilities of having Selected each number of minority Applicants can be computed and accumulated. As noted before, these individual probabilities are a function of the number of minority and non-minority Applicants and the number of Applicants to be Selected.

Using the distribution above, a 90 percent confidence interval on the variable 'Number of Minorities Selected' would have a lower bound of 51 and an upper bound of 57.

The significance of having Selected 51 or fewer Minorities is graphically displayed below.



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As noted earlier, Adverse Impact, according to the 4/5ths rule, would be found if you Selected approximately 45 *or fewer* minority Applicants. The word "approximately " was used since the results were computed in increments of 3.

You have Selected 51 minority Applicants. The probability of having Selected 51 *or fewer* Minorities is equal to the cumulative probability for having Selected 51 Minorities Applicants. The cumulative probability of having Selected 51 minority Applicants is 0.1457 and is graphically displayed, in red, above.

Since the probability is greater than 10%, we are unable to reject the hypothesis that the decisions occurred due to chance. Therefore, we must conclude that it is entirely possible that having Selected 51 or fewer minority Applicants is an event that occurred due to chance and not from discriminatory actions by the employer.

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