80 Percent Rule Calculations

The calculations

Male Point A	14700	
Male Point B	10788	
Male Not Passing A	3912	
Female Point A	11722	
Female Point B	7892	
Female Not Passing A	3830	

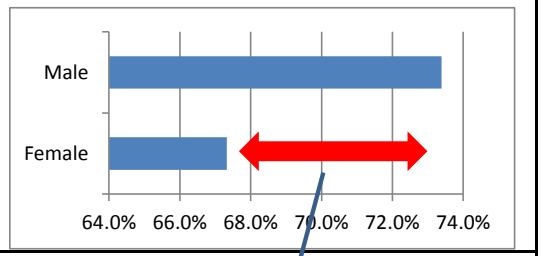
Compare Female versus Male

1. Looking at Positive Results (those getting to Point B)

Rate found getting to Point B:

Female	67.3%	=B7/B6
Male	73.4%	=B3/B2

(So that 73.4% of the males got to Point B compared to 67.3% of the females)



IS THIS DIFFERENCE SIGNIFICANT?

But how close is the Female rate getting to Point B to the Male rate?

The Impact Ratio Analysis will provide the answer

Rate for Female	67.3%	=B14
Rate for Male	73.4%	=B15
Impact Ratio (Rate for Female/Rate for Male)	0.92	=B20/B21

That means the rate for females is .92 of the rate for males.

Using the 80% or .80 rule, because the .92 is greater than .80, the difference is not enough to suggest disparate impact.*

**see point 3 below*

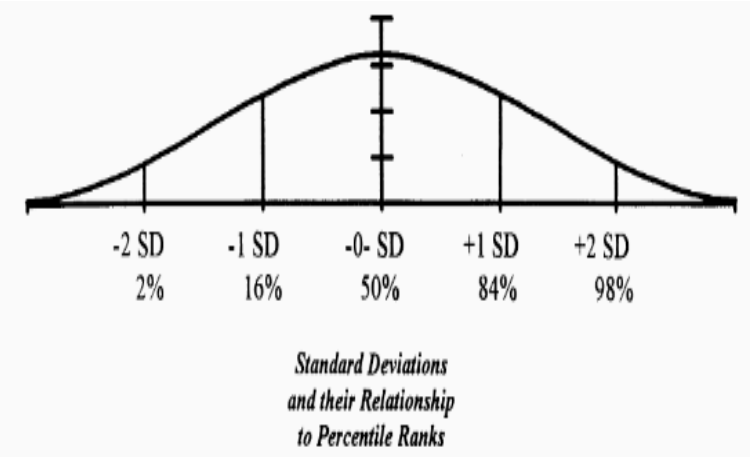
Couple of Points about the 80% Rule

1. It's a rule-of-thumb but a good starting point
2. See 41 CFR 60-3 for reference
3. The larger the number, even small differences will impact a large number of people. Even in this example, if the females got to Point B in proportion to the overall rate, an additional 395 females would have gotten to Point B.
4. See tab for standard deviation calculation that I think is a better analysis
5. The analysis can also be used to measure a negative outcome (where getting to Point B is a negative action)

Overall Rate	70.7%	395.30
	=(B3+B7)/(B2+B6)	=(C30*B6)-B7

Calculating the Standard Deviation

	A	B	C
1			*The Calculations*
2	Male Point A	14700	
3	Male Point B	10788	
4	Male Not Passing A	3912	
5			
6	Female Point A	11722	
7	Female Point B	7892	
8	Female Not Passing A	3830	
9			
10	**Calculate 1 Standard Error**		
11	P = Overall Rate getting to Point B	0.7070	=(B3+B7)/(B2+B6)
12	1 - P	0.2930	=1-B11
13	nF = Number of Favored Group Males are the favored group	14700	=B2
14	1 / n_F	0.00006803	=1/B13
15	nNF = Number of Non Favored Group Females are the favored group	11722	=B6
16	1 / n_{NF}	0.00008531	=1/B15
17	1 Standard Error *a technical term that I always used to call the standard deviation*	0.5636%	=SQRT(B11*B12*(B14+B16))
18			
19	**Calculate Difference in Rates of Getting to Point B**		
20	Rate for Males	73.39%	=B3/B2
21	Rate for Females	67.33%	=B7/B6
22	difference	6.06%	=B20-B21
23			
24	**Calculate Number of Standard Deviations**	**10.75**	=B22/B17
25			
26	**Notes about Standard Deviations**		
27	1. The standard deviation analysis looks at the probability that the difference in rates is due to chance.		
28	2. Technically, this is a two independent sample binomial test		
29	3. Differences **greater than 2.0 standard deviations** is generally what suggests possible discrimination		
30	4. The 2.0 standard deviation represents a less than 5.0% chance that the difference in rates is due to chance.		
31	5. Another way to think about it is that if the SD is greater than 2.0, there is something that is controlling the process because there is less than 5% chance that the difference was caused by chance.		



$$\sqrt{p \times (1-p) \times \left\{ \frac{1}{n_F} + \frac{1}{n_{NF}} \right\}}$$