

Tuesday, January 16, 2018  
8:01 PM

# KEY

A two way table describes the relationship between *two categorical variables*, the row variable and the column variable.

Marginal distributions look at *one* of the variables in comparison to the **entire** table total.

A conditional distribution compares the total of *either one row or one column* and which becomes the **condition** to the probability.

## Example - I'm Gonna Be Rich!

- 1.) A survey of 4826 randomly selected young adults (aged 19 to 25) asked, "What do you think the chances are you will have much more than a middle-class income at age 30?"

The table below shows their responses.

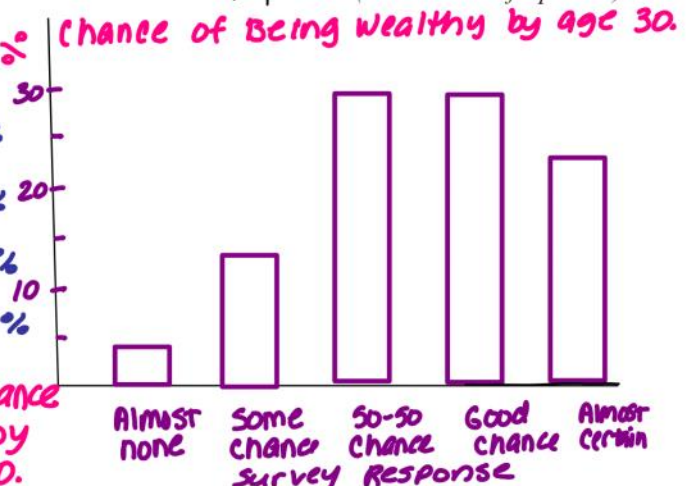
Young adults by gender and chance of getting rich			
Opinion	Gender		Total
	Female	Male	
Almost no chance	96	98	194
Some chance but probably not	426	286	712
A 50-50 chance	696	720	1416
A good chance	663	758	1421
Almost certain	486	597	1083
<b>Total</b>	<b>2367</b>	<b>2459</b>	<b>4826</b>

What is the row variable? opinion      What is the column variable? gender

- a) Use the data in the two-way table to calculate the *marginal distributions*.  
 b) Make a *bar graph* to display the *marginal distributions* of opinions (nearest tenth of a percent).

Response	Percent
Almost no chance	$\frac{194}{4826} = 4.0\%$
Some chance	$\frac{712}{4826} = 14.8\%$
So-so chance	$\frac{1416}{4826} = 29.3\%$
good chance	$\frac{1421}{4826} = 29.4\%$
Almost certain	$\frac{1083}{4826} = 22.4\%$

c) What does this graph tell you?  
 over 50% felt they had a good chance or were almost certain to be rich by age 30.



2) The *marginal distributions* tell us nothing about the relationship between the gender and opinion. To do this, we will find the *conditional distributions* for each gender.

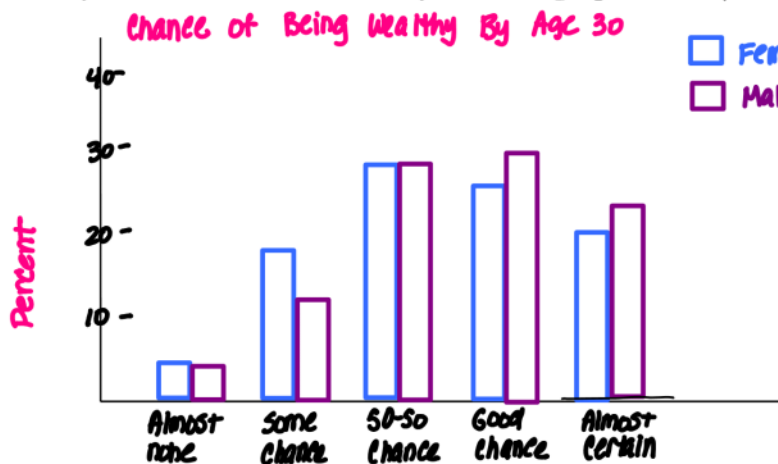
a) We can study the opinions of women alone by looking only at the "female" column in the two-way table.

Response	Percent
Almost no chance	$\frac{96}{2367} = 4.1\%$
Some chance	$\frac{426}{2367} = 18.0\%$
So-so chance	$\frac{696}{2367} = 29.4\%$
Good chance	$\frac{663}{2367} = 28\%$
Almost certain	$\frac{486}{2367} = 20.5\%$

b) We can study the opinions of men alone by looking only at the "male" column of the two-way table.

Response	Percent
Almost no chance	$\frac{98}{2459} = 4.0\%$
Some chance	$\frac{286}{2459} = 11.6\%$
So-so chance	$\frac{720}{2459} = 29.3\%$
Good chance	$\frac{758}{2459} = 30.8\%$
Almost certain	$\frac{597}{2459} = 24.3\%$

c) We can now make a *side-by-side bar graph* to compare the opinions of males and females.



d) Based on the survey data, can we conclude that young men and women differ in their opinions about the likelihood of future wealth? Give evidence to support your answer.

Based on the sample data men seem more optimistic about their future income than women. Men were less likely to say they had "some chance" and more likely to have a good chance.

We can say there is an *association* between two variables if knowing the value of one variable helps predict the value of the other.

e) Is there an *association* between gender and opinion of future wealth in this sample of young adults?

The graph provides evidence of an association between gender and opinion of future wealth. Men more often chose the 2 highest categories.