Step 1

It is assumed that the projects assigned are large enough where there are potential chances of equal distribution among males and females with a probability of 0.5. Accordingly, based on based on the binomial distribution, there are n=12 for the number of projects. Now, to check the biasness of selected males or females, we have calculated the following:

Results

$P(8) = 12!/8!(12-8)!*\cdot 0.58\cdot(1-0.5)12-8$

P(8) =0.1208 =12.08%

In this way, we found that the probability of having 8 out of 12 projects assigned to women is 12.08%. This means that there are high chances of potential bias towards assigning more projects to women.

Step 2

The next step of the event is similar to the previous one, where, we calculated the speaker invitation bias; i.e., what is the probability bias of having female speaker. So, we found:

$P(3) = 3!/3!(3-3)!*\cdot 0.53\cdot(1-0.5)3-3$

P(3) = 0.125 =12.5%

The probability of having speaker invitation bias is 12.5%. It means that there are high chances of biasness that females are invited as speaker.

Step 3

The reasoning is closer to the previous, where, the distribution of probability shows the biasness of having more females or males among the selected jury members.

$P(6)= 7!/6!(7-6)!*\cdot 0.56\cdot(1-0.5)7-6$

P(6) =0.05468 = 5.468%

The probability bias in this case is 5.468%. This suggests a potential bias towards selecting more female jury members.

Step 4

The last step indicates the award distribution to males and females and we have seen that all award receivers were females.

P(4)= 4!/4!(4−4)!*·0.54·(1−0.5)4−4

P(X=4) = 0.0625 = 6.25%

The probability of having all 4 awards go to women, given an equal chance for both genders, is 6.25%. This indicates a potential bias towards awarding more women.

The analysis overall indicates that there is a potential gender bias in the entire event. These findings collectively raise concerns about gender-related disparities in different phases of the event making it a biased event which favours women.

Probability Combined

P Combined =0.1208×0.125×0.05468×0.0625 = 0.0000516

P Combined=0.0000516*100 =0.00516%

The joint probability of gender bias, assuming independence between the different aspects, is approximately 0.00516%. This indicates a very low probability of all these events happening together purely by chance.