# CONCLUSION

This paper considered the problem of estimating the fraction of nodes in a graph that has a particular attribute (represented by a binary label) and, proposed a novel class of polling methods called Neighborhood Expectation Polling (NEP). In NEP, each sampled individual responds with information about the fraction of her neighbors in the social network that has label 1. We considered the cases where either: 1) the pollster as no knowledge about the social graph but, has the ability to perform random walks on the graph 2) uniformly sampled nodes from the unknown social graph are available. Two NEP algorithms were proposed (for case 1 and case 2) exploiting a form of network bias called friendship paradox. Theorems 3 to 8 characterized the bias, variance and mean-squared error of the estimate as well as how they depend on the properties of the underlying network (correlation between node labels and degree, expansion, average, minimum and maximum degree, etc.) were derived. These results are useful for a pollster to incorporate prior knowledge about the underlying network to choose the best algorithm (in terms of statistical efficiency) and guarantee its performance. Extensive empirical and simulation results are provided to illustrate the performance of the proposed methods under different network properties. These complement the theoretical analysis an provide insights into how the proposed algorithms would perform under different conditions. Both theoretical and experimental results indicate that the friendship paradox based NEP algorithms are capable of obtaining an estimate with a smaller mean-squared error with only a smaller (compared to alternative methods) number of respondents.