# MAT 243 Project Two Summary Report

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## Introduction: Problem Statement

The purpose of this report is to analyze historical data and discover patterns. Through use of hypothesis testing with focus on population mean, proportion and differences between the two variables to review significant statistical claims connected with team performance. Assisting team management in data driven validation to implement results in the upcoming season. The data sets used are those of the Chicago Bulls (years 1996-1998) in addition to the Golden State Warriors with focus on years 2013 to 2015.

## Introduction: Your Team and the Assigned Team

The team I chose for this analysis is the Golden State Warriors years of 2013 to 2015. I was assigned to the Chicago Bulls for my comparative study from the range of years 1996 to 1998.

Table 1. Information on the Teams

|  | **Name of Team** | **Years Picked** |
| --- | --- | --- |
| 1. Yours | Warriors | 2013 - 2015 |
| 2. Assigned | Bulls | 1996- 1998 |

## Hypothesis Test for the Population Mean (I)

Hypothesis testing is commonly used to test claims about a population mean by the use of sample data to evaluate based on assumptions in regard to parameters. This is accomplished by accepting or rejecting the null hypothesis and alternative hypothesis which are mutually exclusive to each other.

The null hypothesis or H0 denoted in statistical notation is a fundamental concept in testing. Considered the default postulation that there is zero change in the population mean or proportion variables. Testing is conducted with the intention of assessing if there is evidence from the sample data that supports (accepts) or contradicts (rejects). And is considered true until otherwise proven. The null hypothesis (H0) stated for our analysis is that the average relative skill level at critical low baseline is equal to 1340 in the years 2013-2015 for the Warriors

(H0: µ = 1340).

The alternative hypothesis or Ha in the statistical notation disputes the null hypothesis and epitomizes that there is a variance in the population. It is compared alongside the null to draw conclusions about the population itself. The alternative hypothesis (Ha) stated for our analysis is that the average relative skill level of the Warriors is greater than 1340 (Ha: µ > 1340) as team management has hypothesized.

The level of significance is a value in which the p-value is equated to evaluate if the null hypothesis is supported or contradicted. The level of significance used in our analysis is 5% ( a = 0.05). As the table below shows the p-value is 0.0 which is less than the level of significance therefore rejecting the null hypothesis that the average relative skill level of the Warriors is equal to 1340.

Table 2: Hypothesis Test for the Population Mean (I)

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 46.95 |
| P-value | 0.0000 |

As the mean relative skill of the team in the years 2013 to 2015 is equal to 1607.22 there is a statistically significant difference in the team’s performance relative to the benchmark of the critical low skill level set by the NBA. The practical significance of this data finding allows management to allocate skill level of players during critical games when strategizing by comparing calculations of other teams directly impacting chances of a win.

## Hypothesis Test for the Population Mean (II)

For this analysis, the null hypothesis is that a team averaging 106 points is probable to be competitive throughout the regular season. Hence, H0: µ = 106. However, the coach for the Golden State Warriors has hypothesized that they score less than that for the years 2013-2015. Therefore, the alternative hypothesis Ha: µ < 160. With a level of significance at 1 % (a = 0.01) results shown below.

Table 3: Hypothesis Test for the Population Mean (II)

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -1.18 |
| P-value | 0.2400 |

Equally the calculations illustrate the p – value of 0.2400 is greater than the significance level of 0.01 (1%), in this analysis the null hypothesis should then be accepted or failed to reject. As there is significant evidence that the mean points scored by the Warriors in the years 2013-2015 is 105.13 and with the test statistic showing a difference in minimal variance from the null of -1.18 that they perform at competitive level during regular season. The practical implication of this data is that based on gameplay and skill level the organization is presently producing outcomes of success. While critical close games persistence scoring efficiency can be fine-tuned to maintain overall consistency.

## Hypothesis Test for the Population Proportion

Similar to hypothesis testing used to test claims concerning population mean of sample data the equivalent overall processes test claims related to proportions. A default assumption or null hypothesis is verified against an alternative hypothesis with a significance level presenting the probability of error to determine acceptance or rejection of the null parameters. In the next analysis the team hypothesizes that the proportion of games that the Warriors win when scoring 102 or more is 0.90. Thus, the null hypothesis is H0: P = 0.90 with P equal to proportion. As discussed previously the alternative hypothesis are mutually exclusive considering the claimed baseline in the null the alternative hence would be Ha: P ≠ 0.90. With the level of significance testing this claim set to 5% (a = 0.05).

Table 4: Hypothesis Test for the Population Proportion

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -2.78 |
| P-value | 0.0055 |

Review of the above chart of the test calculations a p-value of 0.0055 does not equal the given significance level of 5% we must reject the null hypothesis. The proportion of games won by the Warriors when scoring more than 102 points in the years 2013 to 2015 is equal to 0.8298 less than the claim by management. Although, considering the test statistic of -2.78 the team with minor adjustments to training and coaching is within the percentage of probability change to improve wining games greater than 102.

## Hypothesis Test for the Difference Between Two Population Means

Hypothesis testing is used to test claims within two sets of data to determine if the two are equal and the plausibility of the hypothesis. For the final analysis, the experimental claim states that the skill level of the Golden State Warriors from 2013 – 2015 is equal to the skill level of the Chicago Bulls from the years 1996 to 1998. The null hypothesis then being H0: µ = µ and alternative Ha: µ ≠ µ with a level of significance set to 1% (a = 0.01).

Table 5: Hypothesis Test for the Difference Between Two Population Means

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 20.18 |
| P-value | 0.0000 |

The results demonstrate a p-value of 0.0000 confirming that there is adequate evidence to sustenance that the relative skill level of the Warriors is not equal to that of the Bulls in their perspective years. With the Bull’s mean relative skill being 1739.8 and the Warriors at 1607.22, a difference of 20.18. From this experiment, the outcome if the team’s management strategy is to match that of the Bulls during their dominant era, then additional development of players must be completed. Options include analyzing playbook of the Bulls to adapt winning strategies and player acquisitions to develop specialization of roles.

## Conclusion

The practical importance of the analyses performed is that it permits enlightened decision making, performance assessment and strategy planning. The calculated population mean, and proportion deliver the average relative skill of the teams allowing for coaches to establish representative outlooks for the team’s performance. Adjusting game plans and promoting effective scouting where specific areas need to be addressed. In conclusion, the analysis provided increases the comprehension of collective team behaviors heightening effectiveness of positive outcomes as the Golden State Warriors likelihood of success is within proximity of the aspiring greatness of the standard legacy of the Bulls.