MA4240 Project

Group 14

April 26, 2022

Survey on Participation in Sports

Abstract

A survey was conducted to better understand the participation of IITH students in sports. The survey asked students about the various sports they play and their previous experiences. It further asked about their involvement in clubs, impact of academics and possible reasons that might affect their participation. The survey also asked their opinion on esports.

Method

The data required for the project was collected by conducting a survey. Data collection was done in two ways:

- Surveying the students on sports ground.

- Rolling out a Google form by mail to the IITH community.

We received a total of 228 responses. Except for gender,department and program no other personal information was recorded from the participants. Out of 228 participants,52 were surveyed personally on the ground, rest filled an online form. The questionnaire had 2 questions for demographic characteristic of the participants and rest 13 aimed to understand their involvement in sports and other related activities.

Participants Demographic

Out of the 228 responses received, 173 ($\approx$ 76 %) were from males and the remaining 55 responses (24 %) were from females. The distribution of students according to their departments and programs is shown in the graph below:

Responses vs Programs
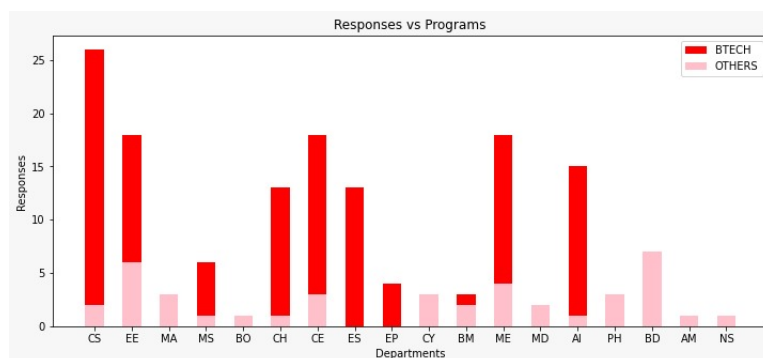
Findings

- Majority of the students ($\approx 61.1\%$) who filled out the form were not part of NSO.

- Many students ($\approx 33.2\%$ out of 228 students) said that they play Badminton regularly. The next most popular sports are board games (Chess, Carrom, Billiards etc.) which are played by $\approx 23.9\%$ of the students. Sports like Cricket, Football and Volleyball are also popular with around 17.5% students playing each of them. Sports like Hockey and Martial Arts are rather unpopular.


Sports vs Gender
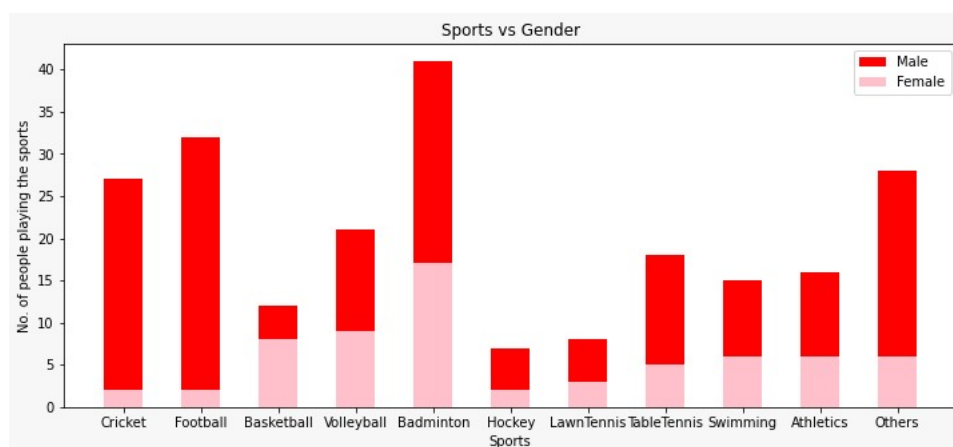
- Approximately, 41.9% of the students have been playing sports for over 5 years. While 30.6% of the students started playing recently i.e; over the last year. Remaining students have been playing sports from 1-5 years.

- Majority of the students have stated that they have been playing sports for **improving their fitness** ($\approx 70.3\%$ out of 228 students) and also for **recreational purposes** ($\approx 56.3\%$ out of 228 students). Some other reasons were, being part of NSO, joining friends and playing sports as a means of socialization.
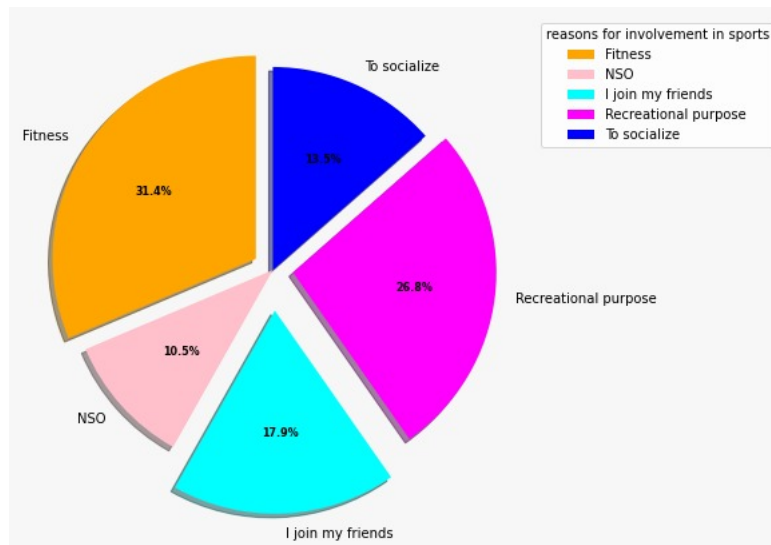
- The most common reason given by students to not play sports ($\approx 60.3\%$ out of 228 students) is that they have many **time constraints** which makes it difficult to play sports regularly. The next common reason is that they have **no company**. But, approximately 25% students play sports regularly.
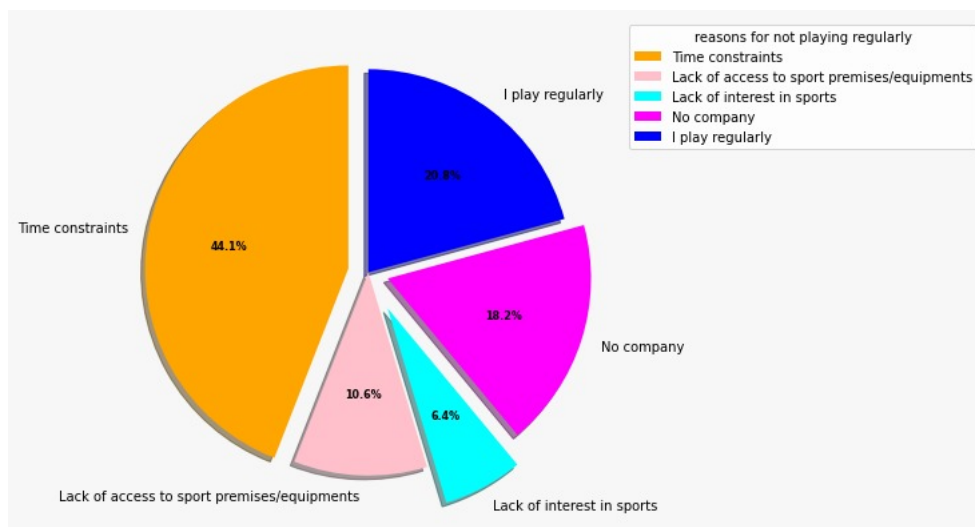
- 75% of the students watch their favourite sports.

- Most of the students ($\approx 31\%$) don't have much idea regarding the level of attention the institute gives to the sports they play. Some ($\approx 20.1\%$) also say that there are no coaches for the sport they play.
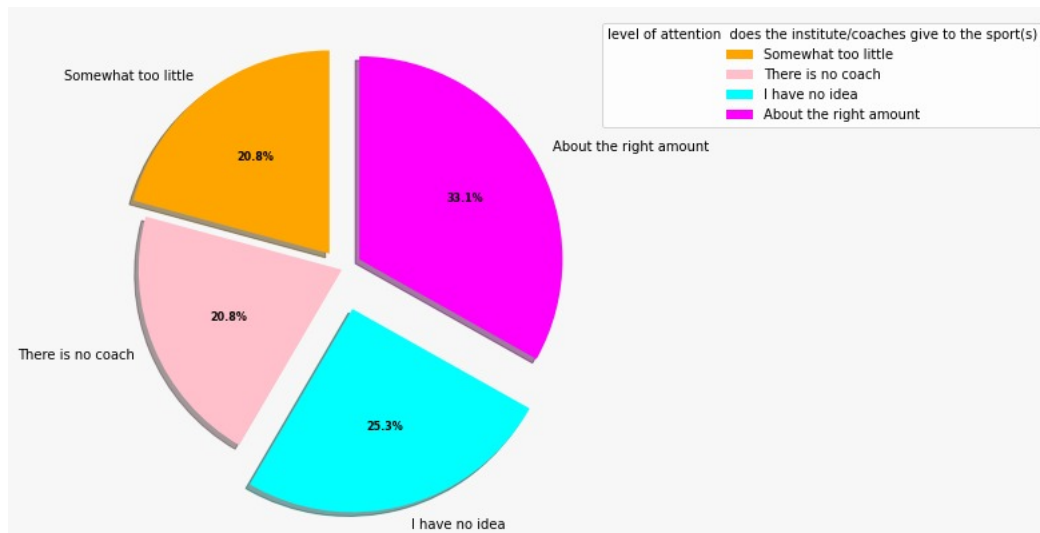
- Majority of the students ($\approx 53.7\%$) opine that the number of sport events conducted on campus are adequate. But some ($\approx 40.6\%$) students disagree.
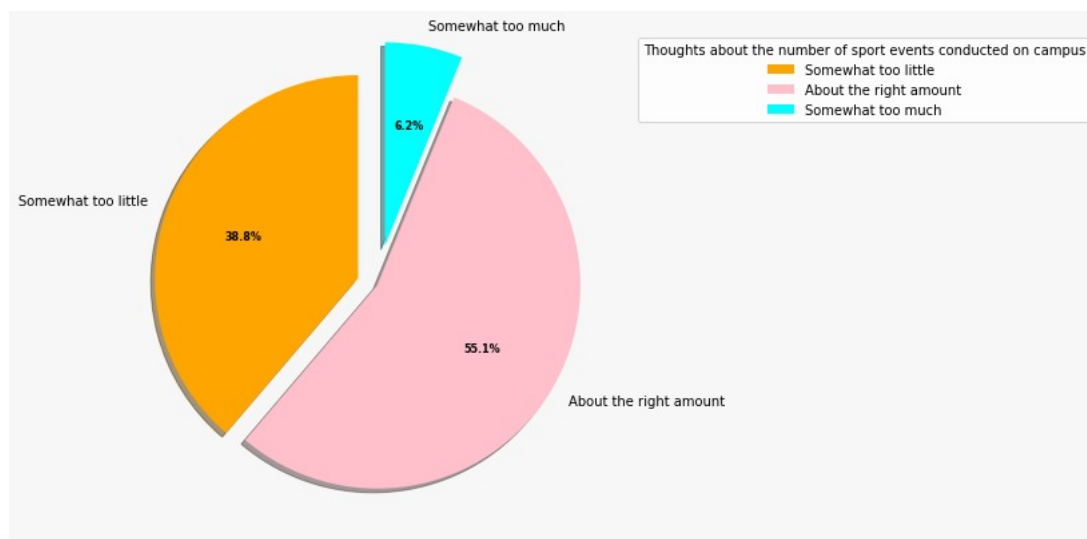
- Majority of the students ($\approx 56.3\%$) opine that their involvement in sports is highly affected by **exams and deadlines**. Other reasons like **physical exhaustion** and **internships** have also been mentioned by 25.8% of the students.

- Majority of the students ($\approx 53.7\%$) are not part of any club (that is not related to sports).

- Majority of the students ($\approx 77.3\%$) do not play videogames like Valorant, BGMI, Rocket League etc. Also, 90% of the students prefer traditional sports over esports.

Key Findings

- Performance in Diesta and the department-wise participation of students in sports. We have grouped the students like the way they were grouped in Diesta, according to their departments. We later found their average number of days of play. Our observations are presented in the graph below.
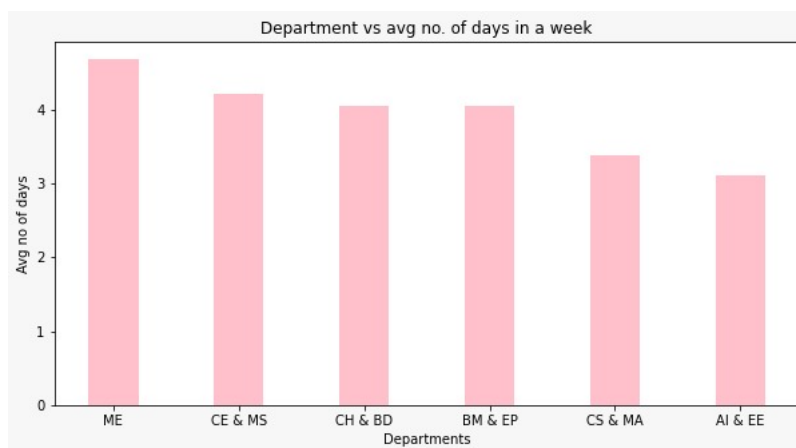
It can be observed that the students of the Mechanical department have the highest average number of days of play. They are followed by the students of the Civil and Chemical departments. This is in accordance with the final standings of the departments in "Diesta", the inter-departmental sports meet.

- Lack of sport premises/equipments.
  Analyzing one of the reasons for students not playing sports regularly - lack of access to sport premises/equipments, our aim was to find which sport's facilities needed improvement. Below is the graph of the sports played by students who stated the above reason to not play regularly.
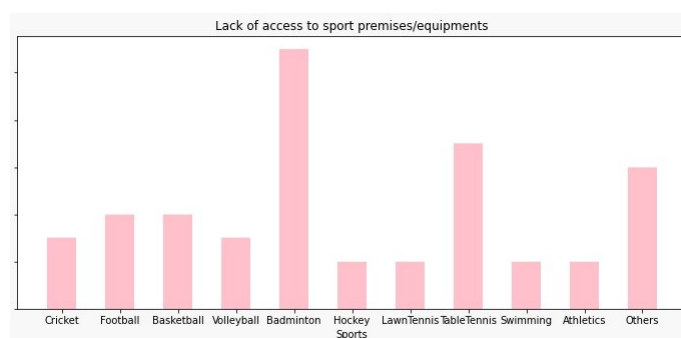

From the above graph, we observe that there are less number of badminton courts and table tennis tables/racquets. Lack of mandatory non-marking shoes among

the students can also be one of the reasons. We can also observe that there aren't enough indoor game facilities like chess boards, carrom boards, billiards tables, etc.

- Confidence interval for number of students playing e-sports.
  Out of 228 students surveyed, 52 students play e-sports. That is, the sample proportion is,

$$\hat{p} = \frac{52}{228} = 0.228$$
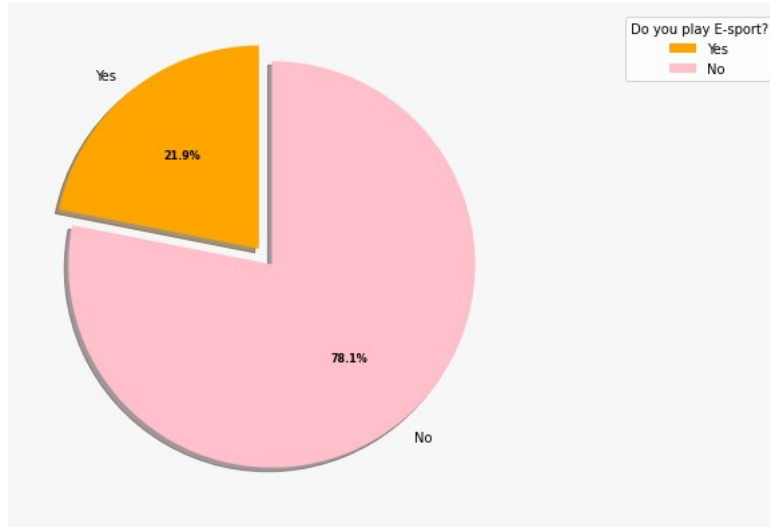
We use this sample proportion to estimate, with 95% confidence, the proportion **p** of all IITH students playing e-sports.

The confidence interval for **p** is,

$$0.228 \pm 1.96\sqrt{\frac{0.228(1 - 0.228)}{228}}$$
$$0.228 \pm 0.0544 = (0.1736, 0.2824)$$

Thus, we can be 95% confident that between 17.4% and 28.2% of IITH students play e-sports.

- Team versus non-team sports
  We categorized the sports - Cricket, Football, Basketball, Volleyball and Hockey - as team sports and the rest of them as non-team sports. We then observe the participation of students in them.
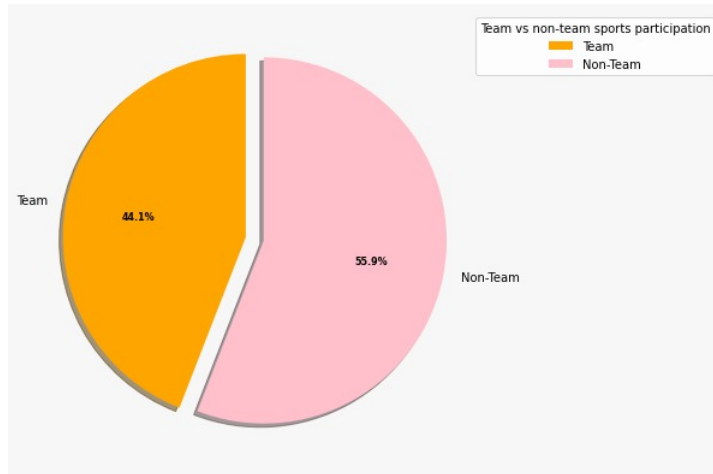
From the above graph, it is observed that more than half of the students, i.e. around 56%, prefer playing non-team sports.
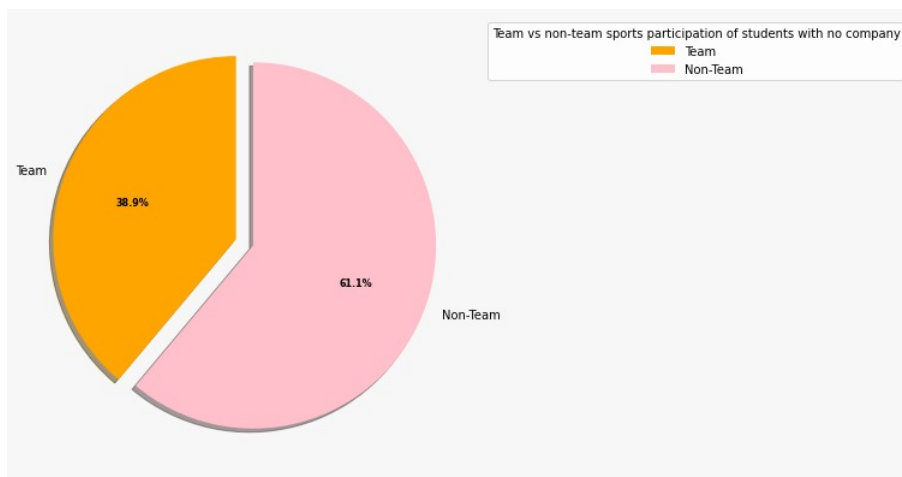
Analyzing another reason for students not playing sports regularly, we observed that, among the students who stated "No company", the percentage of playing non-team sports is higher (around 61%) than the population.

Inferences

- The average number of days an NSO player plays, is greater than that of a non-NSO player.

Hypothesis Testing

$$H0: \quad \mu_{\text{NSO}} - \mu_{\text{non-NSO}} \leq 0$$
$$Ha: \quad \mu_{\text{NSO}} - \mu_{\text{non-NSO}} > 0$$

Given $\bar{x}_{\text{NSO}} = 4.048$, $\bar{x}_{\text{non-NSO}} = 2.92$, $S_{\text{NSO}} = 1.93$, $S_{\text{non-NSO}} = 2.24$.

Taking $\alpha = 0.05$, $n_1 = 83$ and $n_2 = 81$.

Since $\frac{1}{2} \leq \frac{S_{\text{NSO}}}{S_{\text{non-NSO}}} < 2$, $S_{\text{NSO}} \approx S_{\text{non-NSO}}$, the sample standard deviations are of a similar size, the pooled estimate of the common population standard deviation s_p is,

$$s_p = \sqrt{\frac{(n_1 - 1)S_{\text{NSO}}^2 + (n_2 - 1)S_{\text{non-NSO}}^2}{n_1 + n_2 - 2}} = 2.092$$

Test statistic t is given by :

$$t = \frac{(\bar{x}_{\text{NSO}} - \bar{x}_{\text{non-NSO}}) - 0}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = 3.434$$

$$t_{\alpha, n_1+n_2-2} = t_{0.05, 162} = 1.6543$$

Since $t \geq t_{\alpha, n_1+n_2-2}$, we can reject H_0.

Since students join NSO out of interest in the sport they play, they tend to play regularly when compared to the others. Hence we can conclude that, the average number of days an NSO player plays, is greater than that of a non-NSO player.

- The participation of girls in sports is less than that of boys. This can be proved by comparing the average number of days of play.

Hypothesis Testing

$$H_0: \quad \mu_{\text{b}} - \mu_{\text{g}} \leq 0$$
$$H_a: \quad \mu_{\text{b}} - \mu_{\text{g}} > 0$$

Given $\bar{x}_{\text{b}} = 3.803$, $\bar{x}_{\text{g}} = 3.036$, $S_{\text{b}} = 2.24$, $S_{\text{g}} = 2.18$.

Taking $\alpha = 0.05$, $n_1 = 173$ and $n_2 = 55$.

Since $\frac{1}{2} \leq \frac{S_g}{S_b} < 2$ and $S_g \approx S_b$, the sample standard deviations are of a similar size, the pooled estimate of the common population standard deviation s_p is,

$$s_p = \sqrt{\frac{(n_1 - 1)S_b^2 + (n_2 - 1)S_g^2}{n_1 + n_2 - 2}} = 2.233$$

Test statistic t is given by:

$$t = \frac{(\bar{x}_b - \bar{x}_g) - 0}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = 2.218$$

$$t_{\alpha, n_1 + n_2 - 2} = t_{0.05, 226} = 1.6516$$

Since $t \geq t_{\alpha, n_1 + n_2 - 2}$, we can reject H_0.

From our observation during the survey, we noticed that there were less number of girls in the ground. Thus, we can conclude that the average number of days of play for girls is less than that of boys.

- The average number of days of play for an NSO player is greater than 2.

Hypothesis Testing

$$H_0 : \quad \mu \leq 2$$
$$H_a : \quad \mu > 2$$

We have, $\bar{x} = 4.05, s = 1.937, n = 83, \mu_0 = 2$. Taking $\alpha = 0.05$ and $n = 83$.
Test statistic z is given by

$$t = \frac{(\bar{X} - \mu_0)}{S/\sqrt{n}} = \frac{4.05 - 2}{1.9/\sqrt{83}} = 9.631$$

$$t_\alpha = t_{0.05} = 1.6632$$

Since $t \geq t_\alpha$, we can reject the null hypothesis H_0.
Since the students involved are expected to attend at least 2 NSO sessions per week, the average number of days of play can be concluded to be greater than 2. $\therefore \mu > 2$

- The population variances for NSO and non-NSO players would be different, with

the variance for non-NSO players being larger.

Hypothesis Testing

$$H_0: \quad \sigma_1^2 \geq \sigma_2^2$$
$$H_a: \quad \sigma_1^2 < \sigma_2^2$$

Using Rejection Region Approach (one Tailed test),
Test statistic is given by:

$$F = \frac{S_{\text{NSO}}^2}{S_{\text{non-NSO}}^2}$$

Here, $S_{\text{NSO}}^2 = 3.859$ and $S_{\text{non-NSO}}^2 = 5.6722$,

$$F = 0.62$$

Now, $df_{\text{NSO}} = n_1 - 1$ and $df_{\text{non-NSO}} = n_2 - 1$, where, $n_1 = 83$ and $n_2 = 89$.
We can assume df_{NSO} and $df_{\text{non-NSO}}$ to be 120 for calculating rejection region F value.

$$\alpha = 0.05$$
$$F_{(1-\alpha, df_{\text{NSO}}, df_{\text{non-NSO}})} = 1.25$$

Since we have $F \leq F_{(1-\alpha, df_{\text{NSO}}, df_{\text{non-NSO}})}$, we can reject our null hypothesis. Since it is mandatory for the students involved in NSO to attend 2 NSO sessions per week, we can expect less variance in the number of days in the weeks they play.

- Previous experience (playing for > 5 years) in sports appears to increase the proportion of students playing it for fitness.

Hypothesis Testing

Let π_1 denote the proportion of students playing for fitness with previous experience and π_2 denote that with little or no experience.

$$H_0: \quad \pi_1 - \pi_2 \leq 0$$
$$H_a: \quad \pi_1 - \pi_2 > 0$$

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From the data,

$$\pi_1 = \frac{73}{95}$$
$$\pi_2 = \frac{88}{133}$$

The test statistic is,

$$Z = \frac{\hat{\pi_1} - \hat{\pi_2}}{\sqrt{\frac{\hat{\pi_1}(1-\hat{\pi_1})}{n_1} + \frac{\hat{\pi_2}(1-\hat{\pi_2})}{n_2}}} = 1.790328$$

Since $Z = 1.7904$ is greater than $z_{0.05} = 1.645$, we conclude that previous experience (playing for > 5 years) in sports appears to increase the proportion of students playing it for fitness.

Discussions

A few proportion of the students believe that not enough attention is given by the institute/coaches towards sports at IITH. Also, lack of equipment and sport premises at campus are reasons for low participation of a few. We believe, more grounds and coaches have to be made accessible to the students to increase their participation. Also, we have to look into the participation of girls in sports and conduct events to increase the same.

Contributions of team members

- AI20BTECH11025- Vaishnavi W - Coordinated the project, Hypothesis 5, Data Collection, Report writing

- AI20BTECH11028- Ayush Kumar Singh - Coordinated the project, Data Collection, Hypothesis 3,4, Report writing

- AI20BTECH11017- Omkaradithya Pujari - Key Findings 2, Slides, Graph, Plots

- AI20BTECH11007- Digjoy Nandi - Graphs, plots, Verified Hypothesis using python simulation, Data pre-processing, Data Collection

- AI20BTECH11024- Vojeswitha Gopireddy - Key Findings 1,4, Data Collection

- AI20BTECH11009- Ganji Varshitha - Data pre-processing, Key Findings 3

- AI20BTECH11029- Rahul Naga - Analysing and summarising the findings - Report writing, Slides

- AI20BTECH11023- Vishwanath Hurakadli - Data Collection, Hypothesis 1

- AI20BTECH11030- V. Rahul - Hypothesis 2, Report writing

- AI20BTECH11002- Dhatri Nanda - Data Collection, Graphs, Slides

Python Code

Github repository - https://github.com/vaishnavi-w/MA4240