UNL's COVID-19 Response

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Fall 2020
Final Report

1 Introduction

Due to the COVID-19 pandemic, many universities and students are forced to adapt to the new normal. Many changes were made as social distancing and the reduction of in-person contact is put in place to limit the spread of the virus. This affects many aspects of student life and this report aims to examine student sentiments regarding some of the changes made by the University of Nebraska-Lincoln.

1.1 UNL COVID-19 Survey

A survey is conducted by Groundwork UNL with the aim of assessing student sentiments on UNL's COVID-19 Response. Each question is assessed on a Likert scale from 1 to 5.

The questions on the survey are as follow:

1. I am aware of UNL's Forward to Fall COVID-19 Response Efforts.
   (1 - Not at All, 5 - Extremely)
2. Testing and Contact Tracing services are adequately provided by UNL.
   (1 - Strongly Disagree, 5 - Strongly Agree)
3. In-person classes transitioned online should have lower tuition fees.
   (1 - Strongly Disagree, 5 - Strongly Agree)
4. My academic performance has been impacted by the change to online/hybrid instruction.
   (1 - For the Worse, 5 - For the Better)
5. Student fee costs should be adjusted according to the accessibility of campus facilities.
   (1 - Strongly Disagree, 5 - Strongly Agree)
6. The enforcement of mandatory mask policy is reasonable.
   (1 - Strongly Disagree, 5 - Strongly Agree)
7. Public Hygiene initiatives taken by UNL is adequate.
   (1 - Strongly Disagree, 5 - Strongly Agree)
8. Based on your current knowledge, UNL is doing enough for campus' safety for the COVID-19 pandemic.
   (1 - Under concerned, 5 - Over concerned)

1.2 Metadata on the Survey

The UNL COVID-19 Response Survey is performed from 22nd of August 2020 to 4th of September 2020 in UNL.

1.2.1 Definition of total population

The set of people we are interested in studying in this survey are the students of UNL, be it students studying on-campus, online, graduate or undergraduate students.

Nevertheless, due to the nature of the collection of data (a mix of in-person and online with more focus of in-person collection), we are undersampling students who primarily have their classes conducted online, graduate students and students who are usually not on campus.

In order to bridge this gap, we have an online survey via email distribution. Given the nature of online surveys, and to avoid tracking of respondents for privacy concerns, we are unable to clearly determine the actual number of responses via online surveys but we place the number of online respondents between 30 to 50 of our respondents (or 10 to 15 percent of our sample size).

1.2.2 Confidence Interval and Margin of Error

We have decided to use a confidence interval of 95% and a margin of error of 5% for this survey.

Using the formula $\epsilon = z\sqrt{\frac{p(1-p)}{n}}$, where $n = 357$ and using the conservative estimate of $p = 0.5$, we would have a Margin of Error of 5.2%.

1.2.3 Sampling Methodology and Coverage

Given this is a preliminary survey regarding students' sentiments on UNL COVID-19 Response, our sampling is not truly random, with possible errors introduced as a result. This includes the aforementioned issues of our survey. On top of that, we conducted part of the survey during the Party at the Union, City Campus Club Fair and East Campus Club Fair. This explains the skewed population samples towards freshman students and overrepresentation of students in CAS, COB, and CASNR while graduate students are severely underrepresented in this survey.

t-tests for skewed populations are used to see if there is a significance in their differences to compensate for the oversampling of certain groups. In general, most of the tests suggest that there are no statistically significant differences between respondents of different demographics. Some exceptions are found and they will be included in our report and discussed thoroughly.

2 Response Demographics

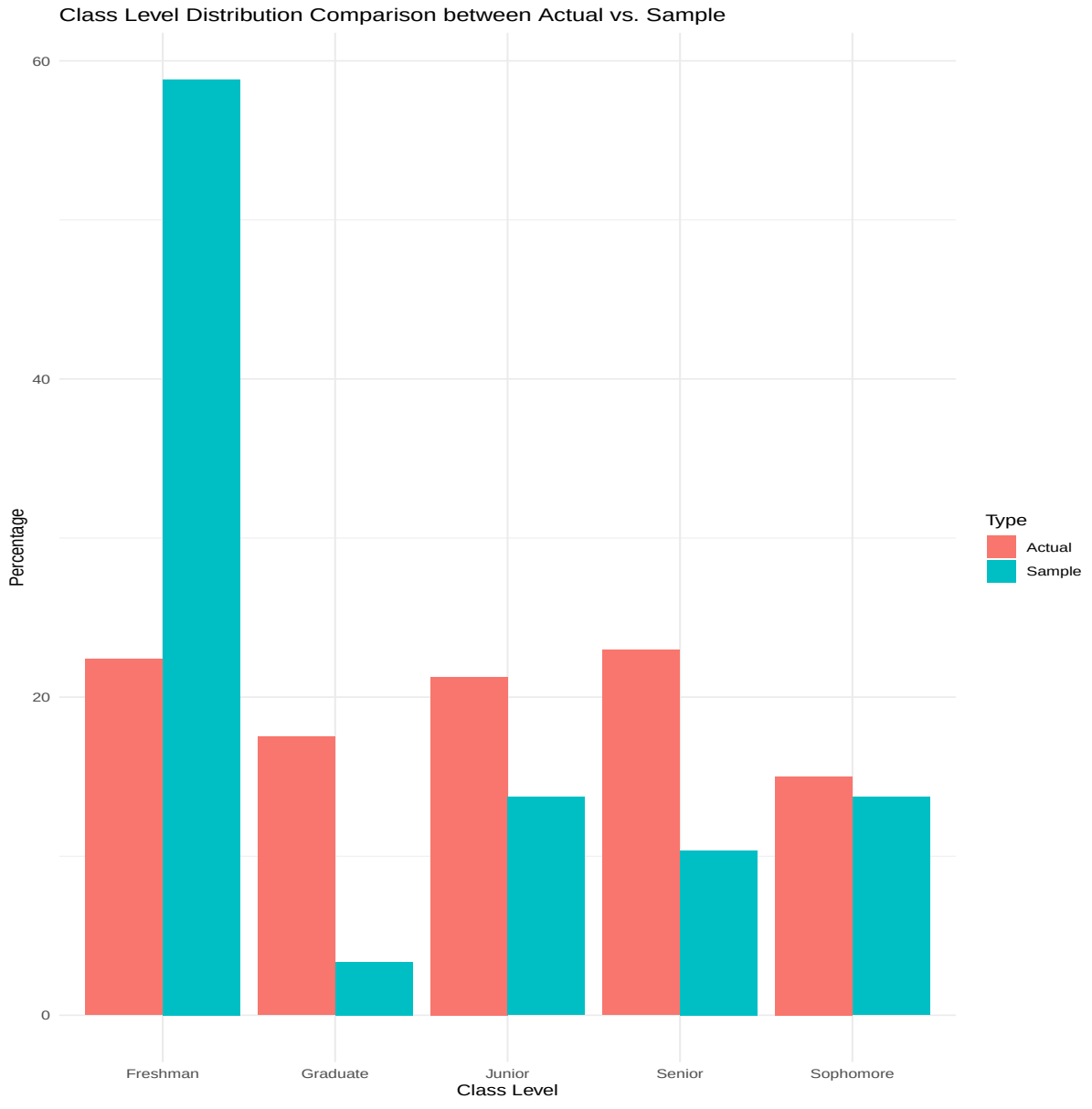
2.1 Demographics Comparison

Using data from UNL Factbook, we are able to provide an approximation as to how much we have deviated from the actual population demographic. This is the main tool used to determine and verify the quality of the data.

Major discrepancies in demographics surveyed are "controlled" and observed to see if the differences do or do not affect the overall results in the analysis section.

2.1.1 Class Level

For the demographic on Class Level, we used the classifications by the UNL Factbook as a comparison to the survey results we collected.

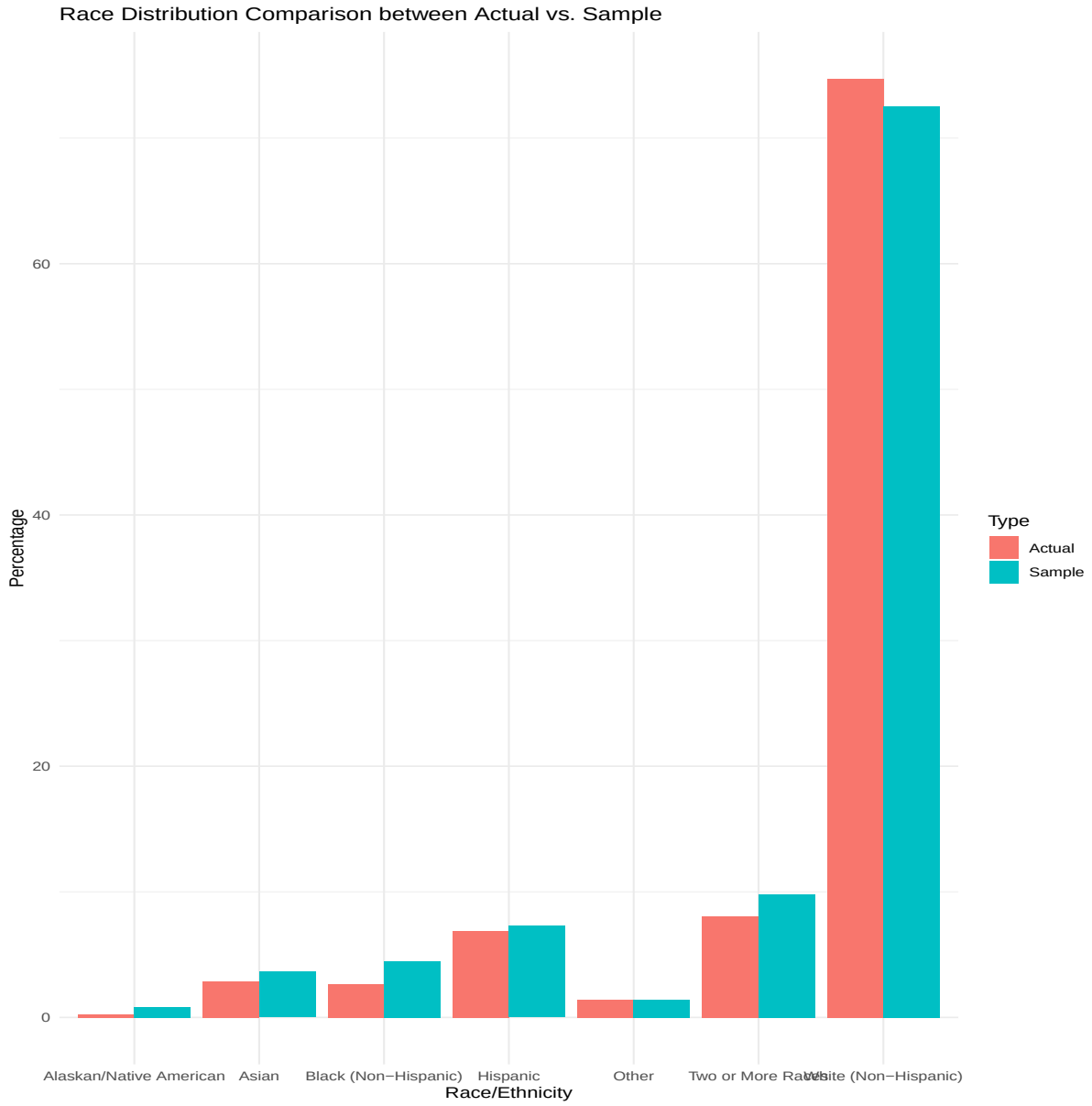


Looking at the bar graph above, we can see that Freshman students are oversampled whereas the other class levels are undersampled, particularly Seniors and Graduate Students. This is likely due to the methodology of our sampling, whereby very few Graduate students are given the chance to take this survey.

From this dataset, we would not be able to generalize the results to Graduate students since they are severely undersampled. Nevertheless, to compensate the uneven nature of our dataset, we perform some statistical test to see if there is a statistically significant difference between Freshman students and students of other class levels and it would be discussed in later sections.

2.1.2 Race

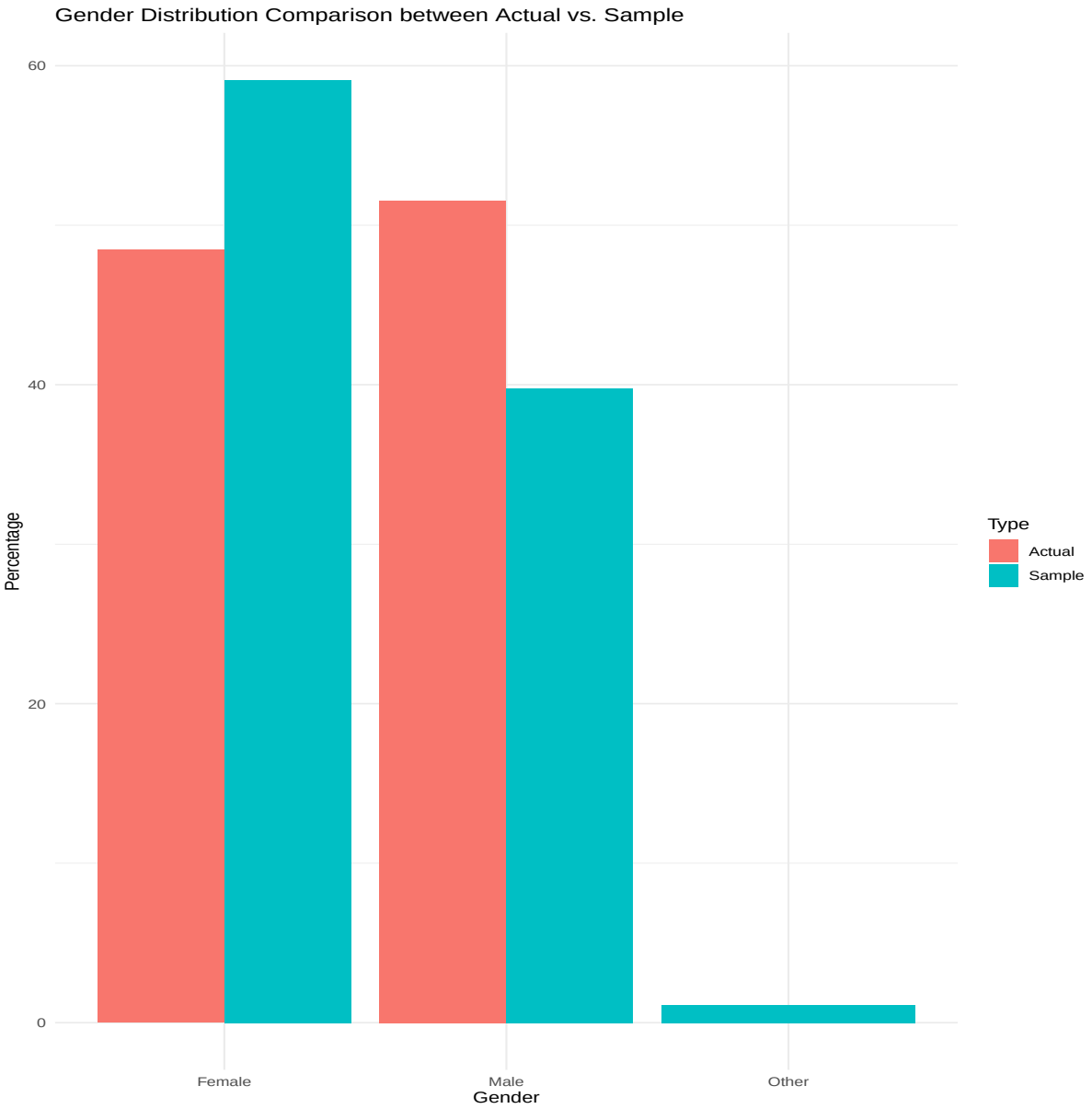
For the demographic on Race, we used the classifications by the UNL Factbook as a comparison to the survey results we collected.



From the bar chart above, it could be seen that the racial demographics of our survey respondents correspond very closely with the actual demographic in UNL. Other than White (Non-Hispanic) students who are slightly undersampled (by 2.15%), all other racial categories are slightly oversampled.

2.1.3 Gender

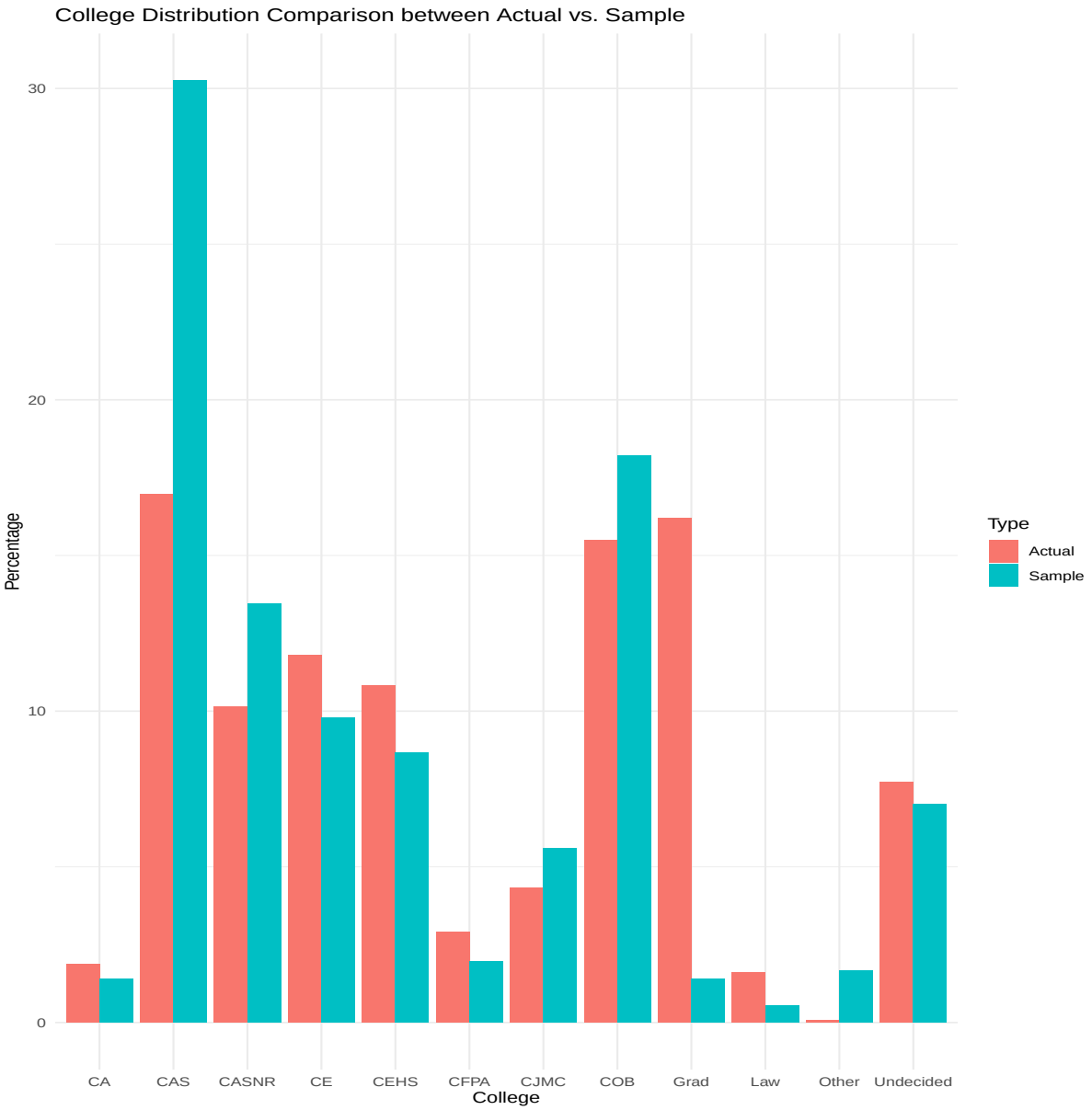
For the demographic on Gender, we used the classifications by the UNL Factbook as a comparison to the survey results we collected. We added an "other" category for respondents who identifies as non-binary or prefer not to disclose this information.



Females are oversampled in this survey as 59.10% of our respondents identify as female whereas the actual percentage of females in UNL is 48.44%. Males on the other hand, are undersampled with respondents identifying as Male at 39.78% and the actual population is at 51.55%

2.1.4 College

For the demographic on College, we used the classifications by the UNL Factbook as a comparison to the survey results we collected.



Students from College of Arts and Sciences (CAS), College of Business (COB), College of Journalism and Mass Communication (COJM) and Undecided students are oversampled in this dataset. Students in Law School as well as Graduate Studies are undersampled in this dataset and inferences derived from this dataset would in general be inapplicable to them.

2.2 Correcting and Identifying Potential Sources of Error

Due to the imperfect nature of our dataset, we are keenly aware to be cautious when making generalized statements from this dataset. Nevertheless, to account for the demographic discrepancy, we

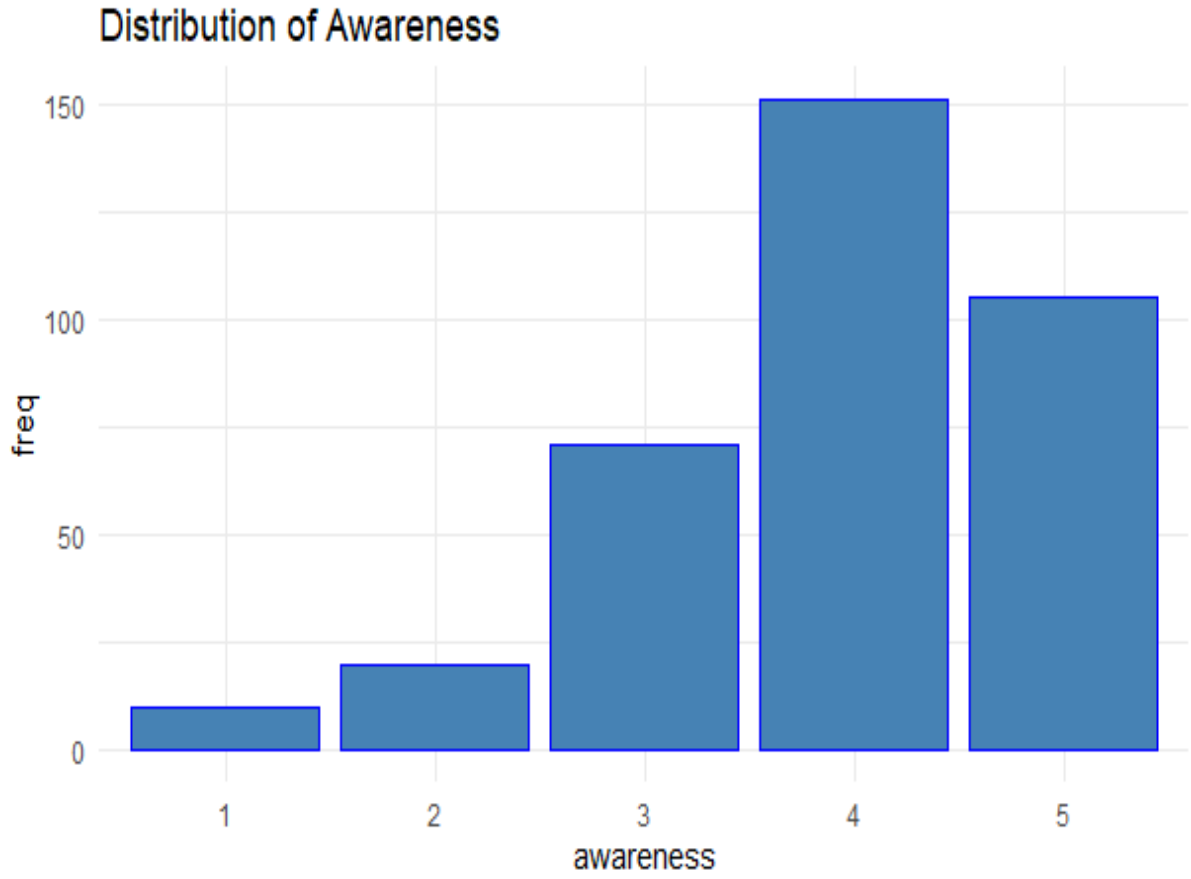
perform significance tests for two sample proportions within the dataset to identify potential sources of differences. This would be discussed further in the discussion and implication section.

For this dataset, weighting would not be applied according to demographics due to the very uneven nature of the dataset. This is to avoid overrepresenting the few respondents from our Graduate Student category as representative of the Graduate Student community as a whole.

3 General Results

These are the general results obtained from the survey and general descriptions on it

3.1 Awareness



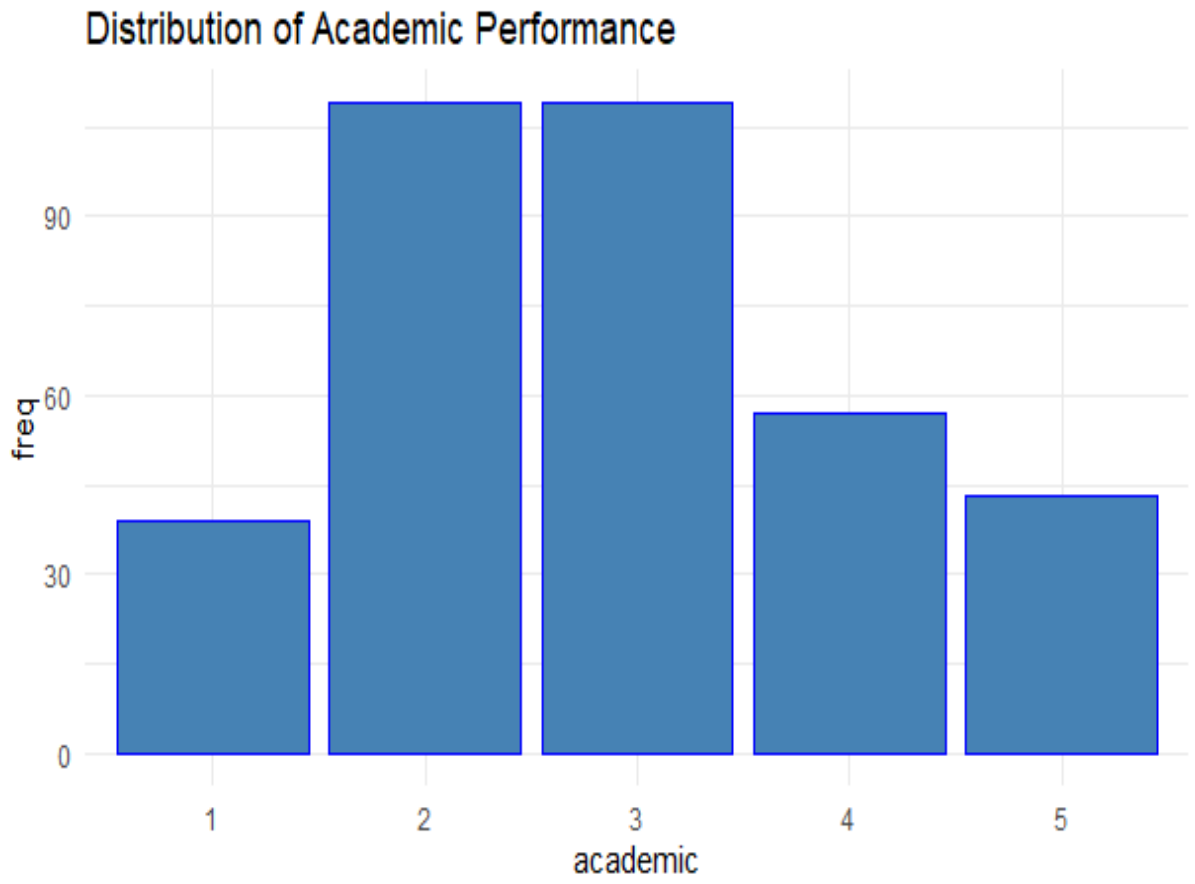

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   3.000   4.000   3.899   5.000   5.000
```

awareness	freq	percentage
1	10	2.801120%
2	20	5.602241%
3	71	19.887955%
4	151	42.296919%
5	105	29.411765%

Table 1: Awareness

The distribution of awareness of UNL COVID-19 policy is close to normal with a left skew. The mode of the response is at 4 from a likert scale of 1 being "Not at All" informed about the Forward to Fall policy instituted by UNL to 5 "Extremely" so.

3.2 Academic Performance




```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   2.000   3.000   2.877   4.000   5.000
```

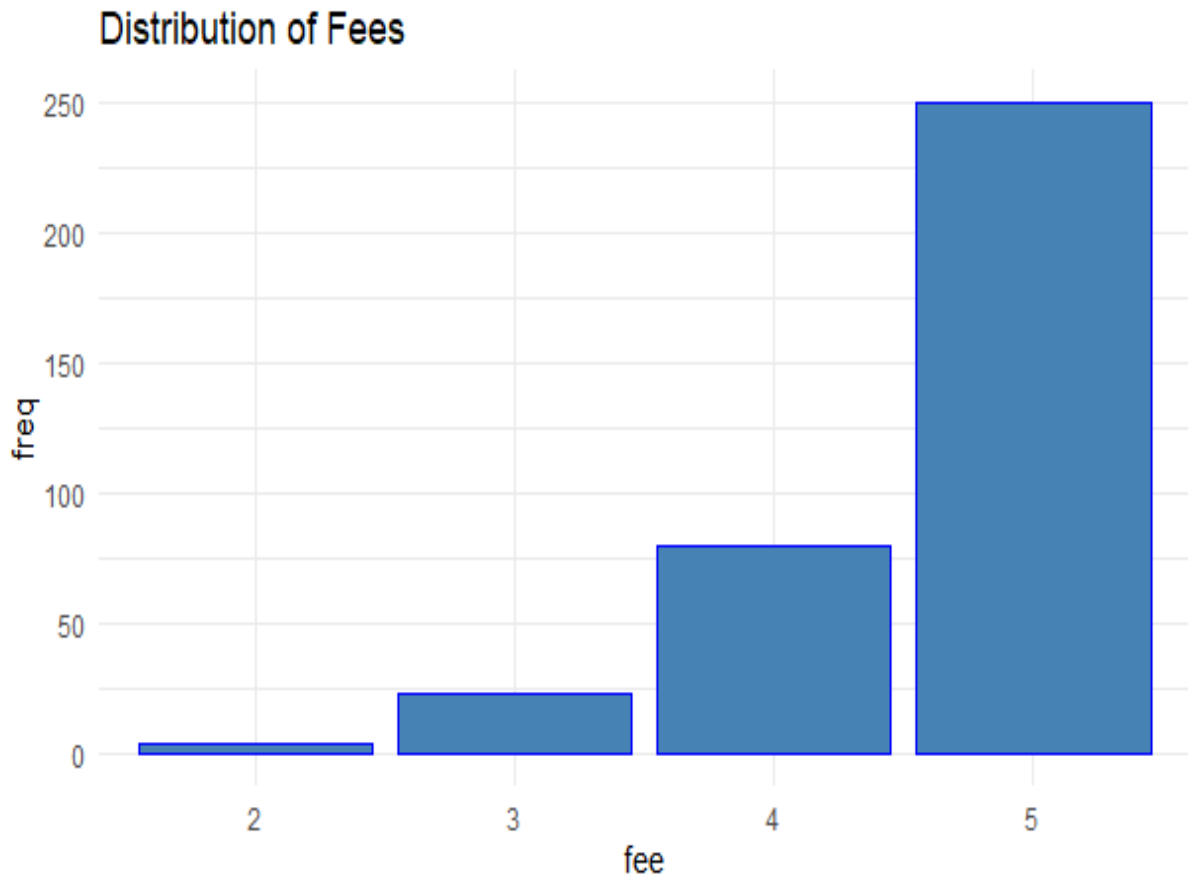
academic	freq	percentage
1	39	10.92437%
2	109	30.53221%
3	109	30.53221%
4	57	15.96639%
5	43	12.04482%

Table 2: Academic

The distribution of academic performance is close to normal with potentially a slight right skew. It is also bimodal, with 109 respondents stating 2 and 3. The average of the results is slightly for the worse for academic performance.

It is important to note that due to the nature of the question, this is a backward looking data and might not reflect current sentiments but projected from the previous semester.

3.3 Fees



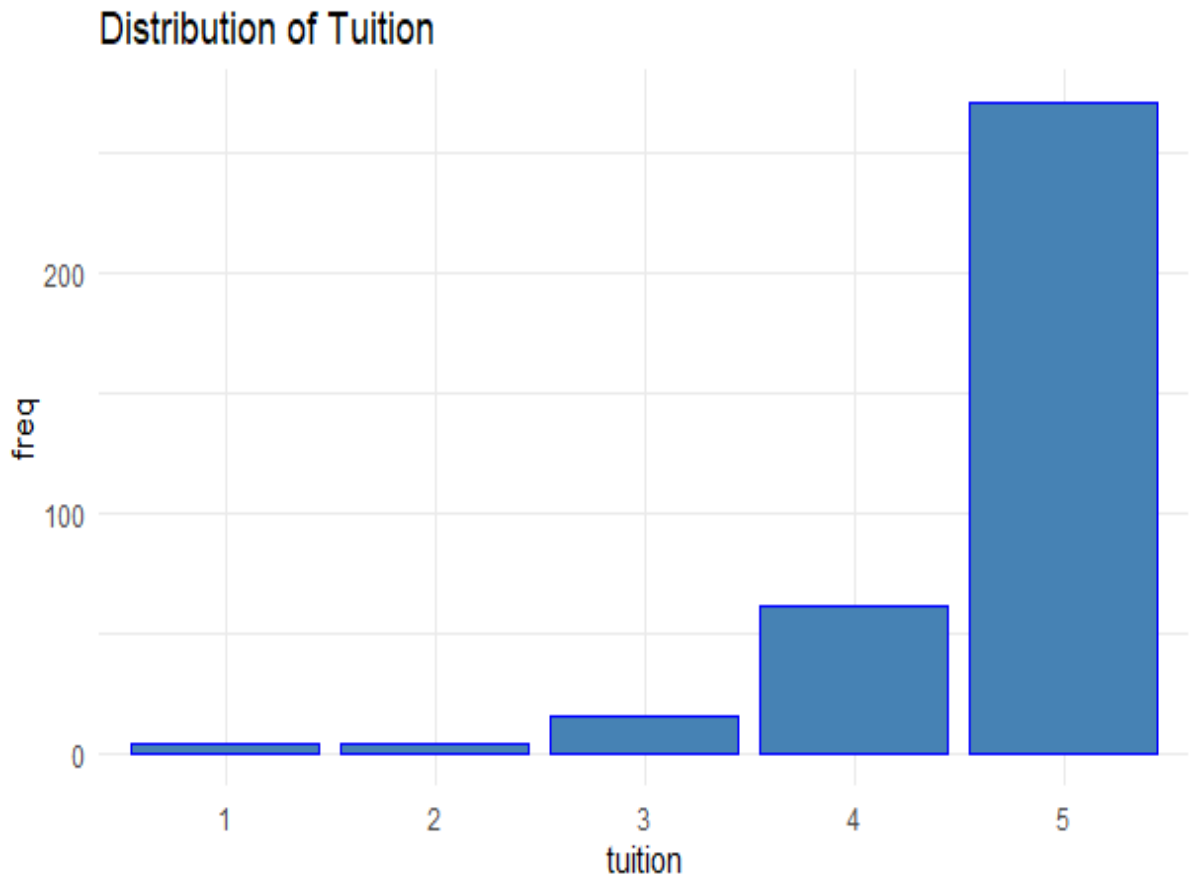

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  2.000   4.000   5.000   4.613   5.000   5.000
```

fee	freq	percentage
1	0	0%
2	4	1.120448%
3	23	6.442577%
4	80	22.408964%
5	250	70.028011%

Table 3: Fee

The distribution for the question on whether student fees should be adjusted according to accessibility is exponential with most respondents stating strongly agree.

3.4 Tuition



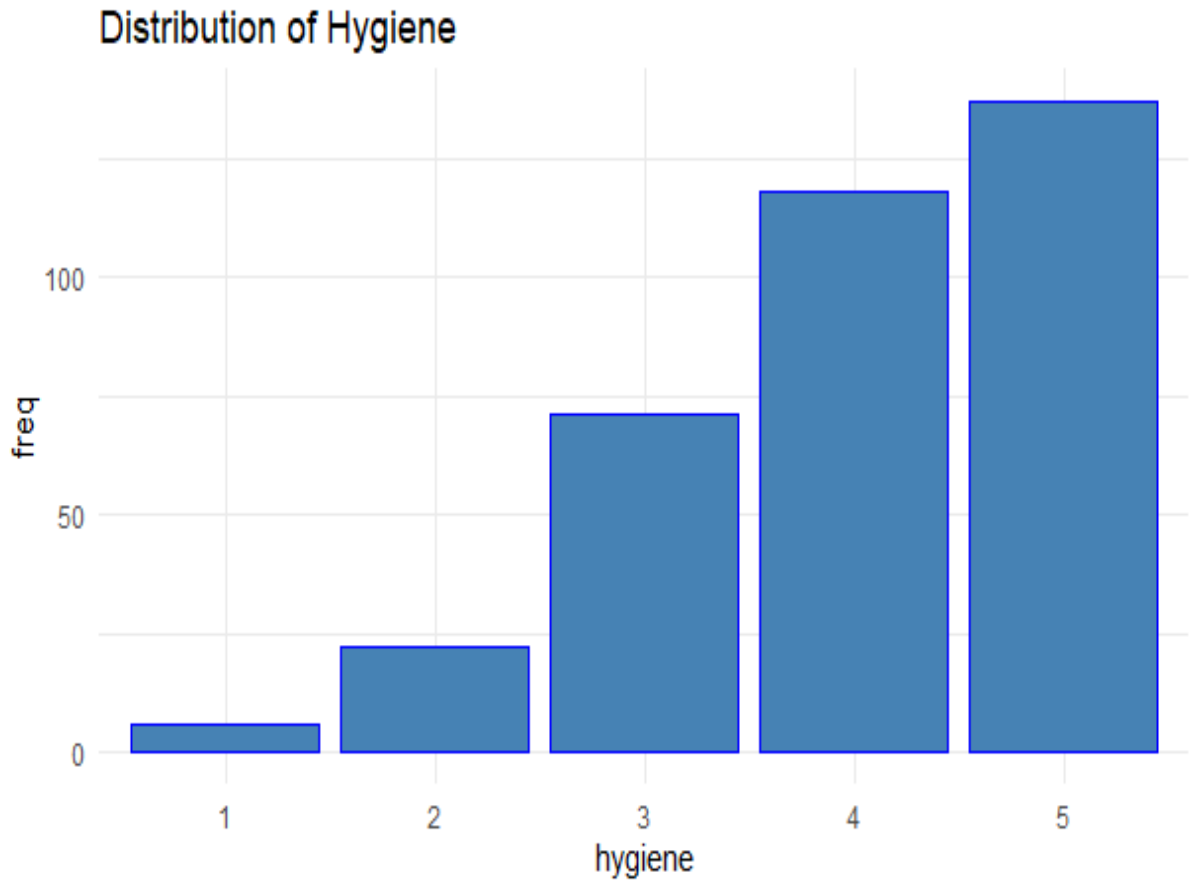
Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
1.00	5.00	5.00	4.66	5.00	5.00

tuition	freq	percentage
1	4	1.120448%
2	4	1.120448%
3	16	4.481793%
4	61	17.086835%
5	271	75.910364%

Table 4: Tuition

The distribution for the question on whether they agree that tuition should be reduced if transitioned online is exponential with most respondents stating strongly agree.

3.5 Hygiene



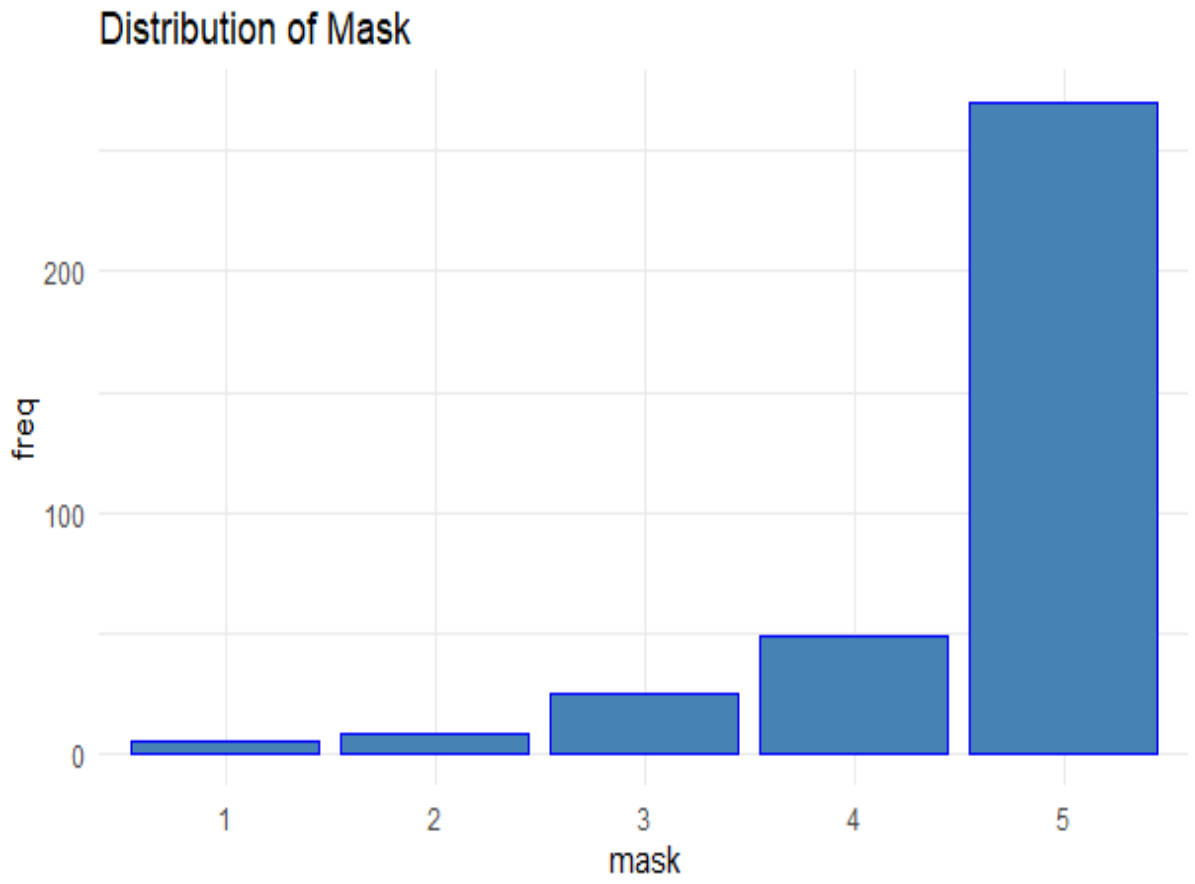

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   3.000   4.000   4.011   5.000   5.000
```

hygiene	freq	percentage
1	6	1.680672%
2	22	6.162465%
3	71	19.887955%
4	118	33.053221%
5	137	38.375350%

Table 5: Hygiene

The distribution for the question on the satisfaction of public hygiene initiative by UNL is rather linear, with a mode of 5 which is strongly agree that it is satisfactory.

3.6 Mask




```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   5.000   5.000   4.599   5.000   5.000
```

mask	freq	percentage
1	5	1.400560%
2	8	2.240896%
3	25	7.002801%
4	49	13.725490%
5	270	75.630252%

Table 6: Mask

The distribution for the question on whether they agree that mask policy on campus by UNL is reasonable is exponential with most respondents stating strongly agree.

3.7 Testing

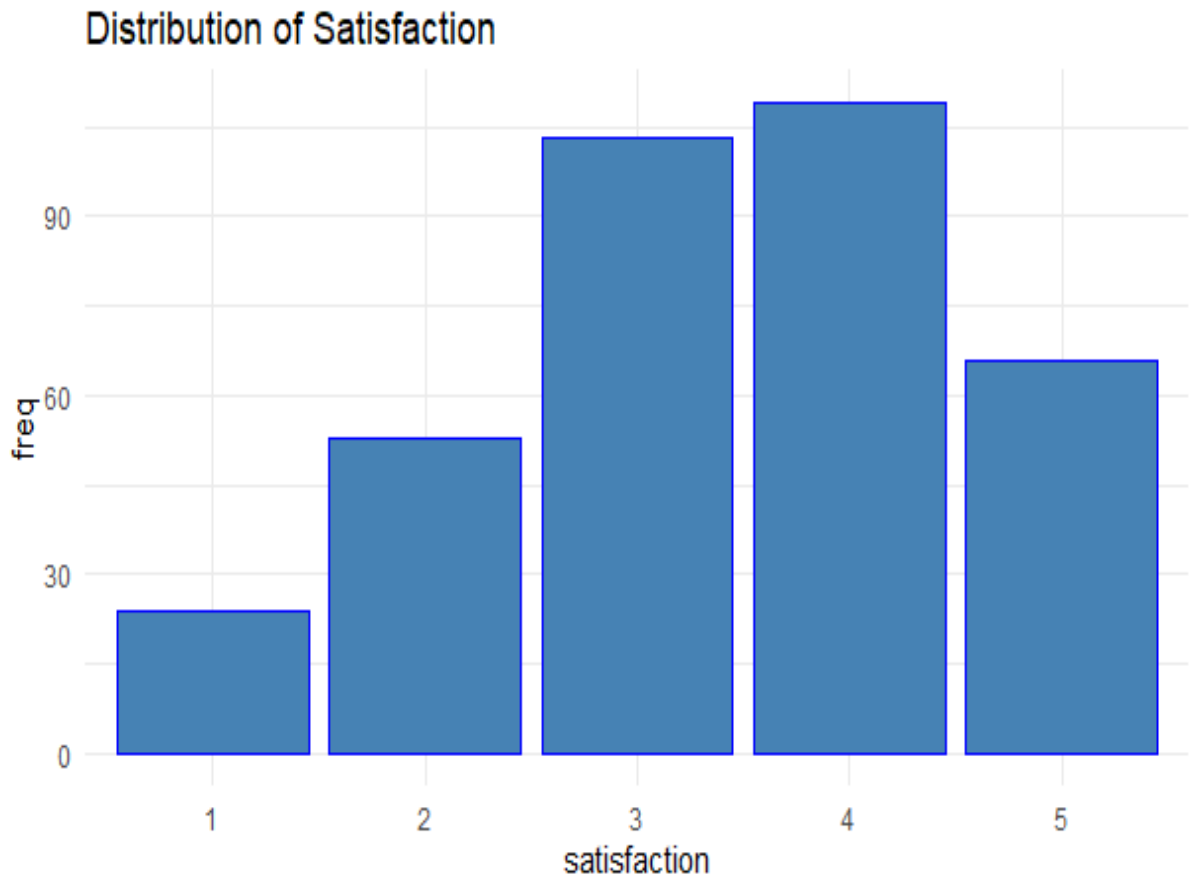

```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
1.000   3.000   4.000   3.637   4.000   5.000
```

testing	freq	percentage
1	14	3.9215686%
2	31	8.6834734%
3	113	31.6526611%
4	109	30.5322129%
5	88	24.6498599%

Table 7: Testing

The distribution of students' response on the question of their satisfaction on testing initiatives by the university is near normal with a left skew. This means that most students are in agreement with testing on being satisfactory, with most students feeling indifferent about it.

3.8 Overall Satisfaction




```
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  1.000   3.000   3.000   3.394   4.000   5.000
```

satisfaction	freq	percentage
1	24	6.722689%
2	53	14.845938%
3	103	28.851541%
4	109	30.532213%
5	66	18.487395%

Table 8: Satisfaction

The distribution of students' response on the question of their overall satisfaction with UNL's COVID-19 Response is near normal with a left skew. This means that students in general feel that UNL is over concerned with COVID-19. The mode of this distribution, which is slightly over concerned.

4 Analysis

In this section, we discuss some of the findings from the dataset in more details. The two tools we are using are t-test for two sample proportions and Ordinary Least Squares Models (OLS).

For t-test for two sample proportions, we are using the two-tailed test, with an $\alpha = 0.05$:

$$H_0 : \mu_1 - \mu_0 = 0$$

Null Hypothesis: There is no difference in the average mean for sample proportion one and sample proportion two

$$H_0 : \mu_1 - \mu_0 \neq 0$$

Alternative Hypothesis: There is a difference in the average mean for sample proportion one and sample proportion two

However, since there is a possibility given the sample size, a more thorough survey should be done for tests that yield value close to α. Most of the subsections done with small subsets of the data should also be interpreted with caution.

As for the OLS model, the typical regression model is used as follow:

$$y = \alpha + \beta x_0 + \gamma x_1 + \delta x_2 \dots$$

4.1 Freshman and Other Student Population

Given the oversampling of freshman students in this dataset, a natural question that arise is whether freshmen respond differently as compared to other student groups.

Performing t-tests on the following question yields mostly statistically insignificant results, with both freshman and other class levels responding similarly except for tuition.

For the variable tuition, freshman students are more likely to feel more strongly that tuition should be reduced that their counterparts in other class level.

4.2 Gender

Studying the differences in how different genders respond yield rather interesting results. Due to the small population of non-binary students who responded, we unfortunately could not account them into our analysis.

We find a statistically significant difference between male and female respondents on the adjustment of student fees, whereby female respondents tend to feel more strongly about the need to adjust them. Other than that, there is reason to believe that female students feel more strongly on mask, tuition and testing though these variables did not pass the significance test.

4.3 College

Due to the huge number of combinations of colleges, we only take into account college populations that have significant enough representation, that is around 10% or more of our sample size.

Most of the tests are insignificant except on academic performance. We have a reason to believe that College of Engineering students are less negatively affected by the transition to online courses compared to College of Business, College of Arts and Sciences and College of Agricultural Sciences and Natural Resources.

It is also interesting to note that in our sample, we have the lowest (in percentage terms) of College of Engineering students with primarily in-person classes. We only have 35 respondents from College of Engineering however, giving a higher chance of error.

4.4 Type of Class

The following is the distribution of type of classes taken by students. Due to the lack of comparative data, it is hard to say if our sample is representative of the actual population.

class type	freq	percentage
A general mix of both online and in-person	263	73.669468%
Primarily in-person	19	5.322129%
Primarily online	75	21.008403%

Table 9: Class Type

4.4.1 Academic Performance for Primarily In-Person Classes

Due to the very small population of students who have primarily in-person class, it is likely that there could be errors in this sample. However, when performing significance test, students who have classes conducted primarily in-person are more prone to being negatively affected by the transition to online classes. It is important to keep in mind also that the academic performance could be a backward-looking measure.

4.4.2 Tuition for Primarily Online Students

For students who have primarily online classes, it is statistically significant that they feel more strongly that tuition should be lowered if classes are transitioned online as compared to their counterparts who responded to a general mix of both online and in-person.

4.5 Ordinary Least Squares Regression

4.5.1 General Findings

Performing simple linear regressions for each individual variables, using the satisfaction as the response variable with other variables as the independent variables, we find a few interesting patterns.

Most of the variables are significant with satisfaction in the regression, with a positive coefficient. However, we find that it is not statistically significant when we modeled the variables tuition and satisfaction. Other than that, mask has a *negative* and significant coefficient with the regression.

4.5.2 Multiple Regression

Using the following regression

$$satisfaction = \alpha + \beta\ awareness + \gamma\ academic + \delta\ mask + \phi fee + \psi\ hygiene$$

the following result is obtained.

```
Call:
lm(formula = satisfaction ~ awareness + academic + mask + fee +
    hygiene, data = covid)

Residuals:
    Min      1Q  Median      3Q     Max
-3.3619 -0.5398  0.1648  0.6381  3.2563

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  0.27978    0.47001   0.595 0.552054
awareness    0.16057    0.05396   2.976 0.003127 **
academic     0.11778    0.04369   2.696 0.007364 **
mask        -0.27964    0.06200  -4.510  8.9e-06 ***
fee          0.28094    0.07893   3.560 0.000424 ***
hygiene      0.53678    0.05249  10.226  < 2e-16 ***
---
Signif. codes:  0  ***  0.001  **  0.01  *  0.05  .  0.1

Residual standard error: 0.9393 on 344 degrees of freedom
Multiple R-squared:  0.3408,    Adjusted R-squared:  0.3312
F-statistic: 35.57 on 5 and 344 DF,  p-value: < 2.2e-16
```

In general, the model satisfies some of the Gauss-Markov Assumptions, such as:

1. **Linearity**
   All the parameters used are linear.

2. **Zero Conditional Mean of Error (Exogeneity)**
   The plot of residuals against the predictor against fitted values show that the linearity assumption is somewhat met.

3. **Homoskedacity**
   The scale-spread plot shows a linear line (except slightly curved downwards towards the end)

4. **No (significant) serial correlation**
   All variables used have correlation less than 0.167. Academic and Hygiene has the correlation of 0.167.

5 Discussion & Implications

The findings reveal and perhaps dispel some of the conjectures that we have about how the UNL's student population in general, feel about the policies conducted by the university.

Based on the results found the analysis section, we would try to understand and discuss the findings in detail in terms of what can be interpreted out of it and what are the implications as a result of the interpretation

5.1 Awareness

5.1.1 Discussion

We find that in general that there is no significant difference between different population groups. That means that in general, it is safe to assume that most students are informed equally across the board.

Nevertheless, we did not measure International Students as a demographic in our survey, and there is reason to believe that international students might not be entirely informed about the UNL's COVID-19 Response.

5.1.2 Implications

Given that the majority of students (71.7%) are somewhat to extremely aware of UNL COVID-19 Response, it shows that the provision of information by the Board of Regents and ASUN seem to be rather effective. However, there is still some room of improvement as 3% of the population are not really aware about the response.

It is also important to note that the regression model shows that the higher the awareness, the higher the satisfaction. It does not imply causation until further studies are done, and due to bidirectional data for satisfaction, we cannot make generalizeable conclusion as to whether students are going to be more satisfied if they are more informed. However, this result shows that there is reason to believe so.

5.2 Testing

5.2.1 Discussion

For testing, most students are indifferent to how UNL has handled the provision of testing and contact tracing. However, in general students agree that UNL has provided sufficient testing and contact tracing for the student population.

It is important to be cognizant however, that the survey is conducted early in the semester, before most students have gone through the experience of testing and contact tracing and when COVID-19 infections are relatively low. This might change across time as the situation worsens.

5.2.2 Implication

We can confirm theoretically that students in general are satisfied with testing and contact tracing initiatives by the university. However, this is not guaranteed as public opinion might change.

Nevertheless, due to the positive correlation between satisfaction and testing, it implies that the keeping students satisfied with the testing and contact tracing program is important in ensuring overall satisfaction.

5.3 Tuition

5.3.1 Discussion

Given the exponential distribution of this indicator, it is safe to say that most students are for the reduction of tuition fees if the classes are transitioned online. It is important to note that the question asks students if tuition fees should be reduced, which is not surprising for students as the consumer of the service to believe the price of tuition should be reduced.

It is also interesting to note that freshman and other class levels respond differently, with freshman students feeling stronger about the reduction of tuition fees (at 4.7 compared to 4.5).

5.3.2 Implication

UNL has taken steps to address the budget shortfall as a result of the COVID-19 pandemic. However, it implies that more effort has to be made to address this issue. In fact, this explains the uproar of the addition of online fees by UNL given that students are already in general upset about the lack of reduction of tuition.

The significant difference in response between freshman and other class levels gives us the reason to believe that understanding why tuition could not be reduced is linked to maturity and understanding. This is not guaranteed, but implies that more explanation would help ease and reduce students' unhappiness about this issue.

It is also interesting to note that tuition is the only factor not significantly correlated to overall satisfaction, which implies that the level of satisfaction is probably unaffected by the indicator.

5.4 Academic Performance

5.4.1 Discussion

In general students are negatively affected by the transition online. However, further analysis shows interesting results and changes the implications. Performing analysis between different colleges shows differences between the engineering college and the other colleges, with students from the College of Engineering being less negatively affected by the transition. This raises some questions and it could be an area of study as to why such difference exists. It is important to note that after subsetting the data, the sample proportion might be too small to provide generalization.

Furthermore, it is interesting to note that students who have classes primarily online are worse off academically than their counterparts with different class composition. This suggests that COVID-19

might have changed fundamentally some aspect of in-person classes that cause the shift. This analysis however, is also not entirely reliable given a small population of in-person students are represented in this sample.

5.4.2 Implication

The implications of these findings is that more research is needed in this area due to the more nuance nature of this indicator. However, the results do suggest that perhaps a transition online does not necessarily negatively impact students academic performance as compared to a lack of proper in-person class due to the pandemic.

These samples are small and the results should be taken with a grain of salt.

5.5 Fees

5.5.1 Discussion

We find that most students, just like tuition fees, are strongly in agreement that student fees should be adjusted according the availability of service. We also find that female respondents feel more strongly so than their male counterparts, and this raises a few question. Are female students more congnizant to student fees given their usage rate with student fee funded services? Another question to ask is, does the COVID-19 transition more severely limiting female students' ability to use campus facilities as compared to their male counterparts?

5.5.2 Implication

The findings implies that ASUN should take note of the general feelings of the students and be cognizant in the adjustment of student fees.

Given the findings, it is also important to enquire if some of the limitations on campus facilities are more negatively affecting female students' access as compared to male students.

5.6 Overall Satisfaction

5.6.1 Discussion

More than half (55.18%) of students believe that the university is over concerned with their response in their efforts to combat COVID-19. This is interesting given that most students are in general, in agreement that the initiatives provided by the university is adequate.

However, it is important to note that most of the respondents are students who are in college in-person. Students who believe that the university is under concerned might not be physically present in college causing a possible skew.

5.6.2 Implication

Despite the shortcomings of the dataset that we have, we can say that the university perhaps have to increase its efforts to explain to students the importance of the COVID-19 response and why it

matters. This is because if most students on campus believe that this is an overreaction, they are more likely to ignore university protocols.

6 Conclusion

The following findings provide us with much insight about how students in UNL are thinking about UNL's COVID-19 Response. Due to the some of the limitations of the study, more research should be done to make generalized conclusions for some aspect of the results, especially in terms of the academic performance of different class composition type (online/in-person/mix) and individual college satisfaction.

Some of the results obtained are statistically unlikely to be inaccurate, or at least not too far from the truth. This includes how students feel about fee allocation, tuition rates and also the level of awareness. The implications that follow from these findings should not be ignored.

7 Disclaimer

This is not an official ASUN correspondence.

The findings in this report reflects only the Registered Student Organization, Groundwork UNL. It does not necessarily reflect the opinions of other parties including ASUN.

The dataset that is used for the analysis can be obtained from the link below:

Source: https://github.com/groundworkunl/UNL_COVID19.

Any detected errors can be reported to the official channel of communication of Groundwork UNL via email *groundwork@unl.edu*.

8 Acknowledgement

8.1 Preparation of the Report

The primary author of this report is *Justin Ho*, the Director of Data and Policy of Groundwork UNL.

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