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Stat 411 Final Report

New Dining Hall Meal Plans at the University of Wisconsin – Madison

**Introduction**

Every day thousands of students and faculty use the dining services at the 7 dining halls and badger markets around campus. Students living in university residence halls can enjoy the benefit of having a 30% discount on all food in the dining halls, while non-residents can enjoy a tax exemption and 5% discount on all food. This year in April, University Housing announced that for the first time ever, they were going to require students living in dorms for the first time to be required to choose a meal plan ranging from $1,400-$3,100 per school year (University Housing). This created quite a lot of uproar, because in years past students could put as much as they wanted on their Wiscard, whenever they wanted, and did not have to financially deal with a meal plan that costs several thousands of dollars. Several students like me did not enjoy the dining hall food, and often opted to cook for myself or find coupons for cheaper meals around campus. Many people feel like this new required charge for new on campus residents is a money grab by University Housing and is a financial burden for many students. The university is doing this as a test run for a year and hopes to learn more and how to improve it in coming years after receiving a negative response (O’Connor, 2018). Because of the many complaints about this new system, I will attempt to survey first year students who live in on campus residence halls to gather information on their thoughts, opinions, and subjective experience with the new required meal plan.

**Population**

Every year over 7,500 undergraduate students at UW Madison live in on campus residence halls, with well more than half of that population being first year students (UW Housing). This year, the new freshman class at UW Madison consists of 4909 students (Office of the Registrar). Now only new residents in the dorms are required to purchase this meal plan, which means that 2nd year, 3rd year, and 4th year students are not required to use a meal plan (University Housing). Since over 65% of residence halls are comprised of first year students, and the other 35% of students are either transfers, and older students who are not required to have a meal plan, we will only be looking at the freshman students and surveying them on this new plan. 99% of students are in the age range of 16-20 years old. Out of the 4,909 first year students, roughly 97% of students live in residence halls, making our number of elements for this population roughly 4,761 freshman students. Out of this population we see that 44.5% of first year students are male, and 55.5% of students are female. Out of these students 54.5% pay in state tuition rates, while 45.5% pay out of state or international tuition rates. (Office of the Registrar). A nice auxiliary variable for this would be income or parent’s income, because someone who has a higher income may not care about having to spend extra money for a required meal plan at the dining halls.

**Design Goals**

We hope to learn from this sample the first-year student’s thoughts and opinions on the new meal plan. Using this data can help university officials decide what to do with this meal plan trial, which could mean lowering costs, eliminating the program, or any other tweaks based on student’s response. We intend to do this through an online survey sent out to first year student’s emails, which we can obtain from mailing lists from University Housing. We hope to complete this survey to help current and incoming students, while staying in our budget of $10,000. We can see from studies that a $10 monetary incentive to complete a survey increases response rates (Yu, 2017). Because of this we will offer $10 Wiscard credit to the students who complete the survey to use at dining halls, convenience stores, the library, or just about anything on campus that requires money. The remaining part of the budget is for any problems and analysis we have for the sample.

There has been no study I could be find that surveyed the people this new meal plan affects, but the target population of the study has most likely been studied in other types of surveys and analysis. The general amount of protests I have seen online and student gossip around campus about this meal plan idea though has influenced my desire to do some actual sampling analytics for the plan. My hypothesis for this study is that we will find out a majority of first year students living in the residence halls will find this new meal plan to be too expensive, and generally have a negative view of the meal plan itself, therefore creating a general census for a desire to go back to not having a required meal plan for students.

**Sampling Scheme**

For this survey I considered using stratified random sampling and one-stage cluster sampling. In a stratified random sample, I could separate the elements of the population in to 2 strata which are the 2 neighborhoods all the residence halls are in, either Southeast or Lakeshore. This allows me to then perform a proportional simple random sample of the 2 neighborhoods and collect my data. A stratified random sample would be nice because there are different dining halls in different neighborhoods, and number of people in the dorms varies greatly from 30-1,130 people per dorm and limiting it to just neighborhoods instead of dorms would eliminate the possibility of drawing a dorm with few people (University Housing). This would be great in decreasing variance among stratum.

I also looked at using a one stage cluster sample to perform this sample. In this case, I would take a SRS from the 19 dorms total on campus as my PSU’s, and use the residents in the dorms selected to be the SSU’s. This would be difficult because some dorms are for students that are older than first year students, and others are learning communities which creates a similar group of people living together and decreases the randomness of the selection. Randomly selecting residence halls for the PSU’s also allows for us to choose residence halls with very few people and can create high variance between our data.

After comparing both sampling schemes, I decided to use a stratified random sample to carry out the study. The main reason being I can be sure I don’t choose a residence hall with very few people in it, or a residence hall that doesn’t have first year students living in them, giving the sample a diverse and low variance for the population parameters. According to our textbook, stratified random sampling can protect us from choosing a bad sample, in our case a residence hall with few first-year students living in it (Lohr, 74). We have data on the subsets of the population (neighborhood population) and can make sure we proportionally distribute the number of samples between them to get fair results. This means we will select a proportional sample size of each neighborhood and send out emails to the residents chosen from the stratified random sample to collect our data.

**Sample Size and Draw**

After we obtain the emails of each first-year student in the residence halls from university housing as well as which hall they live in, we would hope to obtain 30% response rate for a total of about 900 responses. Since every first-year student in the dorms pays for this meal plan, any first-year student in the residence halls is fair game to respond to this survey. This is about 18% of our total element population and is more than enough to get a general population parameter estimate about the impacts of the new meal plan. 4,213 students out of the 7,505 students live in Southeast residence halls, with the other 3,292 living in Lakeshore (University Housing). We are not sure how many of these are first-year students, so we can use the proportion of total students in each neighborhood to roughly estimate first-year students’ numbers in dorms. This shows us that 56% of first-year students live in the Southeast neighborhood, and 44% of them live in Lakeshore. Using these percentages, we estimate that 2,666 first-year students live in Southeast, and 2,095 live in Lakeshore. Using proportional allocation, we wish to sample 60% of each stratum and obtain at least a 30% response rate from each stratum. This would require us to send out surveys to 1,600 students in Southeast, and 1,257 students in Lakeshore. A 30% response rate for each stratum would give us 480 responses from Southeast, and 377 from Lakeshore. Approximately 857 students each receiving $10 would cost $8,570 and would leave us with $1,430 for any extra participants, unexpected errors, and time for analysis. Time is another important constraint for this study, as the first-year students are paying for a yearly meal plan. This would require us to obtain data from the students at in the last month of the 2019 Spring semester.

To obtain the 60% of students from each stratum, we will use a random number generator after assigning numbers 1-2,666 for Southeast students, and 1-2,095 for Lakeshore students. Again, if they are first year-students in the residence halls, they are fair game for this survey.

**Non-Sampling Issues**

I intend for this to be a survey that is quick and easy, with no more than 10 questions. We must be careful when asking personal questions about income and if their parents help them pay for their food. We can make sure that this is less of an issue by randomizing the order in which the questions are asked in the survey. Sending out the survey during the last month of school before the summer would mean that students are very busy and could miss the email, but the $10 Wiscard incentive should help make sure we get at least 30% response rates from each stratum.

I know when I was a first-year student living in the residence halls, I received several surveys about my dorm experiences and such. Because of past experiences and the universities desire to learn more about how this new meal plan affects students, I know it is possible to obtain contact information for first-year students living in residence halls and guarantee we are drawing data form the real target population.

The types of questions in this survey would be very simple, but also would help us understand our demographic we are targeting and their honest opinions about the new meal plan. Questions would help us understand the age, race, and sex of the student sampled. Meal plan questions would help us understand about how many meals they ate per week at the dining halls, if they enjoyed the food being served, and to rate their experience with the required meal plan. This would generate plenty of data for analysis and would be clear that it is for the purpose of getting university officials information on how to deal with the new required meal plan. If they do not wish to participate in the survey, they do not have to. The survey will be provided in the Appendix.

One issue we may run into is participants that fail to record a response to each question, or maybe wish to remain anonymous in terms of gender, age, etc. For this, we can make sure we have a prefer not to respond selection for personal characteristic questions. If a participant misses a part of the question, we can have the survey save their responses, and notify them that there are unanswered fields for the survey and cannot submit for their $10 until fully completed. If we are getting full responses from the correct target populations, which I believe we will, we can minimize the errors easily, and we will have plenty of great data for analysis.

**Estimation of Population Characteristics**

Our main parameter that we are trying to estimate is if the first-year students living in residence halls have had a positive or negative experience with the new required meal plan for dining halls. We will calculate this by taking a sum of all the yes’ for the response to the question about if they liked having a required meal plan and have our total (t-str) statistic for each stratum. We then add the total statistics for each stratum and will divide by the total population response total to obtain our sample average for feeling about the required meal plan (y-str = t-str/N). This sample average becomes our best estimate for the real population average and gives us the lowest amount of variance possible. We can then use this data to show the university officials the consensus of the required meal plan on students. Using analysis of the auxiliary variables such as parent’s income and demographics can help us learn more about the reasoning behind liking the new meal plan or not. Using a 95% confidence interval is always a good idea, so we can make sure we have a range of accuracy to provide the evidence. After doing all this analysis, we should have created a sample average that represents the target population well and can make informed decisions based on the results.

References

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**Appendix**

**First Year Student Meal Plan Survey**

1. What is your sex?
   1. Male
   2. Female
   3. Prefer not to answer
2. What is your age?
   1. 16-17
   2. 18
   3. 19
   4. 20
   5. 21+
   6. Prefer not to Answer
3. Which residence hall do you live in?
   1. Southeast Residence Halls
   2. Lakeshore Residence Halls
4. Do your parents help you pay for school?
   1. Yes
   2. No
   3. Prefer not to answer
5. What is your income as a student?
   1. None
   2. $1,000-$3,000
   3. $3,000-$5,000
   4. $5,000-$10,000+
   5. Prefer not to answer
6. How many meals a week on average did you eat at University Dining Halls?
   1. 1-3
   2. 4-6
   3. 6-9
   4. 9+
7. Did you feel the required meal card plan was too expensive?
   1. Yes
   2. No
8. Did you feel like you would be better off without a required meal plan?
   1. Yes
   2. No

**Thank you for participating in this survey. You will be redirected to enter your information for you $10 Wiscard credit!**