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Kentucky Dental Health with Regards to Social Factors

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Kentucky Dental Health with Regards to Social Factors

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By

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This honors thesis researched the current dental standing of Kentucky compared to the other US States in a variety of factors. The information collected was compared to the national average dental health and will be used to expand on the statewide education on dental health. A wide range of demographics were be surveyed from across the state to get the most accurate representation of the true population. The survey included questions regarding the participants background dental information and social statuses. Also included were questions regarding county of residence, income, race, age, gender, consumption of certain foods and drinks, status of dental insurance, frequency of brushing and flossing, and comfort with seeing a dentist. This information was collated and used to determine which factors of the participant's lives were contributing the most to their dental health. Through this thesis project, it was found that the studied sample had better dental health than the national average and determined that the stereotypes of Kentucky dental health could be inaccurate, disproving our hypothesis. However, the sample size and the irregular data of this sample may have contributed to skewing the data and not accurately representing the state of Kentucky.

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Acknowledgements

I would like to first thank Dr. Oliver Oakley for the time spent helping me develop this thesis. The guidance and feedback on this entire project have been such a phenomenal help in ensuring the quality of this thesis. An immense amount of thanks to Dr. David Coleman and the Eastern Kentucky University Honors Program for the opportunity to complete this research and the resources available for me to use. A huge thanks to my family and friends for the support and encouragement while embarking on this year long journey. I'd like to finally thank the survey participants for the time spent completing the survey for the sake of this research, the study would have little purpose without the help of the survey volunteers.

Kentucky Dental Health with Regards to Social Factors

Introduction

The background of conducting the research for this study is due to my interest in dentistry. I am a pre-dental biology major with shadowing experience in a dental setting for over 4 years. My experience in this field has led me to see the range of dental health in Northern Kentucky and piqued my curiosity towards the entire state. Whilst picking a topic for my Honors Thesis, I realized this was a great opportunity to study other counties and see the comparison of Kentucky's dental health with the national averages. I wanted to sample a randomized group of participants from Kentucky. A survey was created to collect information regarding the individual's county of residence, income, race, age, gender, consumption of certain foods and drinks, status of dental insurance, frequency of brushing and flossing, comfort with seeing a dentist, and more factors which will be discussed later in this piece.

Purpose of Study

There were three main questions to be examined when designing this experiment: Are the stereotypes of Kentucky dental health warranted? What factors contribute most significantly to the overall dental health of the state? Can the collected data from this study be used to further educate the populous on what needs to be done to improve Kentucky dental health? The survey

was designed by taking some of the most significant factors into account and was completely anonymous. I applied to the Institutional Review Board at Eastern Kentucky University and was approved with Research Protocol Number 4668. Advertisement of the survey was primarily through social media and word of mouth. A handout was printed with a QR code to be spread out in public gathering places to catch the publics attention. It was found that the most effective way of advertising was through social media and word of mouth.

Limitations of Study

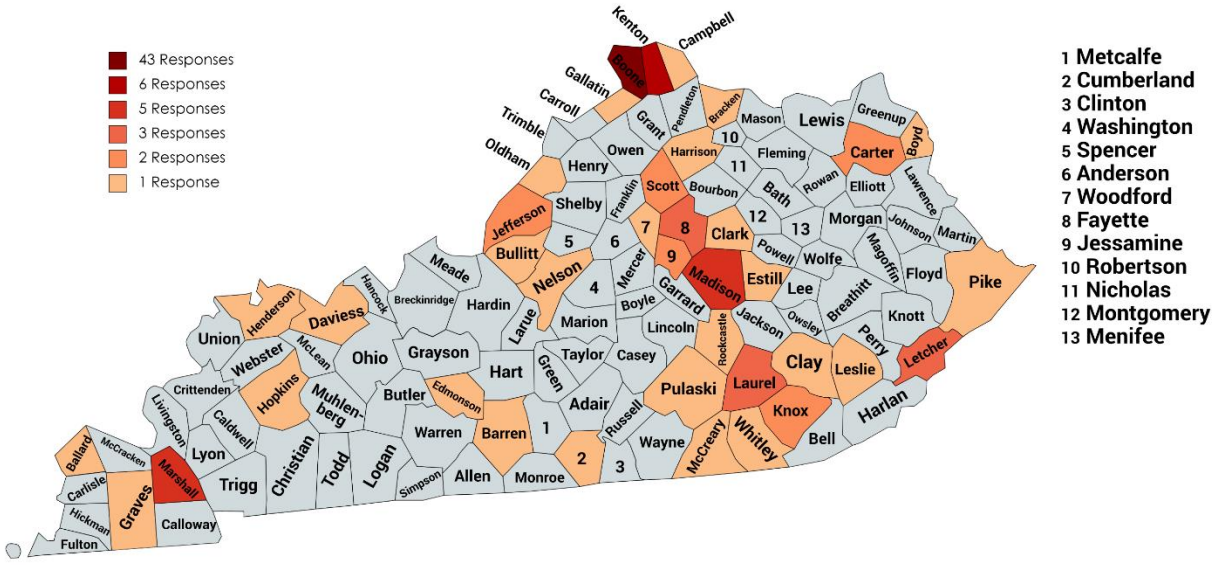
Through collection of the survey results, it was found that the data could be restricted and possibly skewed due to several different factors. These factors include, but aren't limited to: randomized sampling, lack of interest, lack of reward for participation, and honesty of survey participants. To elaborate, the sample group was not as diverse nor as large as it could have been to equally represent the state. With this accounted for, the results may not necessarily yield accurate data when comparing the entire state, but still have interesting trends. There was also a lack of interest when searching for participants. Most of the respondents to the survey social media or word of mouth. The handouts placed in dentist offices or other public places did not garner much interest. This could be due to people not fully understanding the purpose of the study or not wanting to take the time to read this disclaimer on the handout or time to take the survey. Since this was a private study completed during undergraduate, it was unfunded. This did not allow me to reward the survey participants or create interest in the survey due to the lack of reward. I advertised this study by explaining the benefits it may have on furthering the dental health of the state and potentially improving people's lives. Lastly, there could have been a lack of honesty coming from some of the participants. Several of the survey questions included 'fill in' answer choices in order to gather the most accurate information. This led to some people not

taking the study seriously and one respondent answered with “your mom” on the question regarding their housing status. All these factors carried some weight when possibly skewing the data of this study.

Results

The first question of the survey determined the county of residence of the participants. This question was asked to examine the distribution of participants and see whether the place of residence influenced the dental health status of the sample. The distribution of participants was relatively uniform across the entire state with the exception of Boone County. This is due to being able to advertise the survey to my home county more easily than anywhere else in the state. One hundred and four people completed the survey, of this group, forty-three were from Boone County. However, the survey was still able to reach most quadrants of the state, as there are responses from some of the most northern, southern, eastern, and western parts of the state.

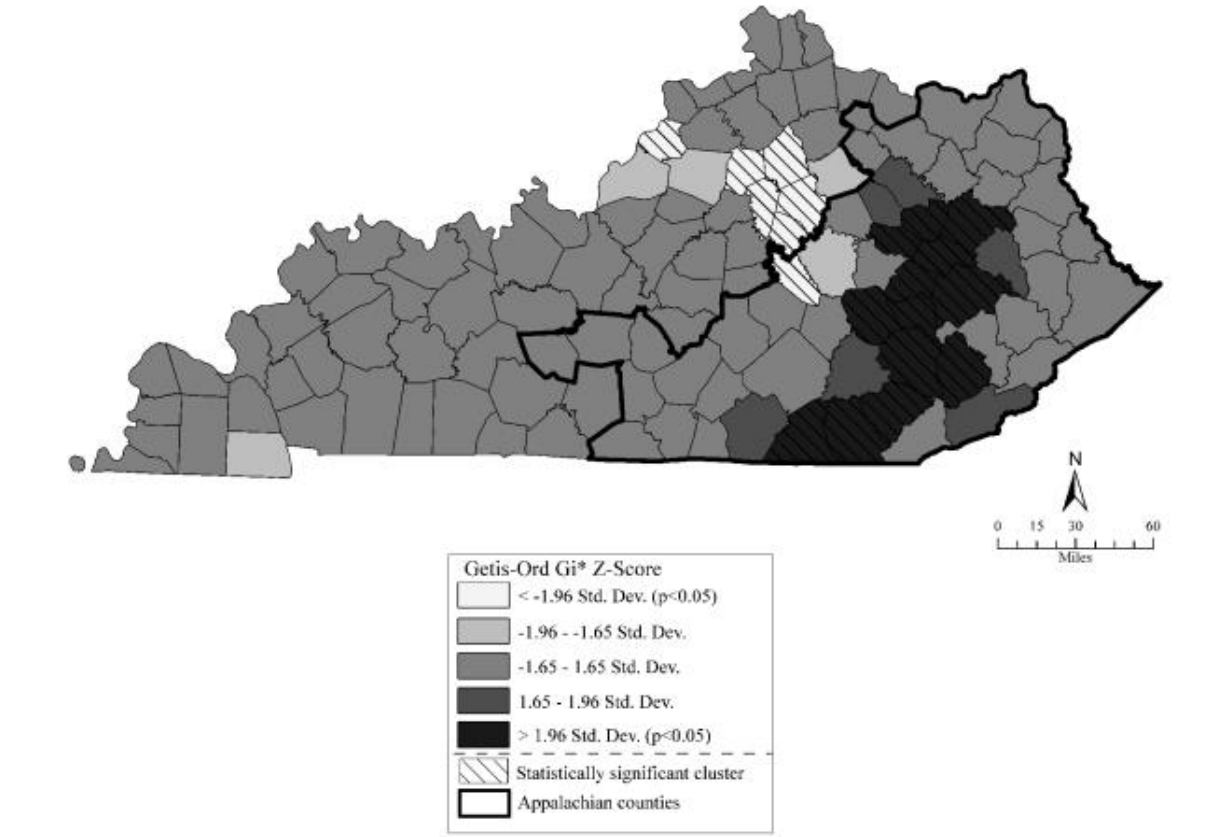
Figure 1.



This map illustrates the distribution of survey participants throughout Kentucky and concentrations per state.

This map was created with the intention of comparing it to a similar study examining the oral health disparities in Kentucky. According to a Saman, et al, "an untransformed choropleth map of Kentucky highlights the concentration of darker counties—those with a higher percentage of adults with six or more teeth removed—in the Appalachian region. Nine of the 10 counties in the bottom oral health class—51%–65%—are located in the Appalachian region." (Saman, et al. 2011). This is in regards to a map they created to illustrate the distribution and concentrations of Kentucky adults with six or more permanent teeth removed.

Figure 2.

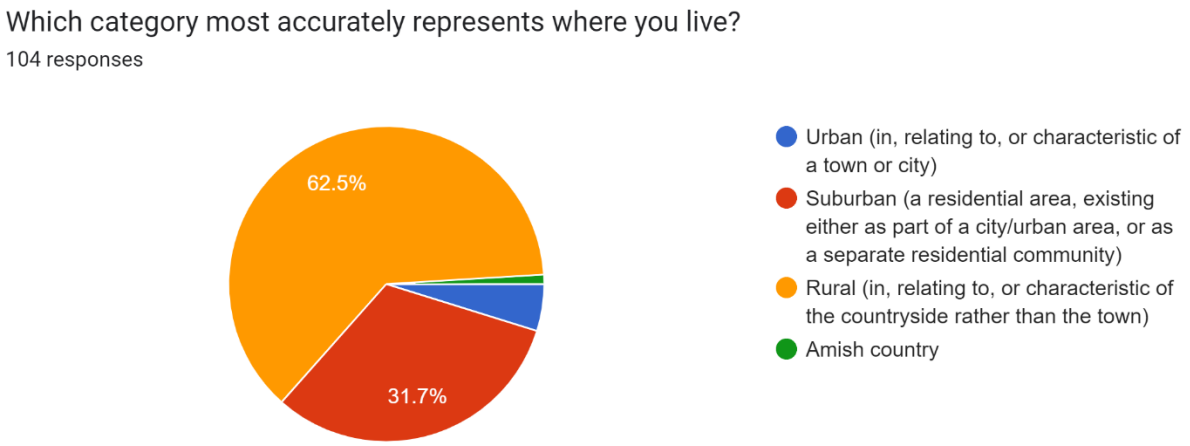


This figure is a map of Kentucky showing the distribution of Kentucky adults with six or more permanent teeth removed. (Saman, et al. 2011)

As can be noted based on the map above, there is a high concentration of Kentucky adults with six or more adult teeth removed located in the center of the Appalachian counties. When creating my map based on my collected data, my intentions were to compare the distribution of the survey sample with the counties highlighted in the map created by Saman et al. Within the survey sample, some respondents came from five of the thirteen different counties that make up this area. This was a good result to see because one of the main goals of the survey was to

examine all aspects of the state and get the most accurate reading possible. This question was paired with a question asking if they live in a rural, suburban, or urban area.

Figure 3.



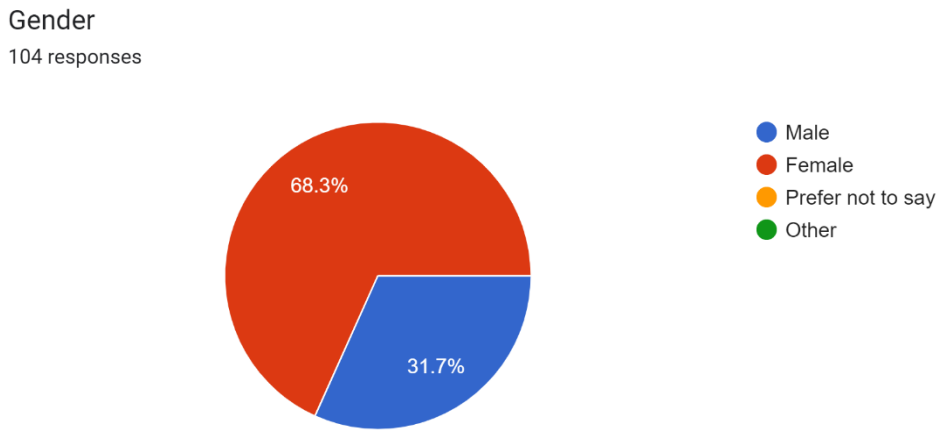
The pie chart above shows the percentages of survey participants place of residence.

The results of this question showed that a majority of the survey participants reside in a rural area, with a percentage of 62.5%. Suburban residents were the next most common with 31.7% and urban was represented the least by participants. One participant wrote in “Amish Country”, which can also be categorized as rural. One study by Dawkins et al, examines the rate of dental caries in children through a mobile dental clinic in South central Kentucky. The results of their study found that there was a higher rate of untreated dental caries in children that come from rural areas. (Dawkins et al. 2013). The findings of this experiment are a good tool to use in comparison to the results of my study. However, this study was targeted towards children, which

in accordance to the IRB approval for my designed experiment, were ommitted. However, these results can be used as reference to the data collected from the adults by my study.

The gender distribution of the survey sample was not as expected. 71 participants, or 68.3% of the sample, were female. The remaining 33 participants, 31.7% of the sample were male. Although this ratio was not very even, it is still a demographic that is interesting to compare to other sources.

Figure 4.



The pie chart above demonstrates the gender distribution from the survey sample.

According to the National Institute of Dental and Craniofacial Research, approximately 92% of women have some sort of dental caries compared to approximately only 90% of men. (U.S. Department of Health and Human Services, 2019). This source examines the percentages of dental caries in gender across the entire United States. If this study found that women were more likely to have dental caries, then the survey sample with a majority of women would most likely

have a higher occurrence of dental caries. With this knowledge, one would assume that the sample that completed this survey would have around a 92% average rate of dental caries, however, this sample is from Kentucky only and may not represent the entire United States statistics.

Table 1.

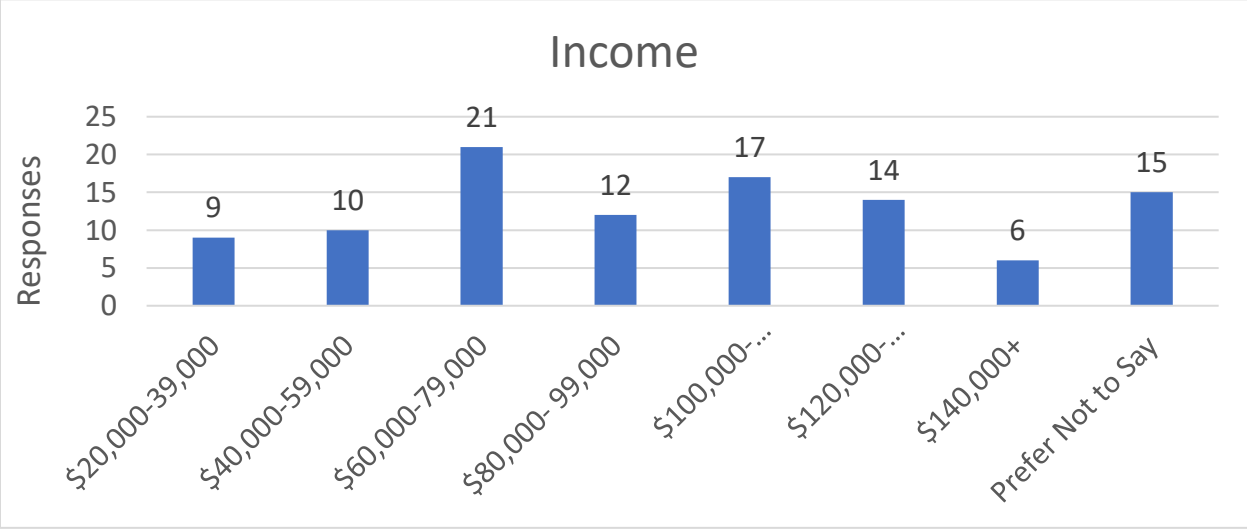
Characteristic	Percent with caries, missing, or filled permanent teeth
Age	
20 to 34 years	85.58
35 to 49 years	94.30
50 to 64 years	95.62
Sex	
Male	90.57
Female	92.66
Race and Ethnicity	
White, non-Hispanic	93.49
Black, non-Hispanic	87.51
Mexican American	82.97

Poverty Status *(Income compared to Federal Poverty Level)*	
Less than 100%	88.69
100% to 199%	88.91
Greater than 200%	93.05
Education	
Less than High School	85.93
High School	92.38
More than High School	92.91
Smoking History	
Current Smoker	91.48
Former Smoker	92.83
Never Smoked	91.19
Overall	**91.63**

Table 1 is from the National Institute of Dental and Craniofacial Research and it examines the percentages of dental caries in relation to other social demographics.

The surveyed sample also had an irregularity regarding income. The respondents had a wide range of income, but a fair distribution across that range. The average yearly household income of this survey sample was approximately $78,876. This is something notable due to the census data on Kentucky income. According to the US Census data from 2016-2020, the average household income in the state of Kentucky was approximately $52,238 (United States Census Bureau, 2021). This data is worth noting because the sample group doesn't fall into the parameters that would represent the average of the state. Although there is only a 2-year gap between the collection of the census data to the thesis survey data, it is not so far off to assume the difference in income statistics was a uniform change.

Figure 5.

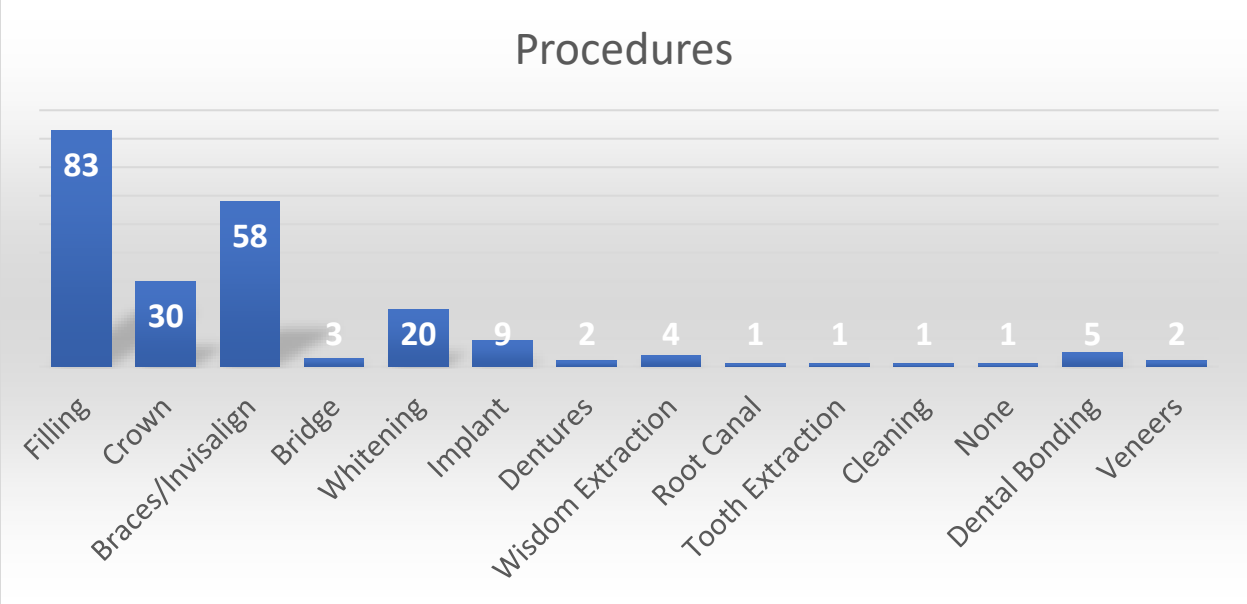


This chart above displays the range of income per household of the survey participants.

The sample group was questioned about the types of dental procedures they have received as well. The most common procedure among this survey sample was fillings, with braces or Invisalign the second most common. However, only eighty-three of the one hundred

four participants had fillings. Fillings are one of the more basic procedures to have completed at a dentist office, and people are more likely to have a filling for a cavity rather than going straight into a crown or bridge. With this information, we can see that our percentage of people who have had dental caries is around 79.8%, and then had this decay treated by filling.

Figure 6.

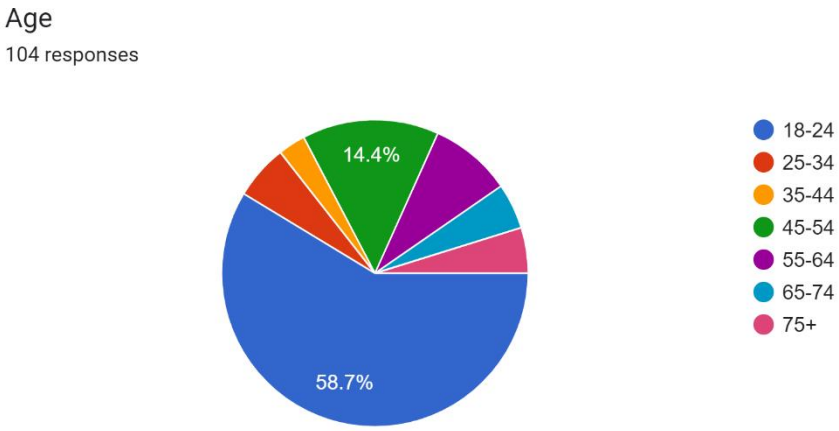


This bar graph illustrates the occurrences of dental procedures the survey participants have received.

This data can be compared with the average age of the sample group and also that from the National Institute of Dental and Craniofacial Research. The average age of the sample was approximately 31 years old. According to the National Institute of Dental and Craniofacial Research, U.S. adults aged 20-34 years had an 85.58% occurrence of dental carries in that age range. Combined with the previous data, we saw that approximately 79.8% of the survey sample

had some type of dental caries treated by fillings. This in comparison with the U.S. average for that age range shows that this Kentucky sample has better oral health than the national average.

Figure 7.



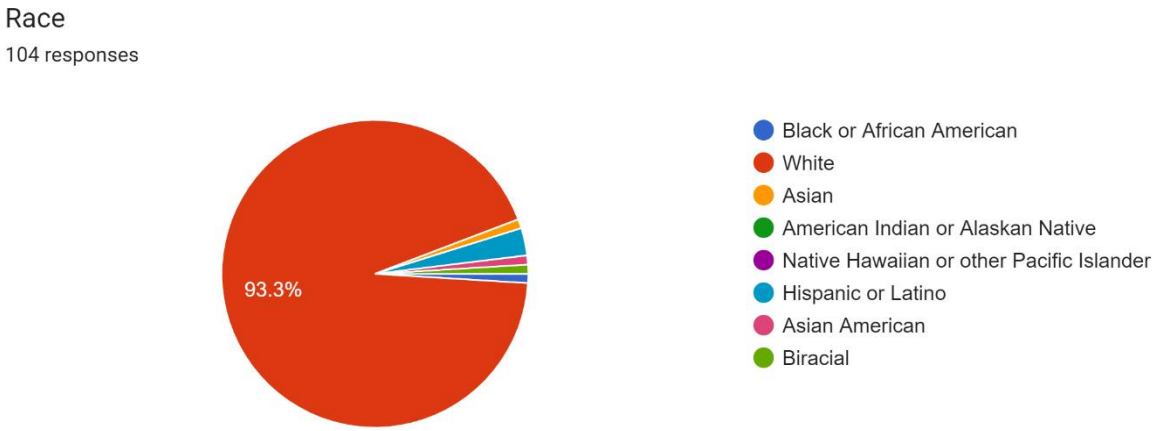
The pie chart indicates the percentages of participants and their age group.

The ages of the participants ranged from 18 years to 75 years and older. The average age sampled was 31, but the highest responding age group was the 18–24-year-old demographic. The uneven distribution of age makes the demographic an interesting trait to examine due to concentration difference in age groups.

The race distribution was homogeneous and did not offer much to the research on that demographic, with 97 of the 104 respondents identified as white. The second highest responding group was the Hispanic or Latino group, with 3 respondents. The remaining four respondents were split evenly among ‘Asian, Asian American, Biracial, and black or African American’. Since there was a lack of even ratios among all of the races, the data could not be accurately compared to the statistics of the state in this demographic, however, the high proportion of white

respondents could have some information to be compared or derived. According to Fisher et al, non Hispanic whites were more likely to visit the dentist and utilize dental insurance compared to non Hispanic blacks (Fisher et al, 2004). This study was completed in the state of Florida to examine the differences in the dental insurance, utilization and effect of care on the quality of life. Since it found that non Hispanic white people are more likely to visit the dentist and have some dental coverage, it may explain the higher rates of dental caries in white people compared to black people. The National Institute of Dental and Craniofacial research found that white people have nearly a 5% higher occurrence of dental carries than black people, and a nearly 11% higher occurrence than Mexican Americans. This information may due to the frequency and ability of these demographics attendance to dental offices.

Figure 8.

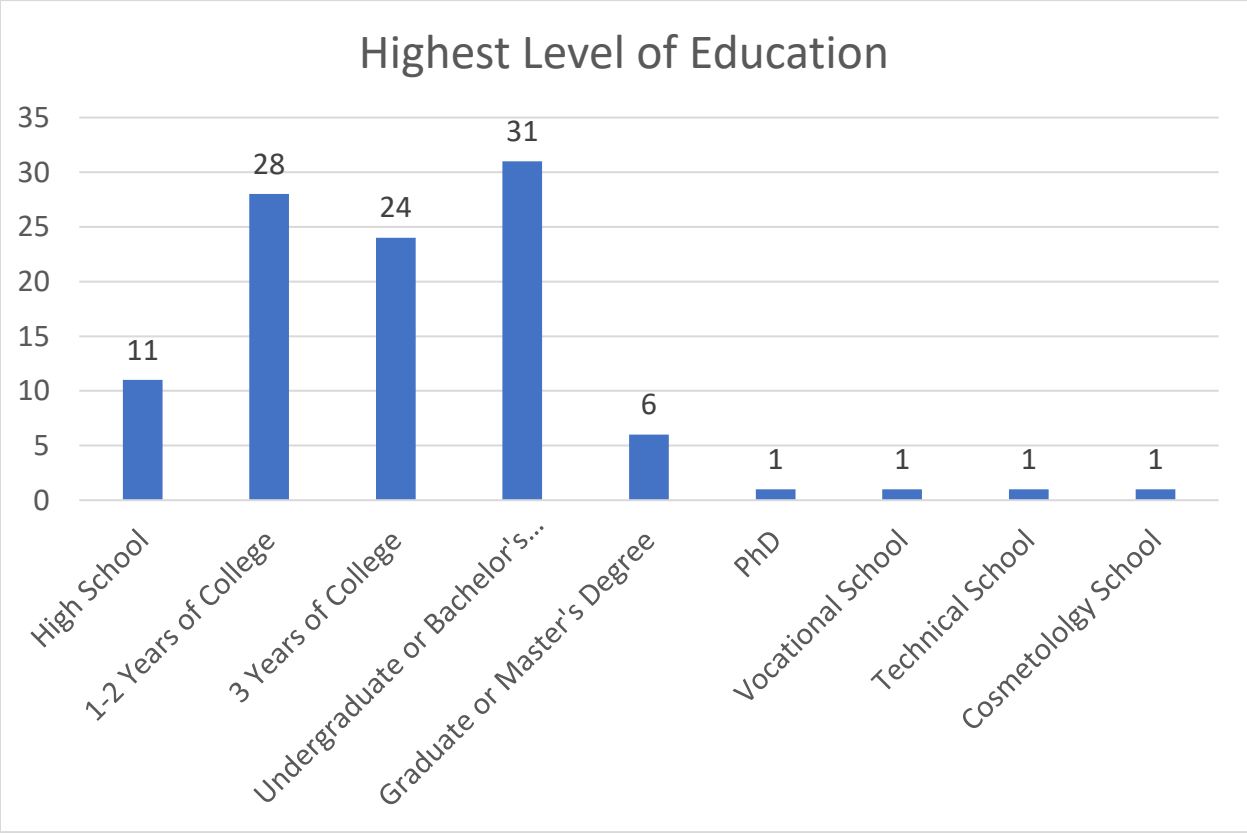


This chart shows the distribution of race among the survey participants.

The participants level of education was also examined in the questions from this survey. Based on stereotypes and assumptions, one may be led to believe that those with lesser education are more prone to dental caries. Based on the results of this survey and other comparative sources, that is not necessarily always the case. According to a study by Paulander et al, there was a direct correlation between those with either and elementary school education or higher. Those with an elementary school education were found to have significantly less healthy tooth structure than those with higher levels of education. (Paulander et al, 2003). This source contrasts with the data found by the National Institute of Dental and Craniofacial Research, which states that those with less than a high school education have approximately an 86% occurrence of dental carries, while those with a high school education or above both occur in around 92% of those demographics. These data from two external sources claim opposite associations with education level. Due to the two-decade gap between the publication of these

sources, there is a chance the data may have flipped and both of the sources were correct at their own time of publication. It is important to consider all these different factors because the trends listed in those may explain results in this survey. The survey results show that a majority of the respondents have higher than a high school education, with only 11 having a maximum of high school education. This demonstrates that our sample should have higher rates of dental caries according to the National Institute of Dental and Craniofacial research, but it has lower, thus illustrating the sample being lower than the national average.

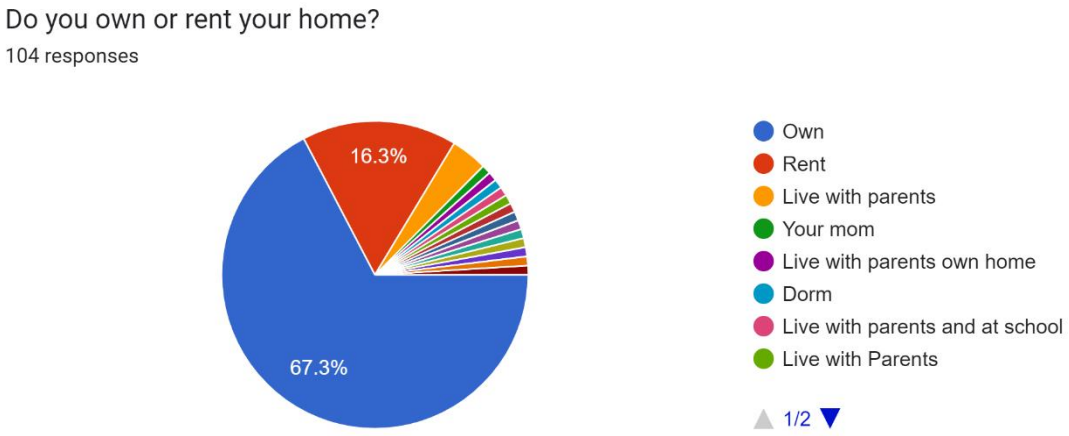
Figure 9.



This figure demonstrates the range of education levels of the survey sample.

Survey participants were questioned on the status of their home ownership to see the influence of assets and home ownership on the rates of dental health. Approximately 63% of the respondents own their home, while around 16% rent. The remaining participants responded with some iteration of living with their parents since such a large number of respondents were in the 18-24 age group. Since those that responded by living with their parents, we are unable to use this data to its fullest capacity because we cannot assume whether their parents own or rent their homes, however, it is important to note that this statistic is extremely close to the U.S. census data on Kentucky home ownership. According to the U.S. census, 63.6 percent of Kentuckians own their homes. With this information, the sample size has one demographic that aligns them with the averages of the official government data.

Figure 10.



The pie chart above shows the variety of home ownerships status of the survey sample.

Whilst conducting this research, it was important to determine the percentages of participants that had dental coverage or not. The survey asked participants if they had dental

coverage, and if so, how it was provided. Our results determined that 83 of the 104 participants had dental coverage, 20 reported no coverage, and 1 responded with “unknown”. It was interesting to note that 86 people responded to the question regarding their type of dental coverage, when only 83 previously reported having dental insurance. The discrepancy noted here may be answered by 3 of the respondents claiming their parents cover their dental insurance. Those that did report having some sort of dental insurance listed employer/company coverage as the most common choice, with 58 of the 83 insured respondents falling in this category. This was followed by private coverage with 13, government/VA with 11, and one respondent that answered unsure, which could possibly align with the one respondent that chose “other” when answering if they had insurance.

Figure 11.

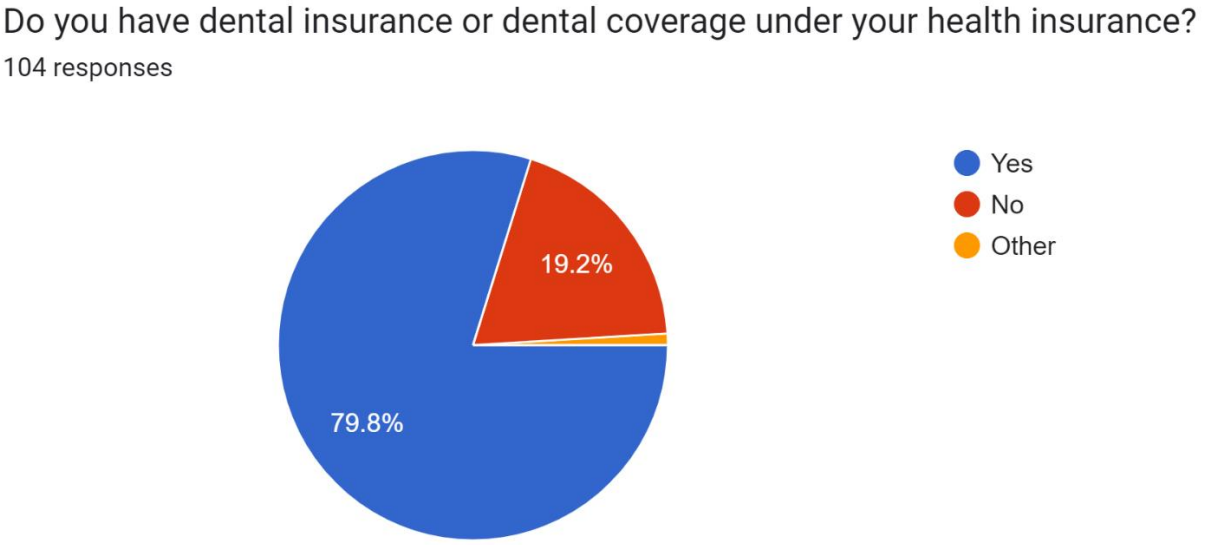
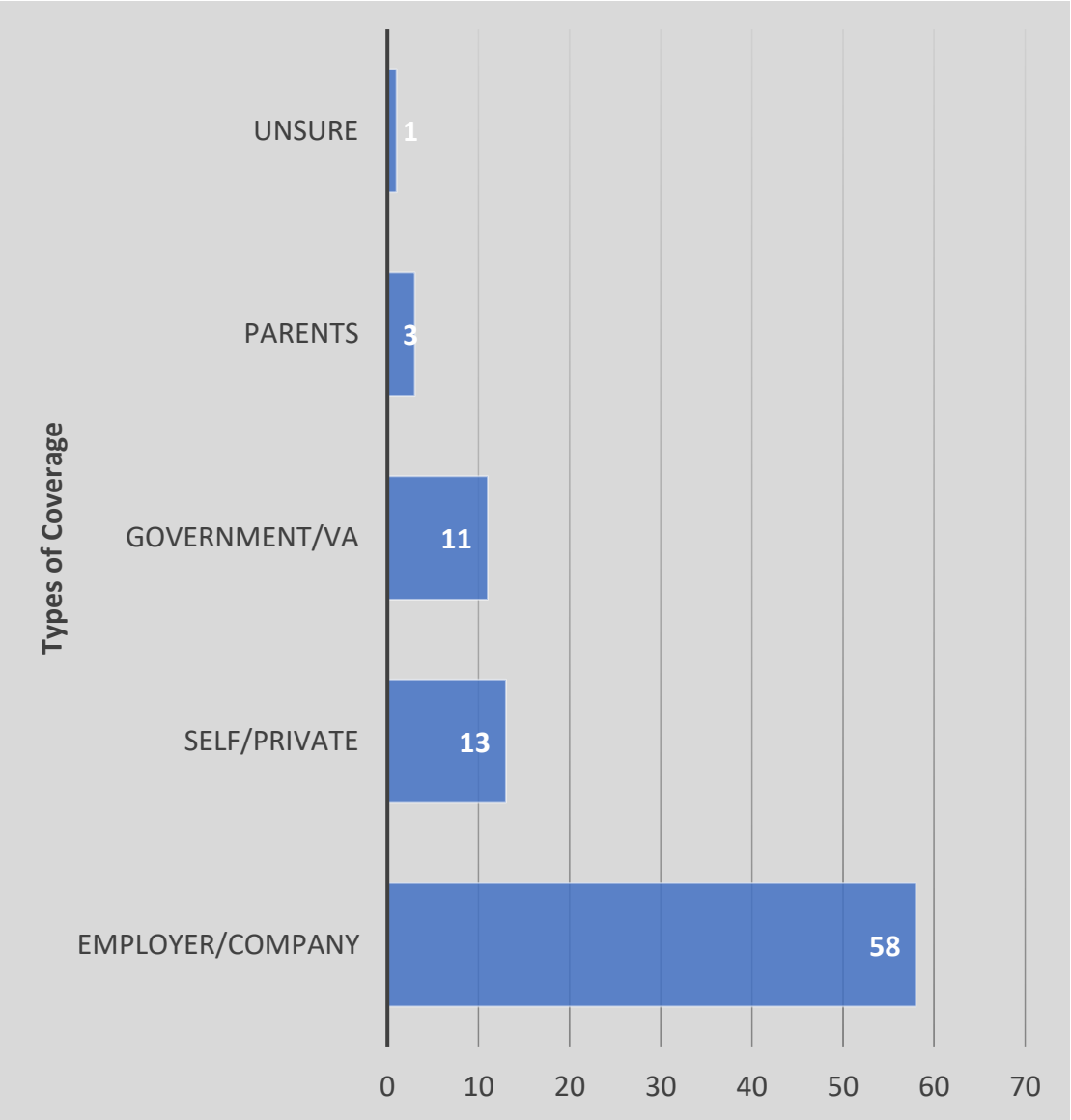


Figure 11 shows the ratio of survey participants with dental insurance compared to those without dental insurance.

Figure 12.



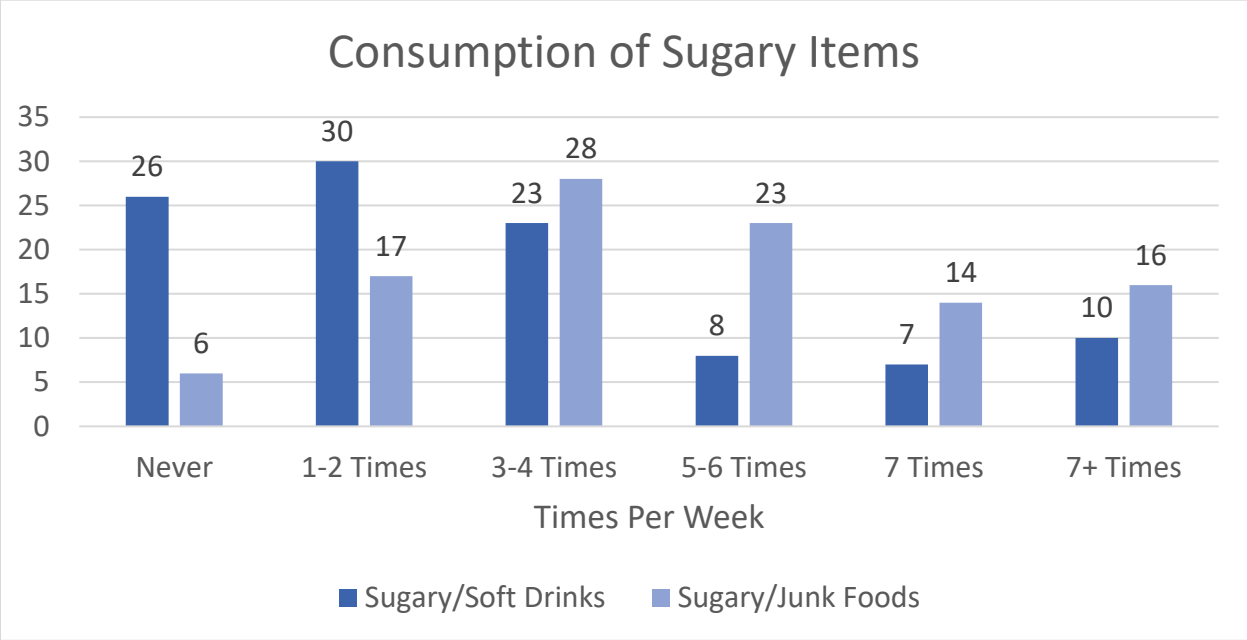
This chart shows what provides the dental coverage of the survey participants.

With nearly 80% of the entire sample reporting some sort of dental coverage, this may explain why the sample has lower rates of dental caries than the national average. However, those that reported having no dental insurance had the option to list the reason(s) as to why, and 16 of the

20 uninsured participants chose to respond. Half of the uninsured group (8) listed expenses as the number one reason for not having dental insurance, this was followed by those that did not have it in their retirement package, and then paying out of pocket. One outlier from this whole data set was the respondent that answered by claiming they have dentures and have had them since youth. They may not visit the dentist as frequently or require insurance since they have no live tooth structure and maintain their dentures without the need for replacement. The data from these questions illustrates that around one in five people in the survey group does not have insurance, which may lead increased dental caries in the future.

Our study also examined the consumption of sugary food/drink items throughout the week to see if there was a significant correlation between the dental procedures reported and amount consumed. The data revealed an interesting trend between the consumption of sugary foods versus sugary drinks. Soft drinks are found to be more likely to increase risk of developing dental caries because of their liquid nature, sugary/junk foods also contribute to dental caries as well, just not as severe. According to a pediatric dental study by Majewski, consumption of these sugary drinks makes adolescents much more susceptible to developing dental caries in the future. (Majewski, 2001).

Figure 13.



This bar graph portrays the consumption of sugary/soft drinks and sugary/junk foods throughout the week of the survey participants.

This graph created by the data collected from my survey shows the rates of consumption of sugary food and drink items by the sample. A majority of the sample is more likely to completely or nearly cut out all soft drinks or sugary drinks from their weekly intake, rather than sugary foods or junk foods. The ratios for all consumption rates were all nearly opposite with the exception of 3-4 times a week. There were only a 5 respondent difference between those that consume sugary drinks to sugary foods 3-4 times a week. As the amount consumed increases, the amount of soft drink respondents decreases while the amount of junk food respondents increases for the most part. It is worth noting that there is a small inflection towards the end with those that consume both more than once daily occur more often than those that only consume once daily. This data is still useful in the study and can be used for a variety of comparisons, but the large

amount of people restraining their sugary drink intake to 1-2 times a week or never is good data to see. This shows that there is less exposure to substances that increase risks of dental caries.

The sample was surveyed about their smoking, vaping, smokeless tobacco, and drinking habits as well, since these are all contributors to poor dental health. According to Lipsky et al, oral cancers can be largely attributed to factors such as increased tobacco usage and heavier use of alcohol. (Lipsky, et al. 2021) However, this sample did not have a large number of respondents that participate in these practices involving smoking or smokeless tobacco. Only 6 of the 104 participants reported smoking, vaping, or using smokeless tobacco.

Figure 14.

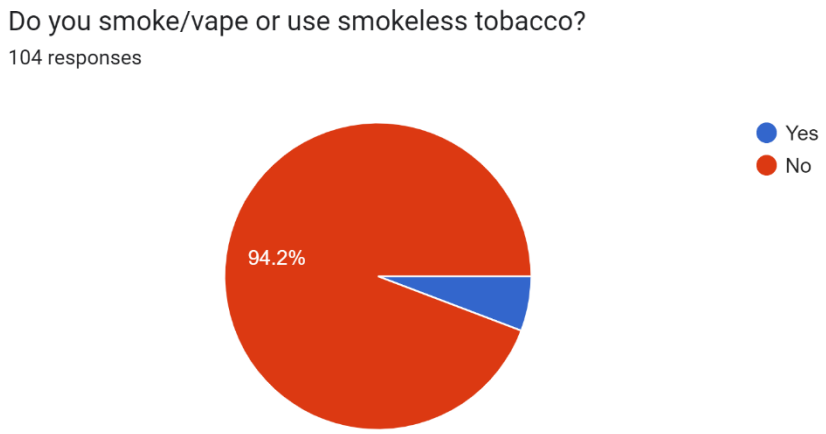
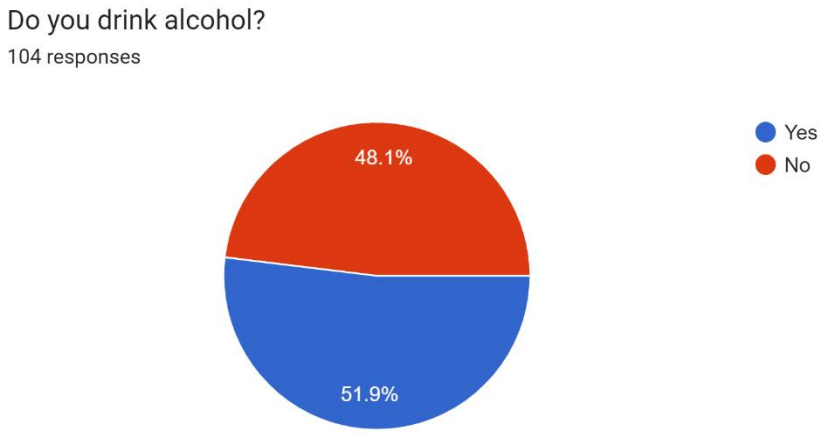


Figure 14 exhibits the percentage of survey participants that use tobacco or nicotine products to those who do not.

However, the ratio of those that drank alcoholic beverages was more evenly distributed. The survey did not question on the amount of these substances consumed weekly. The ratio of survey respondents that drink alcohol was 54 that do drink, and 50 that do not drink alcoholic beverages.

Figure 15.



The pie chart above shows the ratio of survey participants that do drink alcohol and do not drink alcohol.

The data provided on the alcohol consumption gives a little more insight on its affect on dental health since it is more evenly distributed than the tobacco demographic.

Due to the nature of the survey, the participants were also asked to provide how often they brush and or floss. A study by de Jong Lenters and colleagues states that tooth brushing with fluoride toothpaste in adolescents is a key recommendation in evidence based guidelines for dental caries prevention. (de Jong et al. 2019). The frequency of brushing teeth is recommended to be at least two times daily, around 2/3 of the sample meet the minimum requirements of healthy brushing. However, around 1/4 of this sample brushes only once daily, which is below the recommended amount. 7 respondents reported brushing their teeth 3 or more times daily. One respondent did answer that they never brush their teeth. This can come as an alarm, but also

could mean a number of different things. The first of which is just someone who does not brush their teeth ever. On the other hand, this may be the respondent that mentioned having dentures since their youth, and they don't clean their dentures in the same ways as normal teeth. In any sense, this is an interesting statistic that can be viewed in a number of ways and may contribute towards skewing data.

Figure 16.

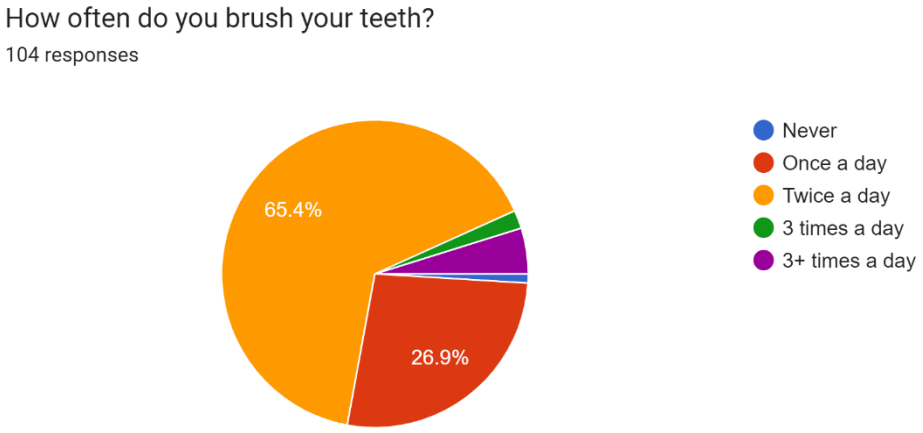
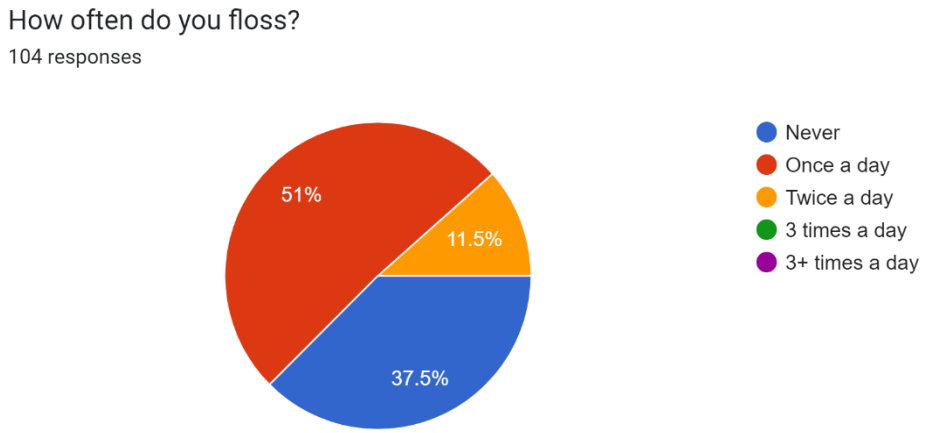


Figure 16 reveals the ratio of survey participants and their habits of tooth brushing.

When surveyed about flossing, even less participants floss regularly. "Using floss or interdental brushes in addition to toothbrushing may reduce gingivitis or plaque, or both, more than toothbrushing alone." (Worthington, et al. 2019). Flossing allows a person to remove the hard-to-reach plaque and reduce gingivitis. The increased rate of flossing reduces risks of dental caries and improves overall oral health.

Figure 17.



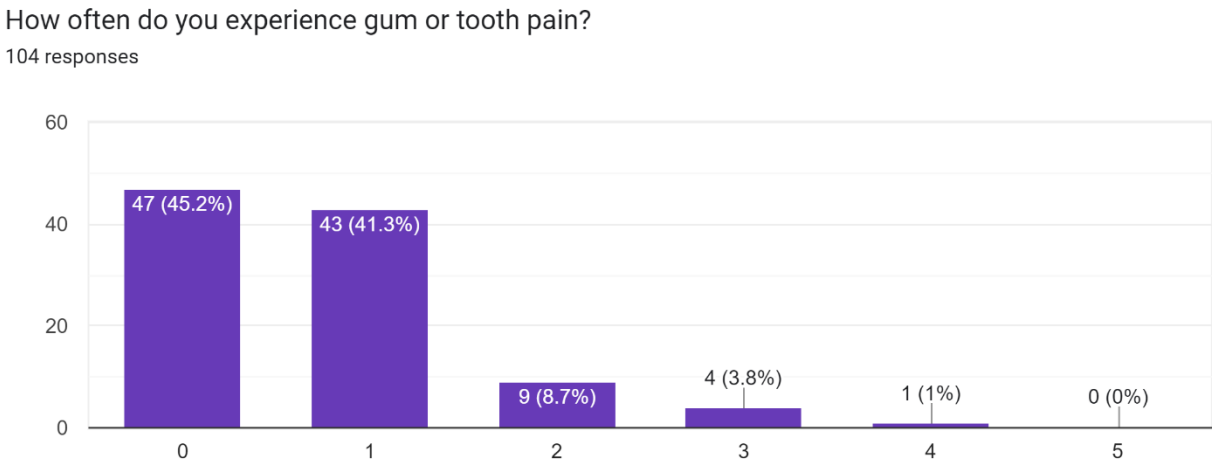
This pie chart displays the daily flossing habits of the survey participants.

This chart shows that just over half of the sample, 53, flosses once a day, with only 12 flossing twice a day. This leaves just over 1 in 3 survey participants not flossing whatsoever. This data may not be directly correlated with the rate of dental caries in this sample, perhaps due to the low rates of soft drink and tobacco consumption.

The survey also asked how often the participants experienced any gum or tooth pain, and if so, to rate it on a scale from 0-5, zero meaning never and five meaning regularly. Most of the patients responded with little to no tooth pain, and a majority of those who did scale their pain were on the lower end. There may be some skewed results for these questions due to the discrepancies in the amounts of responses though. 57 participants reported some occurrence of tooth or gum pain at different intervals. 71 participants scaled the severity of their oral pain. There is a 14-response discrepancy between these two questions, but for the sake of this study, we will take the data from the scale of pain to be accurate. 53 of the 71 participants that reported

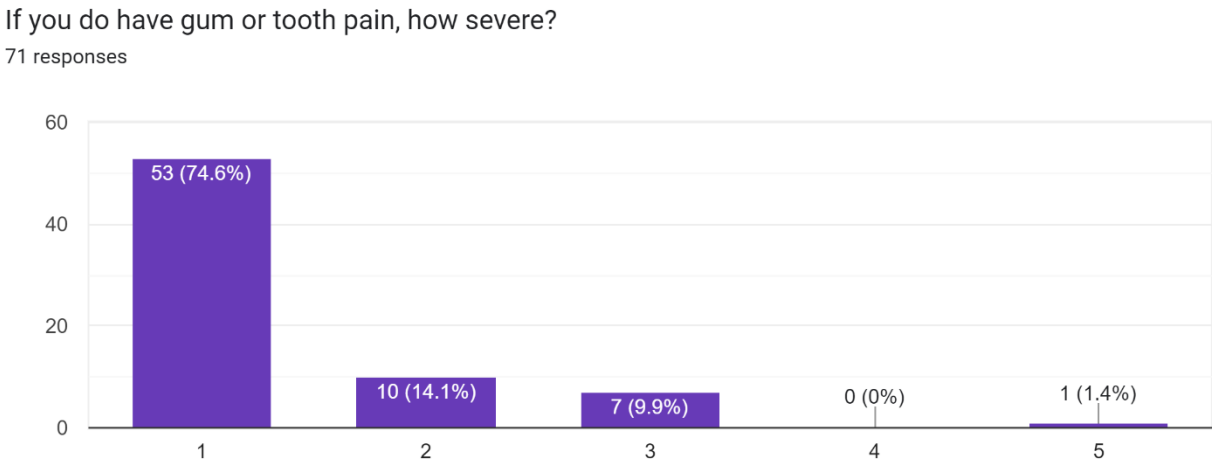
pain reported the lowest scale of pain listed, only 10 reported two as their severity of pain. 7 reported 3 as the severity of pain, and one participant reported 5 as having the worst tooth or gum pain on the scale. This can be a result of untreated dental caries or other underlying faults.

Figure 18.



This bar graph indicates the frequency of gum or tooth pain among the participants.

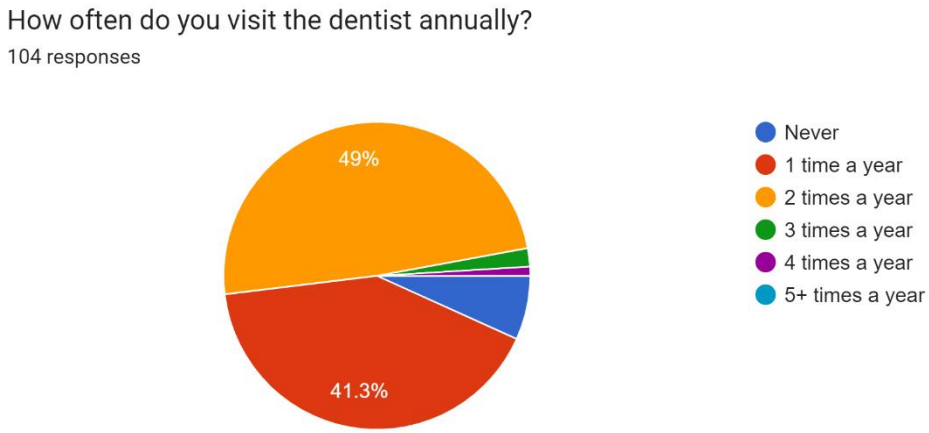
Figure 19.



The bar graph above indicates the level of tooth or gum pain severity in the survey respondents.

With this, the survey group was also asked to provide how often they visit the dentist annually. People may only be inclined to visit the dentist if they are in some sort of pain or know they need dental treatment. Those that may not visit the dentist could come from a culmination of different reasons such as fear, not seeing the need, or not having insurance coverage for procedures. A study in Saudi Arabia was done to see the attendance rate of children at a dentist's office. It found that pain was the most common reason for visiting the dentist, followed by education of the children's parents, income, and oral care habits. The rates of sugary food and drink consumption were inversely related, the higher the consumption, the lower the rates of dental visits. (Alhareky & Nazir, 2021).

Figure 20.



This pie chart analyzes the frequency of annual dentist visits of the survey participants.

Nearly half of the survey sample visits the dentist two times annually, with the next largest group visiting once a year. However, there were 7 respondents that reported never going to the dentist. This could be due to lack of insurance, fear, or a number of different reasons, but those that don't visit a dentist regularly may have untreated dental caries that may need examination.

The follow-up question asked if the respondents had a history of poor dental health which was added to the survey to account for potentially receiving a sample that reported a large amount of dental caries. This sample had a little less than 1/4 of the respondents with family history of poor dental health. This poor dental health can be due to genetic or environmental factors, but education on the subject and frequency of visiting the dentist also could play a role in this statistic.

Figure 21.

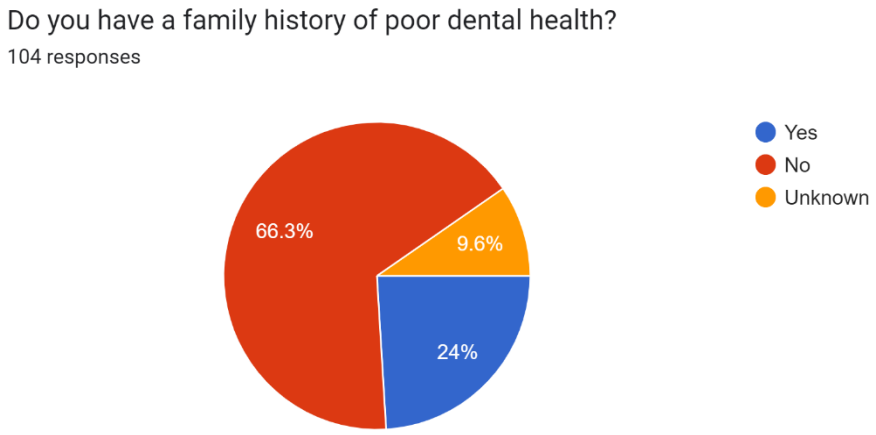
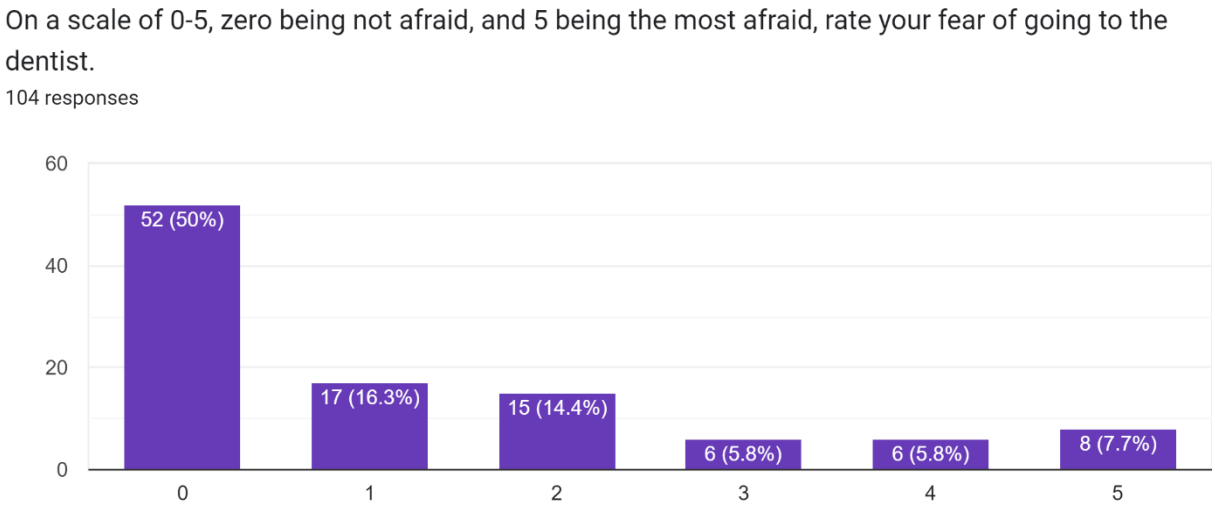


Figure 21 shows the ratio of survey participants with a history of poor dental health to those without a history of poor dental health.

The last question of the survey was to scale the levels of fear participants may have of the dentist. Exactly half of the survey sample reported no fear of the dentist, but the remaining half was spread out across the board. This question was scaled as 0 meaning no fear and 5 being the most afraid. 17 and 15 participants responded 1 and 2 respectively. 6 respondents picked 3 and 4 each, and 8 respondents picked 5, being the most afraid of the dentist.

Figure 22.



This bar graph illustrates the level of fear for the dentist that the survey participants have.

The fear of the dentist could be due to countless reasons, but should be something that is worked on nonetheless. With increasing comfort levels with the dentist, this can increase oral health across the state, and potentially improve the already above average status of this sample group.

Discussion

All the factors discussed in this thesis contribute in some way to the dental health in the state of Kentucky. They all may have different scales in how much they contribute to the oral health but have been demonstrated to be contending factors in oral health in general. The statistics discovered in this survey and thesis can be used to disprove the stereotypes people potentially have on Kentucky oral health and can be used to bring awareness to what the real issues may be affecting dental health. Some of the demographics examined in this thesis also

showed the importance of having a heterogeneous sample for all different qualities. Some results were able to be used and have significant meaning, whereas others were not diverse enough to accurately represent the entirety of the state. With this, the surveyed sample for this study was found to have greater oral health than the national average and contained responses from some of the poorer oral health counties. Although this is good information, the study was not completely perfect and unable to obtain results without the chance of having some skewed data. The questions with potentially skewed data were highlighted during this piece but offered some explanation as to why they may appear as they do. A larger sample size with a wider range of people taking it would make this study a more accurate representation of Kentucky. However, with these limitations, this sample proved to be a diverse group in several different aspects, all while providing unique data from all corridors of the state. The information obtained through this research can be used to help further dental health in the state of Kentucky by highlighting the problems that need to be addressed and furthering education on the subject, and by expanding on the data that has been collected thus far. In closing, the experiment was successful and provided legitimate data to be examined on the subject and can be studied for other research in the field

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