

Parental Oral Hygiene Knowledge: Investigating the Source for Successful Oral Hygiene Behavior in Children

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Research Article

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Posted Date: November 29th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-1048554/v2>

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PARENTAL ORAL HYGIENE KNOWLEDGE: INVESTIGATING THE SOURCE FOR
SUCCESSFUL ORAL HYGIENE BEHAVIOR IN CHILDREN

ABSTRACT

Background

The deleterious effects of dental caries in children can often be arrested if parents are knowledgeable regarding dental treatment. The purpose of this study was to examine the relationship between a parent's level of oral hygiene knowledge and the oral hygiene behaviors of their children ages 7 to 17 in the greater United States.

Methods

The researcher utilized a quantitative descriptive study based on a non-experimental cross-sectional survey design. 103 participants voluntarily responded. To be eligible, participants had to live in the greater United States and have a child between the ages of 7 to 17.

Results

Data analysis was completed using inferential statistics while utilizing the chi-square test of independence as the analytical method. The Chi-Square test was used to determine whether a relationship between the parent's hygiene knowledge and the child's oral hygiene behaviors existed. Results did reveal an association between the variables, a parent's hygiene knowledge and their child's oral health hygiene behaviors upon completion of the chi-square test analysis.

Conclusions

The oral hygiene knowledge of some parents needs to be increased to ensure positive outcomes with their child's oral hygiene behaviors—information about pit and fissure sealants to aid in the prevention of dental caries for their children would be highly advantageous. Additionally, further studies are warranted to address possible limitations of the child and parental socioeconomic issues.

Practical Implications

More schools need to invest in school-based sealant programs to offer parents another alternative to help with the prevention of dental caries in their children.

Key Words

Parental oral hygiene knowledge, child's oral hygiene behaviors, Social Cognitive Theory, Health Belief Model, child's sealants, dental caries

INTRODUCTION

Some younger orthodontic patients display a problem with poor orthodontic compliance and poor oral hygiene health. Since implications suggest the development of oral hygiene habits be implemented and enforced by parents, the onus of good oral hygiene relies heavily on the mother and father of the child. The purpose of this study was to investigate whether there was a difference in oral hygiene behaviors between children who have parents with a higher level of oral hygiene knowledge than those children who have parents with a lower level of oral hygiene knowledge. There should be a greater focus placed on more early dental visits and parent accountability (Bahuguna, Jain, & Khan, 2011). Studies have highlighted the significant influence that parental knowledge of oral health has on dental caries in children; moreover, dental caries among children and a lack of parental oral knowledge has shown an association (Isong, Luff, Perrin, Winickoff, & Ng, 2012; Naidu & Nandlal, 2017). Researchers have found that parents' knowledge of oral dental health plays a vital role in the development of oral hygiene habits in their children (Birant, Koruyucu, Ozcan, & et al., 2020; Zhang, Li, Lo, & Wong, 2020). Additionally, it has been found that a mother's positive behavior regarding oral health during a child's early years significantly influences the oral health behavior of the child (Khoshnevisan, Shariatpanahi, Sadeghipour-Roudsari, Namdari, Niknejad, & Malek-Mohammadi). Some parents

assume that restoring primary teeth is frivolous since the primary teeth are temporary. This sentiment was found in a recent study where 30% of parents with a postgraduate level of education similarly felt that treatment on deciduous teeth would be unnecessary since the teeth would exfoliate on their own and be replaced by a permanent tooth (Srinivas & Jeevanandan, 2019). However, studies have found that 56.3% of mothers were cognizant of the importance of keeping the deciduous teeth in good health (Faheem, Maqsood, & Shaikh, 2018). This research seeks to answer the following question: What is the relationship between a parent's level of oral hygiene knowledge and their child's oral hygiene behaviors in the greater United States?

METHODS

Design

The researcher utilized a quantitative descriptive study based on a non-experimental cross-sectional survey design. Moreover, this study sought to find a relationship between two variables, independent and dependent, after an event had already occurred, *ex post facto*. The independent variable, parental oral hygiene knowledge, was defined as the correct and incorrect understanding of how to achieve oral hygiene success. The dependent variable, children's oral hygiene health, was defined as proper and improper brushing habits and the presence or lack of dental caries.

Population

The target population for this cross-sectional design was selected from a convenience sampling dataset; participants were required to currently reside in the greater United States. The participants were willing parents with children 7- to 17 years of age. After giving consent, the willing parents were asked to provide information about their level of oral hygiene knowledge. Information related to the parent's level of oral hygiene knowledge was obtained from the

survey. Also, the survey obtained information about the oral hygiene behaviors of the participant's 7- to 17-year-old children which represented the dependent variable of this study.

Sampling

This study used single-stage sampling which was designed to allow the researcher to sample elements or people in a population directly. More specifically, the researcher used homogeneous convenience sampling which was a non-probability sampling technique.

Participants

Potential participants received notification about the study in two ways: social media and a flyer. Those individuals who were willing to participate had the option to notify the researcher if they had any additional questions; the researcher sent the potential participant an email that contained a link to the survey that included the consent form. Additionally, the flyer provided a link to the survey as well as a QR code that the participant could scan with their phone. After scanning the QR code, the survey would open, starting with the consent form. The participant had a period of three weeks to complete and sign the electronic information. The researcher ensured that participant consent was obtained and that participants met the required prerequisites to participate in the study.

Instrument

At the onset of the survey, initial questions were asked to address whether the participants qualified to partake in the survey. Those who qualified proceeded with the subsequent questions. Those who didn't qualify were asked to cease with the survey. Additionally, the email included a summary of the study that would be administered electronically. Participants were able to exercise the principles of freedom and autonomy that allowed them to refuse participation or withdraw at their discretion with no recriminations. The

researcher gathered data for this study by utilizing a modified version of two existing survey tools to collect qualitative data from the parents of 7- to 17-year-old children. One of the existing survey tools the researcher utilized to obtain data from parents was designed by the World Health Organization, Oral Health Surveys: Basic Methods 5th Edition (Who | Oral health surveys: basic methods – 5th edition, 2020). Permission to use the survey was requested and granted utilizing the WHO Permissions Request Form found on their website. The survey consisted of 16 questions that were a mixture of Likert-like and open- and closed-ended questions. Also, an additional instrument was used based on a survey conducted in Wuhan. This survey investigated the education levels of parents with either their child's oral health behavior or their oral health knowledge; 8446 families were surveyed. This questionnaire utilized the 12 questions from the Fourth National Oral Survey of China (2015-2016). The researcher culled and melded pertinent information from both surveys to construct one instrument for this study. The researcher noted any changes to the original questions and gave credit to the original authors when necessary. The researcher utilized REDCap (Research Electronic Data Capture), a secure web application that functions to support online data capture for research studies, for building and managing the online survey.

The researcher began the data collection process after receiving IRB approval (Project number 032521-19). Of the one hundred and seventy participants, 167 respondents, or 98.2 percent, responded yes. Moreover, of the one hundred and seventy participants, 3 respondents, or 1.8 percent, responded no. The participants that responded no did not participate in the study.

Analysis

After completion of the online survey, aggregated results were imported into Microsoft Excel and cleaned before being imported into the data analyzer R console. The researcher used

inferential statistics during data analysis. The software utilized by the researcher was the open-source freeware called R Studio. The chi-square test was utilized as an analytical method to seek out possible statistical relationships between experimental and control groups.

RESULTS

Of the one hundred and seventy participants, the complete responses of one hundred and three participants, $n=103$, were recorded. There were different regions within the United States that the participants had the option of choosing to confirm their place of residence. The regions of the United States given for the participants to choose from were West, Midwest, Southwest, Northeast, and Southeast. As noted in Figure 1: Residence, most of the participants, thirty-five percent, resided in the West. In the Midwest, there was 12.6% participation. In the Southwest, 16.5% participation was recorded. In the Northeast, there was a participation total of 18.4% recorded. Lastly, there was 17.5% participation recorded from the Southeast.

The participants were required to have at least one child between the ages of 7- to 17-years old to be considered eligible to partake in the study. Of the 103 eligible participants, sixty-four participants had one qualifying child. Two or more children were recorded for the remaining 39 participants. Eligible participants were asked to state their relationship to the child. Participants were given the option to choose whether they were a biological parent, stepparent, adoptive parent, foster parent, grandparent, or other. Some seventy-nine participants were biological parents. Five of the participants were stepparents. Four participants were adoptive parents. In addition, three participants were foster parents and only one participant was a grandparent; the remaining eleven were recorded as other. The educational level of the mother and father were also inquired. The demographics are detailed in Table 1.

Table 1. Detailed Demographics of Survey Participants (n=103)

| Variables | <i>n</i> | % |
|---|----------|------|
| Residence in the United States (<i>n</i> = 103) | | |
| West | 36 | 35.0 |
| Midwest | 13 | 12.6 |
| Southwest | 17 | 16.5 |
| Northeast | 19 | 18.4 |
| Southeast | 18 | 17.5 |
| Household number of children (<i>n</i> = 103) | | |
| One child | 64 | 62.1 |
| Two or more children | 39 | 37.9 |
| Relationship to child (<i>n</i> = 103) | | |
| Biological parent | 79 | 76.7 |
| Variables | | |
| | <i>n</i> | % |
| Stepparent | 5 | 4.9 |
| Adoptive parent | 4 | 3.9 |
| Foster parent | 3 | 2.9 |
| Grandparent | 1 | 1.0 |
| Other | 11 | 10.7 |
| Mother's highest level of education (<i>n</i> = 103) | | |
| Middle school degree or below | 3 | 2.9 |
| High school diploma | 19 | 18.4 |
| Associates degree | 14 | 13.6 |
| Bachelor's degree | 34 | 33.0 |
| Master's degree or higher | 28 | 27.2 |
| Unsure | 5 | 4.9 |
| Father's highest level of education (<i>n</i> = 103) | | |
| Middle school degree or below | 5 | 4.9 |
| High school diploma | 20 | 19.4 |
| Associates degree | 14 | 13.6 |
| Bachelor's degree | 39 | 37.9 |

| | | |
|---------------------------|----|------|
| Master's degree or higher | 20 | 19.4 |
| Unsure | 5 | 4.9 |

Child's Oral Hygiene Behaviors

To test for a significant association between a parent's oral hygiene knowledge and their child's oral hygiene behaviors, a chi-square test of independence was performed. The assumption was that the sample was randomly drawn from the population and the expected values were at least 5 or greater. The researcher's first hypothesis was: H_0 : (null hypothesis) There is no relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7- to 17-year-old child, are independent. The researcher's second hypothesis was: H_1 : (alternative hypothesis) There is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7- to 17-year-old child, are not independent. In Table 2, the observed values are listed and the expected values are listed in parentheses. Since the expected values were at least 5, the assumption of the chi-square test of independence was met.

Table 2. Child's Oral Hygiene Behaviors (n=103)

| | Dental visit past 12 months | Child brushes own teeth | Child uses toothpaste | Must remind child to brush | Row totals |
|---------------------|--------------------------------|----------------------------|--------------------------|-------------------------------|---------------|
| Child w/good OH* | 74 (78.75) | 86 (78.75) | 97 (82.76) | 62 (78.75) | 319 |
| Child w/poor OH | 24 (19.25) | 12 (19.25) | 6 (20.24) | 36 (19.25) | 78 |
| Column Totals | 98 | 98 | 103 | 98 | 397 |

* OH = Oral Hygiene

After the observed and expected totals were tabulated, the researcher performed a Pearson's Chi-squared test utilizing the quantitative software R. The Pearson's Chi-square test rendered the following values: $X^2 = 35.447$, $df = 3$, $p\text{-value} = 9.803e-08$. Since the p -value of $9.830e-08$ is less than the 0.05 significance level, the null hypothesis was rejected. Therefore, since the two variables being independent were rejected, the alternative hypothesis, there is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child, was accepted.

The researcher sought out to find period prevalence since the proportion of the population exhibited a particular characteristic at a point during a given period of interest, for this study 4 weeks. The prevalence of dental visits in the past 12 months among children with good hygiene behaviors was 75.5% as opposed to children with poor hygiene behaviors which was 24.5%. Moreover, the prevalence of children with good hygiene behaviors that brush their teeth was 87.8% when compared to children with poor oral hygiene which was 12.2%. The prevalence of children with good hygiene behaviors that used toothpaste to brush their teeth was 94.2% in contrast to children with poor hygiene behaviors which was an estimated 5.8%. Lastly, the prevalence of children with good hygiene behaviors that had to be reminded to brush their teeth was 63.3% as opposed to children with poor hygiene behaviors which was 36.7%.

Parent's Hygiene Knowledge

The chi-square test of independence was also applied to the parent's hygiene knowledge section of the instrument. The assumption was that the sample was randomly drawn from the population and the expected values were at least 5 or greater. The researcher's first hypothesis was: H_0 : (null hypothesis) There is no relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child. The two variables, a parent's oral

hygiene knowledge and the oral behaviors of their 7- to 17-year-old child, are independent. The researcher's second hypothesis was: H_1 : (alternative hypothesis) There is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child. The two variables, a parent's oral hygiene knowledge and the oral behaviors of their 7- to 17-year-old child, are not independent. In table 3, the observed values are listed and the expected values are listed in parentheses. Since the expected values were at least 22, the assumption of the chi-square test of independence was met.

Table 3. Parent's Hygiene Knowledge (n=103)

| | Necessary for child to floss | Optional for child to floss | Only brushing necessary for child's good oral hygiene | Necessary for child to get cavity filled | Gingival bleeding normal | Row totals |
|------------------|------------------------------|-----------------------------|---|--|--------------------------|------------|
| Child w/good OH* | 73 (43.22) | 40 (43.22) | 41(43.22) | 38 (36.49) | 14 (40.44) | 206 |
| Child w/poor OH* | 17 (46.78) | 50 (46.78) | 49 (46.78) | 38 (39.51) | 69 (35.87) | 223 |
| Column Totals | 90 | 90 | 90 | 76 | 83 | 429 |

* OH = Oral Hygiene

After the observed and expected totals were tabulated, a Pearson's Chi-squared test was performed within the R software and the following values were rendered: X-squared = 72.553, df = 4, p-value = 6.559e-15. Since the p-value of 6.559e-15 is less than the 0.05 significance level, the null hypothesis was rejected. Therefore, since the two variables being independent were rejected, the alternative hypothesis, there is a relationship between a parent's oral hygiene knowledge and the oral hygiene behaviors of their 7- to 17-year-old child, was accepted.

The researcher also sought out to find period prevalence for the third section of this study. The prevalence of children with good hygiene behaviors that had parents that believed their child needed to floss was 81.1% as opposed to children with poor hygiene behaviors which was 18.9%. Moreover, the prevalence of children with good hygiene behaviors that had parents that believed it was optional for their child to floss was 44.4% when compared to children with poor hygiene behaviors which was 55.6%. The prevalence of children with good hygiene behaviors that had parents that believed only brushing was necessary for their child to have good oral hygiene health was 45.6% in contrast to children with poor hygiene behaviors which was an estimated 54.4%. Furthermore, the prevalence of children with good oral hygiene behaviors with parents that believed their child needed to get their tooth cavity filled was 50% as well as 50% for children with poor oral hygiene behaviors. Lastly, the prevalence of children with good hygiene behaviors that had parents that believed that gingival bleeding was normal when brushing was 16.9% as opposed to children with poor hygiene behaviors which was 83.1%.

DISCUSSION

The results from the study showed that the oral health hygiene behaviors of 7- to 17-year-old children had an association with their parent's oral hygiene knowledge. The data showed that 71.8% of the parents who knew about oral hygiene ensured that their child visited the dentist in the past 12 months. This statistic was significant in that it aligns with the literature that found children with educated parents were also more likely to visit the dental office for routine checkups when compared to children of uneducated parents (Mishra, Pandey, Chopra, & Arora, 2018). Additionally, the data showed that 83.5% of children could brush their teeth. This statistic would infer those parents modeled brushing techniques for their child/children.

Albert Bandura's Social Cognitive Theory (SCT) was utilized to illuminate behavioral interaction between the parent(s) and the child regarding oral hygiene health. A child brushing on their own was indicative of the child employing the six constructs of the Social Cognitive Theory—reciprocal determinism, behavioral capability, observational learning, reinforcements, expectations, and self-efficacy. Consistent with the Social Cognitive Theory, data found that 94.2% of the children used toothpaste to brush their teeth. This statistic would suggest that the child employed some of the components of SCT such as behavioral capability, observational learning, and reciprocal determinism. However, the data showed that 60.2% of children had to be reminded to brush their teeth. This begs the question, why did more than half of the respondent's children fail to continue with the behavior of brushing their teeth? According to the Social Cognitive Theory, the reinforcement construct addresses the likelihood of continuing or discontinuing a behavior based upon internal or external responses to a person's behavior. The literature suggests that oral health-related habits are established and maintained during early childhood (Djordjevic, 2018). Therefore, parents may not be using the proper positive reinforcement techniques to ensure their child brushes their teeth without having to be reminded.

Flossing is a vital part of having good oral hygiene health. The data results showed that 70.9% of the parents thought that their child needed to floss. There was 38.8% percent of parents that felt flossing was optional. Additionally, the data found that only 47.6% of parents thought that their child needed to floss daily. Parents must teach their children that flossing is just as important as brushing. The literature aligns with the data which found that emphasizing parental oral health practices and beliefs can be vital in preventing poor oral hygiene and dental caries (Djordjevic, 2018). This would include the practice of brushing and flossing daily. Moreover,

the literature found that parental knowledge of oral health has a significant influence on dental caries in children (Isong, Luff, Perrin, Winickoff, & Ng, 2012; Naidu & Nandlal, 2017).

The data showed that 36.9% of parents felt that their child needed to have a cavity in a baby tooth restored. Equally, 36.9% of parents felt that their child didn't need to have a cavity in a baby tooth restored. However, it was expected that a higher percentage of parents would have been more aware that baby teeth are important. This expectation was based upon previous literature that found that 97.7% of parents were aware that baby teeth are important (Mahat & Bowen, 2017). Additionally, 28.7% of parents perceived that dental cavities in baby teeth produced long-lasting issues. A parent's perception about cavities in baby teeth aligns with one of the theories within the conceptual framework of this study, the Health Belief Model. The Health Belief Model addresses how an individual must believe in their susceptibility to a disease or condition. Moreover, the individual must also believe that the condition is serious and that there is an opportunity for successful intervention for the condition. Therefore, if the parent does not believe that a cavity in their child's baby tooth is a serious condition, the opportunity for successful intervention for the condition will be negated.

The data showed that 67% of parents felt that gingival bleeding was not normal when brushing teeth. Typically, the gingival will bleed due to improper flossing and brushing. This statistic gives credence to previous studies that suggest using a toothbrush to remove debris from the teeth (Macnab & Mukisa, 2018).

Recommendations for Action

The results of the study showed that some parents are uncertain about what necessitates good oral hygiene behaviors in their children. It is recommended that parents receive educational literature to inform them on how to ensure their children develop good oral hygiene behaviors—

according to data results, oral hygiene behaviors such as frequency of brushing and flossing. Children should brush their teeth a minimum of twice daily to negate the possibility of dental caries (Boustedt, Dahlgren, Twetman, & Roswall, 2020). However, data results revealed that 31.1% of children were brushing once a day and 7.8% of children were brushing 2-6 times a week.

The American Dental Association recommends flossing at least once a day for the removal of plaque between the teeth (Soofi, Karami-Matin, Pasdar, Hamzeh, Moradi-Nazar, Ameri, & Najafi, 2020). The removal of plaque between the teeth will lessen the incidences of caries and help prevent periodontal disease. However, data from this study revealed that 48.5% of parents viewed flossing as optional for their child. Therefore, it would be advantageous for children if their parents receive educational literature on the importance of brushing and flossing for their child. Additionally, oral health education should be integrated into school health programs to help parents with the reinforcement of proper oral health behaviors for their children (Simmer-Beck, Walker, Gadbury-Amyot, Liu, Kelly, & Branson, 2015). School nurses and teachers can help to promote good oral health behaviors by displaying dental health posters in various locations throughout the school, especially in the classroom and cafeteria. School nurses and teachers should also work with school administrators and parents to decide on which healthy foods and drinks should be made accessible in school vending machines. Teachers should emphasize oral health in health class. For instance, teachers can stress the importance of making healthy food and drink choices and model the proper way to brush. Modeling how to floss may pose a challenge for teachers and children, so a video showing children how to floss their teeth may suffice.

In addition, it is recommended that schools invest in school-based sealant programs to help prevent dental caries (Simmer-Beck, Walker, Gadbury-Amyot, Liu, Kelly, & Branson, 2015; Williams, Rogo, Gurenlian, & Portillo, 2018). This recommendation is based on the literature of this study and survey data. While the application of sealants helps to reduce caries, only 29.1% of parents had ever heard of pit and fissure sealants as noted in Figure 2: Sealants.

It appears that parents are not fully aware of the benefits of getting sealants on their child's teeth. This is a preventative measure that is beneficial for the child as it will prevent unwarranted cavities that could lead to pain and missed days in school (Griffin, 2016; Mark, 2016). Also, the researcher recommends parents invest in motivational devices to encourage younger children to brush for an appropriate amount of time, a minimum of two minutes. For example, a two-minute egg timer can be used to help the child to develop consistency in the amount of time they allot for brushing. Additionally, some electric toothbrushes play music to help encourage the child to brush. The researcher also suggests that parents monitor their child's brushing to determine the efficacy of the child's brushing technique. As an added device, disclosing tablets can be used to show the child the areas of the teeth that need further attention. Disclosing tablets are safe tablets that the child chews and it temporarily stains plaque left on the teeth due to inadequate brushing. The highlighted areas are removed once the child brushes again and an additional tablet can be used to ensure the teeth have been thoroughly cleaned.

Recommendations for Further Study

There are areas in this research study that need further investigation. Data from this study showed that 11.7% of children did not brush their teeth. Based upon the research alone, this statistic might seem unusual since it is assumed that children between the ages of 7 to 17 are expected to know how to brush their teeth. However, there could be various reasons for this

statistic. The child could have a physical disability that prevents them from brushing their teeth. Moreover, the child could have a cognitive impairment that prevents them from brushing their teeth. Also, the respondent could have answered the question incorrectly on purpose or by accident. Therefore, it is suggested to further this study by including a section that investigates whether the child has any limitations in their ability to perform their oral hygiene behaviors.

Another area of concern that needs further investigation is the child's accessibility to dental offices. The data from the research highlighted that 23.3% of children had not visited the dentist in the past 12 months. These results could suggest that socioeconomic factors could play a factor in children not visiting the dentist. For instance, a child's family may live in an area of town that lacks dental offices. Moreover, the child's family may not have a vehicle for transportation and may not live near a bus line to transport them to a dental office. Additionally, the child may not have dental insurance or the parent may not be able to afford to go to the dentist. While these examples are speculative, they are valid concerns that need further investigation to better understand equitable access to dental hygiene resources. Therefore, it is suggested to build upon this study by investigating the socioeconomic status of the parent(s).

There are limitations to the Social Cognitive Theory. The SCT does not emphasize emotion or motivation other than relying on past experiences. Moreover, the theory assumes that changes in the person will be based upon changes in the environment. The theory can also be broad-reaching and tend to disregard biological and hormonal tendencies that may influence an individual's behavior.

CONCLUSION

Many of the parents displayed positive oral hygiene knowledge regarding their child's oral hygiene behaviors. This study showed that there are areas that some parents need to improve

to ensure the success of their child's oral hygiene behaviors. However, the areas that need improvement could be targeted better if the study were able to distinguish between the parent's gender, ethnicity, race, and educational level. Additionally, other areas of socio-economic status could also help distinguish where researchers could be more direct in their investigation.

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Figures

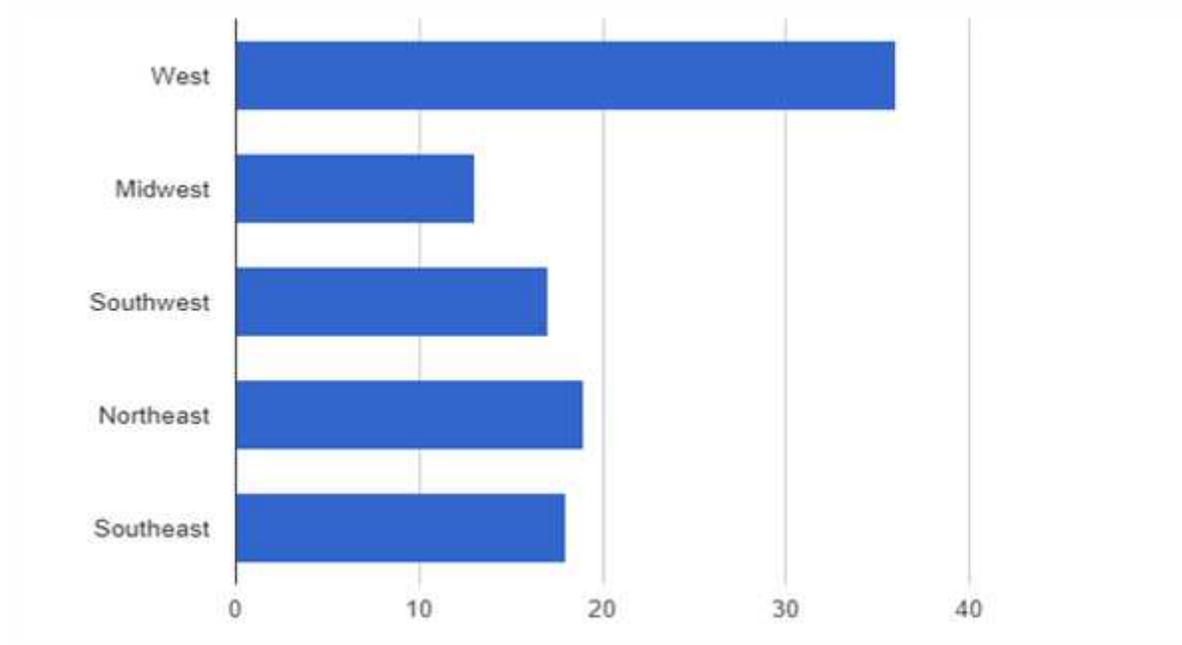


Figure 1

Residence. Counts/frequency: West (36, 35.0%), Midwest (13, 12.6%), Southwest (17, 16.5%), Northeast (19, 18.4%), Southeast (18, 17.5%).

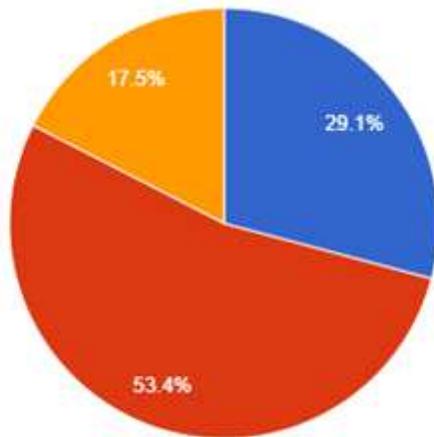


Figure 2

Sealants. Counts/frequency: Yes (30, 29.1%), No (55, 53.4%), Unsure (18, 17.5%).