# Promoting Healthy Smiles Through Education and Prevention

## Preventive Services Program

## 2017-2018

## Final School Year Report

Missouri DHSS Department of Health and Senior Services


**Office of Dental Health**

**health.mo.gov/livingfamilies/oralhealth**

**573-751-5874 or 800-891-7415**

# What is PSP?

The Missouri Oral Health Preventive Services Program (PSP) was created by the Missouri Department of Health and Senior Services (DHSS) to help children with various oral health needs. The program is operated under the guidance of the State Dental Director, and carried out by the Office of Dental Health. The program is coordinated through five regional Oral Health Consultants, all of whom are registered Dental Hygienists. The consultants travel through their regions promoting oral health care at daycares, schools, Head Start preschools, preschools, health clinics, and other settings where there are large numbers of children. The consultants help with distributing supplies for PSP events, all of which are funded through the Office of Dental Health, including:

- Technical Assistance,
- Distributing DHSS Provided Educational Materials,
- Distributing Oral Health Supplies (Toothbrushes, Floss, Toothpaste),
- Providing Oral Health Screening Supplies (Disposable Mouth Mirrors and Screening Forms),
- Fluoride Varnish, Online Tutorial for Health Professionals Who Perform Oral Health Screenings and for Parents and Volunteers Who Apply Fluoride Varnish.

One of the biggest reasons the PSP is successful is due to the community support it receives. If it were not for the engagement and interest from the school nurses and others promoting the program, this program would not be anywhere near the level of success it has gained over the last few years. Local volunteers include dentists and hygienists who provide the screenings and volunteers and parents who help apply the fluoride varnish.

# Why is Oral Health Important?

Oral Health Care is a growing concern in the United States for a number of reasons. Chronic oral health problems can be precursors to more serious heart and lung diseases, symptoms of serious viral infections such as HIV and Herpes, and can also cause more serious health issues such as severe bacterial infections.[1] "The Oral Health in America: A Report of the Surgeon General" defined a four pronged approach to combating oral health issues in America:

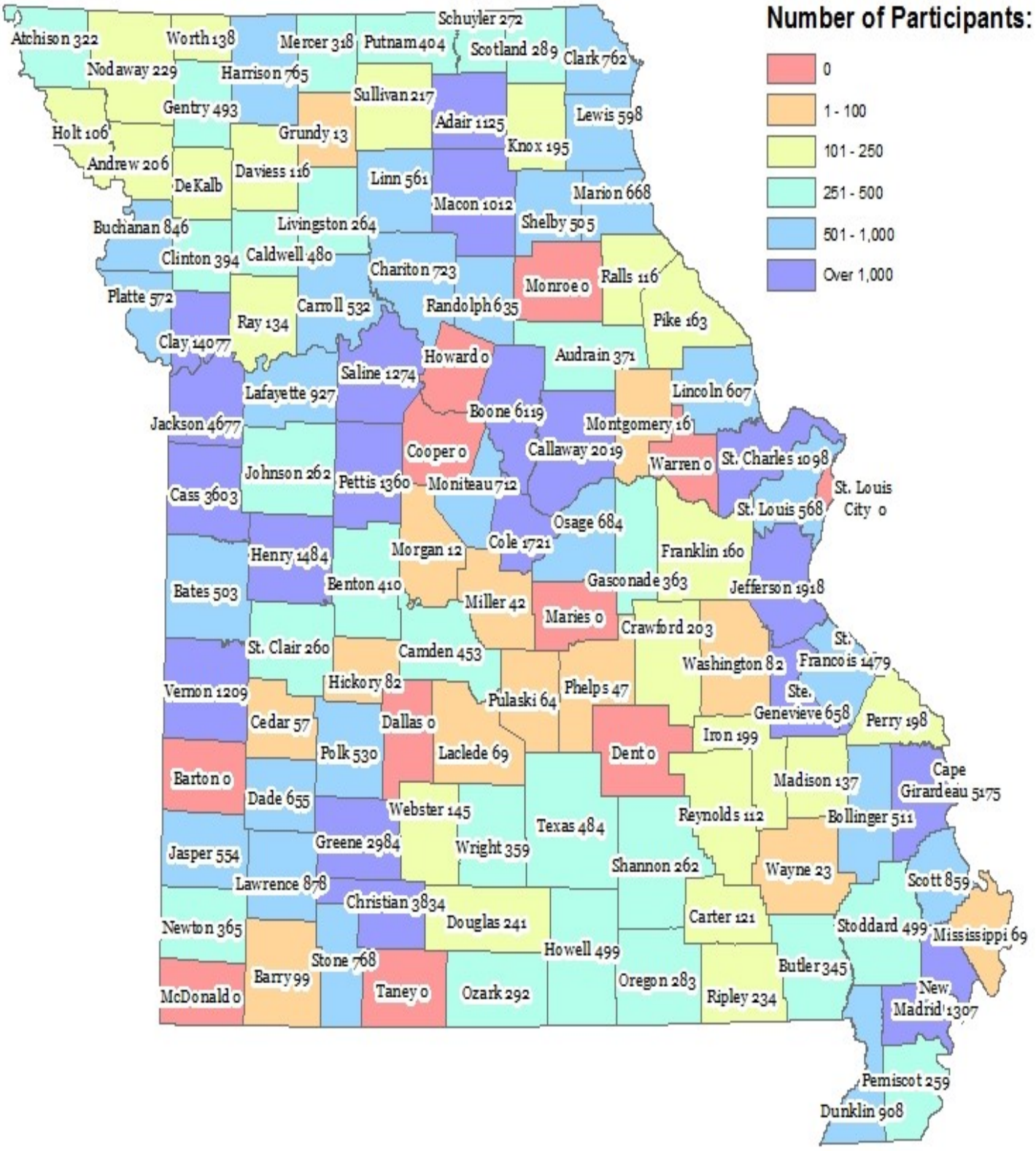
1. Oral health means much more than healthy teeth;
2. Oral health is integral to general health;
3. Safe and effective disease prevention measures exist that everyone can adopt to improve oral health and prevent disease;
4. General health risk factors, such as tobacco use and poor dietary practices, also affect oral and craniofacial health.[1]

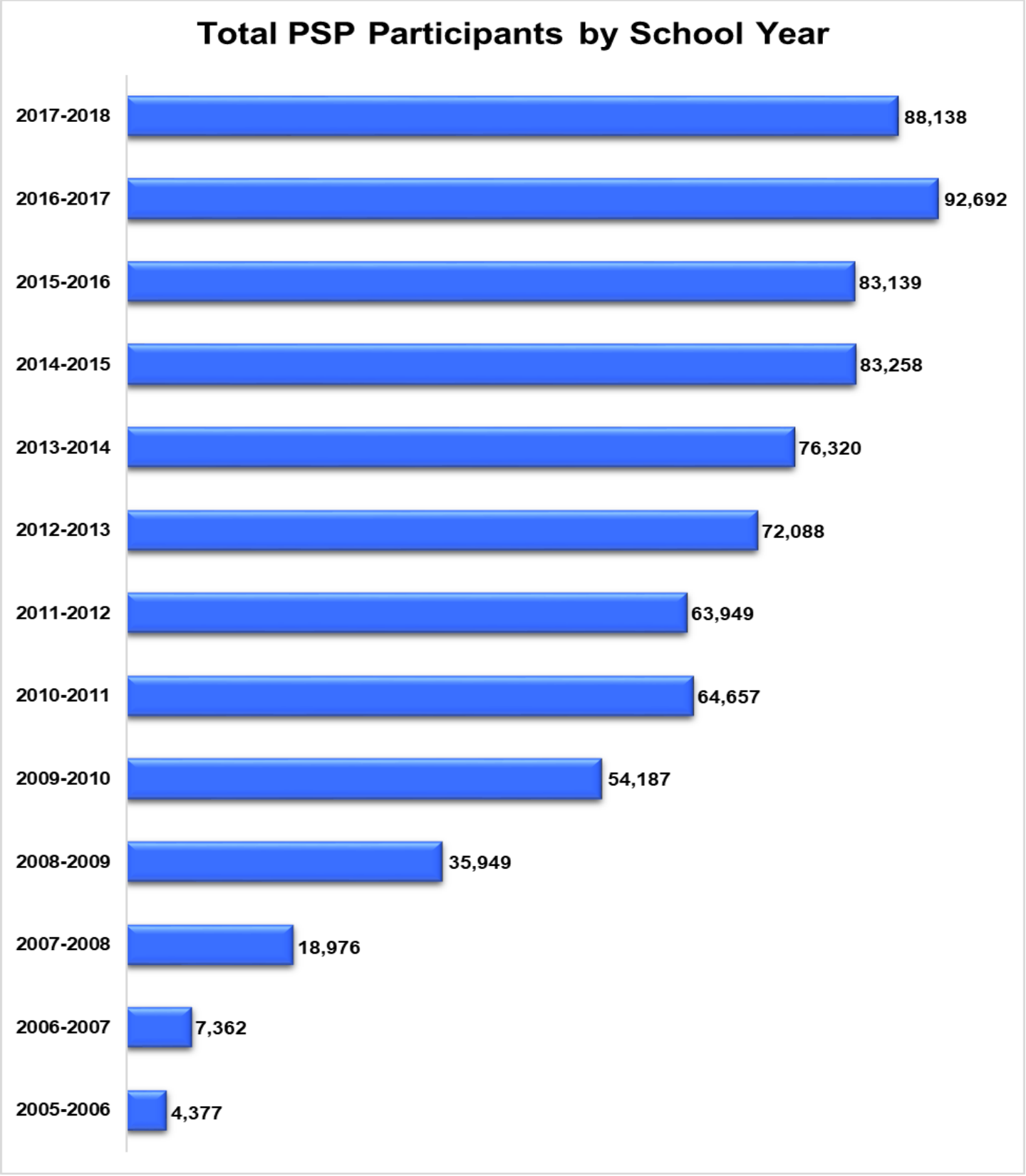
Since the Missouri Preventive Services Program (PSP) focuses on children, this report will focus on how oral health impacts children only. Studies have shown that children with poor oral health often skip school and have difficulties with speaking, eating, and learning.[1] More than 51 million school hours are lost each year due to children having a dental related illness.[1] Even more concerning, children aged 5-17 years old are 5x more likely to have had at least one cavity or filling than a reported history of asthma.[1]

- **51.6% of Children ages 5-9 have had at least one cavity or filling in the coronal (crown of tooth) portion of their primary or permanent teeth.[1]**
- **77.9% of children age 17 have had at least one cavity or filling in the coronal (crown of tooth) portion of their primary or permanent teeth.[1]**
- **84.7% of individuals ages 18 and older have had at least one cavity or filling in the coronal (crown of tooth) portion of their primary or permanent teeth.[1]**

# 2017-2018 PSP Participants by County

There was a total of **88,138** participants in the Preventive Services Program (PSP) for the 2017-2018 school year.

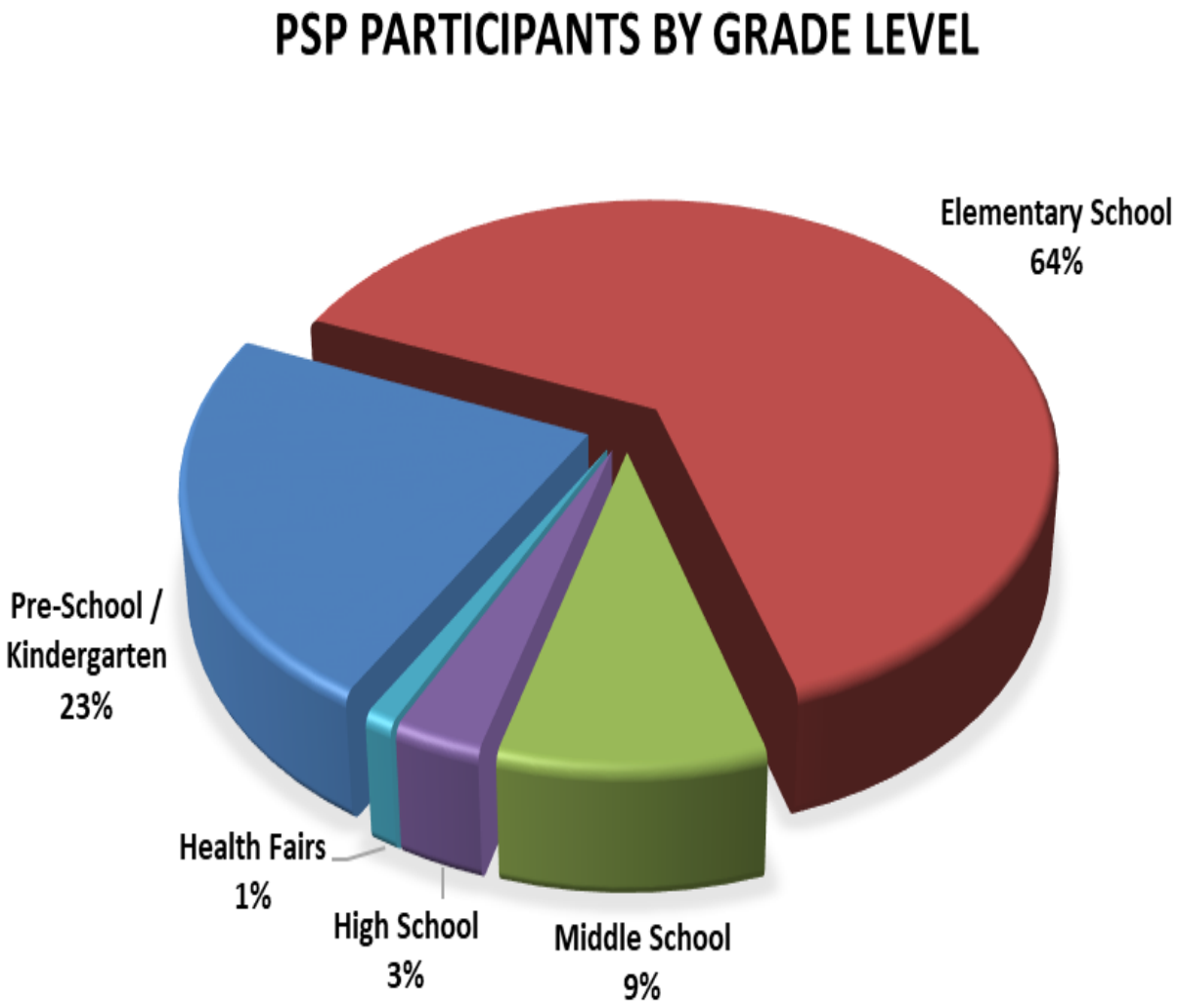





There was a **5.04%** decrease in PSP Participants between the 2016-2017 and 2017-2018 school years.

# Demographics of PSP Participants

While many PSP events do occur in school settings, there are a few that occur at local health fairs or community health events. Since those events often occur during the summer and away from school, it is easier to categorize children by their school type rather than specific grade levels.




Similar to previous years, the majority of participating children are elementary school aged children. Between 2016-2017 and 2017-2018, there was a 1% increase in middle school children and a 1% decrease in elementary children.

## PSP Participants by Grade Level

| Kindergarten/ Pre-School | Elementary School | Middle School | High School | Health Fairs |
|---|---|---|---|---|
| 19,880 | 56,678 | 7,567 | 2,735 | 1,278 |

# PSP Participants by Gender

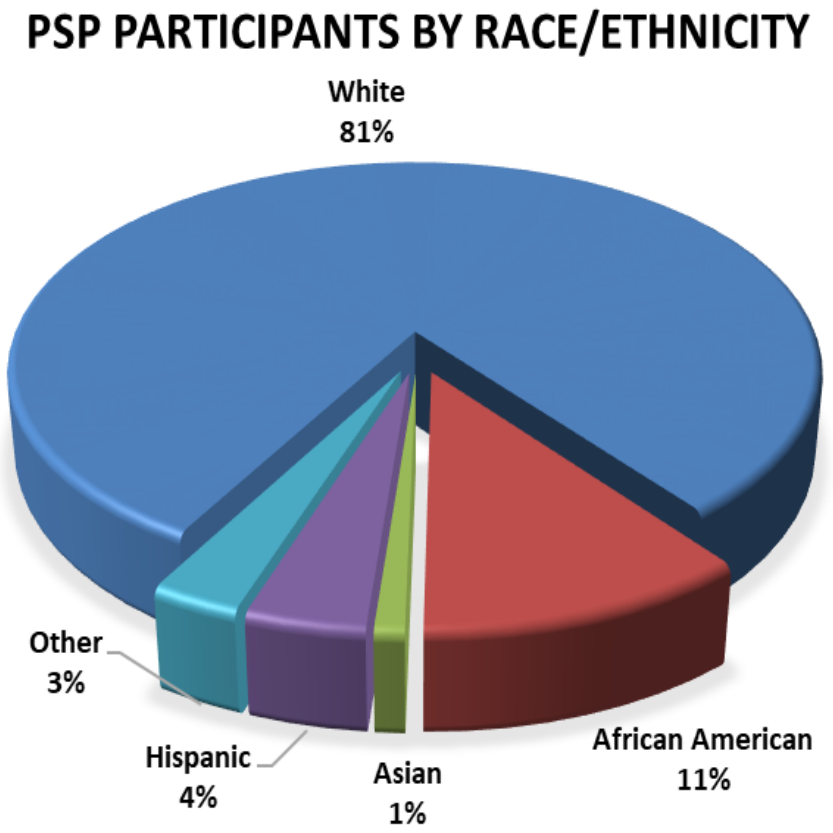
The number of participants was a fairly equal split between genders. Males account for **1,091** more participants than females.

| Gender | Number | Percent |
|---|---|---|
| Female | 43,430 | 49% |
| Male | 44,521 | 51% |


# PSP Participants by Age Group and Gender

| Age Group | Female | Percent | Male | Percent | Total |
|---|---|---|---|---|---|
| 0-5 years old | 8,222 | 19.0% | 8,690 | 19.6% | 16,931 |
| 6-12 years old | 32,569 | 75.4% | 33,033 | 74.6% | 65,749 |
| 13 years and older | 2,403 | 5.6% | 2,558 | 5.8% | 4,971 |
| **Total:** | 43,194 | | 44,281 | | 87,651 |

The participants 6-12 years of age has the highest number among both genders. The second highest number of participants was in the 0-5 years of age group, and the last was in the 13 years and older group. (Some screening forms did not have the gender marked correctly, so those children are not accounted for in the gender numbers.)

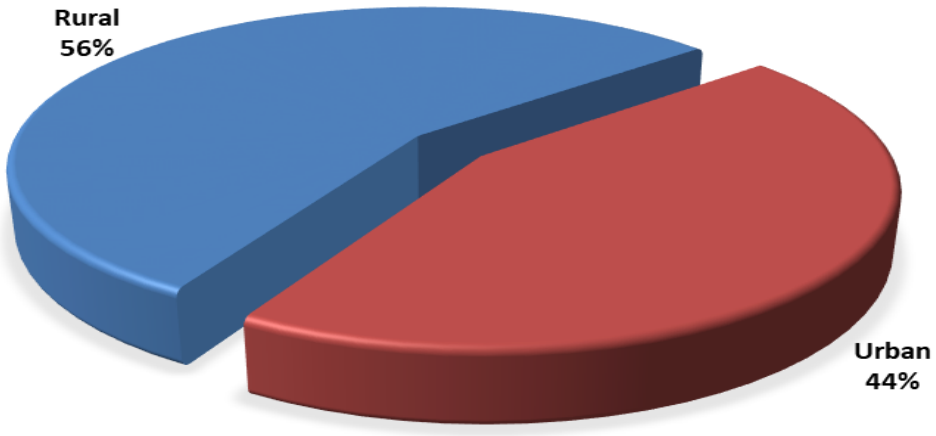



A majority of participants were identified as white. For children identified as African American, the category also includes the box for "multi-racial." Since the United States Census Bureau classifies "multi-racial" as African American, the categories were merged for this report. The category "other" includes all categories the screeners have identified as being other than "White," "African American," "Asian," or "Hispanic."

PSP Participants by Race/Ethnicity Totals

| White | African American | Asian | Hispanic | Other |
|---|---|---|---|---|
| 71,280 | 9,691 | 1,121 | 3,336 | 2,710 |

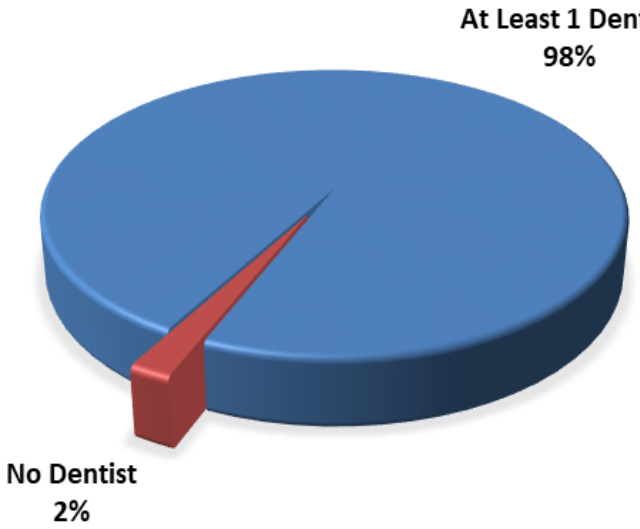
## PSP PARTICIPANTS BY GEOGRAPHIC DISTRIBUTION




Of the 114 counties in Missouri, 101 of them are designated as rural counties. There are 20.3% more PSP participants in rural counties than urban ones.

| Designation | Number of Participants |
|---|---|
| Rural | 49,036 |
| Urban | 39,102 |

## PSP PARTICIPANTS BY NUMBER OF AVAILABLE DENTISTS

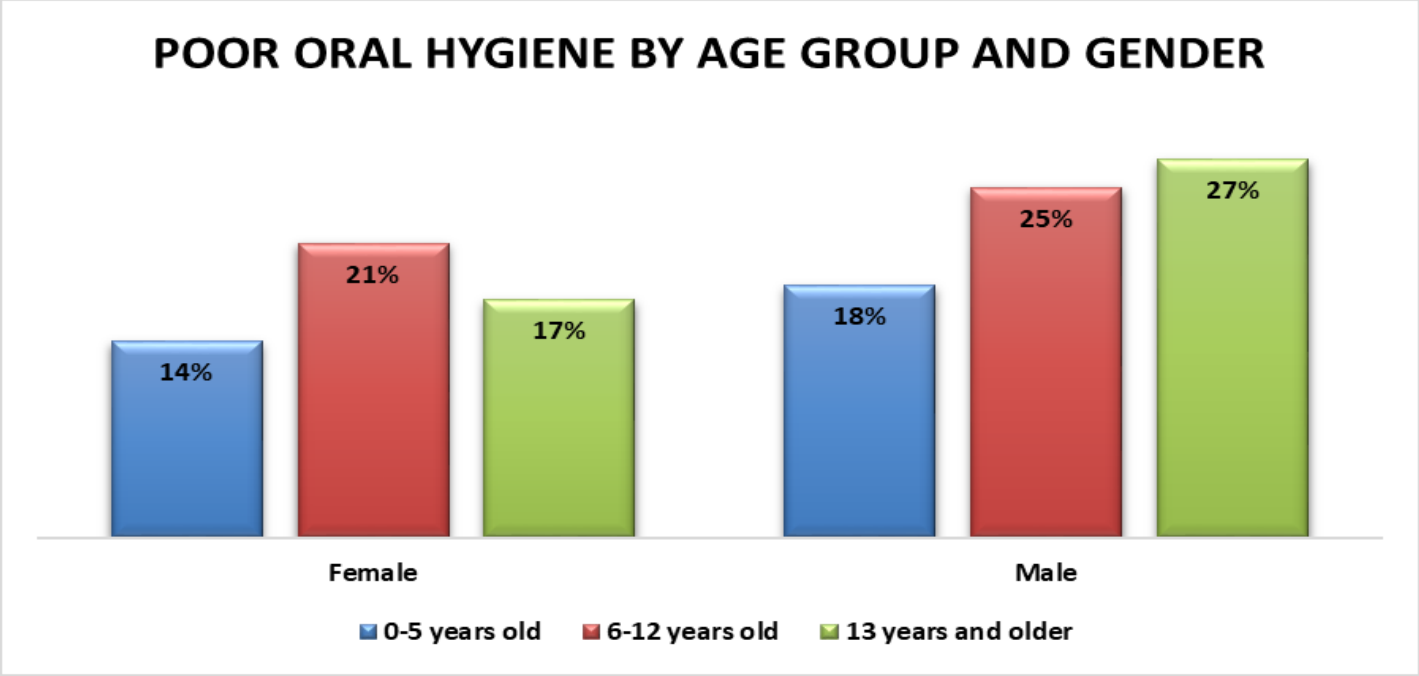



There are 10 counties in Missouri that have no dentist: Holt, Mercer, Oregon, Ralls, Reynolds, Ripley, Shannon, Sullivan, Wayne, and Worth. During the 2017-2018 school year, all 10 counties had PSP participants. However, combined, those counties only accounted for approximately 2% of all PSP Participants.

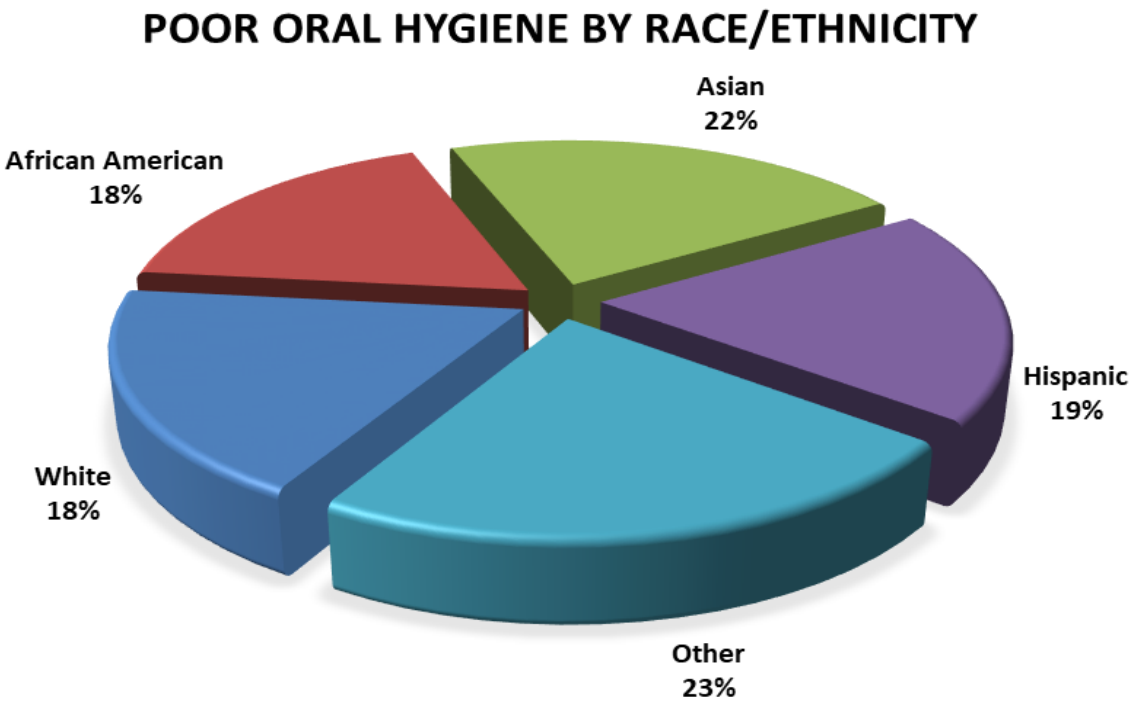
| Number of Dentists | Number of Participants |
|---|---|
| At least 1 | 86,329 |
| None | 1,809 |

# Oral Hygiene of PSP Participants

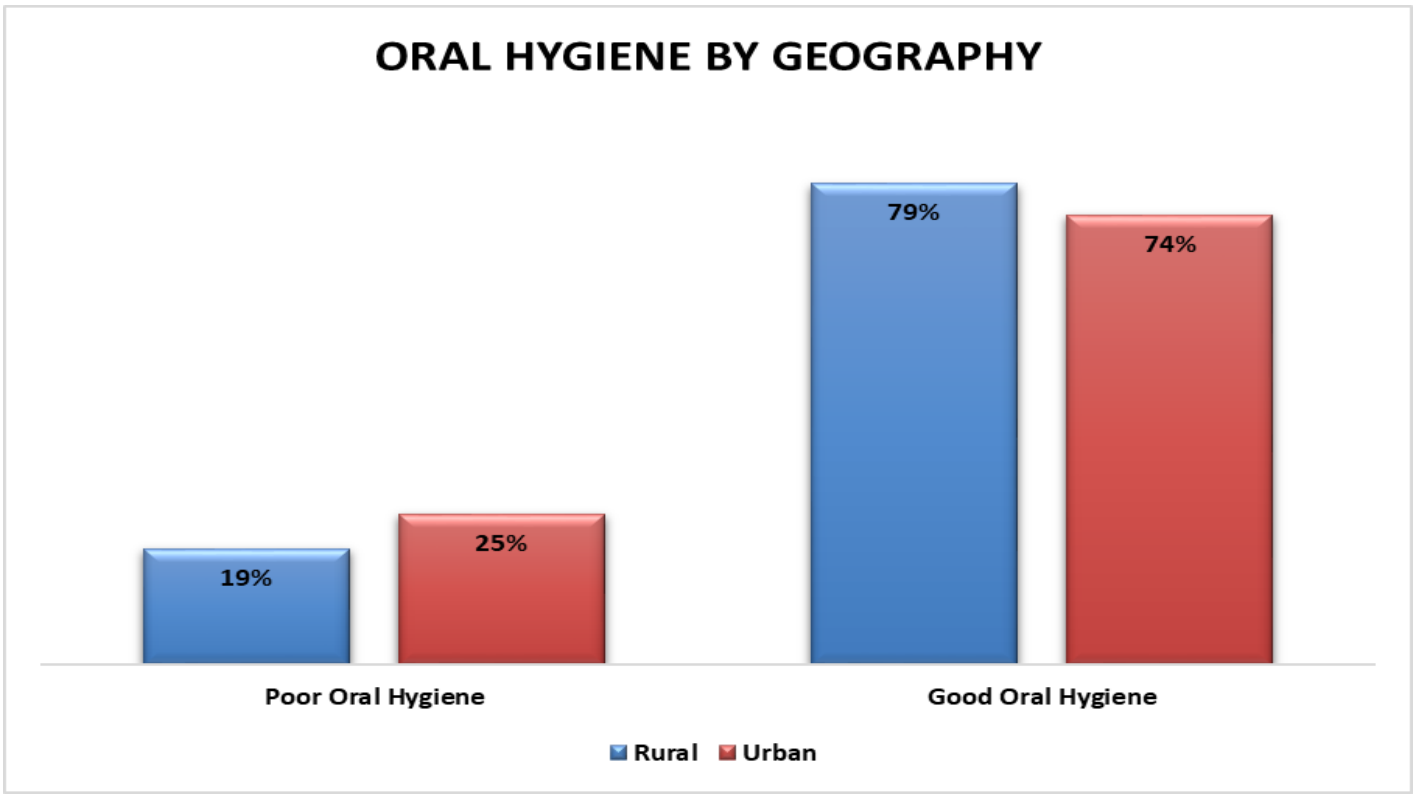
Poor oral hygiene is defined by moderate to heavy plaque on the teeth with red gums and tissue. Approximately 22% of the children screened where determined to have poor oral hygiene. Males 6-12 years of age were more likely than females of any age group and males in the other two groups to have poor oral hygiene. The group with the highest percent of good oral hygiene was females 0-5 years of age.



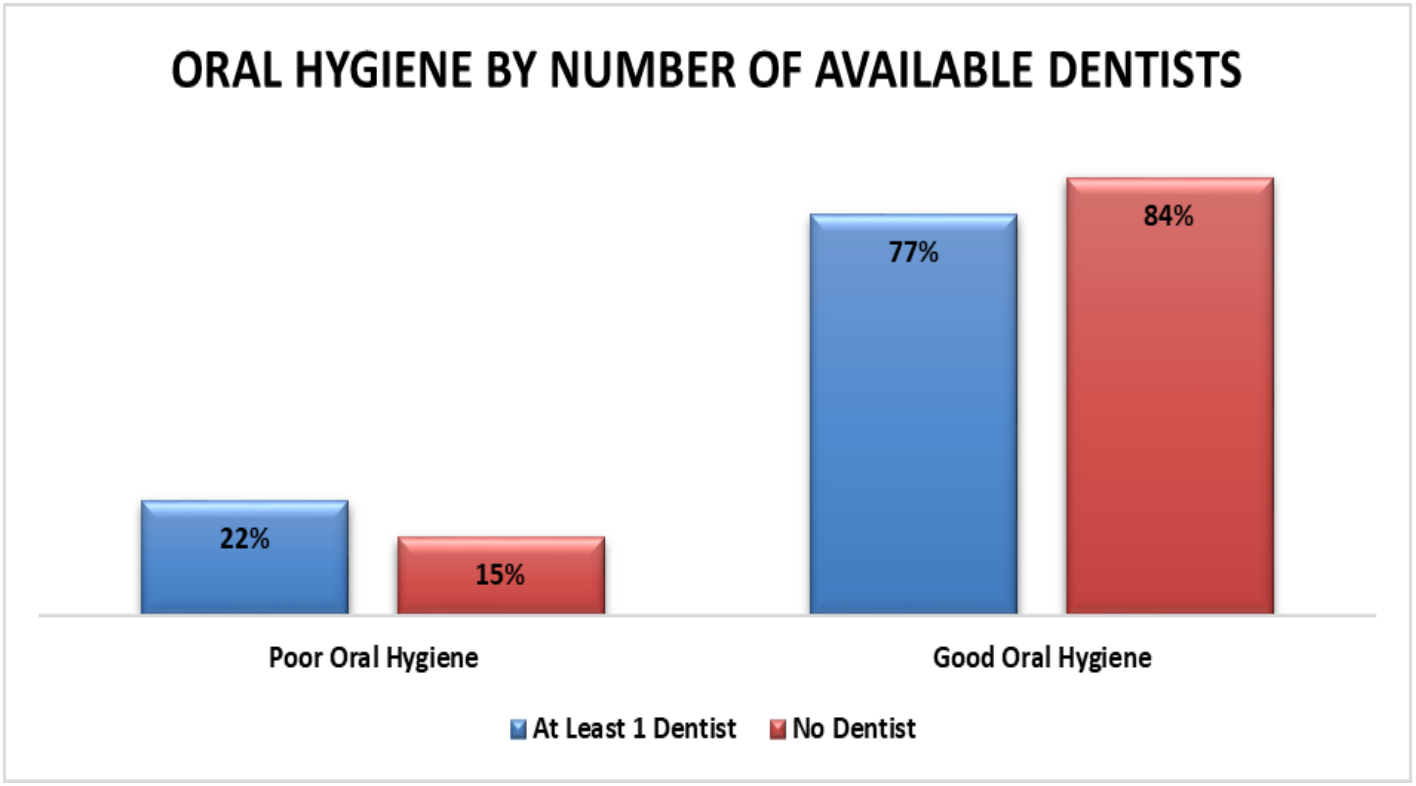

The highest percent of poor oral hygiene was detected in children whose race was marked as "Other." The second highest group was children marked as "Asian." Poor oral hygiene was detected at higher rates this year than in previous PSP school years.



Rural children had a higher rate of good oral hygiene (79%) compared to urban children (74%).

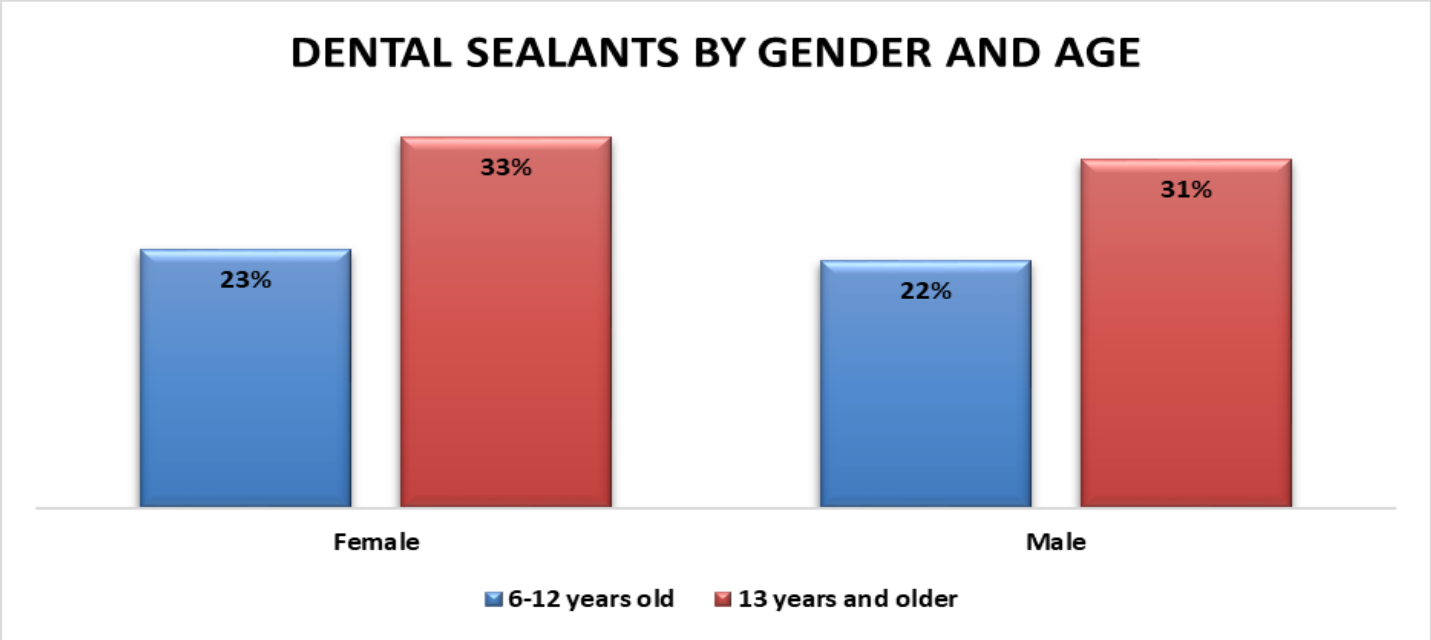



Children who lived in counties with no dentist had better oral hygiene (84%) than those who lived in a county with at least one dentist (77%).

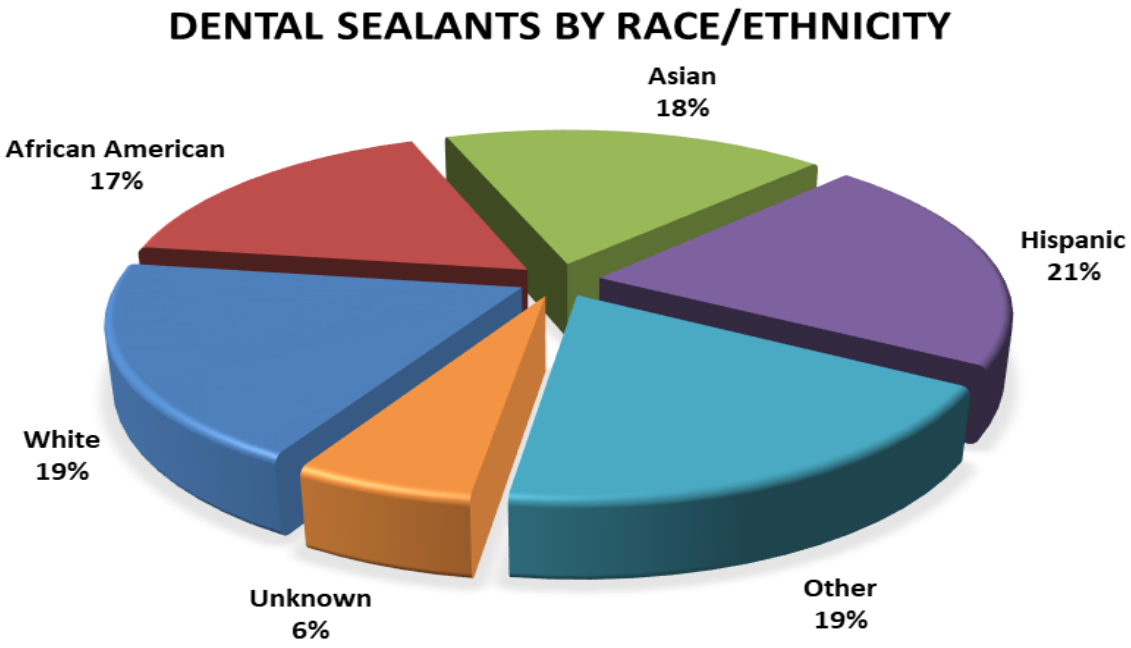


# Sealants of PSP Participants

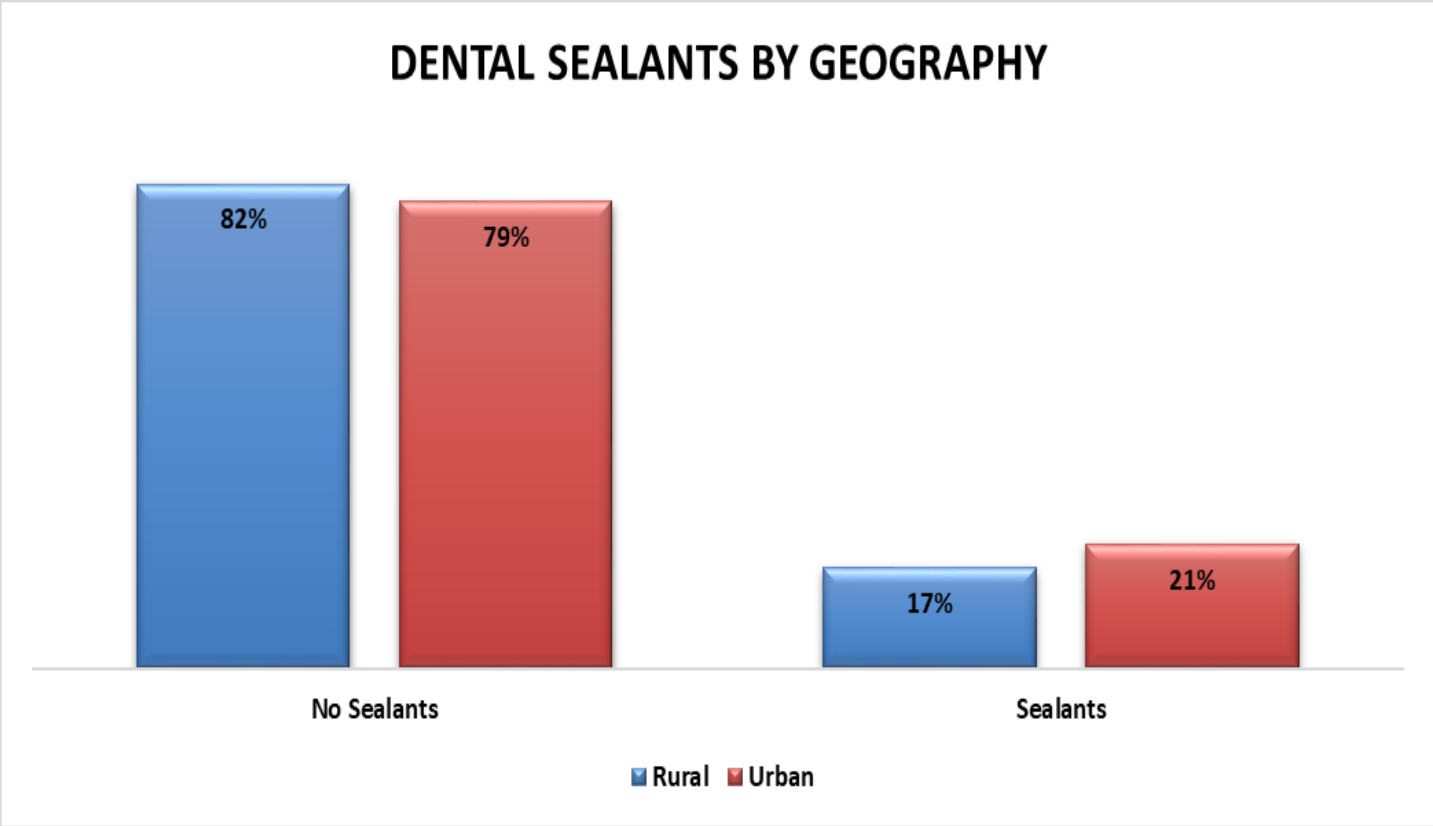
Dental sealants are a clear plastic coating that is applied to the chewing surface of permanent molars to help prevent cavities. Once a permanent molar erupts, dentists like to apply sealants as soon as possible. Typically, around the age of 7 is when the first permanent molar will erupt, and 10 is when the second permanent molar will erupt.



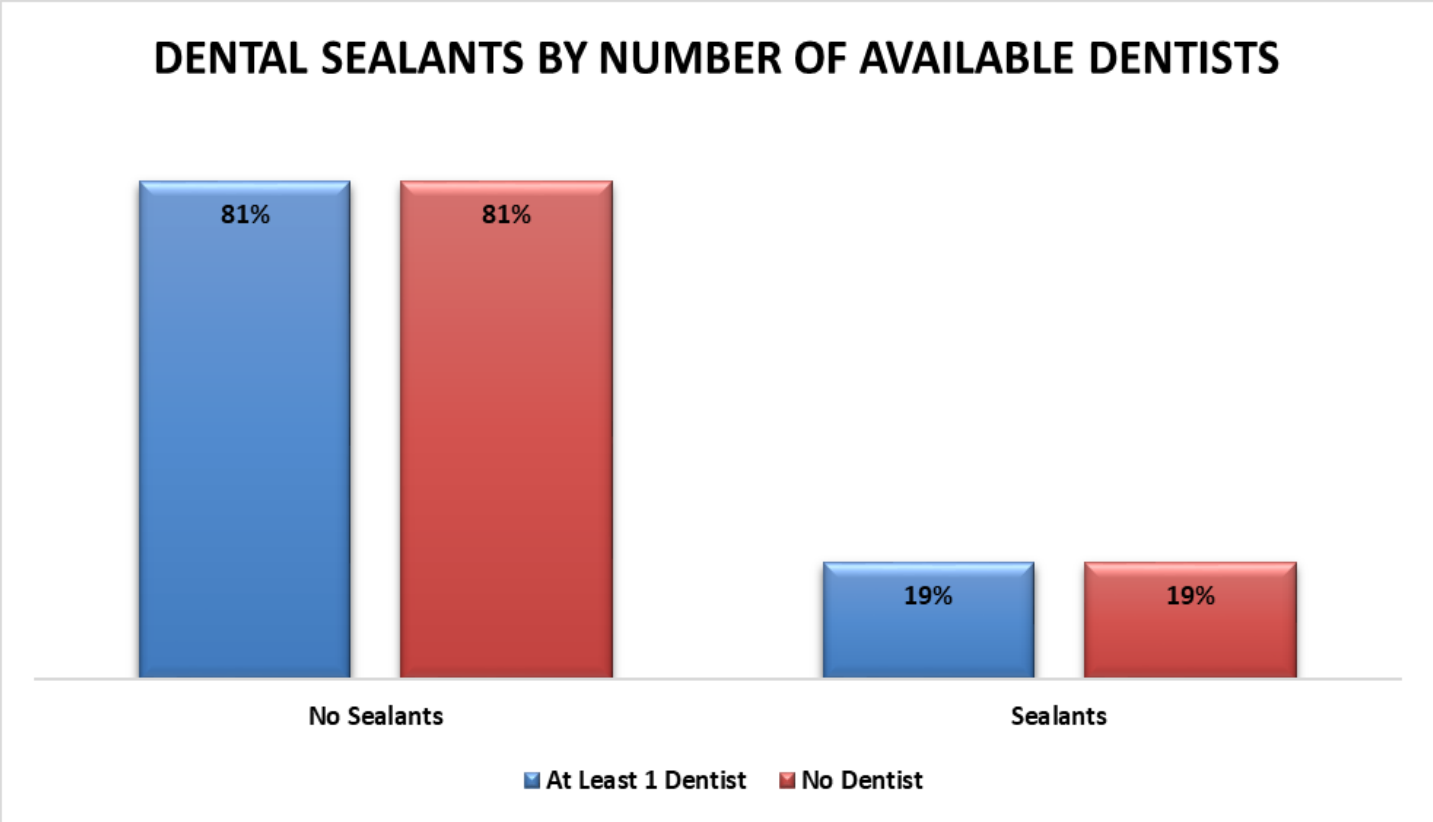

Unfortunately, there were more children screened that did not have dental sealants than those that did. Among children who had sealants, females were slightly more likely to have had their teeth sealed than males in both age groups. Hispanic children had the highest percent of dental sealants, and African American children had the lowest.



Children in urban counties were 3.7% more likely to have dental sealants than those in rural ones.



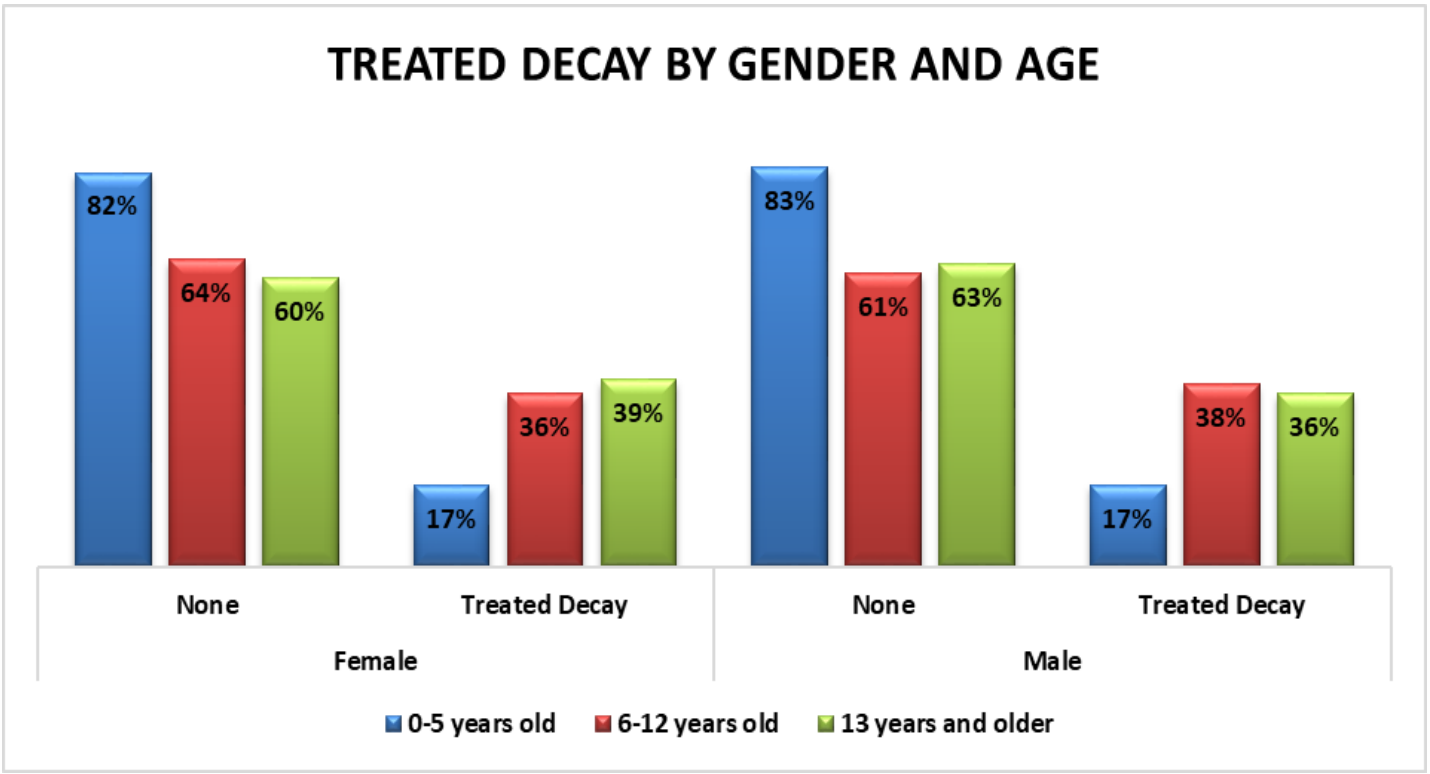

There was no difference between children who resided in a county with no dentist licensed in the county and children who resided in a county with at least one dentist licensed in the county in the percent of sealants. Both had the same 19% of children having dental sealants at their screening.



# Treated Decay of PSP Participants

Treated tooth decay is apparent by the number of fillings recorded on the teeth (either primary or permanent) during the screening. Primary teeth are more colloquially referred to as baby teeth.

| Tooth Type: | Female: | Percent: | Male: | Percent: | Total: | Percent: |
|---|---|---|---|---|---|---|
| Permanent Only | 2,256 | 5.2% | 2,024 | 4.6% | 4,290 | 4.9% |
| Primary and Permanent | 1,967 | 4.6% | 2,013 | 4.5% | 3,988 | 4.5% |
| Primary Only | 9,861 | 22.8% | 11,028 | 24.9% | 20,939 | 23.9% |

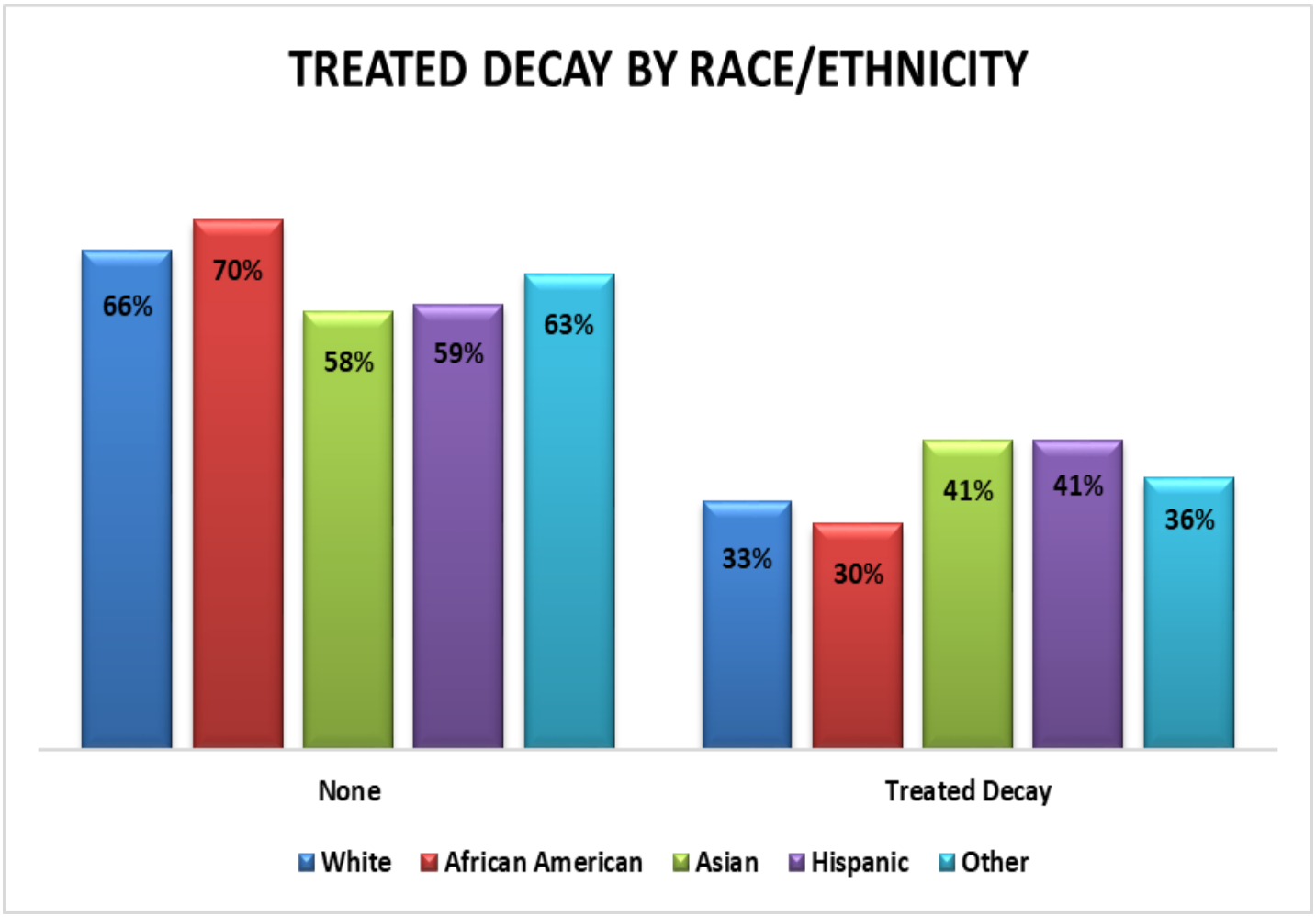


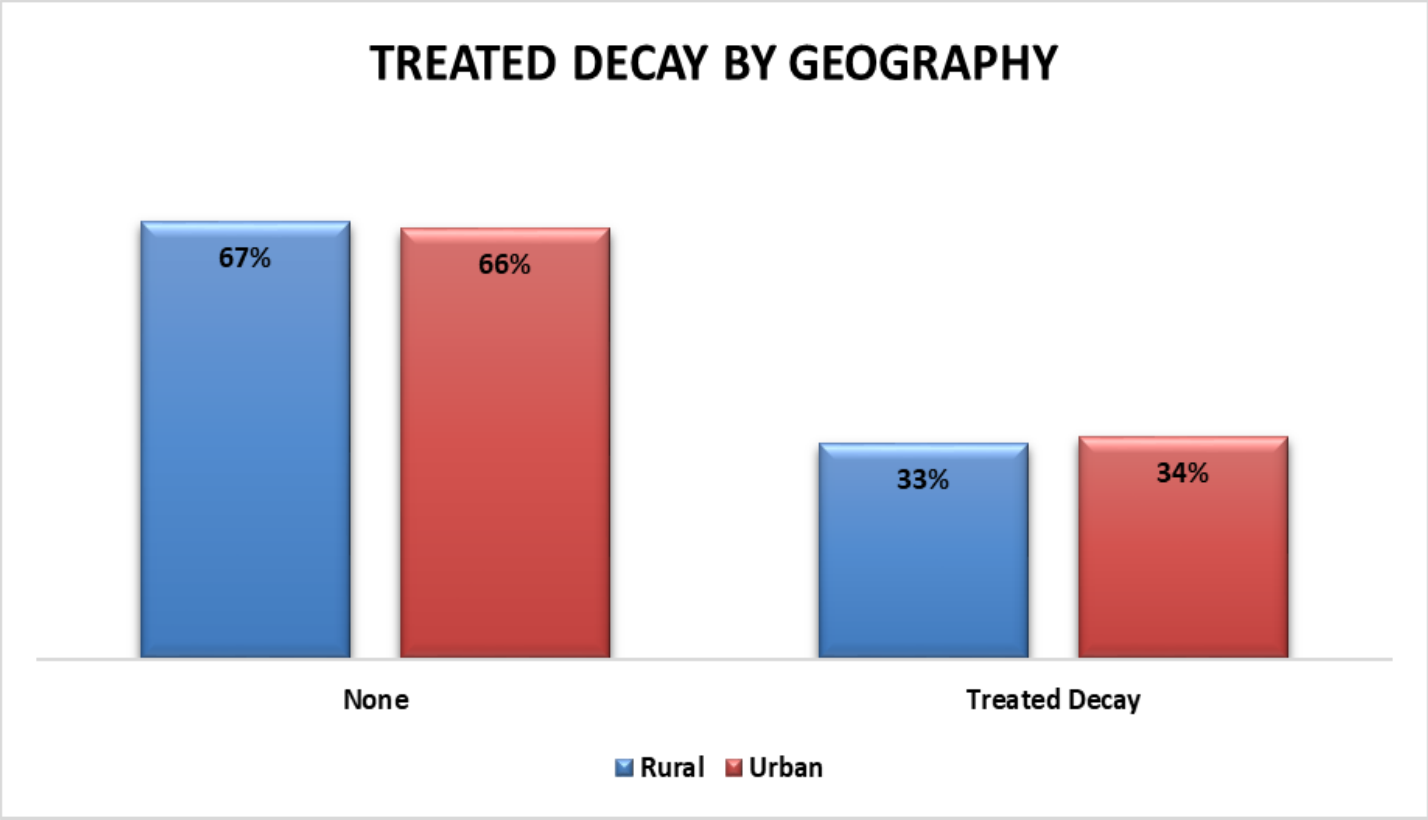

Females 13 years and older had the highest percent of treated decay in permanent teeth. Males ages 6-12 had the highest percent of treated decay in primary teeth. Treated decay was equal in children ages 0-5 years old.

## Treated Decay by Tooth Classification and Race/Ethnicity

| Tooth Classification: | White | | African American | | Asian | | Hispanic | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| None | 47,391 | 66% | 6,779 | 70% | 654 | 58% | 1,955 | 59% | 1,716 | 63% |
| Permanent Only | 3,461 | 5% | 427 | 4% | 48 | 4% | 238 | 7% | 131 | 5% |
| Primary and Permanent | 3,166 | 4% | 417 | 4% | 78 | 7% | 205 | 6% | 145 | 5% |
| Primary Only | 17,059 | 24% | 2,033 | 21% | 338 | 30% | 928 | 28% | 697 | 26% |

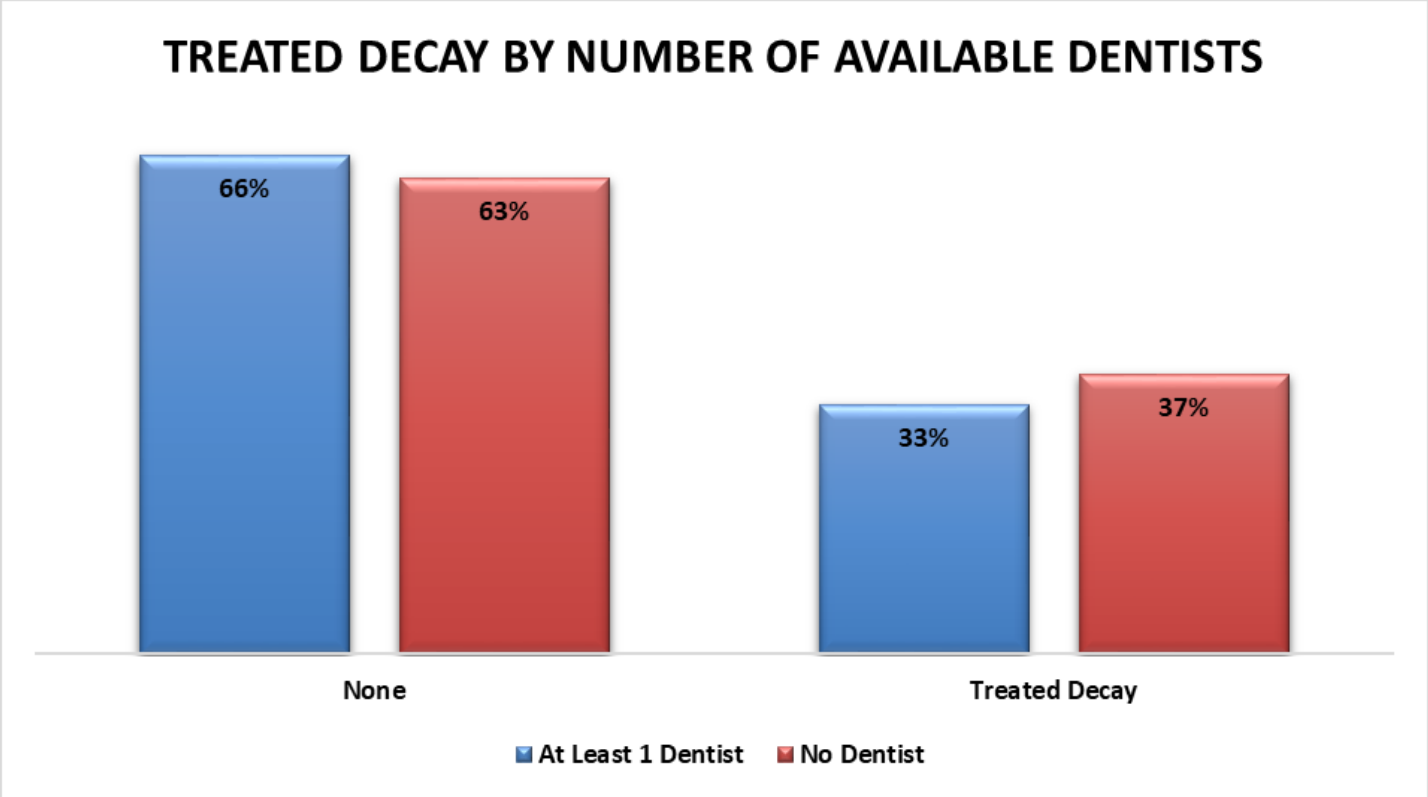
Children identified as African American had the lowest percent of treated decay among all teeth types, while children identified as Asian and Hispanic had the highest percent.






Rural and urban children had similar rates of treated decay during their screenings with urban kids having slightly higher rates than rural ones.

Counties that have no dentist have higher rates of treated decay than counties that have at least one dentist.



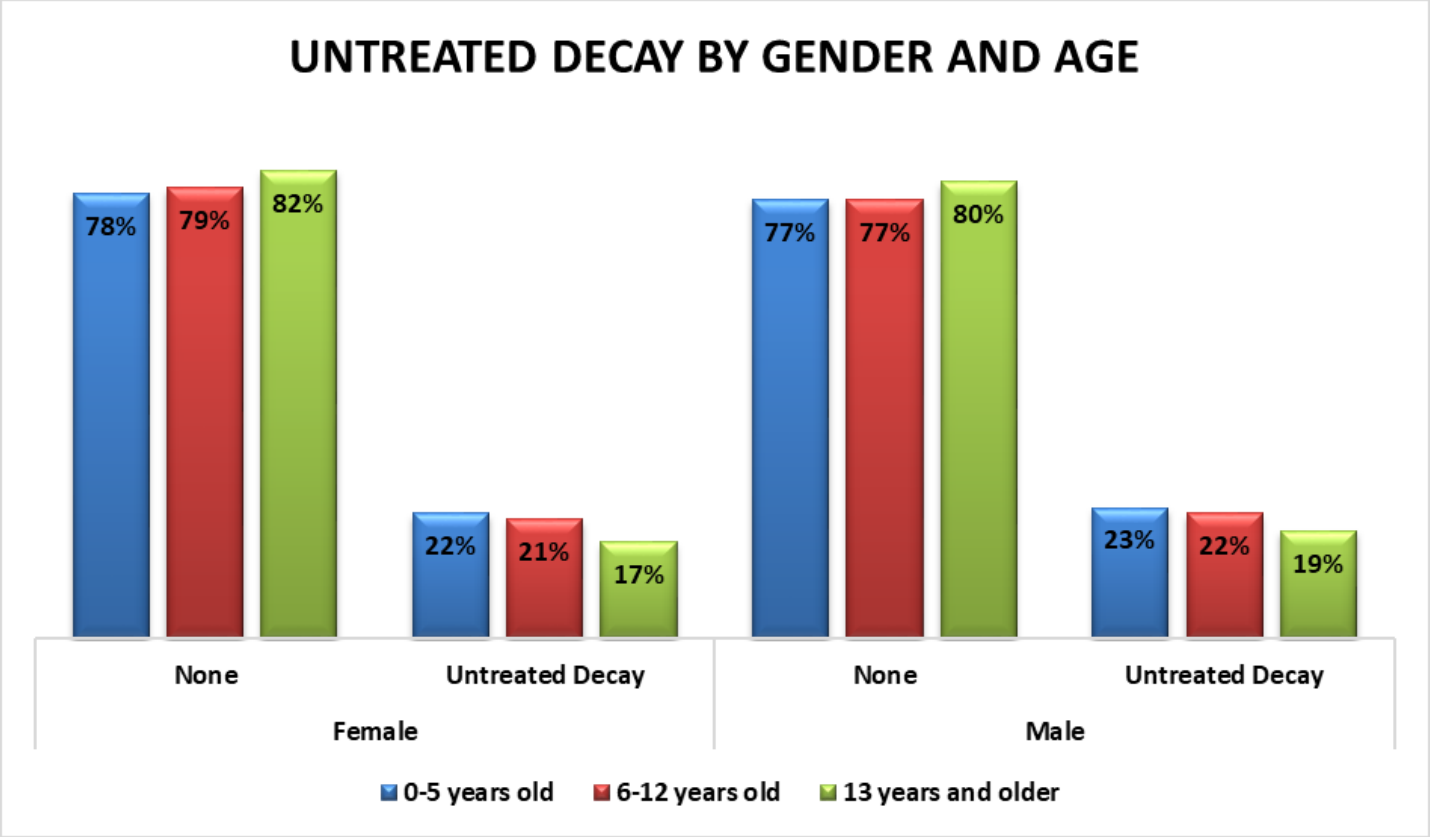
# Untreated Decay of PSP Participants

Untreated decay is determined during the screening when plaque, a sticky substance that forms over the teeth that causes a breakdown in the tooth's enamel and eventually leads to a cavity, is found on a primary or permanent tooth.[2]

| Tooth Classification: | Female: | Percent: | Male: | Percent: | Total: | Percent: |
|---|---|---|---|---|---|---|
| Permanent Only | 1,655 | 4% | 1,616 | 4% | 3,280 | 4% |
| Primary and Permanent | 1,070 | 2% | 1,096 | 2% | 2,170 | 2% |
| Primary Only | 6,334 | 15% | 7,116 | 16% | 13,480 | 15% |

Male children had slightly higher rates of untreated decay on primary teeth. Overall, untreated decay on permanent only, and primary and permanent teeth was approximately the same for both genders.

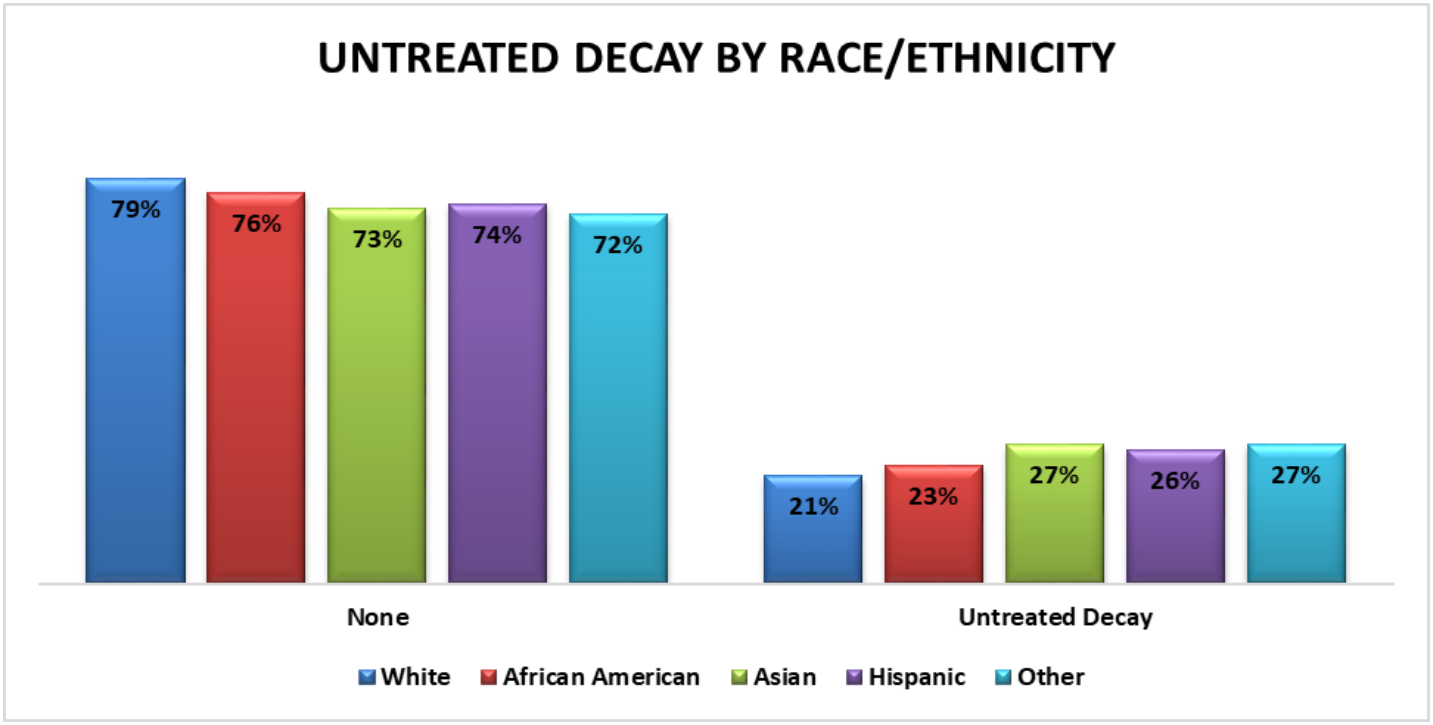
Children 13 years and older had the lowest amount of untreated decay, with females slightly better than males. Males 0-5 years old had the highest percent of untreated decay, however it was only slightly more than females 0-5 years old and males ages 6-12.

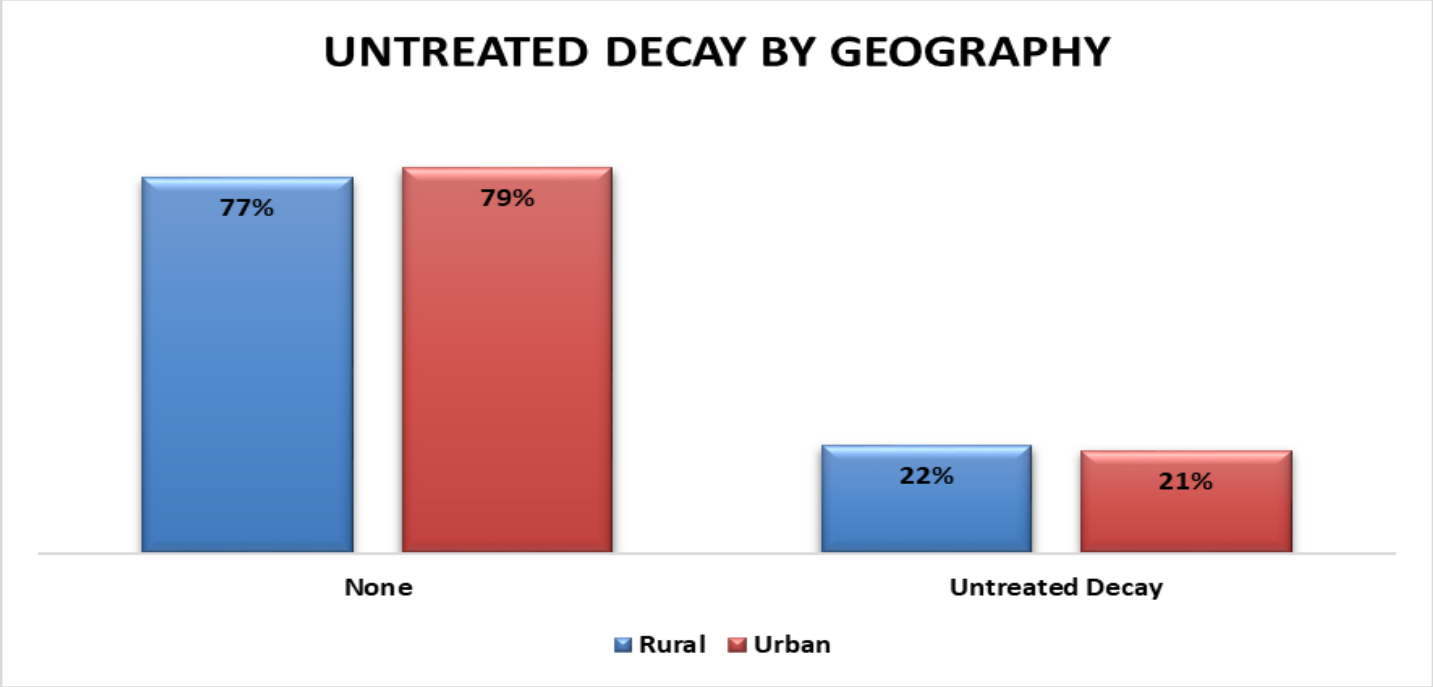


## Untreated Decay by Tooth Classification and Race/Ethnicity

| Tooth Classification: | White | | African American | | Asian | | Hispanic | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|
| None | 56,186 | 79% | 7,393 | 76% | 815 | 73% | 2,467 | 74% | 1,941 | 72% |
| Permanent Only | 2,572 | 4% | 397 | 4% | 40 | 4% | 179 | 5% | 107 | 4% |
| Primary and Permanent | 1,641 | 2% | 286 | 3% | 34 | 3% | 107 | 3% | 115 | 4% |
| Primary Only | 10,710 | 15% | 1,558 | 16% | 231 | 21% | 571 | 17% | 520 | 19% |

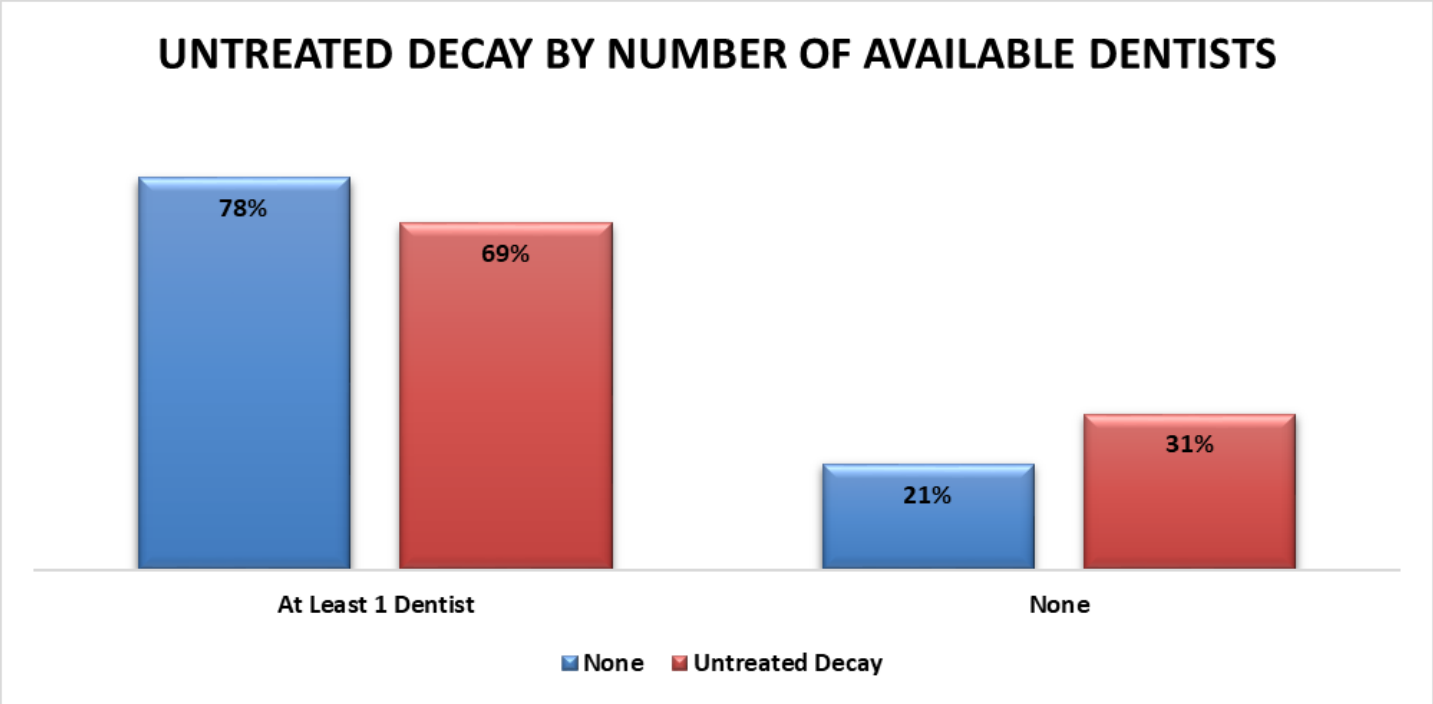
Children identified as White had the lowest percent of untreated decay among all teeth types, while children identified as Asian and Other had the highest percent.






| Designation | None | Permanent | Primary and Permanent | Primary |
|---|---|---|---|---|
| Rural | 37,879 | 1,900 | 1,242 | 7,858 |
| Urban | 30,923 | 1,395 | 941 | 5,732 |

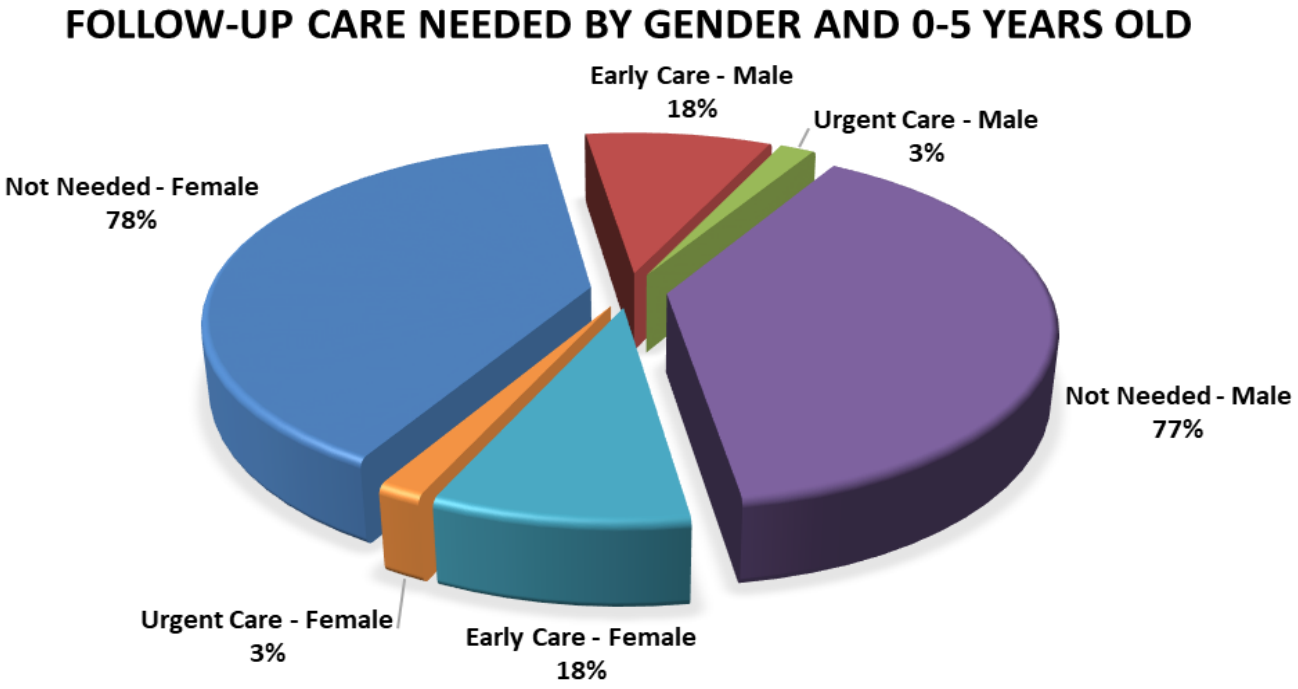
Children in rural counties had a slightly higher rate of untreated decay than children in urban counties. However, children who lived in a county with no dentist had significantly higher rates of untreated decay.

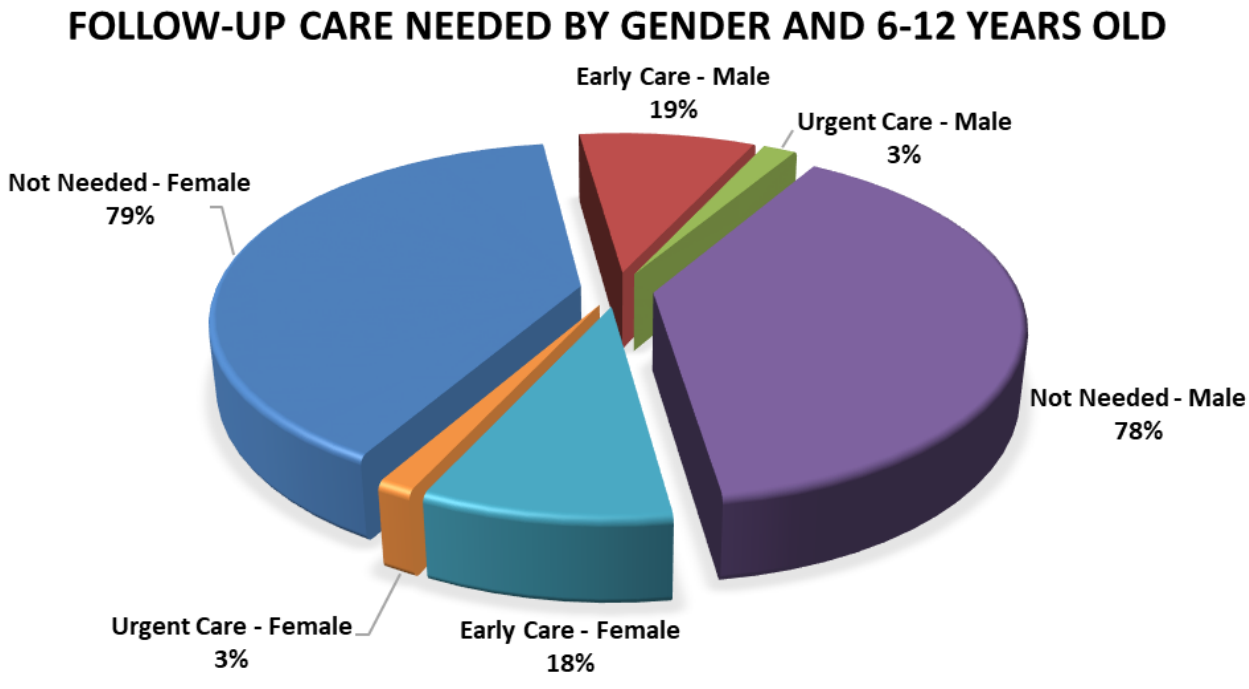


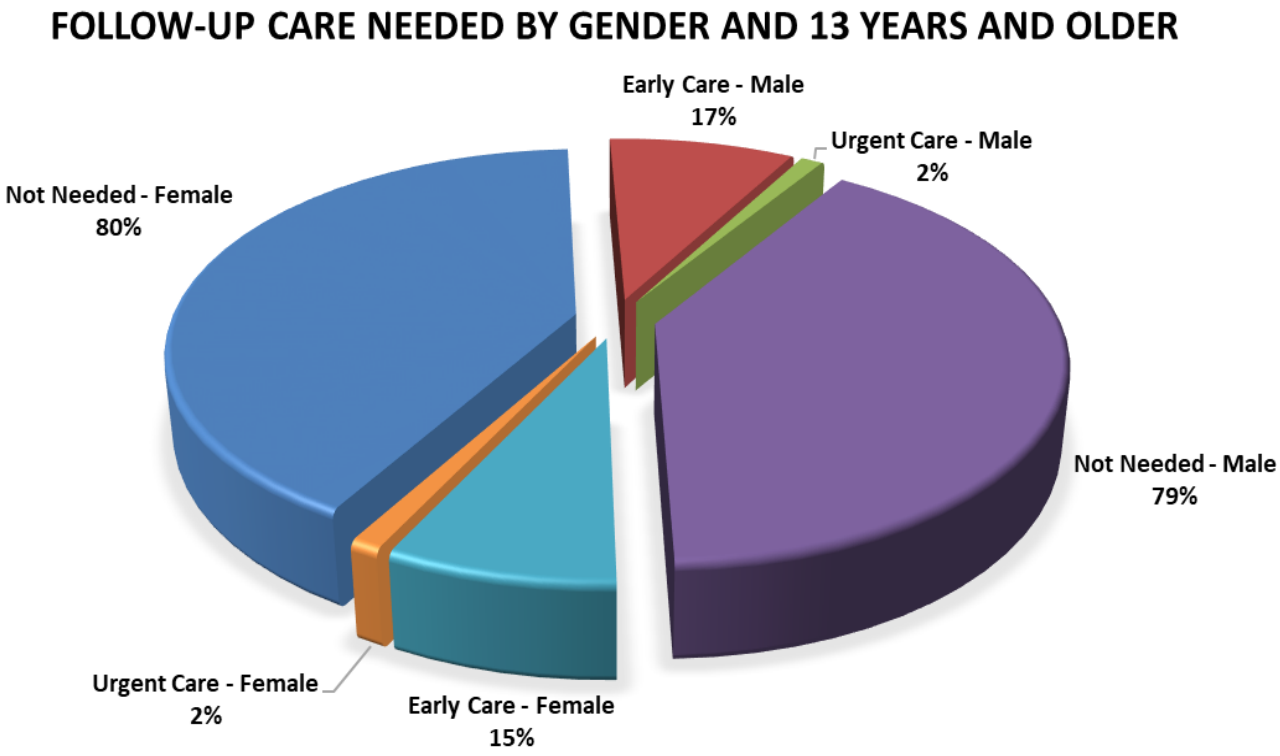

| Number of Available Dentists | None | Permanent | Primary and Permanent | Primary |
|---|---|---|---|---|
| At least 1 | 67,555 | 3,191 | 2,114 | 13,201 |
| None | 1,247 | 104 | 69 | 389 |

# Recommended Follow-Up Care for PSP Participants

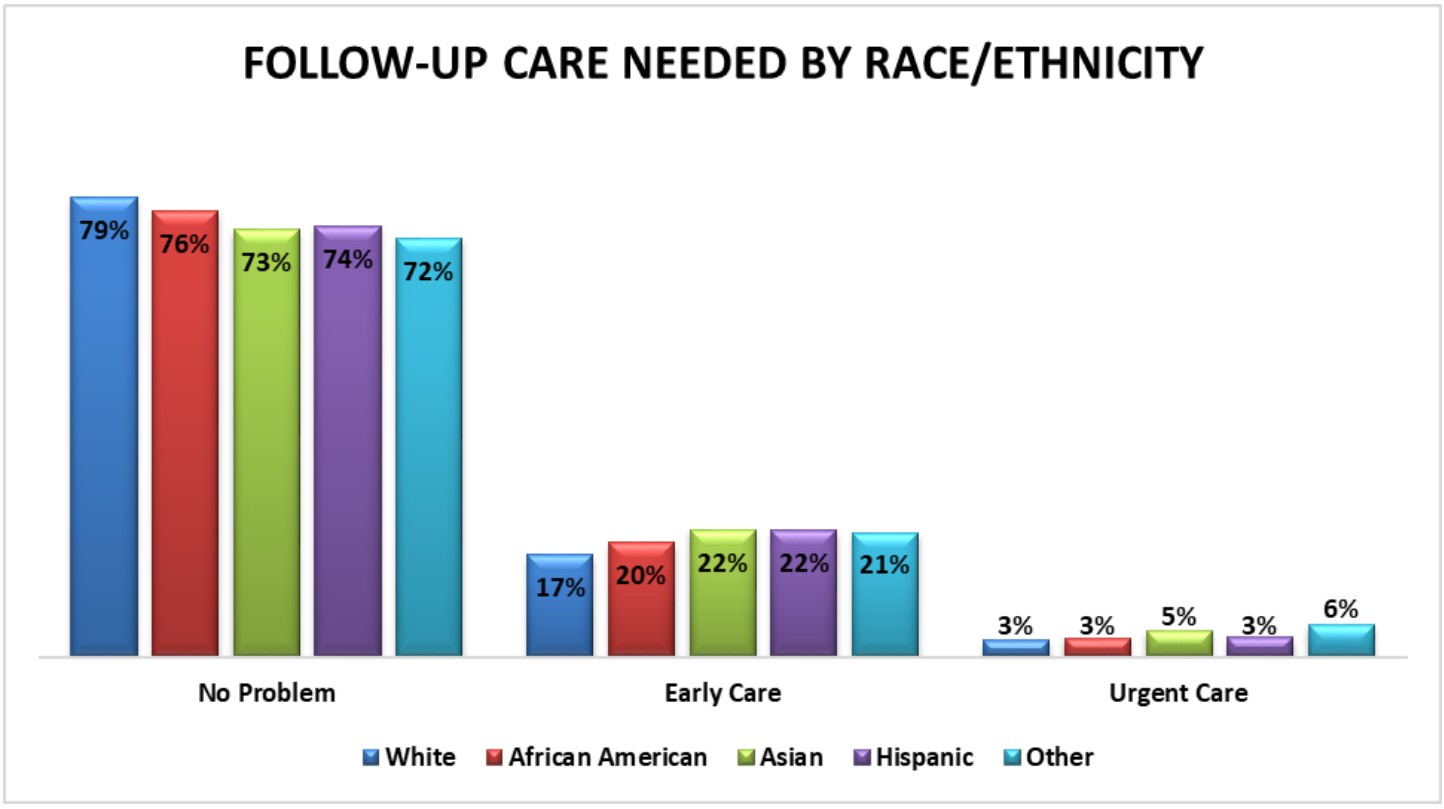
One of the biggest services PSP offers is that parents and guardians are informed when a dental issue that needs immediate attention is detected during a screening. If a problem is detected, the PSP organizers will provide referrals to local dental offices or clinics so the child can receive proper follow up care. There are two classifications for recommended follow-up care: Early dental care and Urgent dental care. Early dental care is recommended for injuries or conditions that need to be addressed within the coming months. Urgent dental care is recommended for injuries or conditions that need to be addressed immediately and typically recommended they be remedied within the next 24 hours.



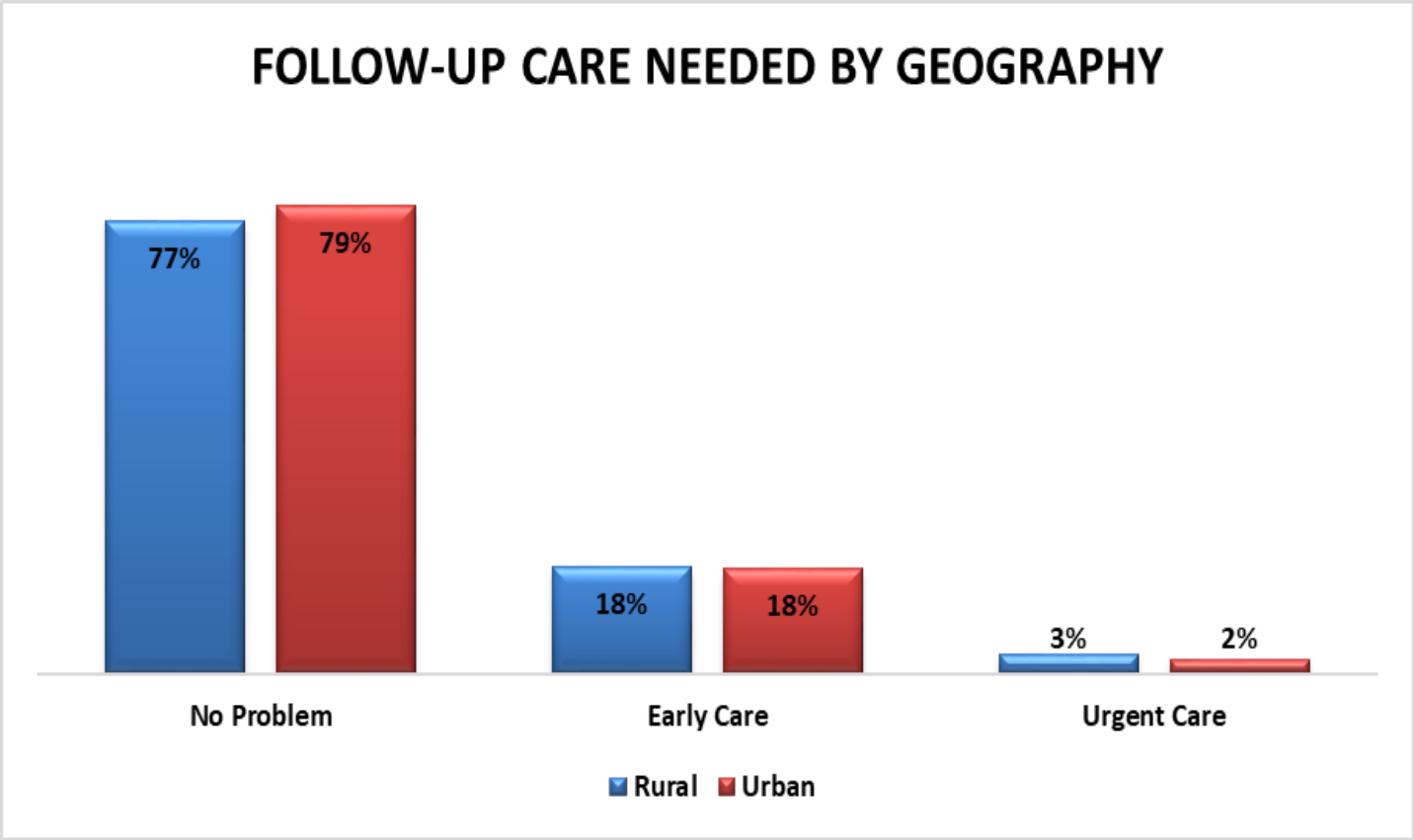





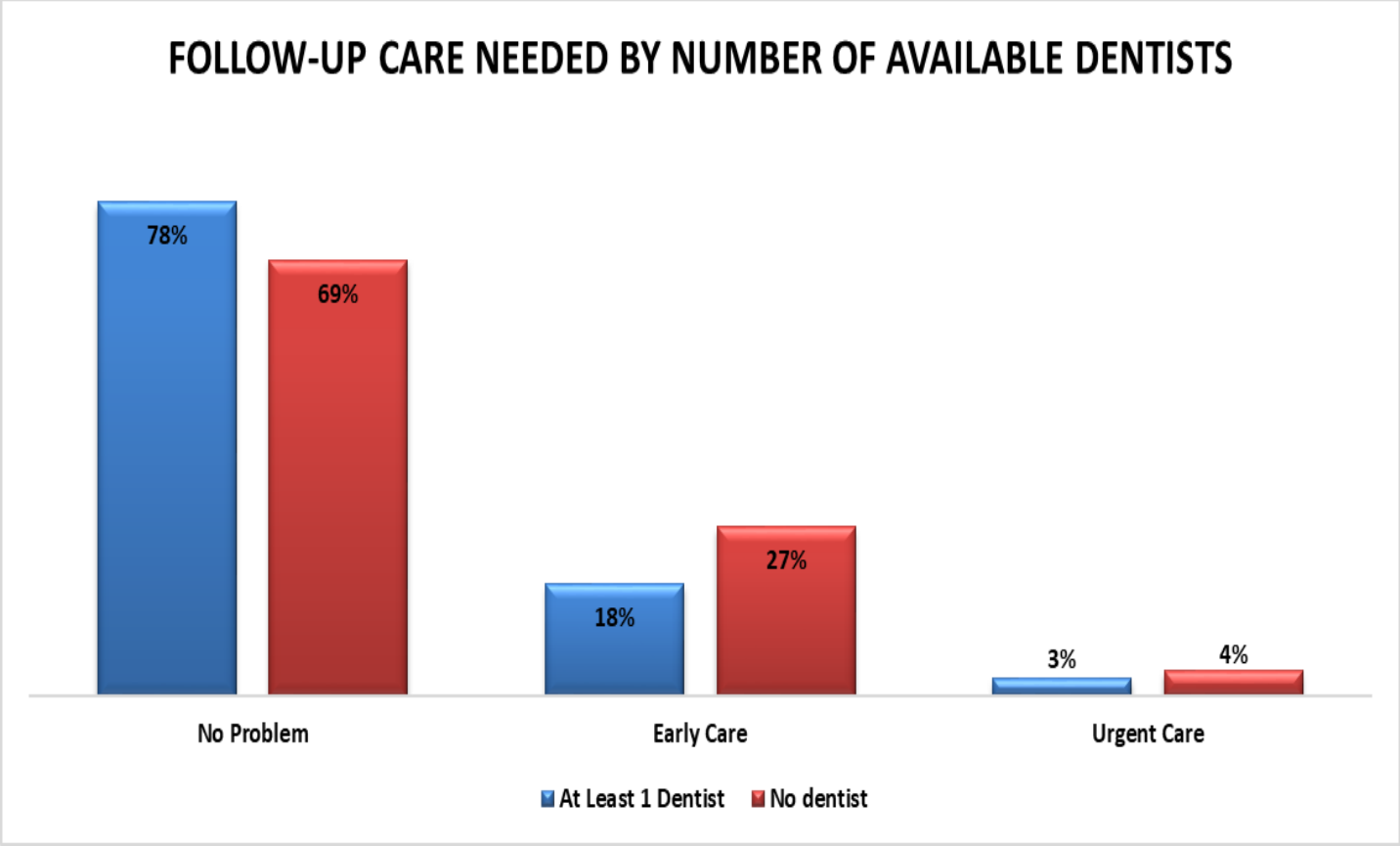

Male children 6-12 years old had the most referrals for early dental care. Male children 0-5 years old had the most referrals for urgent care. Female children 13 years and older had the lowest number of referrals for dental care among all age groups for both genders.




Asian children had the highest percent needing early dental care. Children identified as Other had the highest percent needing urgent care. Overall, White children had the lowest percent for any treatment urgency.




Children living in rural counties had higher rates of follow-up referrals than children in urban counties.

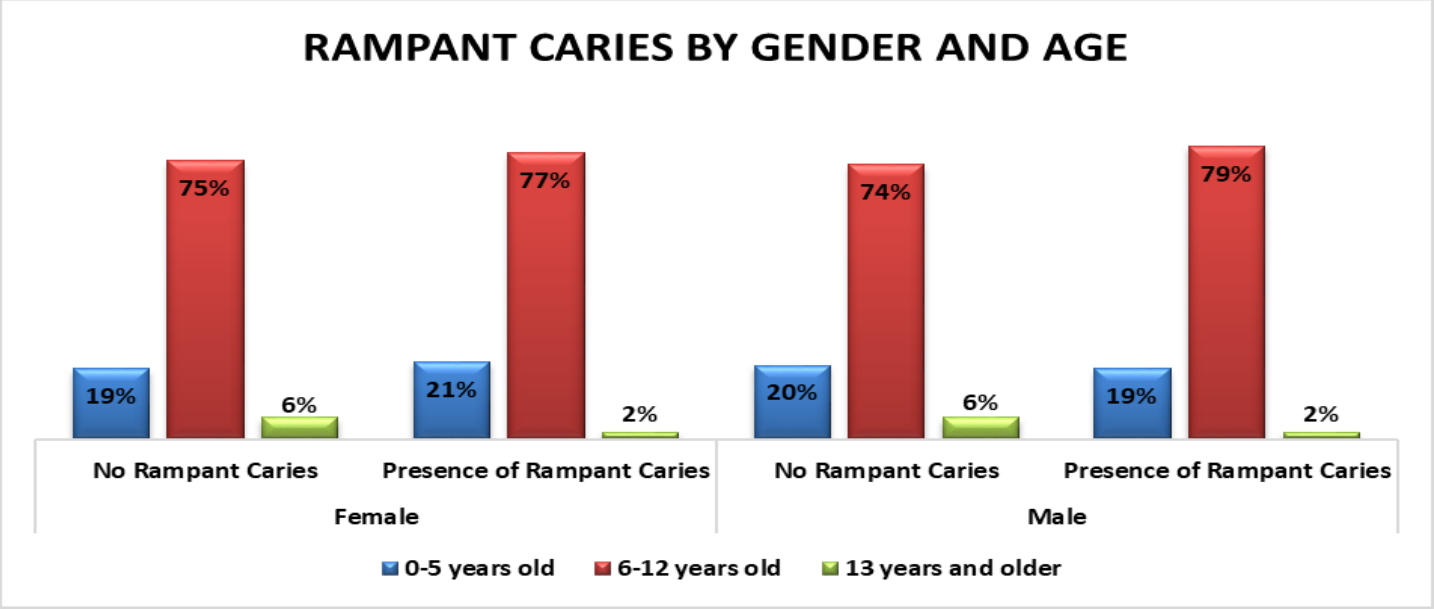


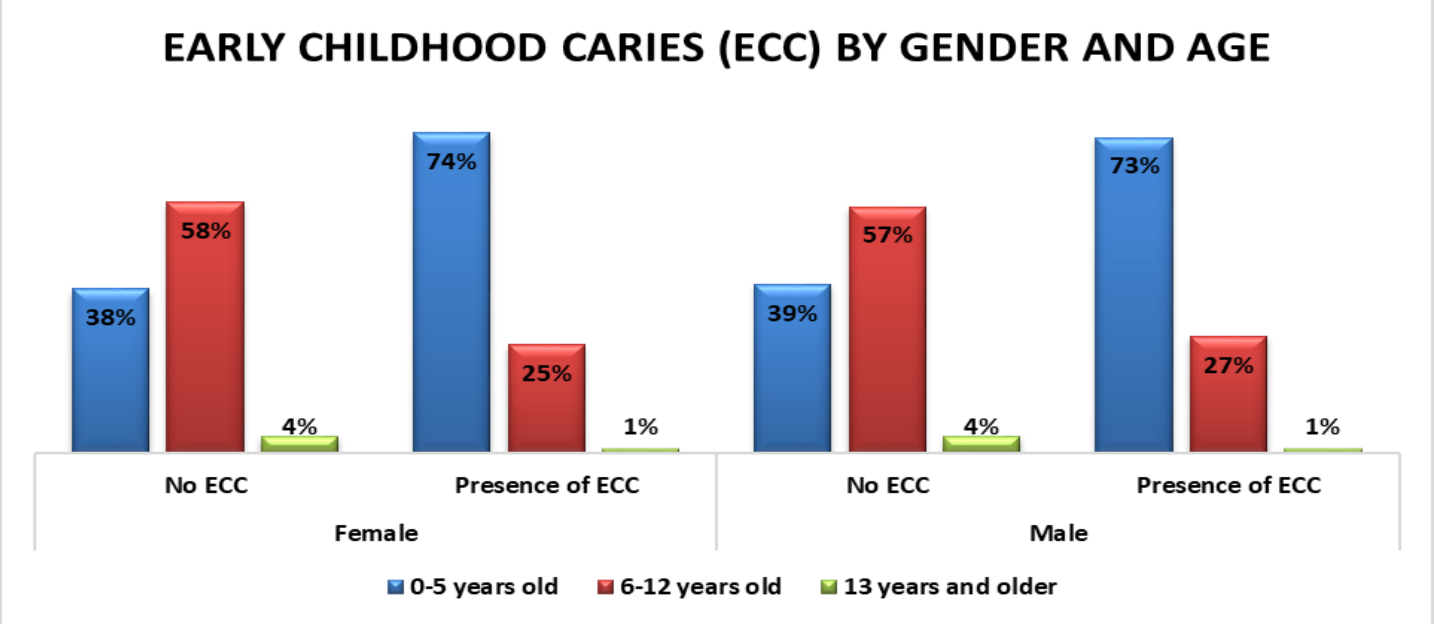

Children in counties with no dentists had much higher rates for follow-up care referrals than children with dentists in the county.

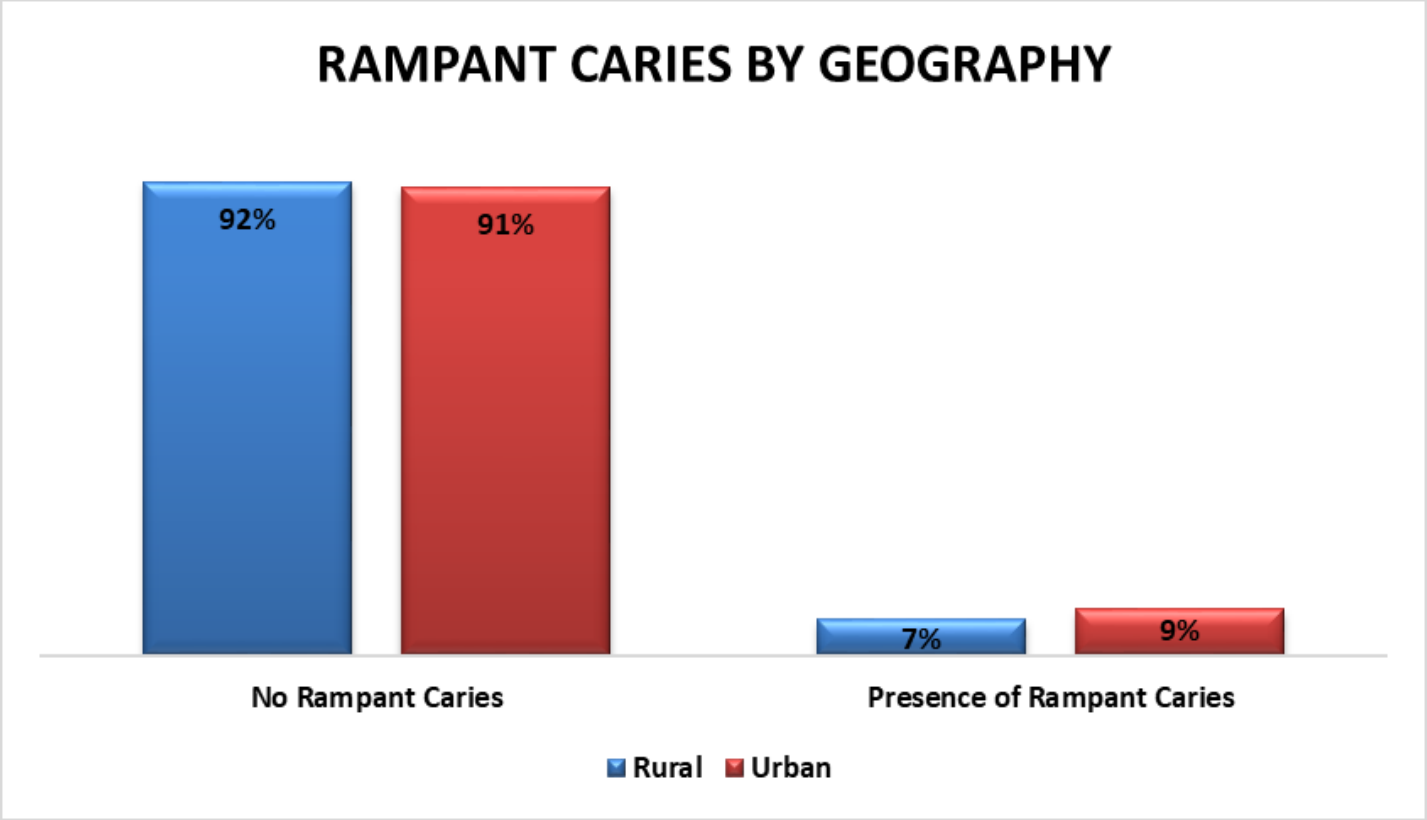
# Caries for PSP Participants

Dental Caries is one of the most common childhood diseases. Caries is the Latin word for "rotten"[1] and is the technical term for cavity. A cavity is a late manifestation of a bacterial infection.[1] A cavity is the result of plaque forming over a tooth and dissolving the enamel. Plaque occurs when bacteria form a gelatinous film that adheres to the tooth's surface.[1] When plaque is considered cariogenic (causing decay) a single site on a tooth could have close to half a billion bacteria living there, including *Streptococcal mutans spp*.[1] Once these bacteria are on the tooth, they begin to ferment sugars and carbohydrates that form lactic and other acids that lead to the eventual erosion of the enamel covering the tooth.[1] Once that protective enamel layer is gone, the tooth begins to decay from the bacterial infection. With PSP, seven or more untreated caries in a child's mouth is considered rampant caries.

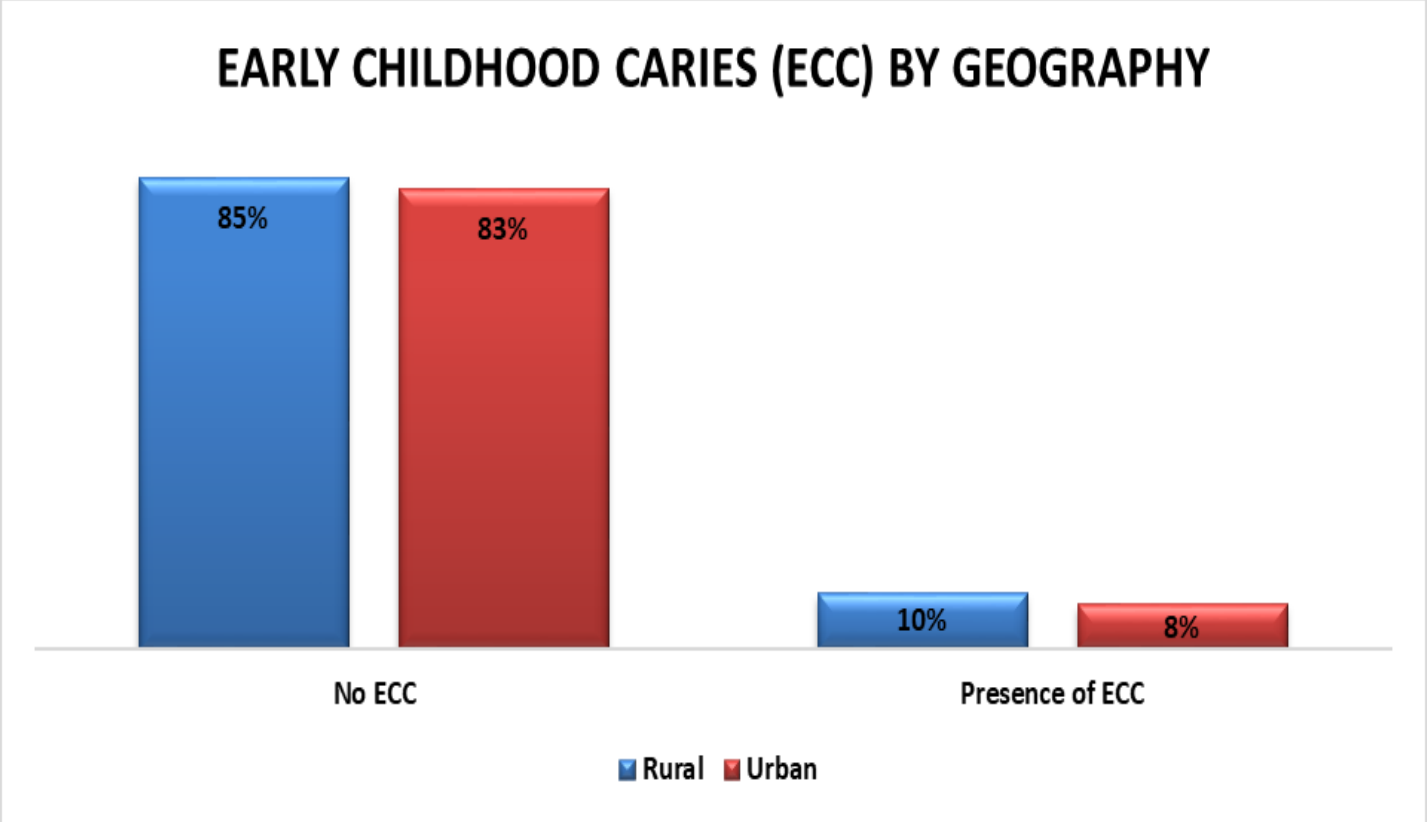
In the 2017-2018 school year, males 6-12 year old had the highest rate of rampant caries. Females 0-5 years old had the highest rate of early childhood caries.



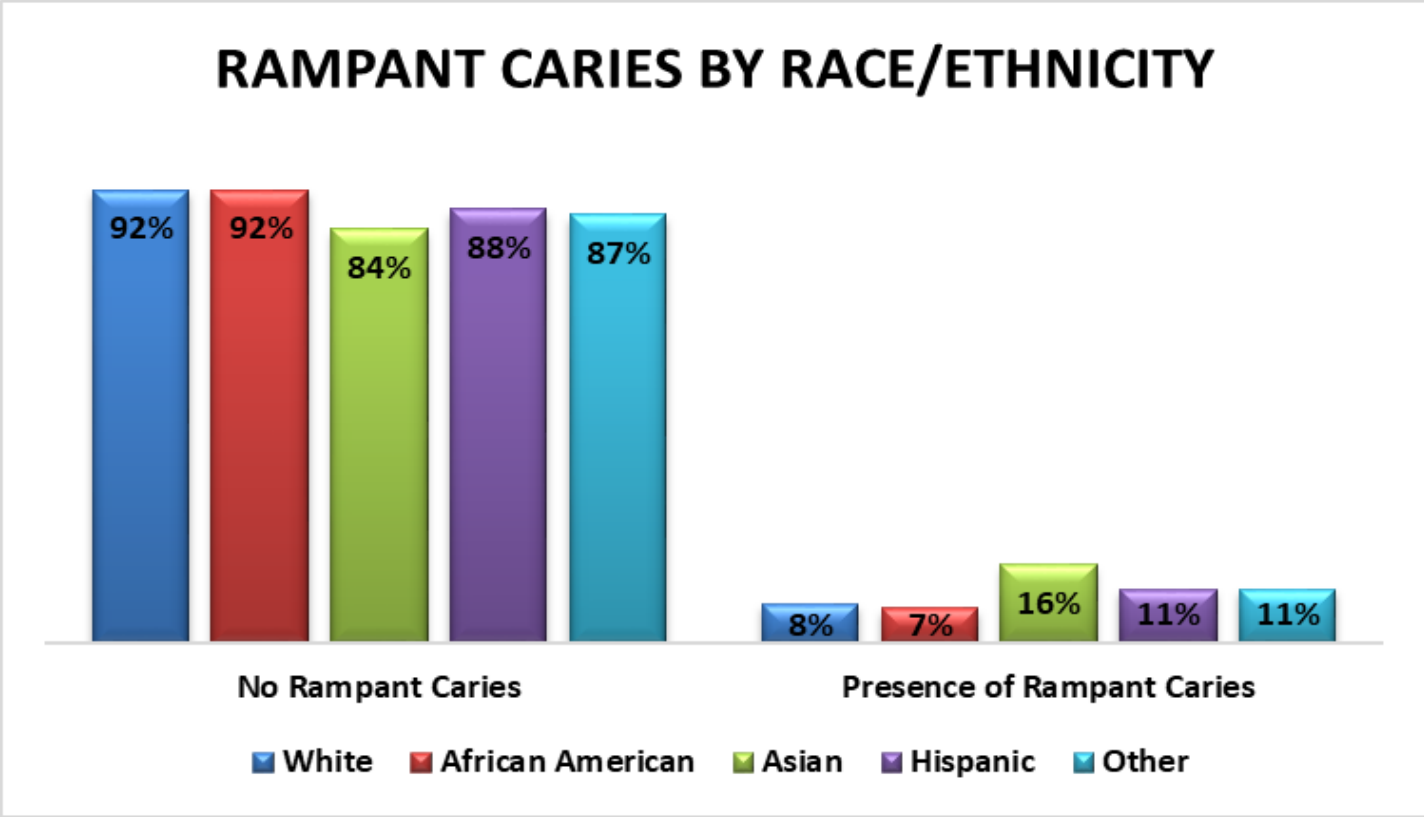





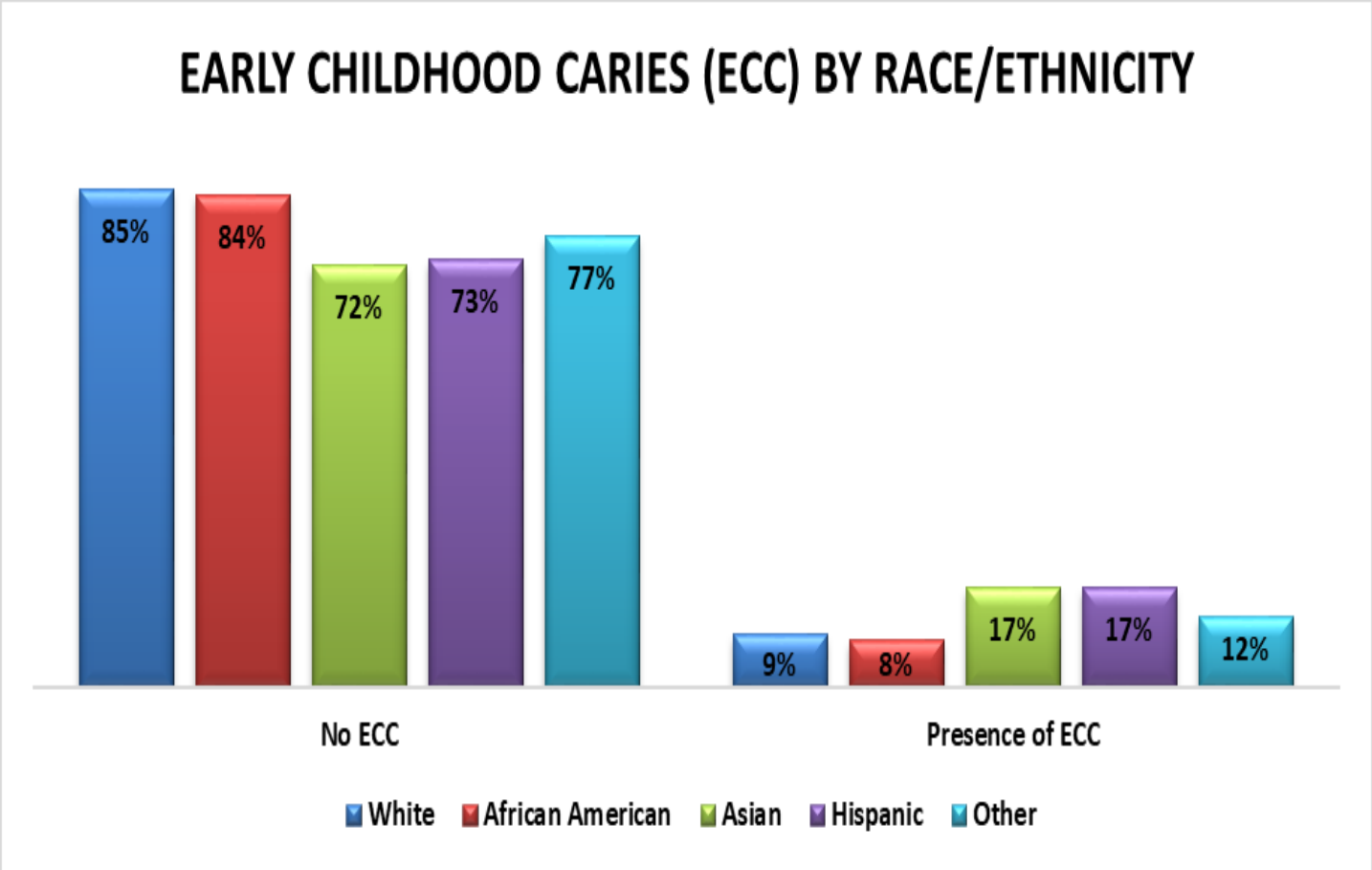

Children in rural counties had a slightly lower percentage of rampant caries than children in urban counties. Rural children accounted for 51% of all rampant caries during the school year.

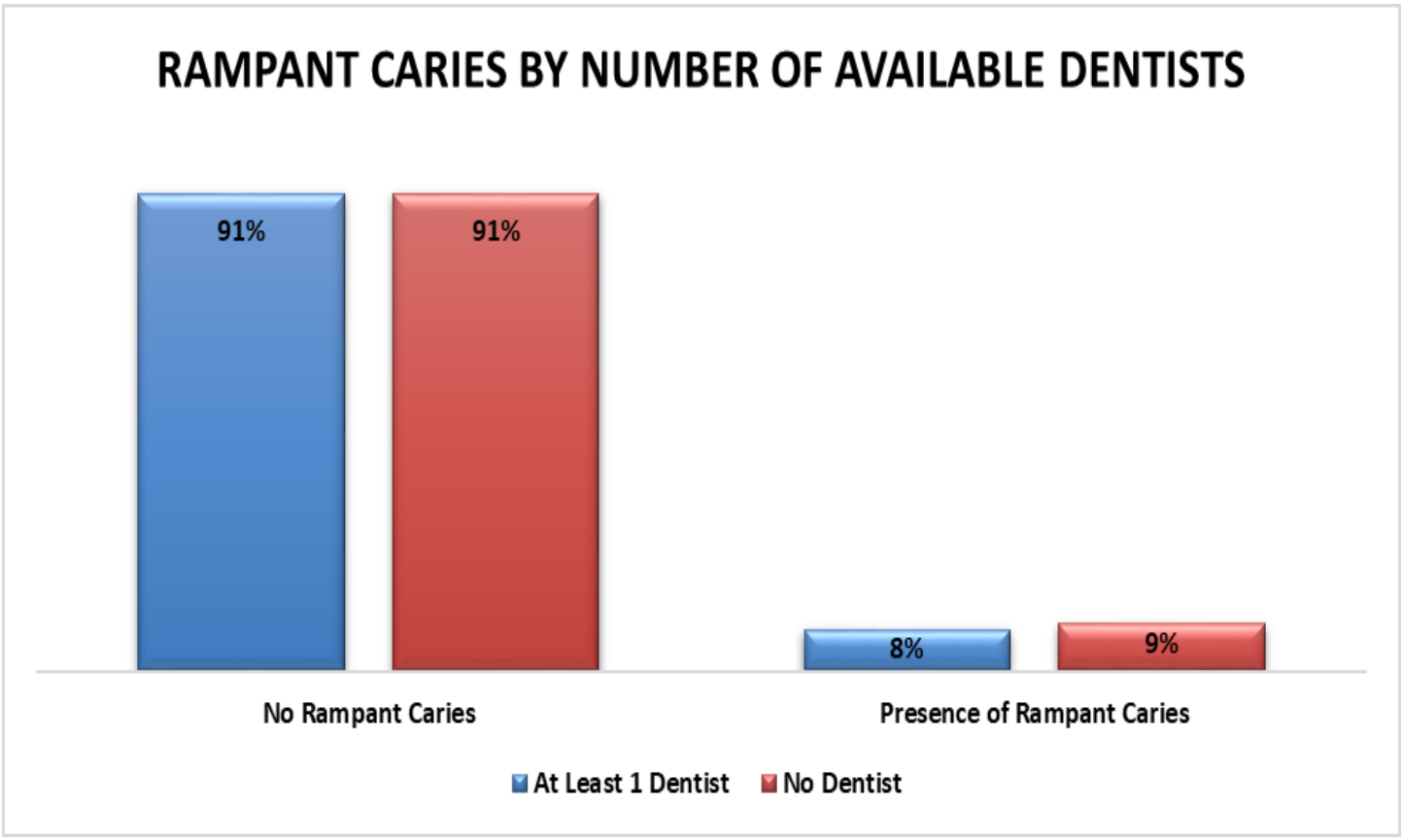



Children in rural counties had the highest percent of early childhood caries and accounted for 62% of all early childhood caries.

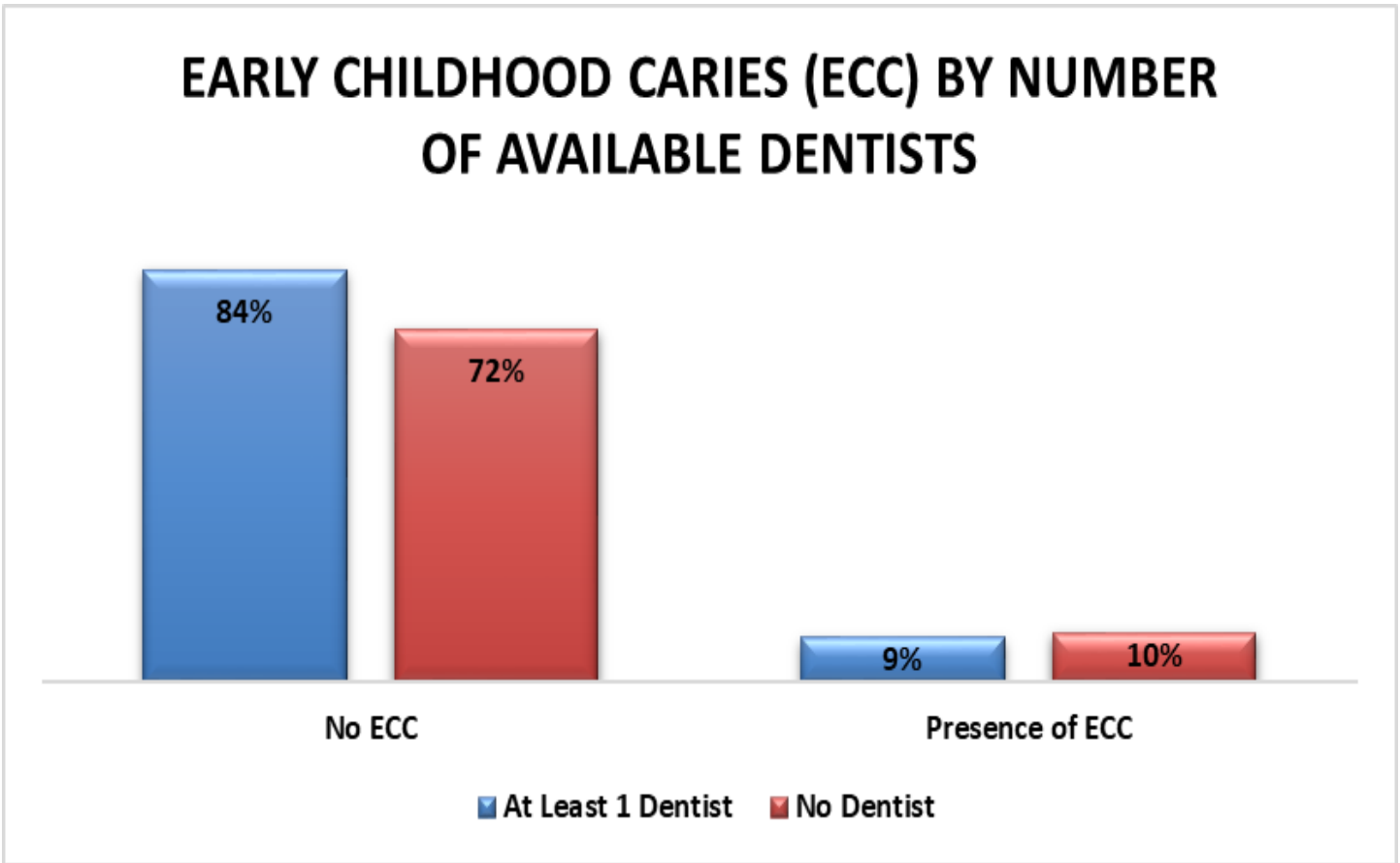



Children who were identified as Asian had the highest rate in rampant caries and tied with Hispanic children for the highest rate of early childhood caries. Children who were identified as African American had the lowest percentage of caries in both categories.



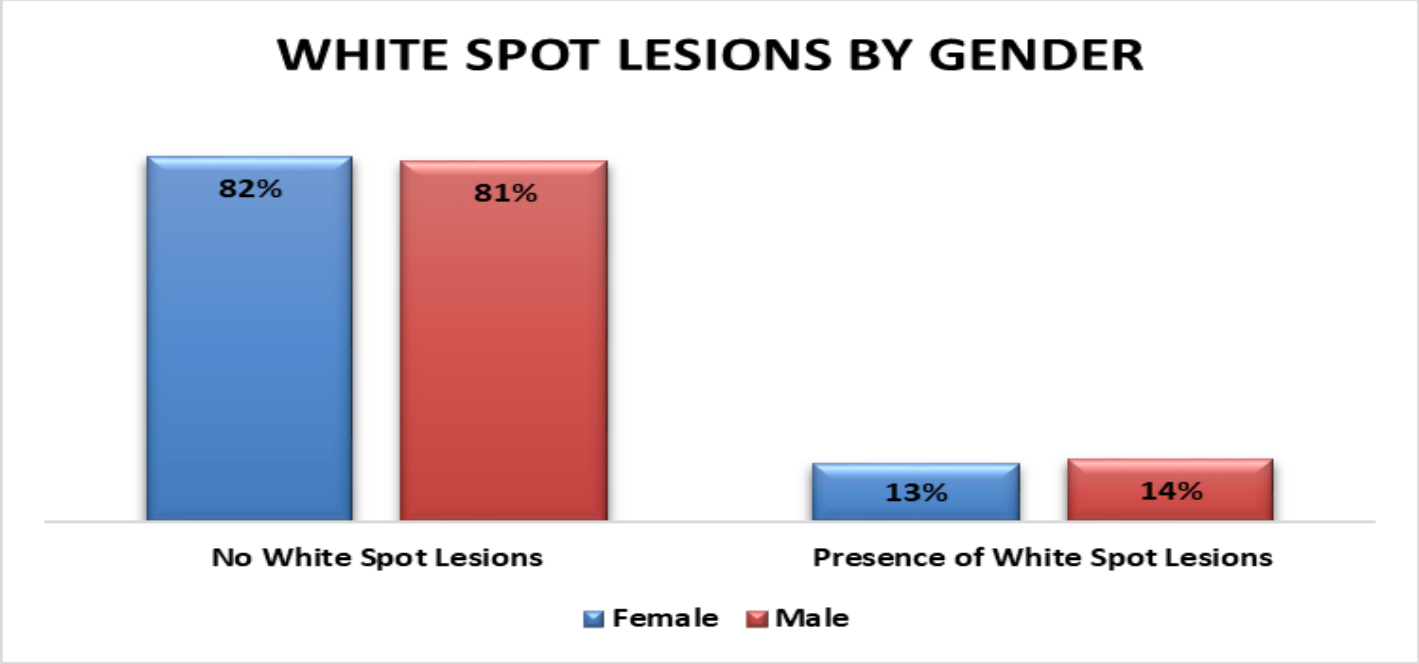



Children in counties with no dentists had higher percentages of rampant caries and early childhood caries.

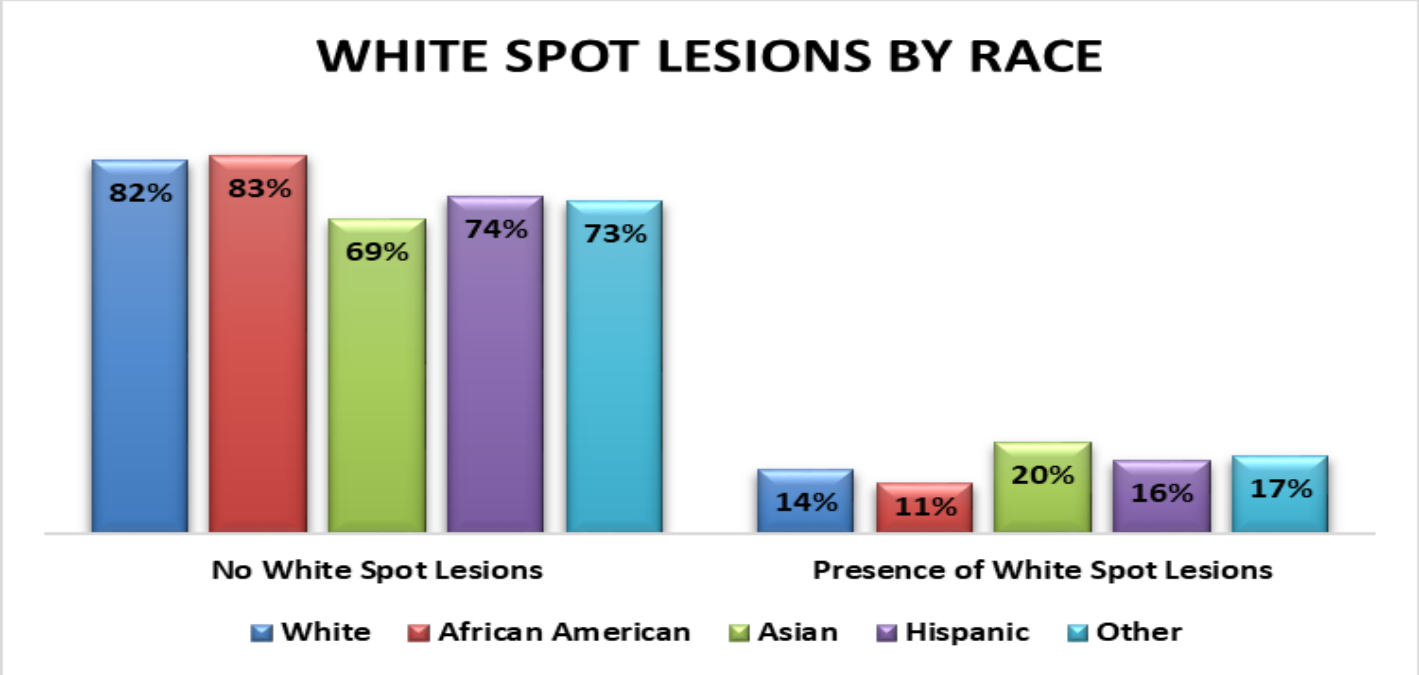


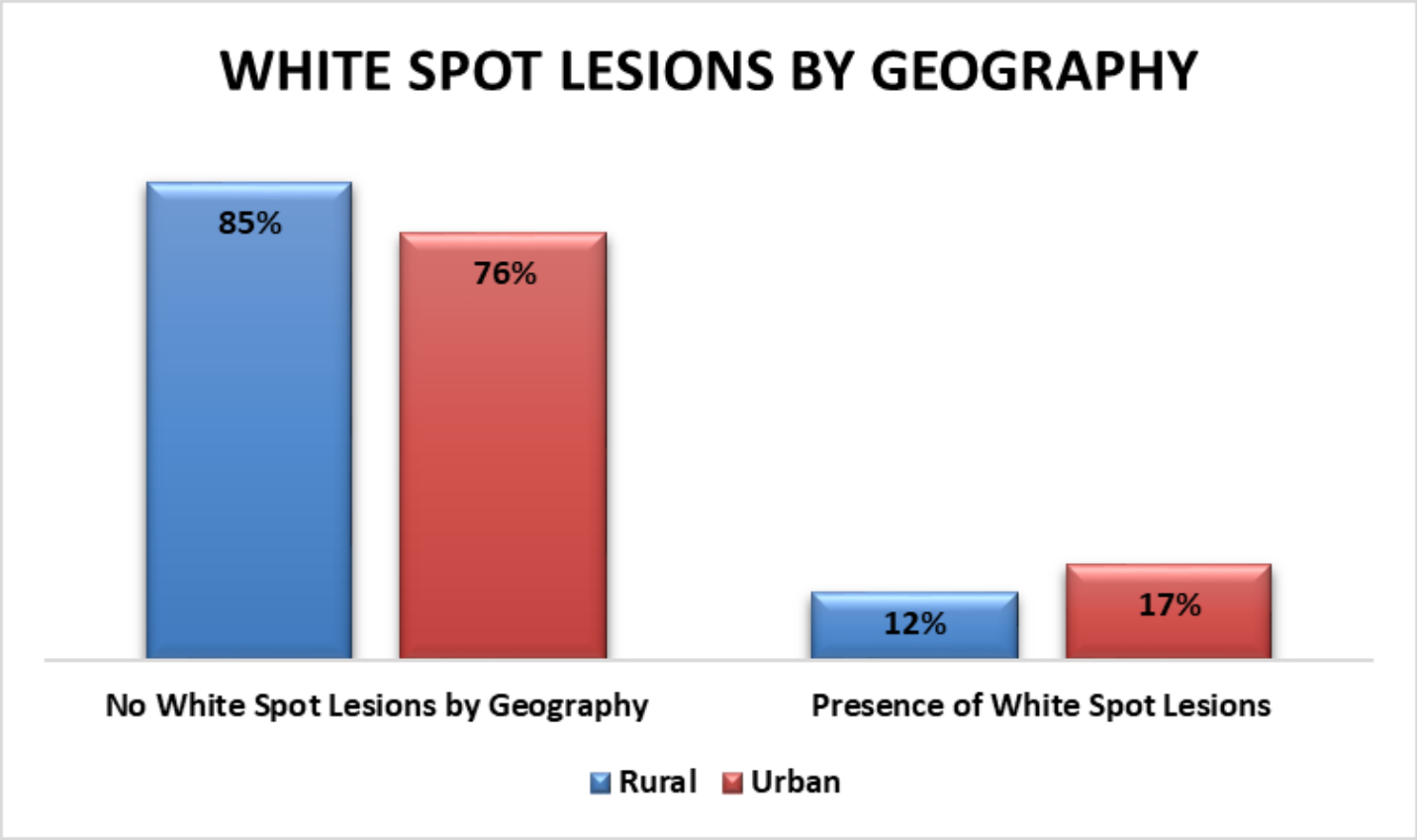
# White Spot Lesions for PSP Participants

White spot lesions are the first signs of decay in children under the age of 5. White spots appear pale and chalky just around the gum line. While white spots are a sign of decay, they are reversible. When treated with fluoride early enough, the enamel can strengthen and help fight off the decay. If Fluoride isn't applied, the spots will continue to decay and turn yellow or brown. [3]

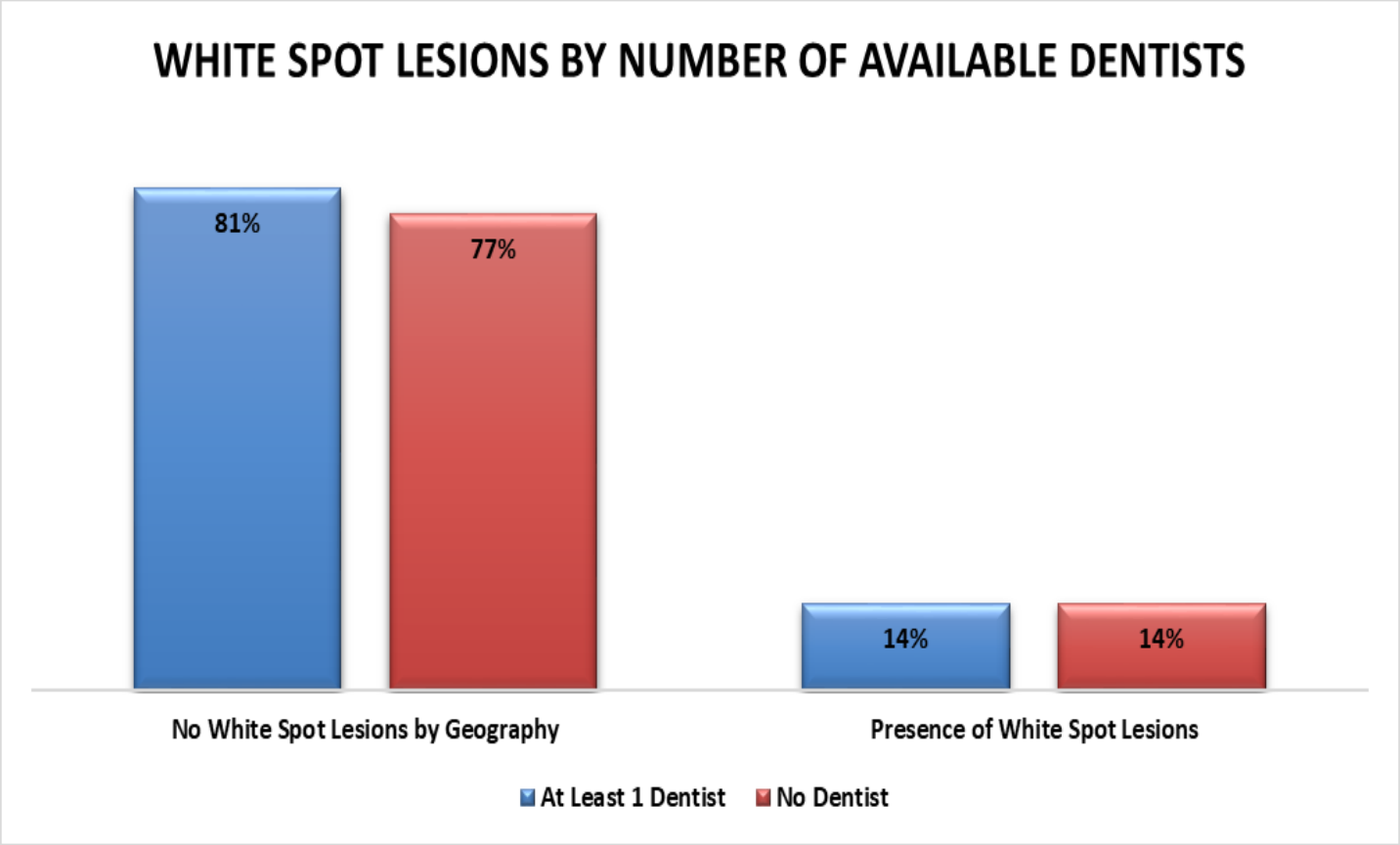



White spot lesions are only included for children 0-5 years old. Males were slightly more likely to have white spot lesions. Children identified as Asian had the highest percent of white spot lesions and children identified as African American had the lowest percent of white spot lesions.






Children in urban counties had a higher percent of white spot lesions.




There was an even split on percentages of white spot lesions between children in counties with no dentists and children in counties with at least one dentist.

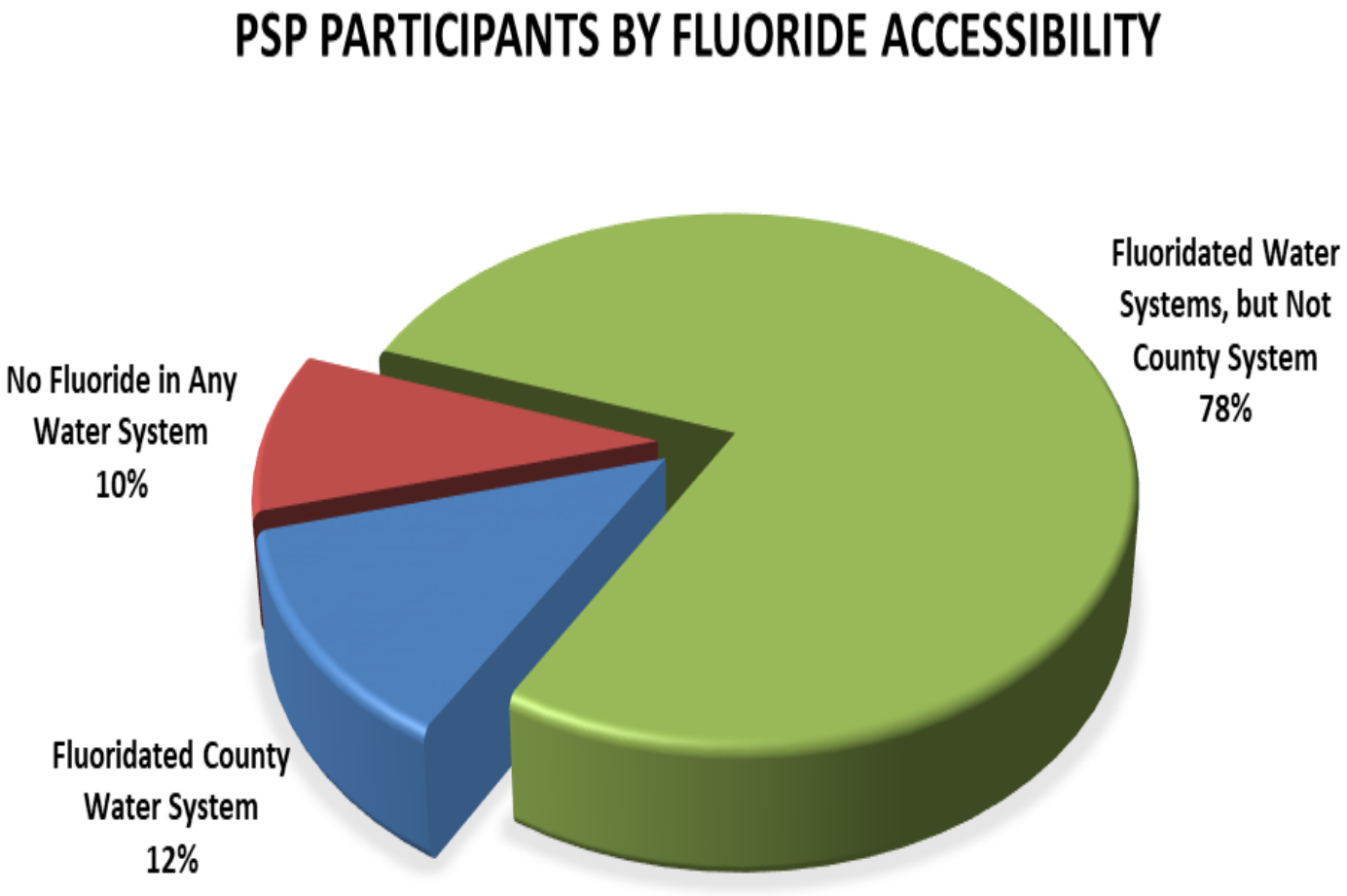
# Fluoridated Water Supplies and PSP Students

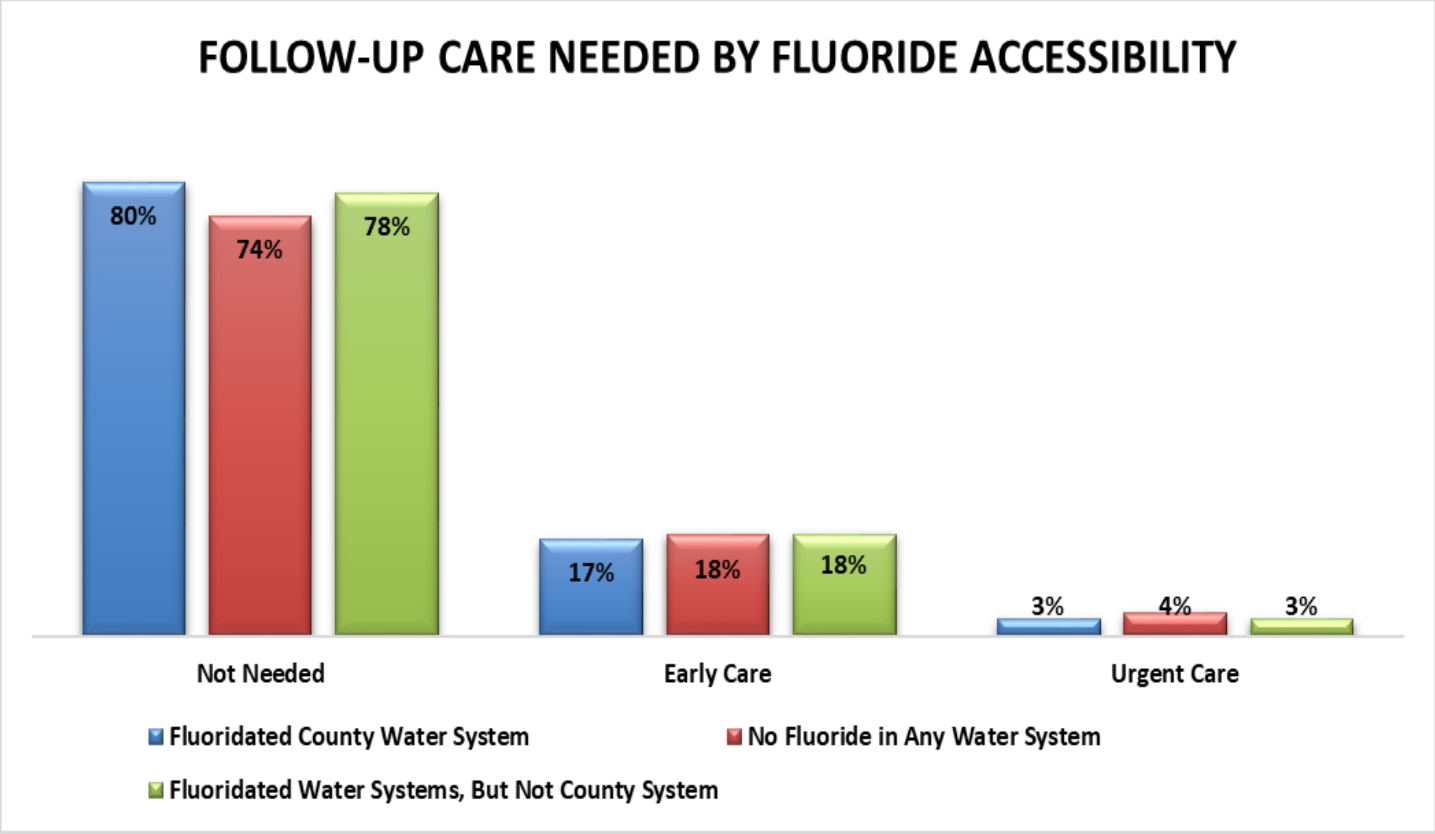
Fluoridated water supplies are hugely beneficial to oral health. The CDC estimates that fluoridated water can reduce cavities by 35% in children.[4] Fluoride in the water also saves money in the long run. It is estimated that "every $1 invested in water fluoridation saves $38 in dental treatment costs."[5] Despite numerous claims that fluoridated water supplies are toxic, erode lead pipes, and cause health problems, scientists have shown through many evidence based studies that there is no scientific basis to these claims.[4, 5]

Since water fluoridation varies from county to county, the fluoridated variable is broken into three groups: Counties with fluoridated county water systems, counties with no fluoride in any waters systems, and counties with fluoride in some water systems but not the county water system. Most children lived in a county that had fluoridated water, but not in the county system.

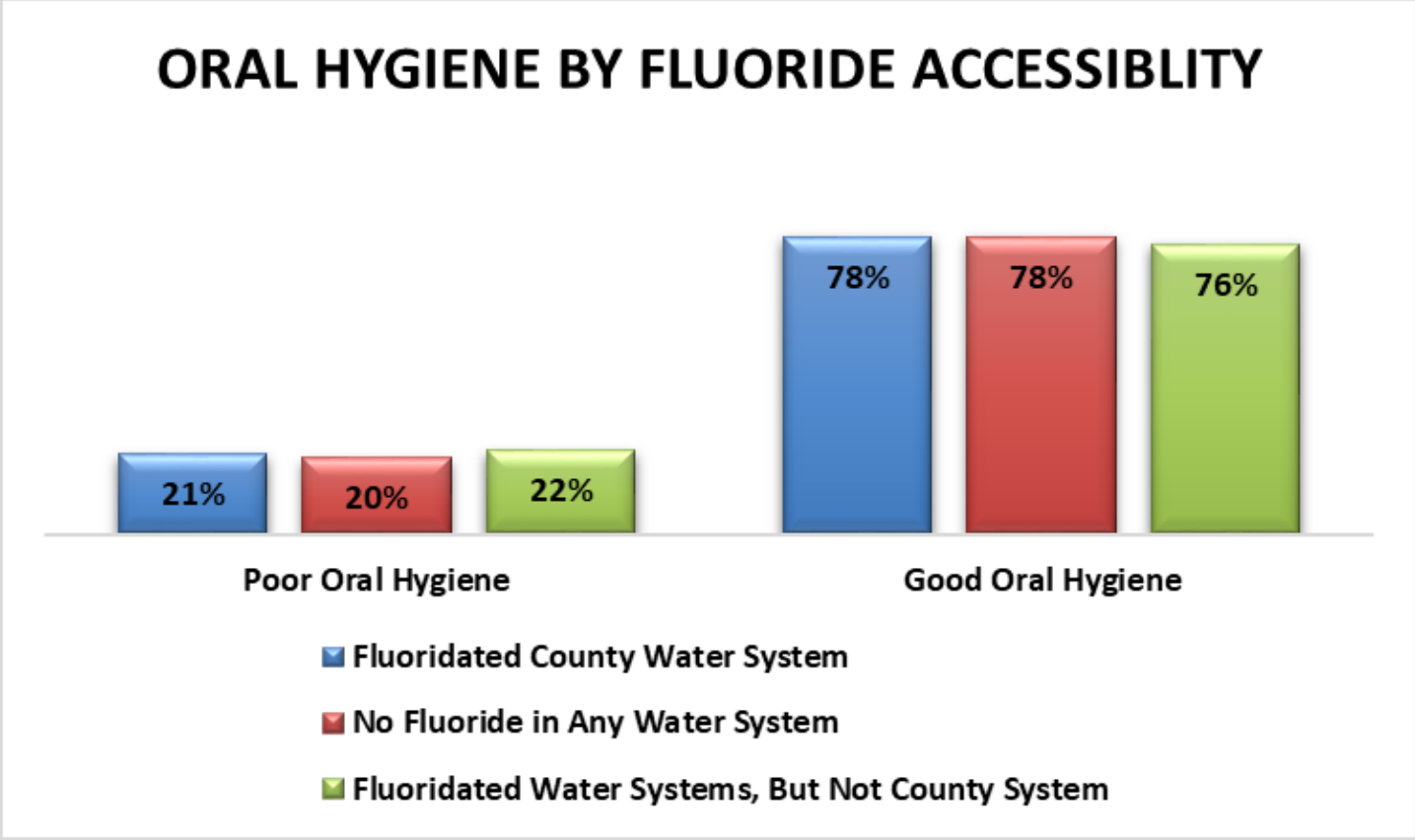
Of all the children screened and deemed to have poor oral hygiene, 10% lived in counties with no fluoride in the water supply; 12 % lived in counties with fluoridated county water system; and 78% lived in counties that had some water systems with fluoride but not the county water system.

| Fluoridated County Water System | No Fluoride in Any Water System | Fluoridated Water Systems, But Not County System |
|---|---|---|
| 10,974 | 8,522 | 68,642 |

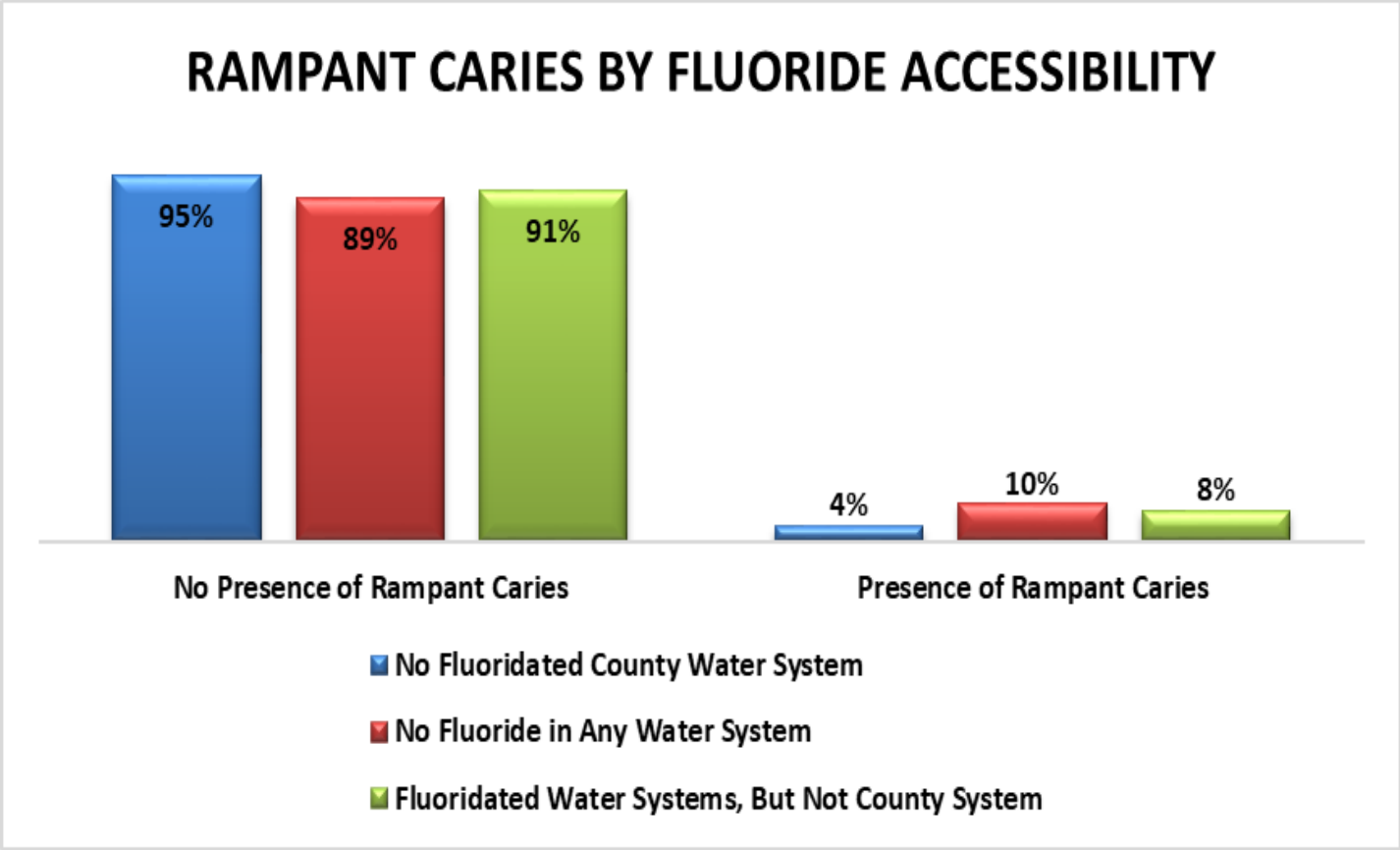




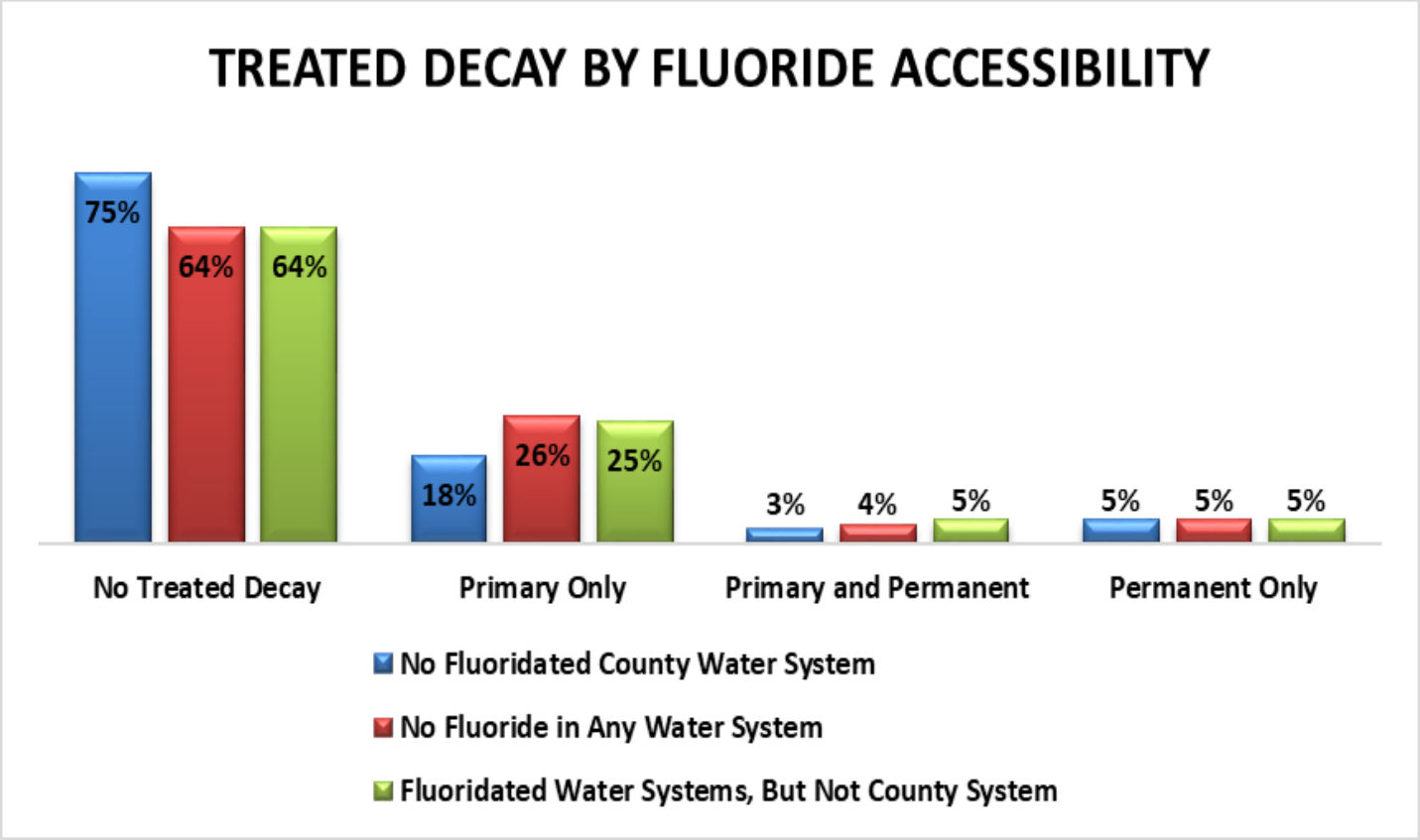

For non-fluoridated counties, children were screened at slightly higher rates for needing follow-up care than children from fluoridated counties, particularly in urgent care situations.



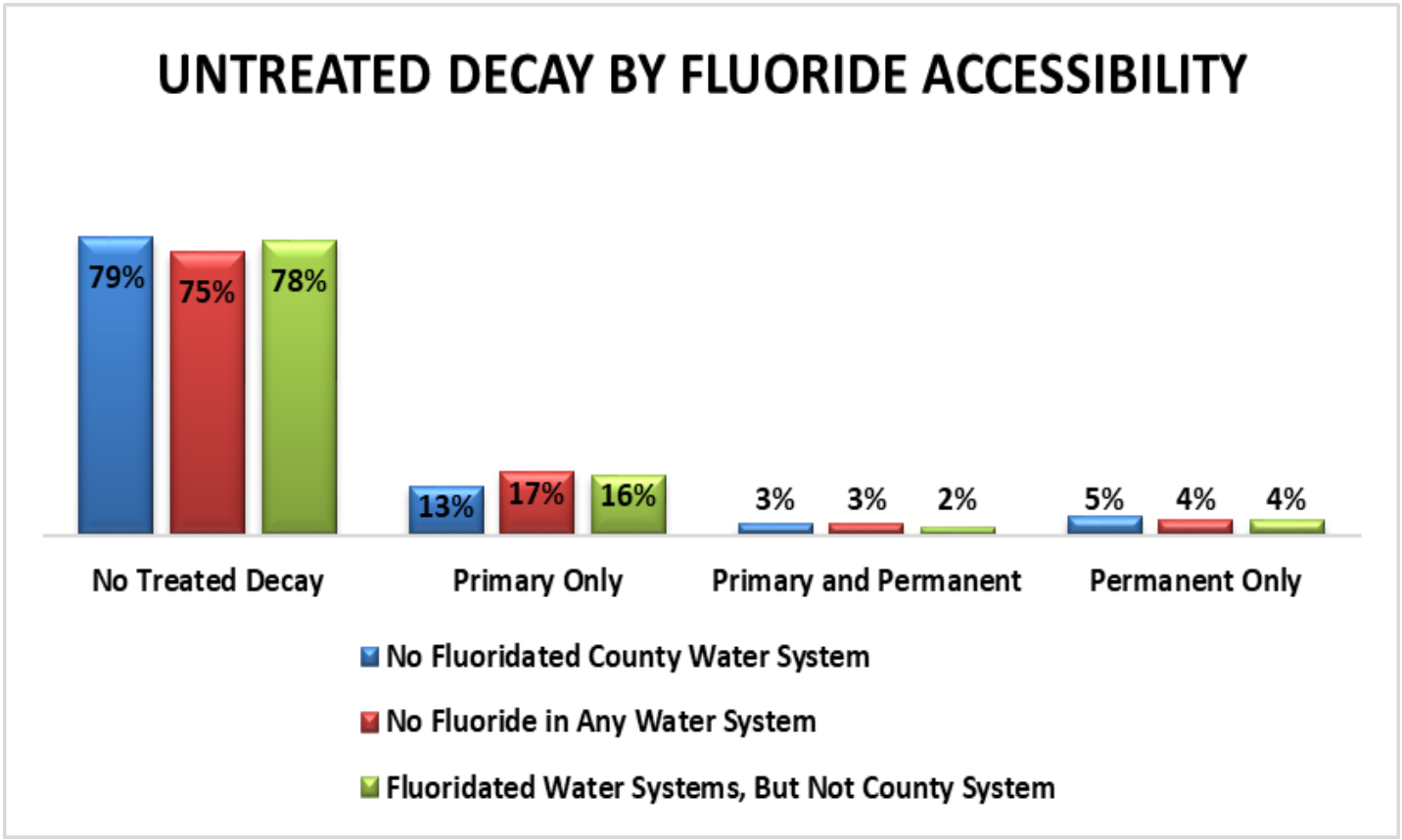

The lowest percent of children with poor oral hygiene lived in counties without any fluoride in the water supplies.

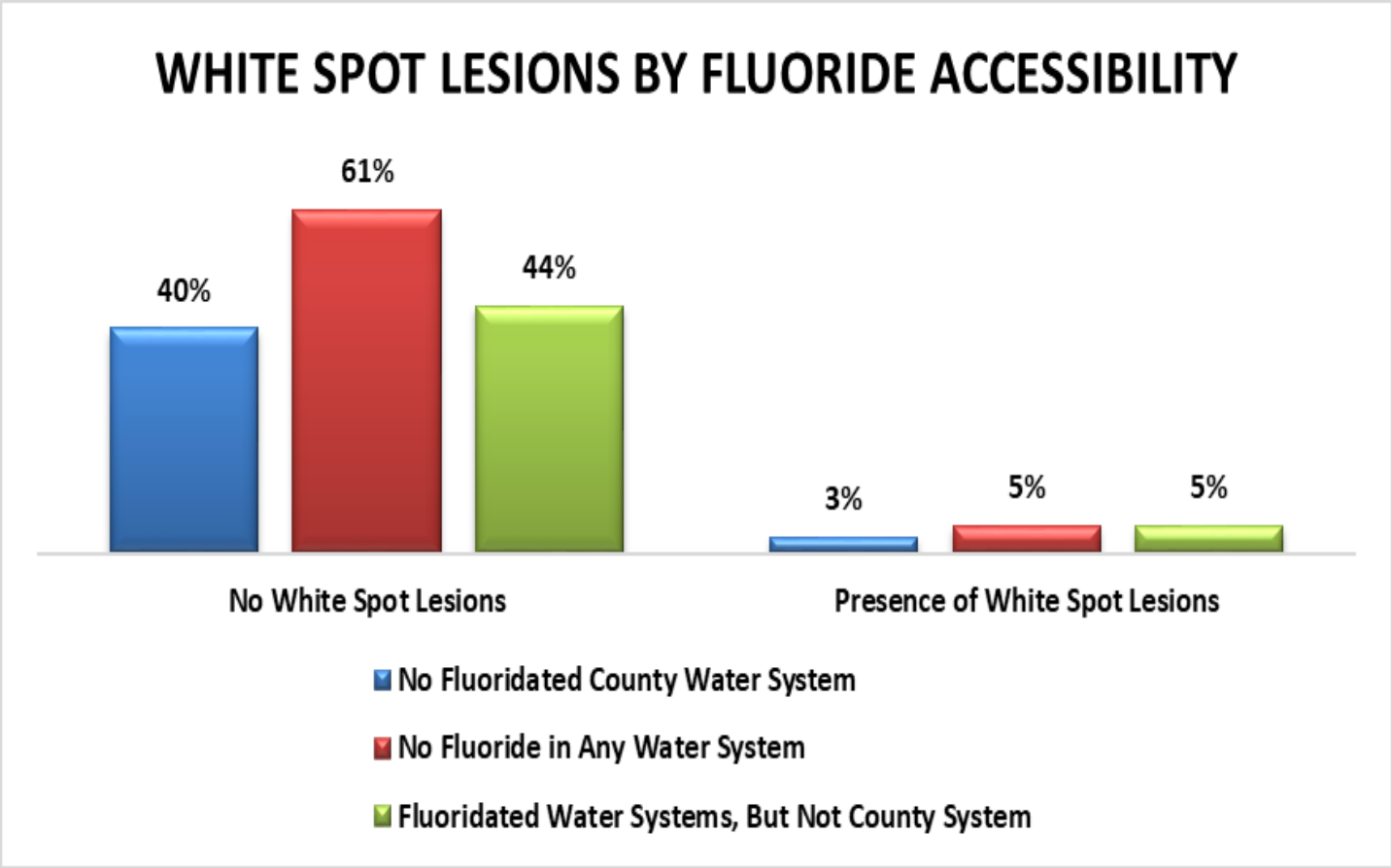



Counties with fluoridated county water supplies had the lower rate of rampant caries followed closely by the counties that have some fluoridated water systems.

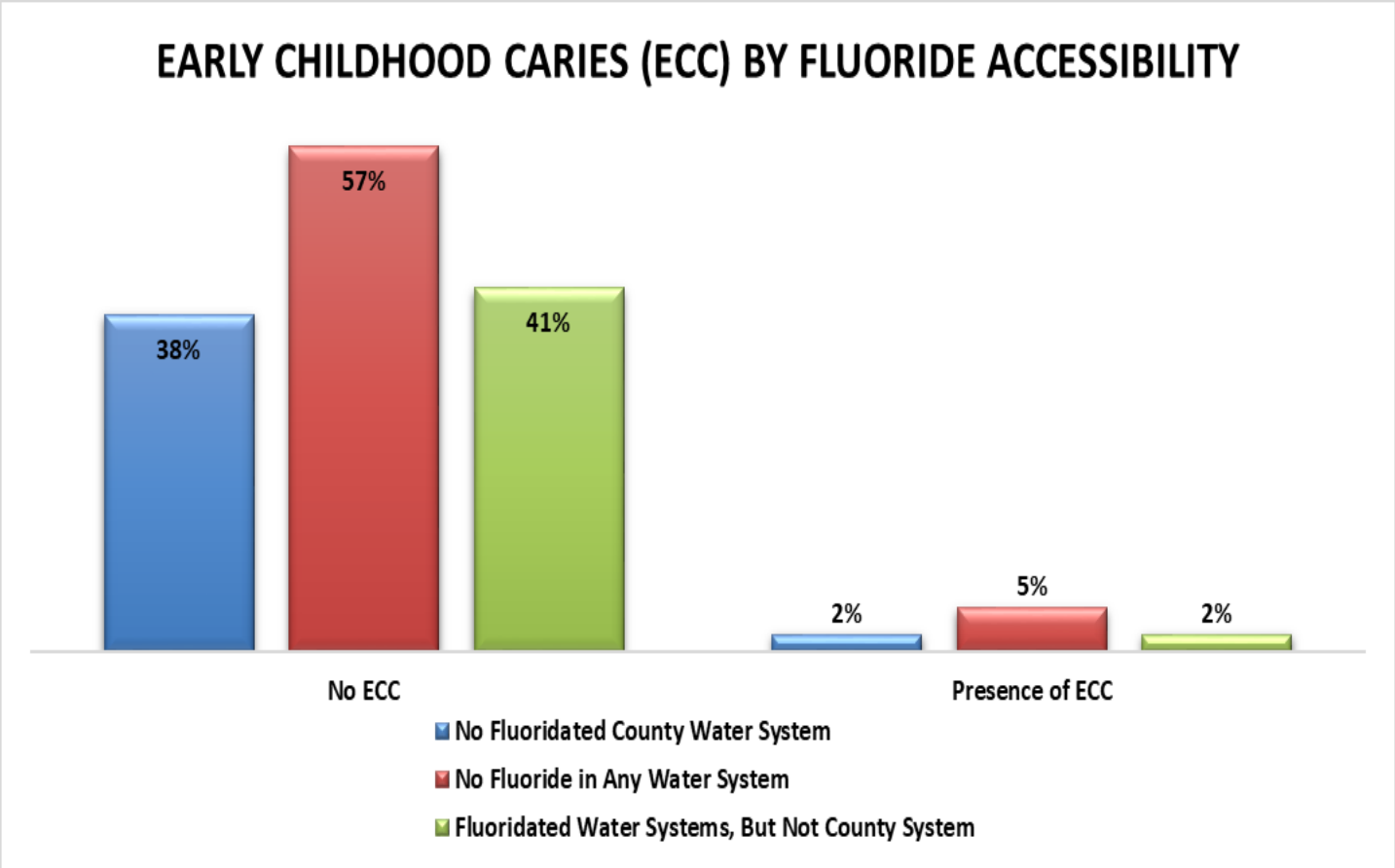



Counties with fluoridated county water supplies had much lower rates of treated and untreated decay. Primary teeth were the most commonly seen with both treated and untreated decay, and in both instances, counties with fluoridated water supplies had the lowest percentage followed by counties with some fluoridated water supplies.

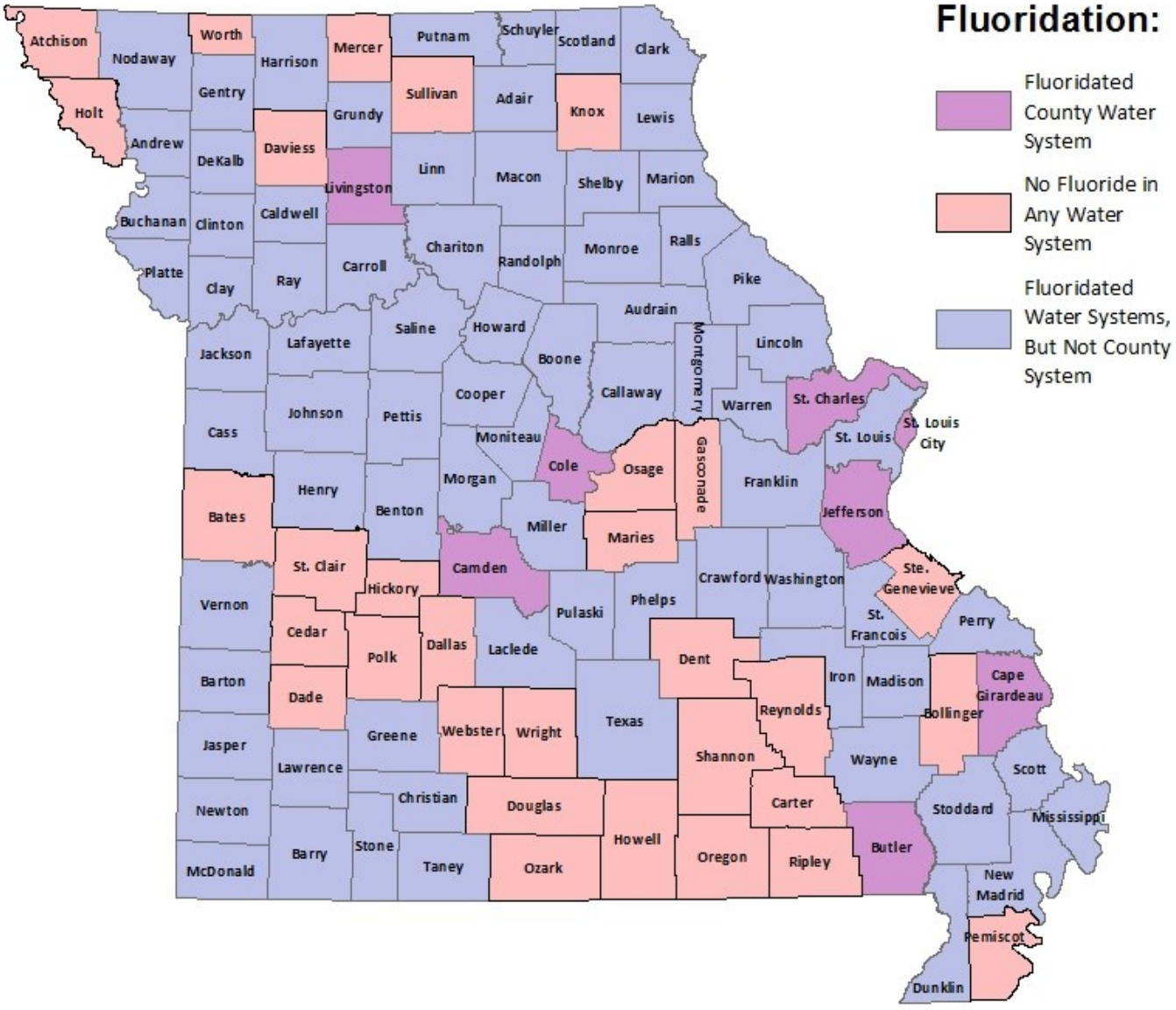





Counties that had no fluoride had a higher percentage of children 0-5 years old with early childhood caries than children the same age who lived in counties with fluoridated water systems.



# Fluoridation in Missouri Counties' Water Systems



# Conclusion

The 2017-2018 school year had a **5.04%** decrease in children participating in PSP. Despite this recent drop, there is still a growing trend in PSP participants compared to the inaugural year.

## *Preventive Factors:*

☐ **78.5%** of the children that participated in PSP events had what was considered good oral hygiene. Males 6-12 years old, and children whose race was marked as Other had the highest frequency of poor oral hygiene.

☐ Dental sealants were found on **18.7%** of children screened who were 6 years and older. African American children were the least likely to have dental sealants while Hispanic children were most likely.

## *Tooth Decay:*

☐ **66.4%** of screened children had no treated decay, and approximately **78.1%** had no untreated decay. Children of "Other" races were the most likely to have signs of treated and untreated decay.

☐ Rampant caries were seen in approximately **8%** of screened children. This was a slight increase from the 2016-2017 school year where only 7% of children screened had rampant caries. Children identified as Asian had the highest percent of rampant caries.

## *Treatment Urgency:*

☐ Approximately **21%** of children screened were identified as needing early or urgent dental care. These children were sent home with a notification for parent/guardian about the issue. Urgent dental care was required most in children 6-12 years of age.

## *Early Childhood Findings:*

☐ White spot lesions were found in approximately **14%** of screened children 0-5 years of age. This was an increase from the 10% found in PSP participants in the 2015-2016 school year. White spot lesions were observed more in children whose race was marked as Asian.

# References

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2. American Dental Association. (2017). Decay. Retrieved September 28, 2017, from http:// www.mouthhealthy.org/en /as-topics/d/decay

3. Freeman, A. (2015, October 23). What Causes White Spots on Baby Teeth? Retrieved September 29, 2017, from http://www.colgate.com/en/us/oc/oral-health/life-stages/infant-oral-care/article/what-causes-white-spots-on-baby-teeth-1015

4. Centers for Disease Control and Prevention. (2018, February 15). Community Water Fluoridation. Retrieved August 31, 2018, from https://www.cdc.gov/fluoridation/faqs/community-water-fluoridation.html

5. American Dental Association. (2018). 5 Reasons Why Fluoride in Water is Good for Communities. Retrieved August 31, 2018, from https://www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation/5-reasons-why-fluoride-in-water-is-good-for-communities