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# An Assessment of What Factors Affect the Average Number of Caries Seen Per Visit Among Children Visiting a Mobile Dental Unit in South Central Kentucky

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AN ASSESSMENT OF WHAT FACTORS AFFECT THE AVERAGE NUMBER OF  
CARIES SEEN PER VISIT AMONG CHILDREN VISITING A MOBILE DENTAL  
UNIT IN SOUTH CENTRAL KENTUCKY

A Capstone Experience/Thesis Project

Presented in Partial Fulfillment of the Requirements for

the Degree Bachelor of Science with

Honors College Graduate Distinction at Western Kentucky University

By

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2014

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## ABSTRACT

**Background:** Dental caries is the single most common chronic childhood disease in Kentucky affecting 20% of preschoolers, 50% of second graders, and 75% of 15 year olds. Dental caries, also known as tooth decay, occurs when bacteria from salivary glands produce an acid to breakdown food. If this acid is not cleaned off the teeth, it can destroy the tooth enamel. Dental problems can be linked to the inability to pay for dental care (i.e. insurance), limited access to dental providers, and parental inability to take their children to dentists. To help address the issue with tooth decay seen among children, mobile dental clinics are tied with school-based dental programs to deliver oral healthcare to the community.

**Methods:** With the use of data from the Institute for Rural Health (IRH) at Western Kentucky University (2006- 2011), the study examines the data from children (6 to 15 years of age) who sought care through the mobile dental unit (MDU). The study focused on the possible relationship of socioeconomic status (i.e. average income level in household income, median income) and access (number of dental providers in a service area) with the dental caries status of children. This study analyzes data from IRH MDU, the 2010 U.S. Census, and the Kentucky Dental Association. The number of caries identified between the years of 2006 to 2011 were calculated to be defined as the average number of caries seen per visit and it was compared to the median income per county, the education level per county, and provider density per county.

**Results & Conclusion:** It was found that the median income might have a complex relationship with the average number of caries seen per visit. The provider density and education level may have an indirect relationship with the average number of caries seen per visit. The availability and access to dental providers may be a key determinant in the average number of caries seen per visit in children.

Keywords: dental caries, children, median income, education level, provider density

Dedicated to  
Continued Research by Jimmy Shah and Continuous Support from Mom, Dad, Sister,  
Miles & Family

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## CHAPTER 1

### INTRODUCTION

According to the American Association of Pediatric Dentistry (n.d), the most common chronic childhood illness is dental caries. Dental caries, also known as tooth decay, occurs on the teeth when acid from food is left on the tooth for too long. According to the National Children's Oral Health Foundation (2012), childhood dental caries is also the most common worldwide problem. The most industrialized countries, like the US still suffer with childhood tooth decay. It is stated that approximately 17 million children go without dental care each year (NCOHF, 2012). "Rampant decay can negatively impact a child's overall quality of life, inhibit their cognitive and social development and compromise their growth, function and self esteem" (NCOHF, 2012). There are many factors that keep children from receiving proper oral care each year. According to authors Kelly, S. E., Binkley, C. J., Neace, W. P., & Gale, B. S. (2005), "Children from low-income families are less likely to receive comprehensive dental care and are more likely to have acute dental disease than children from middle- and upper-income families". Furthermore, Kelly, S. E., et al (2005) states,

Access to care is limited by the number of dentists who accept Medicaid or provide charity care for the uninsured. In the few caregiver studies that have been conducted, factors affecting access include lack of knowledge among caregivers and physicians of the consequences of oral disease among children, children's dental anxiety, and negative experiences with the dental care system (difficulty

with locating providers, arranging appointments, and transportation; long waiting times; and discriminatory treatment).

The state of Kentucky, like many other, are consistently working to improve its overall oral healthcare.

“KY ranked high for teeth cleaning and dental sealants, but had greater caries experience and untreated caries among children” (Chattopadhyay, A., Arevalo, O., Cecil, JC., 2008).

Governmental and non-governmental assistance programs, such as Medicaid, Kentucky Children’s Health Insurance Program (K-CHIP), and SMILE Kentucky, provide basic dental services for children from low-income families but factors still exist that keep children from receiving these services. Optimal community health begins with the children and making sure there is accurate access to fluoridated water is one initiative that can adverse the effects of dental caries. Today approximately 96 percent of Kentucky’s citizens are on a fluoridated water supply, making Kentucky a national leader (McKee, 2014). Another initiative includes the implementation of the mobile dental unit. Mobile dental units provide preventive care to a community that may have limited access to care. Some dental units are supported by school-based programing to help children of all demographics receive dental screenings.

The Institute for Rural Health at Western Kentucky University operates the Mobile Dental Unit for South Central Kentucky, which visits 10 counties in the area. Between the years of 2006 to 2011, a dentist, dental hygienist and supervised hygiene students collected patient dental information that was compared to the education level, the median income, and the provider density in each county. From this data, the objective was to

describe and assess what factors affected the average number of caries found in children visiting the mobile dental unit.

## CHAPTER 2

### LITERATURE REVIEW

The American Academy of Pediatric Dentistry (AAPD) released a document about early childhood caries and how detrimental it can be to a child's health. Early childhood dental decay is an important oral health concern because tooth decay can cause pain as well as long-term health complications. The more a child is exposed to sugary liquids such as milk, breast milk, juice etc. the more their risk increases. It is important that parents are educated on brushing a child's gums to keep bacteria from forming and causing decay. The AAPD states that tooth decay is more common than asthma, obesity and diabetes. The National Children's Oral Health Foundation (NCOHF) supports the commonality of childhood tooth decay. It also mentions that untreated tooth decay can lead to developmental issues and low self-esteem. Early tooth decay can also result in eating problems and possible speech problems. Fortunately, tooth decay is preventable with proper education and initiatives to help with the global issue.

The state of Kentucky has the social stigma of having unpleasant oral health. Fluoridated water is a major public health initiative that has greatly reduced the number of people with tooth decay. Julie McKee (2014), who is the state of Kentucky's Dental Director, records that 96% of its residents has access to fluoridated water. The Journal of the Kentucky Medical Association published work by A. Chattopadhyay, O. Arevalo, and JC

Cecil (2008), which states that Kentucky is the 2<sup>nd</sup> in the nation in providing fluoridated water. It states that although Kentucky has a high rate of dental cleanings and sealants, there is still a high rate of untreated tooth decay amongst children.

A study done in Jefferson County, Kentucky by Susan E. Kelly, PhD, Catherine J. Binkley, DMD, MSPH, William P. Neace, PhD, and Bruce S. Gale, MS, MAT (2005) was seeking to identify barriers among nonutilizing caregivers of Medicaid enrolled-children. There were a total of 8 focus groups in the study and it was found that the strongest demographic factor associated with utilization was caregiver education.

“Approximately three quarters of nonutilizing caregivers reported no more than a high school education, and more than half of utilizing caregivers reported at least some college” (Kelly, S. E., et al, 2005). Other barriers included their health beliefs such as correlating oral health with overall health and recognizing professional preventive dental care with the caregiver’s responsibility for the children’s overall health (Kelly, S. E., et al, 2005). “Transportation, school absence policies, discriminatory treatment, and difficulty locating providers who accept Medicaid” (Kelly, S. E., et al, 2005) were structural barriers that kept caregivers from taking their child to receive oral care.

## CHAPTER 3

### METHODS

The Institute for Rural Health Mobile Dental Unit provided the data for this research. A dentist, a dental hygienist and supervised dental hygiene students collected the data. The Mobile Dental unit visits each of the 10 counties during various times of the year and provides dental screenings for children ages 6 to 15. During these screenings, they were able to capture the number of caries found for each child and correlate it to their respective county. The number of caries found in each child, per visit, per county, was totaled to give the total number of caries found per county for the years of 2006 to 2011. This number was then divided by the total number of visits paid to each county giving the average number of caries seen per visit. The average number of caries seen per visit was then compared to the education level, median income, and provider density. The education level and the median income was taken from the 2010 US Census. The provider density was calculated using the Kentucky Dental Association (KDA) provider data. First, all zip codes that were associated with each county were tabulated by a zip code map. Then, each zip code was typed into the KDA provider database to find what dentists practice within that zip code. Once the total number of providers in each county was found, it was divided by 10,000.

The graphs displayed in Chapter 4 were populated using Microsoft Excel and they show the average number of caries seen per visit versus the education level, the median income and the provider density.

## CHAPTER 4

### RESULTS AND DISCUSSION

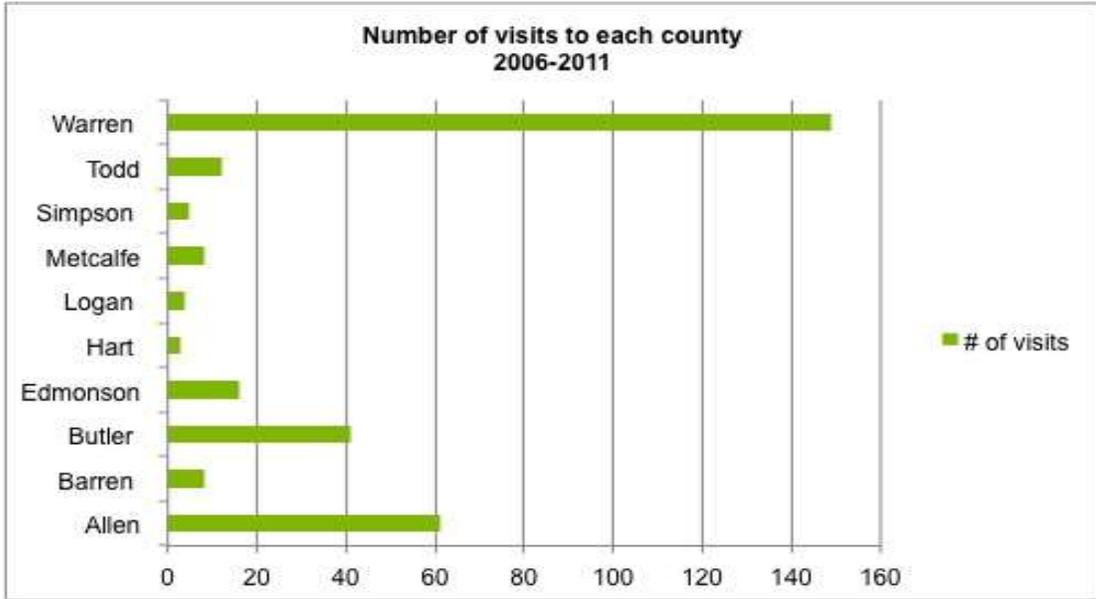
The graphs in this study plot the average number of dental caries seen per visit against each factor examined. It was found that the median income in South Central Kentucky might have a complex relationship with average number of caries per visit. The provider density and education level may have an indirect relationship with the average number of caries per visit. This could potentially mean that as caries increased, the number of providers or education level decreased.

Table 1:

Descriptive statistics (n = 3,919)		
	n	%
Age, years		
6-15	3,919	100
Gender		
Male	1,908	48.6
Female	1,979	50.4
Race/ethnicity		
White	2,896	73.9
Non-white	820	20.9

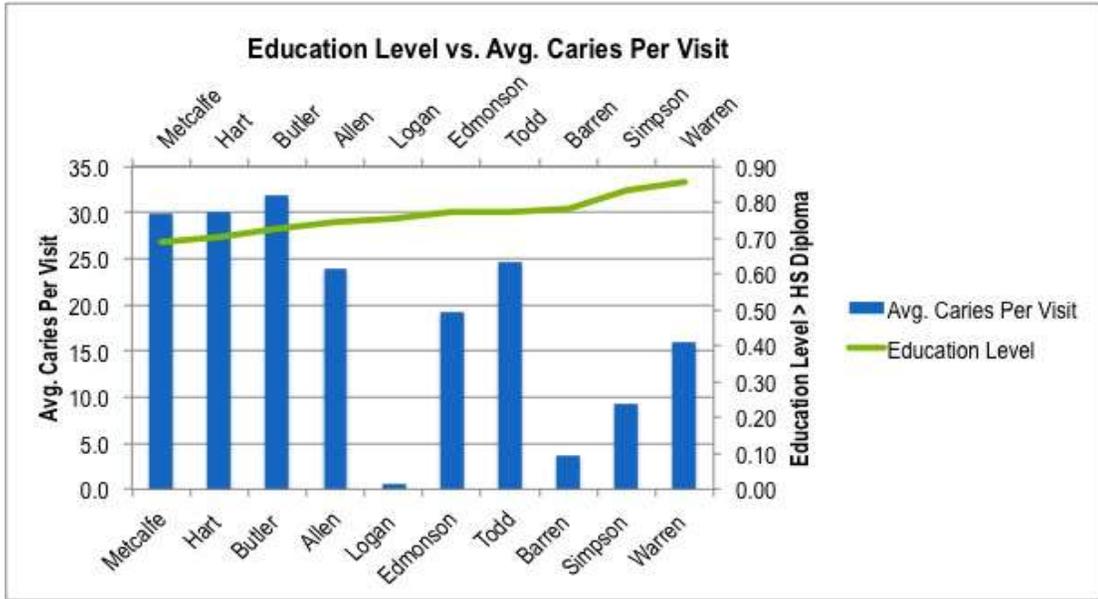
From the years of 2006-2001, there was a total of 3,919 participants aged 6 to 15 that were assessed in this study. There were more females than male and more whites than non-whites. Not all the percentages add up to 100% because there is some data that was missing.

Figure 1:



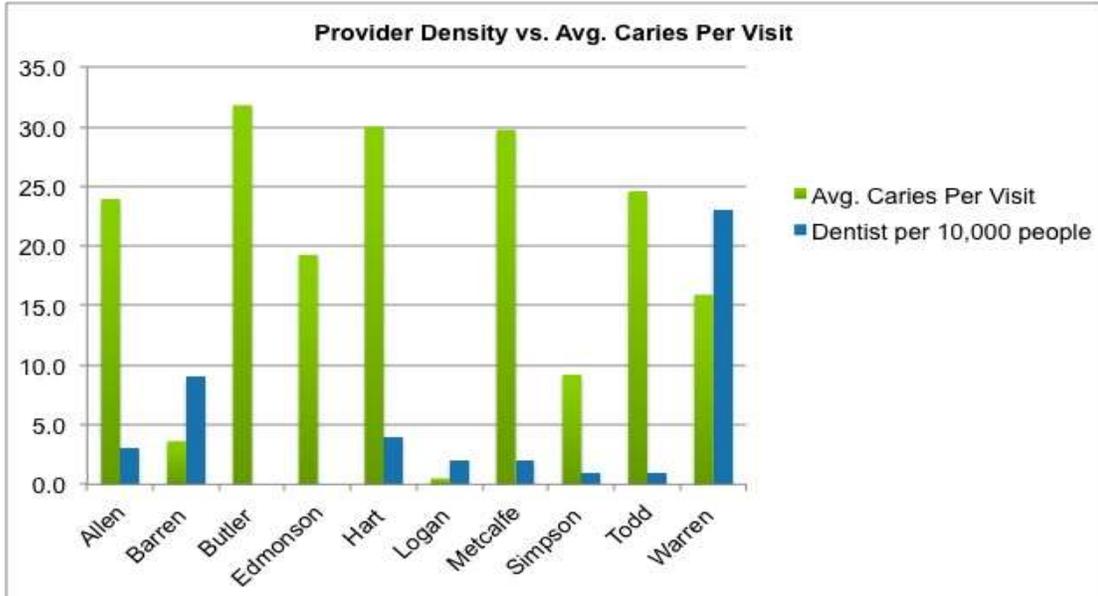
Displayed above is the total number of visits per county. On the y-axis, the county is displayed and on the x-axis is the number of visits. Warren County has the highest number of visits mainly due to the MDU being located on Western Kentucky University's Campus. The second highest number of visits is Allen County and Hart County has the least number of visits.

Figure 2:



The graph displayed above shows the education level compared with the average number of caries seen per visit. Along the top and bottom x-axes are the counties and the right y-axis corresponds to the education level and the left y-axis corresponds to the average number of caries seen per visit. The education level is taken from the 2010 US Census and is defined as having a high school diploma or higher. Metcalfe County has the lowest educational level with approximately 70% receiving a high school diploma or higher while having one of the highest number of average caries seen per visit (approximately 30 per visit). However, Butler County has the highest number of caries seen per visit out of all the counties and its education level is a little higher than Metcalfe County at approximately 76%. There could be another factor that affects this county more than the education level. Warren County has the highest education with almost 90% having a high school diploma or higher but has the 4<sup>th</sup> lowest number of average caries seen per visit. Education level may have an impact on the average number of caries seen per visit.

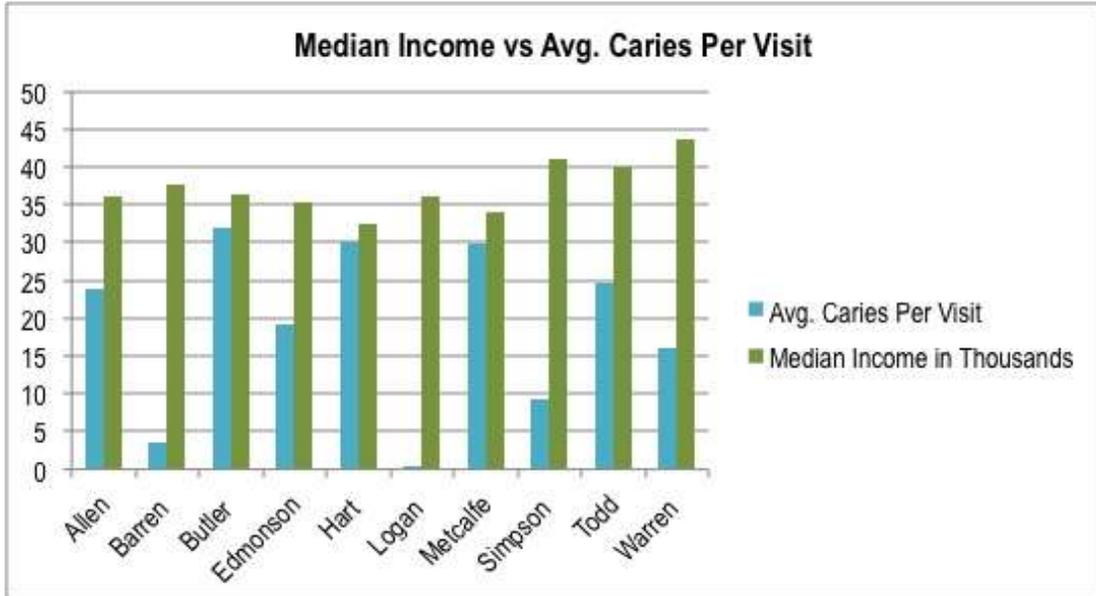
Figure 3:



The graph above shows the provider density (blue) per county along with the average number of caries seen per visit (green). The y-axis corresponds to the provider density and the average number of caries seen per visit. The x-axis shows the county names. The counties with the highest provider density, Warren and Barren County, had a low number of average caries seen per visit. On the other hand, Butler County has the highest number of average caries seen per visit and no dentists practice within that county.

Provider density may have an impact on the average number of caries seen per visit.

Figure 4:



Displayed above is the median income and average number of caries seen per visit. The y-axis corresponds to both the median income and the average number of caries seen per visit. The y-axis reads in thousands of dollars when viewing the income (green) and the average number of caries seen per visit (blue) when viewing the caries experience. Simpson and Warren County have the top 2 highest incomes out of the 10 counties and the average number of caries seen per visit is low. When Todd County is added to the comparison, the median income is very similar to Simpson County, yet the average number of caries seen per visit is much higher than Simpson. There may be a complex relationship between the median income and the average number of caries seen per visit.

## CHAPTER 5

### CONCLUSION

Oral health is a prominent concern when it comes to overall health. The oral health of children plays a major role when evaluating a community's health. The state of Kentucky is at risk for continuous oral care problems if the children's oral health does not improve. Initiatives, such as the mobile dental unit, helps combat the oral health issues many counties are experiencing. From the research, we explored some key factors that might explain the average number of cavities that are seen per visit. An important factor may be the availability and access to dental providers. Based on the provider density, many counties do not have access to dentists. There may be a relationship with the education level and the average number of caries seen per visit, but more research is needed. The relationship between the median income and the average number of caries seen per visit is complex and continuous research is needed to show a correlation.

As this future research continues, factors that should be considered include fluoridated water and Medicaid providers. At this time, educational and promotional awareness about oral health should continue to be a focus as well as the distribution of dentists to provide care in rural areas.

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