

**ORAL HEALTH DISPARITIES IN RURAL US CHILDREN**

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Oral health in rural children is in need of significant improvement. The combination of a high prevalence of poverty, limitations of employment benefits, depressed population and economic growth, and decreased preventive care in rural regions all contribute to the problems in oral healthcare in rural areas.

Current literature and programs show that community involvement is crucial in reducing the outcomes of poor oral health despite economic disadvantages. In this study, three Head Start offices of rural Pennsylvania are used as the community model to determine the extent of awareness and any additional need to change the behaviors of those who participate in the program.

Results showed that in these three areas, Head Start staff needs to increase communication about oral health to parents and guardians. The implications of the study's findings indicate the need to allow communications to be based upon components of community building. The findings from this study are significant in public health since it enables a governmental backed program to be able to be spotlighted upon this pressing issue, which could allow for increased support to address this problem through larger studies representing the entire nation and further legislative actions. The multidimensional attributes of Head Start programs enables the key structures that make community assessments efficacious to be utilized while

maintaining general regulations that are accommodating to a multitude of groups. Future actions could even successfully create a nation – wide mandate for dental health to be a part of a pre – screening regimen for children who are planning on enrolling into schools or daycares.

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## 1.0 INTRODUCTION

The wellness of rural populations in America has becoming an increasingly pressing issue. While the majority of Americans today reside in urban – suburban areas, almost 75% of the nation's counties are located on what is considered rural land.<sup>1</sup> This land today houses over 59 million individuals, accounting for 20% of the nation's total population.<sup>2</sup> Although about 20% of individuals the US reside in rural areas,<sup>2</sup> healthcare disparities remain persistent throughout these regions. Issues of access and delivery of healthcare plague rural health and create an environment where residents are more likely to have fewer providers, fewer resources, and have less knowledge of health maintenance. Out of the 500 poorest counties in the nation, 459 of them are in rural areas.<sup>3</sup> Poor children are an especially vulnerable part of rural populations. About 19% of young children in nonmetro areas of the nation are living well below poverty levels.<sup>4</sup> This sort of statistic reflects upon an overall poorer outcome of wellbeing.

Problems with oral health are one of the most significant dilemmas that disadvantaged rural children have. In very young children, rampant childhood caries, which are also known as baby bottle caries, are one of the most prevalent childhood diseases especially among poorer individuals. It is also one of the easily preventable diseases, if both parent(s) and child(ren) follow a basic and simple regimen of good oral hygiene.

Unfortunately, oral health is often overlooked as part of an important component of good health. The past decade has shown a change in attitudes towards this sort of belief; increased awareness in maintaining good oral health has become one of the priority considerations in society's image of good health. While dental care has started to become a standardized part of

healthcare, economically stable individuals still have an advantage to services for oral health, primarily due to access and affordability. The majority of dental care providers are private, with public services being few and far between.<sup>5</sup> While current data shows that 44 million Americans lack health insurance, 108 million individuals do not have any form of dental insurance.<sup>6</sup> Furthermore, rural children have a decreased rate of dental insurance compared to urban children (74.2% versus 78.4%).<sup>7</sup> Counties that are more rural than others have even less dental insurance coverage, documenting only 69.9% of children in more remote rural counties with dental insurance.<sup>7</sup>

Rural disadvantaged populations struggle to make ends meet, and often dental care is not considered a priority health issue. Access to care is particularly difficult due to the insular demographics of the land. The combination of a high prevalence of poverty, limitations of employment benefits, depressed population and economic growth, and a general lack of understanding of preventive care all contribute to the problems of oral healthcare in rural areas.

This thesis will 1) evaluate current literature that identifies causal pathways to poor oral health with focus on the Appalachian region of the nation, 2) present the results of a study in Appalachian communities located in Western Pennsylvania that identifies causal pathways to poor oral health, 3) identify priority issues that can be remedied to improve oral health, and 4) offer additional suggestions and discussions to further the scope and direction for future research. The goal is to identify the key oral health issues that affect regions of rural Pennsylvania, and to compare them to the issues from literature. To do so, the researchers worked directly with Head Start staff to obtain data for evaluation. The premises for this collaboration is based upon the belief that in order to reach rural citizens, the best possible way is to reach trusted individuals that are not only supportive community figures, but also bears an authoritative command upon

people's health and welfare decisions. Head Start amply fits this profile since they can be actively involved in the community's young children's lives for a length of time; in 2005, over 25% of children enrolled throughout the nation in this program have been enrolled for over a year.<sup>8</sup> Head Start clientele are most likely to be mothers and young children, with whom close, trusting relationships can be established. Therefore, the upkeep of these families' health will be impacted by the influence that Head Start staff have upon their participants.

To measure this impact, this study will evaluate the staffs responses based upon their current knowledge of oral health, their observations of their clients, and their personal opinions of the quality of oral health in their client's children. Interaction was limited to the staff at Head Start. This enables a measure of the professional (a Head Start staff member)'s views of priorities of oral healthcare in young children in their area. Next, the study compares the findings in a discussion it to the measures of health concern that are addressed in literature. The study revealed that the need for dental knowledge and care was indeed necessary for mothers and young children ages 0 – 5 in the areas that were studied. It also showed that there were indeed rural areas with healthcare professionals that were taking proactive measures upon preventing further oral health damage, but that there were additional dimensions to behavioral attitudes that ought to be considered, especially pertaining to parent attitudes. Mothers can play a detrimental role in not having their children's oral healthcare adequately met not only because of access issues, but also in developmental behaviors that are encouraged by mothers that affect good oral health. These results can be important for future studies to help determine the major factors that ought to be observed and utilized when developing preventive action for oral health problems in young children ages 0 – 5.

## **2.0 BACKGROUND: UNDERSTANDING THE SOURCE OF DISPARITIES IN RURAL AMERICA**

Rural land has been defined specifically by United States Census Bureau as population densities in a specific geographic region. The definitions classify urban geography into two defining regions called urbanized clusters (UCs) and urbanized areas (UAs).<sup>1</sup> UCs encompass at least 1000 people per square mile in core census blocks and UAs and have at least 500 people per square mile in surrounding blocks.<sup>1</sup> Rural regions are broadly defined as the housing, populations, and territory outside all of the UAs and UCs.<sup>1</sup>

The establishment of rural versus urban and suburban lands did not come about until the late 19<sup>th</sup> century, with the disappearance of the true American frontier.<sup>9</sup> From the 1860s to the beginning of the early 20<sup>th</sup> century, the American Civil War followed by a surge of innovation and invention resulted in the industrialization of the nation.<sup>10</sup> Both were significant contributors to the greater divide in demographic characteristics seen in city and “country” life. Industrial developments such as the railroad, the discovery of oil, and assembly line machinery began to overflow with job opportunities, which attracted large numbers of people seeking employment, resulting in growing clusters of people setting up residences so that they may continue employment with the companies.<sup>10,11</sup> Thus, with this continued growth the first definitions of true “cities” began to emerge. Simultaneously, a surge of immigration worldwide seeking refuge in the United States dramatically increased the population density of already well established cities.<sup>11</sup> The demand for workers attracted people around the country to settle down in crowded

cities and also driving people globally to take chances in a country they knew little of, all in the chance that their own could come true.<sup>11</sup> For many, the journey was a risk, sacrificing at times an entire lifetime's savings without guarantee of return.

As the nation's land capacity continued to grow, technological improvements and the demand of the goods across an expanding nation increased as well, making industrial materials a very lucrative market. The shift from the 19<sup>th</sup> to 20<sup>th</sup> century saw many of these industrial companies thrive into large corporations with the blessings of the government, but often government policies intended for growth and reform were put under duress by corrupt corporate bosses.<sup>12</sup> Not all corporation bosses had their worker's best intentions in mind, and with their influence, the government was also likewise badly influenced. As corporation owners pocketed large sums intended for their workers' welfare, an economic gap between laborers and their management began to grow wider.<sup>12</sup>

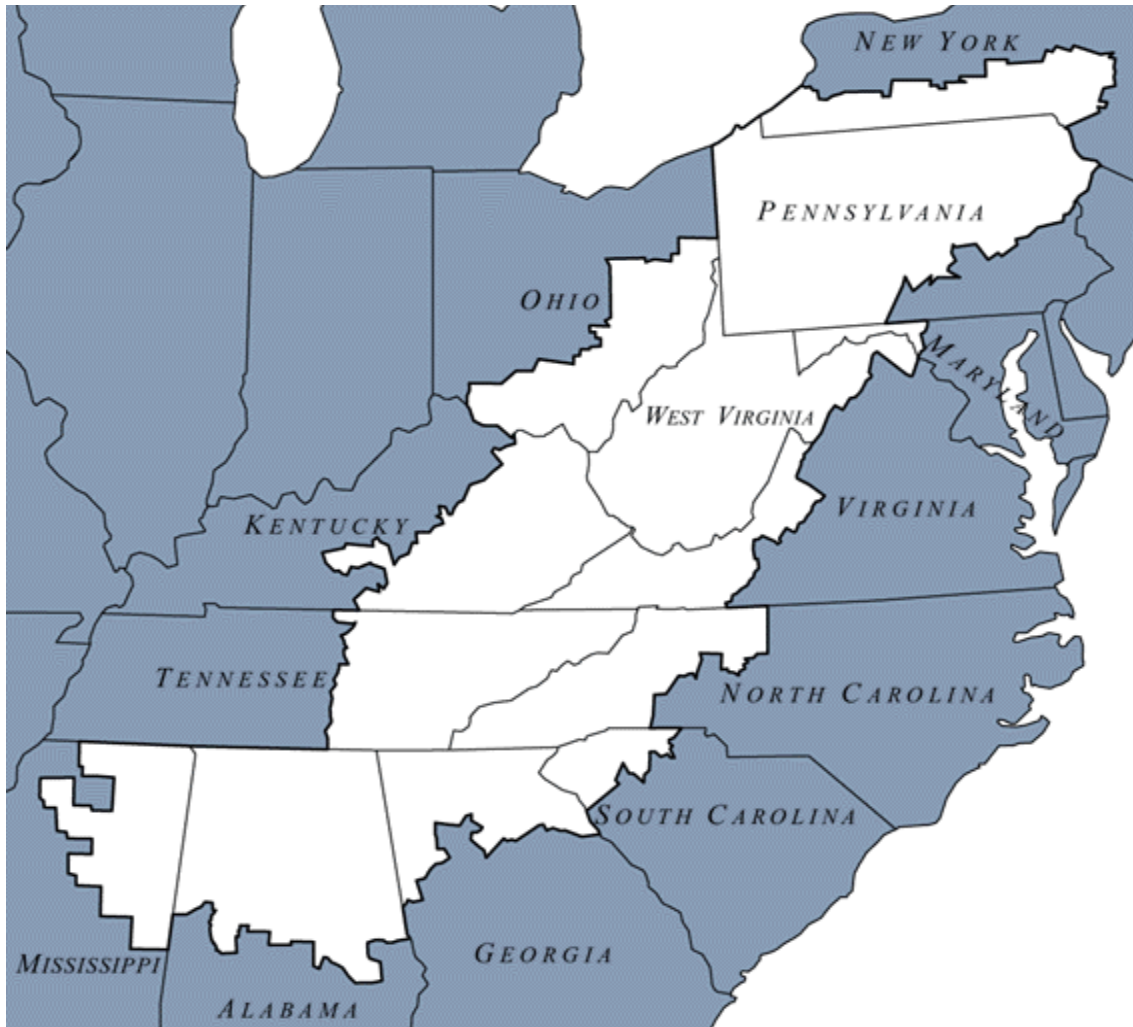
The result of inadequate governmental control forced industrial commerce which relied upon the supply of natural resources such as coal and oil to be at the mercy of the land's capacity to produce such materials. Regions that possessed an abundance of these natural resources were heavily utilized, often to the point of exploitation, inadequately repaying residents who occupied the land. At times, whole communities were bereft of authority of their own land. This left behind a lingering a sense of betrayal and resentment which can still be felt today.

At the same time, the nation's agriculture industry was influenced by industrialization, making production more efficient into the industrial market.<sup>13</sup> However, much like other industrial tools, rapid technological developments forced expansion for efficient production, thus commercializing previously family – owned farms, and requiring mass production of other resources, including outputs from farms in order to accommodate the ever growing population in

the nation.<sup>13</sup> Therefore, growing demand for natural resources force companies to seek better supplying grounds for commercial industry. The shift of these resources has moved large companies elsewhere, which dramatically decrease opportunity in certain areas once thriving.

### **2.1.1 Exploitation of Land and its Consequences**

Once a rich land for industry, the Appalachian region has been an area in the nation that is most affected by this shift. Comprised of a cluster of eastern states that is home to the Appalachian Mountains, the region is defined as the area of northern Mississippi and Alabama upwards to Pennsylvania and the southern part of New York.<sup>14</sup> 91% of the counties in Appalachia are considered to be rural.<sup>15</sup> Figure 1 shows the Appalachian region and the states that it encompasses.



**Figure 1: The Appalachian Region**

Source: Appalachian Regional Commission, [http://www.arc.gov/misc/arc\\_map.jsp](http://www.arc.gov/misc/arc_map.jsp)

The Appalachian region is an area rich in natural resources, such as petrochemicals and coal.<sup>16</sup> Because of the abundance of such resources, it has suffered some of the worst damages historically with large – scale corporation and business expansion and exploitation.<sup>13,17</sup> To make matters worse, many of these businesses were often backed by the support of government funded public “services” that supposedly promised to aid residents.<sup>17</sup> For individuals inhabiting the land, a significant amount of resentment towards large corporations and government organizations has been passed along to present generations, who still guard their ancestor’s land

fiercely because of the amount of mistrust that has been established from the past.<sup>17</sup> As a result, the region has been slow to grow and develop at the same speed urbanized regions develop. Where skepticism and mistrust run deep, public institutions and assistance are still frequently rejected even though the intention is not maligned.

Individuals that have persistent negative attitudes towards their outcome of life are often correlated with a greater likelihood of living in poverty, have more health problems, and persist in poorer conditions.<sup>18</sup> The living environment is likewise in need; rural residents' surrounding areas are more likely to experience declining economic growth and the geographic sprawl of the land increases isolation.<sup>19</sup> In addition to the isolation of communities which detracts from large scale social environments, geographic sprawl also implicates difficulty in technology and land improvement, decreasing progress seen in urban communities.<sup>19</sup> The slower development and technology advancement can significantly impact the beliefs on the quality of living in rural regions of America.<sup>19</sup>

One of the biggest issues resulting from the attitudes of mistrust is that legitimate attempts to help individuals in need are often rebuffed. Inhabitants of Appalachian soil often find comfort seeking a familiar figurehead and are more apt to follow his or her lead as an integrated member of an extremely tight – knit community.<sup>20</sup> This is a particularly challenging obstacle that has been presented in the endeavors to improve health in these areas. There is a constant struggle between trusting “appointed” authority – which is embodied by the government, and “perceived” authority – which is embodied by the community.<sup>17,20</sup>



### 2.1.2 The Impact upon Healthy Behavior

Continuing these attitudes is detrimental against healthy behavior. Furthermore, it can also be manifested in physiological wellbeing. Often, negative attitudes manifest themselves into actual illnesses, becoming an enabling factor to physical and mental debilitation. In common measures of poor health, including lower economic status, education and demographic isolation, there is consistent evidence showing decline in physical and mental health. Psychological issues that arise often include a sense of resignation, despair and anger.<sup>21</sup> In some cases, psychological disorders left untreated and/or undiagnosed have created debilitating consequences to an individual's lifestyle. Lack of proper care, financial means and time to do so can put a toll on one's overall health and contribute to the strain on mental wellbeing.<sup>22</sup> The combination of all these factors on an individual can thereby reflect itself in poorer health status overall, which can also be influential upon a satellite of people in a community that interact frequently with this individual.

Another compounding difficulty that rural individuals face today is the reliance that society has upon *medicalization*. This attitude towards health in modern – day society has dramatically increased reliance towards pharmaceutical repairs for ill health. This has been concurrent with increasing developments in medical technology and discoveries of new diseases and evolving “superbugs,” which are pathogens that are extremely resistant to former treatments, namely bacterial resistance to antibiotics.<sup>23</sup> The benefits of technology have enabled medicine to reach more rapid forms of treatment, which can ensure better quality of health for the majority of people.<sup>24</sup> Pharmaceutical drug use and new drug manufacturing are rapidly expanding to accommodate for the number of health conditions being considered diagnostic diseases or disorders, which results in the over – medicalization of society.<sup>25</sup> These abundant “health

issues” can blur the line in which determining what is truly a disease and what is a natural human condition.<sup>25</sup> Medicalization also tends to depersonalize health, which can cause many healthcare professionals to overlook some of the other underlying causes for poor health and provide superficial diagnoses to a situation that is rooted deep in characteristics including history and present – day limitations to the society that is being scrutinized.<sup>24,25</sup>

For these situations, the “quick fixes” that many people hope for in order to gain better health does not exist. While it is true that some physical problems can be remedied with a simple administration of a medication, it is crucial to educate communities to understand that health issues should not be fully dependent upon the ease of a pharmaceutical miracle. Achieving good health and the measure of what good health is may be a different priority for individuals in rural America. Differing economic situations in rural versus urban America affect things that can be taken for granted such as health insurance, job security, cost and quality standards of living. In rural parts of the nation, often these situations are more likely to be precarious and less available.<sup>22</sup> Therefore, priorities of rural populations in America must be comprehended with these factors to be able to stimulate a desired change towards improvement in these regions.

Dental care is a prime example of how health can be regarded with different attitudes in urban and rural populations. The cost of dental care, decreased access to dental insurance, and negative attitude associated with prioritizing dental visits provides an inhospitable environment to accept the importance of dental care. Many individuals also may not consider it a crucially needed service, compounding the problem further.<sup>26</sup> Especially for children, studies have linked the association of regions with decreased dental insurance rates having increased dental caries incidences in young children.<sup>27</sup> Including provider care, literature identified shortages in

resources are both interpersonal and socio – political. It pertains to the knowledge and willingness to acquire knowledge, the readiness to seek out resources, inclusive of clinical dental care and dental care products, as well as the motivation to maintain healthy oral hygiene practices on a regular basis.

On the policy and social side, basic community awareness of preventive measures are limited in rural areas due to interpersonal factors. These include things like community and group action for water fluoridation, which has been clinically proven through research that it is efficacious in reducing dental caries.<sup>28</sup> However, political debates still exist upon the safety of water fluoridation and has set back opportunities for additional community water supplies to be fluoridated.<sup>29</sup> Geographic availability of community water supplies in rural America are sometimes difficult due to the more sprawling nature of the land, which results in more private water sources owned by individual families or small groups of families.<sup>30</sup>

### **2.1.3 The Health Consequences of Rural Women and Children**

The consequences of rural health disparities can impact women and children very severely. The social determinants to health outcomes in women and children may often put them at a disadvantage since women, especially in rural regions, are more likely to be dependent upon a health insurance policy through a spouse, or find it difficult to seek employment that offers a good insurance plan especially if she is the primary caretaker of the children in her household.<sup>21</sup> Furthermore, the average income in rural regions is lower than urban regions. The 1996 average income per capita in rural areas was \$18,527 compared to the \$25,944 average in urban areas.<sup>31</sup> From 1990 to 2000, the per capita income gap between rural and urban populations increased in 40 states.<sup>32</sup> Since then, the gap does not appear to be decreasing much. For instance, the state of

Pennsylvania reported in 2001 that the average rural per capita income was \$23,941, whereas the urban income was \$32,578, which still has a difference of over \$8000.<sup>33</sup> Not only do lower wages in rural areas make less opportunity in job growth, but also makes health benefits more difficult to come by.<sup>34</sup> This is also paralleled to a decreased level of educational achievement.

For women, facing all these factors can put them at considerably difficult odds when children are involved. The combination of factors can take a toll on both their own health and their children's health.<sup>21</sup> The woman's socioeconomic status can reflect directly upon her family life. Furthermore, impoverished rural families are more likely to be a single parent household, which also decreases parental support and supervision since a mother must be the sole financier for her dependents in a household, often straining budgets and struggling to make ends meet.<sup>22</sup> The image of a woman as a primary caretaker for both household and children is a cultural phenomenon in rural America, but at the same time, the same areas have also have a higher rate of single parent households with mothers being the single parent in.<sup>20,21</sup> Poverty also links to the lack of health insurance, which also contributes to poorer health status as well.<sup>35</sup> Receiving proper care with a limited income and available resources is a challenge to the overall health and wellbeing of the rural woman and her child(ren).

The impact that this has upon children is significant. In a child's life, a mother is a key determinant to good health of the child. This is measured in utero, long before a child is born through the establishment of prenatal care standards that have been set by the medical community.<sup>36</sup> Prenatal care has been set at a national standard as both preventive and proper care for an expecting woman; it enables early detection of potential disorders and an excellent evaluation as to whether or not an unborn child is developing properly.<sup>37</sup>

In rural America, there has been statistical evidence showing that pregnant women receive limited to no obstetric care during pregnancies, including standard routine prenatal care. An observation of women throughout the United States found that women living in low income households and geographically rural areas were less likely to obtain prenatal care or have late onset of prenatal care.<sup>38</sup> Contributing factors in the analysis to reduced prenatal care were age, education levels, attitudes towards pregnancy and access to care.<sup>39</sup> Numerous surveys consistently observed that lower income status women and rural women were more likely to have lower education levels, have overall higher adolescent pregnancy rates and have a negative perception of their pregnancies. Access to care was a major setback and also was a very large source to the negative attitudes that mothers reported back about their pregnancies.<sup>40</sup>

Issues with providers are also contributors to the problem. The volume and accessibility of physicians that offer obstetric services are limited. Major national reports such as Rural Healthy People 2010 report that the last two decades has seen a decline in the number of rural healthcare providers that offer prenatal care services. Between 1980 and 1992, the number of prenatal visits to physicians in rural regions declined from 17.7 million to 6.8 million visits.<sup>22</sup> Furthermore, statistics have shown that physicians in the United States are less likely to practice in a rural area.<sup>41</sup> Recent data shows that 10% of the nation's physicians practice in rural regions. In terms of obstetric care, the number of obstetricians has been decreasing significantly since the 1980s.<sup>22</sup>

Even after infancy, the social and physical development of rural children are affected by multilevel socioecologic influences. One of the most significant outcomes affected by these determinants of wellness is the level of educational attainment. As children grow into adolescence, the angst of "growing up" in the insular social environment that rural regions

provide may be reflected in health outcomes, resulting in risk – taking behaviors that not only jeopardize educational achievement but also include health risks including smoking, alcohol consumption, and earlier age for sexual initiation.<sup>34</sup> While exploration, curiosity and some risk taking is a natural part of adolescent behavior and development, factors that cause significant decline in educational attainment and social opportunity are a cause of concern in the realm of health and wellbeing.<sup>42</sup> The outcome of limited educational attainment is poorer health, which, for some teens, includes the risk of pregnancy during adolescence.

Adverse maternal health is an important issue in rural America. Prenatal care is already limited and often under – utilized in the region. For an adolescent, pregnancy has a significantly detrimental effect upon both the mother and the child that she is carrying. In the past decade, research has reported that adolescents residing in non – metropolitan areas are more likely to be at risk for unintended pregnancies.<sup>43</sup> Teenage mothers, especially younger mothers, do not obtain adequate nutrition during her pregnancy that is necessary for the child, nor are they more likely to seek prenatal care, resulting in lower birth weight babies and also puts the child at risk for developmental problems.<sup>44</sup> The youngest teenagers had the lowest levels of prenatal care, with 28.3% seeking late or no care at all in the combined years of 2000 – 2002.<sup>44</sup> About 36.2%, or one in three unmarried women in rural America giving birth, are adolescents.<sup>38</sup> This statistic is supported by a study of eight southeastern states that showed that teenage pregnancies of ages 15 – 17 years are generally higher in rural than metropolitan areas, with some numbers as high as 58.8 (rural) versus 48.9 (urban) births per 1000 adolescents in Mississippi.<sup>35</sup> Overall, adolescents who are sexually active in non – metropolitan areas are more likely to be at a greater risk for unintended pregnancies, births, and poor birth outcomes.<sup>43</sup>

Not only does a young adolescent mother face physical difficulties in carrying a healthy baby while trying to maintain her own health, a pregnancy and childbearing may result in school dropouts. Lowered levels of Education are associated with high poverty levels. Low educational outcomes often produce continuing access barriers both in completion of schooling and knowledge of health education. This is because decreased educational attainment also decreases the likelihood of career choices that provide adequate healthcare benefits, further decreasing access.<sup>22,34</sup> In rural America, these disadvantages may prolong the cycle of poverty for women. Studies indicate that populations living in rural regions of the United States have poorer educational achievement and opportunities, than their urban associates, as well as a higher rate of teenage pregnancies in these areas.<sup>34</sup>

Furthermore, there are significant disparities between rural and urban regions with the availability and provider of care. Nationally, only 9% of all licensed physicians in the United States practice medicine in rural areas. Pediatrician availability in rural areas is only at 5.2 per 100,000 people, whereas urban availability of pediatricians are more than triple that rate at 17.2 per 100,000.<sup>22</sup> Rural adolescents are also more likely to be uninsured either since rural areas have higher proportions of families that have limited or no coverage for health expenses.

From an early age, children raised in this environment can exhibit these poorer health determinants. Unhealthy behavior and associated economic constraints prevalent among their influencing factors – parents, community members and peers can become established at an early age can continue to be practiced as they grow older.<sup>45</sup> These practices develop into routine habits that often lead these children to influence other individuals into poor health habits as well.

In these environments, healthy oro – dental practices are an appropriate example of poor habit development. Establishing healthy dental practices must start at an early age, with the

participation of parents or guardians in the maintenance of good habits. Lower educational status may mean that a parent is less likely to have proper knowledge of children's oral health practices and as a result, is more likely to contribute to the development of establishing poor oral health habits early on. Furthermore, provider shortages, especially dental professional shortages are extremely abundant in rural America. Pennsylvania faces one of the most challenging situations for rural oral health. As of 2002, the state identified 67 Dental Health Profession Shortage Areas (DHPSAs), with 49 DHPSAs defined as special population.<sup>46</sup> Many of these special population DHPSAs are in rural areas of Pennsylvania.<sup>46</sup> National statistics reported that in 2003, there were 2,235 DHPSAs, with 74% of them being in non – metropolitan areas.<sup>6</sup> Shortages of professional care can impact children particularly, who are considered an extremely vulnerable population, especially in the field of oral health.

#### **2.1.4 Early Childhood Caries**

Dental caries are one of the most prevalent and preventable chronic diseases in young children.<sup>47</sup> The marked neglect of oral hygiene accelerates the progression of dental caries as a chronic disease, and are known as Early Childhood Caries (ECC), and sometimes colloquially as Baby Bottle Tooth Decay. It is identified by pronounced tooth decay, or cavities, in children's primary teeth.<sup>48</sup> There are still many more terms to call ECC which also varies in definition since many different patterns of decay and levels of severity in decay exist.<sup>49</sup> Currently, the standard definition set by the American Dental Association (ADA) is: "the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a preschool-age child between birth and 71 months of age."<sup>50</sup> The focus age group of this thesis falls within the age range of susceptibility for ECCs. Although decay



can affect all the teeth in children, the upper anterior teeth are often most affected in ECC because it correlates to how a bottle teat is held near the upper palatal surface right behind the teeth.<sup>51</sup>



**Figure 2: Photos of Moderate and Severe Decay**

Source: American Dental Association, <http://www.ada.org>

Cariogenic activity is induced by both genomic predisposition and behavioral actions, although both factors do not necessarily guarantee the presence of caries.<sup>52</sup> Rather, the two factors are contributing causal relationships to the elevated risk of caries in young children. Childhood caries have been identified as a transmissible infectious disease, often brought about by the presence of a gram – positive bacteria called *streptococcus mutans*.<sup>53</sup> The presence of *S. mutans* is necessary but not sufficient to produce caries, but current research shows an association of elevated risk of cariogenic activity on teeth with exposure to *S. mutans*.<sup>52</sup> Longitudinal research has shown that colonization of *S. mutans* in a child's mouth at an early age is linked to an increased amount of dental caries by the time all the primary teeth have emerged.<sup>54</sup> One of the most likely routes of *S. mutans* transmission is through mother to child contact.<sup>52</sup> Despite an elevated risk for cariogenic activity, dental caries most commonly occur when there are behavioral factors associated with caries formation.<sup>49,52</sup>

A major behavioral effect that contributes to caries formation are diet patterns in young children, especially during their bottle fed years. This is an issue when parents or guardians allow their children to consume sugary drinks and foods, especially before a child gets put to bed.<sup>48</sup> Additionally, milk and formula can contribute to problems of decay if the child is not

provided with proper hygiene after each meal.<sup>55</sup> The sugars inside these liquids create a breeding ground for natural oral bacteria to flourish within a child's mouth, and bacteria can proliferate rapidly in the environment created by these sugars.<sup>56</sup> The bacterial build up results in plaque formation on children's teeth, which is a substance called biofilm.<sup>57</sup> This biofilm is comprised of bacterial communities which feed off the tooth's natural structure, causing decay.<sup>58</sup> Untreated decay is a serious health problem in children, which can result in the loss of teeth (edentulism), speech impediments, infections, improper chewing and dental development especially in permanent teeth, and emotional trauma.<sup>50,51,59</sup>

There is a significant amount of literature that shows that the prevalence of ECCs in the nation's children has marked demographic trends in their rate of distribution. Tremendous amounts of evidence have shown that income levels are a significant predictor for ECCs; poor families are more likely to have an increased rate of ECCs in children.<sup>60</sup> Children ages 2 – 5 years of age living below the poverty line are five times more likely to have untreated tooth decay (30%), compared to children of the same age group living 300% over the poverty line (6%).<sup>61</sup> Severe decay in children are characterized by the number of teeth exhibiting signs of decay, or in the most severe cases, a count of the number of edentulous teeth due to pronounced decay.<sup>62</sup> Low – income children are more likely to exhibit the signs of severe decay, and have over a two – fold rate of having at least one untreated decayed tooth, with 17.3% of the children living above the federal poverty level have at least one untreated decayed tooth versus the 36.8% of poor children in this category.<sup>53</sup>

The amount of dental disease found in children also varies across race and ethnicity of the children. With relation to poverty, poor Hispanic children have the highest rates of untreated dental problems, along with non – Hispanic black children, who also exhibit alarmingly high

rates of untreated decay.<sup>53,61,62</sup> In American Indian populations, the rate of dental decay is extremely rampant, with over 50% of young children within the identified age group for ECC sufferers.<sup>53</sup> For poor children, economic status can be a fairly accurate predictor of whether or not they will have untreated dental problems.<sup>53</sup> Rural America encompasses a large proportion of the children suffering from oral diseases in the nation.<sup>53,60,61</sup>

The persistent issues affect the status of oral health wellbeing in many rural populations. The 1988 – 1994 NHANES surveys documented that children in rural areas are more likely to be uninsured and have a greater percentage of unmet dental needs than urban children.<sup>61</sup> Rural regions also have a dearth of providers with an estimated 29 dentists for every 100,000 individuals, whereas urban areas have 61 dentists for every 100,000 individuals.<sup>63</sup> Lastly, behavioral and cultural views of dentistry have been observed to reduce the likelihood that a rural individual will seek dental care. Historical implications that lead to self – reliance and mistrust in rural communities impact these views, as well as common misperceptions of both rural society and oral health that also have an effect upon motivation to seek care. People living in rural regions are more likely to seek out dental care when they are experiencing actual physical discomfort, “bothering or hurting” in their mouth.<sup>64</sup>

One additional reason that is often overlooked is the reluctance some children have about visiting a dentist, especially for children with poorer oral health needing more invasive treatments. When a child has a severe case of dental disease, requiring a young child to undergo the treatment required may be painful and frightening, especially if the child is not accustomed to going to a dentist on a regular basis.<sup>65</sup> There is evidence that shows that fear in children is directly correlated to having to see a dentist for more extensive treatment procedures (such as dental restorations, extractions), and the fear decreases with more check – up visits prior to the

treatment.<sup>66</sup> Furthermore, parent behavior modeling also affects the likelihood that a child will be fearful of a dentist, so therefore if parents show reluctance in seeking dental care, their children observe their behavior and seek to emulate it.<sup>65</sup> Rural regions may have a higher rate of children who are reluctant to visit a dentist, especially when their teeth are badly decayed, and their parents may not understand the importance of having routine dental checkups.

### **2.1.5 Fluoridation**

The development of community water fluoridation intended to prevent dental decay has been regarded as one of the most significant discoveries in public health today.<sup>67</sup> Consistent low level exposure to fluoride has been shown to be a preventative for tooth decay. Its clinical benefits for oro – dental health were established in 1945 through clinical trials of paired test and control populations in four different US cities through community fluoridation in the cities' water supplies.<sup>68</sup> The evidence over all age groups showed that there was a consistent decrease in dental decay in people receiving fluoridated water supplies.<sup>69</sup> Today, community water fluoridation is still one of the most effective means to deliver fluoride to as many people as possible, in addition the many products in oral care available over the counter such as toothpastes, mouthwashes and gels.

Despite continuing research that has continually corroborated with the hypothesis that fluoride is beneficial to dental health, there are still considerable conflicts of opinion with community fluoridation efforts. Some of it is opposition stemming from personal disagreement towards fluoride. One of the arguments these individuals have is that they believe that fluoride poses a health risk,<sup>29</sup> despite research that has proven otherwise. Additionally, resistance towards community fluoridation is not towards fluoridation itself, but towards the freedom of

choice – essentially, if a community has a minority of dissent, they are disregarded in a majority vote.<sup>70</sup> However, a large proportion of dissent towards community fluoridation is associated with the belief that it is harmful to a person’s wellbeing. The other conflict preventing community fluoridation is that numerous communities, especially rural communities do not receive the controlled fluoridation sources as there are many rural residents receiving their water from private wells.<sup>30</sup> In a study where an urban and rural Massachusetts area were studied, the researchers observed that 96% of the urban children were receiving water from municipally fluoridated community sources, whereas 85% of the rural children had well water.<sup>71</sup> Nationally, the distribution of available community water supplies also tends to be located mostly in urban settings.<sup>72</sup> Of the 50 largest cities in the United States, 42 have been treated with fluoride, and two of these cities have natural fluoride content that is at the optimal level for good dental health.<sup>72</sup>

Rural water sources have issues unique to their land. The geographic sprawl and conservative atmosphere of rural individuals both contribute personal issues to them. For one, land sprawl makes piping a community’s water very difficult and costly, so many inhabitants often utilize private wells that are more convenient to direct water to their households.<sup>73</sup> Furthermore, the initial mistrust and cautiousness of individuals towards policy changes may also delay the onset of accepting fluoridation into water, if community fluoridation or well water regulation is available.<sup>70,74</sup> Often, well water is minimally regulated because it is usually on private land owned by individuals or groups in rural communities, and mandated testing of the water supply can be inconsistent.

Initially, *Healthy People 2000* and the *Healthy People 2010* had both set goals to fluoridate 75% of the nation’s public water sources.<sup>22,37</sup> Current day statistics show that the

increase of fluoridated water supplies have slowed after the 1970s, where in 1992 the rate was at 62.1%, and by 2000 the rate increased to 65.8%, which still fell short of the 75% goal set by *Healthy People 2000*.<sup>37</sup> For children aged 2 to 4 in the nation, dental caries on primary teeth increased from the 23% rate in 1994 – 1998 to 32% in 1999 – 2004.<sup>75</sup> There are still approximately 100 million individuals in the nation that do not have access to fluoridated water.<sup>76</sup>

For many rural children, lacking community fluoridated water supplies can be supplemented through their personal dental care. However, despite the ready availability of many fluoridated products, maintaining a proper regimen of dental hygiene in the home is a regulatory issue in both child and adult interaction behavior.

Some available resources include topical fluoride, which is found in toothpastes, rinses, mouthwashes and other over – the – counter dental supplies that are easily accessible to the vast majority of the public. Even some bottled water now has fluoride added in them.<sup>77</sup> They are found everywhere, from convenience stores to the dentist’s office. However, education of topical fluoride use is crucial for proper management of young infant and children’s teeth in the early stages of development. The ADA recommends young children to not use fluoridated products in the first few months of a child’s life, primarily due to aesthetic reasons to decrease the risk of fluorosis.<sup>78</sup> Fluorosis of the teeth is merely an appearance issue, which is when over – exposure of fluoride causes permanent discoloration and staining of teeth. When young children do start using toothpastes, regardless of whether or not they are fluoridated, they ought to be closely supervised. The toothpaste amount should not be no more than a smear to a pea size amount, and the child should be encouraged to spit out the toothpaste after brushing. Brushing is an activity that should be a routine of daily hygiene in parents and guardians, which in turn

establishes proper reinforcement of this habit as the child becomes more and more capable of independently brushing his or her own teeth properly. This is an issue that parents and guardians face today, because the establishment of this practice is not properly used at an early age, which allows for the increase of poor behaviors to occur early.

### **2.1.6 Risk Assessment of Children's Oral Health**

The literature above identifies a number of risk factors that delineate outcomes to poor oral health. Exposure to these factors contributes to a higher occurrence of poor health, and some factors have a stronger association with more rampant cariogenic activity. Assessments of risk enables increased impetus for preventive care and the knowledge of cariology. In community health assessments, the measure of wellness or the need for better health is analyzed through two key concepts, needs and capacities. Understanding the needs and capacities of community groups, in this case a rural community enables researchers and healthcare professionals to better assess the health status of these rural communities. *Needs* are defined when community members realize that there is a possibility for a more desirable situation.<sup>79</sup> Assessing needs of an issue determines the current room for changing the status of the issue, and it also compares what individuals in community regard as important priorities that ought to be addressed more. Once there is a consensus on the assessed change to take place, the needs of a community can begin working on improvement of the issues agreed upon. The starting point where this improvement or change can occur by identifying the current resources is defined as *capacity*.<sup>79</sup>

The process of identifying the processes of needs and assessments of individuals can be a challenge, especially in the face of diverse groups within communities. Risk perception factors are affected by age, gender, education levels and race, and for a community, it can play a

significant effect upon a community's willingness to change behavior.<sup>80</sup> Often, communities will display trends in demographics, resulting in individual characteristics to be similar in more than one variable, making communication adaptable towards community oriented program planning.

The needs and capacities of children's oral health and wellness has often been measured in community level assessments. Measuring the etiologic causes of ECCs will help researchers ascertain variables that contribute to low, medium or high risk of caries occurrence.

Documenting risk can be useful, and are known as caries – risk assessment tools, or CATs, which are evaluative reports derived from researched behavioral and environmental factors.

The CAT is a method to measure caries proclivity in children through a series of questions that are based off investigated factors of caries formation.<sup>49</sup> The American Academy of Pediatric Dentistry has created a standard for CAT studying, and it takes into consideration the diverse risk factors such as the child's age, frequency of dental care, and exposure to positive oral products (like fluoride) and negative oral influences (like poor diet).<sup>49</sup> For risk assessment in infants and young children, a CAT could be an invaluable evaluation tool for ECC since it evaluates factors that young children are most susceptible to in those age groups. A CAT also enables healthcare professionals such as dental care providers and other health educators to facilitate appropriate treatment based upon the answers provided. Another advantage of the CAT is that the evaluation does not need to be taken by a dentist per se, but an assessment can be made by individuals who are knowledgeable in the signs and symptoms – both clinically and behaviorally – that constitute caries risk in a child.<sup>49</sup> This enables community assessment to be more wide scale, and reaches to as many children in the community as possible.



Preventive measures can be established early on before any caries formation young children, or before initial carious lesions have the opportunity to become extensive or severe damage in primary and permanent teeth. Staff can be trained in CAT administration, which is imperative for the child to be diagnosed correctly and also for the consistency of data.

Chart 1 is an example of a CAT developed with the risks identified in literature and modeled from the example of a CAT by the American Academy of Pediatric Dentistry (AAPD). It has three categories: “caries – risk indicators” which are “physical symptoms,” “environment,” and “other health conditions.” Observations are categorized into a low, moderate or high risk. A child can have a higher risk in environmental influences, yet still be evaluated low risk clinically. Sorting factors separately as the AAPD’s tool has done enables researchers to observe whether a certain factor has a higher risk than another factor. These tools can be beneficial in determining a community’s highest risk trends, and addressing those factors appropriately depending on level of severity.

	<b>Low Risk</b>	<b>Moderate Risk</b>	<b>High Risk</b>
<b>Physical Symptoms</b>	<ul style="list-style-type: none"> <li>• No caries in 24 months</li> <li>• Healthy enamel</li> <li>• Plaque is not evidently visible; no inflammation of gums.</li> </ul>	<ul style="list-style-type: none"> <li>• Caries in 24 months)</li> <li>• At least one surface on teeth show enamel demineralization</li> <li>• Some plaque, gums appear inflamed (gingivitis).</li> </ul>	<ul style="list-style-type: none"> <li>• Severe (Caries in 12 months)</li> <li>• Lesions are apparent</li> <li>• Plaque clearly visible on anterior teeth, gingivitis is apparent, with bleeding upon probing.</li> <li>• Presence of high levels of <i>s. mutans</i>.</li> </ul>
<b>Environment</b>	<ul style="list-style-type: none"> <li>• Frequent access to fluoridate water and supplements (toothpastes, rinses, etc.).</li> <li>• Regular brushing and flossing.</li> <li>• Socioeconomic status above poverty level</li> <li>• Limited consumption of sugar and low cariogenic diet</li> </ul>	<ul style="list-style-type: none"> <li>• Some exposure to fluoridated water or supplements</li> <li>• Sporadic irregular brushing and flossing habits.</li> <li>• Moderate consumption of sugars</li> </ul>	<ul style="list-style-type: none"> <li>• No exposure to fluoridated water or supplements</li> <li>• Irregular or infrequent brushing and flossing habits</li> <li>• Frequent consumption of sugars instigating a cariogenic diet</li> </ul>
<b>Other Health Conditions</b>			<ul style="list-style-type: none"> <li>• Special needs (i.e. immunocompromised)</li> <li>• Other health conditions or treatments for illnesses that could impair the normal flora of biofilm in the mouth.</li> </ul>

**Figure 3: Caries Risk Assessment Tool**

## 3.0 METHODOLOGY

### 3.1.1 Rationale and Background to Study Design

The importance of using literature to identify the antecedents and consequences of inadequate awareness towards children's dental health allows researchers to understand the aspects of rural America lifestyles that are unique to those regions. The information pertaining to rural policy, social environment, and community actions must all be taken into consideration in order to adequately address the burgeoning issue of poor dental health in children living in the area. This study aims to determine the primary causes of poor oral health in the region, and whether or not they are consistent with national observations. Head Start offices were recruited as the location for where the research study would take place. The rationale behind involving Head Start is because the association is a nationally based organization that provides resources and assistance for lower income children and their families of the nation.<sup>81</sup>

Head Start was first formed in 1965, and currently assists over one million children nationally, and has established over 2700 programs.<sup>82</sup> The program emphasis is upon all aspects of child education, including nutrition, health and parenting involvement. To date, approximately 25 million children in the nation have received services from Head Start offices.<sup>82</sup> Enrolling children in Head Start has shown that children have decreased behavior problems, improved reading, writing and math skills, and increased parental involvement with enrichment activities such as reading with children, while showing decreased disciplinarian activities.<sup>83</sup>

This same report also documented that the over 68% of children enrolled in Head Start would receive dental care at age 3, compared to the almost 52% of children who were not enrolled in the program.<sup>83</sup> Concurrently, this statistic increased at age 4, showing over 73% of 4 year olds would receive access to dental care, whereas almost 57% of children not enrolled received care.<sup>83</sup>

### **3.1.2 Study Design**

The first step was identifying potential participants in Head Start offices in Western Pennsylvania. Sites that participated were a Washington County Head Start office and two Waynesburg Head Start offices located in the townships of Morrisville and Carmichaels. Offices serving an area considered rural were approached and recruitment was done through cold calling and emailing. If any office expressed interest in participating in the study, the researcher would continue communications with them through email, primarily for setting up a time to conduct the study. The research was performed under the auspices of the University of Pittsburgh School of Dental Medicine's department of Dental Public Health and Information Management, and the Head Start offices located in Washington and Greene County.

Quantitative data analyses were numerically coded and inputted in the SAS 9.1.3 software package. Missing or unclear responses were assigned numerical code "9" and excluded from analysis.

### **3.1.3 Research Questions**

Literature pertaining to oral health issues in rural children has posited several key risk factors that are significant contributors to the prevalence of children's poor oral health in these areas. These factors are outlined below in two main statements:

- 1) Barriers to oral healthcare in these three sites are consistent with barriers identified nationwide for rural oral health.
- 2) Working with Head Start staff members is beneficial because they are trusted healthcare members that can communicate health concerns directly to their clients.

The goal of this study is to support both statements by through data analysis consistent with literature studies. To facilitate the analysis process, a set of questions have been developed to discern if the barriers identified from literature are consistent with the study outcomes. They are sequenced with the questions from the survey and are based on the Head Start staff's observations of parents or guardians and children:

- 1) Do you find that your parents or guardians see their child(ren)'s oral health as a priority?
- 2) Prior to the presentation, to what capacity were you prepared to discuss oral health issues with your clients, and do you feel that the presentation imparted any useful information to make you better prepared?
- 3) What resources are you already familiar with that could help children facing barriers to receive proper oral healthcare?

#### **3.1.4 Sample**

The actual study successfully recruited 33 individuals who participated in the study and completed the survey. Twenty of the individuals were from the Washington Head Start office, 6 were from Morrisville and 7 from Carmichaels. All the presentations and surveys were done during the time span of November, 2007 to April 2008.

### **3.1.5 Instrument**

The instruments of study include a PowerPoint slide presentation and the survey. A study protocol, the presentation, survey and informational script were all submitted for exempt status by the University of Pittsburgh Institutional Review Board and approved (Appendix A). All survey data were collected between November 2007 and April 2008.

The presentation includes the basic definitions and causes of ECC, information on the dental development of infants, and common questions of children's dental health such as teething and thumb - sucking behaviors. The slides also provide resources for both staff and clients on regional services that offer reduced cost dental care in the area. Total length of the presentation averaged forty – five minutes total, including time for brief discussions or questions. Comments and questions were noted by the researchers for potential follow up. Immediately after the conclusion of the presentation, the survey was distributed to the participants. Participants received one hour of continuing education credits for their time.

A pilot survey was presented to a group of daycare workers in an Allegheny County daycare. Seven individuals in an Allegheny County daycare received the survey as a pilot test group. The purpose of this pilot was to establish whether or not the survey was comprehensible for the anticipatory Head Start groups. For comparative measures only, results from the daycare are classified as a trial run only and are not included within data analysis.

The survey is 14 questions long, which included basic demographic questions (such as gender, education and age), questions seeking the strength of the staff's beliefs regarding personal oral health knowledge and awareness, and questions asking the staff to what degree of importance they felt their clients viewed oral health in their children. The answers were all

structured with multiple choice selections except for two questions which provided space for written answers.

Written responses to question 11 and 12 were classified as qualitative data (See Appendix C for actual survey questions). Question 11 asked the Head Start staff members' personal perceptions of barriers for patient care, and the responses from this question underwent content analysis to group the responses into categories. The other open ended question asked to include additional comments or suggestions.

### **3.1.6 Results**

#### ***Descriptive Analysis (Demographics)***

All the participants were female, and the majority of them (65%) had a bachelor degree pertaining to child care or development. Eighty seven percent of the participants work with preschool aged children, and the almost half of the group (48%) had been working at Head Start for 6 or more years. See Table 1 for the complete descriptive analyses.

**Table 1: Demographic Characteristics of Head Start Staff, N = 33**

<b>Demographic Characteristics</b>	<b>Frequency</b>	<b>%</b>
<b>Gender</b>		
Male	0	0
Female	33	100
<b>Age</b>		
Under 20	0	0
21 – 30	5	15
31 – 40	6	19
41 – 50	6	19
51 – 60	13	41
Over 65	2	6
No Response	1	--
<b>Education pertaining to child care/ child development</b>		
Bachelor’s Degree	21	65
Associate’s Degree	4	13
Courses post high school; no degree	3	9
No official coursework; on the job training	4	13
No response	1	--
<b>Length of time working at Head Start</b>		
Less than 1 year	2	6
1 – 5 years	15	46
6 – 10 years	5	15
More than 10 years	11	33
<b>Age group of children at Head Start</b>		
Infants	1	3
Toddlers	3	10
Preschool	26	87
No response	3	--

### 3.1.7 Quantitative Analysis

The results from the returned surveys revealed that there is a notable gap in communication of dental care between the staff at Head Start and the parents and guardians. The majority of the staff (82%) felt that oral health is a concern among most of the families, but 64% of the individuals also reported despite this awareness, questions about children’s oral health were addressed less than once a month by families.



With regards to preparedness, the survey showed that over 90% of the participants responded that they felt the presentation prepared them to discuss oral health with families, and they all agreed that the information was at least somewhat relevant to their professional role, although the majority (79%) felt much stronger than “somewhat” in terms of relevancy. Furthermore, almost all of the participants (97%) planned to make the resource materials from the presentation available to families.

The majority of the staff was also familiar with some resources that assist children who have difficulty receiving dental care. All of the staff (N = 33) were familiar with the Pennsylvania CHIP program prior to the presentation. The CHIP program is a statewide program that provides health insurance coverage for all children of Pennsylvania, regardless of income.<sup>84</sup> There is no association with the frequency of questions being asked by parents and the age of the child in Head Start, and there are no patterns in the age of the staff member and her view upon the importance (relevancy) of the study, or her prior knowledge of resources available about dental care.

### **3.1.8 Qualitative Analysis**

The first qualitative question asked participants, “[w]hat barriers, if any, do you think you face when providing health information to patients?” To this written question, 18 individuals (55%) out of the 33 total offered a response. All the responses were grouped into two categories: access (A) and behavior (B).

A: Responses that were grouped into the access category (n = 9),

- “Lack of Dentists taking age of children”
- “Transportation...Pediatric Dentists (Lack of)”

- “Pediatric dentistry – hard to find”
- “Transportation...dental coverage (\$)... dental coverage (Drs.)”
- “Dental insurance...dental providers...transportation”
- “Dentists who accept – Medicare...private dental costs”
- “Lack of insurance and/or lack of transportation to healthcare facilities. Not enough dentists willing to take on Medicaid patients.”
- “Transportation to and from dentist – price of gas and condition of vehicle to transport child to Pittsburgh.”
- “Transportation and no or limited dentists in the area.”

The common factors in access barriers that individuals identified appear to be transportation, insurance coverage, and shortage of dentists providing services in the areas. One unique point that was brought up was the comment that the “price of gas and condition of vehicle” also created a barrier towards proper care. The individual specified the means that were necessary to provide transportation, which was one of the identified factors commented on in 56% of the respondents who answered the survey question with an access issue.

B: Responses that were grouped into the behavior category (n = 9),

- “Some parents feel as if this issue is being forced onto them”
- “Parent level of concern”
- “No follow through – no concerns”
- “Getting parents to be more aware and active in this topic”
- “Parents do not understand the importance of early dental care”
- “Parents / Guardians do not see the importance/ ignorance of health importance”
- “Parents do not think dental care is important.”

- “They tend to ignore the info provided”
- “Lack of understanding on parents part or serious of dental health. Unwillingness to change eating/ drinking habits.”

Responses in this behavior category show that the staff found parent attitude and behavior to be a major contributor to the problems of children’s oral health. Issues with prioritizing oral health needs was frequently brought up as a significant barrier, often associated with barriers to access.

### **3.1.9 Discussion**

The purpose of this study is to elucidate the priority risk factors that create barriers to quality children’s oral healthcare in rural areas of Western Pennsylvania. Barriers which have been established in literature were sought out and defined more accurately in this thesis’s study. Summarized below are the main points formed from literature, the study’s data analysis and outcomes.

- 1) Access issues such as insurance coverage, income disparities, the high cost of services and limitations in transportation make seeking dental services difficult for families that are unable to afford both the expenditure needed to receive care and the time needed to ensure their child(ren) receive services.
- 2) Behavioral issues such as diet, prioritizing healthcare services below other needs, parental influence and historical mistrust of governmental authority all contribute to the continuous deterioration of children’s oral health status and wellbeing. This not only affects individual children’s lifespans but also through generations of families.

- 3) The confluence of access, behavioral and pathological factors are all interlinked with one another and influence the actions or outcomes of each other.
- 4) Head Start staff can play a very important role in improving the status of oral healthcare in rural children. Their authority in rural communities can be a synergistic relationship with healthcare providers, especially when the latter are limited, so that parents, guardians and children are able to see oro-dental care as a feasible task.

Although the quantitative survey responses showed that the staff's perception of awareness and concern was high among families, the statistics from the data collection do not collaborate. The survey's outcomes show that there appears to be evident concern for children's oral health among families, but questions are not addressed as frequently as anticipated towards Head Start staff. However, 50% of the respondents discussed behaviors of families which may have been barriers for improving their child(ren)'s oral health. This could suggest that there is a desire in the community to increase awareness of dental care among rural families in the area, but that communications also must increase between families and Head Start staff. Barriers in access and behavior do indeed play a role in oral health wellness.

The findings showed that perceived barriers to oral healthcare in rural Pennsylvania are consistent with barriers identified nationally. Head Start staff also are aware that oral health in children needs more attention. As mentioned before, most of the staff perceived that there is a lot of concern, but parents rarely asked questions pertaining to oral health. Eighty seven percent of the staff who participated were familiar with sources of free or reduced dental care prior to the presentation, and all (N = 33) knew about CHIP coverage. These statistics show that Head Start staff can be invaluable resources of information to their clients, which supports the claim that "working with Head Start is beneficial because they are trusted healthcare members," however,

channels of communication need to be opened. The outcomes show that the messages are not being conveyed effectively, and that there needs to be more interaction between staff and parents.

Another observation was that the staff attributed much of the children's health problems to parent and guardian attitudes towards the issue. While this topic was not originally considered to have a significant effect upon children's oral health, in all the locations researched, the issue of parent concern was brought up in discussion during the presentations, with 27% of all the participants providing additional comments.

According to both the American Academy of Pediatric Dentistry and the American Dental Association, the guidelines for children's dental care recommends 2 visits each year to a dental provider, starting from the age of one.<sup>48</sup> The AAPD and ADA also have defined normal age parameters for young children's habits that affect their mouths, such as thumb - sucking and the use of pacifiers. These specific behaviors were noted in discussion during the presentation as a specific note of concern among the staff at Head Start, where the staff observed children prolonging these behaviors. The notes taken from these discussions suggest that there are a number of parents and guardians who are prolonging these behaviors which ought to naturally cease between ages 2 – 4 in children,<sup>85</sup> consequently allowing health problems to arise, which not only pertain to the structure and health of the children's mouths, but also to growth and development of a child psychologically, who may continue to remain attached such an infantile behavior, thereby delaying natural child maturation.

Some of the comments that were provided as explanations for prolonging negative behaviors that can seriously affect children's oro – dental health included how many parents sought convenient and quick methods to sooth an unhappy child. Many of these behaviors can

begin extremely early, and were sometimes observed by the staff while children were still in infancy. These included parents and guardians offering infants a pacifier or a bottle as a method to soothe their child even though the child may or may not be hungry. Feeding a child through a bottle is entirely acceptable so long as proper oral hygiene practices are practiced and that they are properly weaned from the bottle at the normal age for proper development, which is usually also around ages 2 through 4.<sup>48,50,55</sup> Health issues arise when parents allow their child(ren) to prolong use of these soothing instruments past normal ages when the children ought to be weaned off. This creates physiological issues such as jaw development problems, leading to speech impediments, delayed dentition and aesthetic problems, all of which could also contribute to potential social problems when the child attempts to assimilate with his or her peers.<sup>86</sup>

Staff members mentioned that the impressions they get from parents are that they are “unconcerned” at their child’s continuous dependence upon these bad habit forming activities. Some even commented on situations they had witnessed where parents would dip pacifiers into sweets such as “kool- whip” (whipped cream), honey and continue to provide children with inappropriate liquids such as “pop” (soda), caffeinated beverages, and fruit juices throughout the day. They have also commented that they have observed parents putting their babies to sleep with a bottle of formula, and then failing to clean the child’s mouth after feeding, unbeknownst that the acids in these beverages can promote rapid deterioration of the child’s oral health.<sup>87</sup> This constant availability of sweets has made some Head Start individuals believe that the parents’ reliance upon sweets to soothe children encourages them to expect it more. Some of these behaviors, whilst parents believe that placating the child is a good thing, can lead to behavior problems in children as they grow older, as it allows children to anticipate a “treat” when they are fussy or angry, so they may continue to act out in order to acquire them. For a

mother, especially in lower income families, the cost of these products are often lower cost than healthy snacks and are therefore more convenient to her economically and emotionally, since her child does not fuss anymore.

One of the key problems with parents inadvertently contributing to the continuation of oral health problems in their children is that urging parents to change routines to accommodate better oral health routines may be difficult to uphold, especially in lower income, single parent households, where the primary financial support comes from the parent's time at employment, which can also limit the amount of supervision of his or her child(ren)'s behaviors. Nevertheless, mobilizing parents to pique their interests regarding children's oral health is still part of a necessary course of action, and enrolling children in programs such as Head Start's enable a greater likelihood for change.

### **3.1.10 Proposed Action**

The literature review identified a number of barriers that young children and their parents and guardians encountered in seeking proper oral care. Both literature and the research study in this thesis demonstrated that the issues were not only formed by personal beliefs and attitudes of the community but also from the environment that rurality has created to prevent the capacity for adequate care. As a result, an intervention sought to reduce this problem ought to address the multidimensional aspects of increasing dental in rural American children needs to have a multidimensional approach. Utilization of theories enables a strategy that can develop and manage a successful intervention. Oftentimes, successful program planning is achieved only when there is a strong comprehension of both the behavioral determinants of health but also the environmental determinants that influence the behavior.<sup>88</sup>

A proposed plan of action would then recruit the help of the community to initiate action in order to reduce the rate of poor oral health seen in rural areas. While involving Head Start offices is crucial, the goal is to involve additional healthcare professionals, parents and authoritative figureheads of the community, including local authority such as clergy members and teachers as well as government authority. The approach through community support enables trust through these individuals, especially since they are already respected and trusted throughout communities. Their presence is an extremely important one in small rural communities and many individuals may be more receptive to their messages.

Community building has been used as a positive tool for improving the health of groups since the late 19<sup>th</sup> century.<sup>89</sup> It has shown that mobilizing the unique abilities of individuals brought together have a positive effect. The effectiveness of community building is attributed to the “grassroots” concept of organization where individuals feel that the plan and actions taken are entirely from their own initiatives, thus establishing comfort in the decisions made.<sup>90</sup> Additionally, community organizing has positive psychosocial effects that give individuals the perceived feeling of support in a tight knit group identifying with each other on a common variable.

### *Theoretical Application*

Despite the positive attributes that community building and organizing has to address the situation, initiating change from poor health can only occur when individuals become motivated enough to create change. This motivation is often self – driven and will occur when the individual feels that there is a need for it. Also called “self efficacy,” the behavior is a key concept from the Social Cognitive Theory (SCT) and its existence is only feasible when an



individual chooses to make conscious changes in his or her behavior, as a means to adapt to the current environment. Human behavior and actions are thought to be partly controlled by the individual's own decision – making process.<sup>90</sup> Therefore, the SCT can identify the psychosocial influences upon health behavior and determine methods to facilitate change.<sup>91</sup>

Partnering with Head Start is beneficial to put the SCT in action since it is a national government program. As mentioned before, it has widespread availability because it is currently responsible for the welfare of over 1 million children in the United States.<sup>82</sup> Head Start can enable the consistency of developing routine programming for preventive care due to their structured regulations from the government (health screening mandates for children), but also allows enough flexibility to give program curricula subtle accommodations to the needs of each site's environment. This structure can be especially useful to rural sites, which face issues unique from urban areas of the nation.

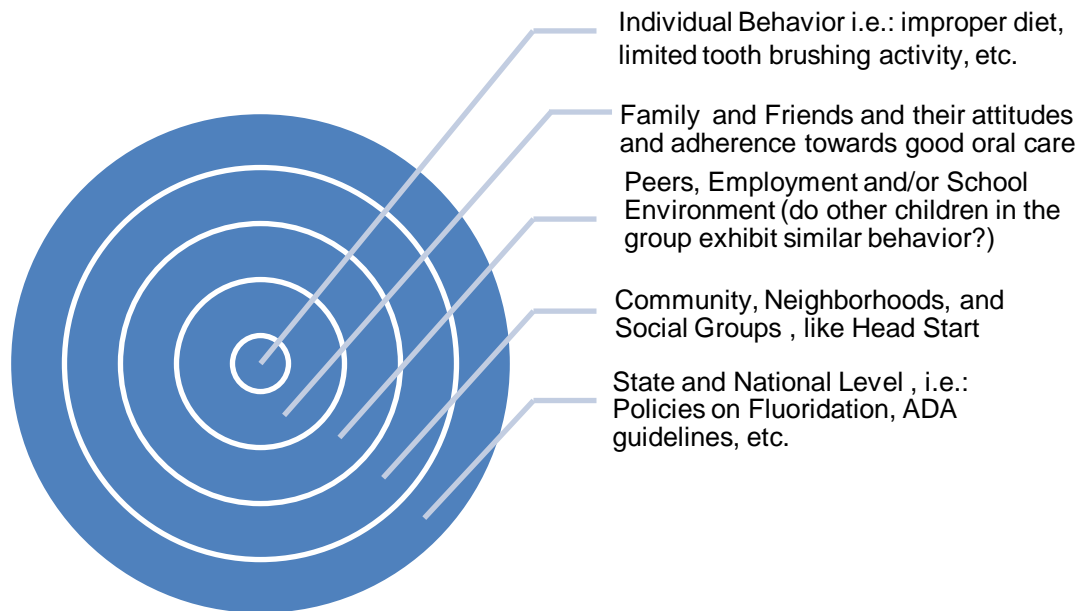
Acknowledging that there is a need for them to be more aware of children's oral health is one of the first steps towards accepting activities for change. The goal of a provider (the community) in this step is to identify the need, and help spread awareness of it through multiple channels of communication. For instance, while meeting with parents, Head Start staff can make it a part of the agenda of items to emphasize oral care needs. Brochures and videos can be made available while parents and guardians are waiting to speak with the staff and pick up their children. This is an important part of the SCT, since the cooperation of parents, guardians and children is crucial for community building to take place. Without both client (parents, guardians and children) awareness and provider emphasis, health improvement cannot take place.

The first concept of the SCT is “environment,” which are external variables that can affect an individual's behavior. Multiple levels of environment create issues in children's oral

health in rural America are addressed as a socio – ecologic model below in Figure 4. At the core of the model is the individual, and instances of individual behavior that affects poor oro – dental health. This includes behaviors which the individual does by himself or herself. Some of these behaviors that can impact oral health are the frequency of teeth brushing, a high sugar diet, and the number of dental care provider visits annually.

Figure 4 shows how these individual behavior outcomes are influenced by the multiple levels of environment. The environment that affects the individual includes a personal level such as family and friends, to a broader range including state and national level policies.

Concurrently, the concepts of the social cognitive theory are influenced to the socio – ecological model of the environment. Factors that broaden beyond the sphere of family and friends and extend into the community, state and even national level, actions for change at all levels will affect the individual’s behavior. Head Start’s involvement for a proposed change is a good example of how the socio – ecologic model can work well with the concepts of the SCT. As a federal program that works directly with communities, Head Start organizations are required to acquire 20% of their funding from the local community as a means to ensure a good rapport with the community and to represent the local area accordingly.<sup>92</sup> Therefore, the program’s broad outreach as a collaborative model for a nationally based concept with community based action applicable to the socio – ecologic model and the social cognitive theory.



**Figure 4: A Socio - Ecological Model of the Environment Addressing Oro - Dental Wellbeing in Rural Children**

The social cognitive theory is applicable to both the consumers (children, parents and guardians) and the providers (such as Head Start staff, community leaders, dental professionals and teachers). In this proposed action, the providers mentioned correlate directly to the thesis’s study, which refer providers specifically as Head Start staff. These providers can utilize the environment effectively to increase awareness of an issue by approaching places that parents and families frequent. For instance, activities such as free assessment sessions can be done in a church, school or social hall. Furthermore, they are reliable areas that allow individuals to seek information and be more inclined to accept the resources since it is being provided in a trusted community environment.

Once community building is established then activities that address the actual situation (for oral health awareness) can continue further. Some activities should help individuals understand the necessity of routine oral hygiene habits and help gradually establish these habits

in the long run. A provider should make sure that the various activities accommodate for the individual's level of preparedness for introducing a healthy habit. For parents and guardians, regular maintenance of their child's teeth, even before teeth erupt in infants is crucial practice to help children establish good independent oral hygiene habits in the future. These include having parent begin with basics such as regularly rinsing and wiping their infants gums, understanding teething and becoming familiar with toothbrushes and toothpastes for very young children. Eventually, introducing regular flossing and proper nutrition will be able to prolong and increase the likelihood of good oral health in an individual who is exposed early on.

This gradual building of healthy oral practices enables consumers of services, which are parents, guardians and children, to recognize their own capabilities in increasing good habits. Encouraging qualified individuals to enroll in Head Start help continue community involvement and increasing the likelihood that people will adhere to some healthy practices, since Head Start has shown to have a positive impact upon children and parent's wellbeing. Incentives can be offered to help children enroll in Head Start, and for enrolled children's families for attending meetings requested by Head Start staff. After meeting with parents about Head Start applications or the evaluation of a child's progress, suggested incentives for attendance such as free toothbrushes, toothpastes, and informative pamphlets. At the conclusion of these meetings, ask that each parent or guardian complete a brief, 3 question query about their understanding of the information just received.

While continuing positive reinforcement of these activities is crucial for building better knowledge, an important part of theoretical application towards behavior change is to be cognizant of people's expectations and reactions towards met and unmet expectations. Even with meticulous care, perfect dental health is still not guaranteed, but must still be recognized as

a priority health issue. As a theoretical approach, the social cognitive theory acknowledges that motivation for an individual to act a certain way is influenced through self efficacy driven by the personal beliefs of one's own capability.<sup>90</sup>

Both providers and consumers of care should work to set realistic goals with families. An example of implementing a realistic application to improve children's dental care is to have families agree to complete a week's worth of proper brushing or gum care in the case of infants. Once a week can be successfully completed, families should increase the activities up to 2 weeks. Parents should ensure that proper enforcement occurs when their children continually request for treats or refuse to brush and floss daily. Since children acquire skills and model their behavior from their environment, especially at a very young age, the SCT's concept of observational learning is a crucial part of how child's behavior is affected.

Observational learning is important, especially in children, since it is suggested that children acquire their behaviors by watching other individuals' actions.<sup>91</sup> In close knit rural communities, a child can be exposed to many people and are likely to emulate their behaviors. Young children especially are very impressionable in the first few years of their life; studies have shown that children are unable to logically differentiate reasonings in their mind until age 7, and up until age 11, acquisition of logical thought is heavily aided by concrete practical analysis.<sup>93</sup> Therefore, modeling good oro – dental behavior especially for the children in this study are heavily influenced by the external environment which can be a small system such as familial lifestyles, to broader issues in policy that affect the welfare of a community.

In summary, the social cognitive theory can enable better understanding of child – adult interaction by considering environmental constructs into active approaches for change. Since natural human development will also play a role in affecting the outcome of behavior, attempts

to change activities for health improvement will also be dependent upon people's willingness to change. A modification in behavior is measured in the aforementioned concept called self efficacy, which can only be achieved when an individual is emotionally ready to be able to continue changing an action. For this to be achieved, social support from community building, recognizing positive actions, and maintaining self control and reinforcements of change will enable a successful outcome.

### **3.1.11 Future Practices**

Despite the preliminary nature of this study, it shows potential to open doors for further investigations that can expand the course of actions to improve the status of oral healthcare in young children in rural America. The continued success of Head Start programs in rural communities is evidence that Head Start staff are regarded as valued community members and leaders, and would certainly be an essential asset to further oral health education in rural areas.

While it is obviously ideal to educate individuals on ways to maintain a good oral health status, the scenarios are not always good for this sort of primary prevention. Failing to address issues such as provider care, cost, insurance coverage and burdens of traveling to a provider as well as the emotional ramifications that result from difficulty obtaining them make it evident that secondary and tertiary prevention implementation must be required as well. In this study, many Head Start staff have already indicated the urgent need for young children ages 0 – 5 to receive intervention care for their oral health, and that the rehabilitation of both mother and child attitudes towards the importance of dental wellbeing and the need for actual physical care suggests that secondary and tertiary prevention needs to be heavily emphasized. Since Head Start staff can be involved with children from as young as infancy, targeting them at this time

and promoting self – efficacious methods of preventive care will make it more possible to establish good practices in oral care.

Moreover, the burden of disease can have a stronghold upon health. The expectations of mothers and children may not always be fully met, even with meticulous care. Scenarios such as this would greatly benefit with having the implementation of the SCT in program planning. To help analyze disease burden against environmental factor’s proclivity for ECCs, future studies ought to include comparative analyses between Head Start staff and their clients or patients. Some possible research can include a cohort study following enrollment of children through an extended length of time (5 years or more), and studies that have parent and child involvement in the evaluation. These studies can measure the efficacy of Head Start’s message by observing whether or not parents and children find it likewise as important. Implementing behavior and motives for positive reinforcement are beneficial to both providers of care and patients for care.

While research in rural health is still limited, new trends suggest that there are significant benefits in making the nation more aware of current issues plaguing these areas. The future of rural health, especially oral healthcare in children, can enable a new generation that forms a community with a more positive outlook upon their health and wellbeing. As research increases in oro – dental health, evidence is showing that proper care of the mouth also transmits to decreased rates in other debilitating diseases. Perhaps vigilant awareness of this can enable a dramatic reduction of chronic health problems such as diabetes, heart disease and pregnancy risks in the future, enabling future generations of healthier children to come.

## APPENDIX A: IRB APPROVAL



# University of Pittsburgh

## *Institutional Review Board*

3500 Fifth Avenue  
Ground Level  
Pittsburgh, PA 15213  
(412) 383-1480  
(412) 383-1508 (fax)  
<http://www.irb.pitt.edu>

### Memorandum

TO: [MARGARET HAMILTON](#)

FROM: [SUE BEERS](#) PHD, Vice Chair

DATE: 4/23/2008

IRB#: PRO08030158

SUBJECT: Evaluation of an Oral Health Continuing Education Program in Head Start Offices

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The above-referenced project has been reviewed by the Institutional Review Board. Based on the information provided, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section 45 CFR 46.101(b)(2).

Please note the following information:

- If any modifications are made to this project, please contact the IRB Office to ensure it continues to meet the exempt category.
- Upon completion of your project, be sure to finalize the project by submitting a termination request.

**Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.**



## **APPENDIX B: INFORMATIONAL SCRIPT**

The purpose of this research study is to evaluate a continuing education program designed to increase awareness of recommended early childhood oral health practices among Head Start staff. The target audience is Head Start staff in western Pennsylvania. Attendees will receive a certificate for one training hour, regardless of whether they complete the survey.

Following a presentation summarizing early childhood standards of care and proper care methods, a brief voluntary survey (approximately 5 minutes) will be distributed. If you are willing to participate, the survey will ask for information such as professional role, years of experience, and the relevance of the information presented. There are no foreseeable risks for individuals who complete the survey, nor are any there direct benefits to you. The responses will be labeled with anonymous identifiers by the first and last initial of the participant and their year of birth (for example: Jane Doe, born in 1968 will be JD1968). All information is kept confidential, and the results will be kept under lock and key. Your participation is voluntary, and you may withdraw at any time.

This study is being conducted by Margaret Kuder Hamilton, Principal Investigator, and Esther Hwang, student. Esther can be reached at 412-651-7779 and Margaret can be reached at 412-648-8513, if you have any questions.

## APPENDIX C: SURVEY

Date \_\_\_\_\_

First and Last Initial and Year of your Birth \_\_\_\_\_ (for example, if your name is Jane Smith, and you were born in 1968, you would write JS1968)

### Oral Health Training Evaluation

1. The age group you work with the most:
  - a. infants
  - b. toddlers
  - c. preschool
  
2. Have you had specialized education in child care/child development?
  - a. Yes, I have a bachelor's degree
  - b. Yes, I have an associate's degree
  - c. Yes, I have taken courses post high school, but have not completed a degree
  - d. No official coursework, I have had on the job training
  
3. How long have you been working at Head Start?
  - a. Less than 1 year
  - b. 1-5 years
  - c. 6-10 years
  - d. More than 10 years
  
4. Do you feel that oral health is a priority health issue with the families at your center?
  - a. Yes, there is a lot of awareness and concern
  - b. Yes, for some families
  - c. No, most families are unaware
  
5. Thinking back to the previous 3 months, how frequently did parents ask you questions about oral health and their children?
  - a. One or more questions per week
  - b. 1-3 questions per month
  - c. Less than 1 question per month
  - d. Never
  
6. After attending this presentation, how prepared do you feel to discuss oral health with families?
  - a. More prepared
  - b. Prepared
  - c. Somewhat prepared
  - d. Not prepared

- 7. Was the information presented relevant to your professional role?
  - a. Yes, it was mostly relevant to my professional role.
  - b. It was somewhat relevant to my professional role
  - c. No, it was not relevant to my professional role at all.
  
- 8. Do you plan to make the resource materials available to families?
  - a. Yes, I plan to share them.
  - b. Maybe, I'll share them with some who are interested.
  - c. No, I do not plan to share them with families.
  
- 9. Had you heard of the Pennsylvania CHIP program before this presentation?
  - a. Yes
  - b. No
  
- 10. Were you familiar with any of the sources of free or reduced cost dental care before this presentation?
  - a. Yes
  - b. No

11. What barriers, if any, do you think you face when providing health information to patients?

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12. Please provide any additional comments or suggestions.

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13. Your age:
- a. Under 20
  - b. 20-30
  - c. 31-40
  - d. 41-50
  - e. 51-60
  - f. over 65

14. Your gender:
- a. Female
  - b. Male

## APPENDIX D: DATA ANALYSIS

### ORAL HEALTH EVALUATION KEY

9=No information given. Applicable to all variables.

ID: age groups

- 1=under 20
- 2=20-30
- 3=31-40
- 4=41-50
- 5=51-60
- 6=over 65

GENDER:

- 1=Female
- 2=Male

LOC: Location

- 1=Pittsburgh Daycare
- 2=Washington County
- 3=Morrisville
- 4=Carmichaels

WORKAGE: The age group you work the most with.

- 1=infants
- 2=toddlers
- 3=preschool

EDU: Have you had specialized education in child care/ child development?

- 1=Yes, I have a bachelor's degree.
- 2=Yes, I have an associate's degree.
- 3=Yes, I have taken courses post high school, but have not completed a degree.
- 4=No official coursework, I have had on the job training.

WORKHS: How long have you been working at Head Start?

- 1=Less than 1 year.
- 2=1-5 years
- 3=6-10 years
- 4=More than 10 years.

ISSUE: Do you feel that oral health is a priority health issue with the families at your center?

1=Yes, there is a lot of awareness and concern

2=Yes, for some families.

3=No, most families are unaware.

FREQ: Thinking back to the previous 3 months, how frequently did parents ask you questions about oral health and their children?

1=One or more questions per week.

2=1-3 questions per month.

3=Less than one question per month.

4=Never.

AFTER: After attending this presentation, how prepared to you feel to discuss oral health with families?

1=More prepared.

2=Prepared.

3=Somewhat prepared.

4=Not prepared.

INFO: Was the information presented relevant to your professional role?

1=Yes, it was mostly relevant to my professional role.

2=It was somewhat relevant to my professional role.

3=No, it was not relevant to my professional role at all.

AVAIL: Do you plan to make the resource materials available to families?

1=Yes, I plan to share them.

2=Maybe, I'll share them with some who are interested.

3=No, I do not plan to share them with families.

CHIP: Had you heard of the Pennsylvania CHIP program before this presentation?

1=Yes

2=No

KNOW: Were you familiar with any of the sources of free or reduced cost dental care before this presentation?

1=Yes

2=No

## SAS CODE USED FOR ANALYSIS

```
/****Head Start Data****/

options ls=100 ps=70 nodate;
footnote '----Esther Hwang----';
/****Run data****/
libname hs 'C:\data'; /*<-location of dataset*/

proc format;
value idf 1='under 20' 2='20-30 range' 3='31-40 range'
4='41-50 range' 5='51-60 range' 6='over 65';
value genderf 1='female' 2='male';
value locf 1='Pittsburgh Daycare' 2='Washington County'
3='Morrisville' 4='Carmichaels';
value workagef 1='infants' 2='toddlers' 3='preschool';
value eduf 1='bachelors degree' 2='associates degree'
3='courses post high school, no degree'
4='on job training';
value wrkhsf 1='Less than 1 year' 2='1-5 years' 3='6-10 years'
4='More than 10 years';
value issuef 1='a lot of awareness and concern'
2='for some families' 3='unaware';
value freqf 1='One or more questions per week'
2='1-3 questions per month' 3='<1 question per month'
4='Never';
value afterf 1='More prepared' 2='Prepared' 3='Somewhat
prepared'
4='Not prepared';
value infof 1='mostly relevant' 2='somewhat relevant'
3='not relevant';
value availf 1='Yes' 2='Only to interested'
3='No';
value chipf 1='Yes' 2='No';
value knowf 1='Yes' 2='No';

data eval;
set hs.final_data;
run;

proc print data=eval;
format id idf. gender genderf. loc locf. workage workagef. edu
eduf. wrkhs wrkhsf. issue issuef. freq freqf.
after afterf. info infof. avail availf. chip chipf. know knowf.;
run;

/****IDENTIFY MISSING AND POTENTIALLY ERRONEOUS DATA****/
```

```

proc print noobs data=eval;
var id gender loc workage edu wrkhs issue freq after info avail
chip know;
where id=9;
run;

data eval_1;
set eval;
****Set missing or erroneous values****/
if id=9 then id=.;
if loc=9 then loc=.;
if workage=9 then workage=.;
if edu=9 then edu=.;
if issue=9 then issue=.;
if freq=9 then freq=.;
if after=9 then after=.;
if chip=9 then chip=.;
if know=9 then know=.;

****Combine categories****/
*combine education levels, set post high school as one group,
the rest in another group;
if edu>=2 then postedu=1;
else postedu=2;
*combine age group indiv. works with most;
if workage<=2 then workbaby=1;
else workbaby=2;
run;

proc freq data=eval_1;
tables id loc workage workbaby edu postedu wrkhs issue freq
after info avail chip know;
run;
proc freq data=eval_1;
tables loc*id;
run;
proc freq data=eval_1;
tables loc*edu;
run;
proc freq data=eval_1;
tables loc*wrkhs;
run;
proc freq data=eval_1;
tables loc*workage;
run;

```

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