



Haitian orphan population and protective factors against caries

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Abstract

Objective In Haiti, families were torn apart and children were left orphans after the 2010 earthquake. In the aftermath of this natural disaster many children were relocated to orphanages across the country and adopted internationally. Years later these children find themselves catching up in growth physically, mentally and emotionally after an extremely traumatic event during a crucial time in their health development. Another important marker of development is the primary dentition and the presence of caries. We report estimates of early childhood caries (ECC) frequency, risk factors and quality of health among Haitian children. **Methods** Medical and dental professionals conducted a descriptive cross sectional study through the Pittsburgh Kids Foundation and their partnership with IDADEE children's home, EBAC orphanage and New Vision Children's home. Vital signs were taken and recorded to create a health/growth history for each child. Brief dental screenings were conducted and topical fluoride treatments were administered. Risk factors and quality of health information was obtained from discussions with the caregivers present. The children and caregivers were given oral hygiene education and supplies (i.e. toothbrushes, toothpaste, floss). **Results** Physical exams and dental screenings were conducted on the 40 children ages 3-10 years of age living in the IDADEE children's home. Two children had cavitated teeth. Eight children had teeth that were stained. Four children had evidence of dental trauma. 26 out of the 40 children had otherwise healthy dentition. **Conclusion** The IDADEE children's home and New Vision Children's home have hopes to expand their capacity with new construction scheduled to be finished in 2016. As more children enter these homes action is needed to educate caregivers on ways to identify high-risk children to prevent ECC and ways they can be treated before irreversible damage is done to the developing permanent dentition.

Citation: Rea M. (2016) Haitian orphan population and protective factors against caries. Dentistry 3000. 1:a001 doi:10.5195/d3000.2015.40
Received: April 2, 2016
Accepted: April 8, 2016
Published: May 10, 2016
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Introduction

In Cap-Haïtien, a city in northern Haiti, multiple orphanages are the home to children who found themselves orphans after the 2010 earthquake that hit the southern capital city Port au Prince. As in any natural disaster aid, clean up and rebuilding can be a long painstaking process and many children when found were fighting to hang on for their lives. The original mission of the IDADEE children's home was in fact not to be a home at all, but rather a place for mere infants and toddlers to respectfully die. Many of these children initially exhibited failure to thrive, [1]

and some continue to show these symptoms, however the vast majority have experienced catch up growth and are developing within normal limits for their sex and age [2]. This can be in large attributed to the organizational set up of the IDADEE children's home. The children of IDADEE find themselves in a very unique situation in which they are divided and assigned to 1 of 8 different house "mothers" who permanently live at IDADEE cooking, cleaning and caring for the basic needs of the children under their care, just as any parent does. The house "mothers" are also the ones brushing the children's teeth or supervising

them brushing their own teeth.



Figure 1. Dental hygiene student brushing teeth to remove plaque before fluoride varnish application.



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The IDADEE children's home is notably located in a more rural portion of Cap Haitien known as Mourné Rouge, however it is unique in that the home is located on a rather large compound that includes the IDADEE school and the Joshua House Retreat Center. The Joshua House Retreat Center is open all year long, accommodating church, business and medical missions. The IDADEE house "mothers" are very aware of the presence of medical personnel that frequent the center and they use that as their main source of medical attention for the children. When our specific medical group was there, the "mothers" were ready and prepared to express their concerns both medically and dentally for many of the children [3]. In this report, we describe the preliminary findings related to oral health of children that survived the Haitian 2010 earthquake.

Subjects and Methods

Physical exams were conducted on the IDADEE compound. IDADEE staff was given notification in the weeks prior to the visit and consent was given and arrangements were made for the physicals. Vital signs were measured and recorded for height, weight, occipital frontal circumference (OFC), blood pressure, and heart rate. These records are then filed in the personal records being kept for each child to track growth patterns. Additionally the children underwent a limited oral exam screening for decay, trauma, staining and oral hygiene. They were then given brief oral hygiene education

and had their teeth brushed by the dental and medical volunteers (Figures 1 and 2). Once superficial plaque removal was achieved PreviDent Varnish (5% NaF) was applied and the caregivers and the children were given instruction to not brush their teeth until the next day. Questions about diet, oral hygiene, previous medical and dental history answered by caregivers via and interpreter.

Results

Table 1 summarizes the oral health outcomes found. Table 2 describes the contents of the children weekly diet and oral hygiene habits as reported by the children's caregivers.

Discussion

According to the AAPD (American Association of Pediatric Dentistry) caries-risk assessment this population of children would all be classified as high risk for early childhood caries (ECC) due to the factors of having a low SES status, non-fluoridated drinking water, little availability of oral hygiene products (i.e. toothbrushes and fluoridated tooth paste, minimal access to or regular dental care [4]. The results of our oral exam findings however only report 5% of these children presenting with tooth decay. This is a relatively large difference in comparison to the 42% of children affected with tooth decay in the United States. The children in our sample that presented with such extensive decay that their DMF

score (Decayed Missing Filled) for their age further classified as having severe early childhood caries (S-ECC). S-ECC is defined as having a DMF score of greater than or equal to 4 surfaces at age 3, greater than or equal to 5 surfaces at age 4 or greater than equal to 6 surfaces at age 5 [4]. Among the children with staining, no further classifications of ECC or S-ECC were made because the staining appeared to be mainly external or confined to the pits and fissures of the teeth. It was suspected that much of this external staining would have been able to be removed with a proper dental prophylaxis. Additionally it was suspected that the pit and fissure staining was the sign of an arrested caries process and that appropriate treatment for this would have been the placement of seal-

Table 1. Frequency of dental operations.

Finding	N	Percent (%)
Staining	8	20
Cavitations	2	5
Trauma	4	10
Normal Dentition	26	65
	40	100

ants or a preventive resin restoration (PRR) confined to these affected pits and fissures [5].

The results of the diet history given by the caregivers notably report a diet that would be considered relatively low caries risk. The children have essentially no processed sugar intake and

their consumption of fruits is mainly in the form of whole fruits. In the case of whole fruits there is little evidence to show causality of caries. Fiber rich fruits such as mangos and bananas require more chewing, therefore stimulate more saliva flow potentially acting as a protective mechanism against caries [6]. Children that these organizations are seeking to bring into their programs are those that are physically, mentally and emotionally delayed. Action is needed to educate these caregivers regarding the specialized care required by these children to prevent as many permanent complications as



Figure 2. 5-year old girl practicing dental brushing technique.

possible. The organizational set up of dividing the children among individual “house” mothers has increased individual attention that children receive and has arguably allowed these children to overcome developmental obstacles early on in life. Additionally it can be argued that oral hygiene provided under the supervision of these “mothers” has resulted in prevention of early childhood car-

ies for the vast majority of these children. These women are the common denominator in controlling crucial environmental factors such as hygiene, nutrition and access to healthcare.

These women are also a common denominator as a reservoir for *Streptococcus mutans*, the prime organism involved in caries initiation and progression. In biologic mothers and children the levels of *Streptococcus mutans* are highly associated due to their contact normally being most intimate, of highest frequency and duration. Additionally, immunological factors are shared between mother and child, a phenomenon known as vertical transmission. Although, the children of IDADEE no longer are in contact with their biologic mothers they still have their immunological factors that were acquired in utero or potentially via breastfeeding. In the case of these women, while their contact with these children can also be described as intimate, in high frequency and duration, their immunological factors are not being conferred to these children. This type of transmission is known as horizontal transmission. Other children in IDADEE also serve as a reservoir of *Streptococcus mutans* and contact with each other is another form of horizontal transmission [7].

With so many of these environmental factors kept constant from child to child in IDADEE, the major difference in these children is their genetics and their past environmental exposures.

Caries is defined as a multifactorial infectious disease caused by an imbalance between protective and risk factors [8]. Keeping in mind the multifactorial nature of this disease it can be proposed that the genetic mode of inheritance would best be described as being polygenic. Genes of interest when investigating cariology include dentition, salivary, immunological, and gustation genes [9]. In some children the protective effect of some of these genes is great enough to outweigh many of the established environmental factors such as diet, oral hygiene, and SES that place children at high risk. In the case of the children at IDADEE it can be argued that the 75% of children with healthy dentition and history of dental trauma have genes that in fact do provide that protection against the caries process. In the 5% of children with ECC we can argue that their genes are not providing adequate protection against the caries process and are being heavily outweighed by known risk factors. In the 20% of children with staining, the exact nature of the staining would be further characterized as either external or pit and fissure. In the case of pit and fissure staining the staining could be the result of an arrested caries process. If this is in fact the case, an argument can be made that while the balance at some point was in favor of risk factors and the progression of the caries process, it has now been tipped to the other direction and protective genetic factors could be predominating.

Table 2. Interview responses obtained from caregivers in regards to diet and oral health.	
Diet	
Protein	Chicken, fish, beans, peanut butter
Carbohydrates	Rice, white bread, oatmeal
Vegetables	Plantains
Fruits	Mango, oranges, pineapple, bananas
Water	Bagged
Juice	Occasionally Tampico (orange and other fruit juices)
Soda	Rarely
Sugar/Sweets	Rarely; have somewhat of an aversion
Dental Health Behaviors	
Brushing frequency	2x a day; by caregiver some of the older children can brush on their own
Fluoride sources	Toothpaste when available Varnish ~1-2x a year Water non-fluoridated
History of pain	2 children with severely cavitated teeth, cry a lot at night, won't open their mouths

Follow-up is definitely indicated in this sample, with potential research expanding to the other associated orphanages that were in place before the earthquake. While, the resilient nature of the IDADEE children is more than evident the synergistic effect of their resilience and the diligence of the

“house” mothers to provide exceptional care to an otherwise marginalized population has resulted in better than expected oral health. It would be very valuable future research to collect saliva samples and identify the exact markers expressed in the children with S-ECC. Additionally, this

would be a very interesting sample population to study longitudinally caries and other oral health outcomes. Overall, this is an extraordinarily unique group of children that can teach us the power of environment on genetics.

Acknowledgements

The Pittsburgh Kids Foundation provided funding and support.

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DOI:10.1002/9780470015802.a0024258