Retention of Low Income Children in Three Dental Studies Investigating Early Childhood Caries

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ABSTRACT

Background: To our knowledge no dental studies have looked closely at subject retention, which is crucial to better understand oral health disparities. In this paper, we report retention rates and review and attempt to assess which retention strategies utilized in 3 dental research studies investigating ECC were effective for retaining WIC-enrolled children. The purpose of this paper is to discuss challenges that were encountered when working with these populations, describe characteristics of those not retained, and summarize some recommendations for future dental studies working at WIC sites.

Methods: Three dental studies were conducted at WIC clinics in Iowa. Retention strategies focused on maintenance of contact over time, persistence in rescheduling appointments, utilization of incentives, high recruitment, and frequent communication with parents and program staff.

Results: Retention rates in the studies ranged from 60 to 75 percent at the final research interventions. Studies were challenged by frequent moves of subjects, missed appointments, disconnected phones, busy schedules of parents, transportation problems, loss of child custody, family illness, and lack of interest. Those not retained in the studies were more likely to be younger, single, and less educated, with a lower household income and a non-Caucasian child. Lower retention was also associated with the presence of carious lesions.

Conclusions: Despite many challenges, studies had good retention rates and benefited from the retention strategies. Future dental studies at WIC clinics may also benefit from arranging transportation, obtaining a free 800 callback number, and offering after-hours appointments for working parents.

Keywords: Retention; Patient Dropouts; Maternal-Child Health Centers; Dental Caries; Poverty; Children
INTRODUCTION

Children from low income and minority populations are disproportionately affected by Early Childhood Caries (ECC), with nearly 42% of all 2- to 5-year-old children living under the federal poverty level affected by caries in the United States (Dye, Arevalo, & Vargas, 2010). Among minority children, these rates are even higher, with 37% of poor, non-Hispanic Black children affected and over 50% of poor, Mexican-American children affected (Dye et al, 2010). Poor and minority children face many barriers to accessing dental care, including lack of dental insurance and dental professionals trained or willing to provide care to young, low income children (Damiano, Kanellis, Willard, & Momany, 1996). Consequently, many are not seen by a dentist until they are in pain and in need of extensive treatment.

Research of cost-effective, innovative treatments and educational tools to reduce ECC among this population is critical. Often such research is conducted in public health settings where low income families frequently seek health care, including the clinics of the Special Supplemental Food Program for Women, Infants and Children (WIC). WIC is a federal grant program that originated in 1972 and is administered by the US Department of Agriculture (USDA). It serves low-income pregnant women, breastfeeding and post-partum mothers, and children up to 5 years of age by providing supplemental nutritious foods through vouchers, nutrition education and counseling, health screenings, and referrals to other health, welfare, and social services. The program is available through 1,900 local agencies and 10,000 clinic sites in all 50 states/District of Columbia, 5 US territories and 34 Indian Tribal Organizations. Annually, it serves more than 8 million people nationwide (Food and Nutrition Service /United States Department of Agriculture, 2013).

Studies have shown high rates of dental caries among WIC-participating children (Douglass, Tinanoff, Tang, & Altman, 2001; Warren et al., 2009; Bray, Branson, & Williams, 2003; Tsubouchi J, Tsubouchi M, Maynard, Domoto, & Weinstein, 1995; Lee et al., 1994; Tang et al., 1997; Weber-Gasparoni, Kanellis, & Qian, 2010). Because WIC clinics serve low-income children in a single location, they make convenient sites for dental research. In addition, they provide an ideal infrastructure for preventive dental interventions and are already committed to improving the oral health of the clients they serve (Kanellis, 2000).

To achieve this research goal, it is essential to retain low-income children in longitudinal dental studies. Although some subject attrition is expected in all long-term research, high levels of attrition can negatively impact studies, raising concerns about bias and loss of statistical power. Some barriers to subject retention in some past health research interventions at WIC clinics have been caused by disconnected phones and/or subjects moving away (Chang, Brown, & Nitzke, 2009; Herman, Harrison, & Eloise, 2006; Damron et al., 1999), work or school conflicts, the fact that subjects no longer participate in or qualify for WIC (Herman et al., 2006; Damron et al., 1999), transportation difficulties, childcare difficulties, family and personal sickness (Damron et al., 1999), and lack of interest (Chang et al., 2009, Damron et al., 1999). During a 6-month study at Maryland WIC clinics, researchers found as many as 30% of mothers participating in a voluntary nutrition education program had a disconnected or changed phone number and 17% had a change of address (Damron et al., 1999). In a 1-year pilot weight loss intervention at WIC clinics in southern Michigan, 46% of mothers were not retained due to disconnected phones (Chang et al., 2009). This loss of contact was also a problem in a fluoride
varnish study at a Washington WIC program, which had 53% attrition after 6 months and higher subject attrition than expected (Weinstein, Domoto, Koday, & Leroux, 1994).

Retention rates of longitudinal dental studies with WIC participants have varied greatly, as have their study lengths and subject counts. Some reported rates include 94% attrition after 4 weeks/72 total subjects (Freudenthal & Bowen, 2010), 47% after 6 months/1,148 total subjects (Weinstein, Oberg, Domoto, Jeffcott, & Leroux, 1996), and the above mentioned Washington study with 53% after 6 months/133 total subjects (Weinstein et al., 1994).

Little attention has been given to discussing retention issues in dental research, and to our knowledge no dental studies have looked closely at subject retention, which is crucial to finding educational tools and innovative strategies to reduce ECC and oral health disparities. In this paper, we will report retention rates and review and attempt to assess which retention strategies utilized in 3 dental research studies investigating ECC were effective for retaining WIC-enrolled children. It should be noted that collecting retention data was not the primary goal of the 3 WIC studies reviewed in this pilot study, and the 3 studies described were not designed to test retention strategies for their effectiveness. Rather, the purpose of this paper is to discuss challenges that were encountered when working with these populations, describe characteristics of those not retained, and summarize some recommendations for future dental studies working at WIC sites. The accumulated experiences of these 3 studies augmented our sample size and broadened the scope of retention experiences.

**METHODS**

Overview

The 3 dental studies were conducted in communities in Iowa at different points in time. In all the studies (summarized in Table 1), interventions were performed on an individual basis (parent/child dyad) and not in a group setting. Recruitment and retention strategies were developed, in part, from experiences with the Iowa Fluoride Study (Levy et al, 2001), a long-term longitudinal study of a birth cohort, as well other experiences and suggestions specific to lower-income populations. Prior to participation, all parents or legal guardians of the children signed consent forms approved by the University of Iowa Institutional Review Board.

The WIC Studies

In each of the studies, a parent participated with the child during the study. The first study (WIC1) (Weber-Gasparoni et al., 2013) collected data to test the effectiveness of an educational intervention using a psychological theory of motivation called self-determination theory (SDT) (Deci & Ryan, 2000). The study was directed at low-income WIC mothers to promote behavior and attitude change concerning their young child’s oral health. The children in this study received a free dental screening at baseline and again 6 months later.

The second study (WIC2) (Weber-Gasparoni et al., 2003; Nair, Weber-Gasparoni, Marshall, Warren, & Levy, 2010) was a pilot study that tested the value of 3 educational interventions to prevent ECC, similar to those in the WIC1 study. The study targeted WIC mothers and offered a free dental screening to their children at baseline and again 3 months later.

The third study (WIC3) (Warren et al., 2009; Warren et al., 2008) lasted 18 months and explored caries risk factors in high risk WIC children. It collected pilot data with the rationale that the WIC program could eventually incorporate successful caries prevention programs to reduce disparities in oral health. The study offered a free dental screening for children 3 times
during the study period and included 2 phone interviews with participating parents 4-5 months after the baseline and second dental assessments. See Table 1 for a brief description of participants in all 3 studies.

Table 1: Descriptive Characteristics of Iowa Dental Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>WIC 1</th>
<th>WIC 2</th>
<th>WIC 3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives of study</strong></td>
<td>To test the effectiveness of 2 educational interventions</td>
<td>To test the value of 3 educational interventions</td>
<td>To explore caries risk factors in high risk children</td>
</tr>
<tr>
<td><strong>Number of intervention groups</strong></td>
<td>2 intervention groups</td>
<td>3 intervention groups</td>
<td>1 intervention group</td>
</tr>
<tr>
<td><strong>Length</strong></td>
<td>6 months</td>
<td>3 months</td>
<td>18 months</td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>2 WIC clinics</td>
<td>3 WIC clinics</td>
<td>1 WIC clinic</td>
</tr>
<tr>
<td><strong>Subjects</strong></td>
<td>WIC mothers and their children, 12-49 months old</td>
<td>WIC mothers and their children, 18-36 months old</td>
<td>WIC mothers and their children, 6-23 months old</td>
</tr>
<tr>
<td><strong>Race of children</strong>*</td>
<td>57% Caucasian, 12% Hispanic, 16% African American, 15% other</td>
<td>77% Caucasian, 4% Hispanic, 8% African-American, 11% other</td>
<td>66% Caucasian, 24% Hispanic, 10% mixed race, African American or other</td>
</tr>
<tr>
<td><strong>Gender of children</strong>*</td>
<td>49% males, 51% females</td>
<td>NA</td>
<td>51% males, 49% females</td>
</tr>
</tbody>
</table>

*Race and gender of children are baseline percentages only

Strategies for Retention

To maintain contact with participating parents, the 3 studies collected 1-2 alternative contacts of participants at the time of recruitment that the researchers could call if participants’ phones became disconnected or if they could not be reached otherwise (i.e., contact information from family members and/or friends). The studies also mailed change of address forms with prepaid return envelopes to parents who could not be reached at their original phone numbers. That way, parents could fill out and send back updated contact information.

To encourage parents to show up for study appointments along with their children, researchers in the studies made reminder phone calls a day before their appointments and mailed reminder letters a week before. Additionally, researchers in the WIC2 study mailed return postcards for subjects to confirm continued participation in the final study intervention. Researchers in the WIC1 and WIC2 studies made some evening phone calls to mothers who worked or were unavailable during the day. Researchers in all the studies were persistent in
rescheduling missed appointments for interested participants. The majority of missed appointments were not cancelled by the parents beforehand. In the WIC3 study, researchers continued to reschedule appointments for interested participants missing 4 or more appointments (n=11), 2 of which missed 9 appointments.

All of the studies offered parents incentives for participating at each intervention, including gift cards, and a toy and toothbrush for their children. WIC1 and WIC3 studies offered parents a choice of incentive: either a package of diapers or a gift card of equal value. All incentives held a modest monetary value in order not to bias the parents’ participation and were compliant with human subject guidelines. In the WIC1 study, 69% and 80% of mothers preferred more flexibility in their incentive, choosing a gift card over diapers during the first and final interventions, respectively.

To increase the overall pool of potential participants and likely insure an appropriate sample size in light of possible low retention, all studies focused heavily on recruitment. The WIC1 study recruited 768 mothers, with 415 (54%) actually participating in the first intervention. In the WIC3 study, 268 parents were recruited, with 212 (79%) actually participating in the first intervention. In the WIC1 and WIC3 studies, researchers primarily recruited mothers with their children face to face in WIC waiting rooms. All of the studies had WIC staff distribute signup sheets for its clients who were interested in hearing about the study. Researchers then called these clients to describe the studies and recruit those who wanted to participate. The WIC2 study solely recruited this way. Of 401 mothers who filled out such forms, 115 (29%) of them were eligible and successfully recruited to the study.

Such collaboration with WIC staff was cultivated during the planning and implementation phases of the studies, which included frequent communication and visits to the WIC sites. For example, in the WIC1 study researchers were on site up to 3 times a week during the implementation phase in order to recruit participants and collect data. WIC1 and WIC2 studies maintained the same primary researchers throughout the study who were in charge of recruitment and retention. The WIC3 study had one primary research staff change during its 18-month duration. Retention methods in all 3 studies are summarized in Table 2.

Table 2: Retention and Intervention Characteristics of Iowa Dental Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>WIC 1</th>
<th>WIC 2</th>
<th>WIC 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects</td>
<td>n=415</td>
<td>n=115</td>
<td>n=212</td>
</tr>
<tr>
<td>Subjects retained</td>
<td>n=269 (65%)</td>
<td>n=86 (75%)</td>
<td>n=128 (60%)</td>
</tr>
<tr>
<td>Number of face to face interactions</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Time lapse between face to face interactions</td>
<td>6 months</td>
<td>3 months</td>
<td>9 months</td>
</tr>
</tbody>
</table>
### Other interventions

<table>
<thead>
<tr>
<th>Retention Methods:</th>
<th>1 month follow-up mailed survey</th>
<th>Additional saliva sample at 1.5 months for a sub sample of 40 subjects for SM counts</th>
<th>Follow-up phone call interviews 4-5 months after first and second interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Made reminder calls</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Sent reminder letters</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Mailed forms to update contact information</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Made some evening calls</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Rescheduled missed appointments</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Maintained good relations with study sites</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Conducted face to face recruiting</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Distributed sign-up sheets</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Mailed cards to confirm participation</td>
<td>✓</td>
<td>✗</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Incentives:

<table>
<thead>
<tr>
<th>Incentives:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Diapers</td>
<td>✓</td>
</tr>
<tr>
<td>Gift cards</td>
<td>$15, $5, $20</td>
</tr>
<tr>
<td><strong>Mailed gift cards</strong></td>
<td>$5</td>
</tr>
<tr>
<td>Toys for children</td>
<td>✓</td>
</tr>
<tr>
<td>Toothbrushes</td>
<td>✓</td>
</tr>
<tr>
<td>Toothpaste</td>
<td>✓</td>
</tr>
<tr>
<td>Stickers</td>
<td>✓</td>
</tr>
</tbody>
</table>

* Incentives given at all in-person interventions
** Gift cards mailed along with 1 month follow-up surveys

### Analysis

Comparison of categorical characteristics of those mothers who did and did not continue to participate in the study were made via standard Chi-square analyses. Mann-Whitney tests were used to compare quantitative maternal characteristics for these two groups of mothers. A 0.05 level of statistical significance was used throughout. Analyses were conducted using SAS statistical software (v.9.3, SAS Institute, Cary, NC, USA).

### RESULTS

#### WIC Studies Retention
As presented in Table 2, the longest study, the WIC3 study, completed the final follow-up intervention with 60% of participating children after 18 months. The WIC2 study retained 75% after 3 months. The WIC1 study, the most concentrated study with the largest sample size (n=415), retained 65% of participating children at the final intervention after 6 months. However, due to problems contacting the mothers, some children from the WIC1 study were not seen for this visit until 7-12 months later. It should be noted that none of the studies required that a child stay eligible for WIC or continue with the program after they participated in baseline dental intervention.

Retention Characteristics

As presented in Table 3, in both WIC1 study and WIC3 study, mothers with a non-Caucasian child were less likely to be retained in the studies (p= .049 and .003 respectively). In both WIC1 study and WIC2 study, the age of mother was significant in non-retention, with younger mothers (19-26 years old) less likely to return (p= .012 and .009 respectively). In all 3 studies, less educated mothers (High School or less) were less likely to be retained than mothers with some college education or higher (p= >001, .011 and .039).

It should be noted that in WIC1 study, mothers with lower annual household incomes ($20,000 or less) were less likely to return to finish the study, as were single/divorced mothers (p=>.001 for both variables). The presence of non-cavitated lesions (white spot lesions) on the child’s teeth in WIC2 study were significant in non-retention (p=.028); as was the presence of both non-cavitated lesions and frank decay or filled teeth together in the same study (p=.017).

Failure to show up for appointments was the primary reason the 29 mothers in the WIC2 study were not retained (n=16). Other reasons included had a death in the family (n=2); had a work conflict (n=2); moved (n=1); had a baby (n=1) and dropped from the study (n=7). WIC1 and WIC3 studies did not consistently collect reasons each of their participants were not retained in final interventions.

Table 3: Characteristics of Participants Not Returning for Final Intervention in 3 Iowa Dental Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>WIC1 % NOT returning</th>
<th>P value*</th>
<th>WIC2 % NOT returning</th>
<th>P value*</th>
<th>WIC3 % NOT returning</th>
<th>P value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race of child</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>38%</td>
<td>0.049*</td>
<td>22%</td>
<td>.122</td>
<td>33%</td>
<td>.003*</td>
</tr>
<tr>
<td>Non-Caucasian</td>
<td>47%</td>
<td></td>
<td>38%</td>
<td></td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Education of mother</td>
<td>&lt;0.001*</td>
<td></td>
<td></td>
<td>&lt;0.001*</td>
<td>0.011*</td>
<td>.039*</td>
</tr>
<tr>
<td>High school or less</td>
<td>60%</td>
<td></td>
<td>32%</td>
<td></td>
<td>42%</td>
<td></td>
</tr>
<tr>
<td>Some college or graduate</td>
<td>37%</td>
<td></td>
<td>10%</td>
<td></td>
<td>21%</td>
<td></td>
</tr>
<tr>
<td>Age of mother</td>
<td>0.012*</td>
<td></td>
<td></td>
<td>0.009*</td>
<td>0.314</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Age of Child</th>
<th>19-26 years</th>
<th>27 or older</th>
<th>Annual household income $20,000 or less</th>
<th>$20,001 or more</th>
<th>Marital status Married or living with significant other</th>
<th>Divorced, separated, or single</th>
<th>Age of child 18-24 months</th>
<th>25-36 months</th>
<th>Presence of d-f2 no</th>
<th>yes</th>
<th>Presence of d-1 no</th>
<th>yes</th>
<th>Presence of d1d2f no</th>
<th>yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24 months</td>
<td>40%</td>
<td>30%</td>
<td>0.624</td>
<td>.390</td>
<td>&lt;0.001*</td>
<td>33%</td>
<td>40%</td>
<td>24%</td>
<td>50%</td>
<td>29%</td>
<td>24%</td>
<td>44%</td>
<td>40%</td>
<td>67%</td>
</tr>
<tr>
<td>25-36 months</td>
<td>43%</td>
<td>21%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of d-f2</td>
<td>0.261</td>
<td>0.272</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of d-1</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of d1d2f</td>
<td>0.323</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

*children in this study were 6-23 months old
**frank decay or filled
***non-cavitated lesions (white spot lesions)
+ Significance probability associated with the comparison of characteristics of those mothers who did and did not continue to participate in the study. Comparisons were made via d Chi-square analyses for categorical maternal characteristics and via Mann-Whitney tests for quantitative ones.

Retention Challenges

The 3 WIC-based studies all identified several challenges that may have added to subject attrition of parents and children. These were not specifically or consistently tracked in all studies, and are discussed separately, below.

Subjects Relocating. Study participants were very mobile, moving both within the community and out of the area. For those who moved within town, their phone numbers did not
always move with them and became disconnected. Some parents moved to homes of families or friends with different numbers. Often, for those moving out of town, their drive was too far away to continue participation and attend follow-up exams. Some mothers also gave work phone numbers where they could be contacted; however, some were no longer working at the same location months afterwards. Phone numbers of alternate contact persons also sometimes became disconnected. In the WIC3 study, 25 participants completing the first intervention were known to have moved out of the area (12%).

**Missed Appointments.** Even when contact was maintained or reestablished, many parents failed to show up to appointments, some even repeatedly and some without ever participating even one time. In the studies, parents often made study appointments on different days than their WIC appointments. However, some scheduled the appointments immediately before or after their WIC appointments if they thought their children could handle 2 appointments in a row. In the WIC1 study, the show rate for study appointments was 46% during the baseline intervention and 59% during the final intervention. Out of 268 children signing up for the WIC3 study during recruitment, 98 missed one or more appointments (37%).

**Cell Phones.** Many participating parents had cell phones instead of landline phones, which presented several problems for researchers. Some parents used prepaid cell phones that ran out of minutes, only to get another prepaid phone weeks or months later with a different phone number. Sometimes cell phones had bad connections that made it difficult to communicate with participants or were not answered because of the amount money it would cost the participants to use them. In addition, participants often did not return messages left by researchers, possibly because the phone number was long distance and would cost money. None of the studies specifically tracked problems with cell phones; however, the loss of phone contact was a substantial component of subject attrition.

**Busy Schedules.** Many of the parents in the studies who worked full or part time had trouble scheduling appointments during the weekday hours when the studies were being conducted. Since the studies were conducted at WIC clinics, their participants were limited to the hours these clinics were open. Some parents also went to college in addition to working. The work and school conflicts limited the days some parents were available to participate or made them unable to continue participation altogether. Also, some parents who had recently started a new job were unable to take time off from work to take their children to their study appointment. Busy schedules caused some parents to send a friend or relative to the appointment who was not the legal guardian and was not qualified to fill out surveys about the children’s dietary and oral hygiene habits.

**Transportation.** Transportation was an issue for many parents, although it was not specially tracked. This included either not owning a car, having a car that broke down, or relying on a ride that was late or did not show up. Those using public transportation encountered obstacles when it rained or snowed. In one community, free, non-public transportation offered to Medicaid patients for health purposes was seldom utilized by study participants; however, the reasons for not using this transportation were not clear. In one case, a mother and her child had to always find a ride to their appointment because the mother had a revoked license due to drinking under the influence of alcohol.

**Changes in custody of child.** Divorce, drug abuse, and neglect were all reasons custody of a child were lost by a participant. Some children were put in foster care, while others went to
live with a grandparent. This presented a problem for researchers who needed follow-up data from the parent who filled out initial surveys and consented to the study. Although the children could still be seen at least for the dental examinations, their new legal guardians sometimes did not follow through with appointments. Although this problem was fairly common, it was not as common as other challenges to retention.

Family Illness. Illnesses in the family, especially colds and flu of children, caused some parents to miss or reschedule appointments. Some parents missed appointments because they were concerned the children would not cooperate with the dentist while feeling ill.

Lack of Interest. Despite not having any of the above mentioned obstacles, many parents told researchers they forgot the appointments. Although some eventually followed through with appointments, others did not. It is possible that even though they did not express interest in dropping from the studies, they were not interested enough to take more initiative to participate. Most parents who definitely lacked interest in the studies did not enroll in the studies from the beginning.

No challenges were identified by researchers based on race and ethnicity. A sizable number of participants identified themselves as Hispanics in WIC1 study and WIC3 study; however, only the WIC1 study had questionnaires and study materials translated in Spanish and enrolled non-English speaking Hispanics (n=9). Researchers in both WIC1 and WIC2 studies spoke proficient Spanish, while the WIC3 study personnel’s Spanish was somewhat less proficient.

DISCUSSION

From the information presented in this paper and others in the literature, it is clear that low-income, high-caries risk families face many challenges which affect their ability to participate in longitudinal research studies. As a result, some meaningful attrition from such studies is nearly inevitable; however, attrition can be kept to an acceptable level if researchers are vigilant in their approach and use retention strategies effectively. In the studies presented, retention rates were good given the aforementioned challenges. Because researchers had no control over participants’ transportation or phone problems, mobility, custody issues and busy schedules, their persistence was important to retention whether through rescheduling sometimes missed appointments or maintaining contact through mail and telephone and at interventions.

All the studies offered some type of incentive, which along with the appeal of the free dental screening, most likely motivated parents to consent themselves and their children. The studies offered monetary incentives, which were especially important because parents were actively participating at scheduled interventions and were depended on to take themselves and their children to the study location.

Duration of the studies, which lasted a minimum of 3 months, may have aided their retention in that it allowed researchers time follow-up with participants. However, the longest study (WIC3) had the lowest retention most likely because its duration caused more participants to be lost through moving and changing phone numbers. The WIC1 study also most likely had lower retention because it had almost twice as many participants as the next largest study. This meant researchers had less time to maintain contact with each participant and reschedule appointments if needed. Although collecting alternative contact information sometimes did not
help maintain contact with the study participants, it did not consume much time or many resources.

A strong focus on recruitment was essential in the WIC studies by increasing the number and potential availability of interested parents with their children. Therefore, even if retention was lower than expected, the desired sample size was still achieved. Good communication and relationships with study sites were important to retention in all studies. Participating children could have been lost if WIC staff did not cooperate with study protocol.

Some of those not retained in the studies tended to be more vulnerable: younger, single, less educated; with lower household incomes, a non-Caucasian child, and a child already with dental decay. Therefore, it is crucial for researchers in future dental studies to come up with innovative strategies to retain non-Caucasian children and children already with high caries risk, as well as those with the least resources and possibly weaker support systems.

Future studies are needed to evaluate retention strategies for studies targeting high risk children, to help achieve study goals by finding the optimal balance between length of study, sample size, and number of interventions given the challenges of the studied population. Tracking all retention attempts for each participant could help researchers better estimate time and financial resources that should be directed at retention efforts. Limitations of this paper include that each parent study had different researchers, study goals, populations, and study sites and therefore, cannot be compared on all variables. In addition, all retention strategies were utilized at the same time and therefore, it is not possible to identify which were the most effective. Lastly, as stated previously, all of the studies were focused on caries and none of them were designed \textit{a priori} to assess subject attrition and retention.

**CONCLUSION**

**Recommendations for Future Studies**

All retention strategies below were important to the 3 WIC studies and are in no particular order. Strategies 5, 6, 8, and 10 were not utilized in any of the studies but should be considered in future dental WIC studies. These strategies can also be used when working with other high risk populations, including children of the Head Start and Early Head Start programs.

1. Give participants incentives, beyond the usual toothbrush and toothpaste (i.e.; gift cards, diapers, toys, etc.).
2. Have persistence in rescheduling missed and/or cancelled visits, which requires advanced planning by the study team, including provision for extra study days.
3. Obtain at least 2 alternative contact information from a family member and/or friend.
4. Place reminder phone calls the day before the scheduled visit, including evening phone calls, and provide mail reminder letters 1 week prior to the scheduled visit.
5. Obtain an 800 call back number to allow participants to make long distance phone calls to the researchers free of charge.
6. Attempt to schedule study visits along with WIC appointments, but consider after-hours appointments at the WIC clinic or other sites to allow working parents to participate in the study.
7. Avoid scheduling study visits too much in advance, when participants are more likely to forget about the scheduled visit.
88 Retention of Low Income Children in Three Dental Studies Investigating Early Childhood Caries
Ann H. Saba, et.al.

8. Utilize and arrange non-public transportation (i.e.; taxi cab) to participants enrolled in the Medicaid program.

9. To enhance recruitment at WIC sites, assign a study person to recruit participants face to face at the WIC waiting room and have WIC personal distribute sign-up sheets for WIC clients interested in hearing about the study.

10. Utilize text messages, emails, Facebook, and other social media outlets to maintain contact with participants.

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REFERENCES


