Food Choices, Reading Cereal Labels and Oral Health

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THESIS

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SUMMARY

A study was carried out to determine covariates of ability to read breakfast cereal labels and if ability to read cereal labels correlates with caregiver's report of oral health in children. Subjects were recruited from three different dental offices and were given a series of questions to determine whether they could identify and correctly use information about sugar content on breakfast cereal food labels. Information on demographics and oral health was collected from all three groups.

Findings from the study showed that food label literacy was related to demographic variables, immigration status and being Caucasian. Among English speaking parents, food label literacy was weakly correlated with recognizing the least-sugared cereal choice. Food label literacy had no correlation with buying the healthier cereal selection. Food label literacy was not found to be correlated with parent oral health for either English or Spanish speaking caregivers. Among English speaking caregivers, food label literacy was weakly associated with child oral health. Among Spanish speaking caregivers, food label literacy was a weak predictor of parents reporting caries-free children. However, these findings show that improvements on ability to read food labels may lead to healthier cereal selection and thus improve children's oral health.

I. INTRODUCTION

A. Background

Health Literacy is "The degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions." [1] Current research highlights the importance the relationship between health and literacy. According to the 1993 National Adult Literacy Survey, 46% - 51% of adult US citizens have deficient reading skills.[2] Previous studies have shown that limited health literacy is associated with poor health status, higher hospitalization rates, limited knowledge about health information, and under-use of preventive health services.[3] In addition, low level of health literacy may have an impact on an individual's food choices, understanding dietary terms, and overall health. [4]

In an effort to help individuals make healthy dietary decision, the Food and Drug Administration and U.S. Department of Agriculture implemented food labels in the US in 1994. The purpose of food labels was to make it easier for consumers to understand the information on labels and allow consumers to make healthy food choices. Food labels include nutrient information such as fat, cholesterol, sugar, calories, and sodium.[5] Previous studies have shown that barriers to adequate food label use could be related to limited availability of reliable food label information, low literacy skills, and a lack of basic nutrition knowledge. [6,7] Having low levels of health literacy may have an impact on an individual's food choices, understanding dietary terms and overall general health. There is limited research on patient comprehension of food labels and the ability to perform various label tasks and its relationship to oral health.

According to the US Department of Health and Human Services, dental caries is the most common chronic disease affecting children in the United States. It is 5 times more common than asthma and 7 times more common than hay fever. It is noted that the prevalence of caries among 2 to 4 years old is 18% and 52% in children between 6 to 8 years. [8] Breakfast cereals are among the most popular snack for children. The packaging on cereal boxes are constantly claiming they are highly nutritious because they are consumed with milk and fortified with vitamins and minerals like calcium. [9] However, when one looks carefully at a cereal box's list of ingredients on its' food label, one will notice the significant amounts of sugar it contains, as well as ingredients such as high-fructose corn syrup. Breakfast cereals advertised to children contain on average 35% sugar [10] and fructose corn syrup is the primary ingredient in many cereals. [11] Previous studies investigated the potential health effects of a diet consisting of fructose syrup, and results have shown that diets consisting of excessive consumption of high-fructose may contribute to the incidence of obesity. [12] Not only may the ingredients of cereal contribute to obesity, but a diet high in sugar is also a risk factor for dental caries, as shown in previous studies. A few studies investigated whether presweetened cereals have cariogenic potential. Unfortunately, many of the studies were conducted on rats using dry-cereal, but they showed that presweetened cereals, such as Frosted Flakes, are more conducive to the formation of smooth surface caries than non-presweetened cereals, such as Oat Flakes and Special K. [13]

B. Statement of the Problem

There are limited studies on the affects of poor oral literacy and its impact on oral health. Oral health literacy is required in order to promote oral health and to prevent oral disease. [14] Limited oral health literacy may serve as a deterrent to care, barrier to information and to preventive services. [15] Individuals with low oral health literacy may not be able to effectively use preventive dental services because they are unable to understand instructions or the importance of preventive procedure. Therefore, they may be less compliant with oral health recommendations, which could lead to further oral health complications. [16] There needs to be increased attention to the link between health and oral health literacy and nutrition. Since studies of general health literacy show an impact on nutrition and overall health, it is likely that oral health literacy may affect oral health behavior. However, this isn't well documented. If research could show a link between oral health literacy and oral health behavior, such as choosing a healthy breakfast cereal for a child, then programs could be developed to improve literacy and thus improve food choices for children.

C. Purpose of the Study

The purpose of this study was to determine if there is a relationship between oral health literacy and self-reported oral health. This question was examined by presenting pediatric dental patient caregivers with a series of questions to determine whether they could identify and correctly use information on breakfast cereal food labels. Caregivers were also asked to report their caries history and report their child's caries history. We expected to find that those with low oral health literacy would have higher rates of

misunderstanding food labels, resulting in poor oral health. In addition, we expected to find that low oral health literacy would affect cereal selection and be associated with poor oral health. (Figure 1). The results of this study will aid in determining if programs need to be developed to improve literacy and thus improve food choices for children.

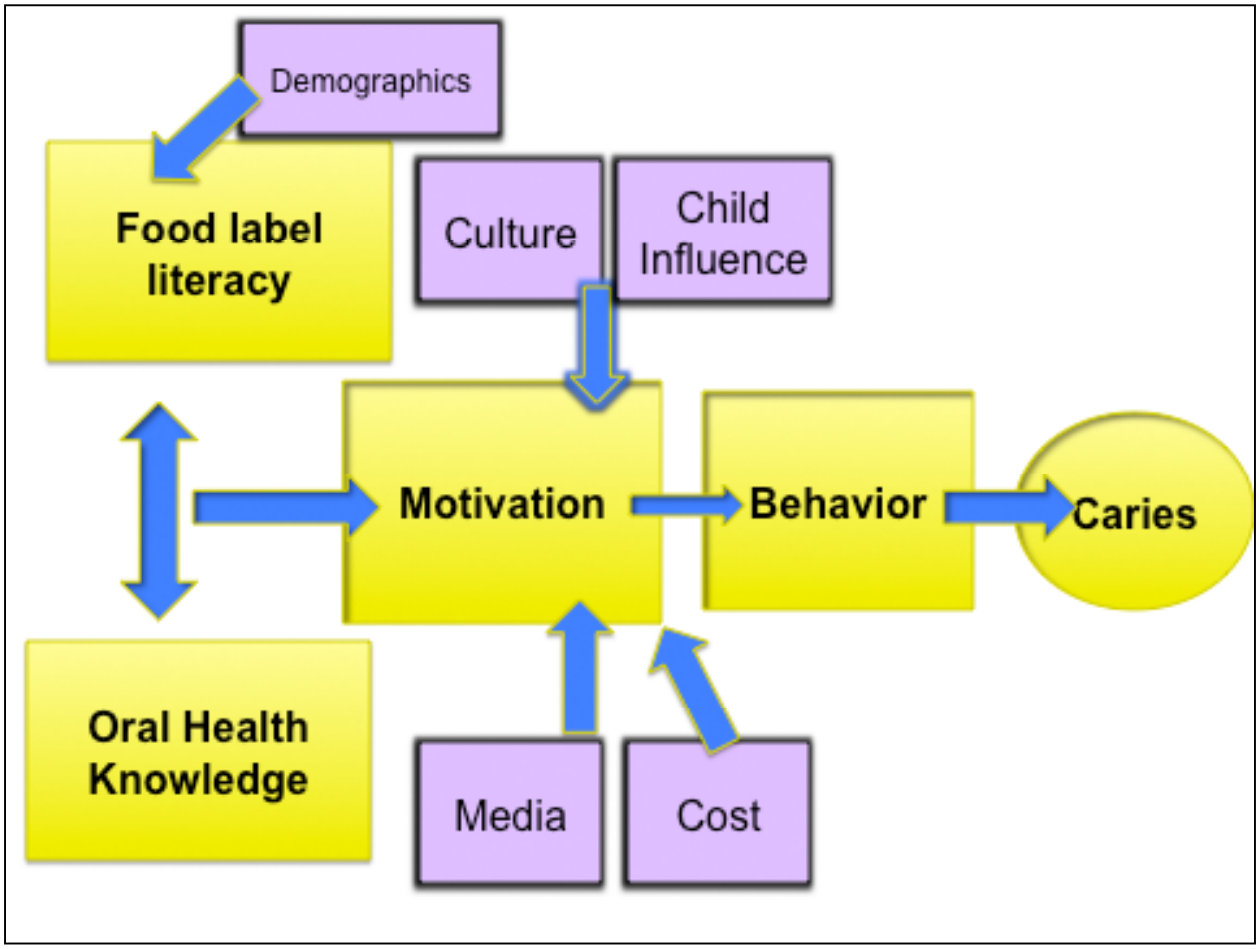


FIGURE 1. Relationship Between Food Label Literacy, Oral Health Knowledge, Motivation, Behavior, and Caries.

D. Hypotheses

1. Caregiver's income, education, and years in U.S. correlates with the ability to read and understand sugar levels of cereal labels.

2. The ability to read and understand food labels affects healthy cereal choice selection, even when controlling for caregiver's income, education, and years in U.S.

3. Caregiver's ability to read cereal food labels correlates with both parent's and child's self-reported oral health.

II. REVIEW OF THE LITERATURE

A. Usage and Comprehension of Food Labels

A study by Russell Rothman *et al* (2006) examined the literacy and numeracy skills of a diverse socioeconomic group of primary care patients by measuring their ability to read and understand food labels. Non-English speaking individuals were eliminated from the study. The survey included questions to assess demographics and behaviors related to food label usage and a series of food label questions, which required the individual to answer questions off food labels. The food label survey's first set of questions required subjects to interpret the food labels, such as "How many grams of total carbohydrates are in ½ of a bagel?" and the second set of questions had subjects compare nutritive information off two food labels. In addition, patients' literacy levels were measured with the Rapid Estimate of Adult Literacy in Medicine and numeracy was measured with the Wide Range Achievement Test. The results from the study reported that 89% of patients used food labels, but only 69% of the food label questions were answered correctly. It was determined that many of the incorrect responses were related to "misapplication of the serving size, confusion due to extraneous material on the food label, and incorrect calculations." The study also demonstrated that even individuals with higher education had difficulties understanding food labels. Therefore, the findings from this study showed that health care providers should take into consideration patient's literacy and numeracy levels when providing dietary recommendations. [17]

A study completed by Kessler *et al* (1999) investigated the relationship between food label use and nutrition knowledge. The study involved 190 diabetic subjects recruited

from the American Diabetes Association patient education program. The subjects were given a four-page survey instrument that had questions related to the frequency of reading food labels, dietary context of food labels, health status of subjects and health-related behaviors. In addition, the survey addressed demographic information of the subjects. Findings from the study showed that majority of individuals often read food label information when selecting foods. In addition, Kessler *et al* found that 88% of subjects used label information to check sugar levels and 70% of participants use food labels to obtain information on total fat, sodium, and calories. Due to the fact that this sample population had such high label use and they used the label to control their sugar intake, this study suggested that nutritional labeling could be used as a tool to limit the intake of certain nutrients. Despite the fact that majority of the sample population claimed that they read food labels, the majority of the sample had deficiencies in nutrition knowledge. This indicated that individuals could lack an understanding of nutrients and therefore cannot effectively follow dietary recommendations. [18]

Macon *et al* (2004) conducted a study about the usage and interpretation of food labels among older Americans, aged 51 years and older. The author also assessed the general nutrition knowledge of the subjects, which included, fat intake knowledge of the fat content of foods, food label use, health indicators, self-reported health, and general demographic information. Examples of questions included "Indicate which of two foods contained more saturated fat (e.g. "hot dogs or ham"), or "When you eat chicken, do you always, sometimes, rarely, or never remove the skin?", or "If one serving of a food contained 20 grams of fat, would you consider that to be a low amount or a high amount of

fat?". The authors found that the understanding and use of food labels was lower among the older age groups. [19] The study also emphasized that those who use labels tend to have higher nutrition knowledge. [20] However, there isn't any evidence found whether label use specifically improves nutrition knowledge. [19]

The usage of food labels among African Americans was investigated by Satia *et al* (2005). The authors administered a questionnaire related to "nutrition label use, fruit and vegetable consumption, total and saturated fat intakes, fat-related dietary behavior, diet-related psychosocial factors and demographic and behavioral characteristics" to North Carolina African Americans, aged 20-70 years. Respondents were asked to state how often they use food labels and how often they looked for certain dietary information on food labels, such as serving size, total energy, grams of fat, and cholesterol. Findings from the study showed that 78% of the participants read food labels when they purchase foods. Satia and authors indicated that these findings were "remarkable" because majority of the participants did not follow the Food Pyramid recommendations. The data also showed that 40% of subjects looked for specific dietary information from food labels. Among those who read food labels, food labels use was "significantly higher among participants who were women, older, aged 50-70 years, educated beyond high school and obese." In addition, those who read food labels were subjects who were trying to lose weight, trying to eat less fat, and had a strong belief in a diet-cancer relationship. The authors from the study showed that those who used food labels had dietary patterns that were "significantly lower in total fat, saturated fat, and fat-related dietary behaviors, and higher in fruits and vegetables" than participants who did not read food labels. They interpreted these results

with the fact that food labels provided healthy information for those who wanted a healthy lifestyle and healthy dietary patterns. Therefore, Satia *et al* (2005) suggested that those with lower education might require additional efforts to make sure that they understand how to use food labels. [21]

Haldeman *et al* (2000) conducted a similar study on the usage, knowledge, and comprehension of food labels to a group of low-income Latino caregivers in Hartford, CT. Findings from the study found that it is evident that this population study requires more education to effectively use FDA food labels. The authors found that proper use of food labels was among those who had higher education, younger age and English speaking. The findings also showed that subjects claimed that they understood food labels. However, when asked to perform tasks off the food labels, they were unable to answer correctly. The authors suggested that the lack of appropriate usage of food labels could be related to lack of nutrition knowledge and therefore lack of understanding of food labels. [22]

These studies consistently show that although many individuals claim they read food labels, interpretation of food labels are not accurate. These studies show that there are several factors related to inadequate food label usage. These variables include low education, low literacy, older age, and non-English speaking subjects. Lack of appropriate usage of food labels can subsequently affect an individual's health. The findings from these studies also show that those who were more knowledgeable of their disease and diet and more knowledgeable about foods have higher ability to use food labels.

B. Health Literacy and Physical Health

A study completed by Mark Williams *et al* (2009) examined the relationship between functional health literacy and knowledge of their chronic disease and treatment in patients with a history of hypertension or diabetes. The investigation consisted of a diverse group subjects from two urban public hospitals located in Los Angeles, CA and Atlanta, GA. Patient's functional health literacy was measured with the Test of Functional Health Literacy in Adults and patients were given a questionnaire that tested the patient's knowledge of diabetes and hypertension. Findings from the analysis showed that "more than two thirds (69%) of Spanish-speaking patients and 22% of English-speaking in Los Angeles and 57% of patients in Atlanta had inadequate functional health literacy." In addition, patients with low literacy had completed fewer years of schooling and were older than patients with adequate literacy. Williams *et al* also found that Spanish-speaking individuals had poorer functional health literacy. In addition, findings showed that 48% of patients with diabetes or hypertension had poor health functional literacy, and these patients were less likely to correctly answer knowledge questions related to their illness than literate patients, and less knowledge related to important lifestyle medications and essential self-management skills. Conclusions from Williams' study confirm that those with low literacy cannot fully understand the medical recommendations given to them by using standard patient education. Therefore, it is suggested by Williams *et al* to successfully communicate with low-literate patients regarding their chronic illness it is important to use appropriately written materials, using oral communication and visual presentation. [23]

Another study from Mark William *et al* (1998) addressed that low literacy strongly correlates with poorer knowledge of a patient's chronic illness. The author measured the literacy levels of asthmatic patients and its relationship to the knowledge of their illness and the ability to use metered-dose inhalers. The study was conducted in the Emergency Department and Asthmatic Clinic of an urban public hospital in Atlanta, GA. A group of diverse patients were recruited and asked to participate in a survey intended to obtain information on patient's literacy levels, using the Rapid Estimate of Adult Literacy in Medicine, asthma knowledge, and an assessment of patient's knowledge on the usage of a metered-dose inhaler. Patients excluded from the study were those less than 18 years of age and less than three month history of asthma and non-English speaking. Information regarding demographics, medication use, self-reported health-care utilization, asthma triggers, recent disease severity, health status, health history, recent disease self-efficacy, attitude, disease knowledge, compliance, and access barriers was gathered from each participant. A trained registered nurse collected all the data from the patients. Even though two-thirds of the sample collection reported at least a high school education, only 27% of patients read at a ninth-grade level or better. In addition, the author found that reading ability was strongly correlated with age, 75% of patients older than 60 years read at or below sixth-grade level compared with 25% of those less than 25 years. The conclusions from the asthma knowledge assessment and MDI assessment also confirm that patients with poorer reading skills had significantly less knowledge of asthma and poorer self-management skills. [24] This study is similar another one of William's study from 2009, which showed that low-literate patients with hypertension and diabetes have poorer knowledge of their disease. [23] Williams also states in a previous study by Boulet *et al* (1996), patients

with poorer self-management skills for asthma may be "unable to adequately treat asthma exacerbations at home and may be more likely to require emergency department visits for treatment." [24, 25] Not only could low literacy affect medical health, it can also create higher medical expenses. [26] Therefore William's suggests that correcting patient's knowledge and self-management skills can help reduce medical expenses and reduce physician visits and hospitalizations. [24]

A study completed by Kennen *et al* (2005) also showed that poor literacy is associated with poor health. The author showed in a study of 210 overweight or obese patients that patients with inadequate literacy levels were significantly less likely to "understand the adverse health consequences of obesity and the need to lose weight and to report ready to lose weight." Kennen conducted his study in two primary care clinics at Louisiana State University Health Science Center. A trained research assistant, using a questionnaire developed by the authors, interviewed each participant. Questions asked included information regarding the "patient's self-rating of health, understanding of the relation between weight and health, the effect of a 10% weight loss, the patient's motivation for weight loss, and previous and current weight loss activities." In addition, subjects were asked to complete an assessment of their literacy through the use of the Rapid Estimate of Adult Literacy in Medicine and subjects completed a questionnaire regarding their readiness to lose weight. The results from the findings showed that two thirds of patients read below a 9th grade level and those with lower literacy were less likely to believe they needed to lose weight and were less likely to be considering losing weight. Kennen states that over half of obese patients at the lower literacy level did not know that

their weight affected their health. The author also suggests that those with lower literacy may have more difficulty understanding terminology needed to aid them in losing weight, such as "patients who were unable to read the word calorie may not be able to understand food labels." Furthermore, Kennen notes that previous studies show that literacy directed educational material and programs have been beneficial to enhance health knowledge and health outcomes. For example in a study conducted by Davis *et a*l (2006) found that the usage of presenting a video brochure to a group of hospital patients increased mammography rates by 30%. [27]

Not only did these studies show that those with lower education had lower literacy skills, individuals with lower literacy were more likely to be less knowledgeable of their illness, such as those individuals with diabetes, hypertension, asthma and obesity. Less knowledge of one's illness leads to inadequate care of one's health, which can eventually lead to harmful health risks or emergency room visits.

C. Health Literacy and Health Services

The relationship between health care costs and low literacy skills was investigated in a study completed by Barry Weiss *et al* (2004). The study population consisted of subjects enrolled in Arizona's managed-Medicaid plan. Subject's literacy skills were measured using the Instrument for the Diagnosis of Reading, which is an English-Spanish instrument. In addition, subject's health care charges were measured which included services related to hospital, emergency department, short-term nursing home, and physician care. The findings from Weiss' study significantly showed that those with low literacy skills had mean medical expenses of $10,688/year compared to those with better

literacy skills had mean medical expenses of $2,891/year. Therefore, those with lower literate levels had higher charges for health services than those persons with better literacy skills. [26]

A study conducted by Baker *et al* (1997) showed that low literacy is strongly correlated with self-reported poor health and it is a stronger predictor of health than number of years of school completed. The study involved patients from two urban hospitals. The patients were presented with a questionnaire that asked questions related to demographics, self-reported reading difficulties, barriers to health care access and health care use, and a literacy level measurement, using the Test of Functional Health Literacy, which was offered both in English and Spanish to participants who native language was Spanish. The findings strongly demonstrated that self-reported health was strongly correlated to literacy levels. Therefore, those patients with poorer literacy skills were more likely to report poor health compared to those patients with adequate reading skills. Baker *et al* showed that the number of years of school completed does not strongly correlate to self-reported health due to the fact that it "merely signifies education attempted." Baker also showed that patients with inadequate reading skills were more likely than those with adequate reading skills to have more frequent physician visits or being hospitalized due to having less knowledge about proper health behaviors. The authors also suggests that individuals with poor literacy have more difficulty getting a job which can "lead to impoverishment" and poorer health than those with adequate literacy which can eventually lead to higher health care costs due to higher rates of hospitalization.[3]

Not only is there an association between inadequate low literacy and misunderstanding in reading food labels but research has also shown that there is also a correlation between lower literacy and misunderstanding drug labels. Previous research indicated that there is an association with low literacy and higher rates of misunderstanding of prescription drug labels, as shown in the study conducted by Davis *et al* (2006). In this study, the authors recruited English-speaking patients from three primary care clinics serving a predominately indigent population to see how well they understood pill bottle use and administration of a literary assessment. Patients were required to answer questions related to understanding the prescription, such as; "How would you take this medicine?" off five different prescription labels. A correct response would require the dosage, frequency, and duration if applicable. Subjects were also required to demonstrate their understanding of the prescription, by requests such as "Show me how many pills you would take [of this medicine] in one day." Findings from the authors showed that those subjects with reading levels less than the sixth grade were less likely to understand all five-label instructions. However Davis *et al* also stated that 37.7% of those with even adequate literacy skills misunderstood at least one of the labels. The authors suggest this is of major concern because patient misunderstanding could be a "potential source of medication error." The authors also found those patients with lower literacy levels and who were taking more than one prescription medication were significantly less able to understand the meaning of the labels. The authors conclude from their findings that it would be beneficial for all individuals to improve the "clarity and comprehensibility of labeling on prescription labels." [28]

Wolf *et al* (2007) conducted a study, which also showed that those with lower literacy had higher rates of misunderstanding prescription drug labels than those with higher literacy levels. Findings from the study show that 48% of participants had a reading level of eighth-grade or below and 46% of patients misunderstood one or more dosage instructions. In addition, results from the data showed that those with low literacy were significantly associated with older age, African Americans, and less education. Conclusions from the study showed that common findings for misinterpreting drug labels include: "label language, complexity of instructions, implicit versus explicit dosage intervals, presence of distracters, label familiarity, and attentiveness to label instructions." However, the authors go on to that although low literacy contributes to misunderstanding of drug labels, the instructions themselves are sometimes written too complex or vague or at reading levels to high for the majority of patients to read. Therefore, Wolf et al suggest that improvements in drug label instructions should be implemented such that they are less complex to read when attempting to understand instructions, especially to aid those with limited literacy. [29]

From these findings, one can conclude that not only is inadequate literacy related to health, but it can lead to an increase in medical expenses, hospitalization, and misuse of drug prescriptions.

D. Oral Health Literacy

Jones *et al* (2007) conducted a study that examined the relationship of dental knowledge, dental care visits and oral health status with oral health literacy in dental patients. The study took place in two private practices located in Chapel Hill, NC, which consisted of a diverse patient population with respect to race, ethnicity and types of dental insurance. Subjects were asked to complete a Dental Literacy exam, which consisted of a dental terminology recognition exam to assess oral literacy levels. Patients were to pronounce dental words due to the fact that previous studies have shown that difficulties with pronouncing a word may indicate difficulty of comprehension and may therefore have poorer health outcomes. After the literacy assessment, subjects were given a survey, which asked questions based on dental knowledge, self-assessment of oral health, and demographics. Their results suggested that those with low literacy levels were more likely than those with higher literacy levels to have low levels of dental knowledge, less recent dental care visits and worse perceived oral health status. They were able to show that the effects of a low literacy level, particularly on dental knowledge, appear to be large. The study was able to show that when improvements were made in literacy among the dental patients, there were improvements in dental knowledge and oral health. [16]

A recent study by Parker *et al* (2010) also showed that those with low oral health literacy had poorer oral health knowledge and were more likely to perform harmful oral health behaviors. [30]

III. METHODOLOGY

A. Intent

Three hypotheses were tested in this study. We tested whether caregiver's income, education, and years in U.S. correlated with the ability to read and understand sugar levels of cereal choices. We examined whether the ability to read and understand food labels affected healthy cereal choice selection, even when controlling for caregiver's income, education, and years in U.S. In addition, we tested whether caregiver's ability to read cereal food labels correlated with both parent's and child's reported oral health. Since this was a survey, reporting of caregiver's and child's oral health was provided through the caregiver. The results of this study will aid in determining if programs need to be developed to improve literacy and thus improve food choices for children and the related oral health.

B. Inclusion Criteria

Questionnaires were given to the receptionist at each clinic. The receptionists were instructed to ask any caregiver if they would participate in a study conducted by a graduate student at the University of Illinois at Chicago. Those willing to participate were asked if they were the legal guardians of the child currently at the dental appointment. Only one parent-child pair per family was used.

Questionnaires were made available in both English and Spanish, based on the preference of the participant.

C. Procedure

The survey was conducted at one pediatric dental clinic, The University of Illinois at Chicago Pediatric Dental Clinic, and two private pediatric dental offices in the Chicago, Illinois, vicinity: in Skokie, Illinois (PP1), and in Glen Ellyn, Illinois (PP2). The subject was verbally asked to participate in a brief survey. A written explanation of the scope of the study was provided to the parent (Appendix A) and the parent was asked to complete the questionnaire, (Appendix B). The Spanish versions are also available, (Appendices C and D). Those who chose not to participate were asked to place the blank survey into the collection box. No time restriction was given for the completion of the questionnaire. Upon completion of the surveys, the surveys were returned to the dental office reception desk and placed into the collection box. The data was entered into a database. The Institutional Review Board of the University of Illinois approved the protocol and questionnaire used in this study (Institutional Review Board reference number 2009-0723, Appendix E)

D. Questionnaire Design

The questionnaire included questions regarding the caregiver's demographic information, such as gender, ethnicity, age, income, means of their child's dental payment, whether or not they were born in the United States, length of time living in the US, how they rate their ability to read English and level of education. Two behavioral questions were asked regarding whether the subjects read food labels and specifically cereal food labels. In addition, the questionnaire also addressed questions related to the caregiver's and the child's caries history at the current dental visits. Selected questions required the subjects to interpret information from three different cereal labels to measure food label

literacy. Food label literacy is the basic measure of whether subjects could read and understand food labels. The three cereal labels used were Kellogg's Frosted Flakes, Kellogg's Froot Loops and Post's Shredded Wheat. The subjects were asked to interpret the cereal labels by circling the number of grams of sugar on each label, and circling the ingredients that contained sugar in the list of ingredients on each label. The sums of the correct responses yielded their total sugar score, which ranged from zero to seven, with seven as the highest sugar score possible. The total sugar score indicated their food label literacy. Those who circled the wrong information were given zero points for that response; points were not deducted for incorrect responses. Two additional questions, (#7 and #8) were included to understand the parents' belief about the healthiest cereal for their child. One additional question was asked for the purpose of providing insight into the subject's way of eating cereal. This question asked if they added anything to their child's cereal for breakfast.

E. Study Sample

The survey was conducted at one pediatric dental clinic, The University of Illinois at Chicago Pediatric Dental Clinic, and two different private pediatric dental offices in the Chicago, Illinois, vicinity, a private office in Skokie, Illinois (PP1), and a private pediatric dental office in Glen Ellyn, Illinois (PP2). A total of 100 surveys were distributed at each of the private dental offices, PP1 and PP2, and 200 surveys were distributed at University of Illinois, 100 to English-speaking subjects and 100 to Spanish-speaking subjects. Study participants were gathered from caregivers who brought their children to one of these clinics between November 2009-Janurary 2010 for routine dental care. Subjects included

caregivers of patients who obtained public aid dental benefits, had private dental insurance or had no insurance for child's dental care. This allowed examination of literacy of different socioeconomic groups (Kennen *et al* 2005).

The University of Illinois Pediatric Dentistry Clinic was chosen for convenience. The clinic serves the largest member of Medicaid pediatric patients in Chicago. At this clinic, in Chicago, Medicaid patients have no out-of-pocket expenses for dental care. Children under 16 years of age are eligible for preventive services, which include annual examinations and prophylaxes, and sealants on six-year old molars. They are also eligible for restorative treatment including extractions, stainless steel crowns, alloy restorations and resin restorations. The private offices were chosen from among faculty members of the University of Illinois Department of Pediatric Dentistry, because they have a large percentage of patients who carry private dental insurance.

Subjects were excluded if they were less than 18 years of age or not legal guardians of the patient.

F. Statistical Analysis

Data analysis was performed with SPSS. A stepwise, backward multiple logistic regression analysis was performed to determine predictors. The logistic regression was used to calculate odds ratios and their 95% confidence intervals. A final p value of less than 0.05 was used to determine statistical significance and a p value of 0.1 was used to determine marginal significance.

IV. RESULTS

A. Demographic and Descriptive Data

A total of 400 subjects were approached; 200 from University of Illinois at Chicago Pediatric Dental Clinic and 100 from each Chicago private practice dental office. Table I describes the response rates from the three offices. A total of 384 questionnaires were collected representing a 96% response rate. There were no differences in response rates among clinics.

TABLE I

RESPONSE RATES FOR EACH CLINIC INVOLVED IN A LITERACY SURVEY

Office	Responded
PP1	98%, 98
PP2	95%, 95
UIC	96%, 191
Total	96%, 384

The demographic distribution of gender and race are displayed in Table II. Fourteen of the respondents did not identify their gender and therefore were not part of the gender total. Respondents for this survey were over two-thirds female for all three offices. The patient population at UIC was proportionately more Hispanic and African American than

the other clinics, and PP1 was proportionately more Asian and Arabic than the other clinics. In addition, PP1 had a greater representation of Eastern Europeans than the other clinics.

TABLE II

GENDER AND RACIAL/ETHNIC DIFFERENCES AMONG CLINICS INVOLVED IN LITERACY SURVEY

	Total	PP1	PP2	UIC	Significance
	% (n)				
Female	82% (302)	86% (83)	84% (77)	79% (142)	NS
Male	18% (68)	14% (14)	16% (15)	22% (39)	NS
Hispanic	33% (125)	10% (10)	1% (1)	60% (114)	0.001
African American	14% (52)	6% (6)	1% (1)	24% (45)	0.001
Caucasian	40% (153)	52% (51)	88% (84)	9% (18)	0.001
Asian	9% (34)	22% (22)	8% (8)	2% (4)	0.001
Eastern European	2% (8)	5% (5)	1% (1)	1% (2)	0.001
Arabic	2% (6)	5% (5)	0%	1% (1)	0.001
Native American	2% (2)	1% (1)	0%	1% (1)	0.001
Other	1% (5)	2% (2)	0%	2% (3)	0.001

Chi Square and Fischer's Exact Test were used for statistical comparisons.
Significance P value < 0.05.

Table III summarizes the median age, median income, and education of subjects contrasted by clinic. Subjects from UIC were characterized by lower income, age and

education. Respondents from the private practice offices were primarily between the ages of 41-50, had an income greater than $60,000, and had obtained a college degree or more. Those subjects from UIC were between the ages of 31-40 had an income of less than $20,000 and had a high school education or GED.

TABLE III

AGE, INCOME AND EDUCATION DIFFERENCES AMONG CLINICS INVOLVED IN LITERACY SURVEY

	Total	PP1	PP2	UIC	Significance
Median Age	31-40	41-50	41-50	31-40	0.001
Median Income	40K-59K	>60K	>60K	<20K	0.001
Education	Some college	College graduate or more	College graduate or more	High School Grad or GED	0.001

Kruskall-Wallis tests determined statistical significance.
Significance P value < 0.05.

Table IV summarizes insurance and acculturation information for each office. The Kruskal-Wallis Test was used to compare the median length of time living in the US and rating of reading English and a Chi-Square test was used to compare dental insurance frequencies among the three offices. The findings show that those subjects from private practice mainly had private insurance, whereas patients from UIC had government insurance. In addition, over 50% subjects from all three populations were born in the US

and of the subjects who were not born in the US, most lived in the US for over ten years, including subjects from UIC.

TABLE IV

INSURANCE TYPE, BORN IN US, TIME IN US, AND READING ABILITY DIFFERENCES AMONG CLINICS INVOLVED IN LITERACY SURVEY

	Total	PP1	PP2	UIC	Significance
	% (n)				
Insurance					
Government Insurance	46% (170)	1% (1)	2% (2)	93% (167)	
Private Insurance	48% (179)	90% (86)	90% (85)	5% (8)	
No Insurance	6% (21)	9% (9)	8% (8)	2% (4)	
Total	100% (370)				0.001
Born in the USA	65% (235)	61% (56)	91% (84)	53% (95)	0.001
Time Lived in the USA					
Less Than One Year	2% (2)	0%	0%	2% (2)	
5-10 Years	30% (38)	14% (5)	0%	40% (33)	
More Than 10 Years	69% (87)	87% (32)	100% (8)	57% (47)	0.001
% Read Poorly	10%	0%	0%	20%	0.03

Kruskall Wallis and Chi Square tests determined significance.
Significance P value < 0.05.

B. Food Label Use

Out of 382 respondents, 28% of respondents reported that they read food labels daily as shown in Figure 2. Fifteen percent of the subjects reported that they rarely or never read food labels. Seventy-nine percent of them state that they read cereal food labels daily, Figure 3.

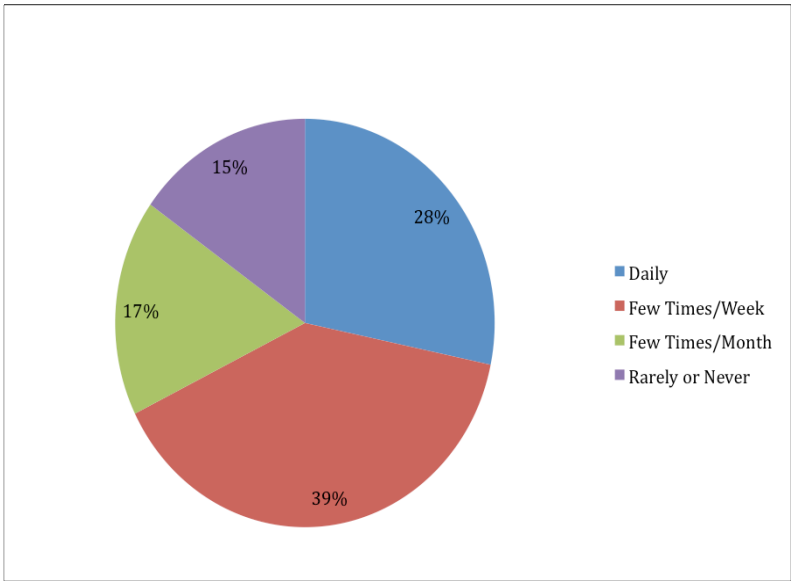


FIGURE 2. How Often Subjects Read Food Labels.

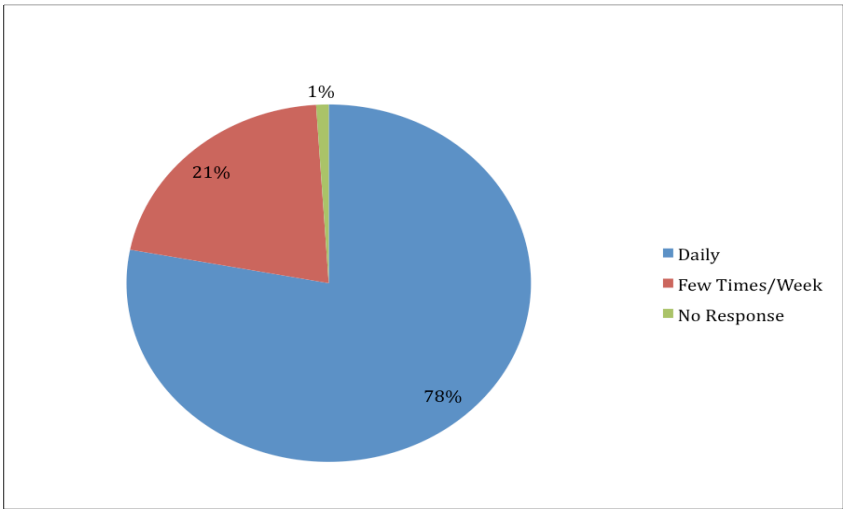


FIGURE 3. How Often Subjects Read Cereal Food Labels.

C. Cereal Most Commonly Purchased

Out of a selection of different cereal choices (Froot Loops, Corn Flakes, Corn Puffs, Raisin Bran, Lucky Charms), the most commonly purchased cereals were Froot Loops, 35% (n=135), Corn Flakes, 39% (n=148), and Raisin Bran, 33% (n=126). The least commonly purchased cereals were Corn Puffs, 12% (n=45) and Lucky Charms, 19% (n=73). Nineteen percent of the subjects (n=74) stated that they do not purchase any of the above cereal choices and 2% (n=6) of the respondents reported that they don't buy cereal.

D. Food Label Literacy Amongst English Speaking and Spanish Speaking Subjects

A box and whisker diagram (Figure 4) compares the food label literacy between English and Spanish speakers. The mean food label literacy for English speaking respondents was 4.2 with a 95% CI of 3.9-4.5, with a minimum score of zero and a

maxiumum was seven. Thirty-six percent of the English speaking subjects obtained a total score of seven, and 16% of the subjects obtained a total score of zero. The mean food label literacy for Spanish speaking respondents was 1.4 with a 95% CI of 0.9-1.8 with a minimum score of zero and a maximum score was seven. Seven percent of the Spanish speaking subjects received a total score of seven and 62% obtained a total score of zero.

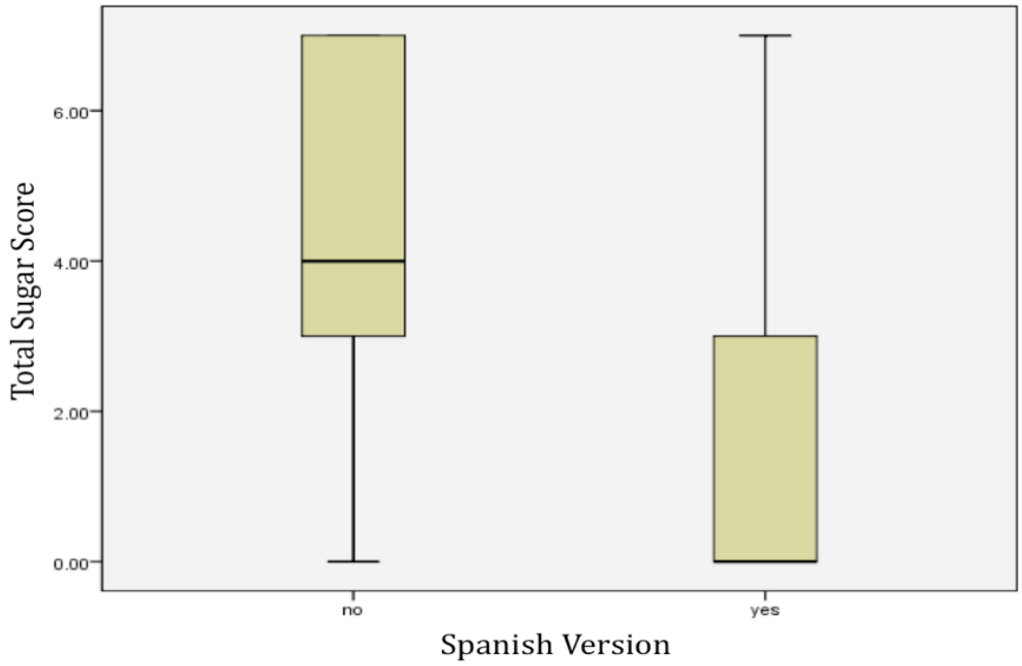


FIGURE 4. Food Label Literacy Distribution Amongst English Speaking and Spanish Speaking Subjects

E. Predictors of food label literacy

A stepwise, backward multiple linear regression analysis was performed to determine predictors of food label literacy. See Table V below. Education (p=0.006) and Caucasian ethnicity/race (p=0.02) were significant predictors of food label literacy, while other covariates such age, length of time in US, and income were not predictive. When

other variables were controlled, there was also a trend for those with Private Insurance (p=.059), those born in the U.S. (p=.07) and those who took the English version (p=.051) as having significant higher food label literacy.

TABLE V

PREDICTORS OF FOOD LABEL LITERACY FROM A LINEAR REGRESSION ANALYSIS WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Standardized Coefficients	t	Significance
Constant		5.76	0.000
Private Insurance	0.12	1.90	0.059
More than High School	0.17	2.78	0.006
Caucasian	0.16	2.36	0.02
English Version	0.13	1.96	0.051
Born in US	0.12	1.80	0.07

Linear regression of covariates on Food Lable Literacy with backwards removal of non-significant covariates.
Significance P value < 0.05.
Marginal Significance P value < 0.1

F. Predictors of recognizing the healthiest cereal and buying the healthiest cereal

From this point on, the analyses were conducted separately for those who used the Spanish version and those who used the English version of the questionnaire. A stepwise, backward multiple logistic regression analysis was performed to determine predictors of recognizing the healthiest cereal and buying the healthiest cereal (that is, the least sugared

cereal, Shredded Wheat). For the English speaking subjects, the predictors of recognizing the healthiest cereal were age ($p<0.03$), food label literacy ($p<0.001$), and being born in the United States ($p=0.07$) (Table VI). For the Spanish speaking subjects, the predictors for recognizing the healthiest cereal were income ($p=0.057$), and food label literacy ($p=0.07$) (Table VII).

TABLE VI

PREDICTORS OF RECOGNIZING THE HEALTHIEST CEREAL (ENGLISH SPEAKING SUBJECTS) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Age	0.03	1.7	1.0-2.9
Food Label Literacy	0.001	1.3	1.1-1.5
Born in the US	0.07	1.5	1.0-2.2

Significance P value < 0.05.
Marginal Significance P value < 0.1

TABLE VII

PREDICTORS OF RECOGNIZING THE HEALTHIEST CEREAL (SPANISH SPEAKING SUBJECTS) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Income	0.057	2.7	1.0-7.4
Food Label Literacy	0.07	1.2	1.0-1.5

Significance P value < 0.05.
Marginal Significance P value < 0.1

For the English speaking subjects, the predictors of choosing the least-sugared cereal as the cereal most likely to be purchased were: being born in the United States ($p<0.008$) having private insurance ($p<0.004$), being non-Hispanic ($p<0.01$) and being non-African American ($p<0.005$) (Table VIII). There were no predictors for Spanish speaking subjects of buying the healthier cereal. Food label literacy was not found to be a significant predictor of buying the healthier cereal choice for either English or Spanish speaking subjects.

TABLE VIII

PREDICTORS OF CHOOSING THE LEAST-SUGARED CEREAL AS THE CEREAL MOST LIKELY TO BE PURCHASED (ENGLISH SPEAKING SUBJECTS) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Not Hispanic	0.01	3.5	1.3-9.3
Not African American	0.005	3.3	1.4-7.7
Born in the US	0.008	1.6	1.1-2.2
Private Insurance	0.004	1.6	1.1-2.1

Significance P value < 0.05.
Marginal Significance P value < 0.1

G. Food label literacy and subject's oral health

A stepwise, multiple logistic regression with backward removal of non-significant variables was performed to determine which variables were predictors for caregivers' self-report of good or poor oral health. Analyses of the English and Spanish speakers were done separately. For those who spoke English, being born outside the US ($p<0.006$), being

a University of Illinois-Chicago subject (p<0.001), and being non-Hispanic (p<0.04), predicted self-report of poor oral health (Table IX). Food label literacy was not significant. For subjects who took the Spanish version of the survey, nothing predicted whether they would self-report as having poor oral health.

TABLE IX

PREDICTORS OF CAREGIVER SELF-REPORT OF POOR ORAL HEALTH (ENGLISH SPEAKING) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Food Label Literacy	0.2	1.1	0.9-1.3
Not Born in the US	0.006	2.3	1.3-4.1
UIC Subject	0.001	8.2	2.8-23.6
Not Hispanic	0.04	10.1	1.1-90.4

Significance P value < 0.05.
Marginal Significance P value < 0.1

For the English speaking subjects, the variables that predicted caregivers reporting themselves as having excellent oral health included being Caucasian (p<001), and lower food label literacy (p=0.07) (Table X). For Spanish speaking subjects, nothing predicted whether they would self-report as having excellent oral health. However, it is important to note that for the English speaking subjects, these predictors only predict about 8%-9% of the variance.

TABLE X

PREDICTORS OF CAREGIVER SELF-REPORT OF EXCELLENT ORAL HEALTH (ENGLISH SPEAKING) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Food Label Literacy	0.07	0.9	0.8-1.0
Caucasian	0.001	5.5	2.7-11.1

Significance P value < 0.05.
Marginal Significance P value < 0.1

H. Food label literacy and child's oral health

A stepwise, backward multiple logistic regression analysis was performed to determine which variables predicted the child having excellent or poor oral health, and which variables predicted no cavities in the child. Analyses of the English and Spanish speakers were done seperately. For the English speaking subjects, the predictors of child's excellent oral health were private office ($p<0.001$), caregivers who rate their oral health as better than poor ($p<0.001$), being African American ($p<0.02$), and having a higher food labelliteracy ($p=0.08$) (Table XI). This model predicted about fourteen percent of the variance.

TABLE XI

PREDICTORS OF CHILD EXCELLENT ORAL HEALTH (ENGLISH SPEAKING) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Food Label Literacy	0.08	1.1	1.0-1.3
African American	0.02	3.6	1.2-10.8
Private Office	0.001	6.5	2.7-16.0
Parent Oral Health rated better than poor	0.001	10.8	3.7-31.2

Significance P value < 0.05.
Marginal Significance P value < 0.1

For the Spanish speaking subjects, caregivers who reported their oral health as better than poor predicted excellent child oral health ($p<0.005$), with a odds ratio of 0.1 and a 95% CI of 0.03-0.5. This model predicted about 9% of the varience.

English speaking caregivers were more likely to report their child's oral health as poor if they were UIC patients ($p<0.001$), rated their oral health as poor ($p<0.001$), were not African American ($p<0.02$), and had a lower food label literacy score, ($p=0.08$) (Table XII). This model predicted about 14% of the varience.

TABLE XII

PREDICTORS OF CAREGIVER REPORTED CHILD POOR ORAL HEALTH (ENGLISH SPEAKING) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Food Label Literacy	0.08	0.9	0.7-1.0
Not African American	0.02	3.6	1.2-10.8
UIC	0.001	6.5	2.7-16.0
Report Their Oral Health as Poor	0.001	10.8	3.7-31.2

Significance P value < 0.05.
Marginal Significance P value < 0.1

Spanish speaking caregivers who were more likely to report their child's oral health as poor were those caregivers who self-report their oral health as poor ($p<0.005$), with an odds ratio of 7.7 and 95% CI 1.9-32.0. This model predicted about 9% of the varience.

English speaking caregivers were more likely to report their child as caries-free if they were African American ($p<0.02$), had a higher income ($p<001$), and were more food label literate ($p=0.09$) (Table XIII).

TABLE XIII

PREDICTORS OF CAREGIVER REPORTED CHILD CARIES-FREE (ENGLISH SPEAKING) BY LOGISTIC REGRESSION WITH BACKWARDS REMOVAL OF NON-SIGNIFICANT VARIABLES.

	Significance	Odds Ratio	95% CI
Food Label Literacy	**0.09**	**1.1**	**1.0-1.2**
African American	**0.02**	**2.5**	**1.1-5.5**
Income	**0.001**	**1.7**	**1.3-2.2**

Significance P value < 0.05.
Marginal Significance P value < 0.1

Spanish speaking caregivers are more likely to report their child as caries-free if they obtained a higher food label literacy score (p=0.07), with an odds ratio of 1.2 and 95% CI 1.0-1.5. However, it is important to note that these models only predicted four to seven percent of the varience.

V. DISCUSSION

Food label literacy was measured in two private practices and a public clinic to determine whether it influences a caregiver's food choices and child's oral health.

Our study showed that 82% of all subjects read food labels and 98% read cereal food labels at least once a month. This finding is remarkable given that only 36% of English speaking subjects and 7% of the Spanish-speaking subjects were able to fully comprehend and interpret cereal food labels.

As shown in a study by Fullmer *et al*, the most frequent ingredient a consumer looks at on a food label is sugar. [6] Results from our study suggest that although subjects look at the sugar information off food labels, they may not understand what the information means or which items are contributing to sugar. Lack of understanding which items contribute sugar can lead to over-consumption of sugar and increase the risk of dental caries. Patients with language barriers may not understand how to read English food labels. The nutrient information on the food labels may need to be written in a format that is more easily understandable, in both Spanish and English versions. Therefore, it was evident from our findings that both the English-speaking population and Spanish-speaking population require more education to effectively use the food label to make healthier food selections.

Hypothesis 1 was marginally supported. Socioeconomic status, immigration status and race were weakly related to health literacy. Education was found to be a strong predictor of food label literacy. One would expect individuals with higher education to understand read and interpret the sugar information from food labels. This finding is

supported by previous studies, such as Haldeman *et al*, which reveal that those with lower level of education were less likely to correctly use FDA food labels. [22] In addition, surprisingly, being Causcasion was also found to be a significant predictor of food label literacy even when other demographic variables were controlled. According to the 2003 National Assessment of Adult Literacy, Hispanic adults had lower average health literacy than adults in any other group. [3]

Hypothesis 2 examined whether food label literacy affected recognizing and buying the healthier cereal choice even when other demographic variables were controlled. For recognizing the least-sugared cereal, food label literacy was found to be entered into the model for both Spanish and English speakers, but only significantly for English speakers. Therefore, there was a weak relationship between food label literacy and recognizing healthier cereal choice even when controlling for demographic variables. Food label literacy had no impact when buying the healthier cereal selection. These results show that although an individual may be able to read food labels and recognize the healthier cereal choice, it does not necessarily indicate that an individual will purchase the healthier cereal choice. Further research may find that culture, habits, advertising and media influence, and socioeconomic status may be involved when an individual is making purchases.

For hypothesis 3, for both English and Spanish speaking caregivers, food label literacy was not correlated with parent oral health. Therefore, there was no evidence that food label literacy was a predictor in parental self-report of oral health.

Three measures were used for child oral health. Among English speakers, food label literacy was weakly associated with child oral health for all three measures. For Spanish

speakers, food label literacy was a weak predictor of parents reporting caries-free children when controlling for demographic variables and parent oral health.

Our findings are consistent with previous studies such as Wolf, Gazmararian and Baker, which stated that those with inadequate health literacy have worse physical and mental health. One can predict from our results that those with inadequate food label literacy may have poor oral health. Although food label literacy was not a strong predictor of food choices and oral health, the information indicates that education on how to read food labels may have an impact on food choices and oral heath. Once there is an improvement in food label literacy, individuals can obtain more information regarding nutrition and subsequently improve food choices and oral health (Figure 1).

A. Implications

Future studies may want to include an oral assessment by a dental examiner. This greater precision may demonstrate more effectively the relationship between food label literacy and oral health. This study demonstrates that if you can teach parents to read food labels, they will be able to choose healthier cereals, but it does not mean they will buy the healthier choice.

B. Strength and Limitations

The study has a number of strengths. The study sample consisted of a large diverse population and participants were distributed across various demographic strata, which rendered the results more generalizable. This is also the first study to investigate food label literacy and its effect on selection of healthy cereal choices.

There are some limitations to this study. Primarily, the cereal food labels provided were only in English. Some individuals, particulary immigrants, have low English literacy skills, yet may be highly literate in other languages. There is a possibility if provided a Spanish food label, the food label literacy of Spanish speaking patients would be higher. A future study could compare the use and understanding between an English written food label and a Spanish written food label for interpreting sugar information and identifying if there are any differences in oral health. However, we chose to use English labels because most products in grocery stores have food labels in English. Another limitation of the study is that it did not include an assessment of the subject's knowledge of the effects of high sugar levels in one's diet. A future study could have a dental professional examine and assess the dental health of the subject and child. In addition, this study did not investigate reasons for nonuse of food labels among participants.

C. Conclusions

- Food label literacy is related to demographic variables, immigration status and being Caucasian.
- Among English speaking parents, food label literacy was weakly correlated with recognizing the least-sugared cereal choice.
- Food label literacy was not related to buying the healthier cereal selection.
- Food label literacy was not correlated with caregiver's self-reported oral health in either English or Spanish speaking caregivers.
- Among English speaking caregivers, food label literacy was weakly associated with caregiver's self-report of child's oral health.
- Among Spanish speaking caregivers, food label literacy was a weak predictor of caregivers self reporting caries-free child.

CITED LITERATURE

1. Weiss B. Health Literacy: An important issue for communicating health information to patients. *Chinese Medical Journal* 64:603-608, 2001.

2. Kirsch I, Junglebut A, Jenkins L, Kolstad A. *Adult Literacy in America: A First Look at the Results of the National Adult Literacy Survey.* Washington, DC: National Center for Education Services, US Dept of Education, 1993.

3. Baker D, Parker R, Williams M, Clark S, Nurss J. The relationship of patient reading ability to self-reported health and use of health services. *American Journal of Public Health* 87:1027-1030, 1997.

4. Boel T. Linguistic issues and literacy barriers in nutrition. *Journal of the American Dietetic Association,* 2007.

5. Kristal AR, Levy L, Patterson RE, Li SS, White E. Trends in food label use associated with new nutrition labeling regulations. *American Journal Public Health* 88:1212-1215, 1998.

6. Fullmer S, Geiger C, Parent CRM. Consumers' knowledge, understanding, and attitudes towards health claims on food labels. *Journal American Diet Association* 1*:*166-71, 1991.

7. Guthrie JF, Fox JJ, Cleveland LE, Welsh S. Who uses nutritive labeling, and what effects does label use have on dietary quality? *Journal Nutrition Education* 27:163-72, 1995.

8. US Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

9. Page R, Montgomery K, Ponder A, Richard A. Targeting children in the cereal aisle: promotional techniques and content features on ready-to-eat cereal product packaging. *American Journal of Health Education,* 2008.

10. Harris JL, Schwartz MB, Brownell KD, et al**.** Cereal FACTS: Evaluating the nutrition quality and marketing of children's cereals. *Rudd Center for Food Policy and Obesity,* 2009.

11. Hanover L, White J, Manufacturing, composition, and applications of fructose, *American Journal Clinical Nutrition* 58: 724S-732S, 1993.

12. Bocarsly, M, Powell E, Avena N, Hoebei B. High-fructose corn syrup causes characteristics of obesity in rats: Increased body weight body fat and triglyceride levels. *Pharmacology Biochemistry and Behavior,* 2010.

CITED LITERATURE (continued)

13. McDonald J, Stookey G. Animal studies concerning the cariogenicity of dry breakfast cereals. *Journal Dental Research* 56: 1001, 1977.

14. U.S. Department of Health and Human Services: *Healthy people 2010: Understanding and improving health*. 2nd edition. Washington, DC: U.S. Government Printing Office; 2000.

15. Rudd R, Horowitz A: The role of Health Literacy in achieving oral health for elders**.** *Journal Dental Education* 69:1018-102, 2005.

16. Jones M, Lee J, Rozier Gary. Oral health literacy among adults seeking dental care. *Journal of American Dental Association* 138: 1199-1208, 2007.

17. Rothman R, Housam R, Weiss H, Davis D, Gregory R, Gebretsadik T, Shintani A, Elasy T. Patient understanding of food labels the role of literacy and numeracy. *American Journal of Preventative Medicine* 31:5, 2006.

18. Kessler H, Wunderlich S. Relationship between use of food labels and nutrition knowledge of people with diabetes. *The Diabetes Educator* 25:549-559, 1999.

19. Macon J, Oakland MJ, Kissack PA. Food label use by older Americans: Data from the continuing survey of food intakes by individuals and the diet and health knowledge survey 1994-1996. *Journal of Nutrition for the Elderly* 24, 2004.

20. Marietta A, Welshimer K, Anderson S. Knowledge, attitudes, and behaviors of college students regarding the 1990 Nutrition Labeling and Education Act Food Labels. *Journal of American Dietetic Association* 99:445-450, 1999.

21. Satia J, Galanko J, Neuhouser M. Food nutrition label use is associated with demographic, behavioral, and psychosocial factors and dietary intake among African Americans in North Carolina. *Journal of American Dietetic Association* 105:392-402, 2005.

22. Haldeman L, Perez-Escamilla R, Ferris A, Drake L, Himmelgreen D, Bonello H, Gonzalez N, Segura-Millan S, Mendez I, Bermudez A, Romero-Daza N. Development of a color-coded bilingual food label for low-literacy Latino caretakers. *Journal of Nutrition Education* 32:152-159, 2000.

23. Williams M, Baker D, Parker R, Nurss J. Relationship of functional health literacy to patient's knowledge of their chronic disease. *Archives Internal Medicine* 158:166-172, 2009.

24. Williams M, Baker D, Honig E, Lee T, Nowlan A. Inadequate literacy is a barrier to asthma knowledge and self-care. *CHEST* 114:1008-1015, 1998.

CITED LITERATURE (continued)

25. Boulet L, Belanger M, Lajoie P. Characteristics of subjects with a high frequency of emergency visits for asthma. *American Journal Emergency Medicine* 14:623-628, 1996.

26. Weiss B, Palmer R. Relationship between health care costs and very low literacy skills in a medically needs and indigent medicaid population. *Journal of the American Board of Family Medicine* 17:44-47, 2004.

27. Kennen E, Davis T, Huang J, Yu H, Carden D, Bass R, Arnold C. Tipping the scales: The effect of literacy on obese patients' knowledge and readiness to lose weight. *Southern Medical Journal* 98:15-18, 2005.

28. Davis T, Wolf M, Bass P, Thompson J, Tilson H, Neuberger M, Parker R. Literacy and misunderstanding prescription drug labels. *American College of Physicians* 145:887-894, 2006.

29. Wolf M, Davis T, Shrank W, Rapp D, Bass P, Connor U, Clayman M, Parker R. To err is human: Patient misunderstanding of prescription drug label instructions. *Patient Education and Counseling* 67:293-300, 2007.

30. Parker E, Jamieson L. Associations between indigenous Australian oral health literacy and self-reported oral health outcomes. *BMC Oral Health* 10:3, 2010

APPENDIX A

University of Illinois College of Dentistry

Food Choices, Reading Cereal Labels and Oral Health.

Dear Parent,

Purpose of Research: We want to see if the ability to read food labels helps people make food choices that are good for oral health.

Description of the Research: To respond to this questionnaire, you will be asked to read three food labels and answer questions about them, and answer some questions about yourself. PLEASE DO NOT RESPOND TO THIS IF YOU ARE UNDER 18 YEARS OF AGE.

Time Needed: You will need less than 7 minutes to answer the questionnaire.

Research Risks and Discomforts: There are no risks involved in this study.

Expected Benefits to You and Others: The results of this study will aid in determining if programs need to be developed to improve literacy and thus improve food choices for children.

Costs To You: There is no cost for you other than your time.

Confidentiality: Your name will not be on the questionnaire, so your answers will be confidential. We will have no way of knowing who answered each questionnaire.

Information about the Study: The principal investigator of this study is Dr. Nanna Ariaban, found at nariab2@uic.edu or at 312-996-7531. If you have any questions about this, you may contact her or her advisor, Dr. Punwani, at the same telephone number.

Voluntary: Participation is voluntary. You do not have to participate in this study if you do not want to. If you don't want to be part of this, simply return a blank survey to the collection box.

If you have any questions about your rights as a research subject, call the Office for the Protection of Research Subjects at 312 -996-1711.

Thank you very much for your participation in this research.

Sincerely,

Nanna Ariaban, DMD
Principal Investigator and PGY2

Indru Punwani, DDS
Co-Investigator and Department Head

APPENDIX B

PLEASE DO NOT RESPOND IF LESS THAN 18 YEARS OF AGE

1. Do you read food labels on food packages?
    a. Daily
    b. Few times per week
    c. Few times per month
    d. Rarely or never
2. Do you read cereal food labels?
    a. Yes
    b. No
3. Which cereals do you buy most frequently? Circle the one you buy the most and cross out the cereals you never buy.
    a. Fruit Loops
    b. Corn Flakes
    c. Corn Puffs
    d. Raisin Bran
    e. Lucky Charms
    f. None of the above
    g. I don't buy cereal.
4. How would you rate your oral health?
    a. Excellent
    b. Good
    c. Poor
5. How would you rate your child's oral health?
    a. Excellent
    b. Good
    c. Poor

6. Has the child at this dental visit ever had any cavities?
    a. Yes
    b. No

Please read and answer **questions 7-10** using the food labels.

7. Which one do you consider the healthiest cereal for your teeth?
    a. Kellogg's Frosted Flakes
    b. Post's Shredded Wheat
    c. Kellogg's Fruit Loops
8. Out of these three labels which of these would you most likely buy?
    a. Kellogg's Frosted Flakes
    b. Post's Shredded Wheat
    c. Kellogg's Fruit Loops

9. How much sugar is found in each food label? Circle on the food label

10. In the list of ingredients, circle all the sugar items in each label

11. Do you add anything to your child's cereal at breakfast? Circle all that apply.
    a. Milk
    b. Sugar
    c. Fresh Fruits
    d. Dried Fruits (raisins)

12. What is your gender?
    a. Male
    b. Female

13. What is your race? (Check all that apply)

    a. Hispanic
    b. African –American/African
    c. Caucasian
    d. Asian – Pacific Islander
    e. Eastern European
    f. Native American
    g. Arab/ Middle Eastern
    h. Other

14. What is your age?

    a. 18-21
    b. 22-25
    c. 31-40
    d. 41-50
    e. Older than 50

15. What is your highest level of education?

    a. Less than High School
    b. High School graduate or GED
    c. Some College
    d. College graduate or more

16. What kind of dental insurance does your child have?

    a. Government Insurance (Medicaid/SCHIP)
    b. Private Insurance
    c. No insurance

17. Were you born in the USA? (If yes, skip to question #19).

    a. Yes
    b. No

18. If not born in the USA, how long have you lived in the USA?

    a. Less than one year
    b. 5-10 years
    c. More than 10 years

19. Rate how well you read English.

    a. Poor
    b. Good
    c. Excellent

20. What is your income?

    a. < $20,000
    b. $20,000 - $39,999
    c. $40,000 - $59,999
    d. >$60,000

Kellogg's® Froot Loops®

Nutrition Facts

Serving Size 1 Cup (29g/1.0 oz.)

Amount Per Serving	Cereal	Cereal with ½ Cup Vitamins A&D Fat Free Milk
Calories	110	150
Calories from Fat	10	10
	% Daily Value* **	
Total Fat 1g*	**2%**	**2%**
Saturated Fat 0.5g	**3%**	**3%**
Trans Fat 0g		
Cholesterol 0mg	**0%**	**0%**
Sodium 135mg	**6%**	**9%**
Potassium 30mg	**1%**	**7%**
Total Carbohydrate 25g	**8%**	**10%**
Dietary Fiber less than 1g	**3%**	**3%**
Sugars 12g		
Other Carbohydrate 12g		
Protein 1g		
Vitamin A	10%	15%
Vitamin C	25%	25%
Calcium	0%	15%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B_6	25%	25%
Folic Acid	25%	25%
Vitamin B_{12}	25%	35%
Zinc	10%	15%

* Amount in cereal. One half cup of fat free milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrates (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: SUGAR; CORN FLOUR; WHEAT FLOUR; OAT FLOUR; PARTIALLY HYDROGENATED VEGETABLE OIL (ONE OR MORE OF: COCONUT, COTTONSEED, AND SOYBEAN)*; SALT; SODIUM ASCORBATE AND ASCORBIC ACID (VITAMIN C); REDUCED IRON; NATURAL ORANGE, LEMON, CHERRY, RASPBERRY, BLUEBERRY, LIME, AND OTHER NATURAL FLAVORS; RED #40; BLUE #2; YELLOW #6; ZINC OXIDE; NIACINAMIDE; TURMERIC COLOR; BLUE #1; PYRIDOXINE HYDROCHLORIDE (VITAMIN B_6); RIBOFLAVIN (VITAMIN B_2); THIAMIN HYDROCHLORIDE (VITAMIN B_1); VITAMIN A PALMITATE; ANNATTO COLOR; BHT (PRESERVATIVE); FOLIC ACID; VITAMIN D; VITAMIN B_{12}.

*LESS THAN 0.5g *TRANS* FAT PER SERVING.

Kellogg's Frosted Flakes®

Nutrition Facts

Serving Size ¾ Cup (30g/1.1 oz.)
Servings Per Container About 16

Amount Per Serving	Cereal	Cereal with ½ Cup Vitamins A&D Fat Free Milk
Calories	110	150
Calories from Fat	0	0
	% Daily Value* **	
Total Fat 0g*	**0%**	**0%**
Saturated Fat 0g	**0%**	**0%**
Trans Fat 0g		
Cholesterol 0mg	**0%**	**0%**
Sodium 140mg	**6%**	**9%**
Potassium 20mg	**1%**	**6%**
Total Carbohydrate 27g	**9%**	**11%**
Dietary Fiber 1g	**3%**	**3%**
Sugars 11g		
Other Carbohydrate 15g		
Protein 1g		
Vitamin A	10%	15%
Vitamin C	10%	10%
Calcium	0%	15%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B_6	25%	25%
Folic Acid	25%	25%
Vitamin B_{12}	25%	35%

* Amount in cereal. One half cup of fat free milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrates (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: MILLED CORN, SUGAR, MALT FLAVORING, HIGH FRUCTOSE CORN SYRUP, SALT, SODIUM ASCORBATE AND ASCORBIC ACID (VITAMIN C), NIACINAMIDE, IRON, PYRIDOXINE HYDROCHLORIDE (VITAMIN B_6), RIBOFLAVIN (VITAMIN B_2), THIAMIN HYDROCHLORIDE (VITAMIN B_1), VITAMIN A PALMITATE, FOLIC ACID, BHT (PRESERVATIVE), VITAMIN B_{12} AND VITAMIN D.

CORN USED IN THIS PRODUCT CONTAINS TRACES OF SOYBEANS.

Exchange: 1½ Carbohydrates
The dietary exchanges are based on the Exchange Lists for Meal Planning, ©2003 by The American Diabetes Association, Inc. and The American Dietetic Association.

NLI#04131

Post's Shredded Wheat

Nutrition Facts

Serving Size 1 cup (49g)

Amount Per Serving	Cereal	Cereal with 1/2 cup Fat Free Milk
Calories	170	210
Calories from Fat	10	10
		*% Daily Value***
Total Fat 1g*	2%	2%
Saturated Fat 0g	0%	0%
Trans Fat 0g		
Polysaturated Fat 0.5g		
Monosaturated Fat 0g		
Cholesterol 0mg	0%	0%
Sodium 0mg	0%	3%
Potassium 190mg	5%	11%
Total Carbohydrate 40g	13%	15%
Dietary Fiber 6g	24%	24%
Soluble Fiber 1g		
Insoluble Fiber 5g		
Sugars 0g		
Other Carbohydrate 34g		
Protein 6g		
Vitamin A	0%	4%
Vitamin C	0%	0%
Calcium	2%	15%
Iron	6%	6%
Thiamin	10%	15%
Riboflavin	2%	10%
Niacin	15%	15%
Phosphorus	20%	30%
Magnesium	15%	20%
Zinc	10%	15%
Copper	8%	8%

Ingredients: WHOLE GRAIN WHEAT. BHT

* Amount in Cereal. One half cup fat free milk contributes an additional 40 calories, 65mg sodium, 200mg potassium, 6g total carbohydrate (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your Daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

APPENDIX C

University of Illinois College of Dentistry
Department of Pediatric Dentistry

Alternativa de comidas, leyendo etiqueta cereales y salud oral.

Estimado padre (madre),

Proposito de esa investigacion: Nosotros queremos saber si la habilidad de leer etiquetas de comidas los ayuda a escojer comidas que son buenas para la salud oral.

Descripcion de esa investigacion: Para responder ese questionario, le pediremos leer 3 etiquetas de comida y contestar preguntas sobre la étiqueta de comida y sobre usted mismo(a). **POR FAVOR NO CONTESTE SI TIENES MENOS DE 18 ANOS DE EDAD.**

Tiempo necesario: Usted necesitara menos de 7 minutos para contestar el questionario.

Incomodidades riesgos de esa investigacion : No hay riesgos en esa investigacion.

Beneficios para usted y otros: Los resultados de esa investigacion ayudaran a determinar si necesitamos desarollar programas para mejorar el entendimiento de las etiquetas y asi mejorar las opciones de comidas para ninos.

Costos para usted: No hay costos para usted, nada mas su tiempo.

Confidencialidad: Su nombre no estara en el questionario, solo sus respuestas. Nosotros no tendremos manera de saber quien contesto cada questionario.

Informacion sobre la investigacion: El investigador principal de este estudio es: Dra. Nanna Ariaban, contactela en nariab2@uic.edu o al numero 312-996-7531. Si usted tiene preguntas sobre esa investigacion, tambien puede contactar su consejero Dr. Punwani en el mismo numero de telefono.

Voluntario: Participacion es voluntaria. Usted no tiene que participar en ese estudio si no quiere. Si no quiere participar, simplemente devuelva el questionario en blanco asi a la caja collectera.

Si usted tiene preguntas sobre sus derechos como sujeto de investigacion, llame a la Oficina de Proteccion a los Sujetos de Investigacion al 312-996-1711.

Muchas gracias por su participacion en esa investigacion.

Sinceramente,

Nanna Ariaban, DMD
Investigadora Principal y Residente de Pediatria Dental

Indru Punwani, DDS
Investigador y jefe de departamento

APPENDIX D

POR FAVOR NO CONTESTE SI TIENES MENOS DE 18 ANOS DE EDAD.

1. ¿ Usted lee las etiquetas de los alimentos que esta en los paquetes de alimentos?
    a. Diariamente
    b. Algunas veces por semana
    c. Algunas veces por mes
    d. Rara mente o nunca

2. ¿ Usted lee las etiquetas de informacion de cereales?
    a. Si
    b. No

3. Cuales cereales usted compra más frecuentemente? Circle el que usted compra mas, y marque el que usted nunca compra.
    a. Fruit Loops
    b. Corn Flakes
    c. Corn Puffs
    d. Raisin Bran
    e. Lucky Charms

4. Como valora usted su salud oral?
    a. Excelente
    b. Buena
    c. Mala

5. Como valora usted la salud oral de su hijo(a)?
    a. Excelente
    b. Buena
    c. Mala

6. Su hijo en esa visita dental tiene alguna caries?
    a. Si
    b. No

Por favor lea y conteste las preguntas 8-11 usando las etiquetas de alimentos.

7. ¿ Cual de esos usted considera el cereal mas saludable para sus dientes?
    a. Kellogg's Frosted Flakes
    b. Post's Shredded Wheat
    c. Kellogg's Fruit Loops

8. Entre esos 3 alimentos de cereales, cual usted compraria?
    a. Kellogg's Frosted Flakes
    b. Post's Shredded Wheat
    c. Kellogg's Fruit Loops

9. Cuanto azúcar hay en cada etiqueta de los alimentos? Circule en cada etiqueta de alimento.

10. En la lista de ingredientes, circule todos los articulos de azucar en cada etiqueta.
12. ¿ Usted addiciona algo en el cereal de su hijo (a)? Circule todas que aplican.
    a. Leche
    b. Azucar
    c. Frutas Frescas
    d. Frutas Secas

11. Cuál es su género?
    a. Masculino
    b. Femenino

12. Cuál es su raza?
    a. Hispano
    b. African- American / African
    c. Blanco
    d. Asiatico
    e. Europa del este
    f. Indu
    g. Arabe
    h. Other

13. Cual es su edad?
    a. 18-21
    b. 22-25
    c. 31-40
    d. 41-50
    e. Mas de 50

14. Cual es el nivel mas alto de su educacion?
    a. Menos que escuela secundaria
    b. Escuela secundaria o GED
    c. Algo de colegio
    d. Graduado de colegio – bachillerato o mas

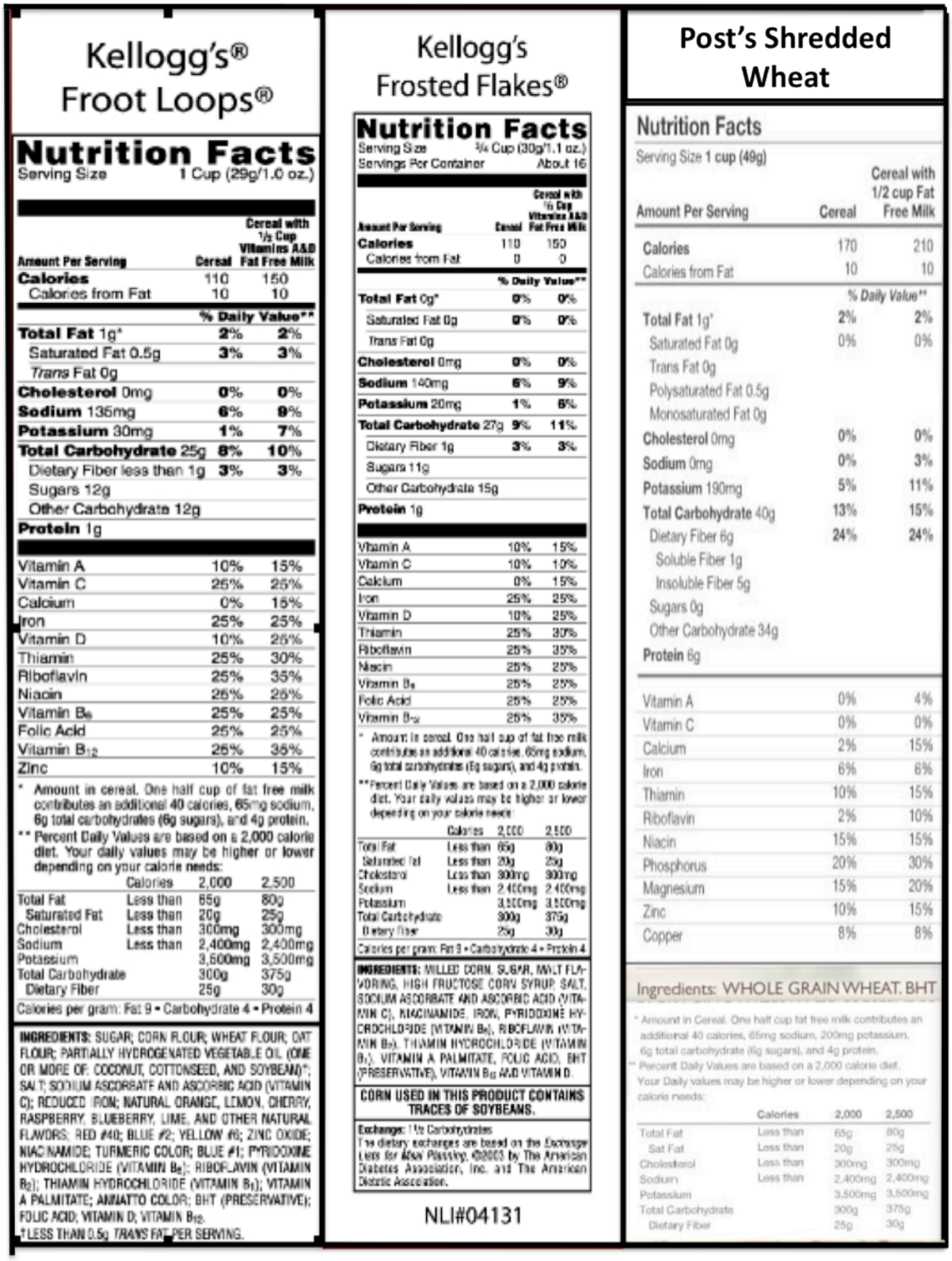
15. Que tipo de seguro dental tiene su hijo(a)?
    a. Seguro del gobierno
    b. Seguro privado
    c. Sin seguro

16. Usted nacio en Estados Unidos? (Si, si pase a la pregunta nº 20).
    a. Si
    b. No

17. Si no ha nacido en Estados Unidos, hace cuanto tiempo usted vive en estados unidos?
    a. menos de un año
    b. 5-10 años
    c. más de 10 años

18. Valore como lee usted el Ingles?
    a. Mal
    b. Bien
    c. Excelente

19. Cuanto usted gana?
    a. <$20,000
    b. $20,000-$39,000
    c. $40,000 - $59,000
    d. >$60,000



Kellogg's® Froot Loops®

Nutrition Facts

Serving Size 1 Cup (29g/1.0 oz.)

Amount Per Serving	Cereal	Cereal with ½ Cup Vitamins A&D Fat Free Milk
Calories	110	150
Calories from Fat	10	10
	% Daily Value* **	
Total Fat 1g*	**2%**	**2%**
Saturated Fat 0.5g	**3%**	**3%**
Trans Fat 0g		
Cholesterol 0mg	**0%**	**0%**
Sodium 135mg	**6%**	**9%**
Potassium 30mg	**1%**	**7%**
Total Carbohydrate 25g	**8%**	**10%**
Dietary Fiber less than 1g	**3%**	**3%**
Sugars 12g		
Other Carbohydrate 12g		
Protein 1g		
Vitamin A	10%	15%
Vitamin C	25%	25%
Calcium	0%	15%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B_6	25%	25%
Folic Acid	25%	25%
Vitamin B_{12}	25%	35%
Zinc	10%	15%

* Amount in cereal. One half cup of fat free milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrates (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Saturated Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram: Fat 9 • Carbohydrate 4 • Protein 4

INGREDIENTS: SUGAR; CORN FLOUR; WHEAT FLOUR; OAT FLOUR; PARTIALLY HYDROGENATED VEGETABLE OIL (ONE OR MORE OF: COCONUT, COTTONSEED, AND SOYBEAN)*; SALT; SODIUM ASCORBATE AND ASCORBIC ACID (VITAMIN C); REDUCED IRON; NATURAL ORANGE, LEMON, CHERRY, RASPBERRY, BLUEBERRY, LIME, AND OTHER NATURAL FLAVORS; RED #40; BLUE #2; YELLOW #6; ZINC OXIDE; NIACINAMIDE; TURMERIC COLOR; BLUE #1; PYRIDOXINE HYDROCHLORIDE (VITAMIN B_6); RIBOFLAVIN (VITAMIN B_2); THIAMIN HYDROCHLORIDE (VITAMIN B_1); VITAMIN A PALMITATE; ANNATTO COLOR; BHT (PRESERVATIVE); FOLIC ACID; VITAMIN D; VITAMIN B_{12}.

†LESS THAN 0.5g *TRANS* FAT PER SERVING.

Kellogg's Frosted Flakes®

Nutrition Facts

Serving Size ¾ Cup (30g/1.1 oz.)
Servings Per Container About 16

Amount Per Serving	Cereal	Cereal with ½ Cup Vitamins A&D Fat Free Milk
Calories	110	150
Calories from Fat	0	0
	% Daily Value* **	
Total Fat 0g*	**0%**	**0%**
Saturated Fat 0g	**0%**	**0%**
Trans Fat 0g		
Cholesterol 0mg	**0%**	**0%**
Sodium 140mg	**6%**	**9%**
Potassium 20mg	**1%**	**6%**
Total Carbohydrate 27g	**9%**	**11%**
Dietary Fiber 1g	**3%**	**3%**
Sugars 11g		
Other Carbohydrate 15g		
Protein 1g		
Vitamin A	10%	15%
Vitamin C	10%	10%
Calcium	0%	15%
Iron	25%	25%
Vitamin D	10%	25%
Thiamin	25%	30%
Riboflavin	25%	35%
Niacin	25%	25%
Vitamin B_6	25%	25%
Folic Acid	25%	25%
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* Amount in cereal. One half cup of fat free milk contributes an additional 40 calories, 65mg sodium, 6g total carbohydrates (6g sugars), and 4g protein.

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INGREDIENTS: MILLED CORN, SUGAR, MALT FLAVORING, HIGH FRUCTOSE CORN SYRUP, SALT, SODIUM ASCORBATE AND ASCORBIC ACID (VITAMIN C), NIACINAMIDE, IRON, PYRIDOXINE HYDROCHLORIDE (VITAMIN B_6), RIBOFLAVIN (VITAMIN B_2), THIAMIN HYDROCHLORIDE (VITAMIN B_1), VITAMIN A PALMITATE, FOLIC ACID, BHT (PRESERVATIVE), VITAMIN B_{12} AND VITAMIN D.

CORN USED IN THIS PRODUCT CONTAINS TRACES OF SOYBEANS.

Exchange: 1 ½ Carbohydrates
The dietary exchanges are based on the Exchange Lists for Meal Planning, ©2003 by The American Diabetes Association, Inc. and The American Dietetic Association.

NLI#04131

Post's Shredded Wheat

Nutrition Facts

Serving Size 1 cup (49g)

Amount Per Serving	Cereal	Cereal with 1/2 cup Fat Free Milk
Calories	170	210
Calories from Fat	10	10
	*% Daily Value**	
Total Fat 1g*	2%	2%
Saturated Fat 0g	0%	0%
Trans Fat 0g		
Polysaturated Fat 0.5g		
Monosaturated Fat 0g		
Cholesterol 0mg	0%	0%
Sodium 0mg	0%	3%
Potassium 190mg	5%	11%
Total Carbohydrate 40g	13%	15%
Dietary Fiber 6g	24%	24%
Soluble Fiber 1g		
Insoluble Fiber 5g		
Sugars 0g		
Other Carbohydrate 34g		
Protein 6g		
Vitamin A	0%	4%
Vitamin C	0%	0%
Calcium	2%	15%
Iron	6%	6%
Thiamin	10%	15%
Riboflavin	2%	10%
Niacin	15%	15%
Phosphorus	20%	30%
Magnesium	15%	20%
Zinc	10%	15%
Copper	8%	8%

Ingredients: WHOLE GRAIN WHEAT. BHT

* Amount in Cereal. One half cup fat free milk contributes an additional 40 calories, 65mg sodium, 200mg potassium, 6g total carbohydrate (6g sugars), and 4g protein.

** Percent Daily Values are based on a 2,000 calorie diet. Your Daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
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Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Potassium		3,500mg	3,500mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

APPENDIX E

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Granted

September 20, 2009

Nanna Ariaban, DMD

Pediatric Dentistry

801 S. Paulina St

M/C 850

Chicago, IL 60612

Phone: (301) 408-8649 / Fax: (312) 413-8006

RE: Research Protocol # 2009-0723

"Food Choices, Reading Cereal Labels and Oral Health"

Dear Dr. Ariaban:

Your Claim of Exemption was reviewed on September 20, 2009 and it was determined that you research meets the criteria for exemption. You may now begin your research.

Exemption Period: September 20, 2009 – September 19, 2012

Your research may be conducted at UIC and with adult subjects only.

The specific exemption category under 45 CFR 46.101(b) is:

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.

2. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.

3. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).

4. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script.

When appropriate, the following information must be provided to all research subjects participating in exempt studies:

a. The researchers affiliation; UIC, JBVMAC or other institutions,
b. The purpose of the research,
c. The extent of the subject's involvement and an explanation of the procedures to be followed,
d. Whether the information being collected will be used for any purposes other than the proposed research,
e. A description of the procedures to protect the privacy of subjects and the confidentiality of the research information and data,
f. Description of any reasonable foreseeable risks,
g. Description of anticipated benefit,
h. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
i. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
j. A statement that the UIC IRB/OPRS or JBVMAC Patient Advocate Office is available if there are questions about subject's rights, which includes the appropriate phone numbers.

Please be sure to:

→ Use your research protocol number (2009-0723) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 355-2908. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne

Assistant Director, IRB # 2

Office for the Protection of Research Subjects

VITA

EDUCATION

July 2008 – June 2010	**University of Illinois -Chicago School of Dentistry** Pediatric Dentistry Residency – Certificate, MS
August 2004 – May 2008	**University of Pennsylvania School of Dental Medicine** DMD
August 1999 – May 2003	**University of Maryland – College Park** BS, Physiology and Neurobiology

DENTAL RELATED WORK EXPERIENCE AND EXTERNSHIPS

Lancaster Cleft Palate Clinic Externship *08/07 – 09/07*
General Dentistry Externship

Beverly Pediatric Dentistry, Mclean, VA *06/05 – 08/05*
Dental Assistant

University of Maryland's Dental Center *09/99 – 05/03*
Dental Assistant

RESEARCH EXPERIENCE

Uniformed Services of the University of the Health Sciences, Bethesda, MD *06/03 – 08/04*
Department of Surgery

Research Fellow and Surgical and Molecular Technician

- Measure changes in neurons and astrocytes using light microscope immunohistochemistry
- Anesthesia Tech

UMD Howard Hughes Medical Institute, College Park, MD *09/01- 08/02*
Department of Microbiology

Research Fellow

- Determine the function of a cellulase gene in the plant Arabidopsis,
- Collect and analyze data by performing transformations and PCR procedure.

National Institute of Health, Bethesda, MD *05/01 – 08/01*
National Institute of Heart, Blood Lung

Research Intern

- Study the function of primary cilia of medullary canine kidney cells.

Towson Summer Undergraduate Biological Research, Towson, MD *06/00 – 08/00*
Department of Biology

Research Intern

- Measure the changes in vasa recta endothelia calcium concentration.
- Final Poster Presentation

AWARDS AND DISTINCTION

- Senior Marshall of Graduating Class 2003
- Member of National Dean's List
- President Scholars Scholarship winner
- Recipient of Howard Hughes Medical Institute Undergraduate Fellowship
- Member of University of Maryland's Life Sciences Scholars Program
- Member of Premannum Honor Society (GPA > 3.5)
- Member of Phi Kappa Phi Honor Society (Top 5%)

PUBLICATIONS

- Profound hypothermia protects neurons and astrocytes, and preserves cognitive functions in a Swine model of lethal hemorrhage. J Surg Res. 2005 Jun 15; 126(2):172-81.
- The rate of induction of hypothermic arrest determines the outcome in a Swine model of lethal hemorrhage. J Trauma. 2004 Nov; 57(5):961-9.
- Application of a zeolite hemostatic agent achieves 100% survival in a lethal model of complex groin injury in Swine. J Trauma. 2004 May; 56(5):974-83.
- Effect of Profound Hypothermia on Immune Activation in a Swine Model of Lethal Hemorrhage. Medimond International Proceedings. 2004 March

ACKNOWLEDGEMENTS

- The Rate of Re-warming from Hypothermic Arrest Determines the Outcome in a Swine Model of Lethal Hemorrhage.
- Does the Rate of Rewarming from Profound Hypothermic Arrest Influence the Outcome in a Swine Model of lethal Hemorrhage? J. Trauma 2006 Jan, 60 (1) 134-146