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ACCEPTANCE

This thesis, CHILD FEEDING PRACTICES OF WIC PARTICIPANTS IN GWINNETT COUNTY, GEORGIA, by Jenny R. Askew was prepared under the direction of the Master's Thesis Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Master of Science in the College of Health and Human Sciences, Georgia State University. The Master's Thesis Advisory Committee, as representatives of the faculty, certify that this thesis has met all standards of excellence and scholarship as determined by the faculty.

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ABSTRACT

CHILD FEEDING PRACTICES OF WIC PARTICIPANTS IN GWINNETT COUNTY, GEORGIA

by

Jenny R. Askew

Background: Mothers of low socioeconomic status are less likely to breastfeed and more likely to formula feed. In addition, low socioeconomic status is associated with a premature introduction of cow's milk, juice and solid foods. Negative outcomes such as asthma, diabetes and obesity later in life may result from improper child feeding practices. Investigating current feeding practices and beliefs of low income mothers may help to focus interventions that have the potential to change feeding practices.

Objective: To determine if WIC participants in Gwinnett County, GA are practicing child feeding recommendations set forth by the American Academy of Pediatrics (AAP) as well as following the Division of Responsibility in feeding developed by Ellyn Satter.

Participants/setting: Ninety-six WIC participants (92% mothers) primarily African American (39%) and Hispanic (35%) from Gwinnett County, Georgia. Participants completed one of three surveys based on their method of feeding (breastfeeding, formula feeding or solid foods) after a nutrition education class.

Main outcome measures: Compliance to feeding recommendations was determined among the entire survey population and by survey subgroups.

Statistical analysis: Frequency distributions by method of feeding were calculated by age and race. Trends in feeding practices and the feeding environment were determined.

Results: Ten percent of participants surveyed reported breastfeeding, 22% reported formula feeding and 68% reported feeding solid foods. Breastfeeding was most common among mothers who were African American (50%) or 26-30 years of age (60%). Introducing juice before the recommended age was found primarily in caretakers feeding solids (48%), while introducing cow's milk early was found mostly in caretakers feeding formula (62%). Mealtime practices were not consistent with the Division of Responsibility in feeding. Participants who were not following AAP guidelines reported that they received advice primarily from health care professionals.

Conclusion: Our results are consistent with previous research in that breastfeeding rateswere low, the introduction of solids was early, and caregivers reported controlling feeding behaviors.Future research should focus on understanding the child feeding practices and beliefs of health care professionals.

CHILD FEEDING PRACTICES OF WIC PARTICIPANTS IN GWINNETT COUNTY, GEORGIA

by

Jenny R. Askew

A Thesis

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ABBREVIATIONS

AAP	American Academy of Pediatrics
BMI	Body Mass Index
CFQ	Child Feeding Questionnaire
CFPQ	Comprehensive Feeding Practices Questionnaire
CFSQ	Caregiver Feeding Style Questionnaire
DGA	Dietary Guidelines for Americans
IFQ	Infant Feeding Questionnaire
PD-I	Parenting Dimensions Inventory
PFQ	Preschool Feeding Questionnaire
PMAS	Parent Mealtime Action Scale
TSFFQ	Toddler Snack Food Feeding Questionnaire
WIC	Women, Infants, and Children

CHAPTER I

INTRODUCTION

Eating patterns and food preferences in children are developed as early as the preschool years (1). Additionally, children of low socioeconomic status living in the United States have been shown to have low fruit and vegetable consumption accompanied by high intakes of fat and sugar compared to the Food Guide Pyramid and the *Dietary Guidelines for Americans* (DGA) recommendations (2). Therefore, it is worthwhile to consider the child feeding practices of low-income mothers. This study will investigate the feeding practices and attitudes of mothers participating in the Special Supplemental Nutrition Program for *Women, Infants, and Children* (WIC) in Gwinnett County. The primary objective of this study is to determine if current feeding practices and beliefs of mothers participating in WIC in Gwinnett County correlate with the American Academy of Pediatrics (AAP) current recommendations of child feeding and Ellyn Satter's guidelines for the Division of Responsibility in Feeding. For the purposes of this paper, child feeding practices will include the way in which food is introduced to children at different stages of development.

CHAPTER II

LITERATURE REVIEW

Breastfeeding

Child feeding practices begin at birth. The AAP recommends breastfeeding as the exclusive form of feeding for the first six months of life (3). The AAP also recommends breastfeeding continue after six months with the addition of complementary foods for the first 12 months of life (4). Historically, WIC has encouraged breastfeeding as the best mode of feeding for proper infant nutrition (5). Benefits of breastfeeding to the infant include better gastrointestinal health, adequate host defense and optimal neurodevelopment. According to epidemiological studies, chronic diseases occurring in childhood may also be lessened in children who are breastfed, these include celiac disease, Chron's disease, diabetes mellitus type I, lymphoma, leukemia, and food allergies(4).

The ever-changing composition of human milk makes it impossible to duplicate. The nutrient contents of human milk may change throughout lactation. Over the course of a day or during a feeding, and the changes in composition vary between mothers. Human milk provides both nutrition and immunity to the nursing infant. The changes in the composition of the milk reflect the changing nutritional needs of the developing infant (4).

Benefits of breastfeeding to the mother include easier post-partum weight loss and faster uterine involution. In addition, research has shown that mothers who breastfeed

also have a longer period of amenorrhea after giving birth. Premenopausal breast cancer rates are lower in breastfeeding mothers and there is a direct correlation between a lower risk of breast cancer and an increased duration of breast feeding. Osteoporosis and ovarian cancer risks are also decreased in mothers who breastfeed (4).

Societal benefits of breastfeeding include economic benefits to the family and to society. The family of a breastfeeding baby saves money as a result of not having to purchase formula. On a larger scale, society benefits in decreased health care costs due to better health of infants who breastfeed thanks to the protective effects of breast milk. Society also benefits from healthier babies because in having healthy babies allow parents to be less absent from work (4).

The introduction of complementary foods

Current recommendations for child feeding are to introduce complementary foods once healthy children reach six months of age. Complementary foods, as defined by the AAP, are "any energy-containing foods that displace breastfeeding and reduce the intake of breast milk" (6). Six months has been determined the proper age for the introduction of complementary foods because by six months of age, most children have developed the skills needed to be able to physically chew and swallow solid foods. Additionally, during the first six months of life, breast milk and/or iron fortified formula provide all necessary nutrients (6). To be able to successfully introduce complementary foods to an infant, the infant should be able to sit with support, maintain control over their trunk and neck, and should be able to communicate their hunger and satiety (7).

The timing of introducing complementary foods is critical because there are risks associated with introducing complementary foods too early and too late. Introducing complementary food before four months has been associated with increased weight gain during infancy which is correlated with increased risk of overweight and obesity in childhood (8). Additionally, weaning from breast milk before 15 weeks of age has been associated with a higher incidence of allergy development (9). Waiting until after six months of age to begin introducing complementary foods may put children at risk for nutritional deficiency, as breast milk is no longer able to provide all of the nutrients needed for the growing baby (6).

When introducing new foods to children, parents should be aware that repeated exposures are necessary in getting a child to accept a new food (10). A child's neophobia, or an unwillingness to try new foods, can be overcome by introducing food to a child multiple times. The more frequently a child is exposed to a food, the more likely he/she is to accept that food. Additionally, encouraging dietary variety early in a child's life decreases neophobic responses to further foods (10). Awareness of the need for repeated exposures to new foods is not well known among parents (11).

There is no evidence to support foods being introduced in a specific order. Providing foods that are a good source of nutrients should be the focus. Recommendations for introducing complementary foods include beginning with foods only containing one ingredient and introducing a new food every 2-7 days. Foods with more than one ingredient can be introduced if the infant shows no reactions to the individual ingredients (6). This process allows time to monitor for adverse reactions to

foods being introduced. The AAP recommendations also include not giving cow's milk to infants during the first 12 months of life, and only allowing 4-6 ounces of 100% fruit juice each day for toddlers (12). To prevent pediatric overweight and obesity, the AAP recommends encouraging caregivers to establish healthy eating in children by offering fruits, vegetables, low fat dairy as well as whole grains. With regard to offering these healthy options to children, the AAP recommends that the caregivers let children regulate their food intake and that the caregivers serve as good role models of healthy eating (13). The DGA recommend that children eat whole grain products often and that half of their total grain consumption should come from whole grains. The DGA also state that children between two and eight years of age should consume two cups per day of fat free or low fat milk (14). Studies have shown that children who grow up enjoying generous amounts of fruits and vegetables continue to eat the recommended amounts of fruits and vegetables as adults. These individuals are also found to have lower risks of dietary related diseases (15).

Feeding dynamics

Deciding what to feed children and establishing a healthy eating environment are critical components of child feeding. A healthy eating environment recognizes the division of responsibility. Under the division of responsibility, parents are responsible for providing appropriate foods and children are responsible for deciding if they eat and the amount of food they eat. Controlling behaviors should not be used when feeding a child, including encouragement or discouragement of any food type (16). Parents should be

able to recognize when their child is satisfied with the amount of food they have eaten. Children should be encouraged to feed themselves, but parents should provide assistance as appropriate. Feeding interactions should be guided by children (6).

When infants are able to sit in a highchair and feed themselves, it is appropriate to include them in family meals. Letting the child take part in what the family is eating is recommended, as long as those foods are appropriate and safe for the child to consume. Once babies reach toddlerhood it is important to have planned meals with between-meal snacks. Toddlers should always be included in the family meal and in charge of what and how much they eat. They should be allowed to explore and examine what they are eating. Family meals should not include television or arguing or scolding, but pleasant conversation (16).

Characteristics of Feeding Practices in Low Income Populations

Breastfeeding

Despite the well-known benefits of breastfeeding and the encouragement of breastfeeding by WIC, studies have shown that WIC participants are not following breastfeeding recommendations. Murimi and colleagues (2010) examined breastfeeding among WIC participants in central Louisiana. Of 130 participants, it was found that 51% breastfed their youngest child for an average of 15.7+/- 14.9 weeks (18). Participants reported that the educational materials provided by WIC were both clear and helpful in educating them about breastfeeding and that these materials influenced their choice to breastfeed. The primary reasons for formula feeding in this study included lack of motivation and

returning to work or school (18). This suggests that women are not able to overcome barriers to breastfeeding despite awareness of the benefits that it provides.

A study by Zoil-Guest and colleagues (2010) examined feeding practices of mothers who participated in WIC prenatally. This was a cross sectional survey of 4,450 births. The surveys were conducted nine months after the mothers gave birth. The researchers found that mothers enrolled in WIC are more likely to formula feed their children than mothers who are not enrolled in WIC. Mothers who entered the WIC program during the first or second trimester were less likely to begin breastfeeding and more likely to introduce cow's milk too early (19). Mothers entering WIC during the second or third trimester were less likely to introduce cow's milk too early. Additionally the researchers found that mothers who entered WIC during the first trimester breastfed for a shorter duration than mothers who entered WIC in the second or third trimesters. These findings are of interest because WIC participants receive educational materials and counseling regarding breastfeeding during the first and second trimesters of pregnancy. Therefore, it would be expected that these mothers have a better knowledge of breastfeeding benefits than mothers who enter WIC after the first or second trimester. This study also found that women who worked before pregnancy were more likely to formula feed their children. These findings suggest that the timing of intervention strategies may play an important role in their effectiveness and it appears that returning to work postpartum is a barrier to breastfeeding for this population (19).

Complementary foods

Mothers with a low income and low education level are likely to introduce solids to their babies before it is recommended. A recent study by Horodynski and colleagues (2007) examined infant feeding behaviors of mothers enrolled in Medicaid who had children less than one year of age. Their research showed that low-income mothers are aware of the AAP recommendations for the introduction of solids, but are not compliant. Reasons for noncompliance included not being aware of the repercussions of introducing solids too early, skepticism of recommendations, beliefs that solid foods helped babies sleep through the night, and trusting advice from family members. Many mothers reported introducing cereal early as a measure to prevent acid reflux and/or vomiting (17). Additional studies have found similar reasons for the early introduction of complementary foods in low income mothers including feeling that the baby did not get enough to eat (20) and advice from family and friends (21). Horodynski and colleagues also reported that low income mothers did not fully understand what foods are considered solid foods. Many participants did not think semisolid or thinned foods (such as cerealmixed with formula or breast milk, yogurt or applesauce) counted as solid foods (17). This study also found low income mothers were unaware of the importance of the feeding environment. Women in this study were not likely to include their infants in family meals, often ate while watching television, and fed their children in a variety of places (17).

Using data collected from the 2002 Feeding Infants and Toddlers Study (22), Hendricks and colleagues examined maternal and child characteristics associated with

feeding patterns and following AAP feeding recommendations. The researchers found that having a household income below 180% of the federal poverty level is correlated with not following child feeding recommendations related to breastfeeding, juice and the introduction of complementary foods. This study also found education level to be the strongest predictor of following AAP recommendations on child feeding. Additionally, Hendricks and colleagues found that participating in WIC is associated with following at least three of eight recommendations for feeding by the AAP. Additionally, it was found that WIC mothers are less likely to breastfeed for six months and are more likely to give iron fortified baby formula (23).

Assessing child feeding practices

With the important implications of early feeding practices well understood, several researchers have attempted to gather information on child and infant feeding practices through surveys. In 2001, Baughcum and colleagues developed and analyzed the Infant Feeding Questionnaire (IFQ) and the Preschooler Feeding Questionnaire (PFQ). The IFQ is meant to assess child feeding practices during the first year of life and the PFQ is meant to assess feeding of children between two and five years of age. The purpose of these surveys was to be able to determine which children were at risk for becoming obese due to feeding practices and to teach parents about proper child feeding in hopes to curb the chances of their child(ren) becoming obese. It is interesting to note that this was the first study that attempted to correlate child feeding practices and beliefs with childhood obesity. Subjects were selected from diverse socioeconomic backgrounds,

453 subjects were administered the IFQ and 634 subjects were administered the PFQ. The questionnaires were factor analyzed and mean scores were determined. The mean scores were linked with height and weight of both the children and the mothers. Scores of obese mothers and nonobese mothers were compared as were scores of mothers of obese children and mothers of nonobese children. Scores between high and low income mothers were also compared. Hierarchical linear regression was used to control for confounding variables. There were differences in feeding styles between high and low income mothers. However, it was not found that overweight children had a certain feeding style in common (24).

Another feeding questionnaire that was introduced in 2001 is the Child Feeding Questionnaire (CFQ). The CFQ is based on a 1985 model by Wood and Constanzo. This is a seven factor model that uses four factors to assess parental concern for their child being obese and three factors to assess a parent's level of control in feeding. This questionnaire was validated using three samples of parents of boys and girls between five and eleven years of age. The sample groups consisted of parents from a variety of educational, geographic, and ethnic backgrounds (white, Hispanic, and African American). The average BMI for women in the sample groups was 26.6 and the average BMI for men in the sample groups was 27.3. The CFQ found positive relationships between parental concern for childhood obesity and their child's weight status. Limitations to this study include that validity and reliability have not yet been established. In addition, because this survey collects cross sectional data, it is impossible

to establish a causal relationship between feeding and overweight. Additional work is also needed to determine the usability of this tool in more diverse populations (25).

In 2005, Hughes and colleagues focused on feeding practices among low income Hispanic and African American preschoolers. A population of 231 subjects completed questionnaires which determined their feeding and parenting styles. Convergent validity was measured to relate styles of feeding to parenting styles and authoritarian practices of feeding. The relationship between children's body mass index (BMI) and feeding style were also assessed. This study used factors of the previously mentioned CFQ which measured the parents' feeding behaviors with the child, the Parenting Dimensions Inventory (PDI-S), BMI and the Caregiver's Feeding Style Questionnaire (CFSQ) to assess parenting styles as they relate to child feeding. The PDI-S is a reliable and valid tool that assesses child rearing methods. The CFSQ was developed to assess feeding styles among African Americans and Hispanics. The CFSQ determines feeding styles to be demanding or responsive. Using differences in demand and response, it the CFSQ determines the parent to have an authoritarian, authoritative, indulgent or uninvolved style of feeding. The CFSQ has good test-restest reliability and internal consistency. It also associates well with the CFQ and PDI-S. Associations were found between CFSQ feeding styles and BMI. For example, overindulgent feeding styles were shown to foster childhood overweight and obesity. Further work needs to be done to investigate the relationship of feeding styles and children's BMIs (26).

In 2007 the Comprehensive Feeding Practices Questionnaire (CFPQ) was developed. The purpose of the development of the CFPQ was to develop a research tool

to more adequately assess child feeding practices. Specifically, it seeks to better measure restrictive feeding practices and to increase the number of feeding style constructs. The CFPQ is a validated self report measure of child feeding that uses previous measures of child feeding as a framework. Literature reviews and feedback from parents were used to develop additional feeding constructs. Three studies were completed to examine the usefulness of this tool. The first study was a validation study, followed by a period of input and literature review, which was then followed by another validation study.

The first validation study consisted of 269 mothers and 248 fathers. Ninety two percent were Caucasian, 5% were African American, and 2% were Hispanic, Asian or other. All parents had children between 3-6 years of age. Items from subscales of 2001 Birch and colleagues 2001 CFQ and 2001 Baughcum and colleagues 2001 PFQ were used. Monitoring, restriction, pressure to eat, food to regulate emotion, child's control of feeding interaction and food as a reward were measured. Two subsets of parents were used. One subset of parents were recruited from a larger study through daycare centers and preschools and a second subset were recruited by undergraduate psychology students. Parents completed surveys and returned them to researchers or students in an envelope.

The second validation study focused on item generation and feedback. Thirty-three mother/father pairs were used in this study. Parents in this study had children between 4-6 years of age. 91% of parents were Caucasian and 9% were African American. The purpose of this study was to develop items to define subscales by asking parents open ended questions. Responses were coded and organized into new or existing subscales.

The third validation study utilized the constructs developed in the second validation. This validation study surveyed 152 mothers of 18 month olds to 8 year olds via a web based survey. Finally, a confirmatory factor analysis was used and determined that the final model was a good fit. Bivariate correlations were calculated among subscales to determine their relations. External validity was measured through bivariate analysis to assess correlations between the CFPQ and attitude measures.

Validation results suggest that the CFPQ forms coherent scales and that parents relationships between feeding their children, their attitude about their child's weight, and response of feeding, support the instrument. Interesting findings from this study include that parents indicated that they think some constructs that are not frequently measured in literature are important. These include the importance of a health eating environment and modeling healthy behaviors. Also, it was found that in regards to restriction of food, motivation is not differentiated on behalf of the parent between motivation by weight and by health of the child. However, literature puts an emphasis on distinguishing between them. Limitations of this tool are that it does not ask about repeated exposures as food is introduced, nor does it address using food as a reward for behavior. In addition, this research was primarily conducted using well educated Caucasians. This tool has a high validity, but the reliability is unknown. The internal consistency of this tool is moderate to high in most subscales (27).

In 2009, the Parent Mealtime Action Scale (PMAS) was developed. This is a 31 item survey that examines nine dimensions of meal time behaviors. The nine dimensions of meal time behavior are then examined to explain differences in weight status and diet

variance among children. The PMAS appears to be a unique tool in that it focuses on behaviors versus attitudes of parents and examines parental differences in meal time actions. In addition, this study seeks to relate parent meal time behavior to child weight status and dietary intake. Limitations to this study include an inability to distinguish weather the parent is influencing the child's diet, or weather the child is influencing the parents decision about what their dietary needs are. Additionally, all of the subjects in this study were from Pennsylvania, mostly Caucasian and had normally developing children. The use of this tool in additional populations needs to be tested. The current study relates PMAS dimensions to weight status and diet. In the future, it would be helpful to examine how well the PMAS dimensions can explain additional weight management and nutritional behaviors in children (28).

Finally, in 2010 the Toddler Snack Food Feeding Questionnaire (TSFFQ) was developed. This examines new constructs of feeding including allow access, rules, and flexibility. Unlike constructs of previous works, these constructs are specific to parents of toddlers. This questionnaire examines influences on snack food intake and measures how much control parents place on their toddler's snack intake. This tool has the potential to be used with the previous measurements of child feeding to examine feeding practices in addition to diet (29).

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CHAPTER III

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ABSTRACT

Mothers of low socioeconomic status are less likely to breastfeed and more likely to formula feed. In addition, low socioeconomic status is associated with a premature introduction of cow's milk, juice and solid foods. Negative outcomes such as asthma, diabetes and obesity later in life may result from improper child feeding practices. The aim of this study was to determine if WIC participants in Gwinnett County, Georgia are practicing child feeding recommendations set forth by the American Academy of Pediatrics (AAP) as well as following the Division of Responsibility in feeding developed by Ellyn Satter. Ninety-six WIC participants (92% mothers) primarily African American (39%) and Hispanic (35%) from Gwinnett County, Georgia were surveyed in March of 2011. Participants completed one of three surveys based on their method of feeding (breastfeeding, formula feeding or solid foods) after a nutrition education class. Compliance to feeding recommendations was determined among the entire survey population and by survey subgroups. Frequency distributions by method of feeding were calculated by age and race. Trends in feeding practices and the feeding environment were determined. Ten percent of participants surveyed reported breastfeeding, 22% reported formula feeding and 68% reported feeding solid foods. Participants who were not following AAP guidelines reported that they received advice primarily from health care professionals. Our results are consistent with previous research in that breastfeeding rates were low, the introduction of solids was early, and caregivers reported controlling

feeding behaviors. Future research should focus on understanding the child feeding practices and beliefs of health care professionals.

INTRODUCTION

Eating patterns and food preferences in children are developed as early as the preschool years (1) Additionally; children of low socioeconomic status living in the United States have been shown to have low fruit and vegetable consumption accompanied by high intakes of fat and sugar compared to the Food Guide Pyramid and the *Dietary Guidelines for Americans* (DGA) recommendations (2). Therefore, it is worthwhile to consider the child feeding practices of low-income mothers. This study will investigate the feeding practices and attitudes of mothers participating in the Special Supplemental Nutrition Program for *Women, Infants, and Children* (WIC) in Gwinnett County. The primary objective of this study is to determine if current feeding practices and beliefs of mothers participating in WIC in Gwinnett County correlate with the American Academy of Pediatrics (AAP) current recommendations of child feeding and Ellyn Satter's guidelines for the Division of Responsibility in Feeding. For the purposes of this paper, child feeding practices will include the way in which food is introduced to children at different stages of development.

METHODS

98 WIC participants were surveyed. Participants were recruited from WIC in Gwinnett County, Georgia. Survey administration took place after nutrition education certification classes. Participants were asked to fill out one of three surveys. Each survey focused on a specific mode of feeding. Modes of feeding were categorized as feeding breast milk, formula feeding, and feeding solid foods. Caregivers were asked to select the survey that

best described their mode of feeding for their oldest child participating in WIC. In the interest of time, one survey was filled out per caregiver. All information and surveys were available in English and Spanish in order to best capture the practices of the entire population.

The study was approved by the Institutional Review Board at Georgia State University. Informed consent was obtained by agreement to fill out the survey. The consent form was explained to all participants in both English and Spanish. Survey administrators were available to answer any questions participants had regarding their rights as a participant and about the survey. Survey readability was assessed by the Flesch-Kincaid index, the Breastfeeding survey was written at a 6.8 grade reading level. The Non-breastfeeding Survey was written at a seventh grade reading level, the Solid Foods Survey was written at a 7.0 grade reading level. Spanish translation was done by a Spanish translator a WIC, cross checked by her colleagues, and verified by a Georgia State University student whose primary language is Spanish. Surveys were pre-tested on WIC participants at the location of administration before the research formally began.

Data analysis was conducted using SPSS and data was analyzed per survey group and as an entire population to assess whether or not the child feeding practices of caretakers participating in WIC in Gwinnett County, Georgia follow child feeding recommendations set forth by the AAP and Ellyn Satter's Division of Responsibility

RESULTS

Participant Demographics

Ninety-six WIC participants were surveyed in a large suburban county in the metropolitan Atlanta area. Ten percent (n=10) reported feeding breast milk and twenty-

two percent (n=21) reported feeding their infants formula as the primary source of nutrition. The majority of WIC participants (n=65, 68%) reported primarily feeding solid foods.

Seventy-one percent of participants were English speaking; the remainder of the participants spoke Spanish. Mothers were the main primary caretakers (92%), while fathers accounted for only four percent. The remaining four percent of primary caretakers were aunts, foster parents, or the data were missing. Forty percent of caretakers reported their race as African American (n=37), 35% Hispanic (n=34), while 6% reported their race as Caucasian (n=6) or Asian (8%, n=8). Eleven percent (n=11) reported being an "other" race or did not respond. The distribution of race by type of feeding given to the WIC infant/child is shown in Table 1.

The majority of caretakers (56%) reported their age between 26-35 years while 25% of caretakers reported being 15-25 years of age and fewer (16%) reported being over 36 years of age. The age distribution of the population by method of feeding given to the WIC infant/child is shown in Table 2.

Breastfeeding

Ten percent of the population surveyed (n=10) reported feeding breast milk. Of these, 40% were exclusively breastfeeding, 40% were feeding a combination of breast milk and formula and 20% did not indicate if formula was being used.

Among participating breastfeeding mothers, reasons for breastfeeding included 1) feeling that it was best for their baby's health and best for their health, 2) breastfeeding is less expensive than formula feeding, 3) because they thought it was easier or 4) because

they wanted to lose weight. Another reason cited by some participants for breastfeeding was that they were influenced by their family to do so. Questions related to the benefits of breastfeeding, indicated the respondents were satisfied with breastfeeding and had an environment which supported breastfeeding.

Formula Feeding

The distribution of reasons for formula feeding are shown in Figure 2. Among formula feeding mothers, reasons for formula feeding included that mothers did not feel they were producing enough milk, returning to work, and the mother being ill and unable to breastfeed. Others reported that their babies were ill and unable to breastfeed or that their baby was biting. Other reasons for formula feeding included "my baby stopped taking the breast," "baby denies breast milk, she prefers the bottle," and "I wasn't comfortable with breastfeeding. Sixty seven percent of formula feeding infants were fed breast milk for an average of 3.89 months. A distribution of the length of time that formula fed infants were breastfed is shown in Figure 3.

Introduction of Complementary Foods

It is recommended that cow's milk should not be introduced until after twelve months of age (3). Twenty-four percent of formula feeding caretakers introduced cow's milk before 12 months. This indicates cow's milk is being introduced too early and that the infants are receiving cow's milk in addition to formula. Reasons for introduction included a health professional's advice (60%), a friend or family member's advice (20%), or other reasons (20%). In contrast, the introduction of cow's milk among caretakers

feeding solid foods appears to be more in compliance with the recommendations. Only 13% of the solid feeding population introduced cow's milk before 12 months of age. Cow's milk was introduced in this population under the influence of health care professionals and/or friends and family.

When looking more closely at advice given by health care professionals as an influence, it appears 14% (n=3) of formula feeding participants introduced cow's milk too early due to health care professional advice and 11% (n=7) of solid feeding participants introduced cow's milk too early due to health care professional advice.

The AAP recommends waiting until after one year of age to introduce juice and limiting juice consumption to four to six ounces of 100% fruit juice for children under five years old (3). Among formula feeding participants who have introduced juice, 48%reported introducing juice before twelve months. A distribution of the ages at which juice introduction occurred in formula feeding infants can be found in Figure 4. Juice introduction among formula feeders was reportedly influenced by health professionals or friends and family. Among solid feeding participants who have introduced juice, 62% reported introducing juice before twelve months. Juice introduction among solid feeders appears to be influenced primarily by health professional advice (56%) and friend and family advice (14%).

When looking more closely at advice given by health care professionals as an influence, it appears 29% (n=6) of formula feeding participants introduced juice too early due to health care professional advice and 35% (n=23) of solid feeding participants introduced juice too early due to health care professional advice.

Twenty-four percent (n=5) of those formula feeding reported introducing items such as baby cereal and baby food through the bottle. Reported ages of children receiving these items through the bottle ranged from two months to two years. Reasons for the introduction of these items included health professional advice (60%), advice from a friend or family member and the baby showing signs of being ready for solids.

The majority of WIC infants and children (68%) consume solid foods as their primary form of feeding. Among solid feeders, reasons for the introduction of solids include the baby showed signs of being ready (65%) and health professional advice (19%). Six percent introduced solids due to friend of family advice. Nineteen percent introduced solids because they felt their baby wasn't growing enough. Four percent introduced solids due to "other" reasons. These included "My baby had a problem and solids foods helped him keep his food down in his stomach." The reported reasons for introducing solids, including advice from friends or family members and using solids to help keep food in the baby's stomach, coincide with reasons for introducing solids in previous research in low-income populations (17, 21).

When looking more closely at advice given by health care professionals as an influence, it appears 10% (n=2) of formula feeding participants introduced baby cereal through the bottle due to health care professional advice and 3% (n=2) of solid feeding participants introduced solids too early due to health care professional advice.

The Eating Environment of WIC Infants and Children Consuming Solid Foods

Feeding behaviors related to Ellyn Satter's Division of Responsibility were examined. Participants answered a series of questions to examine the eating environment,

mealtime structure, and control over a child's eating and ability to regulate intake, Behaviors are reported under the corresponding Division of Responsibility subheading.

Caretaker Responsibilities

The parent is responsible for what the child eats

Parents are responsible for providing food for their children, and children are responsible for what they eat and how much they eat at each meal (4). The majority of caregivers serve all of their children the same meal. Responses were recorded as follows:

- Always or most of the time serve all of their children the same food at one meal, versus making each child something different (70%)
- Always or most of the time cook different meals for children if they do not like what the rest of the family is having (28%)
- Only cooking foods that they know their children will like (30%)

The parent is responsible for when the child eats

Approximately half of WIC participants understand and practice the importance of providing regular and reliable meals for their children (4). Responses related to this concept were reported as follows:

- Food not left out on the table for children to finish later (64%)
- Children rarely or never eat snacks whenever they want (50%)
- Meals are served at approximately the same time each day (65%)

The parent is responsible for where the child eats

Approximately half of those surveyed seemed to understand the importance of eating in a structured setting without distractions. Responses to the concept of creating a healthy eating environment were reported as follows:

- Participants provide a structured place for their child to eat (42%)
- Participants report turning the television off during meal times (59%)

Children's Responsibilities

The child is responsible for how much they eat

Parent's responses to these questions indicate that they may be over controlling of what and how much their children eat. Some responses appear to be restricting food intake while others seem to be encouraging over indulgence. For example, 25% of participants do not let their children decide if they want a second helping. Forty-two percent insist that their children clean their plates before leaving the table and 64% of participants make their children finish their meals before dessert. Approximately 25% of participants let their children decide how much they should eat and what to eat from the foods served at a meal.

The child is responsible for whether they eat

Forty-six percent of participants understood that a child may need to try a food many times before he or she likes it. Sixty-five percent of participants reported making their child eat fruits or vegetables even though he or she may not like them.

The Helpfulness and Ease of Understanding of the Information Provided by WIC Regarding Child Feeding

Finally, of the entire population surveyed, 89% found that the information provided by WIC regarding child feeding is always or most of the time helpful. Eighty-nine percent of participants also agreed that the information provided by WIC regarding child feeding is always or most of the time easy to understand. A distribution of responses to these questions can be found in Figures 5 and 6.

DISCUSSION AND CONCLUSIONS

The primary outcome of interest in this study is that poor feeding practices are being influenced by health care professionals. Other outcomes of interest includecaretakers at the Gwinnett County WIC location reported that they are more likely to formula feed than breastfeed. Additionally, those who are formula feeding reported introducing cow's milk earlier than recommended and those who are feeding solids reported introducing juice too early. This is of interest because WIC provides formula vouchers. We are unsure if the reported infants are receiving cow's milk because: they are drinking more than the amount of formula provided by WIC or because the caretakers are intentionally transitioning them to cow's milk. The introduction of solids appears to be premature in both the formula feeding and solid feeding populations. Of the total population surveyed, 15% of infantswere under six months of age. If the recommendation of breastfeeding for the first six months were followed, we would expect 15% of this population to be breastfed. However, only 10% of the survey population was reportedly being breastfed and at least three were over six months of age.

Previous research has found reasons for not breastfeeding include, returning to work or school and lack of motivation (5-6). Lack of motivation was not a reported factor in this group of subjects, but returning to work accounted for 19% of responses.

Twenty-four percent (n=5) of those formula feeding reported introducing items such as baby cereal and baby food through the bottle. Of these, 60% (n=3) had infants between two and five months of age. Also, 60% reported doing so due to a health professional's advice. This indicates non-compliance to age of solid food introduction and noncompliance towards the recommendations on how to introduce solid foods. However, what might be more significant is the fact that caretakers reported that their reasons for these practices were based on the advice of a health care professional. When introducing solids it is recommended to interact with the child by spoon feeding them while they are either propped up or in a highchair (7). Feeding solids through a bottle has the potential to decrease interactions while feeding and could possibly facilitate an unstructured meal time environment. Interestingly, previous research has also found that WIC participants add cereal to formula in the bottle as a result of advice from health professionals, specifically pediatricians(8). Additionally, six percent of those who have introduced solids reported introducing them before six months of age, indicating an early introduction of solid foods.

Regarding the feeding environment of WIC infants and children consuming solid foods, caretakers reported controlling feeding behaviors and catering to their children's food preferences. These practices have the potential to be harmful. Research has shown that when parents exhibit too much control over their child's eating, children become less able to regulate their own food intake (9). Forcing a child to eat something they do not

want to eat is a controlling behavior and should not be used (4, 10). Previous research in the WIC population has shown parents are likely to encourage overindulgence, but less likely to cater to food preferences, which is consistent with our results (31).

Approximately half of this population seems to understand the importance of the feeding environment and provides regular meal times. A significant finding of this research is that 78% of participants (n=50) feeding solids reported eating meals with their children. This finding is contrary to previous research by Horodynski and colleagues on feeding practices of African American and Caucasian mothers enrolled in Medicaid. The researchers found their group of subjects less likely to eat with their children (12). Likeliness to eat with children appeared similar across races groups.

Areas for further research in this population include better understanding what advice mothers enrolled in WIC are receiving from health care professionals. It would also be beneficial to identify the types of health care professionals that may be giving incorrect advice. If health care professionals are giving incorrect information regarding child feeding, then education regarding child feeding should also focus on health care professionals. In addition, investigating dietary variety in infants and children and clarifying the ages of the introduction of solid foods is recommended. It would be worthwhile to investigate the dietary variety of children in this population as it appears that parents may be catering to food preferences and not repeating exposures to new foods. The combination of these practices has the potential to decrease dietary variety. Encouraging dietary variety ensures children receive proper nutrition and decreases the chances of children having aversions to certain foods later in life (10). Research in dietary quality in low income children living in the United States has found diets to be

high in sugar and fat and low in meats, fruits, and vegetables (2). However, WIC participation has been found to increase the intakes of fiber, iron and potassium in children (13).

Limitations to this study include that it is unclear if any of the mothers feeding solids were also breastfeeding or formula feeding. The formula feeding survey only asked about the introduction of solids through the bottle and the solid feeding survey did not ask about breastfeeding. Unfortunately, this information was not captured on the respective surveys. In addition, the survey was studied on a small portion of the WIC population at the Gwinnett County location and cannot be generalized to the entire WIC population. Finally, the survey was not validated. However, questions used were adapted from surveys used in previous research studies.

TABLES

Table 1: Race distribution by method of feeding

	Caucasian N (%)	African American N (%)	Hispanic N (%)	Asian N (%)	Other N (%)	**Total Population**
Breastfeeding	1 (10%)	5 (50%)	2 (20%)	2 (20%)	--	**10 (10%)**
Formula Feeding	2 (10%)	4 (19%)	7 (32%)	2 (10%)	6 (29%)	**21 (22%)**
Solid Foods	3 (5%)	28 (43%)	25 (38%)	4 (6%)	5 (8%)	**65 (68%)**
Total Population	**6 (6%)**	**37 (39%)**	**34 (35%)**	**8 (8%)**	**11 (11%)**	**96**

Table 2: Age distribution by method of feeding

	<25 years N (%)	26 – 35 years N (%)	>35 years N (%)	Not reported N (%)	**Total Population**
Breastfeeding	3 (30%)	6 (60%)	--	1 (10%)	**10 (10%)**
Formula Feeding	10 (47%)	10 (48%)	--	1 (5%)	**21 (22%)**
Solid Foods	11(17%)	38(58%)	15 (23%)	1 (2%)	**65 (68%)**
Total Population	**24 (25%)**	**54 (56%)**	**15 (16%)**	**3 (3%)**	**96**

FIGURES

Figure 1: Age distribution of the WIC infant/child for participating parents and guardians

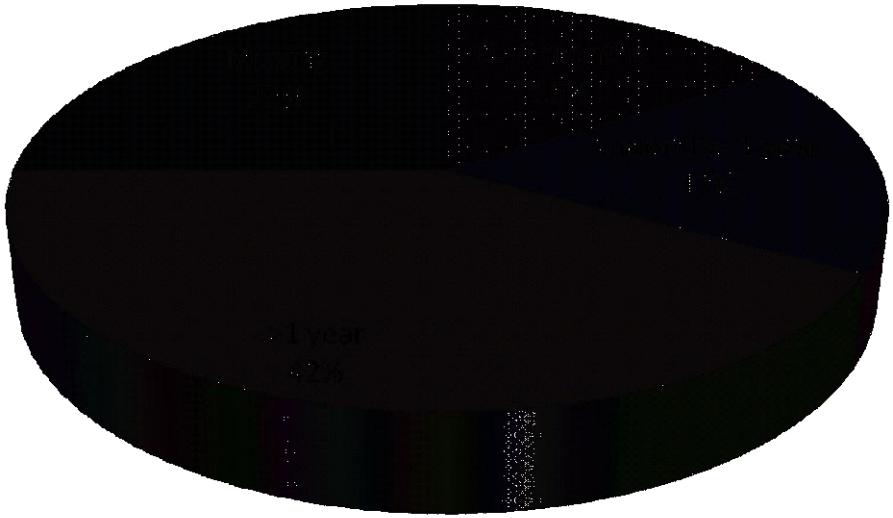


Figure 2: Age of juice introduction among participants formula feeding their infants/children

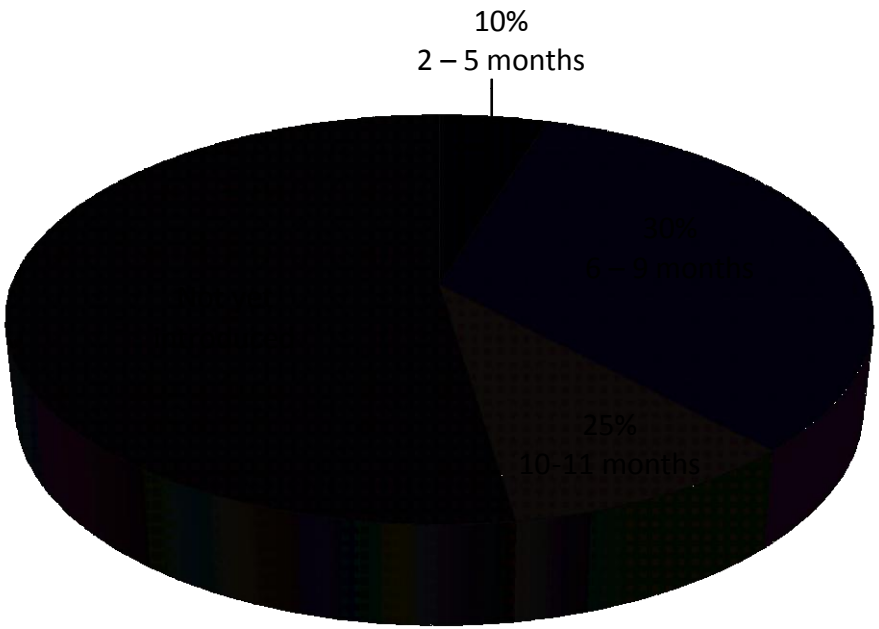


Figure 3: Length of time that formula fed infants/children were reportedly fed breast milk

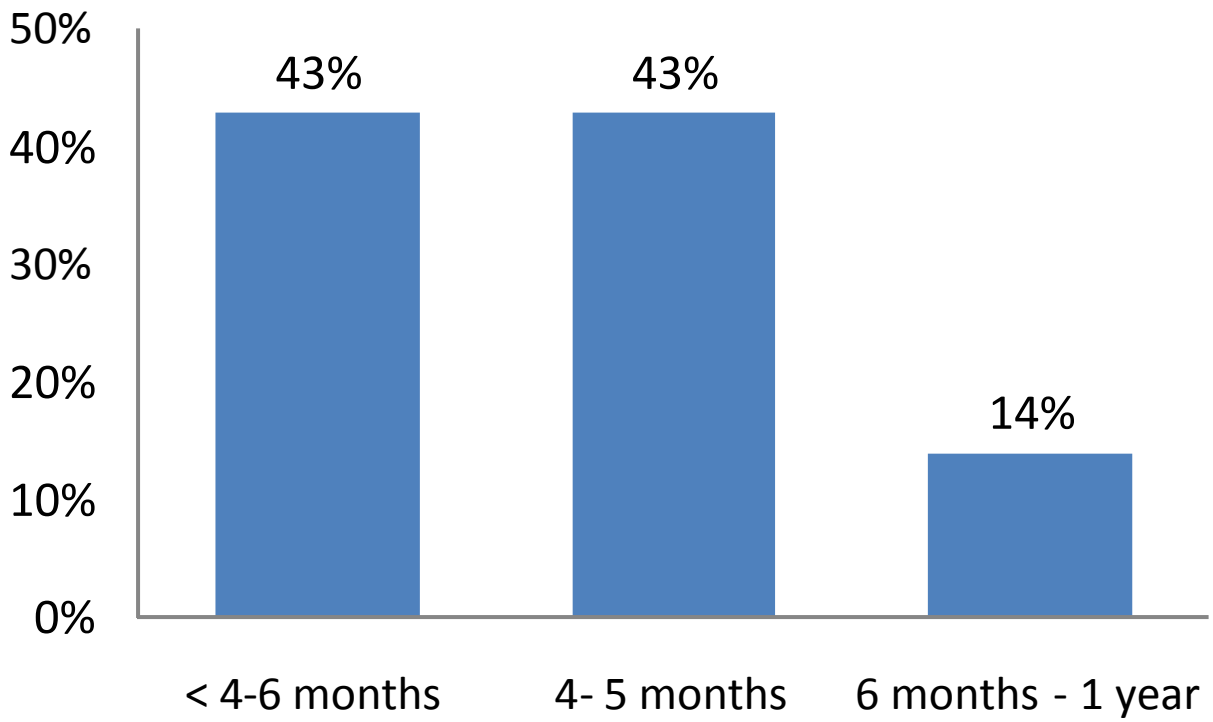


Figure 4: Reasons for formula feeding

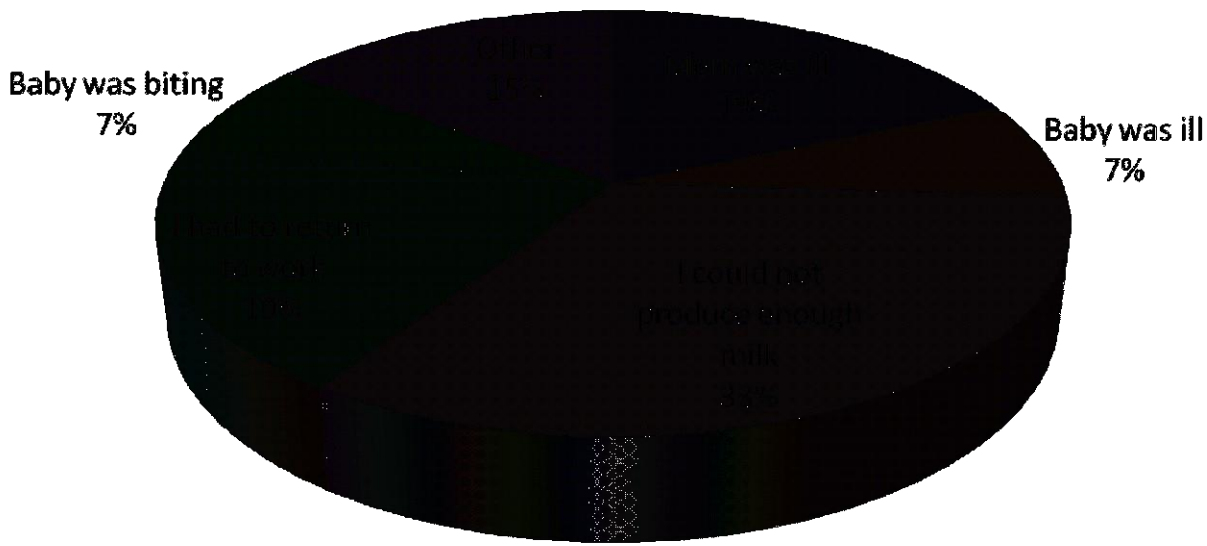


Figure 5: "I have found the information provided by WIC regarding child feeding to be helpful."

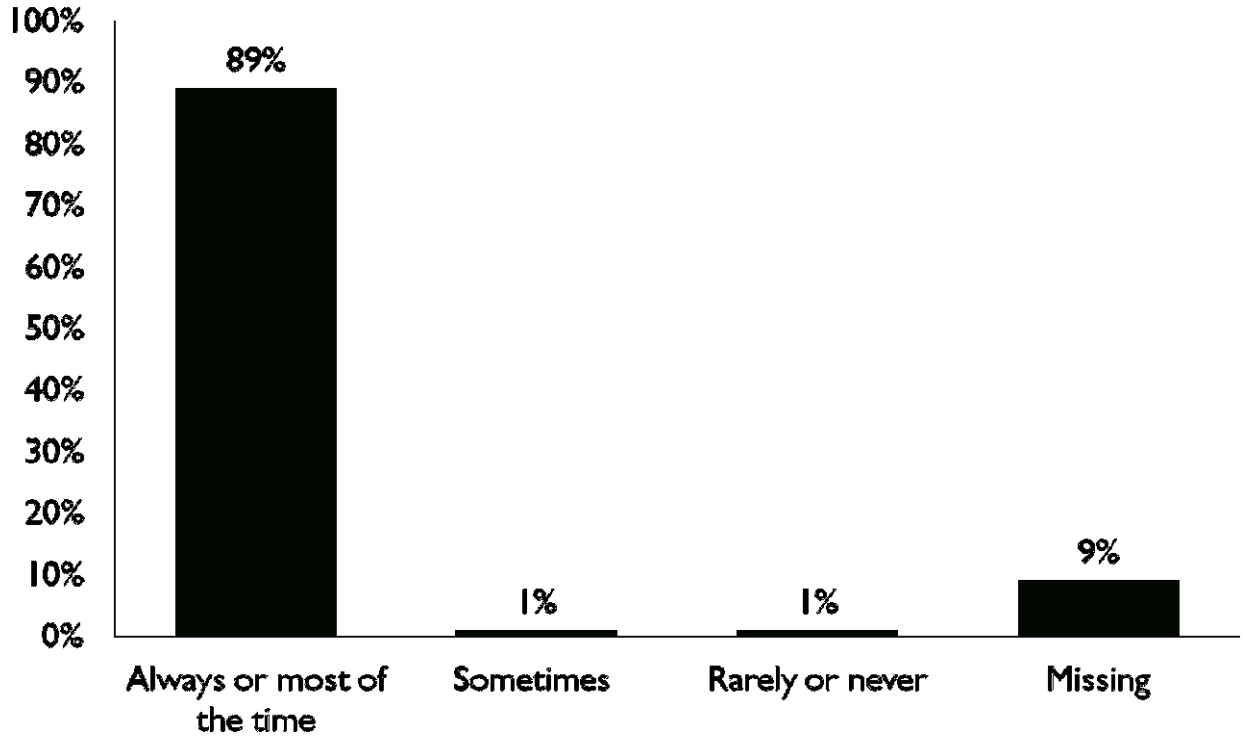
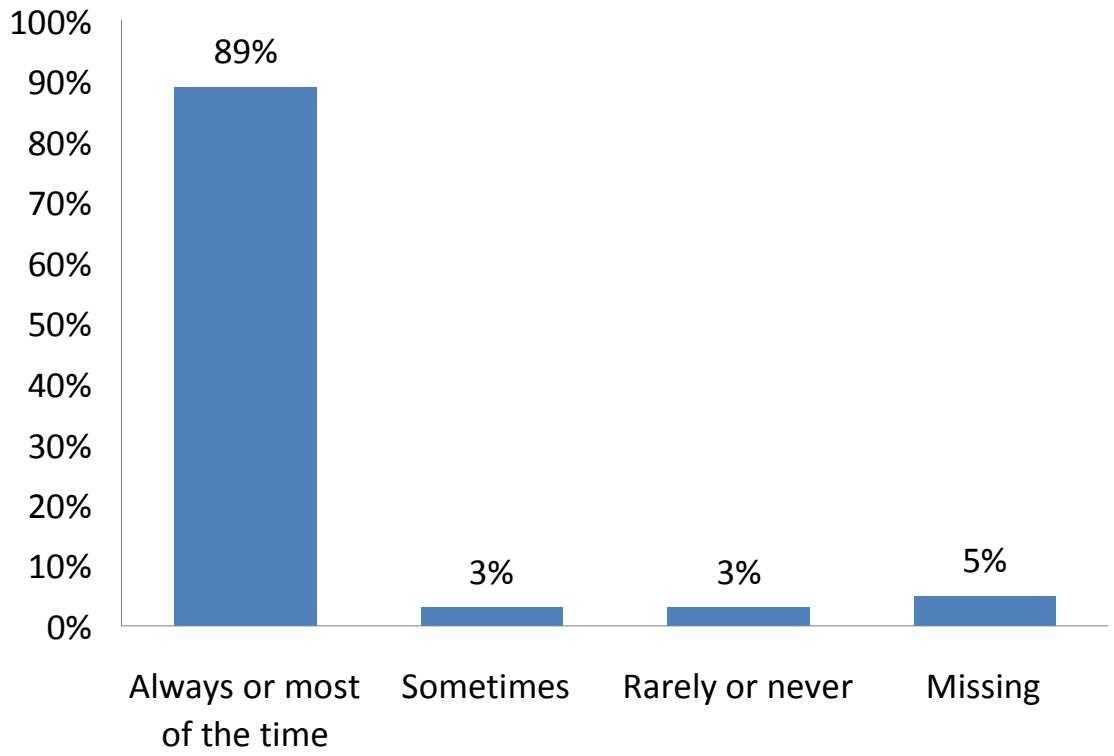


Figure 6: "I have found the information provided by WIC regarding child feeding to be easy to understand."



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APPENDICES

APPENDIX A

Breastfeeding Survey

To help the WIC office in Gwinnett County, GA better serve your needs, it is important to understand the child and infant feeding practices of mothers enrolled in the program. The survey below should take you less than ten minutes to complete. Answers should reflect your personal beliefs and will remain completely anonymous.

Participant ID_____

Demographic information

Please circle the answers that best describe you and your child.

1. What is your relationship to the child you (the caretaker) are caring for?

Mother Father Grandmother Grandfather
Guardian

Foster parent Aunt Uncle Other_____

2. Race of caretaker
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

3. Age of caretaker
   - 15-20 years
   - 21-25 years
   - 26-30 years
   - 31-35 years
   - 36-40 years
   - >40 years

4. Race of child
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

5. Age of child
   - 0–1 month
   - 2-3 months
   - 4-5 months
   - 6-7 months
   - 8-9 months
   - 10-11 months
   - 1 year
   - Older than one year

6. What is your baby currently being fed?
   - Breast milk only
   - Breast milk and formula

7. How are you currently feeding your baby?
   - Breast only
   - Bottle
   - Breast and bottle

8. How beneficial do you believe breastfeeding is for the health of you and your baby?

very beneficialbeneficialI don't know/neutral somewhat not beneficialnot beneficial

9. Please put a check mark on the line next to each statement to indicate if you feel that it describes when a baby is hungry, full or both.

	Hungry	Full
A baby opens his or her mouth during feeding.	_____	_____
A baby is crying.	_____	_____
A baby spits out a bottle nipple.	_____	_____
A baby stops sucking on their bottle or mother's breast.	_____	_____
A baby smiles at their caregiver.	_____	_____
A baby falls asleep while feeding.	_____	_____
A baby becomes distracted while feeding.	_____	_____

9. Why did you decide to feed your baby breast milk? Circle all that apply.
   - I felt it was the best choice for my baby's health
   - I felt it was the best choice for my health
   - I was influenced by my family to do so
   - I was influenced to do so by a health professional
   - Breast milk is less expensive
   - Feeding breast milk is easier
   - I wanted to lose weight
   - Society made me feel as though "it was the thing to do"

10. How satisfied are you with your decision to feed your baby breast milk? Please circle.

very unsatisfiedunsatisfied I don't know/neutral satisfied very satisfied

11. How would you describe the support of your friends and family towards your decision to exclusively feed your baby breast milk? Please circle.

not supportive somewhat not supportive neutral somewhat supportive supportive

12. Please explain if you have had any problems you have had with feeding your baby breast milk and approximately how old your baby was when they occurred.

_____

_____

_____

Please circle the response below that best describes how you feel.

13. I have found the information regarding child feeding from WIC to be helpful.

always most of the time sometimes rarely never

14. I feel that the information provided by WIC regarding child feeding is easy to understand.

always most of the time sometimes rarely never

APPENDIX B

Bottle Feeding Survey

To help the WIC office in Gwinnett County, GA better serve your needs, it is important to understand the child and infant feeding practices of mothers enrolled in the program. The survey below should take you less than ten minutes to complete. Answers should reflect your personal beliefs and will remain completely anonymous.

Participant ID_____

Demographic information

Please circle the answers that best describe you and your child.

1. What is your relationship to the child you (the caretaker) are caring for?

Mother Father Grandmother Grandfather Guardian

Foster parent Aunt Uncle Other_____

2. Race of caretaker
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

3. Age of caretaker
   - 15-20 years
   - 21-25 years
   - 26-30 years
   - 31-35 years
   - 36-40 years
   - >40 years

4. Race of child
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

5. Age of child
   - 0–1 month
   - 2-3 months
   - 4-5 months
   - 6-7 months
   - 8-9 months
   - 10-11 months
   - 1 year
   - Older than one year

Feeding information

1. Was your child ever breast fed or fed breast milk? (please circle)

   Yes No

<u>If yes,</u> please specify and indicate the length of time _____

2. What is your baby currently being fed?
   - Breast milk only
   - Breast milk and formula
   - Formula only

3. How do you feed your baby?
   - Bottle
   - Cup
   - Other (please explain)_____

4. What best describes your reason for formula feeding? Circle all that apply.
   - I was ill and was therefore unable to breastfeed
   - My baby was ill and was therefore unable to breastfeed
   - I could not produce enough milk
   - Breast feeding is too time consuming
   - Breast feeding takes away my freedom and flexibility
   - I had to stop breastfeeding when I returned to work
   - My baby was biting
   - Breast feeding was too painful
   - Breast feeding was embarrassing
   - Other:_____

5. Have you ever fed your baby any other liquids or foods through the bottle? (please circle)

   Yes No

   (If yes, please explain what has been introduced)

   _____

   _____

6. Please put a check mark on the line next to each statement to indicate if you feel that it describes when a baby is hungry, full or both.

	Hungry	Full
A baby opens his or her mouth during feeding.	_____	_____
A baby is crying.	_____	_____
A baby spits out a bottle nipple.	_____	_____
A baby stops sucking on their bottle or mother's breast.	_____	_____
A baby smiles at their caregiver.	_____	_____
A baby falls asleep while feeding.	_____	_____
A baby becomes distracted while feeding.	_____	_____

If your baby has received something other than breast milk, formula or water through a bottle, please answer question 11.

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11. Please indicate at what ages you introduced the following and for reason(s) you chose to do so.

Item introduced	Age	Reason
Cow's milk	○ <1 month ○ 2-5 months ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years ○ Not yet introduced	○ I did not feel my baby was growing enough ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____
Juice	○ <1 month ○ 2-5 months ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years ○ Not yet introduced	○ I did not feel my baby was growing enough ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____

Solid foods (These include anything besides drinkable liquids that your baby has been introduced to)	○ <1 month ○ 2-5 months ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years	○ I did not feel my baby was growing enough ○ My baby was showing signs of being ready for solid foods ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____

12. I have found the information regarding child feeding from WIC to be helpful.
always most of the time sometimes rarely never

13. I feel that the information provided by WIC regarding child feeding is easy to understand.
always most of the time sometimes rarely never

APPENDIX C

Solid Foods Survey

To help the WIC office in Gwinnett County, GA better serve your needs, it is important to understand the child and infant feeding practices of mothers enrolled in the program. The survey below should take you less than ten minutes to complete. Answers should reflect your personal beliefs and will remain completely anonymous.

Participant ID_____

Demographic information

Please circle the answers that best describe you and your child.

1. What is your relationship to the child you (the caretaker) are caring for?

Mother Father Grandmother Grandfather
Guardian

Foster parent Aunt Uncle Other_____

2. Race of caretaker
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

3. Age of caretaker
   - 15-20 years
   - 21-25 years
   - 26-30 years
   - 31-35 years
   - 36-40 years
   - >40 years

4. Race of child
   - Caucasian
   - African American
   - Hispanic
   - Asian
   - Other _____

5. Age of child
   - 0–1 month
   - 2-3 months
   - 4-5 months
   - 6-7 months
   - 8-9 months
   - 10-11 months
   - 1 year
   - Older than one year

Child feeding information

1. Please indicate at what ages you introduced the following and for reason(s) you chose to do so.

Item introduced	Age	Reason
Cow's milk	○ <1 month ○ 2-5 months ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years ○ Not yet introduced	○ I did not feel my baby was growing enough ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____
Juice	○ <1 month ○ 2-5 month ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years ○ Not yet introduced	○ I did not feel my baby was growing enough ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____
Solid foods	○ <1 month ○ 2-5 months ○ 6-9 months ○ 10-11 months ○ 12-18 months ○ 19-24 months ○ >2 years	○ I did not feel my baby was growing enough ○ My baby was showing signs of being ready for solid foods ○ A health professional advised me to do so ○ A friend or family member advised me to do so ○ Other (please explain) _____ _____

2. Please answer the following questions related to child feeding by circling the response that best describes your feeding practices*.

1. I let my child(ren) eat wherever he or she wants.	always	most of the time	sometimes	rarely	never
2. My child(ren) and I eat meals together.	always	most of the time	sometimes	rarely	never
3. When feeding more than one child, I serve all children the same food.	always	most of the time	sometimes	rarely	never
4. I make my child(ren) eat foods I feel are good for them.	always	most of the time	sometimes	rarely	never
5. I let my child(ren) decide weather he or she wants a second helping.	always	most of the time	sometimes	rarely	never
6. I only cook food I know my child(ren) will like.	always	most of the time	sometimes	rarely	never
7. I insist on my child(ren) cleaning their plate before they leave the table.	always	most of the time	sometimes	rarely	never
8. I leave food out on the table so my child(ren) can finish it later.	always	most of the time	sometimes	rarely	never
9. I let my child(ren) decide how much they should eat.	always	most of the time	sometimes	rarely	never

10. I make my child(ren) eat all of their meal before they can have dessert.	always most of the time sometimes rarely never
11. I let my child(ren) choose foods they want from what is served at a meal.	always most of the time sometimes rarely never
12. I let my child(ren) eat snacks whenever they want.	always most of the time sometimes rarely never
13. I serve meals around the same time everyday.	always most of the time sometimes rarely never
14. I turn off the TV during mealtime.	always most of the time sometimes rarely never
15. Its okay to cook different foods for my child(ren) if he or she does not like the meal the rest of the family is having.	always most of the time sometimes rarely never
16. Children should help decide what foods you buy because that will make them more likely to try them.	always most of the time sometimes rarely never
17. A child may need to try a food many times before he or she likes it.	always most of the time sometimes rarely never
18. I make sure my child(ren) does not eat too much.	always most of the time sometimes rarely never
19. I make my child(ren) eat vegetables even though he or she doesn’t like them.	always most of the time sometimes rarely never

20. I have found the information regarding child feeding from WIC to be helpful.	always	most of the time	sometimes	rarely	never
21. I feel that the information regarding child feeding is easy to understand.	always	most of the time	sometimes	rarely	never
22. Who most influences your child feeding practices?					

*Adapted from: Freedman MR, Alvarez K. Early Childhood Feeding: Assessing Knowledge, Attitude, and Practices of Multi-Ethnic Child-Care Providers. *Journal of the American Dietetic Association.*2010;110:447-456.

Thank you for participating in this survey