GROWTH AND DIETARY PATTERNS OF CHILDREN IN A FIRST NATIONS COMMUNITY

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ABSTRACT

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Anthropometric status, feeding mode and dietary intake of infants aged birth to 48 months were assessed in 102 infants and their families residing in the First Nations Community of Walpole Island, as a part of the longitudinal, multidisciplinary prevention project, Better Beginnings, Better Futures. At birth, 75% of infants were breastfed; however only 25.4% were exclusively breastfed at 3 months. Only one infant (0.98%) was fed in accordance with current infant feeding guidelines. The proportion of children $\geq 85^{th}$ percentile for weight-for-height was greater than expected. At 48-months of age, 25.7% and 30.0% of infants were $\geq 85^{th}$ percentile for weight-for-height and BMI respectively. Preschoolers were at risk of inadequate intakes of folate, vitamin C, fibre, iron, zinc, vitamin A and possibly calcium. Mothers must be educated on feeding recommendations for infants and preschoolers. Physical activity must be encouraged for all family members.

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1.0 Introduction

In Ontario there are 127 First Nations communities (Chiefs-of-Ontario, 2001) and the most recent nutrition data collected on these populations, the National Nutrition Survey, was conducted in 1972. However, this survey grouped children between the ages of 1 and 4 years, and did not examine infant feeding practices (Nutrition Canada, 1975). Thus, there is a critical lack of information on the nutritional health of First Nations children.

Infant feeding methods during the first year of life have been linked with infant growth rates. For the first 2-3 months, both breastfed and formula fed infants have similar growth rates, after which breastfed infants tend to grow at a slower rate than both formula fed infants and the NCHS growth charts (Dewey et al, 1992; Dewey et al, 1995b; Duncan et al, 1984; Hitchcock et al, 1985; Hitchcock and Coy, 1989; Michaelson et al, 1994).

Breastfeeding initiation among Canadian women is increasing; however, early cessation is quite common (Bourgoin et al, 1997; Schwartz and Evers, 1998; McNally et al, 1985; Myres, 1979; Nolan and Goel, 1995; Sheehan et al, 1999; Williams et al, 1996). Women in southern regions who were younger, had less breastfeeding experience, less education, had lower incomes, and were single, were least likely to breastfeed (Evers et al, 1998; Nolan and Goel, 1996; Williams et al, 1996). In the Native Mohawk community of Kahnawake in Quebec, breastfeeding initiation was linked to being older, having previous breastfeeding experience, being affiliated with their native traditions, and receiving more positive advice towards breastfeeding (Macaulay et al, 1989). In Canada, very little research (none in Ontario) has been conducted to examine feeding patterns or

factors associated with the initiation and duration of breastfeeding in First Nations Communities.

By the time children reach two years of age, they should consume a variety of foods from each food group (Health Canada, 1995). Information on the intakes of children at this age is limited; instead, research has focused on the nutrient intakes of older preschool children. Little research has been conducted in First Nations communities. The most recent research on Native children was reported in 1981. In that study has intakes were below recommended levels for iron, zinc, calcium, vitamin A, thiamine, riboflavin, folate, and vitamin C (Ellestad-Sayed et al, 1981). Among non-Native children in southern regions, recommendations for most nutrients were being met (Evers and Hooper, 1996; Gibson et al, 1993; Leung et al, 1984, Smit Vanderkooy and Gibson, 1987).

Factors predictive of obesity in preschool children are becoming a focus for researchers. Several factors including maternal BMI, maternal education, employment and marital status have been identified (Baranowski et al, 1990; Hediger et al, 2001, Strauss and Knight, 1999; Takahashi et al, 1999), but, in Native communities, where obesity rates in children are as high as 45% (Hanley et al, 2000), research into predictive factors has not been conducted.

A combined cross-sectional and longitudinal study to assess the anthropomentric status, feeding mode and dietary intake of infants from birth to age 48 months, as well as factors predictive of obesity at 48 months was conducted. The children all live in the First Nations community of Walpole Island, one of the communities participating in the longitudinal primary prevention program Better Beginnings Better Futures (Appendix 2).

2.0 Literature Review

This chapter will provide an overview of the current literature in the areas of infant feeding and the growth and dietary intakes of preschoolers. The first section will focus on infant feeding practices, infant growth patterns, and the relationship between the two. The second section will focus on dietary intakes and factors associated with the risk of overweight in preschoolers.

2.1 Infant feeding practices

Since 1979, WHO has recommended "all infants should be exclusively on breast milk from birth to 4-6 months of age." (WHO, 1979). However, recent changes to these recommendations have been made by the World Health Organization and the American Academy of Pediatrics, as both now encourage exclusive breastfeeding for 6 months (American Academy of Pediatrics, 1997; WHO, 2001). In Canada, changes to breastfeeding recommendations have not yet been made as the Joint Working Group of the Canadian Paediatric Society, Dietitians of Canada and Health Canada (1998) encourage exclusive breastfeeding for at least the first four months.

The protective effects of breastfeeding have been demonstrated in numerous studies. The prevalence of gastrointestinal illnesses (Howie et al, 1990; Wright et al, 1998), respiratory infections (including *streptococcus pneumoniae*) (Gessner et al, 1995; Wright et al, 1998), ear infections (Dewey et al, 1995a; Duncan et al, 1993), and urinary tract infections (Pisacane et al, 1992) are all lower in breast fed infants. In the case of respiratory illnesses at age 6-7 years, particularly wheezing, the protective effects of breastfeeding have been reported (Wilson et al, 1998; Wright et al, 1995). There is also

evidence of protection against chronic diseases. Breastfeeding has been associated with decreased rates of celiac disease (Greco et al, 1988; Ivarsson et al, 2000), insulin dependent diabetes mellitus (IDDM) (Perez-Bravo et al, 1996), Sudden Infant Death Syndrome (Brooke et al, 1997; Fleming et al, 1996), and childhood acute leukemia (Shu et al, 1999). These benefits have led to breast milk being labeled the gold standard for infant nutrition, and the only food that an infant requires for the first four to six months of life (Canadian Paediatric Society, Dietitians of Canada, Health Canada, 1998).

In Canada, rates for the initiation of breastfeeding have increased over the past several decades. In 1970-1972, the initiation rate was about 25%, this increased to 75% in 1982 (McNally et al, 1985; Myres, 1979). Currently, studies available suggest that the breastfeeding initiation rate ranges from 69%-96% (Evers et al, 1998; Lee-Han et al, 1998; Nolan and Goel, 1995; Schwartz and Evers, 1998; Sheehan et al, 1999; Sheehan et al, 2001; Williams et al, 1996). Although initiation rates have increased, early cessation is quite common. By 8 weeks postpartum, from 21-30% of women in some populations have stopped breastfeeding (Bourgoin et al., 1997; Sheehan et al, 1999; Williams et al, 1996). Nolan and Goel (1995) found that of the 3,120 women who gave birth in Ontario between 1986 and 1990, the overall breastfeeding initiation rate was 69%; of these mothers, the rate at four months postpartum was 55%. In Ontario, exclusive breastfeeding was terminated in 51% of infants within the first three months postpartum in one study (Schwartz and Evers, 1998).

Factors influencing feeding method and duration of breastfeeding were studied by Macaulay et al. (1989) in all 93 infants born between July 1, 1985 and June 30, 1986 in the Mohawk Nation on the Territory of Kahnawake, Quebec. In this sample, 64% of the

women initiated breastfeeding; this rate decreased to 39% at 3 months and to 24% at 6 months. Women who were older and had previous breastfeeding experiences, identified themselves as being followers of the Mohawk Longhouse tradition, and received more advice to breastfeed from the baby's father and their mothers, were more likely to initiate breastfeeding. For these women, breastfeeding was not associated with the infant's gender, parity, smoking, timing of decision on feeding method, or how the mother was fed. The only factor associated with breastfeeding duration was the mother's decision to breastfeed prior to becoming pregnant.

These results differ somewhat from other Canadian studies. In a population based study in Vancouver, British Columbia (n=434), the initiation and duration of breastfeeding was highest among Caucasian women, and those who had a high level of education, a high family income (especially when the mother was in the top two income brackets), and were either married or living common-law (Williams et al, 1996). For both Caucasian and non-Caucasian women personal choice was the most frequent reason for deciding to breast-feed. In addition, non-Caucasian women reported that their physician was influential in their decision to breastfeed (Williams et al, 1999). In Ontario, a study (n= 3,120) based on the 1990 Ontario Health Survey, identified the following factors as highly associated with the initiation and duration of breastfeeding: being married, having a higher level of education, being a never or previous smoker, and speaking a language other than French (English and others examined separately) (Nolan and Goel, 1995). Being currently employed was only associated with increasing the initiation of breastfeeding, whereas continued breastfeeding was also related to being previously employed, older age and having a high or medium level of well-being (Nolan

and Goel, 1995). The Ontario Mother and Infant Survey identified 27 variables, which were associated ($p<0.05$) with the duration of breastfeeding, of these variables; seven were predictive of early cessation. These include: less than a high school education, intention to breastfeed <4 month, not planning on relying on a mom's group or drop-in center, one or more maternal visits to a family physician, staying at least 48 hours in the hospital after giving birth, needing care or help with breastfeeding but not being able to obtain it, and receiving advice, information, or support about formula feeding before or after the baby was born (Sheehan et al, 2001). These results are very similar to those found in low-income communities in Ontario. In five low income communities participating in the Better Beginning, Better Futures project, Evers et al. (1998) found that women who were married, had higher levels of education, were not experiencing financial stress and attended prenatal classes were more likely to initiate breastfeeding. Duration of breastfeeding was associated with higher levels of maternal education, older age, not smoking and participating in a home visitor program (Evers et al, 1998).

Schwartz and Evers (1998) assessed infant feeding to determine whether the CPS recommendations for infant feeding were being met. By three months of age, 33% of infants were receiving solids. The age at which solid foods were introduced was not associated with the mother's country of birth (Canada vs. elsewhere), education, family type (lone parent vs. two parent), or parity. However, a higher proportion of formula fed infants were introduced to solids at the age of 3 months when compared to breastfed infants.

Similar results were found in the Ottawa-Carleton area where Kwavnick et al. (1999) examined the introduction of solid foods in infants up to the age of 6-months.

Data were collected for infants born in 1988, 1992 and 1996. The percentage of mothers who initiated breastfeeding was not provided, but about 20% (21% in 1988, 23% in 1992 and 16% in 1996) of the infants were introduced to solids by 3 months of age. Once again, more formula fed infants received solids in their first four months than breastfed infants. For all three data groups (1988, 1992 and 1996), early introduction of solids was associated with being formula fed at birth, having a mother who smoked during or after the pregnancy, and exposure to tobacco smoke in the home. Infants who were least likely to receive solids before 4-months were those who were breastfed at birth or at 6-months, and those who had older, educated, married mothers with higher incomes. For infants born in 1988 and 1992, receiving cow's milk at 6 months was related to an early introduction to solids. In infants born in 1996, maternal support after birth reduced the likelihood of early introduction to solids.

Many infants are not being fed in accordance with the CPS recommendations. Although the initiation rates of breastfeeding have increased since the 1970s, the duration is quite low. A high proportion of infants are being introduced to solids and cow's milk at young ages. Factors influencing feeding method and duration of breastfeeding have been identified in Southern regions of Canada; however, influences on breastfeeding have not been examined in Native communities in Ontario.

2.1.1 Infant feeding mode and anthropometric status

The rate of weight gain varies by type of feeding. These differences in weight gain have occurred as early as 10 days of age with formula fed infants gaining more weight than exclusively breast-fed infants (Shephard et al, 1988). However, several

researchers have found that changes in weight gain between breast fed and formula fed infants did not become significant until the age of 2-3 months, after which the rate of growth in the breast fed infant declines, as does their percentile ranking in the 1977 NCHS growth charts (Dewey et al, 1992; Dewey et al, 1995b; Duncan et al, 1984; Hitchcock et al, 1985; Hitchcock and Coy, 1989; Michaelsen et al, 1994).

Focusing on the first three months, Schwartz (1996) examined the association between infant growth pattern and mode of feeding in a sample of (n=257) Better Beginnings Better Futures children. The percentage of all infants with length-for-age, weight-for-age, head circumference, and weight-for-length over the 90th percentile was greater than the expected 10%. At three months, there were no significant differences in growth measures across the feeding groups; however, in female infants, weight gained varied across the feeding groups. Weight gain for female infants was highest for the mixed breast-fed and formula-fed group.

The Davis Area Research on Lactation Infant Nutrition and Growth Study (DARLING) longitudinal study followed infants who were breast-fed for at least 12-months and those not breastfed for longer than 3 months. The two groups were matched for parental socioeconomic status, education, ethnic group, and anthropometric characteristics, infant sex and birth weight, and none of the infants were given solids before four months. Infant's weight, height and head circumference were measured monthly for the 18 months of the study. When examining weight gain in three-month increments, both breastfed and formula fed infants had similar weight gains for the first three months, but from 3 months to one year, weight gained by the breastfed infants was significantly lower than that of the formula fed infants (Dewey et al, 1992). Weight gains

of breast-fed males were significantly lower than formula fed males when weight gain was examined at one-month increments. Differences were not significant among females (Dewey et al, 1992). Between the ages of 4 and 18 months of age, breast-fed infants were leaner than those who were formula fed (Dewey et al, 1992).

To compare growth patterns of a large sample of breastfed infants in affluent populations, Dewey et al. (1995b) pooled data from 7 longitudinal studies of infant growth in Canada, The United States and Northern Europe. A total of 453 infants were included, 226 who were breastfed for at least one year. Patterns for weight gain resembled those of the DARLING study with infants breastfed for 12-months gaining weight rapidly for the first two months, followed by a deceleration from 3 to 12 months. When examining the changes in weight for infants breastfed for 6 to 8, 9 to 11, or 12 or more months, the three groups showed similar weight patterns for the first 5 months (rate of weight gain decreased around 2-3 months), but after 5 months of age, the magnitude of the decline in rate of weight gain for the group breastfed for 6 to 8 months was less than the other two groups. Between the ages of 8 and 12 months, infants who were still being breastfed continued to gain weight more slowly. In studies which collected data for more than one year, the rate of weight gain generally increased during the second year of life such that breastfed infants caught up with formula fed infants.

In order to assess the impact of infant feeding mode on growth and body composition during the first two years of life, Butte et al. (2000) collected body circumferences, weight and length on infants breastfed for at least 12 months (but exclusively breastfed for the first three) and those breastfed for less than three months every three months for two years. Patterns of weight gain once again resembled those of

the DARLING study with formula fed infants having a higher weight velocity (g/day) when compared to the breastfed infants between 3 to 9 months of age. In females, this resulted in the formula fed infants having significantly higher weights at both 9 and 12 months. Overall the differences in body composition between formula fed and breastfed infants did not persist into the second year of life.

Hediger et al. (2000) obtained the same results in a study of the effects of early infant feeding on growth status of children up to the age of 5 years. At the age of 8-11 months, infants who were exclusively breastfed for 4 months had a lower weight and length than formula fed infants and infants who were breastfed for less than 4 months. By the age of 12-23 months (1 year) the differences disappeared and there were no significant differences through to the age of 5 years. In summary, breastfed infants have slower growth from 3-12 months, but this does not persist. Males and females have similar patterns of growth.

The reference data most often used to assess infant growth are the NCHS-WHO growth charts from 1977, which are based on data collected from the Fels Longitudinal Study, conducted in Yellow Springs, Ohio between 1929 and 1975 (Roche et al, 1989). Within this sample, the ethic and racial backgrounds of infants were Caucasian, the majority of infants were formula fed; of those who were breast fed, very few were breast fed for more than three months and growth measurements were conducted infrequently (Dewey et al, 1995b; Dewey, 1998; Dewey, 2001). Since it has been demonstrated that variations in growth patterns in breastfed and formula fed infants exist, the reference data may not accurately reflect the growth of breastfed infants. In 1994, the WHO Working group concluded that those NCHS-WHO reference data were inadequate, and that new

weight and length references needed to be created (WHO, 1994). Thus, findings from studies using these data must be interpreted with caution. The new NCHS growth standards (Kuczmarski et al, 2000) include reference data derived from Cycles II and III of the National Health Examination Surveys (NHES II and III) and three National Health and Nutrition Examination Surveys (NHANES I, II and III) for both breast-fed and formula fed infants. To ensure a representative sample, statistical sample weights were calculated for each national survey at the time of implementation.

Changes in infant length as a result of feeding mode are less consistent than those for weight gain. In a study of infants up to the age of three months, Nelson et al. (1989) found that formula fed infants gained about 6% more length from age 42 days to 112 days than exclusively breastfed infants. Over a one-year period, Dewey et al. (1992) found significant differences in the cumulative length gain for boys aged, 0-12 months, but not among girls. This amounted to a difference of 1 cm in length (Dewey et al, 1992). Similar differences in length for both girls and boys were also found by Butte et al. (2000) and Michaelsen et al. (1994). When pooling data from 7 longitudinal studies over 12 months, Dewey et al. (1995b) demonstrated that there was a slight decline in length for age of breastfed infants relative to current reference data (1977 NCHS-WHO growth charts), but that this decrease was not as great as it was for weight, and was not related to the duration of breastfeeding. This supported research by Duncan et al. (1984) who reported a decline in percentile rankings in breast fed infants between the ages of birth and six months. Comparing infant length to the new growth charts, using the results from the 7 studies in Dewey et al. (1995b), Dewey (2001) demonstrated that infant length

remained at the 50th percentile from ages 0-12 months for infants who were still being breastfed.

Rates of weight gain have been demonstrated to vary by mode of feeding. Infants who were breast-fed for at least 4 months tended to have slower weight gain and growth was somewhat slower during the first year of life, but the differences disappeared during the second year (Butte et al, 2000; Dewey et al, 1992; Dewey et al, 1995b; Hediger et al, 2000).

2.1.2 Supplementary foods

The majority of infants are given cereal when first introduced to solids (Kwavnick et al, 1999; Macaulay et al, 1989; Schwartz and Evers, 1998). Schwartz and Evers (1998), found that among the 68% of infants receiving supplementary foods during the first 3 months, 57% were fed cereal, followed by fruits (13%), vegetables (11%), apple juice (12%), other fruit juice (12.0%), other fruit juice (5%), and sugar water (10%). However, age at introduction to cow's milk varies. For example, 2.4% of infants in low-income Ontario communities received cow's milk by the age of 3 months, (Schwartz and Evers, 1998) compared to 1% in Vancouver by the age of 6 months (Williams et al, 1996).

Williams et al. (1996) identified the types of foods infants were being fed from birth to one year of age. Between the ages of 4 to 6 months, when the majority of infants were given solid foods, the most common were iron-fortified infant cereal, vegetables and fruits. By the ages of 7 to 9 months, meats, chicken, fish, egg yolks, and legumes were generally introduced. However, for some infants introduction of solid foods was

infant cereal was not given to 10% and 4% of infants respectively. By 9 months of age delayed beyond the recommended ages. At the ages of 6 and 9 months, iron fortified some infants had not yet been introduced to fish (62%), meats (33%), or chicken (24%).

2.1.3 Age of introduction to solids and anthropometric status

A recent analysis of data from the Better Beginnings, Better Futures project (Smith, 1998) examined age of introduction of solids in relation to anthropometric changes by 18 months. The age at which solids were introduced were classified into three groups; 1) $\leq$ 8 weeks (5 to 8 weeks) 2) 9 to 12 weeks and 3) 13 to 16 weeks. Early introduction of solids was associated with overall gains in length and head circumference. Infants introduced to solids at 9 to 12 weeks had greater gains in length when compared to infants given solids between the ages of 13 to 16 weeks. Significant differences in head circumference were seen between infants introduced to solids at 5 to 8 weeks and at 13 to 16 weeks of age, as the younger age of introduction were associated with increased head circumference.

Other researchers found that when solids were introduced after the age of four months, age of introduction had no effect on growth of breastfed or formula fed infants, and by one year of age, there were no significant differences in infant length (Butte et al, 2000; Mehta et al, 1998).

To determine whether the early introduction of solid foods had an effect on infants' weight, Forsyth et al. (1993) studied 671 infants who were given solids at <8 weeks of age (n=65), between 8-12 weeks of age (n=332) or >12 weeks of age. Introduction of solids before 12 weeks of age was associated with increased weight at 8,

13 and 26 weeks of age but not at 52 weeks or 104 weeks. There were no differences in weights between the infants who were given solids <8 weeks and those given solids at 8-12 weeks. However, it was also found that infants given solids at an early age were significantly heavier at 4, 8, 13, and 26 weeks of age but not at 52 or 104 weeks, thus suggesting that heavier infants were given solids at a younger age. Dewey et al. (1995b), however, found that timing of introduction of solid foods was significantly associated with weight for age. Infants given solids earlier (4 to 5 months) were lower in weight and weight for length before 4 months than infants given solids at 6 months or later.

Early introduction to solids has an effect on growth. When given solids before three months, weight, length and head circumference were greater at 18 months (Smith, 1998) and 26 months (Forsyth et al, 1993), however when giving solids after four months of age, age of introduction had no effect on growth of breastfed or formula fed infants, and by one year of age, there were no significant differences in infant length (Butte et al, 2000; Mehta et al, 1998).

2.2 Dietary intakes of preschoolers

The Canadian Nutrition Recommendations state that in healthy individuals over the age of 2 years the diet should provide at least 55% of energy as carbohydrates, 13-15% as protein and a maximum of 30% as fat (of this 30%, a maximum of 10% can be saturated fats) (Health and Welfare Canada, 1990). However, modifications to these recommendations suggest that from the age of two until the end of linear growth, fat intakes should be slowly reduced to a maximum level of 30% (Canadian Paediatric Society and Health Canada, 1993). In Canadian studies these recommendations are

generally met. In 1984, Leung et al. (1984) reported that intakes of carbohydrates, protein and fat were 52%, 15% and 34 % respectively. Ten years later, these proportions had not changed as Campbell (1993) reported intakes of 53%, 14% and 33% for carbohydrates, protein and fat respectively, and Evers and Hooper (1996) found that the energy contribution from protein was 14%; fat, 30%; and carbohydrates, 56%. In Northern native communities, these values were 15% of energy from protein, 45-46% from carbohydrates and 39-40% from fats (Ellestad-Sayed et al, 1981).

Intakes of fat are consistently at or above the recommended 30% of energy as fat (Campbell, 1993; Ellestad-Sayed et al, 1981; Gibson et al, 1993; Evers and Hooper, 1996; Leung et al, 1984). In a group of 106 Ontario preschoolers aged 4-5 years, 19 children had diets which were ≤30% fat, of these only 7 children actually had diets in which the saturated fat content met the recommendation of ≤10% (Gibson et al, 1993). Diets with fat levels exceeding the recommendation have also been reported in the United States (Harvey-Berino et al, 1997; Thompson and Dennison, 1994).

In order to determine nutrient composition and risk of nutrient inadequacy in children's diets, their food intakes have been compared (Campbell, 1993; Evers and Hooper, 1996; Gibson et al, 1993; Leung et al, 1984; Smit Vanderkooy and Gibson, 1987) to the Canadian RNIs (Bureau of Nutritional Sciences, 1983; Health and Welfare Canada, 1990). In the southern regions of Canadian provinces, children's average nutrient intakes have remained above 2/3 recommendations, however, this is not the case in Northern Indian populations (Gibson et al, 1993; Leung et al, 1984; Smit Vanderkooy and Gibson, 1987). In Montreal and Toronto, Leung et al. (1984) reported intakes above the RNIs (released in 1975) for calcium, phosphorous, iron, thiamin, riboflavin, niacin

and vitamin C. Somewhat lower intakes were reported by Campbell (1993) as at the age of 4, between 2-4% of children were below the RNI for riboflavin, calcium, thiamin, folate and vitamin C. In four low-income communities participating in the Better Beginnings, Better Futures project, Evers and Hooper (1996) found that children's mean intakes were above the RNIs for vitamin A, vitamin C, niacin, riboflavin, thiamin, vitamin B12, folate, calcium, iron and zinc.

The intake of Vitamin A has varied. In a population of 189 children aged 3.5-4 years, analysis of 4-day food records indicated average vitamin A intakes of 566% of the 1975 recommendation (Bureau of Nutritional Sciences, 1975). In contrast, Campbell (1993) demonstrated that at the age of 2-3 years, 8% of children had intakes below the RNI, by the age of 4, this value increased to 15%. These discrepancies are not of great concern as Vitamin A is a nutrient for which day to day variations are high. Fluctuations in vitamin A intakes make it very difficult to assess; Mahalko et al. (1985) found that a seven-day food record would be less likely to provide a representative intake, and diet history of usual intake is difficult to determine. Basiotis et al. (1987) calculated that the number of days required to estimate true individual vitamin A intake for males ranged from 115-1724 days with an average of 390 days, and for females the range was from 152-1372 days, with an average of 474 days.

Nutrient intakes of preschool children in a Northern Native community were much lower than Better Beginnings, Better Futures communities (Ellestad-Sayed et al, 1981). In Northern Manitoba, over half the children consumed less than the recommended intake of iron, between 27-46% were below the zinc RNI, 30-65% were below the RNI for calcium, 25%-30% did not meet the RNI for Vitamin A, 49-60% were

below the RNI for thiamin, about ¼ of the children consumed inadequate levels of riboflavin, and vitamin C levels were not met by 9-21% of the children.

The recommended energy intake for preschoolers aged 4 years is 1800 kcal (7531KJ) (Health and Welfare Canada, 1990). Since the early 1980s, in the southern regions of Canada, the average intake of children has been below this recommendation (Campbell, 1993; Evers and Hooper, 1996; Gibson et al, 1993; Leung et al, 1984; Smit Vanderkooy and Gibson, 1987). The same trend has been reported in the United States, where although the intake is slightly higher, children consumed an average of 85.5% of the recommendation (Thompson and Dennison, 1994).

Few studies have been conducted on the energy needs or energy expenditures for children, thus recommendations are based on limited information. Evers and Hooper (1996) examined 24-hour recalls for 4 and 5 year old Better Beginnings Better Futures children (n=325). Energy intakes were found to be well below the RNI, but this was not a concern as mean nutrient intakes met or exceeded recommended levels, there was a marked tendency to overweight, and a high proportion of children were above the 90th percentile for weight-for-height, upper arm fat area and BMI. It has therefore been suggested that rate of growth is the most effective method of assessing the adequacy of the energy intake of children (Health and Welfare Canada, 1990).

In a Northern Native community, even though between 30-39% did not meet energy recommendations, the median energy intake averages around 120% of the allowance for age, sex and body size (Ellestad-Sayed et al, 1981). However, when focusing on obese Mohawk children (over the 85th percentile), their energy intakes averaged 402 kcal higher than non-overweight children (Harvey-Berino et al, 2000).

To date very few studies have been conducted on factors associated with the dietary intake of Canadian preschool children. Smit Vanderkooy and Gibson (1987) found that daily energy and nutrient intakes of preschool children (n=106) were independent of age, parent's education levels, and socio-economic status. However, fiber intakes were significantly higher for children whose mother had some postsecondary education.

Among single working mothers, the diversity of preschoolers' diets (number of foods consumed) has been associated with higher income and more childcare arrangements with licensed facilities. Various work, childcare and home/family characteristics affected the quality of preschool diets (Campbell and Sanjur, 1992). Campbell (1993) extended these findings by determining that maternal employment patterns influenced where children ate, where food was prepared at different times of the day, and the length of time children spent at childcare facilities. Thompson and Dennison (1994) identified ethnicity and income as factors affecting children's food intakes.

Diets of preschool children generally meet the Canadian Nutrition Recommendations (Health and Welfare Canada, 1990) for carbohydrates, fat and protein as well as the DRIs/RNIs for most nutrients (Campbell, 1993; Evers and Hooper, 1996; Gibson et al, 1993; Health and Welfare Canada, 1990; Leung et al, 1984; Smit Vanderkooy and Gibson, 1987). However, in Northern First Nations Communities intakes of iron, zinc, calcium, vitamin A, thiamin, riboflavin, folate, and vitamin C were below recommended levels (Ellestad-Sayed et al, 1981). Income and ethnicity have been associated with intakes in preschoolers (Campbell and Sanjur, 1992; Thompson and Dennison, 1994).

2.2.1 Prevalence of overweight

The prevalence of overweight in children is high across Canada, with the highest rates in First Nations Communities. In Sandy Lake First Nation, located 2000 km northwest of Toronto, between the ages of 2-5 years the percentage of children with BMI $\geq 85^{th}$ percentile was 34.6% and 45.2% for boys and girls respectively (Hanley et al, 2000). Similar results were found in the St. Regis Mohawk reservation in New York, where 13 of the children aged 1.5 to 4 years (65% of sample) were above the 85^{th} percentile for weight for height; of these children, 10 children were above the 95^{th} percentile (Harvey-Berino et al, 2000). In low-income Ontario communities, among girls between the ages of 4 and 5 years, the percentage above the 90^{th} percentile for weight-for-height and BMI were 20% and 16.6% respectively. For boys, the percentages above the 90^{th} percentile for weight-for-height and BMI were almost 25% and 23 % respectively (Evers and Hooper, 1996).

Several factors predictive of overweight in preschool children have been identified. The strongest predictor of children's BMI status was their mother's concurrent BMI (Baranowski et al, 1990; Hediger et al, 2001; Scaglioni et al, 2000; Strauss and Knight, 1999; Takahashi et al, 1999; Unger et al, 1990). The likelihood of children being overweight was nearly 3-fold greater when the mother was overweight; this increased to over 4-fold with maternal obesity (Hediger et al, 2001). Takahashi et al. (1999) revealed that there was a greater prevalence of obesity amongst children whose siblings were obese; these children also had limited outdoor playtime and snacked irregularly.

Fisher and Birch (1995) went on to assess the relationship between parental BMI and preschooler's fat intake. In a group of 3-5 year olds (n=18), preferences for high-fat foods were associated with both total fat intake and triceps skinfold measurement. Furthermore, both preference for high fat foods and total fat intake were correlated with parental BMI.

O'Callaghan et al. (1997) identified child and parental predictors of obesity at age 5 years (n=4062). Maternal and parental BMI $\geq 95^{th}$ percentiles were significantly associated with severe ($\geq 95^{th}$ percentile) and moderate (85^{th} to 94^{th} percentile) obesity in their 5-year-old children. Child predictors of severe obesity were birthweight ($\geq 95^{th}$ percentile) and female gender. Birthweight above the 95^{th} percentile and sleeplessness at 6 months were predictive of moderate obesity where as SGA (small for gestational age) status and feeding problems at 6 months were protective. Strauss and Knight (1999) followed 2913 American children aged 0-8 years over a 6 year period and identified lack of cognitive stimulation, low income, single mother households, black ethnicity, maternal education less than high school, and children with either unemployed or non professional parents as significant predictors of childhood obesity.

In addition, infant feeding practices may have an effect on the risk of obesity. Baranowski et al. (1990) identified the duration of breastfeeding as having a marginally significant inverse relationship to children's weight at ages three and four years, but not their BMI or sum of skinfold measurements. As well, introducing infants to high fat or high carbohydrate foods was not associated with weight, skinfold or BMI measurements.

In a study of 20 Mohawk children, obesity was linked to eating larger portions of

food. Overweight children averaged a caloric intake 402 kcals higher than normal weight children (Harvey-Berino et al, 2000).

The most significant predictor of overweight and obesity in preschool children is maternal BMI (Baranowski et al, 1990; Hediger et al, 2001; O'Callaghan et al, 1997; Strauss and Knight, 1999; Takahashi et al, 1999; Unger et al, 1990). In addition, low maternal education, income, infant birthweight $\geq 95^{th}$ percentile, female gender and single mother households have been associated with increased prevalence of obesity (O'Callaghan et al, 1997; Strauss and Knight, 1999). The influence of these factors has not been examined in Native Communities in Ontario.

2.3 Summary

Exclusive breastfeeding is internationally recognized and promoted as the preferred method for infant feeding for the first four to six months of life (Canadian Paediatric Society, Dietitians of Canada, 1998). Compliance to this recommendation as well as others regarding age of introduction to solids and cow's milk have been increasing over several decades; however, not all mothers are following the recommendations. In Southern regions of Canada, being married, higher income, not smoking, being employed and being Caucasian were all associated with initiation and duration of breastfeeding. For Native communities, very limited research has been conducted. In the Mohawk Nation on the Territory of Kahnawake Quebec, results differed from southern regions as breastfeeding was not associated with infant gender, parity and smoking (Macaulay et al, 1989). There have been no studies conducted in Ontario's First Nation Communities.

Early introduction to solids (before four months) has been associated with exclusively formula fed infants, mothers who smoked during and after pregnancy, and exposure to tobacco smoke in the home (Kwavnick et al, 1999; Schwartz and Evers, 1998). Once again, information is lacking in First Nations communities, as similar studies have not been conducted in Native communities in Ontario.

Breast fed infants demonstrated a slower rate of growth when compared to formula fed infants and NCHS growth curves (Butte et al, 2000; Dewey et al, 1992; Dewey et al, 1995b; Hediger et al, 2000). Few of these studies have been conducted in Canada. In a sample of Better Beginnings Better Futures children aged birth to 3-months, Schwartz (1996) demonstrated no significant differences in growth measures by mode of feeding; however, Native children were not included. The influence of feeding mode on growth has not been examined in Native communities in Canada.

Guidelines on healthy eating for preschoolers encourage the selection of a variety of foods from each food groups everyday (Health Canada, 1995). Information as to what children between the ages of 1 and 3 are eating is limited, as no current research has focused specifically on this age group. While recent studies are demonstrating that diets in Canadian preschoolers (age 4) are meeting the Canadian Nutrition Recommendations as well as the RNIs for most macro and micornutrients, this is not consistent throughout Canada (Campbell, 1993; Evers and Hooper, 1996; Gibson et al, 1993; Health and Welfare Canada, 1990; Leung et al, 1984; Smit Vanderkooy and Gibson, 1987). Twenty years ago, among native children, Ellestad-Sayed et al. (1981) indicated that intakes of iron, zinc, calcium, vitamin A, thiamin, riboflavin, folate, and vitamin C were below

recommended levels. Since this study, no similar research has been conducted in Ontario's Native communities.

In Canada, the prevalence of obesity in young children is highest in Native communities, where between 35 and 45% of children aged 2-5 have BMI $\geq 85^{th}$ percentile (Hanley et al, 2000). Although obesity rates are high, there is very limited research on predictors of obesity, with none focusing on First Nations communities in Ontario.

3.0 Research Objectives

The primary objective was to assess the growth and feeding patterns of children from birth to age four years in the Better Beginnings, Better Futures First Nations community Walpole Island.

Specific research objectives

1. To compare weight, height (length) or weight-for-height at ages 3, 18, 33 and 48 months to NCHS reference data.
2. To determine if infants are being fed following the recommendations made by the Joint Working Group of the Canadian Paediatric Society, Dietitians of Canada and Health Canada (Canadian Paediatric Society, Dietitians of Canada, Health Canada, 1998).
3. To determine if there is a relationship between adherence to infant feeding recommendations (summarized in Appendix 1) and parental characteristics. To examine initiation and duration of breastfeeding in relation to the following characteristics: maternal age, marital status, maternal and paternal education, maternal and paternal employment, income, maternal birthplace, attendance at prenatal classes, smoking, alcohol consumption, number of children in the home and membership in a clan. To examine the age of introduction to solids and cow's milk in relation to the above characteristics and breastfeeding practices.
4. To determine if there is a difference in weight, height (length) or weight-for-height at ages 3, 18, 33 and 48 months according to infant feeding practices from birth to 3 months controlling for maternal BMI.
5. To compare head circumferences at 3 and 18 months to reference data.

6. To determine if children are following the recommendations in Canada's Food Guide to Healthy Eating, Focus on Preschoolers (Health Canada, 1995) at the ages of 18 and 33 months.
7. To determine if there is a relationship between what children are being fed at 18 and 33 months and the following characteristics: maternal and paternal education, maternal and paternal employment, maternal BMI, income, smoking, alcohol consumption, number of children in the home, and membership in a clan.
8. Based on the 24 hr recall, to determine if the mean proportions of energy from fat, protein and CHO meet current recommendations for carbohydrates- at least 55%, protein- 13-15%, and fat – a maximum of 30% (30% fat recommendation was selected to enable comparisons to other research).
9. Based on the 24 hr recall, to determine if mean intakes of children age four years meet the DRIs (Food and Nutrition Board, 2000) for calcium, iron, zinc, vitamin A, vitamin C, thiamin, niacin, folacin, and riboflavin; and an intake of fiber of age plus 5 grams (Williams et al, 1995) as well as the current recommendations for energy intake of 1800 kcal and a protein intake of 18 grams (Health and Welfare, 1990).
10. To identify factors predictive of child overweight (weight-for-height $\geq 85^{th}$ percentile of CDC reference data (Kuczmarski et al, 2000) at age 4 years. Variables to be considered include infant feeding method, age of introduction to solids, maternal BMI, maternal and paternal education, income, maternal and paternal employment, marital status, number of children in the home and the child's birthweight and gender.

11. To determine if children aged 48-months with WH percentiles $\geq 85^{th}$ and $< 85^{th}$ have differences in their nutrient intakes. Differences based on BMI percentiles $\geq 85^{th}$ and $< 85^{th}$ were also examined.
12. To examine the tracking of weight-for-height $\geq 85^{th}$.

4.0 Methods

The data presented for this thesis were collected from April 1994 through March 1999. The Better Beginnings, Better Futures project, of which this thesis is a part, is summarized in Appendix 2.

4.1 Study design

Focusing on the first four years of the Better Beginnings, Better Futures longitudinal project, this study examines both cross-sectional (3, 18, 33 and 48 months of age) and longitudinal (birth to 48 months of age) data collected from interviewer administered questionnaires, anthropometric measures and a 24 hour recall in the Walpole Island younger cohort site. Figure 4.1 provides an overview of measures used from the four interviews (3, 18, 33 and 48 months) used in the present analysis.

Figure 4.1 Overview of Measures used from the four interviews used in the present analysis

	3 Months n=84 * n=75***	18 Months n=81*$^{\Delta}$ n=73***	33 Months n=97*$^{+}$ n=80***	48 Months n=98* n=73***
Weight	✓	✓	✓	✓
Height/Length	✓	✓	✓	✓
Head Circumference	✓	✓		
Infant Feeding	✓	✓		
FFQ- 7 day		✓		
FFQ- 24 hours			✓	
24 hour recall				✓
Maternal and Demographic Characteristics	✓	✓	✓	✓

* number of families who completed the interview
***number of children for whom anthropometric measures were taken
$^{\Delta}$ 10 children were first time interviews
$^{+}$ 7 children were first time interviews

4.2 Participants

Families were eligible to participate in the Better Beginnings, Better Futures project if they had a child born in 1994 and they lived within the boundaries of one of the younger cohort communities.

The Better Beginnings, Better Futures site that this thesis focuses on is Walpole Island. Walpole Island, situated at the mouth of the St Clair River, between Ontario and Michigan, United States is a unique site as it is a First Nations Community. Over 2000 people from the Ojibwa, Potawatom, and Ottawa tribes inhabit the island. Citizens of Walpole Island are able to support themselves through hunting, trapping, fishing and guiding. (Walpole Island, 2001). Along with the urban sites (Willow Road in Guelph, North end community in Kingston, Regent Park/Moss Park in Toronto, southeast Ottawa, and a comparison site in Peterborough) Walpole Island makes up the 'infant longitudinal cohort'. Data will be collected on these children from birth until they reach their mid twenties in order to determine long term effects of the project. At the onset of each interview, parents were provided written information about the project and written consent was obtained (see Appendix 3). To be part of this longitudinal cohort, families must reside in a Better Beginnings, Better Futures community for a minimum of 12 months. If families move out of a research site (after 12 months), attempts are made to maintain contact so data can be collected in future interviews. Procedures for the recruitment of families are reported by Schwartz (1996).

4.3 Training

Site Researchers and research assistants from all Better Beginnings, Better Futures, sites attended training sessions on all measures including the questionnaire, anthropometric measures, the 24-hour recall and the child developmental tests for the 3, 18, 33 and 48 month interviews. For the younger cohort, training procedures for data collection at 3 months are reported by Schwartz (1996), and for 18 months are reported by Smith (1998). For the 33-month and 48 month interviews, training manuals outlining procedures for athropometric measures, and the questionnaire were reviewed during training sessions. In addition, training for the 48-month interview included a detailed session on the 24-hour recall. Training procedures for the child development tests will be described in detail in other reports.

4.4 Data collection

Data collection was conducted at age 3 months (± 2 weeks); 18, 33, and 48 months (± 4 weeks). The two hour parent interviews, tests of child development, anthropometric measurements and the 24-hour dietary recall (at 48 months) were usually conducted in the families' homes, but alternative arrangements were made if requested. In appreciation for the completion of each interview, parents were given $25, and their children received a Better Beginning, Better Futures gift.

4.4.1 Anthopometric measurements

Weight, height and head circumference were measured for each infant at ages 3 months, and 18 months. Weight for dressed infants (without shoes) was measured to the

nearest 0.05 kg using the Portable Infant Weight Scale (Wilder Medical, Kitchener), and measurements of infant length (head-to-toe) to the nearest millimeter were conducted using the Pediatric Length Board (Ellard Instrumentation, Seattle WA). The Fiberglass Inser-Tape (Ross Laboratories, Columbus Ohio) was used to measure infant's head circumference. Each measurement was taken twice, if the two measures differed by 0.10 kg, 0.2 cm and 0.2 cm for weight, length and head circumference respectively, a third measurement was taken. See "Standardized Protocols for Infant Growth Measures" for procedures (Appendix 4),

At 33 months and 48 months both weight and height were measured. Weight was measured to the nearest 0.5 lb using an electronic scale (Health-o-meter, Inc., Bridgeview IL) and height was measured to the closest 0.1cm using the Microtoise Modified Tape Measure (CMS Weighing Equipment, London UK). If measurements differed by more than 0.5 lbs and 0.5 cm for weight and height, a third measurement was taken. The "Standardized Protocols for use with 3 ½ to 4 ½ year old Children" can be found in Appendix 5, and Growth Measures recording forms can be found in Appendix 6.

In order to determine the prevalence of obesity, Body Mass Index (BMI) was calculated for all mothers and 4-year old children. BMI is an index of a person's weight in relation to their height and is calculated using the following formula: weight(kg)/height $(m)^2$. Values for BMI for adults are interpreted as follows:

BMI < 18.5 = underweight

BMI 18.5 to 24.9 = normal

BMI 25 to 29.9 = overweight

BMI ≥ 30 = obese (National Institute of Health, 1998)

In children, BMI is intrerpreted based on the child's age and gender (Kuczmarski et al, 2000). The cutoffs for children are as follows:

BMI-for-age <5th percentile = underweight

BMI-for-age ≥85th to <95th percentile = at risk of overweight

BMI-for-age ≥ 95th percentile = overweight (Himes and Deitz, 1994)

4.4.2 Assessment of infant feeding patterns

In the 3-month interviews, each primary caregiver was asked how their infant was fed at birth and whether the infant was being breast fed at the time of the interview. The age when the infant was first introduced to solids was noted. Respondents were also questioned regarding the types and amounts of formula and milk used and whether the infant consumed any other food or drink during the past 24 hours (see Appendix 7 for relevant questions from the 3-month interview).

In the 18-month interview, parents were asked how the infant was fed at birth and their current feeding practices. Questions focused on the age when infants were introduced to solids, age of introduction to milk other than breast milk and formula, amounts and types of milk consumed and the duration of breast and or formula feeding. Parents also identified which foods their infant consumed in the past 7 days (see appendix 8 for relevant questions from the 18-month interview).

When the children were 33 months of age, respondents were asked about type of milk used and what foods (from a list) the child had consumed in the previous 24-hours (Appendix 9 for relevant questions from the 33-month interview).

There are no standard definitions for infant feeding groups. Some of the most common include: exclusively breastfed, partially breastfed, formula fed, bottle fed, and supplementary foods. Operational definitions for Better Beginnings, Better Futures (taken from Schwarz and Evers, 1998; adapted from Labbock and Krasovec, 1990; King and Ashworth, 1991; Heinig et al., 1993) are as follows.

Exclusively Breastfed (BF) refers to breastfeeding with or without supplements of vitamins, minerals and water

Exclusively Formula Fed (FF) refers to the feeding of commercially available cow's milk based (casein or whey) or soy protein based formula, with or without water, vitamin/mineral supplements.

Supplementary Feeding refers to the use of any food or fluid other than human breast milk or infant formula.

For the purpose of our study, three infant feeding groups were created

1. Exclusively breastfed: Infants breastfed for at least three months
2. Partially breastfed: Infants breastfed for less than three months
3. Exclusively formula fed: Infants fed only formula from birth to three months

A cutoff of three months was selected to ensure the highest accuracy of data as parents were interviewed within two weeks of the child's three month birthday, and were not interviewed again until the child was 18 months old.

Age of introduction to solids was examined by subdividing the infants into the following groups based on when solids were first introduced: <4 weeks of age, 5-8 weeks, 9-12 weeks, and 13-16 weeks.

4.4.3 24 Hour recall

In the 48-month interview, parents were asked to recall the types and quantities of foods and beverages consumed by their child in the past 24 hours. To help in estimating portion sizes, the child's usual cup, glass and bowl were calibrated and food models were utilized. Details of the procedures followed for the recalls are outlined in the Better Beginnings, Better Futures Standardized protocol for 24 Hour Recall Interviews (Appendix 10).

The 24-hour recall has been found to be a valid and reliable method for assessing the food intakes of preschoolers. To validate the 24-hour recall, Klesges et al. (1987) compared parental recall and children's weighed food intake. In the home environment, significant correlations between the two methods over a 24-hour period were found for most nutrients (average r=0.65). The few errors which occurred were due to under-reporting (4%). Over-reporting of portion sizes was not observed. Parents were able to identify 96% of the foods eaten by their child.

4.5 Data analysis

Statistical analysis was performed using SPSSV, Release 10.0 (SPSS Inc., Chicago). All questions from the parent interview were recorded on a computer scannable form. Anthropometric data were checked prior to entry into Epi Info, Version 6.3. Any questionable data were checked on the original forms to see if transcribing errors had been made. If there were any remaining data with questionable validity it was excluded from further analyses.

4.5.1 Demographic characteristics and maternal characteristics

From all four interviews, the following demographic information was used: number of people in home, marital status, birth place (both parents and child), income, education, employment, age (both parents and child), involvement with Native tribe/band, gender and age of child. Income was categorized as above or below the low income cut-offs. A family is below the low-income cutoff if the average household spending on food, shelter and clothing is at least 35% of before-tax income (Statistics Canada, 1998d).

The 3-month interview also included questions about maternal characteristics; attendance at prenatal classes; alcohol, drug and tobacco use both during and after pregnancy; maternal weight before, during and after pregnancy; and maternal height. Body Mass Index (kg/m^2) for the mothers was calculated as an additional indicator of weight status.

4.5.2 Analysis of anthropometric data

Anthropometric measures were entered into Epi Info Version 6.3 (Stony Mountain Georgia) for the 3, 18, 33 and 48-month interviews. The data consisted of weight, length and head circumference for infants at 3 and 18 months, weight and height at 33 and 48 months. In addition, sex and age were entered for all four interviews. Epi Info then calculates percentile values for height/length-for-age, weight-for-age, and weight-for-height based on NCHS reference data (Kuczmarski et al, 2000). For head circumference (HC) the cutoffs from CDC reference data, (Kuczmarski et al, 2000) will be used.

New growth charts were released in May 2000 by the Center for Disease Control and Prevention (Kuczmarski et al, 2000) to better represent the racial/ethnic diversity, as well as the size and growth patterns of infants fed a combination of breast milk and formula in the United States. These charts are based on data collected in national child growth studies, but once again, there are relatively few infants who were exclusively breast fed for several months (Roberts and Dallal, 2001).

4.5.3 Analysis of dietary intake

Dietary information from the 3 and 18-month interviews was used to assess whether the infant feeding practices in Walpole Island met the Canadian Recommendations as outlined in Appendix 1. Dietary information from the 18 and 33-month interviews was utilized to assess the variety of foods the infants are consuming and whether they meet the recommendations from Canada's Food Guide, Focus on Preschoolers (Health Canada, 1995).

Nutrient intake from the 24-hour recalls (collected at 48 months) was determined using the Candat Nutrient Calculation System (London, Ontario: Godin London Inc., 1999). Nutrient inadequacy was assessed by comparing mean intakes with the DRIs (where available) and the Recommended Nutrient Intakes for Canadians (RNIs) for the remaining nutrients. Intakes of boys and girls were analyzed separately.

4.5.4 Relationship between infant feeding and anthropometric status

Differences in percentile values for length-for-age (LA), weight-for-age (WA), and weight-for-height (WH) at the ages 3 and 18 months were examined by feeding mode at three months, and age of introduction to solids.

4.5.5 Relationship between dietary intake and anthropometric status

Differences in percentile values for HA (height-for-age),WA, and WH for the 33 and 48-month olds, were examined by feeding mode at three months, and age of introduction to solids. Nutrient intakes at 48-months between children who are $\geq 85^{th}$ percentile WH and $<85^{th}$ percentile were compared. As well, differences based on BMI $\geq 85^{th}$ percentile and $<85^{th}$ percentile were examined.

4.5.6 Relationship between infant feeding and maternal and demographic characteristics

Factors associated with breast-feeding initiation, and duration were identified using data collected from the first interview. To examine factors associated with the age of introduction to solids and cow's milk, data from the 3 and 18 month interviews were utilized. For the infants at 18 and 33 months, the effects of various demographic characteristics on food intake/variety were examined.

4.6 Statistics

Differences in sample means were assessed using T-tests (when there were two groups) and Analysis of Variance (ANOVA) (when there were three or more groups). To describe relationships between variables, logistic regression was used. For all statistical

tests, significance cutoff was $p<0.05$. For the logistic regression, a significance level of $p<0.10$ was the criterion for the inclusion of variables.

5.0 Results

The cohort of First Nations children consisted of 52 males and 50 females. Questionnaires and anthropometric measures were conducted when children were 3, 18, 33, and 48-months of age. For a list of measures at each interview, refer to appendices 11-14. The number of children at each questioning and assessment period can be seen in figure 1. For all analyses, eight children whose birthweight was below 2500g and the child of the single male respondent were excluded.

5.1 Demographic profile

The demographic profile of the 102 respondents is in table 5.1. Parental characteristics were obtained at the time of their first interview. Of the 101 females and one male interviewed, 84 had their first interview when the child was 3 months of age, 10 when the child was 18 months and seven when the child was 33 months.

The average age of the mothers at the time of birth was 25.38 (± 6.77) years. Over 90% of the mothers reported Ontario as their place of birth. Almost two thirds of the mothers had less than a high school education (63.4%). The education of the partner as reported by the respondent indicated that 68.4% had less than a high school education. Of the mothers who were interviewed at 3 months post-partum, 13.7% were working; this increased to 31.4% by the 18 or 33-month interview (based on first response). Sixty-one percent of the partners (as reported by the respondent) were employed. Single parent households were reported by 41.2% of the respondents. The number of siblings living in the home ranged from zero to seven, with 39.6% of the respondents reporting no siblings.

All 102 families were below the low-income cutoff (Statistics Canada, 1998c) with a mean income of $23,455.51 (± 4602.18).

Table 5.1 Demographic profile of families living in the Walpole Island community at the time of their first interview

	no. (%)
Respondents Birthplace (n=99)	
Ontario	91 (91.9)
United States	8 (8.1)
Respondents Education Level (n=102)	
primary and some high school	65 (63.7)
completed high school	20 (19.6)
> high school	17 (16.7)
Education of Partner (n=58)	
primary and some high school	40 (69.0)
completed high school	7 (12.1)
> high school	11 (19.0)
Respondent Currently Working for Pay (n=74) **	
Yes	10 (13.5)
No	64 (86.5)
Respondent Employed (n=97)***	
Yes	32 (31.4)
No	65 (63.7)
Partner Employed (n=58)	
Yes	36 (61.0)
No	23 (39.0)
Single Parent Household (n=102)	
yes	42 (41.2)
no	60 (58.8)
Number of children living in the home (n=101)	
zero	40 (39.6)
one	20 (19.8)
two	19 (18.8)
three or more	22 (21.8)

** Only asked during the 3 month interview

***Only asked during 18, 33 & 48 month interviews

5.2 Infant feeding practices and their relationship with maternal and demographic characteristics

The feeding characteristics examined include feeding method at birth, feeding method at 3-months, and the age of introduction to solids and milks. Relationships between feeding practices and parental characteristics were examined based on responses from the 3 and 18-month interviews.

5.2.1 Feeding method at birth

The initiation rate for breastfeeding was 75% (n=84) (Table 5.2). Women who breastfed (24.4 ± 6.5 years) were younger than those who formula fed (28.0 ± 6.9) (t=2.74; p=0.008). Women who attended prenatal classes and belonged to a clan were more likely to initiate breastfeeding (table 5.3). A higher proportion of the women who breastfed had partners who did not work part-time, and did not have other children compared to those who formula fed. The decision to formula feed or breastfeed at birth was not associated with the birthweight of the infant.

The five variables associated with feeding method at birth; partner's part-time employment (x^2 =6.45; p=0.01), belonging to a clan (x^2 =4.97; p=0.03), attending prenatal classes (x^2 =3.82; p=0.05), having siblings in the home (x^2 =3.89, p=0.05), and maternal age (t=2.74; p=0.008) were going to be used in logistic regression analysis. However, there were only 29 partners who were employed part-time, thus this variable was excluded from the logistic regression. Of the remaining four variables, none were predictive of infant feeding at birth (table 5.4).

Table 5.2 Characteristics of infants living in the Walpole Island community

	no. (%)	mean ± sd
Sex of Child (n=102)		
Male	52 (51.0)	
Female	50 (49.0)	
Birthweight of child (g) (n=96)		3396.25 ± 651.57
Birthweight <2500g**	8 (8.3)	1973.87 ± 637.35
Birthweight >2500g	88 (91.7)	3535.56 ± 477.43
Feeding at Birth (n=84) ****		
Breastfed	63 (75.0)	
Formula fed	21 (25.0)	
Feeding at 3 months (n=63)		
Exclusively Breastfed	17 (27)	
Partially Breastfed	13 (20.6)	
Exclusivity Unknown ******	8 (12.7)	
Stopped Breastfeeding	25 (39.7)	
Introduction to Milk (n=69)		
Regular Milk		
6-9 months	8 (11.6)	
9-12 months	15 (21.7)	
12-15 months	5 (7.2)	
15-23 months	0 (0.0)	
1% or 2 Milk		
6-9 months	8 (11.6)	
9-12 months	19 (27.5)	
12-15 months	5 (7.2)	
15-23 months	9 (13.0)	
Age of Introduction to Solids (n=48)		
< 4 weeks	1 (2.1)	
5-8 weeks	8 (16.7)	
9-12 weeks	13 (27.1)	
13-16 weeks	26 (54.2)	

** These children are not included in additional analyses
**** From the 3-month
and 18-month interviews
****** These children were breastfed at 3 months, however exclusivity is unknown- they are excluded from comparisons between formula fed and breastfed infants

Table 5.3 Characteristics of mothers who initiated breastfeeding (n=63) or formula feeding (n=21) *

Characteristic	Breastfeeding no. (%)	Formula Feeding no. (%)
Mother's Birthplace		
Ontario	57 (90.0)	20 (95.2)
United States	6 (10.0)	1 (4.8)
Mother's Education (n=94)		
<High School	37 (63.8)	14 (77.8)
>= High School	21 (36.2)	4 (22.2)
Partner's Education (n=54)		
<High School	23 (65.7)	8 (80.0)
>= High School	12 (34.3)	2 (20.0)
Mother's Currently Working (at three months) (n=74)		
Yes	6 (12.5)	4 (22.2)
No	42 (87.5)	14 (77.8)
Partner Working Full time (n=54)		
Yes	18 (46.2)	3 (27.3)
No	21 (53.8)	8 (72.7)
Partner Working Part time (n=32) **		
Yes	5 (23.8)	6 (75.0)
No	16 (76.2)	2 (25.0)
Single Parent Household (n=94)		
Single	24 (38.1)	10 (47.6)
Not Single	39 (61.9)	11 (52.4)
Number of Siblings at home (n=93) **		
Zero	30 (48.4)	5 (23.8)
One	15 (24.2)	2 (11.8)
Two	9 (14.5)	7 (33.3)
Three or more	8 (12.9)	7 (33.3)
Belong to a Clan (n=75) **		
Yes	35 (68.6)	6 (37.5)
No	18 (31.4)	10 (62.5)
Attended Prenatal Classes (n=91) **		
Yes	36 (57.1)	6 (31.6)
No	27 (42.9)	13 (68.4)
Smoked During Pregnancy (n=85)		
Yes	21 (37.5)	8 (40.0)
No	35 (62.5)	12 (60.0)

Characteristic	Breastfeeding no. (%)	Formula Feeding no. (%)
Consumed Alcohol During Pregnancy		
Yes	12 (23.5)	6 (35.3)
No	39 (76.5)	11 (64.7)
Other Smokers in the Home (n=72)		
Yes	22 (40.7)	8 (44.4)
No	32 (59.3)	10 (55.6)

* not all subjects responded to every question
** $p<0.05$

Table 5.4 Factors predictive of infant feeding at birth* (n= 64)

Factor	Odds Ratio	95% Confidence Intervals	Coding
Belonging to a clan	3.64	0.89-14.94	Yes=1, No=0
Attending pregnancy classes	4.30	0.94-19.72	Yes=1, No=0
Having siblings at home	1.51	0.19-11.96	No=1, Yes=0
Maternal age	0.91	0.80-1.03	Continuous

*Feeding at birth was coded so that formula feeding =0, and breastfeeding =1

5.2.2 Feeding at age three-months

By three months of age, only 27% (n=63) of the mothers were exclusively breastfeeding, and 20.6% were partially breastfeeding (Table 5.2). An additional eight infants (12.7%) were being breastfed at 3 months, however exclusivity could not be determined, and they were excluded from further analyses. There were no differences between mothers who exclusively breastfed and those who stopped (table 5.5). Neither the maternal age nor birthweight of infant was associated with breastfeeding to age three months. For the logistic regression, both belonging to a clan ($x^2=3.10$; $p= 0.08$) and

current smoking (at first interview) (x^2=2.80; p= 0.09) were used. In the logistic regression, partially breastfed infants were grouped with the formula fed infants, and classified as not following the infant feeding recommendations. Belonging to a clan was identified as a predictor (table 5.6).

Table 5.5 Characteristics of mothers still exclusively breastfeeding (n=17) at three months and those who stopped (n=38)***

Characteristic	Breastfeeding no. (%)	Stopped no. (%)
Mother's Birthplace		
Ontario	17 (100)	35 (92.1)
United States	0 (0.0)	3 (7.9)
Mother's Education		
<High School	10 (58.8)	22 (66.7)
>= High School	7 (41.2)	11 (33.3)
Partner's Education		
<High School	6 (60)	14 (66.7)
>= High School	4 (40)	7 (33.3)
Mother's Currently Working (at three months)		
Yes	2 (15.4)	4 (14.8)
No	11 (84.6)	23 (85.2)
Partner Working		
Yes	8 (100)	14 (51.9)
No	0 (0.0)	13 (48.1)
Single Parent Household		
Single	8 (47.1)	12 (31.6)
Not Single	9 (52.9)	26 (68.4)
Number of Siblings at home		
No Siblings	7 (41.2)	19 (50.0)
Siblings	10 (58.8)	19 (50.0)
Belong to a Clan		
Yes	7 (46.7)	22 (73.3)
No	8 (53.3)	8 (26.7)
Attended Prenatal Classes		
Yes	12 (70.6)	21 (55.3)
No	5 (29.4)	17 (44.7)
Currently Smoking		
Yes	3 (20.0)	17 (44.7)
No	12 (80.0)	21 (55.3)
Currently Consuming Alcohol		
Yes	0 (0.0)	12 (46.2)
No	7 (100)	14 (53.8)
Other Smokers in the Home (n=48)		
Yes	5 (33.3)	14 (42.2)
No	10 (66.7)	19 (57.6)

* does not include the 8 children for whom exclusivity of breastfeeding is unknown
** not all subjects responded to every question

Table 5.6 Factors predictive of infant feeding at 3-months *(n= 41)

Factor	Odds Ratio	95% Confidence Intervals	Coding
Currently Smoking	4.99	0.91-27.31	No=1, Yes=0
Belonging to a clan	6.67	1.37-32.48	Yes=0, No=1

* Feeding at 3-months was coded so that not exclusive breastfeeding=0, and exclusive breastfeeding =1

5.2.3 Age of introduction to solids

Forty-eight children were introduced to solids before 4 months of age (Table 5.2). There were no differences in the proportion of infants fed according to the recommendations for introduction to solids compared to those who were not based on: maternal birthplace, maternal education, partner's education, employment of mothers and their partners, single parent households, belonging to a clan, attendance at prenatal classes, currently smoking, others smoking in the home, the consumption of alcohol, and how the infant was fed at birth. Having no siblings in the home was associated with early introduction of solids ($x^2 = 7.07$; $p= 0.008$). The age of the mothers and infant birthweight were not associated with the early introduction of solids.

Infants who were introduced to solids before four months were further subdivided according to their age at introduction of solids (below 8 weeks, 9-12 weeks and 13-16 weeks). There were no significant differences found among these groups.

5.2.4 Age of introduction to milk

The age of introduction to regular milk ranged from 6-15 months, and low fat milk was given between the ages of 6 and 23 months (Table 5.2). A total of 16 children (23.2%) were introduced to milk between the ages of six and nine months, and were

classified as "not following milk recommendations"; of these children, half were receiving low fat milk. An additional 47.8% of the children (n=69) were given low fat milk after 9 months of age. These children were classified as "not following the fat recommendations in milk". The remaining 29% of the children received regular milk, as their first type of milk; however, of these children, 25% were given low fat milk before two years of age. Mothers who were non smokers and introduced their infants to solids before 16 weeks, were more likely to follow the recommendations regarding the introduction of milk (table 5.7). Infant's birthweight and maternal age were not associated with the adherence to milk recommendations.

Currently smoking ($x^2 = 8.08$; $p=0.02$), and age of introduction to solids (above or below 16 weeks) ($x^2 = 6.50$; $p=0.04$) were associated with following milk recommendations and were included in the logistic regression, and both were identified as predictors of following milk recommendations (table 5.8).

Table 5.7 Characteristics of mothers following (n=20) and not following milk recommendations (n=49) *

Characteristic	Not following Milk Recommendations no (%)	Following Recommendations no (%)
Mother's Birthplace		
Ontario	46 (93.9)	19 (95.0)
United States	3 (6.1)	1 (5.0)
Mother's Education		
<High School	33 (75.0)	10 (58.8)
>= High School	11 (25.0)	7 (41.2)
Partner's Education		
<High School	19 (67.9)	10 (83.3)
>= High School	9 (32.1)	2 (16.7)
Mother Working		
Yes	16 (33.3)	7 (36.8)
No	32 (66.7)	12 (63.2)
Partner Working		
Yes	19 (63.3)	9 (64.3)
No	11 (36.7)	5 (35.7)
Single Parent Household		
Single	18 (36.7)	7 (35.0)
Not Single	31 (63.3)	13 (65.0)
Siblings at home		
No Siblings	17 (35.4)	9 (45.0)
Siblings	31 (64.6)	11 (55.0)
Belong to a Clan		
Yes	23 (59.0)	9 (56.3)
No	16 (41.0)	7 (43.8)
Attended Prenatal Classes		
Yes	25 (52.0)	11 (55.0)
No	23 (48.0)	9 (45.0)
**Currently Smoking ** **		
Yes	21 (45.7)	4 (20.0)
No	25 (54.3)	16 (80.0)
Currently Consuming Alcohol		
Yes	15 (41.7)	4 (30.8)
No	21 (58.3)	9 (69.2)
How Infant was fed at Birth		
Breastfed	38 (77.6)	15 (75.0)
Formula Fed	11 (22.4)	5 (25.0)

Characteristic	Not following Milk Recommendations no (%)	Following Recommendations no (%)
Age of Introduction to Solids **		
Below 16 weeks	24 (51.1)	16 (84.2)
Above 16 weeks	23 (48.9)	3 (15.8)
Feeding at 3-months		
Exclusively Breastfeeding	13 (30.2)	3 (15.0)
Stopped Breastfeeding	19 (44.2)	12 (60.0)
Formula Feeding (from birth)	11 (25.6)	5 (25.0)

* not all subjects responded to every question
** $p<0.05$

Table 5.8 Factors predictive of following milk recommendations* (n= 63)

Factor	Odds Ratio	95% Confidence Intervals	Coding
Currently smoking	6.39	1.49-27.29	No=1, Yes=0
Early Introduction to solids	6.89	1.52-29.19	No=1, Yes=0

*Following milk recommendations was coded so that following recommendations =1, and not following recommendations =0

In summary, the proportion of infants who were fed according to the current recommendations varied from 29% for introduction to milk after 9 months and introduction of low fat milk after 2 years to 75% for breastfeeding at birth (Table 5.9).

Table 5.9 Proportion of children fed according to infant feeding recommendations

	Following no. (%)	Not Following no. (%)
Breastfeeding at Birth	63 (75.0)	21 (25.0)
Breastfeeding at Three Months*	17 (27.0)	39 (61.9)
Following any milk recommendations **	20 (29.0)	49 (71.0)
Not following recommendations for regular and low fat milk		16 (23.1)
Not following fat recommendations		33 (47.9)
Introduction to Solids after 4 months of age	36 (42.9)	48 (57.1)

* excluding the 8 children for whom exclusivity is unknown
** based on first milk given

5.3 Dietary intakes of preschoolers

The diets of children were assessed at 18, 33, and 48 months of age. At 18 and 33 months, parents were read a list of foods and asked to identify what the child had consumed. A single 24-hour recall was completed when the child was 48-months of age.

5.3.1 Food group consumption

During the 18-month interview, parents identified which foods their infant consumed in the past 7 days; foods were grouped according to the four food groups from the Canada's Food Guide for Healthy Eating (Health Canada, 1997). During the 33 month interview, parents identified foods which their infant had consumed in the previous 24-hours. Table 5.10 and 5.11 highlight the proportion of children consuming the various foods.

Table 5.10 Proportion of infants consuming foods from the four food groups during the previous week at age 18 months (n=73)

Food	Yes no. (%)	No no. (%)
Grain Products		
Pablum, Cooked Cereal	46 (63.0)	27 (37.0)
Ready to Eat Cereals	64 (87.7)	9 (12.3)
Breads, Crackers, Pancakes	72 (98.6)	1 (1.4)
Pasta	70 (95.9)	3 (4.1)
Meats and Alternatives		
Eggs	60 (82.2)	13 (17.8)
Chicken, turkey, beef, pork, lamb	65 (89.0)	8 (11.0)
Fish	30 (41.7)	42 (58.3)
Processed meats (hotdogs, bologna)	64 (87.7)	9 (12.3)
Peanut butter, tofu, baked beans, lentils	46 (63.0)	27 (37.0)
Dairy Products		
Yogurt, Milk Pudding, Ice Cream	65 (89.0)	8 (11.0)
Cheese	67 (91.8)	6 (8.2)
Vegetable and Fruits		
Potatoes (including french fries)	72 (98.6)	1 (1.4)
Red, Yellow and Orange Vegetables	62 (84.9)	11 (15.1)
Green Vegetables	63 (86.3)	10 (13.7)
Bananas	61 (83.6)	12 (16.4)
Other raw fruit	70 (95.9)	3 (4.1)
Canned Fruit	37 (50.7)	36 (49.3)
Fruit Juice	66 (90.4)	7 (9.6)
Other Foods		
Cookies, Cake, Other Pastry	62 (84.9)	11 (15.1)
Snack foods	66 (90.4)	7 (9.6)
Candy, Pop, Popsicles	55 (75.3)	18 (24.7)

Table 5.11 Proportion of preschoolers consuming foods from the four food groups during the previous 24 hours at age 33 months (n=84)

Food	Yes no. (%)	No no. (%)
Grain Products		
Pablum, Cooked Cereal	32 (36.8)	55 (63.2)
Ready to Eat Cereals	67 (76.1)	21 (23.9)
Breads, Crackers, Pancakes	81 (93.1)	6 (6.9)
Pasta	66 (75.9)	21 (24.1)
Meats and Alternatives		
Eggs	47 (53.4)	41 (46.6)
Chicken, turkey, beef, pork, lamb	76 (86.4)	12 (13.6)
Fish	12 (14.0)	74 (86.0)
Processed meats (hotdogs, bologna)	63 (72.4)	24 (26.1)
Peanut butter, tofu, baked beans, lentils	30 (34.1)	58 (65.9)
Dairy Products		
Yogurt, Milk Pudding, Ice Cream	62 (70.5)	26 (29.5)
Cheese	55 (62.5)	33 (37.5)
Vegetable and Fruits		
Potatoes (including french fries)	68 (77.3)	20 (22.7)
Red, Yellow and Orange Vegetables	48 (54.5)	40 (45.5)
Green Vegetables	42 (48.3)	45 (51.7)
Bananas	54 (62.1)	33 (37.9)
Other raw fruit	65 (73.9)	23 (26.1)
Canned Fruit	21 (24.1)	66 (75.9)
Fruit Juice	78 (88.6)	10 (11.4)
Other Foods		
Cookies, Cake, Other Pastry	57 (64.8)	31 (35.2)
Snack foods	61 (70.1)	26 (29.9)
Candy, Pop, Popsicles	57 (64.8)	31 (35.2)

At 18 months, most children ate at least one food from each of the four food groups, however one child did not consume any dairy products (milk consumption was not asked). In the fruit and vegetable food group, intakes were variable, 11 children consumed no red, orange, or yellow vegetables and 10 children consumed no green vegetables. The only vegetable consumed by three children was potatoes. One child did not consume any fruits or vegetables besides potatoes.

At 33 months, a large number of children ate at least one food from each of the four food groups, however the number of children missing a food group was much higher. A total of 10 children did not consume any fresh or canned fruits; one of these children did not have any fruit juice as well. Forty-five children consumed no green vegetables, and 15 children consumed no red, orange or yellow vegetables. One of the children consumed no meats and alternatives and another child consumed no dairy products (milk consumption was not asked).

5.3.2 Dietary intakes at 48-months

Dietary intakes were initially examined by gender, however there were no differences in nutrient intakes between males and females. Therefore, data were combined.

The mean and median intakes for all nutrients except for energy, folate and calcium exceeded current recommendations (table 5.12).

Folate is one of the nutrients that has a calculated Estimated Average Requirement (EAR); therefore intakes were assessed using the EAR cut point method. A

total of 60.7% (n=89) of the preschoolers had intakes below the median (EAR) requirement of 160 ug/day.

The mean calcium intake of 726 mg/day was below the Adequate Intake (AI) of 800 mg/day. Over half of the children had intakes below the AI, however the prevalence of inadequate intakes cannot be determined using only an AI value (Food and Nutrition Board, 2000).

Table 5.12 Energy, nutrient and fibre intakes compared to current recommendations (n=89)

Nutrient	Unit	RNI *	EAR**	RDA**	AI**	Mean Intake	Median Intake	% below Recommendation
Energy	kcal/day	1800				1657 ± 502	1615	59 (66.3)
Protein						56 ± 23	52	
Fat						57 ± 25	54	
Fibre	g/day	9				11.4 ± 6.7	10	36 (40.4)
Thiamin	mg/day		0.5	0.6		1.5 ± 0.8	1.3	2 (2.2)
Riboflavin	mg/day		0.5	0.6		1.6 ± 0.6	1.4	0 (0.0)
Niacin	mg/day		6	8		24.2 ± 10.5	21.8	0 (0.0)
Folate	ug/day		160	200		151.9 ± 71.8	144.5	54 (60.7)
Vitamin C	mg/day		22	25		86.3 ± 76.3	58.2	18 (20.2)
Calcium	mg/day				800	726 ± 360	631	55 (61.8)
Iron	mg/day			10		11.6 ± 4.9	10.6	31 (34.8)
Zinc	mg/day			5		6.8 ± 3.1	6.3	27 (30.3)
Vitamin A	ug/day			400		585.9 ± 561.6	430.2	39 (43.8)

* Health and Welfare Canada, 1990
**Food and Nutrition Board, 2000

The current energy recommendation for preschoolers is 1800 kcal/day (Health and Welfare Canada, 1990). Mean energy intake was 1657 kcal, with 66% of the children having intakes below 1800 kcal.

The percentage of energy coming from protein, fat and carbohydrates was 13.4, 30.7, and 57.7 respectively. These percentages are consistent with the 1990 Canadian recommendations (Health and Welfare Canada, 1990).

Several nutrients have calculated upper tolerable levels (UL), above which individuals are at risk of adverse health effects from excessive nutrient intake (table 5.13). The only nutrient which preschoolers are exceeding the UL is niacin. All 89 children had niacin intakes above the EAR, 87.7% exceeded the UL.

5.13 Proportion with inadequate nutrient intakes and at risk of excessive nutrient intakes (n=89)

Nutrient	Unit	RDA*	Less than RDA (%)	EAR*	Less than EAR (%)	UL*	Greater than UL (%)
Thiamin	mg/day			0.5	2 (2.2)		
Riboflavin	mg/day			0.5	0 (0)		
Niacin	mg/day			6	0 (0)	15	78 (87.7)
Folate	ug/day			160	54 (60.6)	400	0 (0)
Vitamin C	mg/day			22	18 (20.2)	650	0 (0)
Calcium	mg/day					2500	0 (0)
Iron	mg/day	10	31 (34.8)				
Zinc	mg/day	5	27 (30.3)				
Vitamin A	ug/day	400	39 (43.8)				

* Food and Nutrition Board, 2000

For iron, zinc and vitamin A, only RDA values have been established. Although the mean and median intakes are above the RDAs, 34.8%, 30.3% and 43.8% of preschoolers had intakes below the RDAs for iron, zinc and vitamin A respectively.

5.3.3 Comparison of preschoolers with intakes of calcium and folate who were above or below the recommended intakes

Twenty-four hour recalls were completed for 73 preschool children aged 45.5-52.5 months. The nutrients with the largest proportion of children at risk of inadequate intakes were folate and calcium. The estimated average requirement for folate is 160 ug/day, and the Adequate Intake for calcium is 800 mg/day (Food and Nutrition Board,

2000). The proportion of children below these recommendations were 60.7% and 61.8% for folate and calcium respectively.

To compare parental factors associated with differences in nutrient intakes, preschoolers were divided into two groups, those who had intakes above the recommendations for both folate and calcium and those who had intakes below the recommendations. The remaining children were excluded from further analyses. Forty-eight children fell into the two categories with 31 children (66%) having intakes below folate and calcium recommendations and 16 children (34%) having intakes above the folate and calcium recommendations. No differences in proportion of preschoolers above and below the recommendations for both folate and calcium were found according to: maternal birthplace, maternal age, education of partners, employment of mothers, single parent households, siblings in the home, belonging to a clan, attendance to prenatal classes, currently smoking, the consumption of alcohol, maternal BMI, and the child's birthweight. The child's feeding history including feeding at birth, duration of breastfeeding, age of introduction to solids and adherence to milk recommendations were not associated with intakes of folate and calcium.

Belonging to a clan ($x^2 = 5.57$; $p=0.02$) was associated with differences in folate and calcium intakes. If the mother belonged to a clan, her child was more likely to have folate and calcium intakes below the recommendations. For the purposes of logistic regression, full-time employment of partners was also included as its significance was $p<0.1$ ($x^2 =2.93$; $p=0.09$).

Logistic regression was conducted, however the low number of partners employed full-time (n=25) decreased the sample size to 19 individuals. Instead, since

dietary sources of calcium and folate are very different, the nutrients were separated to see what factors were associated with each individually.

The only factor associated with calcium intake below 800 mg/day was belonging to a clan ($x^2 = 8.45$; p=0.004); mothers who belonged to a clan were less likely to follow calcium recommendations. Maternal education was the only factor associated with the intake of folate ($x^2 = 3.96$; p=0.05); mothers who had at least a high school education were more likely to have children not meeting the folate recommendation of 160 ug/day compared to those without a high school education. Since only one factor was associated with calcium and folate, logistic regression could not be conducted.

Legumes and vegetables, particularly green leafy vegetables are very high in folate (Whitney and Rolfes, 1999). To assess whether a lack of green vegetable consumption at 33 months was associated with folate intakes below recommendations at 48 months, folate intake was assessed for children who did and did not consume any green vegetables (in the previous 24-hours) at 33 months of age (n=45). Green vegetable consumption at 33 months was not associated with folate levels at 48 months (t=1.57; p=0.121). Associations between green vegetable intake at 18 months and folate levels at 48 months could not be assessed as the period of measurement varied.

5.4 Anthropometric measures

Data collection, including anthropometric measurements, was supposed to be conducted at age three months (± 2 weeks) and at 18, 33, and 48 months (± 4 weeks). However in Walpole Island, anthropometric measures were often not conducted at the time of the parent interview and the age ranges are much greater. Appendix 15 shows the

age distribution for the anthropometric measures for infants at their first measurement session.

Due to these large age ranges, children were initially grouped in small age groups (six months for infants up to one year and then twelve months up to the five years). The proportion of children within these groups less than the 10^{th} percentile or greater than or equal to the 85^{th} percentile for weight-for-age, length/height-for-age and weight-for-height is shown in Table 5.14.

To examine growth at the time of planned assessments, only children within 4 weeks of their 3, 18, 33 and 48 month birthdays were included. The proportion of children less than the 10^{th} percentile or greater than or equal to the 85^{th} percentile for weight-for-age, length/height-for-age and weight-for-height is shown in Table 5.15. A small proportion of children at all ages had values below the 10^{th} percentile for weight-for-age, length/height-for-age and weight-for-height. For all age groups, more than 15% of children were taller and heavier than the NCHS reference data for weight-for-age, length/height-for-age and weight-for-height.

Table 5.14 Proportion of infants from birth to 48 months of age < 10th percentile and ≥85th percentile for selected anthropometric measures

Age in Months	N	<10th %ile no (%)	≥ 85th %ile no (%)
Weight-for-Age			
2.5-5.9 months	44	0 (0.0)	19 (43.2)
6-11.9 months	18	0 (0.0)	4 (22.2)
12-23.9 months	59	0 (0.0)	22 (37.3)
24-35.9 months	87	4 (4.6)	32 (36.8)
36-47.9 months	38	0 (0.0)	16 (42.1)
≥ 48 months	56	1 (1.8)	19 (33.9)
Length/Height-for-Age			
2.5-5.9 months	45	4 (8.9)	13 (28.9)
6-11.9 months	18	0 (0.0)	6 (33.3)
12-23.9 months	60	3 (5.0)	24 (40.0)
24-35.9 months	85	4 (4.7)	28 (32.9)
36-47.9 months	37	0 (0.0)	12 (32.4)
≥ 48 months	58	2 (3.4)	13 (22.4)
Weight-for-Height			
2.5-5.9 months	43	1 (2.3)	13 (30.2)
6-11.9 months	18	1 (5.6)	1 (5.5)
12-23.9 months	58	4 (6.9)	19 (33.8)
24-35.9 months	84	4 (4.8)	23 (27.4)
36-47.9 months	26	0 (0.0)	12 (46.2)
≥ 48 months	52	2 (3.8)	13 (25.0)

Table 5.15 Proportion of children <10th percentile and ≥85th percentile for selected anthropometric measures when age at measurement was ±4 weeks of their 3, 18, 33 and 48 month birthdays

	n	<10th %ile n(%)	≥85th %ile n(%)
3 Months (2.5-4 months)			
Height for age(cm)	23	1 (4.3)	7 (30.4)
Weight for age (kg)	23	0 (0.0)	12 (52.5)
Weight for Height	23	1 (4.3)	4 (17.4)
18 Months (17-19 months)			
Height for age(cm)	23	0 (0.0)	9 (39.1)
Weight for age (kg)	23	0 (0.0)	8 (34.8)
Weight for Height	23	1 (4.3)	6 (26.1)
33 Months (32-34 months)			
Height for age(cm)	42	2 (4.8)	14 (33.3)
Weight for age (kg)	42	1 (2.4)	17 (40.5)
Weight for Height	41	2 (4.9)	13 (31.7)
48 Months (47-49 months)			
Height for age(cm)	45	0 (0.0)	15 (33.3)
Weight for age (kg)	41	0 (0.0)	16 (37.2)
Weight for Height	41	2 (4.7)	11 (25.6)

Similar results were found for head circumference of infants aged 2.5 to 30 months (table 5.16). The proportion of infants with head circumferences below the 10th percentile ranged from 3.1-20%; however, the proportion of children with head circumferences above the 85th percentile were much higher, ranging from 30-65.6%. The prevalence of higher weight was not limited to the children. A high proportion of mothers were overweight (BMI 25-29.9) (27.5%) and an additional 29.4% were obese (BMI ≥ 30).

Table 5.16 Proportion of infants <10th percentile and ≥ 85th percentile for head circumference

	Number of children	<10th percentile n (%)	≥85th percentile n (%)
<3.0 months	10	2 (20.0%)	3 (30.0%)
3.0-5.9 months	31	1 (3.2%)	16 (51.6%)
6-11.9 months	18	2 (11.1%)	5 (27.8%)
12-17.99 months	19	3 (15.8%)	10 (52.6%)
18-23.99 months	32	1 (3.1%)	21 (65.6%)
24-30 months	19	1 (5.3%)	8 (42.1%)

5.5 Relationship between infant feeding and parental characteristics and weight-for-height percentiles at the second and third assessment periods

Infant feeding patterns and parental characteristics were compared for children above and below the 85th percentile for weight-for-height at the second and third assessment periods.

Sixty-one children ranging in age from 17.1 to 34.3 months (mean age 21.9 ± 4.0 months), had weight and height measurements taken as part of their second assessment. Twenty children (32.8%) had weight-for-height percentiles ≥ 85th percentile.

During the third assessment, measurements were taken for 65 children; however one child was excluded due inaccurate measurements. The ages of the remaining 64 children ranged from 31.9 to 45.5 months, with a mean age of 34.6 ± 2.4. The number of children with weight-for-height ≥ 85th percentile was 21 (32.8%).

No differences in percent of preschoolers above and below the 85th percentile for weight-for-height at either assessment period were found according to: maternal birthplace, education of mothers and their partners, employment of mothers and their partners, single parent households, number of child's siblings in the home, belonging to a

clan, attendance to prenatal classes, currently smoking, the consumption of alcohol, and the birthweight of the child (appendices 16 and 17). The child's feeding history, including feeding at birth, duration of breastfeeding, age of introduction to solids and adherence to milk recommendations, was not associated with weight-for-height at either the second or third assessment periods. Maternal age was significantly associated with infants weight-for-height, however this was only seen in the second assessment (t= -3.21; p=0.002). Mothers who were younger were more likely to have children with weight-for-height $\geq 85^{th}$ percentile.

For the purpose of logistic regression at the second assessment period, having siblings (x^2 =3.19; p=0.074), infant feeding at birth (x^2 = 2.73; p=0.099), maternal BMI at second interview (t=-1.84; 0.072), and maternal age (t=3.21; p=0.002) were included. Logistic regression analysis was not conducted for the third assessment as only maternal BMI at the third interview (t=-1.74; p=0.088) had an association with $p<0.1$.

Results for the logistic regression at the second assessment period can be seen in table 5.17. Having siblings was identified as a predictor of weight-for-height $\geq 85^{th}$ percentile.

Table 5.17 Factors predictive of weight-for-height as above or below the 85^{th} percentile at the second assessment period*

Factor	Odds Ratio	95% Confidence Intervals	Coding
Maternal BMI	0.92	0.80-1.05	Continuous
How infant was fed	6.07	1.00-36.75	BF=0, FF=1
Having siblings	6.54	1.15-37.28	Yes=0, No=1
Maternal Age	1.05	0.89-1.24	Continuous

*Weight-for-height was coded so that weight-for-height $\geq 85^{th}$ percentile =1, weight-for-height $<85^{th}$ percentile=0

5.6 Relationship between infant feeding, dietary intakes, parental characteristics and anthropometric status at 48-months

Comparisons were made between children at 48 months of age who were above and below the 85th percentile for weight-for-height and BMI to determine whether there were differences in their dietary intakes and what factors were predictive of overweight.

5.6.1 Comparison of dietary intakes between children above and below the 85th percentile for weight-for-height and BMI

The Mann-Whitney U test was utilized to compare energy and nutrient intakes of children who were above and below the 85th percentile for weight-for-height and for children who were above and below the 85th percentile for BMI. Differences between the two groups for both weight-for-height and BMI were not statistically significant.

5.6.2 Factors predictive of overweight at 48-months

Seventy children between the ages of 45.5 and 52.5 months completed the weight and height portions of the anthropometric measurements. From these values, weight-for-height percentiles and BMI were calculated.

The number of children ≥85th percentile for weight-for-height and BMI were 18 (25.7%) and 21 (30.0%) respectively. All 18 children who were ≥85th percentile for weight-for-height were also were ≥85th percentile for BMI.

No differences in percent of preschoolers above and below the 85th percentile for both weight-for-height and BMI were found according to: maternal birthplace, maternal age, education of mothers and their partners, employment of mothers and their partners, number of child's siblings in the home, belonging to a clan, attendance to prenatal

classes, currently smoking, the consumption of alcohol and gender of the child. The child's feeding history including feeding at birth, duration of breastfeeding, age of introduction to solids and adherence to milk recommendations, was not associated with obesity at four years (see appendix 18). The birthweight of the child was positively associated with the preschooler's weight-for-height (t=3.19; p=0.003) and BMI (t= 3.7; p=0.002) at the 48 month interview. Single parent households were positively associated with both preschooler's BMI (x^2=4.79; p=0.029) and weight-for-height (x^2 =3.54; p=0.06).

Current maternal BMI (calculated based on self reported weight and height of mothers at time of fourth interview) (n=42) was not associated with either weight-for-height (t=1.89; p>0.05) or BMI (t=1.47; p>0.05) of the child. When recoding maternal BMI as underweight (<18.5), normal (18.5-24.9), overweight (25-29.9) and obese (≥30) (appendix 14), maternal BMI became positively associated with the child's weight-for-height (x^2 =7.73; p=0.021). The association between the recoded maternal BMI and the child's BMI remained nonsignificant (x^2 =3.73; p>0.05); however it became significant when recoded as above or below 25 (x^2 =4.36; p=0.04).

Maternal BMI, the birthweight of the child, and single parent household, were included in the logistic regression for weight-for-height of preschoolers < or ≥85th percentile. Birthweight of the child was not identified as a predictor after logistic regression was conducted; however, both single parent households and maternal BMI continuous or categorical (above and below a BMI or 25) were predictive of children's BMI as a variable. The predictability of children's BMI was much greater when maternal BMI was categorical (table 5.18a and 5.18b).

Table 5.18a Factors predictive of weight-for-height ≥85th percentile at 48-months (n=40) when maternal BMI was continuous*

Factor	Odds Ratio	95% Confidence Intervals	Coding
Birthweight of child	1.00	1.00-1.01	Continuous
Maternal BMI continuous	1.17	1.01-1.35	Continuous
Single Parent Household	0.124	0.02-1.00	No=1, Yes=0

*weight-for-height was coded so that weight-for-height ≥85th percentile=1, and weight-for-height <85th percentile =0

Table 5.18b Factors predictive of weight-for-height ≥85th percentile at 48-months (n=40) when maternal BMI was categorical*

Factor	Odds Ratio	95% Confidence Intervals	Coding
Birthweight of child	1.00	1.00-1.01	Continous
Maternal BMI above or Below 25	17.89	1.66-193.05	>25=1 <25=0
Single Parent Households	0.09	0.10-0.86	No=1, Yes=0

*weight-for-height was coded so that weight-for-height ≥85th percentile=1, and weight-for-height <85th percentile =0

In addition to the three variables associated with BMI of preschoolers ≥85th percentile: birthweight of the child, single parent households and maternal BMI as above or below 25, having siblings (yes or no) was included (x^2 =3.14; p=0.08). Maternal BMI (categorical) and single parent households were predictors of preschoolers BMI in the logistic regression analysis (table 5.19).

Table 5.19 Factors predictive of BMI ≥85th percentile at 48-months (n=40)

Factor	Odds Ratio	95% Confidence Intervals	Coding
Birthweight of child	1.00	1.00-1.01	Continuous
Maternal BMI as above or Below 25	6.75	1.09-41.88	>25=1 <25=0
Single Parent Household	0.07	0.01-0.61	No=1, Yes=0
Having Siblings	0.27	0.04-1.79	Yes=0, No=1

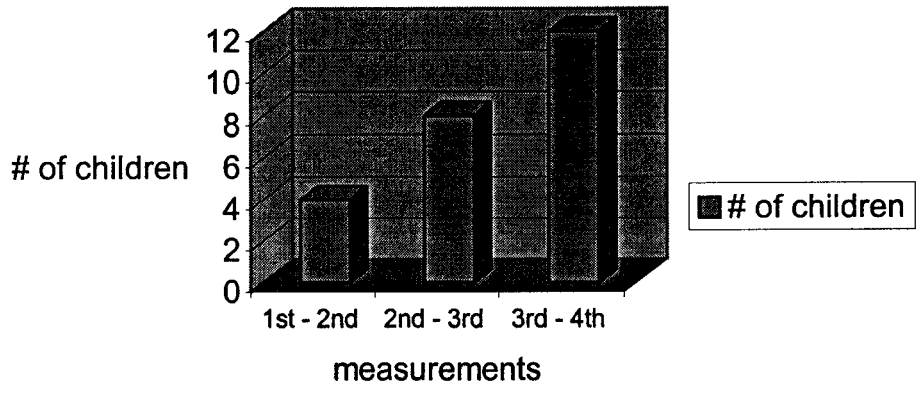
*BMI was coded so that BMI ≥85th percentile=1, and BMI <85th percentile =0

5.7 Tracking of weight-for-height

The number of children who remained above the 85th percentile for at least two consecutive assessments can be seen in Figure 1. Of the four children who tracked between the 1st and 2nd measurements, one child remained above the 85th percentile for all four measurements. Four additional children remained above the 85th percentile from the 2nd to the 4th measurement. The highest proportion of children tracked between the third and fourth measurement period (12 children); however due to these low numbers, it was not possible to look at factors associated with the tracking of weight for height >85th percentile.

There were also several children whose weight-for-height fluctuated above and below the 85th percentile. One child was >85th percentile for the 1st measurement, below the 85th percentile for the second, and surpassed the 85th for both the 3rd and 4th measures. Two children tracked for the 1st and 3rd measures, and three children for the 2nd and 4th.

Figure 5.1 Tracking of weight-for-height across four measurements



6.0 Discussion

Better Beginnings Better Futures is a multidisciplinary, longitudinal project, which takes a community wide collaborative approach to help prevent health and social problems in children living in economically disadvantaged communities in Ontario. Walpole Island, one of the younger cohort sites, is unique as it is a First Nations community. The analyses provide information on the feeding practices, dietary intakes and anthropometric status of children from birth to 48-months of age living in Walpole Island. These are the first nutritional data on First Nations children in Ontario since the National Nutrition Canada Survey in 1972 (Nutrition Canada, 1975).

It has been estimated that 16.4% of all Canadian families are living below the poverty line (National Council of Welfare, 1998). However in the Walpole Island cohort, all families were living below the low-income cutoffs (Statistics Canada, 1998c).

Low levels of education and high unemployment may be partially responsible for such high poverty rates. Among all Canadian women, 49.3% have less than a high school education, and an additional 15% have completed high school; the remainder have at least some post-secondary education (Statistics Canada, 1998a). These values are higher than education rates for all Canadian Aboriginal women, as 55.8% have not completed high school, and an additional 11.8% have graduated from high school (First Nations and Northern Statistics, 2001). In Walpole Island, a higher proportion of women have less than a high school education (63.7%) when compared to both Canadian women and Canadian aboriginal women. However, more women have completed high school (19.6%).

The national unemployment rate for men and women was 7.7% (Statistics Canada, 2002), in 1998; the rate was 8.6% (Statistics Canada, 1999a). In this cohort, unemployment rates for men and women were much higher, with 39% of men and 63.7% (from 2nd, 3rd or 4th interview), and 86.5% (based on 1st interview) for women.

In addition to having low education and high unemployment, many of the families (41.2%) in Walpole Island are lone parent. This value is higher than for all Canadians (16.4%) and all aboriginal Canadians (32.1%) (Statistics Canada, 1998b).

Single parent status and low income have been linked to increased incidence of low birth weight babies (Statistics Canada, 2001). These factors may help explain why the incidence of low birth weight was higher (8.3%) than the national rate of 5.6% (Statistics Canada, 1999b), and resembled other low-income Ontario communities (7.0%) (Evers et al, 1998).

6.1 Infant feeding practices

Infant feeding practices were determined based on maternal responses from the first and second interview. Few maternal and demographic characteristics were associated with infant feeding practices. This may be due to the small size and the homogeneity of the cohort. Other associations may be a consequence of multiple bivariate analyses.

6.1.1 Mode of feeding at birth

The current infant feeding recommendations encourage exclusive breastfeeding for the first four to six months (Canadian Paediatric Society, Dietitians of Canada, Health Canada,1998). In Canada, from available studies, recent breastfeeding rates have ranged between 69 and 96% (Evers et al, 1998; Lee-Han et al, 1998; Nolan and Goel, 1995; Schwartz and Evers, 1998; Sheehan et al, 1999; Sheehan et al, 2001; Williams et al, 1996).

Walpole Island falls right in the middle with an initiation rate of 75%. This rate is comparable to other communities participating in the Better Beginnings Better Futures Project (77%) (Evers et al, 1998), and higher than the most recent First Nations data (64% in the Mohawk Nation on the Territory of Kahnawake, Quebec [Macaulay et al, 1989]).

In Walpole Island, all women had household incomes below the low income cut-offs, a higher proportion were less educated and more were single parents when compared to other low income Ontario communities (Evers et al, 1998). These factors were not associated with the initiation of breastfeeding in Walpole Island. However, in non-native Better Beginnings, Better Futures communities, mothers who were married, had a higher level of education, and did not experience financial stress, were more likely to breastfeed (Evers et al, 1998). Education and marriage have been linked with breastfeeding initiation in higher income communities as well (Williams et al, 1996; Williams et al, 1999).

The current findings indicate that part-time employment of the partner, number of siblings in the home, belonging to a clan, attending prenatal classes and maternal age are

associated with breastfeeding initiation. Compared to other low-income communities, attending prenatal classes is the only factor consistently associated with the initiation of breastfeeding. Factors influencing breastfeeding initiation resemble the Quebec Mohawk community as following native traditions (belonging to a clan) and more breastfeeding advice (attending prenatal classes) were associated with feeding at birth in both First Nations communities. In the Mohawk community, associations between breastfeeding initiation and education, income or employment of the mothers were not examined.

In contrast to the Mohawk community, in Walpole Island mothers who initiated breastfeeding were younger than formula feeding mothers. This cannot be attributed to attendance at prenatal classes or belonging to a clan; these possibilities were checked and no associations were found. This finding is also at variance with other studies on factors associated with breastfeeding initiation (Macaulay et al, 1989) which have reported an increase in the percentage of women who initiate breastfeeding with an increase in age. The positive influences on the decision to breastfeed should be identified in future research; such data could be the basis for renewed education efforts with young women elsewhere.

6.1.2 Continuation of breastfeeding

Of the infants breastfed at birth in this study, 60.3% were still being breastfed at 3 months. However, only 27% were exclusively breastfed. Adherence to the breastfeeding recommendation is slightly higher than other Better Beginnings, Better Futures communities where only 20% of infants were exclusively breastfed for 3 months (Schwartz and Evers, 1998). Data on breastfeeding duration is very limited in First

Nations communities. In the Mohawk Nation on the Territory of Kahnawake, Quebec, 65% of infants were being fed breast milk at 3 months; however, exclusivity is not known.

In Walpole Island, there were no factors associated with the duration of breastfeeding. This cohort is homogeneous; all families were below the low-income cut-offs, 92% of the women were born in Ontario, 63.7% had below a high school education, and, at the time of the first interview, 86.5% of the women were not working (in subsequent interviews, this decreased to 63.7%). Therefore, the presence of minimal significant predictors of breastfeeding duration was expected. Although one predictor was identified, the overall characteristics of this cohort match the factors associated with early weaning identified in previous research. Belonging to a clan was identified as a predictor of early cessation of breastfeeding, as women not belonging to a clan were over 6 times more likely to be exclusively breastfeeding at 3 months (OR 6.67; CI 1.37-32.48) ($p<0.5$). The relationship between belonging to a clan and adhering to feeding recommendations must be addressed in future research.

In non-native low income communities, older, non smoking, well educated women who participated in a home visitors program breastfed for longer durations (Evers et al, 1998), and in Sudbury, high income, well educated Anglophone mothers with at least one previous child had longer durations of breastfeeding (Bourgoin et al, 1997). Results from the NPHS (National Population Health Survey) and the NLSCY (National Longitudinal Survey on Children and Youth) found that infants were more likely to be weaned prematurely if their mothers were young, single or had lower levels of income and education (Health Canada, 1998).

6.1.3 Introduction of solids

Despite infant feeding guidelines recommending that infants not be introduced to solids until at least four months of age, more than half the children (57%) were given solids before four months. Previous studies examining age of introduction to solids used cutoffs of either 3 or 4 months, thus comparisons using both these cutoffs are made. In Walpole Island, 26% of the cohort was given solids before 12 weeks. This is similar to other Better Beginnings, Better Futures, communities where 33% of infants were given solids by 3 months (Schwartz and Evers, 1998).

In this study, the majority of children (54.2%) were introduced to solids between 12 and 16 weeks. This pattern resembles other studies. In the Ottawa-Carleton region, in 1988, 1992 and 1996, between 16% and 23% of infants were given solids by 3 months; by 4-months, this increased to 58%-75% (Kwavnick et al, 1999).

In contrast to previous studies in low- income Ontario communities and other Canadian cities, there was no difference in age of introduction to solids between breastfed and formula fed infants. In past research, mothers who were formula feeding were more likely to introduce solids earlier (Kwavnick et al, 1999; Schwartz and Evers, 1998; Williams et al, 1996). In Walpole Island, 57% of the infants who were breastfed at birth and 57% of those who were formula fed received solids before four months. Among mothers who breastfed at birth, the introduction of solids was not associated with full or partial termination of breastfeeding. The only factor associated with meeting the recommendation for age at introduction to solids was having siblings in the home. Perhaps with subsequent pregnancies women are more aware of the recommendations.

In Ottawa, women who were older, well-educated, married, with a higher income and who breastfed were less likely to introduce solid foods early (Kwavnick et al, 1999). Although feeding at birth had no effect on introduction to solids, the entire Walpole Island cohort was low-income and a high proportion of mothers were single and had a low level of education. This may in part, explain why such a large proportion of the children were given solids earlier than recommended.

6.1.4 Introduction to cow's milk

Infants should not receive cow's milk until 9 months, and fat reduced milk is not recommended until 2 years of age (Canadian Paediatric Society, Dietitians of Canada, Health Canada, 1998). In Walpole Island, adherence to these recommendations was poor. Twenty-three percent of children were given milk between the ages of 6 and 9 months, half of whom were being given fat reduced milk. An additional 47.8% were given low fat milk between the ages of 9 and 24 months. The remaining infants (29%) were initially fed following the recommendation as the first type of milk given was regular milk at age 9 months or older; however, by two years, 25% of these children were being given fat reduced milk.

In the few studies which have reported on the age of introduction of cow's milk, compliance with recommendations was much greater. In low-income Ontario communities, only 2.4% of infants under 3 months were given cow's milk in addition to formula (Schwartz and Evers, 1998), in North York (Ontario) 1.3% of infants were given cow's milk before 6 months (Lee-Han et al, 1998), and in Vancouver, 6.1% of infants under 9 months were fed cow's milk (Williams et al, 1996).

Non smokers and mothers who introduced solids before the recommended age of 16 weeks, were more likely to follow milk recommendations. Not smoking is a positive health behaviour, thus these women may have a greater awareness of infant feeding recommendations. Regarding the association between early age of introduction to solids and adherence to the recommendation on feeding of cow's milk, this may simply be consequence of multiple bivariate analyses.

The high intake of cow's milk before 9 months of age is a concern. Compared to human milk, cow's milk contains greater amounts of protein and minerals (calcium, phosphorous, sodium, chloride and potassium) and lower amounts of essential fatty acids (linoleic and alpha linolenic acid) zinc, vitamin C and niacin (Canadian Paediatric Society, Dietitians of Canada, Health Canada,1998). Thus the renal solute load is two times higher than that of breast fed infants (Fuchs et al, 1992). This high renal load could cause dehydration when an infant becomes ill (e.g. diarrhea or vomiting) as cow's milk may not supply enough free water (Fomon, 1993).

Introduction to cow's milk before the age of 3 months has been associated with an increased risk for insulin dependent diabetes mellitus, especially in children identified as being at high risk (based on HLA-DQB1 molecular marker) (Kostraba et al, 1993; Virtanen et al, 1993). This may be of concern in Walpole Island as many children are introduced to milk when they are very young.

The prevalence of iron deficiency anemia in Europe is 2.3% (Hb< 110 g/L), and is more frequent among low-income infants (aged 12-months). The strongest determinant of low iron status was the early introduction to cow's milk (Male et al, 2001). In addition to cow's milk, infants born to anemic mothers or mothers who smoked during pregnancy

were at a greater risk of developing anemia (Freeman et al, 2000). Among 9 month-old James Bay Cree infants in northern Quebec, the prevalence was much higher at 31.9% when a hemoglobin cutoff value of 110 g/L was used, and 7.9% when a cutoff value of 100 g/L was used (Willows et al, 2000). Infants who were exclusively breastfed, exclusively given cow's milk or fed a combination of breastmilk, formula and cow's milk were at increased risk compared to formula fed infants (information on consumption of solids was not collected) (Willows et al, 2000). In Walpole Island, since a high proportion of children were introduced to cow's milk before 9 months, children may be at an increased risk of anemia.

The Joint Working Group of the Canadian Paediatric Society and Health Canada (1993) stress that the Nutrition Recommendations do not apply to children under the age of two years. During infancy a high fat diet (around 50% of energy from fat) helps ensure that adequate amounts of energy and fatty acids are consumed. From the age of two years changes in preschoolers diets should be made so that 30% of energy as fat (no more than 10% as saturated fats) will be achieved (Canadian Paediatric Society, Dietitians of Canada, Health Canada,1998). This is why the current guidelines encourage parents to give children regular milk until 2 years of age (Canadian Paediatric Society, Dietitians of Canada, Health Canada,1998).

In the United States research into reducing fat intakes in children has included an assessment of the effects of feeding children low fat milk at 12 months of age. Recent results have found that consuming 2% milk has lowered the intakes of total fat and saturated fats in infants compared to those consuming whole milk, without altering their total energy intake, height, weight and percentage body fat (Wosje et al, 2001). Although

fat intakes were reduced in the toddlers, the long-term effects of reducing fat (including the possible changes in essential fatty acid intakes) are unknown (Wosje et al, 2001). Therefore, to ensure the health of children, parents should be taught to refrain from using low-fat milk until the child has reached two years of age.

6.2 Dietary intake of preschoolers

At 18 and 33 months, the food group with the least variety of foods consumed was fruits and vegetables (particularly vegetables), this low consumption of vegetables was evident in the 24-hour recall conducted at 48 months as children were at risk of inadequate intakes of folate and vitamin C in addition to iron.

6.2.1 Food group consumption

Guidelines on healthy eating for preschoolers encourage the selection of a variety of foods from each food group everyday. Between the ages of 2 and 5, preschoolers should consume child-sized servings of grains and fruits and vegetables from the lower range of recommended servings from Canada's Food Guide to Healthy Eating, 2-3 child sized portions of meats and alternatives as well as 2 cups of milk and a child-sized serving of another milk product (Health Canada, 1995).

There are a limited number of studies which focus on the intakes of preschool children based on the four food groups. Leaman and Evers (1997) reported the average number of servings consumed by 4-year-old children (n=302) within each of the four food groups: 4.4 servings of grain products, 3.4 servings of fruits and vegetables (2.0 fruits, 1.4 vegetables), 1.0 servings of milk products and 2 servings of meats and

alternatives. Mean intakes in each food group were similar to those identified by Campbell (1993), except for fruit. Campbell (1993) reported a mean intake of 2.7 servings, Leaman and Evers reported 2 servings. In both studies, the combined fruit and vegetable intakes were below the 5 servings recommended by Canada's Food Guide to Health Eating. This was also found by Leung et al. (1994).

In Walpole Island, majority of children at both 18-months and 33-months were eating at least one food from each of the four food groups, however the variety of foods consumed in the fruits and vegetable groups was low. Over the span of 7 days, 15% of preschoolers consumed no red, orange or yellow vegetables, and an additional 13.7% consumed no green vegetables. Similar findings were seen at 33-months; 45.5% of children had no red, orange or yellow vegetables, 51.7% had no green vegetables, and 11.4% did not have any fresh or canned fruits. These results confirm the low intake of vegetables and fruits identified in previous research (Campbell, 1993; Leaman and Evers, 1997; Leung et al, 1994).

Compared to the nutrient content of foods consumed by preschoolers in non-native Better Beginnings, Better Futures Communities, children in Walpole Island may be at greater risk of inadequate intakes of folate, vitamin A and vitamin C, due to their low intakes of vegetables and fruits. If children are not receiving 2 glasses of milk daily, they may also have low consumptions of calcium, riboflavin and vitamin D. All children at 18 and 33-months (except one child at 33-months) consumed at least one serving of meats and alternatives. However, at 18-months, 11% of children were not fed any chicken, turkey, beef, pork of lamb in the previous week, and 13.6% of children at 33-

months did not consume these meats in the previous day. In both age groups, if these are consistent dietary patterns, children are at risk of inadequate intakes of iron and zinc.

6.2.2 Dietary intake at 48-months

The 24-hour recall has been found to be a valid and reliable method for assessing the food intakes of preschoolers (Klesges et al, 1987). Further investigation into the accuracy of the mother, father and family group (parents and child) in recalling what the child consumed in the previous 24-hours has revealed that reasonable assessment of their child's intake was provided by both the mother and father individually; however the consensus of mother, father and child was more accurate (Eck et al, 1989). Both under-reporting and over-reporting errors were reduced when consensus was utilized.

Focusing on maternal recall of their child's intake, Baranowski et al. (1991) examined how socioeconomic status and the amount of time mothers spend with their child affected the accuracy of the child's dietary intake. The amount of time mothers spent with their children had no impact on the accuracy of nutrient estimates and percent agreement in identifying foods. However, only 13 of the 27 "not at home" mothers could provide information on their child's full day diet compared to 27 of the 29 "at home" mothers. In this case, both under and over reporting were higher than previous studies with values of 18% and 10% respectively. Socioeconomic status had no impact on the mother's ability to report what the child had eaten and resulting nutrient estimates and percent agreement in identifying foods.

Therefore, in 1998, when dietary data were collected for Better Beginnings, Better Futures communities, single 24-hour recalls were sufficient for determining nutrient

intakes of groups of children. The low-income characteristics of the communities would not have a negative impact on the results. With the recent release of the Dietary Reference Intakes (DRIs), single 24-hour recalls are no longer considered adequate to assess the prevalence or inadequate nutrient intakes within a group, as usual intakes of the nutrient in the group must be known (Food and Nutrition Board, 2000). To calculate usual intakes, at least two days of independent dietary intake data for a representative sub sample of the group are needed (Food and Nutrition Board, 2000). Twenty-four hour recalls were collected in 1998, making it impossible to collect a second recall. Therefore, DRIs are being applied to the results of a single 24-hour recall.

In Walpole Island, children were at risk of inadequate intakes of folate (60.7%), and vitamin C (20.2%). Sixty-two percent of children had calcium intakes below the adequate intake; however, the prevalence of inadequate intakes cannot be determined (Food and Nutrition Board, 2000). For iron, zinc and vitamin A, only RDAs exist. Although the mean and median intakes of these nutrients are above recommendations, some children are at risk of inadequate intakes. Vitamin A is not of great concern as vitamin A is a fat-soluble vitamin for which body stores are likely high. In addition, vitamin A is also concentrated in only a few foods.

For certain nutrients a maximum limit of intake, called the upper tolerable limit (UL), has been set; if intakes exceed this limit, there is a risk of adverse effects (Food and Nutrition Board, 2000). The only nutrient whose mean and median intake has surpassed the UL is niacin. A total of 87.7% of children have intakes above the maximum limit of 15 mg/day. Although a high proportion of children are exceeding the UL, adverse effects

are not severe and do not occur until intake is three to four times the RDA (Whitney and Rolfes, 1999).

Previous research into nutrient intakes of preschoolers have referred to an assortment of nutrition recommendations; however, general comparisons can be made. In other low-income Ontario communities, the median nutrient intakes met 100% of the RNIs for all nutrients, and the 10^{th} percentile values for most nutrients were close to the recommended amounts (Evers and Hooper, 1996). In these communities, children were still at risk of inadequate intakes of calcium, iron and zinc (Evers and Hooper, 1996). The mean intake of folate was 155 ± 90 ug (Evers and Hooper, 1996), thus meeting the RNI for 4-6 year old children of 70 ug (Health and Welfare Canada, 1990). However, the new DRI for 4-6 year old children is 160 ug (Food and Nutrition Board, 2000), and based on these new recommendations, children in non-native Better Beginnings, Better Futures communities would be at risk of inadequate folate intakes as well. In the two northern Manitoba First Nations communities of Cross Lake and Garden Hill, at least 25% of children were below the RNIs (released in 1975) for iron, zinc, calcium, vitamin A, thiamin, niacin, folate, vitamin D and vitamin E (Ellestad-Sayed et al, 1981). A smaller proportion of children were also at risk of inadequate intakes of vitamin C and riboflavin (Ellestad-Sayed et al, 1981).

In Northern Manitoba, children were at risk of inadequate intakes of all nutrients; however it is important to note that these data were collected in 1974. In addition, Cross Lake and Garden Hill differ from Walpole Island in that they are northern communities accessible only by air (Ellestad-Sayed et al, 1981), introducing the issue of cost of food. When comparing the costs of 46 food items in the Thrifty Nutritious Food Basket for

Northern Communities, Wein (1994) demonstrated that in Southern Yukon the cost of the basket was 127-181% higher than in Edmonton, Alberta. These costs increased up to 318% in Northern Yukon. Since Walpole Island is a southern community, the actual cost of food may not be an issue; however, income could have an effect on the foods being purchased. Myres and Kroetsch (1978) examined the influence of family income on food consumption patterns and nutrient intakes in Canadians. For preschoolers aged 1-4 years, those from low-income families had lower mean intakes of nutrients, resulting from lower intakes of dairy products, meat, poultry, fish, eggs, fruits and vegetables. Lower income children had higher consumption of margarine, breakfast cereals, bread, other grain mixtures and products, as well as potatoes. Casey et al. (2001) found similar patterns in American children aged 1-5 years. Children from food-insufficient low-income homes consumed significantly lower amounts of fruits, nonwhole grains, dark green leafy vegetables, other vegetables, yogurt, nuts and seeds, and aged sugar than higher income children.

For healthy individuals over the age of two years, the diet should provide at least 55% of energy as carbohydrates, 13-15% as protein and a maximum of 30% as fat (of this 30%, a maximum of 10% can be saturated fats) (Health and Welfare Canada, 1990). (Although modifications to these recommendations suggest that from the age of two until the end of linear growth, fat intakes should be slowly reduced to a maximum level of 30% (Canadian Paediatric Society and Health Canada, 1993), in order to compare intakes with other communities, a value of 30% was selected). In Walpole Island, the distribution of energy closely resembled these recommendations with 13.4%, 30.7% and 57.7% of energy from protein, fat and carbohydrates respectively. These values are almost

identical to other Better Beginnings, Better Futures sites where the energy contribution from protein was 14%; fat, 30%; and carbohydrates, 56% (Evers and Hooper, 1996). The energy distribution was similar to First Nations communities; however, fat levels were lower. In Manitoba First Nations communities, fat intakes for preschool children ranged from 39-40% (Ellestad-Sayed et al, 1981), and in the Mohawk community of Akwesasne in New York fat intakes of 2-5 year old children was 33% (Harvey-Berino et al, 2000). A possible reason for the lower fat intakes in Walpole Island is the type of milk consumed. In American children aged 2 to 5 years, whole milk was the largest source of both total and saturated fats (Thompson and Dennison, 1994). In Walpole Island, a high proportion of children consumed fat reduced milk, thereby decreasing their fat intakes.

In agreement with previous research, energy intakes (1657 ± 502 kcal) in Walpole Island preschool children were below recommended levels. In low income 4 and 5 year old children, Evers and Hooper, (1996) reported intakes of 6590 KJ (1574 kcal). In the American Mohawk community of Akwesasne, mean energy intake was 1,462 kcal per day (Harvey-Berino et al, 2000). Although this intake is below the recommendation of 1800 kcal (Health and Welfare Canada, 1990), many of the children were below 4 years of age. When applying the recommendation for 2-3 year olds (1300 kcal) (Health and Welfare Canada, 1990), intakes of the Mohawk children surpassed the recommendation. Similar to the Mohawk community, although 30-39% of children did not meet energy recommendations, mean and median intakes of 3-month old children from the northern First Nations communites of Cross Lake and Garden Hill exceeded energy intakes (Ellestad-Sayed et al, 1981).

Sixty-one percent of children had folate intakes below the recommended 160 ug/day, and 62% of children had calcium intakes below the AI of 800 mg/day (Food and Nutrition Board, 2000). Calcium and folate are very important nutrients in growing children as calcium is used for the development of teeth and bones, and folate is used in cell division and protein synthesis (Whitney and Rolfes, 1999). When comparing children above and below the intakes of both calcium and folate, belonging to a clan was the only variable associated with the nutrient intakes (full-time employment of partners was included in the logistic regression ($p>0.05$)). A possible reason for finding few associations is that the sources of calcium and folate are very different; therefore, calcium and folate intakes were also assessed individually. Calcium intake was associated with belonging to a clan, and folate intake was associated with maternal education. Although different factors influenced the intakes of calcium and folate, it was expected that more factors would have been identified. Previous research has identified that preschoolers from low-income families have lower intakes of a variety of foods including dairy products, fruits and vegetables (Casey et al, 2000; Myres and Kroetsch, 1978), thus a possible reason for lack of associations is the homogeneity of the sample in terms of employment and income. All families were below the low-income cutoff, and the majority of women were not working.

6.3 Anthropometric Status

Based on the NCHS growth curves, it was expected that no more than 15% of children would be above the 85th percentile; this was not the case in Walpole Island. When grouping children into 6-month age groups (from 3-48 months), the proportion of children above the 85th percentile for the NCHS growth curves for weight-for-age, height/length-for-age, and weight-for-height/length ranged from 22%-43%, 22%-40%, and 5.5%-46.2% respectively. These results demonstrate that children in Walpole Island are taller and heavier than the reference population. Further, less than the expected 10% of infants and preschoolers had weight-for-age, height/length-for-age, and weight-for-height/length below the 10th percentile, indicating that children were not at risk of wasting or stunting.

These results support findings from non-native Better Beginnings, Better Futures communities where a higher proportion of infants exceed the 85th and 95th percentiles of the NCHS growth curves for all growth indices (Evers and Hooper, 1996; Schwartz, 1996; Smith, 1998). In the United States, for low-income children from birth to 54 months, the overall prevalence of obesity (above the 85th percentile for weight-for-height) increased from 18.6% in 1983 to 21.6% in 1995. When based on the 95th percentile, obesity increased from 8.5% (1983) to 10.2% (1995) (Mei et al, 1998).

Growth data for First Nations communities, especially for children below 4-years of age is very limited, and in most reports children between the ages of 1 and 5 years are grouped together. In these First Nations communities, higher weights have been found. Between 1974 and 1977, 17% of 12-month old First Nations infants from southwestern Ontario exceeded the 95th percentile for weight-for-age (based on 1979 growth curves)

(Evers and Rand, 1982). This high prevalence of overweight has also been found more recently in the Sandy Lake Reservation (Northwest of Toronto) where 34.6% of boys and 45.2% of girls aged 2-5 years had BMIs $\geq 85^{th}$ percentiles (Hanley et al, 2000), and in the Mohawk communities of Kahnawake (Quebec) and Tyendinaga (Ontario) where between 20 and 37% of children between the ages of 6 and 11 years were above the 85^{th} percentile for BMI (Potvin et al, 1999). These results raise concerns for the potential of childhood obesity. However, a possible explanation for this high prevalence of overweight is that the NCHS growth curves are representative of all children in the United States, and may thus not be representative of the growth of First Nations Children. Regardless, the high incidence of NIDDM among Native Canadians and the strong association between obesity and the risk of NIDDM suggests that prevention of obesity in childhood is essential in the communities (Dean, 1998; Harris et al, 1996; Must et al, 1992; Young et al, 2000).

6.3.1 Factors associated with weight status at 18 and 33 months

In the first three months, mode of feeding was not associated with infant growth patterns (Schwartz, 1996). However, after 2-3 months of age, rate of growth in breastfed infants declines, as does their percentile ranking in the 1977 growth charts (Butte et al, 2000; Dewey et al, 1992; Dewey et al, 1995b; Duncan et al, 1984; Hitchcock et al, 1985; Hitckcock and Coy, 1989; Michaelsen et al, 1994). In female infants who were either exclusively breastfed or formula fed at 4-months, formula fed infants were significantly heavier at 9 and 12 months (Butte et al, 2000). Similar results were found by Hediger et al. (2000) as weight and weight-for-height were significantly lower at 8 and 11 months

for infants who were exclusively breastfed for four months when compared to infants who were partially breastfed at 4 months, infants who were breastfed for <4 months and infants who were formula fed from birth. However, in both studies as infants were introduced to other milks and foods, differences in body composition disappeared in the second year of life (Butte et al, 2000; Hediger et al, 2000). In Better Beginnings, Better Futures communities there were no differences in weight-for-age, height-for-age or weight-for-height when comparing feeding methods at birth and 18 months (Smith, 1998).

In Walpole Island, at the second assessment period (18-months) 32.8% of children were ≥85th percentile for weight-for-height. The only factor predictive of weight-for-height ≥85th percentile was having siblings, (OR 6.54; 95% CI- 1.15-37.28), as the risk of overweight is six times greater ($p<0.05$) for children who do not have any siblings. By the third assessment period (33-months), 32.8% of children were at risk of being overweight (≥85th percentile for weight-for-height).

The high prevalence of overweight in Walpole Island is consistent with previous research (Evers and Rand, 1982; Hanley et al, 2000; Smith, 1998). The lack of association with mode of feeding at birth and at 3-months was expected as any significant differences due to feeding diminished between 12 and 24 months (Butte et al, 2000; Hediger et al, 2000); these factors remained insignificant until the children reached 54-months (Hediger et al, 2000).

In Walpole Island there were also no associations between the early introduction to solids and anthropometric measures at 18 months. These results are consistent with Dewey et al, (1995b) as differences in weight disappeared by 12-months; however,

Dewey et al, (1995b) focused on children introduced to solids after 4 months. In non-native Better Beginnings, Better Futures Communities, although significant differences were found in length and head circumference, these were based on changes in length and head circumference, not absolute measures at 18-months (Smith, 1998).

6.3.2 Factors associated with anthropometric status at 48-months

The prevalence of overweight in First Nations children and its association with a variety of diseases including NIDDM makes research into factors predictive of obesity necessary. At the age of 48-months, there were no differences in nutrient and energy intakes between children who were above or below the 85th percentile for either weight-for-height and BMI, suggesting that diet may not be a key factor in obesity. These results confirm findings in non-Native Better Beginnings Communities where children categorized as "average" (15th to 85th percentile) and "above average" (> 85th percentile) for weight-for-height did not differ in their intakes of macronutrients or energy (Evers and Hooper, 1996).

Obesity in childhood has been associated with elevated blood pressure, elevated cholesterol levels, and asthma (Unger et al, 1990). Research has demonstrated that childhood obesity tracks into adolescence and adulthood (Guo and Chumlea, 1999; Rolland-Cachera et al, 1987), increasing the risk of numerous diseases including cardiovascular disease and diabetes (Must et al, 1992; Sinaiko et al, 1999; Steinberger et al, 2001)

Of great concern is the prevalence of non-insulin dependent diabetes mellitus (NIDDM) among First Nations communities. In Canadian First Nations communities,

the prevalence of NIDDM among men and women above the age of 15 years is 3.6 and 5.3 times higher than the Canadian population (Young et al, 2000). The prevalence of NIDDM was not examined in Walpole Island, however due to the high prevalence of maternal obesity (27.5% overweight and 29.4% obese), it is estimated that the prevalence would be high. In the Sioux Lookout Zone prevalence of NIDDM in children under 16 years was 2.5/1000, with a ratio of 6:1 for females to males (Harris et al, 1996). In an Ojibwa-Cree community in Northern Manitoba, were obesity rates (BMI $\geq 85^{th}$ percentile) for children 4-19 were 60% and 64% for males and females respectively, obese children were at a greater risk of having diabetes or impaired fasting glucose (OR, 5.1; 95% CI, 1.51-17.0) (Young et al, 2000).

The strongest predictor of preschoolers and young children's BMI is the concurrent BMI of their mother (Baranowski et al, 1990; Hediger et al, 2001; Scaglioni et al, 2000; Strauss and Knight, 1999; Takahashi et al, 1999; Unger et al, 1990). If a mother was overweight, their child was 3 times more likely of being overweight, this risk increased to over 4-fold if the mother was obese (Hediger et al, 2001). In Walpole Island, this association was present at the fourth assessment period (48-months). Maternal BMI was calculated based on self reported weight and height of the mothers at time of interview.

Maternal BMI was found to predict both weight-for-height and BMI of preschool children. If a mother had a BMI >25, her child was almost 18 times more likely to be $\geq 85^{th}$ percentile for weight-for-height (OR 17.89; CI 1.67-193.05) ($p>0.05$), and a child was almost seven times more likely to have a BMI $\geq 85^{th}$ percentile (OR 6.75; CI 1.09-41.88) ($p<0.05$), however in all cases, the confidence intervals were very large. Living in

a single parent household is associated with a reduced risk of overweight compared to children in two parent household.

The reason maternal BMI was not associated with children's risk becoming overweight at 48-months may be the small sample size; only 43 children were included in the logistic regression models (the sample size was small because only 51 mothers reported their BMI).

Child's birthweight did not predict either BMI $\geq 85^{th}$ or weight-for-height $\geq 85^{th}$. This was unexpected because past research has found that birthweight above 3,500g was associated with obesity in 3-year olds (Takahashi et al, 1999) and was predictive of moderate obesity (85^{th}-94^{th} percentile) and severe obesity ($\geq 95^{th}$ percentile) at 5 years (O'Callaghan et al, 1997). It was expected that birthweight would also be associated with a child's weight-for-height $\geq 85^{th}$ percentile at both the 18 and 33-month assessment periods; however it was not.

Although not examined in Walpole Island, another factor which could influence BMI of preschoolers is their weight gain during infancy. Compared with the general population in the United States, Pima Indian infants have significantly higher weight-for-length values between the 1^{st} and 6^{th} month of life (Lindsay et al, 2002). Increase in weight in the first month of life (in addition to birthweight) has been associated with BMI at 3-years of age (Tanaka et al, 2001). Similar to the Pima Indians, children of Walpole Island may have significant increases in weight-for-length, putting them at greater risk of becoming overweight.

The prevalence of children $\geq 85^{th}$ for various anthropometric measures is above the expected 15% from the NCHS growth curves (Evers and Hooper, 1996; Mei et al, 1998;

Schwartz 1996; Smith, 1998). Hitchcock and Coy (1989) have demonstrated that infants from lower social groups were significantly heavier than infants from higher social groups at 9 and 12 months. Since the entire Walpole Island cohort was below the low-income cutoff, the higher proportion of children at risk of overweight is a likely consequence.

The lack of association between either feeding patterns or demographic characteristics and anthropometric measures indicate that other factors such as physical activity may have a more significant impact on early childhood obesity. Davies et al. (1995) demonstrated that in children aged 1.5-4.5 years, physical activity was correlated with level of body fat. In infants between the ages of 9-12 months, activity has been associated with increased skinfolds at two years of age (Wells and Ritz, 2001). Among 3-year old children limited playtime outdoors has been associated with obesity (BMI ≥ 18) (Takahashi et al, 1999). In older children aged 5-7 years television viewing (low physical activity) was associated with overweight (Muller et al, 1999), and a higher proportion of elementary school children who were not participating in organized sports were obese compared to more active children (O'Loughlin et al, 2000). Physical activity was not measured in Better Beginnings, Better Futures. Given the high prevalence of overweight among both mothers and children, this should be investigated further.

In Canada, the number of children who are not physically active enough to achieve health benefits ranges from 47%-70%, with Ontario falling in the middle with 54% (Health Canada, 2002a). Due to the low levels of physical activity, and increasing prevalence of overweight, Canada has developed Physical Activity Guidelines for children and youth. For children the guidelines recommend increasing time currently

spent on physical activity, starting with 30 minutes more per day. The amount of time spend on television, video games, computer games and surfing the net should be reduced, starting with 30 minutes less per day (Health Canada, 2002b).

6.3.3 Persistence of overweight

Few studies have examined the tracking of overweight through infancy and preschool children. It has been found that adiposity fluctuates during infancy and early childhood, and therefore does not track well into adolescence. Rolland-Cachera et al. (1987) demonstrated that of children who were $\geq 75^{th}$ percentile at one year of age, 41% remained $\geq 75^{th}$ percentile at 21 years. The age at the second rise of adiposity in children (adiposity rebound) has been identified as a factor influencing obesity in adolescence and early adulthood. Children who had an earlier age of rebound ($\leq$ 5.5 years) were significantly heavier (BMI) and had greater subscapular skinfolds at 21 years of age when compared to children with delayed rebound ($\geq$ 7.0 years) (Rolland-Cachera et al, 1987).

Once children surpassed the period of adiposity rebound, the risk of remaining overweight ($\geq 90^{th}$ percentile) for a 6-year period was 2.8 (95% CI 1.1-7.0) when comparing to non-overweight children, and the risk of remaining above the 75^{th} percentile for BMI was 1.5 (CI 1.4-1.6); this risk increased when at least one parent was obese 1.9 (CI 1.1-3.1). The risk of remaining underweight was 3.6 (CI 2.3-5.5) (Wang et al, 2000).

In Walpole Island, weight-for-height was followed for children from 3 to 48 months. During this period, the proportion of children who remained $\geq 85^{th}$ percentile for

weight-for-height increased with age, as 7% of children (4/57) tracked between 3 and 18 months, 12.7% of children (8/63) tracked between 18 and 33 months, and 18.2% of children (12/66) tracked between 33 and 48 months. Although the likelihood of tracking did increase with age, all children were assessed prior to their adiposity rebound, thus these weights may not track into adolescence. Since Better Beginnings, Better Futures, is an ongoing longitudinal study, future research should examine these children after adiposity rebound to determine the proportion that's weight-for-height continues to track.

6.4 Limitations

Walpole Island is a unique First Nations community located in Southwestern Ontario. The population is about 2000 people (Walpole Island, 2001), 102 of whom participated in the first four years of the Better Beginnings, Better Futures project. A cohort of 102 individuals is small, making data analysis difficult. Often the cohort was of insufficient size to run statistical tests or find statistically significant differences. For example, it was not possible to meet research objective 12 (tracking of weight for height $\geq 85^{th}$ percentile) and objective 7 (factors predictive of what children are fed at 18 and 33 months) because of the small number of children. In addition for objectives 3 and 10, few factors were associated with infant feeding and preschoolers risk of overweight, it is possible that the selected variables may not be associated in First Nations communities, or there is lack of variability within Walpole Island community; however, the lack of association may also be due to the small sample size.

Walpole Island was the only First Nations community included in Better Beginnings, Better Futures, thus all data analyzed pertained only to this First Nations

community. Each First Nations community has its own distinct characteristics, thus findings may not be generalized to all First Nations communities. However, the findings provide an idea of the dietary intakes and anthropometric status of children in other Native communities, and specify areas for future research or program development.

Anthropometric measures were supposed to be collected within 2 weeks of infants 3-month birthdays, and within 4 weeks of their 18, 33, and 48-month birthdays. The varying ages of children at time of assessment made it difficult to obtain accurate descriptions of the children at specified ages (3, 18, 33, and 48 months).

The revised NCHS growth curves were developed using data from cycles two and three for the National Health Examination Survey (NHES II and III) and three National Health and Nutrition Examination Surveys (NHANES I, II and III), and are thought to be representative of the growth of children in the United States (CDC, 2000). The NCHS growth curves were used to assess growth of children in Walpole Island; however it unknown if these curves accurately assess growth in First Nations children. Therefore, the rates of overweight and obesity may be slightly over-estimated.

Feeding practices of infants were determined from the first two interviews when the child was 3 and 18 months of age. Exclusivity of breastfeeding was therefore reported at three months, not at age four months. To determine age of introduction to solids and milk, responses from the 18-month interview were utilized. This may have introduced recall error as mothers were asked to report on how their infant was fed more than a year earlier.

Parental 24-hour recalls have been identified as a valid and reliable method for assessing preschoolers' food intake (Klesges et al, 1987). The single 24-hour recall was a

common method used for dietary assessment in several studies (Evers and Hooper, 1996; Frank et al, 1988). With the release of the new DRIs, single 24-hour recalls are no longer considered sufficient to assess nutrient intakes with a group. To apply the DRIs, at least two independent days of food intake from a representative sub sample are needed (Food and Nutrition Board, 2000). Collecting a second dietary intake in the Walpole Island cohort was not possible, as children are now 8 years of age. Therefore, DRIs were applied to single 24-hour recalls. Use of the DRIs with one 24-hour recall may slightly over or under estimate nutrient intakes as usual intakes were not known.

The use of 24-hour recalls have their own inherent limitations. Baranowski et al. (1990) identified ethnic differences in maternal recalls of their child's intakes: Caucasians and Mexican-Americans tended to underreport, and blacks tended to overreport. However, Native Americans were not examined, thus tendencies of overreporting and underreporting are not known. The third National Health and Nutrition Examination Survey identified that women who were overweight (BMI $\geq$ 27.3), had a low education (< 8 years) and were living below the poverty level were more likely to underreport their dietary intakes (Briefel et al, 1997). This could be of concern as underreporting mothers may also underreport intake of their children.

Stewart et al. (1987) identified that in both men and women, as relative weight increased, the level of underestimation also increased ($p<0.0001$), which led to misclassifications when relative weight was categorized. This may be a concern in Walpole Island. Although the prevalence of maternal overweight and obesity was high, these values may be underestimated as BMI was calculated from maternal self reported

weight and height. This underestimation of weight could also have lead to lower associations between children's BMI and weight-for-height and maternal BMI.

6.5 Summary and Conclusions

In Walpole Island, breastfeeding initiation rates were quite high at 75%; however as infants aged, fewer of the infant feeding recommendations were followed. At three months, a high proportion of infants were no longer exclusively breastfed (73%), by four months a high proportion had already been introduced to solids (62.3%), by 9 months (23.2%) had been given milk, and by two years an additional 47.8% were receiving low fat milk. No factors were identified as predictive of infant feeding at birth or the age of introduction to solids. Belonging to a clan was predictive of feeding at three months, and smoking status and age of introduction to solids were predictive of following milk recommendations.

Children were given a variety of foods at 18, and 33 months, however, the range of fruits and vegetable consumed was low. By 48 months some children were at risk of inadequate intakes of folate, iron, zinc, vitamin A, and vitamin C. Children at 48 months also had low intakes of calcium, but risk of inadequate intake could not be determined (Food and Nutrition Board, 2000). When comparing children above and below the 85th percentile for both BMI and weight-for-height, no differences in nutrient intakes were found. The percentages of energy coming from protein (13.4), fat (30.7%), and carbohydrates (57.7%) were consistent with the Canadian recommendations (Health and Welfare Canada, 1990). The intake of fat at the maximum level is not of concern as the fat recommendations for preschoolers remains controversial, with the most recent

Canadian recommendations from the age of two years until the end of linear growth, fat intakes should be slowly reduced to a maximum level of 30% (Canadian Paediatric Society and Health Canada, 1993).

In Walpole Island, there was no evidence of inadequate growth. At all four assessment periods, infants and children were found to be heavier and taller/longer than the NCHS growth curves. Between 18 and 48 months of age, 26 to 33% of children were at risk of becoming overweight. Maternal BMI was associated with preschoolers weight-for-height and BMI at 48 months of age.

Overall, compliance with infant feeding recommendations, and dietary recommendations in infants and children in Walpole Island is not very high, a high proportion of children are at risk of becoming overweight, and the persistence of being at risk of overweight is increasing as the children age.

7.0 Recommendations

Between the ages of three and 48-months there are many different changes in both diet and growth, thus recommendations will have to target children at specific ages as well as infants and children overall. Programs must support and encourage breastfeeding, educate mothers on infant feeding recommendations and Canada's Food Guide for Health Eating Focus on Preschoolers (Health Canada, 1995), and address maternal body weight. In addition, the entire Walpole Island community must be informed of the new Canadian Physical Activity Guidelines for children and youth (Health Canada, 2002b). Ideas for future research have been developed based on findings from this study.

7.1 Infant feeding

Adherence to all infant recommendations: initiation and duration of breastfeeding, and introduction to milk and solids were not very high. Walpole Island differed from other low-income communities in that very few factors were predictive of infant feeding practices. This First Nations community had a homogeneous identity; the entire cohort lived below low-income cutoffs, it had a low education rate, a high unemployment rate, and half the families were lone parent. Therefore, research into maternal decision-making regarding infant feeding must be conducted to better understand factors influencing their choices, and to target programs at these needs. Along with research to implement and encourage feeding recommendations, current programs in place must be evaluated.

Attending prenatal classes was associated with initiation of breastfeeding. Since breastfeeding initiation was quite high, these classes would be a good place to educate and support mothers on the recommended infant feeding practices. Prior to

implementing education programs, more research must be conducted to learn the most effective methods of education to use in this population. Continued support and education is needed postpartum, and can be maintained through a home visitors program, which was found to increase the duration of breastfeeding in other low-income communities (Evers et al, 1998). Education must focus on the key recommendations: to exclusively breastfeed for four months, to introduce solids after four months, and to give whole milk to infants after 9 months of age. In addition, belonging to a clan was the one factor, which emerged as being associated with infant feeding at birth and at three months, demonstrating the need to focus on native traditions within feeding programs.

The cost savings of breastfeeding has been identified as an important advantage of breastfeeding, especially in lower income communities. It has been calculated that the cost of formula is approximately twice as expensive as extra food for the mother while she is breastfeeding (Riordan, 1997). In addition are the cost savings from the treatment of childhood illnesses associated with lack of breastfeeding. In the United States a minimum of $3.6 billion would be saved from treating otitis media, gastroenteritis, and necrotizing enterocolitis if the duration of breastfeeding was increased to 5-6 months (Weimer, 2001). In Walpole Island, since all families are below the low-income cutoffs, education programs focusing on the economic benefits of breastfeeding would be very beneficial.

Food preferences of family members and exposure to a variety of foods have also been associated with the diversity of preschooler's diets (Skinner et al, 1998). Consensus in the likes and dislikes of foods between toddlers and another family member ranged between 82.1%-83.3%, consequently children were often not introduced to foods which

the parents disliked. An average of 81.1% of foods sampled by children were liked, demonstrating the importance of exposure to a variety of foods. In addition, Birch et al. (1998) have demonstrated that younger children are more accepting of new foods: in 4-7 month old infants, if given a food twice, their intake doubles, whereas at ages 2-5 years, between 8-10 exposures are needed to increase consumption. Mothers should be taught strategies for introducing new foods to preschoolers.

7.2 Dietary intakes of preschoolers

Preschoolers (18-48 months) with low intakes in fruits, vegetables and dairy products are at risk of inadequate intakes of a variety of nutrients. Parents of these children must be educated on the Canada's Food Guide for Healthy Eating, Focus on Preschoolers (Health Canada, 1995), and ways of introducing new foods to infant's diets. However, prior to implementing such programs, research into the consumption of traditional foods must be conducted. Citizens of this First Nation are still able to support their families through hunting, fishing, trapping, and guiding activities (Walpole Island, 2001), thus the influence of these foods on the diets of children must be understood. Although factors influencing the intakes of calcium and folate were conducted at 48-months, future research must address why nutrient intakes are so low (i.e. is it availability of food, cost of food, lack of cooking skills etc). This type of research will enable programs to target the specific needs of the community.

7.3 Risk of overweight

Between 26 and 33% of children between the ages of 18 and 48-months were at risk of becoming overweight ($\geq 85^{th}$ percentile for weight-for-height). At 48-months, infants above the 85^{th} percentile for both weight-for-height and BMI did not differ in macro and micro nutrient intakes compared to children below the 85^{th} percentile, thus programs must focus on enhancing physical activity (in addition to healthy eating). With the release of the new Canadian Physical Activity Guidelines for children and youth (Health Canada, 2002b), the first priority should be to develop and implement culturally appropriate physical activity programs throughout the community for children of all ages.

The high prevalence of overweight is not only evident in children, but among the mothers as well. Programs need to focus on the development of healthy eating behaviours and increasing physical activity among adults.

7.4 Additional future research

Over and underreporting of preschooler's intakes by mothers is associated with ethnicity (Baranowski et al, 1991). Individuals of First Nations descent were not examined, thus their over or underreporting tendencies are not known. Research should be undertaken to examine these practices to better assess dietary intakes.

Levels of physical activity were not assessed in this study; future research must assess types and amount of physical activity to help address the issue of overweight in the Walpole Island community.

The growth curves used to monitor growth of First Nations infants and children are the NCHS reference data (Kuczmarski et al, 2000). These growth curves are based

on National Examination Surveys conducted from 1963-1994, and include data from different racial groups in the United States (Kuczmarski et al, 2000): however, it is unknown if these growth curves accurately assess the growth of First Nations children. Additional research into the growth of children from various Native communities must be conducted to assess the accuracy of these curves.

Belonging to a clan was associated with several feeding practices of infants and children. When mothers followed Native traditions, they were more likely to initiate breastfeeding; however, they were also more likely to terminate exclusive breastfeeding before three months, and not provide their preschool children with sufficient dairy products (calcium intakes were below recommended levels). Further research into associations between Native beliefs/practices and the feeding of infants and children must be conducted to better understand how Native customs influence dietary intakes.

The cohort in Walpole Island was small, thus in the future; researchers should recruit additional birth cohorts to allow examination of the tracking of weight status. This will also enable further study into factors predictive of infant feeding practices and preschoolers' risk of overweight.

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Appendices

Appendix 1

Infant Feeding Recommendations

The following are excerpts from the recommendations issued in Canada by the Joint working Team of Canadian Paediatric Society, Dietitians of Canada and Health Canada (1998) for healthy term infants from birth to 24 months of age. These recommendations are based on available scientific evidence, and are intended for the use of health care professionals.

Breastfeeding is the optimal feeding method for infants. Infants should be exclusively breastfed for at least the first four months, and may continue until the child is 2 years of age or older.

Solids should be introduced to an infant's diet between the ages of 4-6 months. The order of introduction should be iron-fortified cereal (starting with rice cereal, barley and oats cereals then mixed cereals), vegetables, fruits, meats and alternatives. Egg whites should be avoided in 1st year.

In Canada the recommendations for pasteurized cow's milk are:

1. Pasteurized whole cow's milk may be introduced at 9 to 12 months of age and continued throughout the second year of life.
2. Partly skimmed milk (1% and 2%) is not routinely recommended in the first 2 years.
3. Skim milk is inappropriate in the first two years,
4. Soy (except soy formula), rice or other vegetarian beverages, whether or not they re fortified, are inappropriate alternatives to breast milk, formula or pasteurized whole cow's milk, formula or pasteurized whole cow's milk in the first two years.

Other fluids which should be avoided are: beverages containing caffeine and theobromine, sodas, fruit drinks, punches, beverages made with artificial sweeteners, excessive amounts of fruit juice, and herbal teas. (Canadian Paediatric Society, Dietitians of Canada and Health Canada, 1998).

Finger Foods should be introduced when the child is close to one year of age. It is recommended that parents start with textured purees and then proceed to finger foods including banana, cooked meat and poultry, cheese cubes, bread crusts, dry toast, soft cookies, vegetables and fruit

Appendix 2

Better Beginnings, Better Futures

Better Beginnings, Better Futures originated from the 1988 consolation paper, "Investing in Children: New directions in child Treatment and Child and Family Intervention", developed by the Ontario Ministry of Community and Social Services, The Ontario Child Health Study revealed that 1 in 6 children is suffering from serious emotional or behavioural problems which affect other aspects of overall health. This study found that an important risk factor was living in a low-income community, with a high proportion of families receiving social assistance or living in subsidized housing. A fundamental principle in "Investing in Children" is the importance of primary prevention with high-risk population such as these.

The Better Beginnings, Better Futures Project, first introduced by the Ontario Government in November 1989, is funded by three Ontario provincial Ministries (Community and Social Services, Health and Long-Term Care, and Education) and the Federal Department of Indian and Northern Affairs. It is designed to take a community-wide, collaborative approach directed towards the prevention of both health and social problems in children living in high-risk communities in Ontario. This twenty-five year research project has three major goals (Peters and Russell, 1994):

- Prevent serious social, emotional, behavioural, physical and cognitive problems in young children;
- Promote the social, emotional, behavioural, physical, and cognitive development of these children; and
- Enhance the abilities of socio-economically disadvantaged families and communities to provide for their children.

The focus is on children, up to the age of eight years old, and their families, living in eleven socio-economically disadvantaged communities/ neighborhoods in Ontario. After reviewing proposals from many Ontario communities, the Ministry of Community and Social Services made the final selection of the research communities, which share the following characteristics: very economically disadvantaged neighborhood or community; very high risk for healthy child development; concrete plans in place for integration of services, plus family and community involvement; and a preschool program in place for one year (Ontario Ministry of Community and Social Services, Ministry of Education, Ministry of Health, 1990). Once selected, communities were funded to provided services tailored to local circumstances over a 5-year period, including one year of program planning and 4 years of implementation. The progress of children and their families will be followed for an additional 20 years. This process is being carried out in regular consultation with the community at large along with various community agencies and organizations. The programs and services are designed to integrate into those already existing in the communities, and are based on a holistic approach to healthy child development. The intent is to ensure that children have "Better Beginnings" in all their social environments, starting with their families and including their immediate neighborhood and broader, local community. Accordingly, the guiding principles of the project are as follows:

- Family and community involvement in program development;
- Implementation and evaluation;
- Accessible, non-stigmatization programs;
- Capability of integration into various service sectors;

- Relatively low cost;
- Sensitivity to social and cultural diversity of families and communities;
- Promotion and facilitation of coordination, cooperation and collaboration of service providers across health, social, childcare, mental health, education, housing and recreation sectors to ensure holistic and consistent support for children and their families.

Evaluation is an integral component of this pilot program and will help to judge the effects of such broadly based programs on children, their families, and the community. The research component will evaluate the development, implementation, and short-, mid- and long-term outcomes of the project. Overall the research is designed to answer three major questions:

1. Is the Better Beginnings, Better Futures Model effective and how large are the program effects?
2. Is the Better Beginnings, Better Futures Model affordable?
3. What are the structures and processes associated with the program development and results?

Researchers at each of the urban sites have collected baseline data from families with children born in 1989. Children were assessed for their social, emotional, behavioural, physical and cognitive development. Their parents/primary caregivers were questioned on a wide range of issues regarding their housing, child care, perception of safety and drug use in their neighborhoods, health, parent-child interaction, levels of stress, food intake of their child, resource usage and social activities.

In 1994, interviews for data collection began with children who were at the bottom of the program age range. For older cohorts, the children were born in 1989 (turned 4 years old in 1993) and were beginning junior kindergarten in September of 1993, for the younger cohorts, the children were born in 1994. Children in both cohorts made up the

"longitudinal research group", and families were interviewed yearly for the first four years and are currently being interviewed at regular intervals (for the younger cohort, the first interview was within two-weeks of the infants 3-month birthday, the yearly interviews followed when the infant was 18, 33 and 48-months old).

Appendix 3- Information Sheet and Consent Form

Information Sheet and Consent Form for Parents

Information Sheet For Parents With Eighteen Month Old Children

What is the *Better Beginnings, Better Futures Project?*

Better Beginnings, Better Futures is a large government-funded project. This project wants to find ways to help young children grow up to be thebest they can be. For over two years, programs for children and their families have begun in your community and in 11 other Ontario communities. Research will ask what these programs did and how well different parts of these programs worked.

Who is the Site Researcher and who do they work with in this community?

The Site Researcher is a contact person for research activities in you neighbourhood. This person is part of what is called the *Research Coordination Unit*, a group made up of university-based researchers and researchers from each of the 12 research communities. The Site Researcher works closely with a subcommittee of the Management Board of Onward Willow Better Beginnings, Better Futures called the Research Team. This committee has been set up in your community to help plan and guide the research. Your Site Researcher can provide you with more information about this committee.

Why am I being asked to take part in *Better Beginnings, Better Futures* research?

To begin the research, we hope to gather information about 18 month old children, their families, and their community. This is where you and your family can help. The Onward Willow Better Beginnings project has programs in your community for children from birth to age 4. If you participate in the research this year, then we would like you to do so again when your child is 33 months old. The Site Researcher will contact you again to see if you and your family agree. This will be repeated again when you child is four. The information you provide will help us to understand whether the programs being run here are helpful.

Your family is important to the research. By taking part in the research you will be helping to build programs for children that work.

What will I be asked to do if I take part in the research?

You will be asked questions about your child, yourself, and your family. The interview with you will last about 2 hours and 15 minutes (or if this is our first interview with your family, then approximately 2 hours and 45 minutes). We feel that the large number of questions is necessary to help answer the very big question about how to help children grow up to be the best they can be. The researcher will ask you questions about your child's behaviours and activities, about family life and parenting, and about family involvement in the community and use of services. You will also be asked about the kinds of food your child eats.

In addition to the interview with you, we would like your child to take part in different activities that look at his or her physical growth and general development. Also, the researcher will ask you to play with you child for 5 minutes. Also, to give us more information about your pregnancy and delivery we ask for permission to review your written and computer stored hospital records as well as your child's birth hospital records.

The final part of the research involves contacting Better Beginnings program staff to find out which Better Beginnings programs, if any, you have been involved with. The only information we will ask program staff is how frequently you go to Better Beginnings programs and activities. In order for us to know which Better Beginnings programs are working well, we need to see how program participation relates to the amount of positive change families undergo.

The interview with you and the activities for you child will be arranged at at time and place that is best for you. You will receive $25 in appreciation for your help.

What if I decide that I do not want to take part or find that I am uncomfortable with some parts of the research?

You have the right to decide that you do not want to take part in the research. Your decision to take part or to not take part will in no way affect you usual educational, health, or community services. You may withdraw from the research at any time, even after signing the attached consent form. If there are any parts of the research that you are uncomfortable with, please say so. The researcher will welcome your participation in the parts of the research that you are comfortable with.

What happens to the answers to the interview?

Your answers and the researcher's observations made of your child are kept private. Names will not appear on any of the interview forms. Only a code number appears on these forms. Names, code numbers, and interview forms are stored in lock cabinets. Only the research staff will have access to this stored information and nothing you say will be passed on to anyone outside the research staff. Research reports will discuss general results for communities; in other words, no one will be able to identify information collected from you or your child in these reports.

One possible exception is that if during the interview the researcher is concerned about the safety of the child(ren), then s/he is required to report it.

The Provincial Freedom of Information and Protection of Individual Privacy Act says that you have the right to look at any stored information about you or your child.

What happens to the results?

The research team will prepare a summary of the results. It will describe how families and neighbourhoods in general are doing but will not, of course, include any information that identifies your child or family. This summary will be given to the Research Team of Onward Willow Better Beginnings, Better Futures. We are also planning to hold meetings to discuss the general findings. If you are interested in learning about some aspect of the results that is not covered in the summary, please contact your Site Researcher. This research was set up to answer general questions about groups of children and families. Based on the type of information being collected, it is not possible for the researchers to answer specific questions that you may have about your child or family.

Where can I get additional help or resources if I need them?

During the interview there may be things which have been discussed which you may have concerns about. If you have any questions or concerns about yourself, your child, or you family, the researcher will be handing out to all participants a list of names and phone numbers of people and agencies in your community that can assist with any questions or concerns that you might have.

****

The information is collected under the legal authority of the Child and Family Services Act, R.S.O. 1990, c.C-11, s.7(2) for the purpose of learning about the impact of the new programs in the Better Beginnings, Better Futures Project. The Ministry of Community and Social Services is working with, and shares reports with, the provincial Ministries of Education and Health as well as the federal Department of Indian and Northern Affairs, and the Secretary of State of Canada.

If you have any questions concerning the collection of this information, please contact:

Jim Vanderwoerd
Site Researcher
Research Coordination Unit
Onward Willow
Better Beginnings,
Better Futures
824-4120, extension 6467

or

Project Design Coordinator
Better Beginnings, Better Futures Project
Ministry of Community and Social Services
Children's Services Branch
3rd Floor, Hepburn Block
80 Grosvenor Street,
Toronto, Ontario M7A 1E9
(416) 325 - 5329

BETTER BEGINNINGS, BETTER FUTURES

RESEARCH CONSENT FORM

I have received a copy of the **INFORMATION SHEET FOR PARENTS** and its summary. I have read it or had it read to me and understand it. It describes the interview with the parent or guardian and the information to be collected from the child's teacher.

	YES	NO
I agree to take part in the research.	☐	☐
I also give permission for my child's teacher to participate	☐	☐

Date: _____

PARENT OR GUARDIAN: _____
(please print name)

_____
(signature)

CHILD: _____
(please print first, middle and last name)

I have discussed the **INFORMATION SHEET FOR PARENTS**, and this Consent Form with this participant and believe that s/he understands the purpose of these documents and the information contained in them.

INTERVIEWER: _____
(please print name)

_____
(signature)

Appendix 4- Standardized Protocols for Infant Growth Measures

Better Beginnings, Better Futures *94-03-25*

Standardized Protocols[1,2,3] for Infant Growth Measures

The general protocol outlined in the following pages is to be followed at each home visit. Measurement of the infant's **length, weight,** and **head circumference** will be taken. We are taking these measures because they will help us understand the effects *Better Beginnings, Better Futures* programs have on the physical development of children involved. Measures of length and weight tell us how the babies are growing, compared to other infants their age. Because the head is also growing rapidly in very young children, head circumference is another good indicator of growth.

It does not matter in which order the measurements are taken, but it may be best to measure the baby's length last; this is the most bothersome for the infant. Ask the baby's mother for help with taking each of the measurements. Encourage the mother to let you know when she thinks the baby is unhappy. If the baby seems uncomfortable or starts crying while being measured, you and the mother may decide to take a break from the measurement, and come back to it later on during the visit. On the other hand, it may just take a distraction with a toy, for instance, to make the baby more comfortable.

Your kit includes:

Equipment

O'Leary Pediatric Length Board

Portable Health-o-meter Infant Weight Scale

Ross Fibreglass Inser-Tape

Form

Infant Growth Measures Recording Form

---

1 Frisancho AR. 1990. Anthropometric Standards for the Assessment of Growth and Nutritional Status. Ann Arbor: The University of Michigan Press

2 Gibson RS. 1990. Principles of Nutritional Assessment. New York: Oxford University Press

3 Lohman TG, Roche AF, Martorell R (eds). 1988. Anthropometric Standardization Reference Manual. Champaign, Ill: Human Kinetics Books

Measuring the Infant's Weight

94-03-25

Equipment: Portable Infant Weight Scale

Calibrating the Scale

If the scale is being moved frequently, it is important that it be calibrated regularly with a known weight. *Every morning*, before setting out to meet with families, use the known weight to calibrate the scale. Follow these steps: (1) with the scale set on a hard flat surface, use the small black knob on the lower right hand side of the base of the scale to adjust the dial to zero (0.0); (2) place the 5.0 kg weight on the center of the tray; if the dial reads 5.0 kg, the scale is calibrated; (3) if the dial reads a value below or above 5.0 kg, use the small black knob to adjust the dial so that the red line is directly on top of '5.0'; (4) remove the weight from the scale, and with a washable marker, draw a line on the window, at the point directly above the '0.0' on the dial; (5) when you are adjusting the scale in the home (as described in #2 below), line 0.0 up *with the line you just drew.*

Taking the Measurement

1. Before proceeding, ask the mother if the baby's diaper needs to be changed. It is important that the diaper is clean so that the most accurate weight of the baby is obtained. However, if the mother says that the baby is fine, and would rather not change the diaper, do not persist. Note any concerns (eg. the diaper was a bit wet, but the mother had just changed the baby, and did not want to change the diaper again) on the recording form.

2. Set the scale on a table or another hard flat surface. Lay the infant's blanket in the tray, making sure that no part of the blanket is resting on the table. Adjust the reading to 0.0 by turning the small black knob on the lower right hand side of the base of the scale.

3. The baby should be wearing a diaper, a light sleeper, and/or an undershirt. Ask the mother to place her baby in the center of the blanket on the tray.

4. Once the baby is settled on the scale, "lock" the dial before removing the infant from the scale. Record the child's weight in kilograms as indicated at the *permanent* red line. Release the lever by lifting it up, and the dial will return to 0.0 kg (adjust if it is a bit off). **Record the weight to the nearest 0.050 kg **.** For example, if the scale reads between 7.100 and 7.200 kg, record 7.150 kg. Take two measurements; if the weights differ by more than 0.100 kg, take a third and record all three. ***If the baby is very fussy, take just one measurement.***

**** Notice that the dial on the scale turns counter-clockwise, and the numbers get higher from right to left.**

Measuring the Infant's Head Circumference *94-03-25*

Equipment: Fibreglass Inser-Tape

1. Have the mother hold the infant on her lap, making sure that the baby's head is supported. Remove barrettes, bows, or anything in the infant's hair if they will interfere with the measurement.

2. Ask the mother to hold the baby's head so that the he/she is looking straight ahead.

3. With the inser-tape looped as a circle, place it on the infant's head. The part of the tape at the front of the head should be placed over the eyebrows and on the most prominent part of the forehead. The part of the tape at the back of the head should be around the largest bulge, as well. Make sure that the tape is the same distance above each ear. If the infant has a lot of hair, try to position the tape so that the hair does not interfere with the measurement (ie. under the hair).

4. Pull the inser-tape so that it is snug, but not tight, on the baby's head. **Record the measurement to the nearest millimetre (0.1 cm).** Follow the above steps to obtain a second measurement; if more than 2 mm (0.2 cm) different from the first, measure the head circumference a third time, and record all three measures.

Measuring the Infant's Length

Equipment: Pediatric Length Board

1. The length board should be placed on a hard flat surface. A table, the floor, or a carpeted surface are fine - use your judgement in each situation.
2. Put the baby's blanket or a towel on the length board, folding it if it is longer than the baby. If the length board is cold, you may want to drape a *single layer* of the blanket over the headboard, as well. Ask the mother to place her baby on the blanket so that he/she is lying face upward and their body straight with the board. The head should be at the fixed headboard, and the legs extended toward the movable end of the board. It is fine if the baby is wearing a sleeper, but thick booties and bonnets should be removed.
3. Ask the mother to stand at the end of the length board near the infant's head. Have her hold the head so that her baby is looking upward. **The top of the head must touch the surface of the fixed headboard.** Ask the mother if the baby's head is touching the headboard *before* taking the reading.
4. With your left hand, gently hold the infant's left knee and/or foot. With your right hand, bring the movable footboard towards the foot until it rests firmly against the baby's heel. Don't expect the heel to be touching the surface of the board on which the baby is laying - the baby's legs don't extend that far!
5. Because the baby is likely to be restless, quickly look at the reading when you know that the baby has been positioned correctly. **Reading the top line on the measuring tape, take measurement to the nearest millimetre (0.1 cm).** If the baby is kicking their feet, he/she is straightening their legs by themselves - you may be able to hold onto the left leg long enough to place the moveable board against the heel and take the reading. Just be ready and have the board very close to the feet!
6. Repeat the process, making sure that the infant is in the correct position. If the first two measurements differ by more than 2 mm (0.2 cm), repeat the measurement a third time.

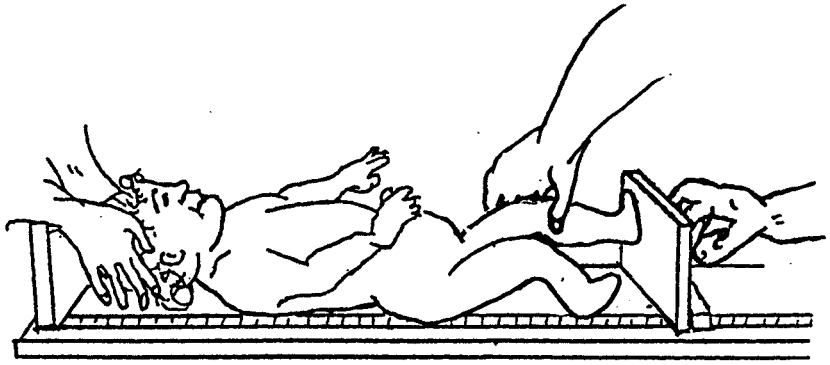

Figure 1. Measuring the infant's length. (Adapted from Frisancho AR. 1990. Anthropometric Standards for the Assessment of Growth and Nutritional Status. Ann Arbor, Michigan: The University of Michigan Press)

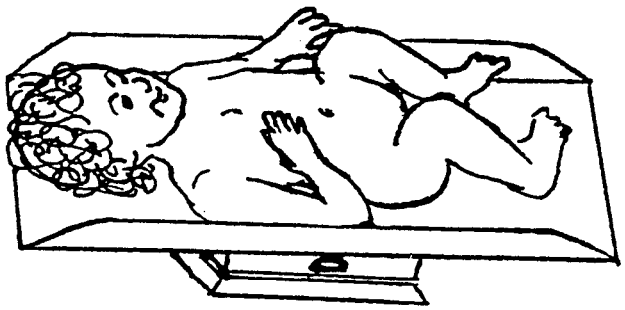

Figure 2. Measuring the infant's weight. (Adapted from Lohman TG, Roche AF, Martorell R (eds). 1988. Anthropometric Standardization Reference Manual. Champaign, Illinois: Human Kinetics Books)

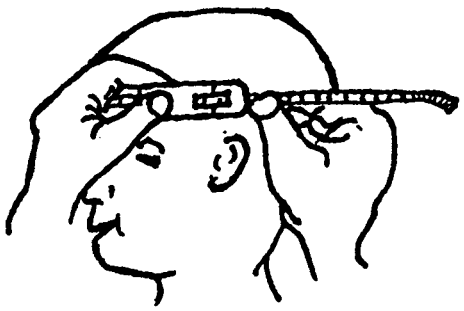

Figure 3. Measuring the infant's head circumference. (Adapted from Gibson RS. Principles of Nutritional Assessment. 1990. New York, New York: Oxford University Press)

Appendix 5- Standardized Protocols for Preschooler Growth Measures

Better Beginnings, Better Futures

Standardized Protocols For Use with 3½ to 4½ year old Children

The general protocol outlined below will be performed at each home visit. Measurement of **height, weight, triceps skinfolds,** and **mid-upper arm circumference** will be taken. The anthropometry kit includes:

Equipment

- Wonderscale
- Microtoise Modified Tape Measure
- Inser-Tape
- Lange Calipers
- Felt tip pen
- Calibration block
- Masking Tape

Form

- Anthropometric Measures Recording Form

During the 33-month interview, only weight and height measurements were taken. Measurements of triceps skinfolds and mid-upper arm circumference from the 48-month interview will not be examined in this thesis.

Standardized Protocol: Measurement of Height

Equipment:

Microtoise Modified Tape Measure
Masking tape

1. Locate a wall to which the Microtoise Tape can be mounted. Choose a wall without a baseboard and an area without carpet.

2. Pull the tape out to its fullest length and release it. Use masking tape to fix the end of the tape to the wall. Make sure that the tape is **completely vertical.**

3. Check the window on the head-bar to see that the red line is in line with the black zero line.

4. The child should be wearing light clothing so that you can more clearly see his/her posture. The child should not wear shoes. If the child is wearing a barrette or a ponytail near the top of their head, it should be removed.

5. With the child's head below the head-bar, have him/her stand straight with his/her eyes looking **straight ahead.** The imaginary line from the middle of the child's ear through the centre of his/her eyes should be parallel to the floor. You might ask the child to look at some object directly in front of him/her. See Figure 1.

6. Make sure that the child's feet are together and flat on the floor; knees are straight; and shoulder blades, heels, and buttocks are in contact with the wall. You may need to hold the child's heels so that they do not leave the ground. It is not necessary that the child's head touches the wall.

7. The child's arms should hang loosely by the sides, with palms facing the thighs.

8. Ask the child to take a deep breath and stand tall (**watch the heels!**). Their back should be straight and the shoulders should be relaxed.

9. Lower the head-bar until it touches the top of the child's head.

10. Take the height measurement at maximum inspiration with your eyes level with the head-bar. You may need to kneel to do this.

11. Record the measurement to the closest 0.1 centimetre. If the reading falls between two values, record the lowest of the two.

12. Follow the above steps to repeat the measurement. If the two measurements are very different (ie. difference of 0.5 cm or more), repeat the measurement a third time. Record all height measures on the record sheet.

Standardized Protocol: Measurement of Weight

Equipment:

Wonderscale

1. Place the scale on a hard flat surface.

2. Turn the scale on. It automatically adjusts to zero.

3. Explain to the child that you want to find out how much he/she weighs, and that they must first go to the washroom.

4. The child should be wearing light indoor clothing and have shoes removed.

5. Have the child stand unassisted with both feet centred on the scale. The child should be standing still and looking straight ahead.

6. Record the body weight to the nearest 0.2 kg.

7. Repeat the above steps one more time. If the two measurements are very different (ie. 0.2 kg) weigh the child once more. Record all weight measures on the record sheet.

Standardized Protocol: Measurement of Mid-Upper-Arm Circumference

Equipment:
Inser-Tape
Marker

1. If the child is wearing a shirt with sleeves, it should be removed or the sleeve rolled up.

2. Have the child stand straight, with his or her left side to you. Ensure that the child is looking **straight ahead** with the middle of his/her ear in line with the centre of his/her eyes, arms are relaxed, and feet are apart.

3. Identify the midpoint of the **left** arm. With the child's left arm bent at a 90 degree angle and the forearm across the body, locate and mark:

- the tip of the bony protrusion of the shoulder blade at the outermost edge of the shoulder, and
- the tip of the elbow.

4. Using the Inser-Tape, locate the midpoint between these two points. The midpoint is the black triangular point on the tape when the numbers on the tape at the shoulder point and the elbow are the same. Mark the midpoint **directly in line** with the point of the elbow and the edge of the shoulder blade already marked. See Figure 2.

5. Extend the left arm so that it is hanging loosely by the child's side, with the palm facing the thigh.

6. Wrap the Inser-Tape around the arm so that it is touching the skin, but not squeezing the tissue. Place the Inser-Tape just **above** the marked midpoint and record the arm circumference measurement to the nearest 0.1 centimetre. See Figure 3.

7. Repeat the above steps one more time. If the two readings are very different (ie. 0.2 cm or greater), repeat the measurement once more. Record all arm circumference measures on the recording sheet.

Standardized Protocol: Measurement of Triceps Skinfolds

Equipment:

Lange Skinfolds Caliper
Inser-Tape
Marker
Calibration block

1. If you have not already measured the child's arm circumference, you must first determine the midpoint of his/her **left** arm. Follow the instructions given for locating the midpoint of the upper arm under the protocol for measurement of mid-upper-arm circumference. See Figure 2.

2. Explain to the child that you want to see how thick their skin is. Because the look of the calipers may frighten the child, pinch your own skin with them to show that it does not hurt.

3. With midpoint marked, have the child extend his or her left arm so that it is hanging loosely with palm facing the thigh.

4. To help the child feel more comfortable with the procedure, gently rub the area of the arm that will be pinched prior to taking the skinfolds measurement.

5. If you are right-handed, use your left thumb and index finger to grasp a vertical fold of skin and underlying fat 1 cm **directly above** the midpoint mark. See Figure 4.

6. *Gently* pull the skinfolds away from the underlying muscle tissue. At the marked midpoint, place the skinfolds caliper jaws at a 90 degree angle to the arm. Release the pressure of the calliper, hold for **four seconds**, then take the reading to the nearest millimetre. **Do not let go of the skinfolds in your left hand until the reading is taken.**

7. Repeat the procedure once more following the above steps. If the difference between the values is large (ie. 2 mm or greater) take a third triceps skinfolds measurement. Record all triceps skinfolds measures on the recording sheet.

Figures

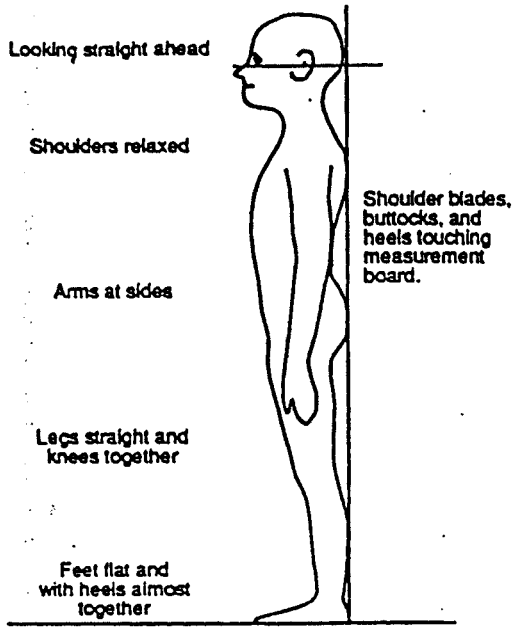

Figure 1
Position the child so that he/she is looking straight ahead with the shoulders, buttocks, and heels touching the wall. The child's legs should be straight with knees together and feet flat on the floor.

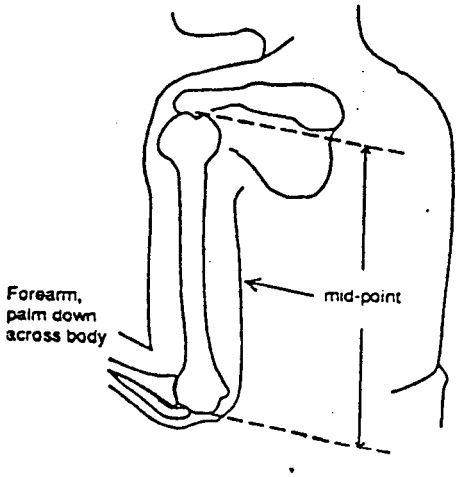

Figure 2
To locate the mid-point of the child's left arm, find the tip of the outermost part of the left shoulder blade and the tip of the left elbow. With the inser-tape, locate the mid-point.

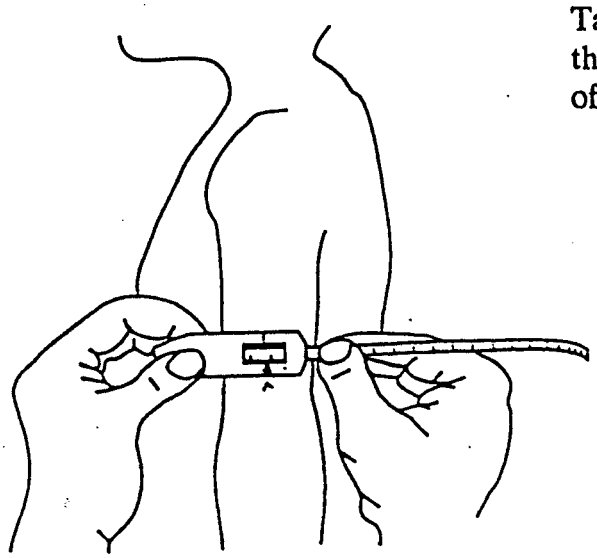

Figure 3
Take the mid-upper-arm circumference reading at the site directly above the marked mid-point of the left arm.

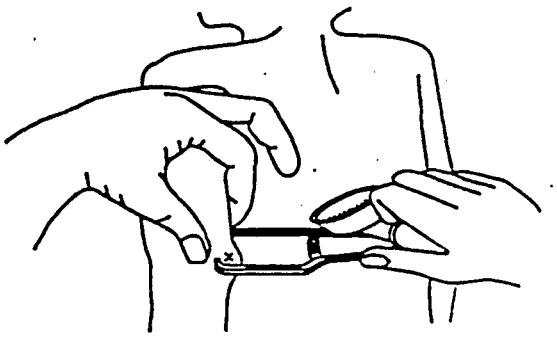

Figure 4
Hold the skinfold **1 cm above** the marked mid-point with your left hand, and take the triceps skinfold reading at the mid-point.

All figures taken from Nutritional Assessment Laboratory Manual. 1991. Gibson, Rosalind S.

Appendix 6- Growth Measures Recording Form

Growth Measures Recording Form - 18 Month Old

26.01.95

Child ID _____-___-_____ **Male** _____ **Female** _____

Interviewer ID _____-_____ **Date of Birth** ____/____/____
yy mm dd

Date of Interview ____/____/____
yy mm dd

		Avg. Meas
Weight		
#1 _____.____ *kg* *#2* _____.____ *kg* *#3* _____.____ *kg*	*Record to nearest 0.05 kg; repeat if #1 and #2 differ by > 0.10 kg*	_____ *kg*
Head Circumference		
#1 _____.____ *cm* *#2* _____.____ *cm* *#3* _____.____ *cm*	*Record to nearest 0.1 cm; repeat if #1 and #2 differ by > 0.2 cm*	_____ *cm*
Length		
#1 _____.____ *cm* *#2* _____.____ *cm* *#3* _____.____ *cm*	*Record to nearest 0.1 cm; repeat if #1 and #2 differ by > 0.2 cm*	_____ *cm*

GROWTH MEASURES RECORDING FORM

Survey Number _____

Sex _____ male _____ female

Date of Birth _____ **Age in Months** _____
day month year

Present Date _____
day month year

Time of Day _____ am _____ pm

Height

#1 _____ cm

#2 _____ cm Average of two closest heights* _____cm

#3 _____ cm

* if all 3 values are equally distant, find average of all 3

Weight

#1 _____ lb

#2 _____ lb Average of two closest weights* _____ lb

#3 _____ lb

* if all 3 values are equally distant, find average of all 3

Appendix 7

PERINATAL PARENT INTERVIEW

A.1 Have you been interviewed before for Better Beginnings Research?
No..... 0
Yes..... 1

A.2 How long have you lived in (name of Better Beginnings neighbourhood)?
(RECORD YEARS AND MONTHS)

A.3 What is your relationship to (name of baby)?
Are you
The biological mother/father 1
In some other relationship
to the baby 2
(PLEASE SPECIFY ON LONG FORM)

A.4 What is the sex of the respondent?
Male 1
Female 2

A.5 What is the sex of the baby?
Male 1
Female 2

A.6 How many people currently live in your home?

Tell me how many are...(SEE FOLLOWING)
THE FOCAL CHILD

A.7 The baby's biological parent(s)

A.8 Husband or partner who is not the child's parent

A.9 The baby's brothers and sisters

A.14 Are you now or have you ever been married?
No (GO TO A.18)..... 0
Yes 1

A.15 How many times?
Once 1
Twice 2
Three or more 3

A.17 Are you currently living with your husband?
No 0
Yes (GO TO A.20)..... 1

A.18 Are you living with a partner or in a common-law relationship?
No (GO TO A.20)..... 0
Yes 1

A.20 When were you born?
(RECORD YEAR, MONTH AND DAY)

* ONLY ASK QUESTIONS MARKED WITH '*' IF R IS LIVING WITH A HUSBAND, OR PARTNER, THAT IS IF R HAS ANSWERED "YES" TO A.17 OR A.18.

A.22 When was (name of baby) born? (RECORD YEAR,MONTH AND DAY)

AGE OF CHILD (MONTHS) (SEE APPENDIX A)

A.23 Where were you born?
In Canada...
Ontario (GO TO A.25)..... 01
Outside Ontario (GO TO A.25)..... 02
Outside Canada...
China 03
Germany 04
Hong Kong 05
India 06
Iran 07
Italy 08
Jamaica 09
Pakistan 10
Poland 11
Portugal 12
Somalia 13
Sri Lanka 14
Trinidad 15
United Kingdom 16
U.S.A. 17
Vietnam 18
Lebanon 19
Haiti 20
Other (SPECIFY ON LONG FORM)..... 21

A.24 In what year did you immigrate to Canada?
(E.G. RECORD 1965 AS '65')

A.26 Where was the baby born? (RECORD HOSPITAL AND CITY ON LONG FORM. RECORD COUNTRY USING CODES FROM A.23)

A.27 How much did the baby weigh? (RECORD IN POUNDS)

A.34 What is the highest level of schooling that you have completed? (INCLUDE ANY PROGRAMS TO PREPARE A PERSON FOR WORK)
No formal schooling (GO TO A.36)..... 01
Some primary school (GO TO A.35)..... 02
Primary school (GO TO A.35)..... 03
Some secondary or high school (GO TO A.35)..... 04
Completed secondary or high school (GO TO A.35)..... 05
Some community college, technical college, CEGEP, or RN program without a university degree (GO TO A.36)..... 06
Completed community college,

technical college, CEGEP,
or RN program without a
university degree (GO TO A.36)..... 07
Some university
(not completed) (GO TO A.36)..... 08
University degree (completed)
B.A./B.Sc (GO TO A.36)..... 09
University degree (completed)
Professional (e.g., law, nursing,
dentistry, medicine, commerce,
engineering) degree (GO TO A.36)..... 10
University degree (completed)
M.A./Ph.D. (GO TO A.36)..... 11

A.36* What is the highest level of schooling that your (husband/wife/partner) has completed?

No formal schooling (GO TO A.38)..... 01
Some primary school (GO TO A.37)..... 02
Completed primary school (GO TO A.37)... 03
Some secondary or
high school (GO TO A.37)..... 04
Completed secondary or
high school (GO TO A.37)..... 05
Some community college,
technical college, CEGEP,
or RN program without a
university degree (GO TO A.38)..... 06
Completed community college,
technical college, CEGEP,
or RN program without a
university degree (GO TO A.38)..... 07
Some university
(not completed) (GO TO A.38)..... 08
University degree (completed)
B.A./B.Sc. (GO TO A.38)..... 09
University degree (completed)
Professional (e.g., law, nursing,
dentistry, medicine, commerce,
engineering) degree (GO TO A.38)..... 10
University degree (completed)
M.A./Ph.D. (GO TO A.38)..... 11

A.53* Does your husband/partner have a paid full-time job?

No 0
Yes (GO TO A.55)..... 1

A.54* Does he/she have a paid part-time job?

No 0
Yes (GO TO A.55)..... 1

SECTION C

C.1 Does your baby have any health problems or illness that make her/him different in the things he/she does?

A Great deal 1
A bit 2
Not at all (GO TO C.4)..... 3

SECTION F

F.1 How did you feed your baby at birth?

Breast-fed 1
Bottle-fed 2
Other (Record on Long Form).
Ask "When baby was brought home, was he/she breast-fed or bottle-fed?"CONTINUE WITH F.1 (CHOICE #1 OR #2)
AS IF THIS HAPPENED AT BIRTH 3

F.2 Why did you choose to breast-feed your baby?

Healthiest/best nutrition for baby 1
Most natural thing to do 2
Prenatal class 3
Advice from doctor/nurse 4
Advice from friends and/or relatives... 5
Other (RECORD ON LONG FORM) 6

F.3 Are you breast-feeding your baby now?

No 0
Yes (Go to F.6)..... 1
(RECORD IN MONTHS)

F.4 Have long did you breast feed?
(RECORD IN WEEKS)

F.5 Why did you stop?

Baby did not like it/rejected it 1
Baby crying and fussing 2
Baby not gaining enough weight 3
Baby seemed hungry 4
Baby sick 5
Not enough breast milk 6
Breast infection/sore nipples 7
Mother sick 8
Returning to work 9
Other (RECORD ON LONG FORM) 10
GO TO F.10

F.6 How long would you like to breast-feed? (RECORD NUMBER OF MONTHS)

F.7 Do you give your baby milk or formula as well?

No (GO TO F.16)..... 0
Yes 1

F.8 How old was s/he when you first gave a bottle?
Less than 4 weeks 1
5 to 8 weeks 2
9 to 12 weeks 3
13 to 16 weeks 4

GO TO F.10

F.9 Why did you choose to bottle-feed your baby?
Uncomfortable with breast feeding 1
Previous breast-feeding experience was unsuccessful..... 2
Return to work 3
Easy/convenient 4
Freedom/others able to help with feeding 5
Advice from doctor/nurse 6
Advice from friends and/or relatives .. 7
Other (RECORD ON LONG FORM) 8

F.10 What type of milk or formula do you currently use?
Whole milk (GO TO F.15)..... 1
2% milk (GO TO F.15)..... 2
Skim milk (GO TO F.15)..... 3
Soy milk (GO TO F.15)..... 4
Goat milk (GO TO F.15)..... 5
Whole milk formula (ASK F.11 TO F.13).. 6
Evaporated milk formula 7
(ASK F.11 TO F.13)
Similac with iron (ASK F.14)..... 8
Similac (ASK F.14) 9
Enfalac (ASK F.14) 10
Other 11
(PLEASE SPECIFY FULL BRAND NAME, TYPE OF FORMULA ON LONG FORM AND GO TO F.15)

How is the formula prepared?

F.11 Milk (RECORD OZ OR ML)

F.12 Water (RECORD OZ OR ML)

F.13 Sugar/corn syrup (TSP)

GO TO F.15

F.14 In what form do you buy the formula?
Powder 1
Concentrated liquid 2
Ready-to-serve 3

F.15 How much formula or milk does your baby drink each day?
(PLEASE INDICATE OZ OR ML)

F.16 Are you giving your child anything other than breast milk or formula to eat or drink?

No (GO TO F.31)..... 0
Yes, other drinks only (GO TO F.21).... 1
Yes, solids 2

F.17 At what age did you start giving your baby solids?

Less than 4 weeks 1
5 to 8 weeks 2
9 to 12 weeks 3
13 to 16 weeks 4

F.18 Do you use a spoon to feed your baby solids?

No (GO TO F.20) 0
Yes 1

F.19 How does the baby take food off the spoon?

Uses tongue to remove food rather than just sucking 1
Sucks it off or another response 2

F.20 Why did you start giving your baby solids?

To gain weight 1
To help the baby sleep through the night 2
Advice from family or friends 3
Advice from doctor or nurse 4
Other (PLEASE RECORD ON LONG FORM) 5

What else has your baby had to eat or drink in the last 24 hours?
(DO NOT READ F.21 TO F.27 OUT LOUD. CODE UNANSWERED QUESTIONS AS 'NM' - NOT MENTIONED)

F.21 Water (OZ/DAY OR ML/DAY)

F.22 Sweetened water/pop/fruit drink (OZ/DAY OR ML/DAY) Record brand name. (E.G. Kool-Aid)and type on long form.

F.23 Apple juice (OZ/DAY OR ML/DAY)

F.24 Other fruit juice (OZ/DAY OR ML/DAY) (Specify type on Long Form)

F.25 Infant cereal/pablum (TSP/DAY) (Specify type on Long Form)

F.26 Baby vegetables (TSP/DAY) (Specify type on Long Form)

F.27 Baby fruit (TSP/DAY) (Specify type on Long Form)
F.28 Other food (TSP/DAY) (Specify type on Long Form)

F.29 Is this what your baby usually eats?

No 0
Yes (GO TO F.31)..... 1

F.30 Why? (RECORD ON LONG FORM)

F.31 Do you give your baby drops, such as fluoride,iron, or vitamins?
No (GO TO F.34)..... 0
Yes 1

F.32 What kind? (RECORD TYPE AND BRAND NAME ON LONG FORM)

F.33 Do you do this every day?
No 0
Yes 1

F.34 USE 24-HOUR DIETARY RECALL FORM FOR BREAST-FEEDING MOTHERS ONLY
(MOTHERS WHO ANSWERED 'YES' TO QUESTION F.3)

SECTION I

I.10 (BB)How many did you attend in the last year?

I.11 For all of last year, How often did you go to Better Beginnings steering group or committee meetings?
Not at all (Go to Section I)..... 0
Occasionally 1
Frequently 2

SECTION L

L.2 Did you have any health problems during this pregnancy?
No (GO TO L.4) 0
Yes 1

L.3 What kinds of problems? (RECORD ALL THAT APPLY)
Operation on your abdomen 1
Kidney Infection 2
Vaginal bleeding after 12 weeks (3 months) of pregnancy 3
Diabetes 4
High blood pressure 5
Toxemia (high blood pressure with protein in urine) 6
Fibroids (non-cancerous tumours in uterus) 7
Sexually transmitted diseases 8
Other (SPECIFY ON LONG FORM)..... 9

L.5 Did you attend prenatal or pregnancy classes during this pregnancy?
No (GO TO L.10) 0
Yes 1

L.7 About how many of the sessions did you attend?

L.9 Were any of your classes part of a Better Beginnings program?
No 0
Yes 1
(GO TO L.11)

L.11 Did you receive support (help) from other people or groups during your pregnancy? (such as friends, relatives, parent group.)

No (GO TO L.13) 0
Yes 1

L.12 Who did you receive support from? (RECORD ON LONG FORM.)

The next questions are about your physical activity.

L.17 How much did you weigh before you became pregnant? (RECORD IN POUNDS)

L.18a How much did you weigh at the end of your pregnancy before giving birth? (RECORD IN POUNDS)

L.18b How much do you currently weigh? (RECORD IN POUNDS)

L.19 How tall are you? (HEIGHT IS TO BE MEASURED DIRECTLY IF THIS IS FEASIBLE. RECORD IN FEET AND INCHES. IF USING SELF-REPORT, MAKE A NOTE OF THIS ON THE ANSWER SHEET.)

Height in inches (SEE APPENDIX A)

Who measured respondent?

Self report 1
Interviewer 2

L.20 How many times have you been pregnant?

Once (GO TO L.30) 1
Two or more 2

L.21 Did all of your pregnancies lead to a live birth?

No 0
Yes (GO TO L.26) 1

L.33 Did you smoke cigarettes during the month before you became pregnant?

No (GO TO L.35) 0
Yes 1

L.35 Did you smoke cigarettes during your pregnancy?

No (GO TO L.38) 0
Yes 1

L.39 Did any of the other people living in your household smoke cigarettes during your pregnancy?

No (GO TO L.41) 0
Yes 1

L.41 Do you currently smoke cigarettes?
No (GO TO L.43)..... 0
Yes 1

L.42 On average, how many cigarettes do you smoke each day?
None 0
Less than 1 half pack of cig..... 1
More than half to one pack of cig..... 2
More than one pack of cig..... 3

L.43 Do any of the other people living in your household smoke now?
No (GO TO L.45)..... 0
Yes 1

L.45 In the month before you were pregnant, how often did you drink alcoholic beverages?
Never (GO TO QUESTION L.47) 0
Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

HOW OFTEN R DRANK ALCOHOLIC BEVERAGES IN THE MONTH BEFORE PREGNANCY (CONSOLIDATED & RECODED FROM PERINATAL & 18 MO. DATA)
Never 0
Less than once a month 1
1 to 4 times a month 2
More than once a month 3

L.46 When you drank alcohol (wine, liquor, beer) in the month before you became pregnant, how many drinks would you have, on the average, each time?
1-2 drinks 1
3-4 drinks 2
5 or more drinks 3

L.47 Did you drink alcohol during your pregnancy?
No (GO TO L.55) 0
Yes 1

L.49 How often did you drink alcohol during this pregnancy?
Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

L.50 When you drank alcohol (wine, liquor or beer) during this pregnancy, how many drinks would you have, on the average, each time?
1-2 drinks 1
3-4 drinks 2
5 or more drinks 3

HOW OFTEN R DRANK ALCOHOLIC BEVERAGES DURING THE PREGNANCY (CONSOLIDATED & RECODED FROM PERINATAL & 18 MO. DATA)

Never 0
Less than once a month 1
1 to 4 times a month 2
More than once a month 3

L.55 Since your baby was born, how many times did you drink 10 or more alcoholic beverages on one occasion?
(One drink means: One bottle of beer, One 4 oz. glass of wine, or one shot(1.5 oz.)of liquor.)

L.56 In the month before you became pregnant did you use marijuana or hash?

No 0
Yes 1

L.57 During this pregnancy did you use marijuana or hash?

No 0
Yes 1

During the pregnancy which of the following medicine (over the counter drugs and doctor prescriptions) did you take?
(IF YES, RECORD NAME OF MEDICATION ON THE LONG FORM)

SECTION N

N.1 What is your current total monthly household income from all sources before taxes or other deductions? (RECORD FULL AMOUNT, E.G., "EIGHT-FIFTY" AS 00850. USE 3 MONTH AVERAGE IF R SAYS IT CHANGES. PROBE. IF R IS UNABLE TO ANSWER THEN SAY "COULD YOU GIVE ME A RANGE?")

LOW INCOME CUT OFF (SEE APPENDIX A)

N.2 How much does your household pay for food each month? (DO NOT INCLUDE NON-FOOD ITEMS. RECORD FULL AMOUNT, E.G."THREE SEVENTY-FIVE" AS 0375.)

N.3 How much does your household pay for rent or in mortgage payments plus utilities and taxes each month? (RECORD FULL AMOUNT, E.G., "SIX HUNDRED" AS 0600. INCLUDE GAS, OIL AND PHONE.)

DISPOSABLE INCOME (SEE APPENDIX A)
Which of the following was true for your household in the past 3 months.

N.4 Sometimes we didn't have enough money for our food and daily living expenses.

True 1
Not true 2

N.5 We've had to go to a food bank.

True 1
Not true 2

N.6 We have not been able to pay all of our bills.
True 1
Not true 2

FINANCIAL STRESS SCALE (SEE APPENDIX A)

SECTION P

P.34 Do you belong to a clan?
No (GO TO P.38)..... 0
Yes 1

Appendix 8

18 MONTH PARENT INTERVIEW

SECTION A

A.1 Is this a first or second interview?
First..... 1
Repeat (USE OTHER INTERVIEW).....2

A.2 How long have you lived in (name of Better Beginnings neighbourhood)? (RECORD YEARS AND MONTHS E.G., YEARS 02 MONTHS 06)

A.3 What is your relationship to (name of child)?
Are you
The biological mother/father 1
In some other relationship to child .. 2
(PLEASE SPECIFY ON LONG FORM)

A.4 What is the sex of the respondent?
Male 1
Female 2

A.5 What is the sex of the child?
Male 1
Female 2

A.6 How many people currently live in your home?
PROBE IF NECESSARY WITH "Could you tell me their relationship to you and (Use name of child)?"

THE RESPONSE TO THIS QUESTION IS THE TOTAL NUMBER OF PEOPLE LIVING IN THE HOME, INCLUDING THE CHILD. QUESTIONS A.7 - A.12 REQUIRE A BREAKDOWN OF THE TOTAL RECORDED IN A.6. HOWEVER, IT IS IMPORTANT TO NOTE THAT THE CHILD IS NOT INCLUDED IN THIS BREAKDOWN.

ESTABLISH HOW MANY ARE...(SEE FOLLOWING)
THE FOCAL CHILD

A.7 The child's biological parent(s)

A.8 Spouse or partner who is not the child's parent

A.9 The child's brothers or sisters

A.14 Are you now or have you ever been married?
No (GO TO A.18)..... 0
Yes 1

A.15 How many times?
Once 1
Twice..... 2
Three or more..... 3

A.17 Are you currently living with your husband/wife?

No 0
Yes (GO TO A.20)..... 1

A.18 Are you living with a partner or in a common-law relationship?

No (Go to A.20)..... 0
Yes 1

A.19a How long have you been living together?
(RECORD YEARS)

SINGLE PARENT HOUSEHOLD (SEE APPENDIX A)

A.19b Is this the same husband/partner as the last time we interviewed you?
(ASKED ONLY IN REPEAT INTERVIEW)

No 0
Yes 1

A.20 When were you born?
(RECORD YEAR, MONTH AND DAY)

* ONLY ASK QUESTIONS MARKED WITH '*' IF R IS LIVING WITH A HUSBAND, WIFE OR PARTNER, THAT IS IF R HAS ANSWERED "YES" TO A.17 OR A.18.

AGE OF CHILD (MONTHS) (SEE APPENDIX A)

A.23 Where were you born?

In Canada...
Ontario (GO TO A.25)..... 01
Outside Ontario (GO TO A.25)..... 02
Outside Canada...
China 03
Germany 04
Hong Kong 05
India 06
Iran 07
Italy 08
Jamaica 09
Pakistan 10
Poland 11
Portugal 12
Somalia 13
Sri Lanka 14
Trinidad 15
United Kingdom 16
U.S.A. 17
Vietnam 18
Lebanon 19
Haiti 20
Other (SPECIFY ON LONG FORM)..... 21

A.24 In what year did you immigrate to Canada?
(E.G. RECORD 1965 AS '65')

A.26 Where was the child born? (RECORD HOSPITAL AND CITY ON LONG FORM. RECORD COUNTRY USING CODES FROM A.23)

A.34 What is the highest level of schooling that you have completed? (INCLUDE ANY PROGRAMS TO PREPARE A PERSON FOR WORK)

- No formal schooling (GO TO A.36)..... 01
- Some primary school (GO TO A.35)..... 02
- Complete primary school (GO TO A.35).... 03
- Some secondary or high school (GO TO A.35)..... 04
- Completed secondary or high school (GO TO A.35)..... 05
- Some community college, technical college, CEGEP, or RN program without a university degree (GO TO A.36)..... 06
- Completed community college, technical college, CEGEP, or RN program without a university degree (GO TO A.36)..... 07
- Some university (Not Completed) (GO TO A.36)..... 08
- University degree (Completed) B.A./B.Sc (GO TO A.36)..... 09
- University degree (Completed) Professional (e.g., law, nursing, dentistry, medicine, commerce, engineering) degree (GO TO A.36)..... 10
- University degree (Completed) M.A./Ph.D. (GO TO A.36)..... 11

A.36* What is the highest level of schooling that your (husband/wife/partner) has completed?

- No formal schooling (GO TO A.38)..... 01
- Some primary school (GO TO A.37)..... 02
- Primary school (GO TO A.37)..... 03
- Some secondary or high school (GO TO A.37)..... 04
- Completed secondary or high school 05
- Some community college, technical college, CEGEP, or RN program without a university degree (GO TO A.38)..... 06
- Completed community college, technical college, CEGEP, or RN program without a university degree (GO TO A.38)..... 07
- Some university (not completed) (GO TO A.38)..... 08
- University degree (completed) B.A./B.Sc. (GO TO A.38)..... 09
- University degree (completed) Professional (e.g., law, nursing, dentistry, medicine, commerce, engineering) degree (GO TO A.38)..... 10

University degree (completed)
M.A./Ph.D. (GO TO A.38)..... 11

A.40 Do you have a paid full-time job?
No 0
Yes (GO TO A.45)..... 1

A.41 Do you have a paid part-time job?
No 0
Yes (GO TO A.45)..... 1

A.43 How many hours per week did you work at all paid jobs
(IF MORE THAN ONE JOB, RECORD TOTAL FOR ALL JOBS)

A.44 Are you looking for paid work? (ONLY ASK IF R DOES NOT ALREADY HAVE FULL OR PART-TIME WORK.)
No 0
Yes 1

A.49* Does your (husband/wife/partner) have a paid full-time job?
No 0
Yes (GO TO A.52)..... 1

A.50* Does he/she have a paid part-time job?
No 0
Yes (GO TO A.52)..... 1

SECTION C

C.1 In general, compared to other children the same age, would you say (name of child)'s health is:
Excellent 1
Very Good 2
Good 3
Fair 4
Poor 5

SECTION F

F.1 How did you feed (Name of child) at birth?
Formula (GO TO F.5) 0
Breast-feeding 1

F.2 Is your child breast-feeding now?
No 0
Yes (GO TO F.4)..... 1

F.3 How old was your child when you stopped?
(RECORD IN MONTHS)

F.4 Have you ever fed your child formula?
No (GO TO F.7) 0
Yes 1

F.5 Is your child still drinking formula?
No 0
Yes (GO TO F.7) 1

F.6 How old was your child when (he/she) stopped drinking formula? (RECORD IN MONTHS)

F.7 Have you ever fed (name of child) milk other than breast milk or formula?
No (GO TO F.11) 0
Yes 1

F.8 How old was your child when you first started giving (him/her) milk (other than breast milk or formula) every day? (RECORD IN MONTHS)

F.9 What type of milk did you first give to your child?
Regular (homogenized) milk 1
2% milk 2
1% milk 3
Skim milk 4
Other (SPECIFY ON LONG FORM) 5
Don't remember 6

F.10 What type of milk do you give your child now?
Regular (homogenized) milk 1
2% milk 2
1% milk 3
Skim milk 4
Other (SPECIFY ON LONG FORM) 5

F.11 At what age did you start feeding (name of child) solid foods (baby cereal, strained foods, crackers, etc.)? (RECORD IN MONTHS)

For the following questions, record as "yes" if child has eaten any of the foods listed on each item.

In the past 7 days did (name of child) eat any of these foods?

F.12 Pablum, Cooked cereal
No 0
Yes 1

F.13 Ready to eat cereal (Cheerios, Rice Krispies, etc.)
No 0
Yes 1

F.14 Bread, crackers, pancakes
No 0
Yes 1

F.15 Pasta (macaroni, noodles), rice
No 0
Yes 1

F.16 Eggs
No 0
Yes 1

F.17 Chicken, turkey, beef, pork, lamb
No 0
Yes 1

F.18 Fish (for example, canned tuna, baked cod)
No 0
Yes 1

F.19 Processed meats (hot dogs, bologna, luncheon meats)
No 0
Yes 1

F.20 Peanut butter, tofu, baked beans, lentils
No 0
Yes 1

F.21 Yogurt, milk pudding, ice cream
No 0
Yes 1

F.22 Cheese
No 0
Yes 1

F.23 Potatoes (including french fries)
No 0
Yes 1

F.24 Red, yellow, orange vegetables (for example, carrots)
No 0
Yes 1

F.25 Green vegetables (for example, green beans)
No 0
Yes 1

F.26 Bananas
No 0
Yes 1

F.27 Other raw fruit (for example, peeled apple slices)
No 0
Yes 1

F.28 Canned fruit
No 0
Yes 1

F.29 Fruit juices (apple, orange, etc.)
No 0
Yes 1

F.30 Cookies, cake, other pastry
No 0
Yes 1

F.31 Mixed dishes (canned pasta, stews, macaroni, soups, restaurant foods etc.)
No 0
Yes 1

F.32 Snack foods (e.g. potato chips)
No 0
Yes 1

F.33 Candy, pop, popsicles
No 0
Yes 1

F.34 Jello, fruit drinks (kool-aid, hi-c, etc.)
No 0
Yes 1

F.35 Do you give your child drops, such as fluoride, iron, or vitamins?
No (GO TO G.8) 0
Yes 1

F.36 What kind? (RECORD TYPE AND BRAND NAME ON LONG FORM.)

F.37 Do you do this every day?
No 0
Yes 1

SECTION L

L.2 Did you have any health problems during this pregnancy?
No (GO TO L.4) 0
Yes 1

L.3 What kinds of problems? (RECORD ALL THAT APPLY)
Operation on your abdomen 1
Kidney Infection 2
Vaginal bleeding after 12 weeks (3 months) of pregnancy 3
Diabetes 4
High blood pressure 5
Toxemia (high blood pressure with protein in urine) 6

Fibroids (non-cancerous tumours in uterus) 7
Sexually transmitted diseases 8
Other (SPECIFY ON LONG FORM)..... 9

Some women go to groups or classes with other pregnant women to learn about their pregnancy and the child. So I would like to ask you some questions about your use of prenatal classes and other supports during this pregnancy.

L.5 Did you attend prenatal or pregnancy classes during this pregnancy?
No (GO TO L.10) 0
Yes 1

L.7 About how many of the sessions did you attend?

L.9 Were any of your classes part of a Better Beginnings program?
No 0
Yes 1
(GO TO L.11)

L.11 Did you receive support (help) from other people or groups during your pregnancy? (such as from friends, relatives, parent group.)
No (GO TO L.13) 0
Yes 1

L.17 How much did you weigh before you became pregnant? (RECORD IN POUNDS)

L.18a How much did you weigh at the end of your pregnancy before giving birth? (RECORD IN POUNDS)

L.18b* How much do you currently weigh? (RECORD IN POUNDS)

L.19* How tall are you? (HEIGHT IS TO BE MEASURED DIRECTLY IF THIS IS FEASIBLE. RECORD IN FEET AND INCHES. IF USING SELF-REPORT, MAKE A NOTE OF THIS ON THE ANSWER SHEET.)

HEIGHT IN INCHES (SEE APPENDIX A)

L.20 How many times have you been pregnant?
Once (GO TO L.30) 1
Two or more 2

AGE OF YOUNGEST CHILD AT HOME (SEE APPENDIX A)

Now I want to ask you about your drug use before and during pregnancy. By that I mean your use of tobacco, street drugs, alcohol, over-the-counter drugs. These questions are being asked of all families. I want to remind you that all of your answers are confidential.

(NOTE: IF YOU HAVE ANY REASON TO BELIEVE THAT THESE QUESTIONS ARE INAPPROPRIATE FOR R (EG. CULTURAL OR RELIGIOUS REASONS) THEN SAY "If you do not feel comfortable answering any of the questions, please say so and I will move on to the next set of questions." AND THEN SKIP TO L.73)

L.33 Did you smoke cigarettes during the month before you became pregnant?

No (GO TO L.35) 0
Yes 1

L.35 Did you smoke cigarettes during your pregnancy?

No (GO TO L.38) 0
Yes 1

L.41 In the month before you became pregnant did you use marijuana or hash?

No 0
Yes 1

L.42 During this pregnancy did you use marijuana or hash?

No 0
Yes 1

I would now like you to consider the number of times you drank either wine, liquor or beer before and during your pregnancy.

L.43 In the month before you were pregnant, how often did you drink alcoholic beverages?

Never (GO TO L.45) 0
Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

HOW OFTEN R DRANK ALCOHOLIC BEVERAGES IN THE MONTH BEFORE PREGNANCY (CONSOLIDATED & RECODED FROM PERINATAL & 18 MO. DATA)

Never 0
Less than once a month 1
1 to 4 times a month 2
More than once a month 3

L.44 When you drank alcohol (wine, liquor, beer) in the month before you became pregnant, how many drinks would you have, on the average, each time?

1-2 drinks 1
3-4 drinks 2
5 or more drinks 3

L.45 Did you drink alcohol during your pregnancy?

No (GO TO L.49) 0
Yes 1

L.47 How often did you drink alcohol during this pregnancy?

Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

L.48 When you drank alcohol (wine, liquor, or beer) during this pregnancy, how many drinks would you have, on the average, each time?

1-2 drinks 1
3-4 drinks 2
5 or more drinks 3

HOW OFTEN R DRANK ALCOHOLIC BEVERAGES DURING THE PREGNANCY (CONSOLIDATED & RECODED FROM PERINATAL & 18 MO. DATA)

Never 0
Less than once a month 1
1 to 4 times a month 2
More than once a month 3

During the pregnancy which of the following medicine (over the counter drugs and doctor prescriptions) did you take?
(IF YES, RECORD NAME OF MEDICATION ON THE LONG FORM)

L.58 How many cigarettes do you currently smoke each day?

None 0
Less than 1 half pack of cig..... 1
More than half to one pack of cig..... 2
More than one pack of cig..... 3

L.60 In the past 12 months, how often did you drink alcoholic beverages?

Never 0
(GO TO L.63 AND
CODE L.61 AND L.62 AS "NA")
Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

L.61 When you drank alcohol (beer, wine or liquor), on average, how many drinks would you have each time?

1-2 drinks 1
3-4 drinks 2
5 or more drinks 3

L.62 In the past 12 months, how many times did you drink 10 or more alcoholic beverages on one occasion? (ONE DRINK MEANS: 1 BOTTLE OF BEER, 1 4-OZ GLASS OF WINE, OR ONE SHOT (1.5 OZ.) OF LIQUOR.)

L.64 In general, compared to other persons your age, would you say your health is

Excellent 1
Very Good 2
Good 3
Fair 4
Poor 5

SECTION N

Now I would like to ask you some questions about your monthly income and household expenses.

N.1 What is your current total monthly household income from all sources before taxes or other deductions?
(RECORD FULL AMOUNT, E.G.,"EIGHT-FIFTY" AS 0850. USE 3 MONTH AVERAGE IF R SAYS IT CHANGES. PROBE. IF R IS UNABLE TO ANSWER THEN SAY "Could you give me a range?")

LOW INCOME CUTOFFS (SEE APPENDIX A)

N.2 How much does your household pay for food each month? (DO NOT INCLUDE NON-FOOD ITEMS. RECORD FULL AMOUNT, E.G."THREE SEVENTY-FIVE" AS 375.)

N.3 How much does your household pay for rent or in mortgage payments plus utilities and taxes each month? (RECORD FULL AMOUNT, E.G., "SIX HUNDRED" AS 0600. INCLUDE GAS, OIL AND PHONE.)

Which of the following was true or not true for your household in the past 3 months.

N.4 Sometimes we didn't have enough money for our food and daily living expenses.

True 1
Not true 2

N.5 We've had to go to a food bank.

True 1
Not true 2

N.6 We have not been able to pay all of our bills.

True 1
Not true 2

FINANCIAL STRESS SCALE (SEE APPENDIX A)

Appendix 9

33 MONTH PARENT INTERVIEW

SECTION A

A.1 Is this a first or repeat interview?
First 1
Repeat (USE THE OTHER INTERVIEW)..... 2

A.2 How long have you lived in this neighbourhood?
(RECORD YEARS AND MONTHS. E.G., YEARS 02 MONTHS 06)

A.3 What is your relationship to (Use name of child)?
Are you
The biological mother/father 1
In some other relationship to the child
(PLEASE SPECIFY ON LONG FORM)..... 2

A.4 What is the sex of the respondent?
Male 1
Female 2

A.5 What is the sex of the child?
Male 1
Female 2

A.6 How many people currently live in your home?
(PROBE IF NECESSARY WITH "Could you tell me their relationship to you and (Use name of child)?"

THE RESPONSE TO THIS QUESTION IS THE TOTAL NUMBER OF PEOPLE LIVING IN THE HOME, INCLUDING THE CHILD. QUESTIONS A.7 - A.13 REQUIRE A BREAKDOWN OF THE TOTAL RECORDED IN A.6.

Establish how many are...

A.7 The focal child (ALREADY RECORDED ON SCANNABLE)

A.8 The child's biological parent(s)

A.9 Spouse or partner who is not the child's biological parent

A.10 The child's brothers or sisters

A.15 Are you now or have you ever been married?
No (GO TO A.19)..... 0
Yes 1

A.16 How many times?
Once 1
Twice..... 2
Three or more..... 3

A.18 Are you currently living with your husband/wife?
No 0
Yes (GO TO A.22)..... 1

A.19 Are you living with a partner or in a common-law relationship?
No (GO TO A.22).. 0
Yes 1

SINGLE PARENT HOUSEHOLD (SEE APPENDIX A)
NOTE: THIS QUESTION IS TO BE SKIPPED AND CODED AS NOT APPLICABLE "NA" FOR THE FIRST TIME VERSION OF THE PARENT INTERVIEW.

A.21 Is this the same husband/wife/partner as the last time we interviewed you?
No 0
Yes 1

AGE OF CHILD (MONTHS) (SEE APPENDIX A)

A.25 Where were you born?
In Canada...
Ontario 01
Outside Ontario 02
Outside Canada...
China 03
Germany 04
Hong Kong 05
India 06
Iran 07
Italy 08
Jamaica 09
Pakistan 10
Poland 11
Portugal 12
Somalia 13
Sri Lanka 14
Trinidad 15
United Kingdom 16
U.S.A. 17
Vietnam 18
Lebanon 19
Haiti 20
Other (SPECIFY ON LONG FORM)..... 21

A.26 In what year did you immigrate to Canada?
(E.G. RECORD 1965 AS '65')

A.28 Where was the child born?
(RECORD HOSPITAL AND CITY ON LONG FORM.)
(RECORD COUNTRY USING CODES FROM A.25)

A.29 How much did the child weigh?
(RECORD IN POUNDS AND OUNCES)

A.36 What is the highest level of schooling that you have completed? (Include any programs to prepare a person for work)

- No formal schooling 01
- Some primary school (GO TO A.37)..... 02
- Completed primary school (GO TO A.37)... 03
- Some secondary or high school (GO TO A.37)..... 04
- Completed secondary or high school (GO TO A.37)..... 05
- Some community college, technical college, CEGEP, or RN program without a university degree 06
- Completed community college, technical college, CEGEP, or RN program without a university degree 07
- Some university (not completed) 08
- University degree (completed) B.A./B.Sc 09
- University degree (completed) Professional (e.g., law, medicine, dentistry, engineering, nursing, commerce) degree 10
- University degree (completed) M.A./Ph.D. 11

A.38* What is the highest level of schooling that your (husband/wife/partner) has completed?

- No formal schooling 01
- Some primary school (GO TO A.39)..... 02
- Completed primary school (GO TO A.39)... 03
- Some secondary or high school (GO TO A.39)..... 04
- Completed secondary or high school (GO TO A.39)..... 05
- Some community college, technical college, CEGEP, or RN program without a university degree 06
- Completed community college, technical college, CEGEP, or RN program without a university degree 07
- Some university (not completed) 08
- University degree (completed) B.A./B.Sc. 09
- University degree (completed) Professional (e.g., law, medicine, dentistry, engineering, nursing, commerce) degree 10
- University degree (completed) M.A./Ph.D. 11

A.40 Do you have a paid full-time job?
No 0
Yes (GO TO A.43)..... 1

A.41 Do you have a paid part-time job?
No 0
Yes (GO TO A.43)..... 1

A.47* Does your (husband/wife/partner) have a paid full-time job?
No 0
Yes (GO TO A.50*)..... 1

A.48* Does he/she have a paid part-time job?
No 0
Yes (GO TO A.50*)..... 1

SECTION C

C.1 In general, compared to other children the same age, would you say (name of child)'s health is:
Excellent 1
Very Good 2
Good 3
Fair 4
Poor 5

SECTION F

Now I have some questions about the kinds of food your child eats.

F.1 What type of milk do you give to your child?
Regular (homogenized) milk 1
2% milk 2
1% milk 3
Skim milk 4
Other (RECORD ON LONG FORM) 5

For the following questions, record as "Yes" if child has eaten any of the foods listed on each item.

In the past 24 hours did (name of child) eat any of these foods?

F.2 Cooked cereal (oatmeal, cream of wheat, etc)
No 0
Yes 1

F.3 Ready to eat cereal (cheerios, rice krispies, etc)
No 0
Yes 1

F.4 Bread, crackers, pancakes
No 0
Yes 1

F.5 Pasta (macaroni, noodles), rice
No 0
Yes 1

F.6 Eggs
No 0
Yes 1

F.7 Chicken, turkey, beef, pork, lamb
No 0
Yes 1

F.8 Fish (for example, canned tuna or salmon, baked cod or haddock, pickerel or perch)
No 0
Yes 1

F.9 Processed meats (hot dogs, bologna, luncheon meats)
No 0
Yes 1

F.10 Peanut butter, tofu, baked beans, lentils
No 0
Yes 1

F.11 Yogurt, milk pudding, ice cream
No 0
Yes 1

F.12 Cheese (for example, cheddar, processed slices, cottage cheese, cheese spreads)
No 0
Yes 1

F.13 Potatoes (including french fries)
No 0
Yes 1

F.14 Red, yellow, orange vegetables (for example, carrots, yellow beans, beets)
No 0
Yes 1

F.15 Green vegetables (for example, green beans, broccoli)
No 0
Yes 1

F.16 Bananas
No 0
Yes 1

F.17 Other raw fruit (for example, apple slices)
No 0
Yes 1

F.18 Canned fruit
No 0
Yes 1

F.19 Fruit juices (apple, orange, etc.)
No 0
Yes 1

F.20 Cookies, cake, other pastry
No 0
Yes 1

F.21 Mixed dishes (canned pasta, stews, macaroni and cheese, soups, foods such as hamburgers from fast food restaurants, etc.)
No 0
Yes 1

F.22 Snack foods (eg. potato chips)
No 0
Yes 1

F.23 Candy, pop, popsicles
No 0
Yes 1

F.24 Jello, fruit drinks (kool-aid, hi-C etc.)
No 0
Yes 1

F.25 Do you give your child vitamins or minerals?
No (GO TO G.1) 0
Yes 1

F.26 What kind? (RECORD TYPE AND BRAND NAME ON LONG FORM)

F.27 Do you do this every day?
No 0
Yes 1

SECTION L

IMPORTANT NOTE: FOR SECTION L, ONLY ASK QUESTIONS L.1 - L.12 IF THE R IS THE BIOLOGICAL MOTHER OF THE FOCAL COHORT CHILD.

IF THE R IS NOT THE BIOLOGICAL MOTHER, PLEASE START AT L.13 AND RECORD L.1 - L.12 AS "NA".

I would like to ask you some questions about your pregnancy with (name of child).

L.1 Did you have any health problems during this pregnancy?
No 0
Yes 1

L.2 What kinds of problems? (RECORD ALL THAT APPLY)
1. Operation on your abdomen
2. Kidney infection
3. Vaginal bleeding after 12 weeks (3 months) of pregnancy
4. Diabetes
5. High blood pressure
6. Toxemia (high blood pressure with protein in urine)
7. Fibroids (non-cancerous tumour in uterus)

8. Sexuallly transmitted diseases
9. Other (PLEASE SPECIFY ON LONG FORM)

L.3 Some women go to groups or classes with other pregnant women to learn about their pregnancy and the child. Did you attend prenatal or pregnancy classes during this pregnancy?

No 0
Yes 1

Now I would like to ask you some general questions about your pregnancy.

L.4 How many times have you been pregnant?

Once (GO TO L.13) 1
Two or more 2

Now I have some questions about your current use of tobacco, alcohol, and prescription medications and drugs.

L.16 How many cigarettes do you currently smoke each day?

None 0
Less than 1 half pack of cig..... 1
More than half to one pack of cig..... 2
More than one pack of cig..... 3

L.17 Do any of the other people living in your household smoke?

No (GO TO L.19)..... 0
Yes 1

L.20 In the past 12 months, how often did you drink alcoholic beverages?

Never (GO TO L.27 AND CODE L.21 - L.26 AS "NA")..... 0
Less than once a month 1
1 to 3 times a month 2
Once a week 3
2 or 3 times a week 4
4 to 6 times a week 5
Every day 6

L.21 When you drank alcohol, (beer, wine or liquor), on average, how many drinks would you have each time?

1-2 drinks..... 1
3-4 drinks..... 2
5 or more drinks..... 3

L.22 In the past 12 months, how many times did you drink 10 or more alcoholic beverages on one occasion? (One drink means: 1 bottle of beer, 1 4oz. glass of wine, or 1 shot (1.5 oz.)of liquor.)

L.27 - L.31 ARE TO BE ASKED FOR THE PAST MONTH.

L.31 Have you [or your husband/wife/partner] used marijuana or hash in the last month?
No 0
Yes 1

L.32 How much do you currently weigh? (RECORD IN POUNDS)

L.33 How tall are you? (HEIGHT IS TO BE MEASURED DIRECTLY IF THIS IS FEASIBLE. RECORD IN FEET AND INCHES. IF USING SELF-REPORT, MAKE A NOTE OF THIS ON THE ANSWER SHEET.)

HEIGHT IN INCHES (SEE APPENDIX A)

SKIP AHEAD TO SECTION N IF R IS MALE

L.36 Did you breastfeed your last child?
No 0
Yes 1

L.37 For how long? (RECORD NUMBER OF MONTHS. IF CURRENTLY BREASTFEEDING, ASK "How long do you intend to breastfeed?")

SECTION N

Now I would like to ask you some questions about your monthly income and household expenses.

N.1 - N.14* ARE NOT ASKED IN THIS VERSION OF THE INTERVIEW.

N.1 What is your current total monthly household income from all sources before taxes or other deductions? (RECORD FULL AMOUNT, E.G., "EIGHT-FIFTY" AS 0850. USE 3 MONTH AVERAGE IF R SAYS IT CHANGES. PROBE. IF R IS UNABLE TO ANSWER THEN SAY "Could you give me a range?")

Income imputed
No, income not imputed 0
Yes, income imputed 1

LOW INCOME CUT OFF (SEE APPENDIX A)
INCOME AFTER IMPUTATIONS CODE (SEE APPENDIX A)

N.2 How much does your household pay for food each month? (DO NOT INCLUDE NON-FOOD ITEMS. RECORD FULL AMOUNT, E.G."THREE SEVENTY-FIVE" AS 375.)

N.3 How much does your household pay for rent or in mortgage payments plus utilities and taxes each month? (RECORD FULL AMOUNT, E.G., "SIX HUNDRED" AS 0600. INCLUDE GAS,OIL AND PHONE.)

Which of the following was true for your household in the past 3 months.

N.4 Sometimes we didn't have enough money for our food and daily living expenses.

True 1
Not true 2

N.19 We've had to go to a food bank.

True 1
Not true 2

N.20 We have not been able to pay all of our bills.

True 1
Not true 2

FINANCIAL STRESS SCALE (SEE APPENDIX A)

Appendix 10- Standardized Protocol for 24 Hour Recall with 48-month old children

Better Beginnings, Better Futures

Standardized Protocol for 24 Hour Recall with 48 month old children - Focal Cohort

Food Recall Kit

Each kit contains the following items:

- Food Models
  - Mounds (XS,S,M,L)
  - Balls (S,M,L,J)
  - Surface Areas (circles, squares)
  - Wooden Thickness Indicator
  - Wooden Pie Wedge
  - Spoons: teaspoon and tablespoon (heaped and level)
  - 1 calibrated mug, 2 glasses, 1 bowl
- 250 ml measuring cup
- Ruler

Forms

The interviewer will have three forms:

- 24 hour recall form
- Recipe sheet
- Permission to contact caregiver form

August 25, 1997

Procedure

General Protocol

The general protocol to be followed when carrying out the 24 hour recall interview is outlined below. Detailed procedures follow.

1. Introduction to recall procedure and the development of rapport

Explain to the child's parent that you will be asking them to recall the foods and beverages their child ate or drank in the last 24 hours. Emphasize that this information is very important and that you will help them remember what was eaten by using different food models. In explaining the 24 hour recall, it is important that the trust of the parent be gained and a positive rapport be developed. Friendly conversation and small talk will put the respondent at ease.

eg. "In the next twenty minutes, I would like you to recall what your child ate and drank yesterday. It is very important that you remember as much as you can and in as much detail as possible. I will help you remember details and show you food models to help you estimate the amount of food or drink your child consumed."

2. Define 24 hour time period

Define the 24 hour period as "the time from midnight of the night before to midnight last night". If, for example, you are conducting the interview on a Wednesday, you would say "the time from midnight Monday to midnight Tuesday". Be as clear as possible in defining the time period.

3. Begin the recall

Ask the parent if the child had anything to eat or drink through the night of the night before (eg. Monday midnight).

eg. "Did your child sleep right through Monday night, or did he/she wake up after midnight? (If 'yes', "Did he/she have anything to eat or drink at this time? What did he/she have?").

4. List food and beverages consumed and portion sizes

On the 24 hr recall form, write down the time of consumption, where it was eaten, and everything consumed during this time period. Record approximate portion sizes and a brief description of the items as described by the parent.

5. Details - food description and amount

Once you have recorded all the food and beverage items consumed in that meal or snack, probe for more detailed

information about the specific items. Obtain the following for each food and beverage item:

(i) Detailed description including preparation method, brand name, etc.
(ii) Quantity consumed. Display only the food models appropriate to the specific food or beverage. Emphasize that models are to be used only as guides.

Note:
- When convenient calibrate the child's dishes* to estimate portion sizes.
- Use Nutrition Canada food models when calibration is not possible.
- Record quantities as gram (g), millilitre (ml), fluid ounce (fl. oz.), weight ounce (wt. oz.), or household measure (eg. teaspoon (tsp.), tablespoon (tbsp)). Use measures with which the parent is most comfortable.

* Fill the container (glass, mug, bowl) with water to the level indicating the volume of food or beverage consumed by the child. Pour all the water into the measuring cup and record the volume in fluid ounces or millilitres in the "Amount" column of the 24 hr recall form. You may need to go through this procedure a number of times, depending on the various quantities of food/beverage consumed.

6. Repeat procedure to cover the rest of the day

Once sufficient detail has been obtained, enquire about the next time the child ate or drank. Be careful not to refer to specific meals (eg. breakfast, lunch, or dinner). Repeat steps 5 and 6 to acquire detailed information about the food/beverage description and quantity consumed.

7. Recap

At the end of the interview read back what you have recorded and ask the parent if what you wrote down is accurate.

8. Scan for missing items

Scan the 24 hour recall for these main types of food:

Food Type	Examples
breads and cereals	• rice, macaroni, bread
fruits and vegetables	• bananas, berries, orange juice; tomatoes, lettuce, potatoes
milk and milk products	• cheese, yogurt, ice cream
meat and meat alternates	• fish, eggs, chicken, peanut butter, nuts

Politely ask about any missing types of food.

eg. "Did your child have any milk with any of his/her meals?"

9. Ask about supplement use

Ask the parent whether the child had a vitamin and/or mineral supplement.

eg. "Did your child have a vitamin or mineral pill yesterday? (if 'yes' "May I look at the label?")

Record the brand name and type of supplement(eg. Flintstones chewable tablets plus iron) and quantity consumed.

10. Is this the child's usual meal pattern?

Ask if this is a typical meal pattern for the child. If the parent says that it was not a normal day, ask why it wasn't and record response.

11. Recipes

Ask the parent for any recipes you need in order to accurately record the child's intake. Fill out a recipe form for each dish required. If a recipe is needed from the child's daycare or babysitter, ask the parent for permission to contact this person and their phone number.

12. Be sure to thank the parent for their time and co-operation.

Detailed Information

Recording

Please refer to the enclosed 24 hour recall form.

1. Time food/beverage consumed

This information is recorded in the first column. The time is recorded only once for that particular meal/snack. A new time must be recorded at each distinct meal/snack period. Leave a space or draw a line to separate each meal or snack.

2. Location that the food is consumed

The location (eg. home, school, daycare, restaurant) where the food or beverage was consumed must be identified. If the food/beverage was consumed when in someone else's care, ask permission from the parent to contact this person and have the parent sign the permission form. Obtain the necessary information from the caregiver over the telephone. When the

food/beverage was consumed at a restaurant, record the name of the restaurant and as much detail about the item as possible.

3. Food or Drink Description

Record the description of the food/beverage consumed in the fourth column. As much detail as possible will be obtained by probing the caregiver for more information. See below for "prompting" detail suggestions.

prompt for meat:	1. kind of meat 2. description of the cut 3. method of cooking 4. lean or lean + fat 5. bone in or not 6. commercial preparation
prompt for fish/seafood:	1. kind of fish/seafood (eg.cod, tuna) 2. fresh/frozen/canned 3. method of cooking 4. bones/skin/shell 5. commercial preparation
prompt for poultry:	1. kind of poultry (eg. chicken, turkey) 2. parts or pieces eaten (eg. breast, thigh) 3. method of cooking 4. white or dark meat 5. meat + skin or meat only 6. commercial preparation
prompt for fats:	1. kind of fat (butter, margarine, oil, lard) 2. brand name, if possible
prompt for milk products:	1. kind of dairy product (eg. milk, cream, etc.) 2. % fat (eg. whole milk, 2% fat, 1% cottage cheese)
prompt for cheese:	1. type (eg. cheddar, cream cheese, mozzarella) 2. % fat, if possible
prompt for bread/rolls:	1. type of grain (rye, whole wheat, etc.) 2. homemade/bought 3. size: standard or unusual (should then use models)

	4. spreads (butter, margarine, jam, etc.)
prompt for baked goods:	1. type of product (cinnamon bun, danish, etc.) 2. whether iced or not 3. homemade* or commercial 4. type of filling
prompt for cereal/pasta/rice:	1. type of grain (ie white, brown, wild) 2. brand name of cereals 3. dry? or milk added?
prompt for vegetables:	1. fresh/frozen/canned 2. peeled/unpeeled 3. method of cooking 4. topping (butter, etc.) 5. commercial preparation (eg. in sauce)
prompt for fruits:	1. fresh/frozen/canned 2. peeled/unpeeled 3. type of liquid/syrup (heavy,light) if canned
prompt for beverages/soup:	1. size of can or bottle 2. fruit juice: sweetened/unsweetened 3. added vitamins/minerals (eg. vit C) 4. pop: diet or regular 5. soups: homemade*/canned 6. soups/frozen juices: mixed with milk or water
prompt for fast food/ take-out foods:	1. restaurant name 2. food/bev. name 3. size of portion (small,med.,large) 4. condiments added (eg. ketchup, mustard)
prompt for candies, etc.:	1. type of candy (soft, hard, toffee, etc.) 2. size or amount
prompt for mixed dishes:	1. product name 2. homemade* or commercial

* **NOTE:** Recipes should be obtained for homemade dishes if available. It must be identified on the 24 hr recall form that the mixed dish recipe is recorded on the Recipe Sheet (eg. tuna casserole-see recipe 1). Record the number of servings the recipe makes and the number of servings consumed by the child *or* the total quantity the recipe makes, noting the portion size the child consumed.

4. Portion sizes

Record the amount of food or beverage consumed in the columns 5 and 6 under "AMOUNT" and "CODE".

(i) Amount

Household Measures: Record the amount of food or beverage consumed in household measures. The units can be weight in ounces (wt. oz.), fluid ounces (fl. oz.), or millilitres (ml).

Standard Measures: Any food items that have standard measures (bread, egg) should be recorded as such. If they are not a standard size, a model should be used to estimate size.

(ii) Codes

Nutrition Canada Food Models: If the Nutrition Canada food models are used to help estimate portion size, record them according to the "Mold Codes", listed below:

QUANTITY / MOLD / SIZE or THICKNESS

eg. 2 MO-S
1/2 BA-M
C-E, TH 4
S-MM, TH 1

Examples of foods for which the models will be appropriate follow:

BALLS	fruits, tomato, meat balls, potatoes, ice cream
MOUNDS	raw/cooked vegetables, pasta, rice, salads
WOODEN SURFACE AREAS	meats, fish, poultry, cakes, squares, cookies, crackers
THICKNESS INDICATOR (or RULER)	meats, cheese, cake

PIE WEDGE	pie, pizza
SPOONS	peanut butter, jam, sugar, condiments

Mold Codes

MOUNDS:	MO-XS (extra-small)
	MO-S (small)
	MO-M (medium)
	MO-L (large)
BALLS:	BA-S
	BA-M
	BA-L
	BA-J (jumbo)
TEASPOON:	tsp-H (heaped)
	tsp-L (level)
TABLESPOON:	TBS-H
	TBS-L
WEDGE:	WE-D (8 " pie)

SURFACE AREA MODELS: Surface area models may be used alone or in conjunction with the thickness indicator or ruler to obtain an estimate of thickness. The model is identified as a circle (C), a square (S) and the size is identified by a letter.

Circles	C-E
	C-M
	C-CC
	C-MM
	C-G
	C-H
Squares	S-E
	S-M
	S-CC
	S-MM
	S-G
	S-H

Thickness Indicator: Each layer represents 1/8 inch or 3 mm. A measure less than 1 leaf is called a sliver. Record the thickness (in number of layers or with a ruler) after the mold description.

eg. S-M, TH 4 (means "square size M, 4 layers thick")
C-H, 3 in (means "circle size H, 3 inches thick")

Labels: The interviewer should record weights or volumes directly from containers or labels whenever possible.

Note: The resources available in the home should be utilized as much as possible. eg. calibrate dishes, read labels, observe food items.

Permission to Contact Caregiver

I give permission for _____ of the
(researcher)
Better Beginnings, Better Futures project to contact my
child's caregiver, to ask what my child _____
(name)
ate on _____, and to ask for any recipes for
(date)
homemade mixed foods.

Name of Caregiver _____

Telephone Number _____

Parent's Signature _____

Recipe Form

ID Number _____

Recipe Number _____

Name of Recipe _____

Ingredients and Method of Preparation

Number and Size of Servings from Recipe

Number of Servings:	Size of Serving:

Better Beginnings, Better Futures: 24-Hour Dietary Recall - **48 Months**

26.08.97

ID # 189 _____ **Sex** _____ **Date of Interview:** _____ **Interviewer:** _____

Date of Birth _____
day mon yr

Mark whether you used the kit's models or calibrated the child's dish.

glass _____ kit _____ cal **mug** _____ kit _____ cal **bowl** _____ kit _____ cal **Recall Kit #** _____

Time of day	Place	Food or drink	Description	Amount	Code	CANDAT (*for office use only*)		
						Meal Code	Food Code	Amount

Time of day	Place	Food or drink	Description	Amount	Code	CANDAT (*for office use only*)		
						Meal Code	Food Code	Amount

1. **Did your child take any vitamin or mineral supplements yesterday?**
   yes _____ no _____
   If yes, what kind? (brand name and dosage) _____

2. **Did your child take any medication in the last 24 hours?**
   yes _____ no _____

3. **Is this a typical meal pattern?** yes _____ no _____
   If no, why not? _____

Respondent(s) *mother* ____ *father* ____ *other* ____
If *other, who?* _____

26.08.97

Appendix 11

Measures from 3 month interview used in the present analysis

Infant Measures
Sex
Birthweight
Age
Feeding at birth
Current feeding (specific questions can be seen in Appendix 7, section F)
  Breastfeeding or formula feeding
  Age of introduction to solids
  Age of introduction to milk
  Type of milk

Maternal Measures
Birthplace
Age
Education level
Partner's education level
Employment status
Partner's employment status
Income (coded as above or below low income status)
Single parent household
Number of children living in the home
Belong to a clan
Smoking during pregnancy
Currently smoking
Consumed alcohol during pregnancy
Currently consuming alcohol
Number of other smokers in the home
Attended prenatal classes (yes/no)

Appendix 12

Measures from 18 month interview used in the present analysis

Infant Measures
Sex
Birthweight
Age
Feeding at birth
Current feeding (specific questions can be seen in Appendix 8, section F)
  Breastfeeding or formula feeding
  Age of introduction to solids
  Age of introduction to milk
  Type of milk
Type of foods consumed during the previous seven days (list of foods can be seen in Appendix 8, questions F12-34)

Maternal Measures
Birthplace
Age
Education level
Partner's education level
Employment status
Partner's employment status
Income (coded as above or below low income status)
Single parent household
Number of children living in the home
Belong to a clan
Smoking during pregnancy
Currently smoking
Consumed alcohol during pregnancy
Currently consuming alcohol
Number of other smokers in the home
Attended prenatal classes (yes/no)

Appendix 13

Measures from 33 month interview used in the present analysis

Child Measures
Sex
Birthweight
Age
Type of foods consumed during the previous 24 hours (list of foods can be seen in Appendix 9, questions F 2-24)

Maternal Measures
Birthplace
Age
Education level
Partner's education level
Employment status
Partner's employment status
Income (coded as above or below low income status)
Single parent household
Number of children living in the home
Belong to a clan
Currently smoking
Currently consuming alcohol

Appendix 14

Measures from 48 month interview used in the present analysis

Child Measures
Sex
Age
24- hour recall – macro and micro nutrient intakes

Maternal Measures
Birthplace
Age
Education level
Partner's education level
Employment status
Partner's employment status
Income (coded as above or below low income status)
Single parent household
Number of children living in the home
Belong to a clan
Currently smoking
Currently consuming alcohol
Height
Current weight

Appendix 15

Age at first anthropometric measurement

Age	# of children
<3.5 months	19
3.6-5.9 months	27
6-7.9 months	10
8-9.9 months	6
10-11.9 months	2
12-13.9 months	5
14-15.9 months	6
16-17.9 months	0

Appendix 16

Characteristics of mothers with children ≥ 85th percentile (n=20) and <85th percentile (n=41) for weight-for-height at the second assessment period *

Characteristic	≥85th percentile for weight-for-height (n=20) no (%)	<85th percentile for weight-for-height (n=41) no (%)
Mothers Birthplace		
Ontario	19 (95.0)	35 (85.4)
United States	1 (5).0	6 (14.6)
Mothers Education		
<High School	10 (55.6)	23 (74.2)
>= High School	8 (44.4)	8 (25.8)
Partners Education		
<High School	10 (83.3)	14 (77.8)
>= High School	2 (16.7)	4 (22.2)
Mother Working		
Yes	5 (27.8)	14 (45.2)
No	13 (72.2)	17 (54.8)
Partner Working		
Yes	7 (53.8)	13 (59.1)
No	6 (46.2)	9 (40.9)
Single Parent Household		
Single	8 (40.0)	16 (39.0)
Not Single	12 (60.0)	25 (61.0)
Siblings at home		
No Siblings	7 (38.9)	5 (16.1)
Siblings	11 (61.1)	28 (83.9)
Belong to a Clan		
Yes	10 (55.6)	22 (68.8)
No	8 (44.4)	10 (31.3)
Attended Prenatal Classes		
Yes	9 (42.1)	23 (57.5)
No	11 (57.9)	17 (42.5)

* not all subjects responded to every question

Characteristic	≥85th percentile for weight-for-height (n=20) no (%)	<85th percentile for weight-for-height (n=41) no (%)
Currently Smoking		
Yes	6 (33.3)	14 (45.2)
No	12 (66.7)	17 (54.8)
Currently Consuming Alcohol		
Yes	9 (50.0)	22 (71.0)
No	9 (50.0)	9 (29.0)
How Infant was fed at Birth		
Breastfed	12 (60.0)	22 (80.0)
Formula Fed	6 (40.0)	8 (20.0)
Age of Introduction to Solids		
Below 16 weeks	12 (63.2)	22 (62.9)
Above 16 weeks	7 (36.6)	13 (37.1)
Feeding at 3-months **		
Exclusively Breastfeeding	4 (36.4)	10 (37.0)
Stopped Breastfeeding	7 (63.6)	17 (63.0)
Maternal BMI		
< 18.5	2 (13.3)	1 (3.4)
18.5-24.9	7 (46.7)	7 (24.1)
25-29.9	2 (13.3)	13 (44.8)
>= 30	4 (26.7)	8 (27.6)

* not all subjects responded to every question
** children breastfed at birth

Appendix 17

Characteristics of mothers with children ≥85th percentile (n=21) and <85th percentile (n=43) for weight-for-height at the third assessment period *

Characteristic	≥85th percentile for weight-for-height (n=21) no (%)	<85th percentile for weight-for-height (n=43) no (%)
Mothers Birthplace		
Ontario	17 (89.5)	32 (91.4)
United States	2 (10.5)	3 (8.6)
Mothers Education		
<High School	13 (68.4)	23 (65.7)
>= High School	6 (31.6)	12 (34.3)
Partners Education		
<High School	5 (71.4)	12 (75.0)
>= High School	2 (28.6)	4 (25.0)
Mother Working		
Yes	7 (36.8)	15 (42.9)
No	12 (63.2)	20 (57.1)
Partner Working		
Yes	3 (30.0)	12 (60.0)
No	7 (70.0)	8 (40.0)
Single Parent Household		
Single	9 (47.4)	17 (47.2)
Not Single	10 (52.6)	19 (52.8)
Siblings at home		
No Siblings	4 (21.1)	10 (28.5)
Siblings	15 (78.9)	25 (71.4)
Belong to a Clan		
Yes	14 (73.7)	19 (55.9)
No	5 (26.3)	15 (44.1)
Attended Prenatal Classes		
Yes	9 (47.4)	25 (58.1)
No	10 (52.6)	18 (41.9)

* not all subjects responded to every question

Characteristic	≥ 85th percentile for weight-for-height (n=21) no (%)	< 85th percentile for weight-for-height (n=43) no (%)
Currently Smoking		
Yes	6 (31.6)	16 (45.7)
No	13 (68.4)	19 (54.3)
Currently Consuming Alcohol		
Yes	12 (66.7)	21 (60.0)
No	6 (33.3)	14 (40.0)
How Infant was fed at Birth		
Breastfed	17 (81.0)	30 (71.4)
Formula Fed	4 (19.0)	12 (26.6)
Age of Introduction to Solids		
Below 16 weeks	10 (52.6)	25 (69.4)
Above 16 weeks	9 (47.4)	11 (30.6)
Feeding at 3-months **		
Exclusively Breastfeeding	4 (36.4)	11 (39.3)
Stopped Breastfeeding	7 (63.6)	17 (60.7)
Maternal BMI		
< 18.5	1 (5.9)	2 (6.3)
18.5-24.9	8 (47.1)	7 (21.9)
25-29.9	5 (29.4)	9 (28.1)
>= 30	3 (17.6)	14 (43.8)

* not all subjects responded to every question
** infants breastfed at birth

Appendix 18

Characteristics of mothers with children ≥85th percentile (n=21) or <85th percentile (n=49) for BMI at 48-months of age *

Characteristic	≥85th percentile for BMI (n=21) no (%)	< 85th percentile for BMI (n=49) no (%)
Mothers Birthplace		
Ontario	20 (95.2)	40 (93.3)
United States	1 (4.8)	3 (6.7)
Mothers Education		
<High School	13 (61.9)	24 (53.3)
>= High School	8 (38.1)	21 (46.7)
Partners Education		
<High School	10 (100.0)	16 (55.2)
>= High School	0 (0.0)	13 (44.8)
Mother Working		
Yes	6 (33.3)	17 (39.6)
No	12 (66.7)	27 (61.4)
Partner Working		
Yes	5 (55.6)	20 (69.0)
No	4 (44.4	9 (31.0)
Single Parent Household * **		
Single	8 (38.1)	30 (66.7)
Not Single	13 (61.9)	15 (33.3)
Siblings at home		
No Siblings	6 (28.6)	5 (11.1)
Siblings	15 (71.4)	40 (88.9)
Belong to a Clan		
Yes	10 (62.5)	21 (58.3)
No	6 (37.5)	15 (41.7)
Attended Prenatal Classes		
Yes	13 (65.0)	24 (53.3)
No	7 (35.0)	21 (46.7)

* not all subjects responded to every question

*** $p<0.05$

Characteristic	≥85th percentile for weight-for-height (n=21) no (%)	<85th percentile for weight-for-height (n=49) no (%)
Currently Smoking		
Yes	12 (57.1)	24 (53.3)
No	9 (42.9)	21 (46.7)
Currently Consuming Alcohol		
Yes	14 (66.7)	26 (57.8)
No	7 (33.3)	19 (42.2)
How Infant was fed at Birth		
Breastfed	16 (80.0)	36 (80.0)
Formula Fed	4 (20.0)	9 (20.0)
Age of Introduction to Solids		
Below 16 weeks	14 (77.8)	25 (62.5)
Above 16 weeks	4 (22.2)	15 (37.5)
Feeding at 3-months **		
Exclusively Breastfeeding	4 (26.7)	10 (32.3)
Stopped Breastfeeding	11 (73.7)	21 (67.7)
Maternal BMI		
< 18.5	0 (0.0)	0 (0.0)
18.5-24.9	3 (21.4)	13 (50.0)
25-29.9	6 (42.9)	5 (19.2)
>= 30	5 (35.7)	8 (30.8)

* not all subjects responded to every question
** children breastfed at birth