

**THE IMPACT OF WORK, CHILDCARE AND FAMILY  
VARIABLES ON THE DIET QUALITY AND DIET DIVERSITY  
OF PRESCHOOLERS IN DUAL-EARNER FAMILIES  
IN WINNIPEG, MANITOBA**

**BY**

**VERMARAN RENEE LORNA EXTAVOUR**

**A Thesis**

**Submitted to the Faculty of Graduate Studies  
In Partial Fulfillment of the Requirements  
For the Degree of**

**MASTER OF SCIENCE**

**Department of Human Nutritional Sciences  
University of Manitoba  
Winnipeg, Manitoba**

**© May 2003**

**THE UNIVERSITY OF MANITOBA**  
**FACULTY OF GRADUATE STUDIES**  
\*\*\*\*\*  
**COPYRIGHT PERMISSION**

**THE IMPACT OF WORK, CHILDCARE AND FAMILY  
VARIABLES ON THE DIET QUALITY AND DIET DIVERSITY  
OF PRESCHOOLERS IN DUAL-EARNER FAMILIES  
IN WINNIPEG, MANITOBA**

**By**

**Vermaran Renee Lorna Extavour**

A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of  
Manitoba in partial fulfillment of the requirement of the degree  
of

**Master of Science**

**Department of Human Nutritional Sciences  
University of Manitoba  
Winnipeg, Manitoba**

(c) 2003

Permission has been granted to the Library of the University of Manitoba to lend or sell copies of this thesis/practicum, to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film, and to University Microfilms Inc. to publish an abstract of this thesis/practicum.

This reproduction or copy of this thesis has been made available by authority of the copyright owner solely for the purpose of private study and research, and may only be reproduced and copied as permitted by copyright laws or with express written authorization from the copyright owner.

## ACKNOWLEDGEMENTS

I would like to thank my research committee for their guidance and encouragement to complete my thesis: Dr. James Friel, Dr. Karen Duncan, and Lynda Corby.

My gratitude is extended to Marian Campbell for her assistance with my research.

My gratitude is also extended to the International Council for Canadian Studies for partial funding of the research

Thanks also go to Dennis Murphy for his statistical advice.

A special thank you to my Winnipeg family and friends for their continued emotional and financial support over the last few years. Above all I thank my family and friends in Trinidad and Tobago for their continued support throughout the years and for their prayers and guidance, which helped to strengthen all aspects of my life.

## TABLE OF CONTENTS

	Page No.
1.0 Introduction	1
2.0 Literature Review	
2.1 Human Development Theory	4
2.2 Nutrient Intake of Preschoolers	9
2.3 Review of a Related Study	11
2.4 Paid Work Setting	13
2.4.1 Paid Work Time	15
2.4.2 Paid Work Schedule	15
2.4.3 Paid Work Schedule Flexibility	18
2.5 Childcare Setting	19
2.6 Family Setting	21
2.7 Summary	24
2.8 Dietary Assessment Measures	28
2.8.1 Diet Quality	30
2.8.2 Diet Diversity	35
2.9 Research Questions, Hypothesis and Rationale	47
3.0 Methodology	
3.1 Baseline Study	51
3.1.1 Subjects	51
3.1.2 Research Methods	51
3.1.3 Response Rate	52
3.1.4 Results and Limitations	53
3.2 Measures for the Present Study	54
3.2.1 Descriptive Variables	54
3.2.2 Analytical Variables	55
3.2.2.1 Independent Variables	55
3.2.2.2 Dependent Variables	57
3.3 Analysis Plan	73
3.3.1 Univariate Analysis	73
3.3.2 Bivariate Analysis	73
3.3.3 Multivariate Analysis	74
4.0 Results	
4.1 Recoding Data	79
4.2 Univariate Analysis	82
4.2.1 Work Setting	82
4.2.2 Childcare Setting	94
4.2.3 Family Setting	97
4.2.4 Diet Quality	100
4.2.4.1 Nutrient Intake	100

4.1.4.2 Prevalence of Nutrient Inadequacy	103
4.2.4.3 Percentage of Nutrient Intake from meals and snacks	103
4.2.5 Diet Diversity	110
4.3 Bivariate Analysis	113
4.3.1 Re-catergorising variables	113
4.3.2 Work Schedule Flexibility	118
4.3.3 Bivariate Results	120
4.3.3.1 Interrelationships among independent variables	120
4.3.3.2 Relationships among dependent variables	126
4.3.3.3 Diet Quality	126
4.3.3.4 Diet Diversity	129
4.4 Multivariate Analysis	132
4.4.1 Testing Assumptions	132
4.4.1.1 Residual Analysis	133
4.4.2 Diet Quality	134
4.4.2.1 Relative influence of mothers' work, child care and family setting variables on diet quality	134
4.4.2.2 Relative influence of family-work, child care and family setting variables and diet quality	137
4.4.3 Diet Diversity	140
4.4.3.1 Relative influence of mothers' work, child care and family setting variables on diet diversity	140
5.4.2.2 Relative influence of family-work, child care and family setting variables on diet diversity	143
5.0 Discussion of Results	146
5.1 Discussion of univariate analysis	146
5.1.1 Work Setting	146
5.1.2 Child Care Setting	147
5.1.3 Family Setting	147
5.2 Discussion of bivariate analysis	148
5.2.1 Diet Quality	148
5.2.1.1 Research question 1	148
5.2.1.2 Research question 2	149
5.2.2 Diet Diversity	151
5.2.2.1 Research question 1	151
5.2.2.1 Research question 2	152
5.3 Discussion of multivariate analysis	153
5.3.1 Diet Quality	153
5.3.1.1 Relative effect of family, childcare and mothers' work setting variables and diet quality	153
5.3.1.2 Relative effect of family, child care and family-work setting variables and diet quality	154
5.3.2 Diet Diversity	155
5.3.2.1 Relative effect of family, childcare and mothers' work setting variables on diet diversity	155

5.3.2.2 Relative effect of, family childcare and family-work setting variables on diet diversity	156
6.0 Conclusion and Limitations	158
6.1 Conclusion	158
6.2 Limitations	162
7.0 Implications for Future Research	164
References	165

## **LIST OF APPENDICES**

A Telephone questionnaire to parents of selected children	173
B How To Keep a weighted food diary of your child's intake	188
C Diet diversity coding template	196
D List of discrete foods	199

## LIST OF TABLES

Table No.	Table Name	Page No.
1.	Health Canada's Food Groups and the Recommended Number of Servings for Preschoolers	9
2.	Nutrient Recommendations	59
3.	Criteria for defining foods	65
4.	Recommended Serving Sizes	69
5.	Serving Sizes to be used as 'cut' points for foods	71
6.	Days of the Week Worked by Mothers and Fathers	83
7.	Hours of the Week Worked by Mothers and Fathers	83
8.	Number of Mothers and Fathers Working Standard vs. Non-standard Work Schedules	84
9.	Combined Family Work Schedule	86
10.	The Ability of Mothers and Fathers to Change Their Hours Worked Permanently	86
11.	The Ability of the Family to Change Their Hours Worked Permanently	87
12.	The Ability of Mothers and Fathers to Change Their Days Worked Permanently	89
13.	The Ability of the Family to Change Their Days Worked Permanently	89
14.	The Ability of Mothers and Fathers to Take Time Off During Their Workday for Personal or Family Matters	90
15.	The Ability Of The Family to Take Time Off During Their Workday for Personal or Family Matters	90
16.	Summated Three Item Score for Work Schedule Flexibility <sup>1</sup> of Mothers and Fathers	92
17.	Summated Three Item Score for Family Work Schedule Flexibility	92
18.	Distribution of Mothers' and Fathers' Occupations	93
19.	The Number of the Different Types of Childcare Arrangements Used by Parents	95
20.	The Number of Families Using More Than One Type of Childcare	95
21.	Parent's Satisfaction with the Childcare Arrangement	96
22.	The Meals and Snacks Parents Reported That Were Usually, Sometimes or Never Eaten With Caregivers	96
23.	Distribution of Mothers' Education	98
24.	Distribution of Fathers' Education	98
25.	Distribution of Family Income	99
26.	Three-day Mean Nutrient Intake (standard deviation)	101
27.	Three-day Mean Nutrient Density (standard deviation)	102
28.	Prevalence of nutrient intake above and below Estimated Average Requirement (EAR)	104
29.	Percentage of the mean three-day nutrient intake from meals and snacks	105
30.	Percentage of the mean three-day nutrient intake from various meals	107
31.	Percentage of the mean three-day nutrient intake from various snacks	108

32.	Percentage energy and mean energy intake ( $\pm$ standard deviation) from protein, fat and carbohydrate in meals and snacks	109
33.	Foods eaten by at least 20% of preschoolers	111
34.	Mothers' work setting variables	114
35.	Fathers' work setting variables	115
36.	Family-work setting variables	116
37.	Child care setting variables	116
38.	Mothers' education	116
39.	Fathers' education	117
40.	Family Income (Categorical distribution)	117
41.	Spearman's correlation results for mothers' work schedule flexibility score	119
42.	Spearman's correlation results for Family work schedule flexibility	119
43.	Significant relationships between mothers' work setting, child care setting and family setting	122
44.	Significant relationships between family work setting, child care setting and family setting variables	125
45.	Significant relationships between mothers' work setting, child care setting family setting variables and diet quality diversity	128
46.	Significant relationships between family work setting variables and diet quality and diet diversity	131
47.	Analysis of Variance Results for main effect of mothers' work, child care and family variables and diet quality	135
48.	Analysis of Variance Results for main and interaction effects of mothers' work, child care and family variables and diet quality	136
49.	Analysis of Variance for main effect of family-work, child care and family variables on diet quality	138
50.	Analysis of Variance for main and interaction effects of family-work, child care and family variables on diet quality	139
51.	Analysis of Variance for main effect of mothers' work, child care and family variables on diet diversity	141
52.	Analysis of Variance for main and interaction effects of mothers' work, child care and family variables on diet diversity	142
53.	Analysis of Variance for main effect of family-work, child care and family variables on diet diversity	144
54.	Analysis of Variance for main and interaction effects of family-work, child care and family variables on diet diversity	145

## ABSTRACT

Over the last 40 years there has been an increase in the number of women entering Canada's labour force. With the increase in participation it is not clear how women working outside of the home affects the diet of preschoolers in dual earner families. This study examined the effects of mothers' work, child-care and family variables on the diet quality and diversity of preschoolers in dual-earner families. The effects of the combined mothers' and fathers' work variables on the diet of preschoolers were also examined. Subjects were 146 preschoolers (24-47 months) in dual earner families living in Winnipeg. Parents and caregivers kept an estimated 3-day food record for non-consecutive days. Work variables were work time, work schedule, and work schedule flexibility. I also included the licensing of the child-care facility as a characteristic of the child-care setting. Mothers' education and family income were used as the characteristics of the family setting. Diet quality was measured using a mean adequacy ratio score, while diet diversity was measured by determining the presence of different foods. Mothers' work time and mothers' education had significant relationships with diet quality ( $r = -0.2$ ,  $p < 0.05$  and  $\chi^2 = 6.78$ ,  $p < 0.03$ , respectively). Mothers' work schedule flexibility was significantly related to diet diversity ( $\chi^2 = 2.94$ ;  $p < 0.05$ ). Family work time and family work schedule had significant relationships with diet quality ( $r = -0.2$ ;  $p < 0.05$  and  $\chi^2 = 7.92$ ;  $p < 0.05$ , respectively). Family work schedule was significantly related to the preschoolers' diet diversity ( $\chi^2 = 5.43$ ;  $p < 0.10$ ). The combined effect of work, child-care and family variables did not indicate any significant relationships with diet quality and diversity. Mothers' work variables and family work variables have an effect on diet quality and diversity of preschoolers. The child-care and family settings also have an effect on the diet of the preschooler. Further research is needed to fully

explore how other variables of mothers' work, and the combined family work settings how they may affect the diet of preschoolers. With mothers' increasing their presence in the labour force, further research is needed to fully explore other characteristics such as work place stress, to determine their effect of the diet of preschoolers. The results of such research have implications for nutrition education programs for parents as well as for the design of work place policies.

## 1.0 INTRODUCTION

In today's world there are several changes taking place with regard to the food habits of most populations. The ability to secure food and ensure health for the population has been a major issue for many governments in the world. A part of this population is comprised of preschoolers, whose diets are influenced by both parents and communities at large. The family provides the near environment in which the decisions relating to the health and nutrition of the child are made. The influence of parents on food patterns is critical to the development of the food habits of the preschooler (Sigman-Grant, 1992).

Within the last 30 years maternal employment has increased significantly, not only in developed countries but also in developing nations. Results from the 1990 General Social Survey (Statistics Canada, 1995) have indicated that, regardless of age, dual-earner families have increased significantly from 1974 to 1994. Families are no longer depending on the single incomes of fathers, but also relying on contributions made by mothers from paid employment outside of the home. The employed mother has become a significant social and economic presence in society (Johnson, Crouter, & Smicklas-Wright, 1993). Statistics Canada (1995) has also reported that women with children under six years of age are the fastest growing group to entering the workforce. Fast, Frederick, Zukewich and Franke (2001) have reported that parents with young children are still entering the work force. These results came from the 1998 General Social Survey.

With the increase in maternal employment, the daily schedules of mothers with preschool children has become hectic and they experience, what is termed by Johnson et

al. (1993) as "time-famine." This famine is seen as a decrease in time spent in household duties including meal preparation as supported by research conducted by Ortiz MacDonald, Ackerman, and Goebel (1981). Results from the 1998 General Social Survey reported by Fast et al. (2001) indicated that although mothers have increased their work time in paid employment they spend a considerable amount of time in household work, such cleaning and child-care.

With mothers working outside of the home and having less time available to do household activities, time spent on activities such as food purchasing, menu planning and meal preparation decreases. Women are faced with balancing their roles as mothers along with their work place roles. Feelings of stress and strain from the work place may influence the decisions made at home with respect to menu planning, and food preparation, as well as child feeding practices. The diets of children, whose parents work long hours, have non-standard work schedules and who have little control over their work schedule, may have lower diversity and quality. Parents are also challenged with the problem of finding childcare facilities that will provide adequately for the preschooler while parents work. The quality of care received may be dependent on the type of arrangement that is used (i.e., grouped versus ungrouped childcare) and whether it is a licensed or unlicensed facility as suggested by other researchers (Campbell, 1988; Caliendo & Sanjur, 1978).

This present research examined the aspects of work, childcare and family settings that influenced the diet of the preschool child. The effects of work time, work schedule and work schedule flexibility were considered under work setting. In terms of childcare, the effects of the type of facility, and the childcare arrangements used by parents were

included. Another setting that was considered in the study is the family itself, where family income and parental level of educational attainment were addressed. The overall dietary status of the preschooler was assessed using dietary diversity and diet quality measures of the diet. I applied the theory of Urie Bronfenbrenner to determine whether the interrelationships of the work, child-care and family settings have an effect on the diet of preschoolers. With mothers' increased participation in the labor force, I examined the effects of the mothers' work setting as well as the combined family setting (i.e. mothers and fathers work setting characteristics).

## **2.0 LITERATURE REVIEW**

### **2.1 A Theory of Human Development**

Urie Bronfenbrenner, a psychologist who studied human development, developed an ecological theory of human development based on theories put forward by Lewin (1935). Bronfenbrenner's theory (1979) indicates that in order to fully understand human development, the researcher needs to consider relationships that occur in the immediate environment of a developing individual, as well as relationships that occur in other social environments. The ecological environment is viewed as a "set of nested structures, each inside the next" (pp. 3).

This ecological theory addresses three main aspects of human development. Firstly, his focus is on the individual's immediate environment and the social interactions that may occur in this environment. Secondly, he believes that the relationships between different settings and environments are important to development. Thirdly, Bronfenbrenner sees the environments that the individual may not experience as having a profound effect on his or her development (Bronfenbrenner, 1979; Tudge Shanahan, & Valsiner, 1997).

Bronfenbrenner's theory focused on the set of processes through which aspects of the person and the environment interact to produce constancy and change in the characteristics of the person over the his or her life span (Bronfenbrenner, 1986, 1994). The developing individual is at the center of an interconnected set of contexts or settings (termed microsystems and mesosystems). The contexts or settings that the individual does not experience also have an indirect effect on the individual's development with the

effects being mediated by persons with whom the individual comes into direct contact. These settings are termed exosystems and macrosystems.

The microsystem is defined as “a pattern of activities, roles and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics” (Bronfenbrenner, 1979). The setting in the microsystem is the place where the individual can have face to face interactions – at home, daycare center, school and so on. The activities, roles and interpersonal relationships that occur constitute the elements of the microsystem. The effects of the microsystem relate to the activities, roles interpersonal relationships. The individual has the opportunity to partake in activities that will allow him/her to observe the roles taken by other participants in the same setting, as well as to engage in those activities. Interpersonal relationships with other individuals in this setting are also developed. These relationships are affected by the characteristics and personalities of the interacting individuals, as well as their belief systems and so on, all of which have a dynamic flux over the course of development. It is also recognized that an individual may exist in more than one microsystem at the same time. For example home, daycare centers, school, and church are all microsystems (Bronfenbrenner, 1979, Tudge et al. 1997).

The mesosystem consists of the relationships and activities that occur across the microsystems. Bronfenbrenner (1979) defines the mesoystem as “the interrelations among two or more settings in which the developing person actively participates (such as, for a child the relations among home, school, and neighborhood peer group; for an adult, among family, work, and social life)” (p.p. 25). Even though the home is the main microsystem setting where development takes place, it is only one of many settings in

which development may take place. Hence, the activities of each microsystem setting do not operate independently of each other. Some individuals from one microsystem setting are also present in another microsystem setting for the developing individual. As a result the activities and the interpersonal relations that occur across the different microsystem settings form the mesosystem.

The exosystem is defined as “one or more setting that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what happens in the setting containing the developing person” (Bronfenbrenner, 1979, p.p. 26). Therefore, the exosystem comprises of the settings that a person does not experience but that have an effect on development. For example, the exosystems for a young child might include the parents’ workplace, or school classes attended by an older sibling. The psychological development of the person is affected not only by what happens in the immediate environments but also what happens in other environments that the person does not experience.

Next in the hierarchy of systems is the macrosystem. The macrosystem is defined as “consistencies in the form and content of lower-order systems (micro-, meso-, and exo-) that exist, at the level of the subculture or the culture as a whole, along with any belief system or ideology underlying such consistencies” (Bronfenbrenner, 1979, p.p. 26). The macrosystem, therefore, is formed within a particular society or social group. The structure and substance of the micosystem, mesosystem and exosystem tend to be similar and function in similar ways. Conversely, between different social groups these systems may vary markedly. Hence by analyzing and comparing the micro-, meso and exo- systems, which characterize different social classes, ethnic, religious and cultural

groups, it is possible to describe the systems and to distinguish the ecological properties that affect human development. Bronfenbrenner's theory tries to answer questions related to how these entities are related to development and how they are related to each other.

The last system that Bronfenbrenner formulated was the chronosystem. This system is defined as "effects related to changes in different settings over time" (Bronfenbrenner, 1986). The effects of changes or stability in the various settings have both a direct and an indirect effect on the individual forms the chronosystem. Changes in the nature and characteristics of the person are also included in this system. This system shows that the developing person changes individually and that he or she does so in ever changing settings including changes within the family setting and changes at the cultural level. This system takes into account changes over time not only within the person but also in the environment and in the relationship between the environment and the individual.

Human development, according to Bronfenbrenner's theory, is an expansion of Lewin's (1935) concept, which states that behavior (B) is a function of person (P) and environment (E), that is,  $B=f(PE)$ , where Lewin's theory focuses on an outcome at a given point in time. Bronfenbrenner's expansion on this concept suggests that development (D) is a function of person (P) and environment (E),  $D =f(PE)$ , where the outcome is the ongoing development of the individual (Bronfenbrenner, 1979, 1986; Tudge et al., 1997). The process of development is at the core of Bronfenbrenner's theory with activity between the developing individual and social partners being the key to understanding both stability and change. Interpersonal interactions are most fully

understood by considering them in broader historical, cultural and social environments, and the relationships within and between the environments are viewed as synergistic (Tudge et al., 1997).

The child takes part in one set of activities at home, another set of activities with peers, another in church, and another at school. The interpersonal relationships are the same within each microsystem but different between microsystems. Sometimes there are consistencies in activities, interpersonal relationships, or both in various microsystems in which the child lives. In other cases the links may be less consistent. There are settings in which the child does not experience but these settings nevertheless indirectly exert an effect on the child's development. Settings such as parents' work place, and experiences parents have at work often influence the activities and interpersonal relationships that the child may experience (Tudge, et al., 1997).

The systems that form Bronfenbrenner's (1979, 1986) theory are conceptualized as interdependent and interactive. Based on Bronfenbrenner's ecological theory of human development, studies of the effect of both parents working on child nutrition should consider not only the family and childcare settings, but also the work setting of the parents, and the interactions among these settings.

Having identified the environments that affect children, it is now possible to examine what aspects of these environments may influence the eating habits of the preschooler. In the following review the impact of work, childcare and family settings on the diet of the child will be addressed. Specifically I address work time, work schedule and work schedule flexibility as variables representing the indirect effect of the work setting. Licensing of child-care facility, type of childcare and parents' satisfaction with

the child-care facility are considered as part of the immediate environment. Another immediate environment is the family environment and variables include parents' education and family income.

## 2.2 Nutrient Intake of Preschoolers

*Canada's Food Guide to Healthy Eating: Focus on Preschoolers* (Health Canada, 1995) recommends that preschoolers eat foods from each of the four food groups. The requirements suggested by Health Canada are summarized in Table 1.

**Table 1. Health Canada's Food Groups And The Recommended Number Of Servings For Preschoolers**

Food Group	Recommended Number of Servings
Grain Products	5-12
Vegetables and Fruit	5-10
Milk Products	2-3
Meat and Alternates	2-3

Currently little research is available on the food patterns of preschoolers. Leung, et al. (1984) conducted a study looking at the nutrient intake of preschoolers in the Toronto and other regions of Ontario whose age range was 3.6 to 4 years. The majority of the families were two-parent, married couple families. The mean family income was \$30,000, which was close to the average income of families in the province. The eating habits of the children were assessed using a four-day diary which parents were required to keep. The results of the study indicated that preschoolers were consuming foods from all of the food

groups and that the recommended nutrient intakes were met and exceeded for some nutrients. Snacks, which were consumed at least once per day, have been recognized as an important source of energy for these children.

Other researchers have also focused on the nutrient intake of preschoolers but not on the type of foods consumed (McNicol, et al., 1989, McNicol, et al., 1991). In contrast, Leaman and Evers (1997) addressed the intake of preschoolers in low-income communities in Ontario in which the foods were grouped based on the actual foods consumed and not on nutrient content or the food groups. This type of analysis allowed researchers to better understand the types of food commonly consumed by preschoolers. Over 80% of the participants in the study by Leaman and Evers (1997) were below the poverty line, while half of parents interviewed were born outside of Canada. It was found that in this study the food consumed by preschoolers compared favorably with the requirements stated in the food guide for Canada.

The study by Leaman and Evers (1997) was carried out using preschoolers aged 4 – 5 years who were enrolled in a project entitled Better Beginnings, Better Futures. Food intake was assessed using a 24-hour recall. The food records were then analyzed and the foods classified into seventeen groups based on the foods that were reported. The results of this study indicate that 92% of the children consumed fluid milk, 87% breads, 81% sugars, 78% fruit, 74% vegetables, 64% fats, 63% cereals and 63% meats, 56% desserts, and 50% grains. The following groups of foods were consumed by at least one fifth of the children – mixed dishes (47%), processed meats (40%), legumes (32%), condiments (29%), cheese (29%), eggs (24%), snacks (22%), and milk desserts (21%).

This study emphasized the need to address the intake of preschoolers based not only on the nutrient intake but also on the actual foods consumed. Since food provides many different nutrients a measure of the different foods eaten may be needed to be developed.

### **2.3 Review Of A Related Study**

In this section I will review a study that looked at the same settings as proposed in the present study and how these settings affect the diet of preschoolers. This study was based on the theory Bronfenbrenner (1979) offered for human development. Campbell and Sanjur (1992) studied the characteristics of work, childcare and family environments that may influence the diet of the preschooler. The main objective of the study was to examine the impact of maternal employment on the diets of preschool children with single parent employed mothers. Their research addressed questions of under what conditions (work, child care, home) a mother's work affects the diet of preschool children and by what process do these affects occur?

The participants were 30 single employed mothers who had preschool children. The settings as outlined by Bronfenbrenner (1979, 1986) that were used were two immediate settings of the child, family and child care, and one outer setting, mother's work, which the child may not necessarily experience directly, but which may have an indirect effect on the child's development. The role strain theory offered by Goode (1960) was used to determine the process by which job strain experienced by the mother influenced the diet of the preschooler. The child-feeding practices adopted by the mother were also considered. The characteristics of work, childcare, and family

environments were analyzed for their effects on the child feeding practices, diet quality, and diet diversity.

To assess the diet of the child, diet diversity and diet quality measures were determined. Diet diversity measured the number of different foods consumed using a three-day mean food intake record as suggested by Randall, Nichman, and Contant (1985). Diet quality was measured using a food-based diet quality score, which was based on a three-day mean intake of foods from the food groups. The score was calculated using a technique adopted by Guthrie and Sheer (1981) and Caliendo, Sanjur, Wright, and Cummings (1977).

The study showed that the characteristics of the work role had significant relationships to job/family strain. After controlling for work, childcare and family characteristics, higher strain was associated with more hours spent working, less positive attitudes toward work, and decreased levels of work satisfaction. The family variables that appeared to be significantly associated with strain were the number of children present in the home and income adequacy. It was apparent that strain increased as the number of children increased. No childcare variables were found to influence the strain.

Family characteristics were important predictors of child-feeding practices. Mother's age was found to be the most important predictor of practices. Role strain was not a significant predictor of practices as was expected, but results indicated that as strain decreased, child-feeding practices improved.

High diet diversity scores were associated with high-income position, more childcare arrangements since birth, and licensed childcare facilities. Role strain and child feeding practices did not appear to mediate the effect of the work, childcare and family

variables on diet diversity. Child-feeding practices however, were a significant predictor of diet diversity whereby high diet diversity scores were associated with improved practices. Furthermore, several of the work, childcare, and family characteristics that predicted diet diversity also were predictors of diet quality. Diet diversity, when added to the model for diet quality, had a mediating effect on some of these characteristics. The effects of paid work schedule control, work schedule, number of child care arrangements since birth, use of licensed vs. unlicensed childcare, number of children in the home, and child feeding practices all had reduced effects after diet diversity was introduced into the equation.

It is clear from these results that diet diversity plays an important role in determining the diet quality of the child. This variable appears to be a key influence on work, childcare, and family variables on diet quality. The present study will look at the characteristics of paid work, childcare and the family environment in dual-parent families as opposed to single-parent families. The diet diversity and diet quality of preschoolers' diets will be assessed based on the results of this study. The impact of role strain and child-feeding practices will be excluded.

#### **2.4 Paid Work Setting**

For the last 30 years more women have been entering the labor force to pursue work outside of the home. Human Resources Development Canada (HRDC) (1994) reported that 60% of Canadian families were dual-earner families in 1991 compared with 40% in 1971. Furthermore over 60% of mothers with children under the age of 6 worked outside of the home in 1993. By 1990, only 32% of families with children under the age

of 6 had fit into the “typical” family of breadwinner father and homemaker mother (HRDC, 1994).

This increase in women’s labor force participation has been accompanied by an increase in the number of dual-earner families – families where both parents work outside of the home - and changes in the role of family members. Along with women’s increasing labor force participation there has also been an increased interest in the effects of maternal employment on the lives of mothers and their families. For example, several researchers (Johnson et al. 1993; Johnson et al. 1992; Stafford, 1983) have looked at the impact of maternal employment on child nutrition. These studies assessed this impact by identifying working and non-working mothers and compared the two groups in relation to child nutrition. The results of these studies have suggested that it is difficult to compare employed and non-employed women, since characteristics of these women differ. Mothers working outside of the home did not significantly affect child nutrition.

According to Bronfenbrenner’s theory, parents’ work setting is an indirect environment that is seen to affect the development of the child. The child does not experience the work setting of dual-earner parents, but the experiences of parents in this setting may indirectly influence the development of the child, including the child’s nutrition. Parents are faced with the challenge of balancing the demands of both work and home responsibilities. Bronfenbrenner’s (1979) theory leads the researcher to consider the characteristics of parent’s work environment and how these may impact upon the child nutrition. The ability of parents to function effectively may be influenced by the amount of time spent at work, the work schedules of both parents, along with the flexibility of the work schedules. Work place stress and job strain may also influence

decisions that parents make regarding the preschooler. The following review will consider the characteristics of parents' paid work time, work schedule, and work schedule flexibility.

With the increase of mothers entering the labor force another question to consider is whether there are situations and circumstances in the mother's work environment that may influence the nutrition of the child. In addition to work outside of the home, mothers retain most of the responsibility for household activities (Fast et al, 2001; Silver, 2000). With this in mind, the effects of mothers' work time, mothers' work schedule and mothers' work schedule flexibility was considered in the following review.

#### **2.4.1 Paid Work Time**

Time spent in the labor force by Canadians is changing. Results of the Labor Force Survey conducted in 1995 (Drolet & Morissette, 1997) suggested that Canadians across the provinces preferred to work more hours than fewer hours for pay, particularly for in the case of fathers. This result was reported for each province, aged 19 to 69.

In families with preschoolers, mothers were found to be more likely than fathers to reduce the number of work hours when the number of children in the family increased. As the number of children per family increased, the number of paid hours for mothers tended to decrease. Fathers tended to work more hours outside the home as opposed to fewer hours. Single mothers were also found to be more willing to increase their paid work hours compared with other mothers working in the labor force.

The combined number of hours that both parents spend at work, that is family work time, decreases the amount of time available for parents to spend doing household

tasks. HRDC (1994) reported that more working parents working longer hours and that 63% of dual-earner families with children under the age of 13 work more than 40 hours per week. Of this total, 48% spent an average of 40-49 hours at work. Results of the 1992 General Social Survey (Marshall, 1993) indicate that even though mothers have increased the time spent in work outside of the home, they retain more than 80% responsibility for household duties. Fathers are reported to have increased their time in household duties by only 10%. This contribution is not enough to reach parity with the contribution of mothers.

Mothers are spending less time in household roles, which raises concern among researchers over the time mothers spend in household duties. Ortiz et al. (1981) has shown that as time spent at work outside of the home increases, the amount of time mothers spend in food preparation decreases. As well, with less time available, more meals were eaten away from home (Ortiz et al., 1981). The impact of this change on child nutrition may be negative. Moe et al. (1995) have also noted that in the United States, women perform 70-80% of household tasks, the majority of which are time-intensive and the most frequently repeated tasks in the home. These tasks include meal planning, food purchasing, food preparation and serving.

#### **2.4.2 Paid Work Schedule**

Another characteristic of the parents' paid work environment is the work schedule. Staines and Pleck (1983) found that along with time spent in paid work, the work schedule might also be important. Their research showed that working nonstandard work days each week or nonstandard work hours each day was associated with higher levels of

work-family interference (Staines & Pleck, 1983). They defined the work schedule based on the pattern of days worked and the time at which work began. Parents working weekdays only and beginning work between 3.30 AM and 11.30 AM were considered to be working standard work schedules. All other work patterns including shift work were considered non-standard work schedules.

Staines and Pleck (1983) also found that work schedules that included weekend work by parents were associated with less time being spent by parents in childcare and housework activities. There was also an increase in conflict of work hours and work schedules. This association was reported to be higher for fathers than it was for mothers. It was found that if one parent worked a non-standard work schedule, the conflict between family life and work tends to be greater than if both parents work standard work schedules. The results from a Health Canada survey published in the *Globe and Mail* (June, 1999) suggested that there is a high amount of work and family conflict within many Canadian families.

Human Resources Development Canada (1994) reported that 42% of dual-earner families in Canada have either or both parents working a non-standard work schedule. In order to balance family needs, dual-earner families were using non-standard work schedules. Thirty-one percent of dual-earner families with children under the age of 5 years had at least one parent working part time. This compared to 24% of the families with children over the age of 5 years (HRDC, 1994).

Statistics Canada's 1995 Survey of Work Arrangements (Marshall, 1998) indicates that 62% of dual-earner families, both husbands and wives work standard work schedules. In 38% of the families, at least one spouse worked a shift-type work schedule

(also considered a non-standard work schedule, according to Staines & Pleck, 1983). It was also found that in 18% of dual-earner couples; the husband had a shift-type work schedule, while the wife had a standard work schedule (Marshall, 1998). For 12% of the dual-earner couples, the wife had shift-type work while the husband had a regular work schedule.

In the 1992 General Social Survey, conducted by Statistics Canada, (Drolet & Morissette, 1997) dual-earner families were identified as the most “time crunched” group in Canada. Both the hours that couples work and their work schedules affect their time availability to attend to family activities. Dual-earner families with spouses doing shift-type work experienced less disruption in family life than families where both spouses work standard work schedules (Marshall, 1998). One of the reasons given for dual-earners couples working shift-type work schedules was because of the need to spend time with their family. Dual-earners with children under the age of 16 years were found to more likely have at least one spouse working a shift-type work schedule than families in which children were above 16 years of age (Marshall, 1998). For 56% of these families, husbands had the shift-type work schedule, while wives worked a regular work schedule.

#### **2.4.3 Paid Work Schedule Flexibility**

In addition to the impact of work schedule, the flexibility that both parents have over their schedule may be another important factor influencing child nutrition. Staines and Pleck (1983) addressed this issue, finding that a negative relationship existed between non-standard work schedules and the quality of family life. They found that the quality of life and its relationship to non-standard work schedules was strongest when the

workers had least control over their work schedules (Staines & Pleck, 1983). Workers with more control over their work schedule reported having a better quality of life than those who had less control over their work schedule. Work schedule flexibility had a mediating effect on work schedule (Staines & Pleck, 1983).

Coordinating the paid work schedules of both husbands and wives become increasingly necessary with the presence of children in the family. The Survey of Work Arrangements (Marshall, 1998) found that dual-earner families used shift-type work to stagger their work schedules in order to meet the needs of the children. These families also preferred that husbands worked the shift-type work schedule.

Human Resources Development Canada (1994) reported that employed parents with children were less likely to have flexible work arrangements. Although 65% of married Canadians had flexible work hours, 45% of these were dual-earner families with no children (HRDC, 1994). The results of a National Child Care survey conducted in 1988 indicated that only 27% of employed, full time parents with children under the age of 13 years had access to paid leave for family reasons (HRDC, 1994).

## **2.5 Child Care Setting**

One of the immediate settings the developing child experiences is the childcare setting. In addition to the effect of dual-earner families and maternal employment on child nutrition, the type of childcare arrangements while parents are at work may also be important. The child forms interpersonal relations with peers, and non-familial caregivers in this setting.

Since preschoolers are cared for by parent and non-parent caregivers, meals served to the preschoolers are from both parent and non-parent caregivers. A study of 3-6 year olds from six childcare centers conducted by Briley, Jastrow, Vickers, and Roberts-Gray (1999) in the United States suggest that parents and caregivers need to have the same goals when providing meals for the child. These researchers used a three-day estimated food record to collect information regarding the food that was consumed at home. Children attending childcare centers consumed 50% to 67% of the nutrient requirements for the day except for the nutrients niacin, zinc, iron and energy (Briley et al., 1999). Both parents and caregivers appeared to be unsuccessful in supplying the diet of the child with ample amounts of food from both the vegetable group and the breads, cereal, pasta, and rice group (Briley et al., 1999). Children consumed considerably fewer foods from the breads, cereal, pasta, rice group and consumed more foods from the fats and oils group at the childcare center than at home.

In Manitoba, the Provincial Daycare Standards indicate that licensed daycare facilities need to provide preschoolers with nutritious snacks and meals. No examples of what constitutes a nutritious snack or meal or what types of menus to be used for meal preparation are outlined. It is required that the childcare facilities provide meals and snacks in accordance with Canada's Food Guide requirements. Persons working in daycare facilities are required to have completed secondary education, and relevant training and certification in childcare is also required. At daycare facilities the eating environment may be more conducive for children to try a variety of foods than at someone else's home. The daycare standards in Manitoba appear to fall short by not providing sufficient regulations and guidelines for licensed facilities to follow with

respect to the types of menus and snacks that can be offered to preschoolers while at daycare facilities.

Moe et al. (1999) in their study of the effects of maternal employment on children's diet quality found that when mothers perceived that the quality of childcare to be high, preschoolers ate more fruits and vegetables. This finding may be a result of those childcare arrangements thought to be of higher quality serving fruit as a snack more often than other foods (Moe et al., 1999). Another reason for this result could be that mothers of children attending these facilities might be more involved in meal and snack service at the facility than at other facilities. However, the study was confined to preschoolers who attended daycares in a rural northeast state of the United States, thus, the results may not be representative of preschoolers.

## **2.6 Family Setting**

The family setting is another environment considered to have a direct effect on development of the child (Bronfenbrenner, 1979, 1986). The family directly influences the dietary patterns of the preschool child since it provides the food, nutrients, and child care necessary for growth and development. The diet of the child is also indirectly influenced by the family through encouraging the child to adopt family attitudes and preferences towards food and other lifestyle behaviors.

According to Schumilas et al. (1984), family characteristics were significantly correlated with the child's dietary score. In this study, the main goal was to identify the family characteristics that influenced the dietary intake of the preschool child. The ages of the children ranged from 50 to 63 months. Ninety four percent of the parents were

from two- parent families; hence, single-parent families were omitted from the analysis. Dietary intake was assessed using methods developed by Guthrie and Sheer (1978) -- a dietary score based on food groups consumed and also a diet quality score based on the nutrient adequacy of the diet. An interesting finding was that in this study parents' age was positively correlated with dietary scores for the child. It was assumed that both dietary scores were influenced by parents' age. The study implied that as parents' age increased, the child's dietary score also increased. Father's age appeared to be a more positive and more statistically significant predictor of the child's intake of food high in fat and sugar than mother's age. As father's age increased, the amount of foods high in fat and/or sugar consumed by the child decreased. The consumption of foods high in fat and/or sugar was assessed from a food frequency questionnaire based on the energy supplied by these foods.

Families occupy different positions in society in relation to their socioeconomic status. Schumilas (1984) assessed family socioeconomic status using the Blishen ratings for mother and father. The Blishen ratings are a combined index that uses income, education and occupation of parents to measure socioeconomic status. The study found that father's Blishen ratings were not significantly related to dietary scores but that mother's Blishen ratings were negatively associated with child's dietary intakes: as socioeconomic status increased, the dietary scores of the child decreased. These findings conflict with other research, which has found that socioeconomic status was positively related to dietary intakes of the child (Sims, 1974; Wolfe et al. 1993).

Nett (1995) reported that researchers have also measured socioeconomic status of families based on the occupation of parents, which is highly associated with their

educational attainment and income levels. Hence, the differences in results in the literature may be a result of the difference in methods used to assess the socioeconomic status of the family. Income is used consistently in these studies, but Schumilas et al. (1984) used education, income, and occupation to determine the socioeconomic status of the family. The method used to measure socioeconomic status by Schumilas was not clearly outlined.

Another family characteristic that needs to be considered is that of parents' education. Schumilas (1984) found that parents' education was positively associated with child's dietary scores, even when other socioeconomic factors were controlled. Interestingly, mothers' education level was more significant in predicting children's dietary intake than fathers' educational level.

Myres and Kroetsch (1978) found that there were few differences in nutrient intake among different income groups in Canada. However, Kant et al. (1991), in their study of the diet diversity of the US population, found that as income increased, diet diversity and diet quality also increased. The methods used to assess the diet were: 1) a food score that counted the number of different foods consumed, and 2) a serving score that was developed using the methods of Guthrie and Sheer (1981) with some adjustments made to include serving size in the calculation. Johnson et al. (1992), also found that higher household incomes were significantly related to diet quality. Diet quality was measured using a nutrient adequacy ratio used by Guthrie and Sheer (1981).

Two other factors that may influence the diet of the family are parental ethnicity and age. The participants in the study by Kant et al. (1991) ranged from 19 to 74 years. The participants were distinguished based on their race background -- either white or

black. The study compared the diet diversity of the two groups and suggested that there is a need to increase the diversity of diets in the U.S. population. Campbell and Sanjur (1992) indicated in their study that mother's age was significant predictor of child feeding practices, but it was not found to influence diet diversity or quality.

Previous research has shown that when assessing the dietary intake of people, it is important to consider the family characteristics such as socioeconomic status and educational level. These characteristics may or may not have a direct influence in the dietary intake of individuals.

## **2.7 Summary**

Dual-earner families in Canada have risen significantly from 1971 to 1990 (Statistics Canada, 1990). In 1990 71% of the couples with children 18 years of age and younger were dual-earners, compared with 30% of such families just over 20 years ago. In 1992 over 60% of families were dual-earner families in Canada (HRDC, 1994). Another study by Statistics Canada revealed that the number of dual-earners have outnumbered the number of single-earner households in Canada (Charrette, 1995; Fast et al., 2001). The results of these surveys suggest that Canadian families now have to balance their job and family more and more (Marshall, 1993; Church, 1999).

The paid work time and work schedules of both parents need to be organized to some extent to ensure that family and work activities do not conflict. This is evidenced in the results of a recent Health Canada survey (Church, 1999), which addressed the work versus family conflict in Canada. When both parents work long hours and non-standard work schedules, parents may eat more family meals away from home. Parents may also

use more convenience foods at meal preparation if there is not sufficient time to prepare meals at home, which may lower the quality of the diet.

Having some control over paid work schedules may allow parents to be flexible in the hours that they choose to work and allow more time to attend to the needs of the preschooler. When both parents are employed, having flexible schedules may also exert a positive effect on the diet of the child since more time may be allocated to feeding and organizing household activities. It may be that by having more control over their work schedules, parents are better able to organize their time to attend to both family and paid work responsibilities. Unfortunately, when parents have little control over the hours and days worked, issues of time and schedule conflicts may arise. Less time may be available to attend to household tasks such as menu planning, and food preparation.

In dual-earner families with young children, it has been reported that the mothers in these families are more susceptible to feeling time stressed since they are juggling their work, family, and personal needs (HRDC, 1994). In these two-income families the role of the homemaker is still held mainly by the mother (Marshall, 1993). The results of the 1990 General Social survey also indicated that mothers who were unemployed, those who were employed part time and those who were employed full time had similar sole responsibility for meal preparation at home (89%, 86% and 72%, respectively). Other studies have shown that the extent to which mothers participate in household work depends on their employment status (Otriz et al., 1981, Berk, 1985, Johnson et al., 1992). As the mothers' involvement in the work place increases time for housework decreases. The survey published by Health Canada indicated that, women are more likely to suffer with work versus family conflict than men (Church, 1999).

Because mothers retain most of the responsibility for household work, it may be that the characteristics of the mothers' paid work setting have a greater impact on the diet of the preschooler than the characteristics of the family-work setting. A decrease in time available for household work may lead mothers to use more convenience foods at mealtime. Mothers may also be encouraged to schedule more family meals away from home if she has little time to plan and prepare meals.

When mothers have to work non-standard work schedule, it may lead them to sacrifice some activities in order to do other tasks. For instance, household cleaning may take precedence over meal preparation or the quality of the meal prepared may be reduced so as to allow the mother to carry out other tasks in the household. The amount of control that mothers have over their work schedules may also influence the ability of mothers to organize their time to attend to work and household activities. Having more control of the work schedule may also allow mothers more time to spend in meal preparation and may have a more positive effect on the meals served.

With respect to childcare arrangements, dual-earner families need to ensure that the facility has the ability to meet the growth and developmental needs of the child. Whether the facility is licensed or not may influence the quality and type of food served to the child. Licensed facilities may be better able to provide nutrition education program to parents to assist with the meal preparation and feeding issues of the preschooler. The environment provided by licensed facilities may be more conducive for the preschooler to eat as well as for the child to try different foods. The provincial guidelines provided for licensed daycare ensure that meals served follow *Canada's Food Guide to Healthy Eating* (Health Canada, 1995) compared to unlicensed facilities, which do not have

predetermined nutritional guidelines to follow. Other types of childcare arrangements such as care in a family members' home, also do not have nutrition guidelines to follow, and as a result the quality of meals served may be compromised. The eating environment may not be conducive to encouraging preschoolers to eat certain foods.

Research has also shown that the socioeconomic status of the family may affect the diet of the child. Having a higher socioeconomic status has been associated with higher quality diets of preschoolers. This relationship may be as a result of parents with higher incomes having more purchasing power so that they are able to buy higher quality foods. The level of educational attainment of parents has also been associated with family income. The family income was found to increase as parents' level of educational attainment increased.

For the work setting the present study looked at the effects of the family work time, family work schedule, and family work schedule control (i.e., mothers' and fathers' work settings combined). When considering the effects of the child care setting, whether the facility is licensed or not was considered. Included in the analysis was the effect of family income. With mothers still retaining most of the responsibility for household work, the effects of the characteristics of the mothers' paid work setting alone will also be considered along with the childcare and family settings.

## 2.8 Diet Assessment Measures

Diet has been measured using several methods. Kant (1996) has summarized the different types of measures or indexes that have been used to assess diet quality. Diet quality has been assessed using either food-based or nutrient-based measures. Kant (1996) classified measures into three groups: 1) measures that assessed nutrients only, 2) measures that assessed food or food groups only, and 3) measures that assessed both the nutrients and the food or food group intake of a target group.

Nutrient-based measures of diet assessment have focused on whether the intake of nutrients in a target group meets the Recommend Daily Allowances. Madden and Yodder (1972) first proposed a nutrient adequacy ratio that reflected the nutrient intake of a group of nutrients. This ratio measured the ability of the diet to meet nutrient requirements suggested by the U.S. Recommended Daily Allowances. Further developments of this measure led to the development of a mean adequacy ratio by Madden and Yodder (1972) that has been expanded upon by other researchers. The mean adequacy ratio assesses the average nutrient intake for a group of nutrients. Another nutrient measure of diet quality looks at nutrient intake relative to the recommended daily allowances. For this measure, the nutrient densities of a food or diet are used to assess the diet.

Food or food group based measures have been developed to: 1) measure the consumption of foods or food groups based on a scoring system, and 2) identify the pattern of food intake using factor analysis. Romero and Sanjur (1974) looked at the number of unique foods that were contained in a person's diet. Krebs-Smith et al. (1987) assessed the quality of the diet by assessing the variety of foods present in a person's diet,

within and among food groups. The variety index used by Krebs-Smith et al. (1987) was closely related to a nutrient adequacy score. Campbell et al. (1982) found that measures of diet diversity were useful in describing the pattern of food intake and not necessarily for assessing nutrient intake. Research using factor analysis to assess food intake patterns include work done by Randall et al. (1990), where cluster analysis was used to assess food patterns. This research used the frequency of a number of foods (called factors) clustered together to identify patterns of food intake.

Few researchers have developed measures that assess both the nutrient and food group of the diet. The United States Department of Agriculture has developed one such measure, the Healthy Eating Index (Kennedy, Ohls, Carlson & Fleming, 1995). This measure assigns scores to the diet meeting several nutrient requirements. Scores were given for consumption of the number of servings for five food groups, the level of fat intake, saturated fat, cholesterol and sodium. A dietary variety measure was also included.

The following review will address the methods used to assess the diversity and the quality of the diet. In reviewing diet quality, nutrient-based measures used in research will be reviewed with an emphasis on the use of the nutrient adequacy ratio. Diet diversity will be reviewed considering research that looked at food-based measures of dietary assessment.

### 2.8.1 Diet Quality

Researchers have measured diet quality using a variety of measures. The following review will look at nutrient-based diet quality measures. A nutrient-based diet quality index has been used to reflect the nutrient adequacy of a person's dietary intake. As a method of assessment of an individual's or group's nutrient intake, a score or ratio is calculated using the nutrient intake data for a group of nutrients or single nutrients (Kant et al., 1996).

In 1973, Hansen developed a nutrient-based diet quality index called an Index of Food Quality to measure the nutrient density of foods. Nutrient density was defined as "the ratio of the nutrient composition of food to nutrient requirements of the human" (Hansen, 1973). The nutrient requirements were assessed in relation to an individual's caloric requirement using the Recommended Daily Allowances (RDA) (1943). The resulting score is a ratio. Ratios of "1" indicate that an individual meets his or her caloric as well as individual nutrient requirements from a specific food item. It was deemed that a food containing many important nutrients and also contains an excess of an individual's caloric requirement would be a good quality food and would therefore have a ratio above "1". Nutrient density ratios, which are used to measure the diet quality were subsequently developed based on the principles of this index.

Sorenson et al. (1976) developed an Index of Nutritional Quality (INQ) to measure the extent of balance in an individual's diet, using the concept put forward by Hansen (1973). This index was developed to compare the nutritive content of food with an individual's energy requirements in terms of individual requirements for nutrients and

energy. This index is similar to the nutrient density ratio. The INQ is calculated using the following equation:

$$\text{INQ} = \frac{\text{Nutrient content of a portion of food}}{\text{Nutrient requirement/day}}$$

Researchers have used this formula to determine the nutrient density of foods consumed by individuals as well as by groups of subjects.

Another popular measure of nutrient adequacy is the Nutrient Adequacy Ratio (NAR), which was first reported by Madden and Yodder (1972) and has been used by other researchers (Guthrie & Sheer, 1981; Randall et al., 1985; Krebs-Smith et al., 1987). The Nutrient Adequacy Ratio (NAR) is defined as the degree to which the diet meets the RDA (Guthrie and Sheer, 1981). The measure is a ratio of nutrient intake to its RDA. Madden and Yodder (1972) further developed this ratio into a Mean Adequacy Ratio (MAR). The average of the Nutrient Adequacy Ratio for a group of nutrients forms the Mean Adequacy Ratio (MAR) also called the Mean Nutrient Adequacy Ratio (MNAR).

Phillips and Johnson (1977) looked at the relationship of a nutrient-based diet quality index to a specific health outcome. These researchers studied pregnant women to assess the quality of the mother's diet and other factors in relation to the birth weight of their babies. In this study, a NAR index was used to evaluate 12 nutrients to determine the overall quality of the mothers' diet. The results of the study indicated that overall diet quality of the mother was positively correlated with birth weights of the infant. By including quality of the diet along with other factors, the explained variation of the prediction results improved by 6-8% (Phillips & Johnson, 1977).

Guthrie and Sheer (1981) assessed the validity of using a dietary score for assessing nutrient adequacy. The dietary scores of university students were computed and one-way analysis of variance tests were done using the NAR and the MAR for selected nutrients. The results indicated that using a dietary score to assess the diet was an acceptable means of assessing the nutrient adequacy of the diet (Guthrie & Sheer, 1981). The researchers used a cut off of less than 66% to determine adequacy. It was noted that this cut off was an arbitrary standard and that nutrient intakes below 66% did not indicate nutrient inadequacy or that that individual was at nutritional risk. This cut off point was also used in reporting findings from Household Dietary Surveys in the United States as an indicator of persons at possible nutritional risk (Guthrie & Sheer, 1981).

In 1993, the U.S. Food and Nutrition Board initiated a review of RDA that were being used. In 1995 the Canadian government joined the process to develop the Dietary Reference Intakes (DRIs). The newly published DRIs are intended as joint Canadian-American reference values to replace the Canadian Recommended Nutrient Intakes (CRNI) and the United States RDA. These reference intakes are designed for use with the general population and are comprised of four standards, which can be used to evaluate the nutrient adequacy of both individuals and groups.

The authors of the Application of the Dietary Reference Intakes (Institute Of Medicine (IOM), 2001) suggest that previous methods of comparing a mean nutrient intake of a group or an individual to the CRNI and the American RDA may be misleading if they suggest that the diet of a group or individual is nutritionally adequate or inadequate. Comparing the mean nutrient intake of an individual or group with the

recommended dietary allowance (or recommended nutrient intake) has led to misinterpretations of the nutrient adequacy of diets. Similarly, previous research methods that calculated a Mean Nutrient Adequacy Ratio have compared the mean nutrient intake with the recommended nutrient intake.

According to the DRI manual, when the nutrient intake of an individual or group exceeds the RDA, it can be stated that it is likely that the individual or the group has adequate nutrient intake (IOM, 2001). If however, nutrient intake falls below the RDA, no conclusion can be made about an individual's or group's nutrient intake. Similarly, when comparing the mean nutrient intake of a group with some percentage of the RDA, it is not possible to conclude whether the nutrient intake of the group is adequate or not.

To appropriately assess the adequacy of an individual's nutrient intake, each individual's actual nutrient requirement is needed as well as the individual's usual dietary intake. An individual's anthropometric, biochemical clinical and dietary measures are required in order to assess an individual's actual nutrient intake. Unfortunately, information on the anthropometric, biochemical and clinical measures for an individual are rarely available at all times when health professionals are carrying out nutrition related research or when assessing the diet of an individual (IOM, 2000).

Also unavailable when assessing the diet of an individual or group is the long-term usual nutrient intake. Dietary information is usually collected using food frequencies, diet recall, and three-day food records. The diet history provided, based on these methods does not reflect the long-term usual nutrient intake of an individual since day-to-day variation exists. An individual's diet assessment is also influenced by the number of days of nutrient intake and whether those days are consecutive or not.

Limitations also exist due to underreporting by an individual, which contributes to the day-to-day variation.

Based on the new references developed by the Institute of Medicine (1997, 1999, 2000) four measures have been developed for use in evaluating nutrient intake of both individuals and groups: Estimated Average Requirement (EAR), Recommended Dietary Allowance (RDA), Upper Tolerable Intake Level (UTIL), and Adequate Intake (AI). For assessing nutrient intake for an individual or for a group, the EAR is recommended. To assess individual nutrient intake adequacy, the mean nutrient intake of the individual is compared with the nutrient standard: the EAR, as opposed to using the RDA. Since there is inter-individual variation (i.e., variation between individuals) present, the standard deviation of the EAR is used to determine how much an individual's requirement can deviate from the EAR. Also present in assessing individual diet is intra-individual variation (i.e., day-to-day variation). To reduce variation caused by intra-individual variation the observed nutrient intake is assessed to determine how much it can deviate from the usual nutrient intake of the individual. Data from previous research has been used to determine the expected standard deviations, which are used to reduce both inter- and intra-individual variations.

To assess the prevalence of nutrient adequacy of a group, two methods have been suggested by the IOM: 1) the probability method, and 2) the EAR cut point method. The probability method combines the distribution of requirements with the distribution of the nutrient intake of the group to determine the expected proportion of individuals at risk of nutrient inadequacy. This concept suggests that at very low nutrient intakes, the risk of nutrient inadequacy within a group is high. Conversely, at very high nutrient intakes, the

risk of nutrient inadequacy is considered low. For the application of the EAR cut point method, the proportion of individuals in the group with nutrient intakes below the EAR is assessed. For both methods to be applied, statistical adjustments to the nutrient intakes are needed to reduce intra-individual variation.

### **2.8.2 Diet Diversity**

Eating a variety of foods is thought to make the eating process for the preschooler more interesting as well as increasing the likelihood that the child will be receiving the more than 50 nutrients that are needed for growth and development. Promoting Nutritional Health During the Preschool Years: Canadian Guidelines (Network of the Federal/Provincial/Territorial Group on Nutrition and National Institute of Nutrition, 1989) state that eating different kinds of foods from each food group helps the child to obtain necessary nutrients. Statements in Canada's Food Guide to Healthy Eating: Focus on Preschoolers (Health Canada, 1995) also supports this point, recommending that preschoolers "enjoy a variety of foods from each food group every day". This recommendation is not only intended for preschoolers since it is also stated in Canada's Food Guide to Healthy Eating (Health Canada, 1992) for persons four years and older.

The preschool years are a time for children to learn the taste of, and to enjoy a variety of different foods prepared in different ways. Health Canada (1995) states in the guide for preschoolers that variety is essential for three main reasons: 1) to promote an adequate intake of nutrients. Choosing foods from the four food groups is seen as the best way for the child to gain the essential nutrients and energy to promote growth and development. 2) To promote the positive aspects of eating by exploring a wide range of foods varying in color, flavor, and texture. Preschoolers are eager to learn and explore

the nature of foods. 3) To promote the use of food and cuisines of different ethnic and cultural groups. Children eat according to the traditions of their family, a valued aspect of the culture of the family (Health Canada, 1995).

Foods are classified into different food groups and each food group provides a set of nutrients. Also, within each food group there are nutrient differences among the foods. Foods vary in terms of their nutritional content because of natural differences as well as a result of processing, enrichment and methods of preparation (Health and Welfare Canada, 1992).

Diversity, according to the Oxford dictionary means "variety". Variety is defined as "the quality of not being the same, the quantity of different things" (The Oxford English Mini Dictionary, 1995, pp 584). The food guide is depicted as a rainbow of different food groups and foods. In reviewing the literature the number of different foods and/ or the number of different food groups that a person consumes characterizes diversity or variety in the diet. Diversity becomes a reflection of how much variety is present in the diet. This diversity is measured in different ways by researchers. Kant (1996) has recognized that measuring the number of different foods in the diet as a food-based method for assessing the diet when trying to determine the diet quality.

Campbell et al., (1982) reported results from their study of the use of qualitative diet indexes used by researchers. The use of the food frequency questionnaire to determine its meaningfulness and limitations as a qualitative diet tool was examined in their study. The food frequency questionnaire was used as a tool for recording the food intake pattern of clients. Campbell et al., (1982) noted that nutritionists use this questionnaire to determine the use and non-use of foods since no data is recorded

pertaining to portions consumed. The potential for diet diversity to predict nutritional risk was analyzed in this study using the data from the food frequency questionnaire. A self-administered food frequency questionnaire was given to 194 women in a particular study area. The list of foods used on the questionnaire consisted of foods available to the women in the study area. Three different major indexes were analyzed: biochemical measures of vitamin status, diet diversity indexes, and nutrient-based indexes to test the food frequency questionnaire. The foods from the food frequency questionnaire were grouped into three categories based on one of the following: 1) the population's perception of food groupings, 2) an objective scheme, based on the characteristics of each food, and 3) the population's use of the food.

Biochemical measures were used to assess the vitamin status of the population in relation to three vitamins of interest: vitamin A, folacin, and riboflavin. These nutrients were measured using: plasma and erythrocyte folacin levels, plasma retinol, beta-carotene, and erythrocyte glutathione reductase activity coefficients. Three diet diversity indexes were used: 1) a simple diet diversity index which was defined as the number of different foods in a food intake pattern, 2) the Shannon Diet Diversity Index, an index that considers both the number and the frequency of foods eaten, and 3) the Shannon Balance Diet Index, an index that considers the balance among all the foods that are eaten (Campbell et al., 1982). When the Shannon indexes were used, two indexes were generated: diversity among the food groups and diversity within the food groups.

In order to compare the diversity indexes to indexes reflecting nutrient intake, two indexes of nutrient analysis were calculated. The first index was adapted from indexes created by Bowering et al., (1977) and Caliendo et al., (1977). The second index

reflected the contribution food made to the three vitamins of interest in this study (Campbell et al., 1982).

The results of the study suggest that, in grouping foods, when different criteria are used there is a difference in the results obtained. The differences suggested that careful attention is needed when grouping foods to reflect diversity of foods. Correlations were also calculated to determine whether there were similarities in results based on the type of food pattern measure that was used. The simple diet diversity index correlated highly with the Shannon Diet Diversity Index. The Shannon Diet Balance Index reflected the same pattern as the Shannon Diet Diversity Index, but was different from the simple diet diversity index. All three diversity indexes had strong correlations with the food grouping schemes. It was also noted that none of the diet diversity indexes correlated strongly with the nutrient-based indexes. From these results it was inferred that even though the Shannon Diet Diversity index had more complex calculations, it did not result in any different information than that produced when using the simple diet diversity index. This conclusion suggests that the most important characteristic of diet diversity is the range of differences in food intake patterns, and that the pattern of choices among those differences may not be as important (Campbell et al., 1982). Hence, researchers (Campbell, 1988; Campbell, et al., 1982) have suggested that when looking at diet diversity, information about a wide range of foods needs to be collected.

The correlations between the diet diversity indexes and the biochemical measures were low, but the food grouping indexes had significant correlations with the biochemical measures. These results reinforce the results noted above that the range of differences in the food intake pattern appears to be more important, even without considering the

frequency of intake of the foods. One of the limitations of the diet diversity index was noted with subjects who were obese. Obese women tended to have different food intake patterns that were not reflected in the different diversity indexes, but the food intake patterns were found to be associated with the biochemical indexes.

This research suggests that the potential benefits of qualitative diet indexes of food intake patterns such as diet diversity, is in their ability to measure the cultural aspects of the diet rather than to assess nutrient intake. The diet diversity indexes seem to be better suited to expanding our understanding of food intake patterns.

Many of the following researchers used diet diversity to predict nutrient intake.

Caliendo and Sanjur (1978) measured the diversity of the diet of preschool children aged 1-4 years old in two-parent families. A diet diversity score was constructed using 24-hour diet recalls. All foods eaten were tallied to determine the foods that were eaten by the children. This list was condensed to include foods that were eaten by 20% or more of the subjects. The resulting 20-item list was then analyzed to determine the different foods that were eaten. Each child's diet scored one point for each food mentioned on the 20-item list. On the 20-item list, the researchers considered some foods different such as peanut butter and milk. Some foods were also classed together, for example, meat, and poultry, fish formed one group and spaghetti, rice, macaroni, and noodles formed another. No mention was made of the criteria used for grouping food items. Combination foods were scored as one food item instead of scoring for the individual foods making up the combined food item.

Randal et al. (1985) as part of a bigger study looked at diet diversity and nutrient intake of persons aged 18-34 years who participated in the National Health and Nutrition

Examination Survey (NHANES II) in the United States. Twenty-four hour food records were used to collect dietary data. The number of unique food codes, as well as the quantity of the foods consumed was also recorded. Diet diversity was measured as the number of unique food codes recorded for each subject. Diet diversity was also analyzed in relation to nutrient intake of specific nutrients. The nutrient density of each subject's diet was analyzed using the quantity of food reported. Nutrient density was used to assess the nutritional consequences of the differences in dietary intake. Dietary composition was also analyzed in the study. It was noted that differences in diet diversity might indicate differences in diet composition. Results of the study showed that the relationship of diet diversity to nutrient composition and nutrient density was not consistent among the nutrients being analyzed.

Krebs et al. (1987) measured variety in the diet at three different levels for individuals participating in the USDA's 1977-1978 Nationwide Food Consumption Survey. Persons in this study were at least one year old, and represented persons from all regions of the United States. Pregnant and lactating women were excluded from the study. Three-day food records were used to assess the food intake of the subjects. Three variety measures used were: overall variety, variety among major food groups, and variety within major food groups. Overall variety was measured by the number of different food items that were recorded in the three days, regardless of the food groups that were represented. Variety among the major food groups was measured as the number of different major food groups that were recorded. The three-day average was used since most of the subjects mentioned each major food group at least once in the three days. Variety within major food groups was measured in two ways. It was first

measured as the number of separate foods mentioned in the food group and second as the number of minor food groups represented in the three days from within the major groups.

Individual foods were identified using food code numbers, assigned based on factors such as added ingredients. Combination foods were separated into their main parts. The number of foods eaten was controlled for in the study. Controlling for the number of foods allowed the researcher to examine the net effect of variety on dietary quality (Krebs, 1985). Age and sex were controlled for in the study. It was determined that the number of foods eaten was interrelated with the variety of the diet, as well as to the nutrient adequacy of the diet. Every different food eaten adds to the total number of foods eaten. Additional servings of food allowed the subject to obtain more nutrients (Krebs et al., 1987). Nutrient adequacy was also shown to increase with an increase in the number of foods eaten regardless of the number of different foods eaten.

Kant et al., (1991) used the NHANES II study, and analyzed the dietary diversity in the US population. Subjects were African and Caucasian and ranged in age from 19 to 74 years. Twenty-four-hour diet recalls were used to collect dietary data. Two scores were developed to assess the diet, a Food Group Score and a Serving Score. The Food Group Score measured the number of food groups consumed daily from a total of five food groups. This score measured the variety among the food groups, similar to the measure used by Krebs et al., (1987). The second measure, the Serving Score, measured the number of servings consumed from the various food groups compared with the recommended number of servings suggested in the Food Guide. If the number of servings consumed exceeded the recommended number of servings, any additional servings were not considered in the final score.

Foods were grouped based on the five food groups: Milk and milk products (all milk and milk products except butter and liquid or powdered cream), Meat group (both plant and animal sources of protein), Grain group (all grain products except cakes, pies, pastries and cookies), Fruit group (all fruit juices and fresh, canned frozen and dried fruit except fruit drinks), Vegetable group (all raw, cooked, frozen and canned vegetables). Combination foods were separated into their main parts and assigned to the relevant food groups. Foods not included in the five food groups were grouped and excluded from the analysis. Foods were also excluded if the food item was consumed in a quantity less than a pre-determined minimum amount for all foods, including combination foods. In calculating the Serving Score, the median weight of each food across subjects was used as the serving size. This method was used because the amount of food constituting a serving varied with different types of food and methods of preparation. The median portion size reflected the amount of food that the subjects in the survey reported.

Kant et al. (1993) evaluated diet diversity in relation to all-cause mortality using data from the First National Health and Nutrition Examination Survey (NHANES I) Epidemiologic Follow-up Study conducted, 1982-1987. Twenty-four-hour food records were used to analyze the foods consumed by persons aged 25-74 years. The Diet Diversity score developed for this study counted the number of different food groups consumed. Foods were grouped based on similarities in nutrient composition as well as the uses of the food item in the diet. Foods were excluded if they were consumed in quantities less than a predetermined minimum amount and also if they did not fall into any of the five food groups being used. These criteria were previously used in the study carried out by Kant et al. (1991). This diet diversity measure is similar to the Food

Group Score measure used to analyze the data from NHANES II study by Kant et al. (1991).

Kennedy et al. (1995) designed a Healthy Eating Index, which takes into consideration dietary variety. This diet quality index is intended to measure different aspects of a healthy diet that incorporates nutrient needs and dietary guidelines. The subjects in this study were aged 2 years and older, surveyed in the 1989 and 1990 Continuing Survey of Food Intake by Individuals in the United States. Dietary data were recorded using 24-hour food recalls and 2-day food records of foods consumed. The two main components of this index are a Food Group Component and a Dietary Guideline Component. The Food Group Component assessed a person's nutrient intake based on the recommended number of servings for each food group. The Dietary Guideline Component assessed a person's compliance with dietary guidelines for total fat (30% or less energy from fat), saturated fat (less than 10% energy from saturated fat), cholesterol (less than 300mg), sodium (less than 2400mg), and variety (16 different kinds of food items over 3-day period).

To assess the dietary variety component of the Healthy Eating Index, the total number of different foods eaten was counted. Foods eaten had to contribute substantially to meeting the requirements for one or more of the food groups. Foods had to be consumed in an amount that contributed to at least one half of any serving in any of the food groups. Identical food items eaten on a separate occasions were combined before imposing the cut off point of consuming at least one half of the serving. Combination foods were separated into their component parts and assigned to the relevant food group. No mention was made of the criteria used to define a food as an individual food item.

Drewnowski et al. (1996) measured dietary diversity as part of a study that looked at diet quality and diet diversity in France. Dietary data was collected for subjects surveyed as part of the 1988 to 1989 survey conducted by members of the Institut Scientifique et Technique de l'Alimentation in Paris. Subjects were aged 18 years and older. The Dietary Variety Score was defined as "the number of different foods that were consumed on a habitual basis" (Drewnowski, et al. 1996). No distinction was made on number of foods eaten across food groups and the number of foods eaten within each major food group.

In classifying foods as different food items, foods were grouped according to food groups and within each group different categories were constructed to represent different foods. For example, meat, fish and dairy products were assigned 25 different categories and alcoholic beverages were assigned 5 categories.

A second score, Dietary Diversity, was also used to assess variety. The Dietary Diversity score counted the mean number of food groups consumed by each person. Five major food groups were used: dairy, meat, grain, fruit, and vegetable. Each person scored one point for each food group mentioned. Foods excluded from this score included other foods such as oil, margarine, candy, and alcoholic beverages. Foods consumed in amounts less than a minimum amount were also excluded. Combination foods were not separated into individual categories. Each food reported was assigned to one of seventy-three mutually exclusive categories, which included separate foods and food groups.

Hatloy et al. (1998) looked at food variety in West Africa as an indicator of nutritional adequacy of the diet. Children aged five and younger were studied. Dietary intake data was collected using 3-day food records. A Food Variety score was developed

to measure the number of different food items eaten. A food item was counted regardless of the quantity of the food item consumed. The Food Variety score was modified from the score developed by Krebs et al. (1987) and Drewnowski et al. (1997). Adjustments that were made to the score were not mentioned in the study. A second score, the Dietary Diversity score was developed. This score measured the number of different food groups consumed by the child. This score is a modification of the score used by Kant et al. (1991, 1995) for studies using the NHANES II and the NHANES I Follow-up study data. Eight food groups were used to assess the diet.

Cox et al. (1997) developed a variety index for toddlers that also considered the foods eaten both within and among the food groups. This index used servings of food consumed as opposed to the absence or presence of a food. This score is similar to other diet quality measures used by other researchers. The foods consumed are all placed into their respective food groups along with the amount of food consumed over three days. A three-day total of food eaten was generated along with the amount of food eaten. At least one-half of the minimum serving sizes for the foods had been consumed in order to be included in the count. Combination foods were separated into their component ingredients using the Diabetic Exchange list. To assess the "within food group variety" the foods within each food group were truncated so that no one food could contribute more than 33% toward the overall score. An exception to this truncation was made with the milk group. The variety score ranged from 0.00 to 1.00 where 1.00 reflected adequate variety in the diet. Scores less than 1.00 indicated that there is inadequate variety since the minimum number of recommended servings was not consumed from each of the food groups.

Dietary diversity is a key message in Canada's Food Guide to Health Eating: Focus on Preschoolers (Health Canada, 1992). The food guide states "enjoy a variety of foods from each food group every day", which translates into variety both among and within food groups. The purpose of having a variety of foods is to improve nutritional status as well as making food more enjoyable (Health Canada, 1992).

Diet diversity has been used to capture the effect of both nutritional and non-nutritional influences on the diet by various researchers. Several researchers have measured dietary variety and have used it to predict nutrient quality. Few researchers have also looked at the effect of environmental influences on diet diversity. It may be that a food-based measure such as diet diversity may respond better to environmental factors than to nutrient assessment. The purpose of diet diversity in this study is to determine the influence of the environmental factors on diet diversity. The influence of the environmental factors may be used as an indicator of food patterning for preschoolers.

Several measures are available to measure the diet. Most of these measures focus on the nutrient intake of subjects. In the present research both the nutrient intake and the kinds of foods consumed were studied. Diet quality was measured using a nutrient adequacy ratio and diet diversity was measured using a diet diversity score.

## **2.9 Research Questions, Hypothesis and Rationale**

### **Question 1:**

**How do family, childcare, and mothers' work settings individually affect the quality and diversity of the diet of preschoolers in dual-earner families?**

#### Hypothesis:

- a) When mothers' work settings are characterized by long work hours, non-standard work schedules with little control over work schedule, preschoolers are expected to have less diverse and poorer quality diets.
  
- b) Children attending licensed childcare arrangements are expected to have higher diet quality and diversity.
  
- c) Children in family settings where mothers have attained high levels of education and family income will have higher diet quality and diversity.

#### Rationale:

With mothers retaining most of the responsibility for household work, the effect of the mothers' work setting is deemed to have greater effects than the work setting of the fathers. Having to work long hours, mothers will have less time to attend to household activities including meal preparation. With less time available for household activities, tasks such as food purchasing, meal preparation, and menu planning may not be done effectively. A decrease in time spent on household activities may also affect child-

feeding practices such as the amount of time spent with the child at mealtime. Less time may be available for mothers to spend introducing new foods to the child. Mothers may not have sufficient time to plan meals and prepare a variety of foods. The number of meals that the family eats away from home may also increase.

Mothers who have standard work schedules may be better able to manage the time spent at work and time spent in household activities such as food purchasing. If there is low work schedule flexibility, there may be less time for mothers to purchase, prepare, and serve meals. Feelings of higher work place stress may also negatively affect decisions made with regards to amount of time spent feeding the child at mealtime, and the types of foods served at mealtime. The diet diversity and quality of the child's diet may be negatively affected by the mothers' work setting characteristics, depending on her work time and work schedule.

Licensed childcare arrangements may positively affect the diversity and quality of the child's diet since non-parent caregivers in a licensed facility are guided by the nutrition guidelines for preschoolers, outlined in the Manitoba Daycare Standards.

Higher family incomes and higher levels of educational attainment may also positively influence the child's diet. Having higher incomes may allow mothers to purchase foods that will increase the diversity and quality of the child's diet. Mothers may be able to select licensed over unlicensed childcare arrangements, if the family income is high. Higher levels of educational attainment may indicate that these mothers are more aware of issues surrounding child nutrition and feeding, such as time spent introducing new

foods to the child. Mothers may be more aware of the need to serve a variety of food to the child and to provide food that is of high quality so the child gets the required nutrients for growth and development.

**Question 2:**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility) exert an effect on the diet quality and diversity of the preschooler?**

Hypothesis:

It is expected that preschoolers whose families are characterized by both parents working fewer hours, both parents having standard work schedules and both parents also having flexible work schedules will have better quality diets and more diverse diets.

Rationale:

It is assumed that when the combined work time for mother and father is less, that parents may have the ability to better manage their family time so as to be able to attend to household activities, including meal preparation. When the work schedules of both parents are standard, parents may be better able to organize their time during the day, than when they are working nonstandard work schedules. In families where one parent works a standard work schedule while the other works a nonstandard work schedule, parents may not be able to manage their time as well as families where both parents work a standard work schedule. When both parents work a standard work schedule, it may be that they are better able to set standard meal times and also have time to spend on household activities. When both parents work flexible work schedules, it is also assumed

that mothers and fathers may experience reduced work place stress, which may improve decisions made regarding child feeding practices and the types of meals prepared at home.

**Question 3:**

**What is the relative influence of the family, childcare, and work settings on the quality and diversity of the diet of preschool children in dual-earner families in terms of a) mothers' work setting and b) family- work setting?**

Hypothesis:

When the work setting is characterized by long work hours and childcare is unlicensed and family incomes are lower, the child's diet is expected to be of lower diversity and quality. This negative effect is also expected to increase when, in addition to working long work hours, the work schedule is nonstandard and when there is little flexibility over the work schedule.

Rationale:

Working long hours will have a significant effect on the diet of the child along with whether the childcare arrangement is unlicensed or not. Lower family incomes are also expected to significantly affect the diversity and quality of the child's diet. The independent effects of these variables are expected to be stronger when long work hours are also accompanied by work schedules of the parents that are nonstandard and when there is low work schedule flexibility.

## **3.0 METHODOLOGY**

### **3.1 Baseline Study**

#### **3.1.1 Subjects**

The sample used by Trumble-Waddell et al. (1998) included 146 preschoolers, 24-47 months of age, living with both parents who were employed outside the home for 15 or more hours per week. This sample was also used for the present study. The criteria for inclusion in the study by Trumble-Waddell et al. (1998) were: 1) the child consumed at least one meal each workday while in the care of a non-parent caregiver, 2) all children were on non-therapeutic diets and not have any medical condition affecting growth and development, and 3) parents of the children had to speak English in order to participate.

The University of Manitoba's Ethics Committee and the Manitoba Health Services Commission (MHSC) approved consent forms and an oath of confidentiality for use in the study. A simple random sample was obtained from a sampling frame provided by the Manitoba Health Services Commission (MHSC). The Commission lists the entire community in Manitoba for the purpose of medical coverage. Potential participants were first sent an introductory letter and then contacted by telephone for recruitment.

#### **3.1.2 Research Methods**

Initial data for the study was collected using a telephone questionnaire (Appendix A). The data collected during telephone screening included demographic information pertaining to parents' work (occupations, work hours, work days, and education level), ethnic background, total family income and number of children, childcare information

including type of childcare arrangement, duration in present childcare arrangement, and meals and snacks eaten with the caregiver.

Participants were also required to keep food records for three non-consecutive days, with work and non-work days of parents being represented proportionately (Appendix B). Two types of food records were kept at two different time periods. At the first time period, parents and caregivers collected data using an estimated food record. For the second time period, parents and caregivers kept a weighed food record. The second food record was administered six weeks after the first record. At the second time period the participants were split into two groups, where one group completed a weighed food record while the other group completed an estimated food record; these steps were necessary in order to test both the reliability and the validity of the three-day estimated food record.

Trained interviewers met with both parents and caregivers at the parents' home or at the childcare facility to instruct parents and caregivers on the use of the food records and how to record the data.

### **3.1.3 Response Rate**

The Manitoba Health Services Commission supplied the initial study with the names and phone numbers 3500 families from which participants for the study were selected. From this group 1264 families were sent introductory letters to participate in the study. One thousand and eighty-two families (1082) were successfully contacted by telephone, out of which 780 were omitted because they did not meet the eligibility criteria or their eligibility could not be established. Three hundred and two (302)

participants who were contacted met the eligibility criteria for the study. For the final study 63% of the eligible participants (189) agreed to participate in the study. Upon completion of the food records at the first time period, 43 participants were omitted based on the food records submitted. As a result, the second food record taken at time 2 was collected for 146 participants. The study was therefore completed and the data analyzed for 146 participants.

#### **3.1.4 Results and Limitations**

The results of the study indicate that the estimated three-day food record was reliable and valid for determining the group mean intakes of nutrients of preschoolers. The method of data collection was found to be unreliable and invalid when trying to estimate the mean intake of individuals due to intra-person variation that was present. It was concluded that more than three measurement days were required to estimate nutrient intake with greater precision. The results were found to be consistent with the literature on reliability and validity of the estimated food record, when used with other age groups where there was a single recorder. It was also recognized that further research was required to validate this tool when kept by parents and caregivers of preschoolers using more stringent validation procedures (Trumble-Waddell et al. 1998).

One of the limitations of this study was that the methods used to validate the three-day estimated intake did not follow the typical validation methods used. The test and reference methods generally were applied at the same time. With data being collected from two separate recorders it made applying this validation technique impractical in this study. Another limitation lies in the order that the tests were

administered. In the design of the study the test (the estimated food record) was administered before the reference (the weighed food record). In order to control for this a cross over design a larger sample size would have been needed (Trumble-Waddell et al. 1998).

The limitations of the previous study also apply to the present study. In additions, the present study was further limited by the sample size that was used. In determining the sample size, the studies used were based on food records collected by one recorder as opposed to two recorders that was used for the previous study (parents and caregivers). It may be that a larger sample size may be needed to evaluate the variables in this study.

### **3.2 Measures for the Present Study**

The demographic data collected from the telephone questionnaires along with the three-day food records were analyzed in the present study. The nutrient analysis of the three day estimated food record along with the estimated three day food record, collected from the parents and the childcare facilities, at the time one data collection period were used to determine the diet quality and diet diversity of the child's diet. The following lists the variables collected that were be used in the present study.

#### **3.2.1 Descriptive Variables**

- a) Child's age - child's age in months
- b) Child's gender - male or female
- c) Parent's age - under 20 years; 20-29 years; 30-39 years; over 40 years
- d) Number of children - number of children in the family living at home

- e) Type of arrangement - seven categories - day care centers, care in someone else's home by a relative, care in someone else's home by a non-relative, care in own home by child's sibling, care in own home by relative, care in own home by non-relative, other.
- f) Satisfaction with childcare arrangement - single item, five point scale (1 = very satisfied, 2 = satisfied, 3 = neither satisfied/dissatisfied, 4 = dissatisfied, and 5 = very satisfied).
- g) Duration in present childcare facility - number of months in present childcare arrangement
- h) Occupation (for both parents) - eight categories from Statistics Canada where 1 = unskilled, 2 = semi-skilled, 3 = skilled, 4 = clerical and sales, 5 = proprietors, managers and officials, small, 6 = semi-professional, 7 = proprietors, managers and officials, large, and 8 = professional
- i) Duration of work (for both parents)- number of years spent in current job.

### **3.2.2 Analytical Variables:**

#### 32.2.1 Independent Variables:

##### **Work Setting Variables:**

- a) Work time (for both parents) - the number of hours spent at work including overtime. Work was defined as work outside the home for pay and involving over 15 hours per week
- b) Work Schedule (for both parents) - i. three patterns of days worked each week (non-variable weekdays, non-variable weekends, variable days) and ii. five

patterns of hours worked each day (day, afternoon, night, rotating, variable hours)  
(Staines & Pleck, 1983)

- c) Work Schedule Control (for both parents) – three-item index indicating difficulty (1 = not all hard to 4 = very hard): ability to change the days worked permanently, ability to change hours worked permanently, and ability to get time off to attend to personal or family matters (Staines & Pleck, 1983). High total scores reflect difficulty in changing work schedules.

#### Child Care Setting Variables:

- a) Type of childcare facility - licensed, unlicensed, both licensed and unlicensed

#### Family Setting Variables:

- a) Parent's education - 8 categories where 1 = grade eight or less, 2 = some high school, 3 = completed high school, 4 = some post-secondary training (non-university), 5 = post-secondary certificate or diploma, 6 = some university, 7 = completed university (has degree), and 8 = postgraduate training
- b) Family income - 8 categories where 1 = under \$20,000, 2 = under \$30,000, 3 = under \$40,000, 4 = under \$50,000, 5 = under \$60,000, 6 = under \$70,000, 7 = under \$80,000, and 8 = over \$80,000 before taxes

### 3.2.2.2 Dependent Variables

#### **Diet Quality**

The Dietary Reference Intakes (DRIs) were comprised of the following four standards: EAR, RDA, AI, and UTIL. The EAR was the nutrient intake value that was *estimated* to meet the requirement defined by a specified indicator of adequacy in 50% of the individuals in a life stage and gender group. At this level of intake, the remaining 50% of the specified group would not meet their nutrient needs (Institute of Medicine, 1997, 1999, 2000). The EAR was expressed as a daily value averaged over time. The EAR was not intended to be used as a reference intake for individuals, even though it was the average (or median) requirement by definition, it was below the needs of half of the individuals in a given age/sex group. It was, however, used as the basis for setting the RDAs and was suggested for use in assessing the nutrient adequacy of intake of individuals and groups (Institute of Medicine, 2000).

The RDA was the average daily dietary intake level that was sufficient to meet the nutrient requirements of *nearly all* (97-98%) individuals in a life stage groups and gender group (Institute of Medicine, 1997, 1999, 2000). Of the four Dietary Reference Intake standards, the RDA closely resembles the 1990 RNI (Health Canada, 1990) requirements used in Canada. The RDA was set at two standard deviations above the EAR for each nutrient based on research data. If data about the variability of the nutrient was insufficient to calculate the standard deviation, a coefficient of variation of 10% was assumed (Institute of Medicine, 1997, 1999, 2000). The primary use of RDA was as an intake goal for individuals. It was not intended for use in assessing the diets of groups or for planning diets for groups or individuals (Institute of Medicine, 2000).

If there was not sufficient evidence to calculate an EAR an AI requirement has been determined. The AI was based on approximations of the average nutrient intake as defined by a population, which appear to sustain a defined nutritional state (Institute of Medicine, 1997). The AI may be used as a goal for nutrient intake in individuals and to form tentative goals for groups (Institute of Medicine, 2001). This requirement has been set above the actual requirement for the nutrient for individuals.

The last standard was the UTIL. This was the maximum level of nutrient intake that was unlikely to pose adverse health risks to almost all individuals in a specified life stage group and gender group. UTIL was developed based on the increasing number of nutrient fortified foods and the increase in use of dietary supplements (Institute of Medicine, 2001).

The nutrient requirements for the micronutrients being assessed in this study were available and include Iron, Calcium, Vitamin C, Thiamin, Riboflavin, Niacin, Vitamin A, and Folate. The following table (Table 6) lists the nutrient requirements of both the Canadian Recommended Nutrient Intakes and the Dietary Reference Intakes – standards for EAR and RDA for nutrients being used as part of the analysis for the present study.

**Table 2. Nutrient Recommendations – 1990 Recommended Nutrient Intakes (RNI)<sup>1</sup> and Dietary Reference Intakes (DRI)<sup>2</sup>**

	1990 RNI <sup>a</sup>	DRI-EAR <sup>b</sup>	DRI-RDA <sup>b</sup>	DRI – AI <sup>b</sup>
Energy (kcal/day)	1300	TBA <sup>c</sup>	TBA <sup>c</sup>	TBA <sup>c</sup>
Protein (g/day)	22	TBA <sup>c</sup>	TBA <sup>c</sup>	TBA <sup>c</sup>
Iron (mg/day)	6.0	3.0	7.0	N/A <sup>d</sup>
Calcium (mg/day)	550	N/A <sup>d</sup>	N/A <sup>d</sup>	500
Vitamin C (mg/day)	20	13	15	N/A <sup>d</sup>
Thiamin (mg/day)	0.6	0.4	0.5	N/A <sup>d</sup>
Riboflavin (mg/day)	0.7	0.4	0.5	N/A <sup>d</sup>
Niacin (NE/day)	9.0	5.0*	6.0*	N/A <sup>d</sup>
Vitamin A (RE/day)	400	210**	300**	N/A <sup>d</sup>
Folate (ug/day)	80	120	150	N/A <sup>d</sup>

*Note.* <sup>1</sup> Recommended Nutrient Intakes (RNI) for Canadians (Health Canada, 1990). <sup>2</sup> Dietary Reference Intakes (Institute of Medicine, 1997, 1999, 2000, 2001). <sup>a</sup> Recommended Nutrient Intakes (RNI) for children aged 2-3 yrs. <sup>b</sup> Dietary Reference Intakes for children aged 1-3yrs – Estimated Average Requirement (EAR), Recommended Dietary Allowance (RDA), Adequate Intake (AI). <sup>c</sup> To Be Announced. Dietary Reference Intake values were currently not available for these nutrients. <sup>d</sup> Not Applicable. Nutrients with reference values for the EAR and RDA do not have an AI set, as well nutrients with an AI reference value do not have reference values for EAR and RDA set.

\* mg/day NE \*\* ug/day RE

The nutrient data in the present study was used to measure the prevalence of nutrient adequacy for the group by applying the EAR cut point method, as outlined by the Institute Medicine (2000). Individual nutrient adequacy was assessed using a Mean Adequacy Ratio, while noting the limitations of this approach.

To determine the prevalence of nutrient adequacy for this group, the three-day mean nutrient intake for each individual was adjusted to reduce the intra-individual variation. The distribution curves for each nutrient were then plotted. Risk curves were plotted on each nutrient distribution using the EAR and the mean intake for the group. By plotting the risk curves on the nutrient distribution, the prevalence of nutrient inadequacy was determined by assessing the proportion of individuals that fall above and below the Estimated Average Requirement (EAR). All the micronutrients were assessed using this method with the exception of calcium, since there was no EAR reference value yet determined.

To assess the prevalence of calcium intake the group mean of calcium were compared with the Adequate Intake requirement for calcium. If the group mean intake of calcium exceeded the AI, it was concluded that the probability of inadequate intake for calcium was considered low. If however, the group mean calcium intake falls below the AI, no conclusion was drawn about the adequacy of calcium intake of the group.

Individual nutrient intake was assessed using a Mean Nutrient Ratio. The procedures used by Caliendo and Sanjur (1981) were used in order to measure the proportion subjects that were at or above the Recommended Dietary Allowance for 6 nutrients. The following equation was used to measure subjects' nutrient intake relative to the Recommended Daily Intake over a three-day period:

$$\text{NAR} = \frac{\text{the child's three day intake of a nutrient}}{3 \times \text{RDA of that nutrient}}$$

The nutrients that were assessed were iron, vitamin C, thiamin, riboflavin, niacin, vitamin A, and folate. For each individual, the Nutrient Adequacy Ratio (NAR) for all the nutrients was totaled and divided by seven. The final score was the Mean Adequacy Ratio (MAR). Each nutrient adequacy ratio was truncated at 100% when necessary, so that no one nutrient controlled the outcome of the Mean Adequacy Ratio.

Based on the new Dietary Reference Intakes, an Adequate Intake requirement had been set for calcium as opposed to a Recommended Daily Allowance requirement. As a result, calcium was omitted from the nutrient adequacy ratio calculations.

There are limitations associated with interpreting a Nutrient Adequacy Ratio. Because an individual's actual nutrient requirement is unknown, it is difficult to determine where an individual's requirement falls relative to the Recommended Dietary Allowance. Another limitation associated with calculating the Nutrient Adequacy Ratio, is that ratios that fall below 1.00, do not indicate that an individual has inadequate nutrient intake. Similarly, if the nutrient adequacy ratios fall above 1.00, it does not indicate that the individual's diet was nutritionally adequate. Individuals with NAR ratios above 1.00 were deemed to have a high probability of meeting their nutrient requirements, while individuals with ratios below 1.00 had a lower probability of meeting their nutrient requirements.

### **Diet Diversity**

In looking at dietary diversity, the present study defined variety as the number of different foods consumed over a 3-day period. The diet diversity score assessed the

presence or absence of a different food item regardless of the food group from which it comes. The presence or absence of a food was measured over 3 days and a 3-day mean number of different foods eaten was determined. A three-day mean was used since Health Canada (1992) states in Food Guide Facts: Background for Educators and Communicators that "healthy eating was the average of what was eaten over time".

Foods can be grouped in a number of different ways. The population's perception of grouping foods may be different from the groupings that nutrition professionals use. Different criteria exist by which foods may be grouped. Initial grouping of foods in this study used Health Canada's food groups outlined in Canada's Food Guide: Focus on Preschoolers (Health Canada, 1992) where foods were grouped according to their commodity or agricultural base, how consumers use foods and by the fact that some food items do not fit into a food group (Health and Welfare Canada, 1992). Since the food groups used by Health Canada were not very discrete food groups, foods were further separated based on the following criteria.

Foods were considered different from each other based on their nutrient composition as well as method of preparation and/or processing. There were minimal groupings of some foods based on their nutrient content. These groups were used for foods that have similar nutrients. For example chocolate milk and strawberry milk was considered different from unflavored milk, but they were grouped together since they differ from each other in flavoring and not nutritional content. The following, illustrates the criteria that were used to determine discrete foods:

1. Differences in vitamin and/or mineral content

2. Similar foods with different vitamin and/or mineral nutrient content were considered separate foods. For example, artificially flavored beverages with vitamin C added were considered different from artificially flavored beverages that do not have added vitamin C. These foods differ since there was an added nutrient to the beverage, namely vitamin C.

3. Differences in fiber content

Similar foods with different fiber contents were considered different from processed foods prepared. For example, fresh fruits such as apples and grapes were considered separate foods from apple juice and grape juice. Fresh fruits differ from the juices since the juices contain little or no fiber. Similarly, whole grain breads and cereals with added grains were considered different from enriched breads and cereals.

4. Differences in fat content

Foods with different fat contents based on method of preparation and processing were considered separate foods. For example, 1% milk was considered a separate food from 2% milk. Similarly, different cheeses contain different quantities of fat, therefore, mozzarella cheese, for example, was considered different from cheddar cheese.

5. Differences in additives and/or preservatives.

Fresh foods were considered different from foods prepared from processed foods. For example, chicken wieners were considered different from baked chicken. The wieners contain more preservatives and additives than does the

baked chicken. Similarly, cheese spreads were considered different from cheese slices since they differ in the amount of emulsifiers they contain.

6. Differences in sugar content.

Similar foods with different sugar content were considered different. For example, 2% chocolate milk was considered different from 2% white milk.

These criteria were developed using the guidelines stated in Canada's Food Guide: Focus on Preschoolers (Health Canada, 1992) which states "a) choose whole grain products and enriched products more often, b) choose lower fat milk products more often and c) choose leaner meats, poultry and fish as well as dried peas and beans more often". Also stated in the guide was "use moderate amounts of margarine, butter and salad dressing, and enjoy the natural flavors of foods". In order to determine the practicality of using the above criteria, the first five food records were assessed applying the criteria, following which the criteria were reassessed. Table 3 summarizes the criteria used.

**Table 3. Criteria for Defining Unique Foods**

Foods/Criteria	Vitamin/Mineral content	Fibre content	Fat content	Additives/Preservatives	Sugar content
<b>Grain Products</b>					
Breads		✓			
Cereal		✓			✓
Bagel/Pita		✓			
Muffin		✓	✓		
Pasta or Rice		✓			
Crackers		✓	✓		
<b>Fruit and Vegetables</b>					
Fresh vegetable or fruit	✓	✓			
Frozen/canned vegetable or fruit		✓		✓	✓

Foods/Criteria	Vitamin/Mineral content	Fibre content	Fat content	Additives/Preservatives	Sugar content
----------------	-------------------------	---------------	-------------	-------------------------	---------------

**Milk and Milk Products**

Cheese			✓	✓	
Yogurt			✓		✓
Milk			✓		✓

**Meat and Alternates**

Meat, fish or poultry				✓	
Beans		✓		✓	
Tofu					
Peanut Butter		✓			

In coding combination foods, differences may arise in terms of how certain foods were prepared by individuals. In order to standardize the ingredients used for combination foods a standard cookbook was used as a reference for coding such foods. In addition to using a standard cookbook, a diary of combination foods was kept so as to ensure consistency in coding. Combination foods such as lasagna were separated into the main ingredients, as much as possible. For example lasagna was separated into five different food items - ground beef, mozzarella cheese, cottage cheese, white pasta and tomato sauce, based on the ingredients in the cookbook. Hamburgers, for example, were separated into white buns and ground beef, lettuce and tomato. Any additional ingredients to combination foods were coded as separate foods, if indicated. Should the food record provide a list of ingredients used in combination foods, this list was used for coding that food item.

In order for a food to be counted as present, a significant quantity of the food item was required to be eaten by the participant. For example, one lick of an ice cream cone was not deemed to contribute significantly to the variety of foods eaten; hence it was excluded from the count. Chery and Sabry (1984) looked at the portion sizes of common foods eaten by young children aged 1-6 years old. Portion sizes were reported for two groups: 1-3 year olds and 4-6 year olds. Data was obtained from the 1970-72 Nutrition Canada survey to determine the portions sizes of foods commonly eaten by these two age groups. The average portion size along with the standard deviation was reported. The mean portion size minus the standard deviation gave a portion size equivalent to one quarter of the lower end of the range of the recommended serving size listed in Canada's Food Guide to Healthy Eating: Focus on Preschoolers (Health Canada, 1990) for the 1-3

year old group. The mean plus or minus the standard deviation represented the part of the population falling within one standard deviation of the mean, which was approximately 68% of the survey population.

Taking into consideration the portion sizes reported in the above study and their relation to the portion sizes suggested in the food guide, approximately 1/8 of the lower end of the range of recommended serving size in the food guide was used in the current study as the cut off points. The following table provides a summary of the approximate serving size requirements for preschoolers with cut off points marked at one half of the lower end of the range of the recommended serving size and also at one quarter of the lower end of the recommended serving size in Table 4. The cut off points to be applied to this study were listed in Table 5. The cut off points listed were determined considering both the nature of the different foods and also the practicality of the portion sizes. Using a set cut off of one eighth of the lower end of the recommended serving size may equate to a 'lick' of a food item, hence the cut off points for the food groups vary from one half of the lower end of the recommended serving size to one eighth of the lower end of the serving size. The values listed were approximate cut off points for the foods. For milk there was no suggested range for the recommended serving size, therefore the cut off point was set using the recommended serving size. The practicality of these cut off points was assessed when coding the first five food records. Appendix C shows the template used for coding the different foods eaten by subjects along with an example of how the diet diversity score was calculated.

**Table 4. Recommended Serving Sizes, along with ½ and ¼ of the Minimum Serving Sizes**

	One half min. serving size	One quarter min. serving size
<b>Grain products</b>		
½-1 slice bread	¼ slice	1/8 slice
15-30 g cold cereal:	8 g	4 g
-125 -250 ml (1/2-1 cup) flaked cereal	- 60 ml (1/4 cup)	- 30 ml (2 Tbsp)
-250-500 ml (1-2 cups) puffed cereal	- 125 ml (1/2 cup)	- 60 ml (1/4 cup)
-30-75 ml (2 Tbsp-1/3 cup) granola or dense cereal	- 15 ml (1 Tbsp)	- 8 ml (1/2 Tbsp)
75-175 ml (1/3-3/4 cup) hot cereal	30 ml (2 Tbsp)	15 ml (1 Tbsp)
¼- ½ bagel, pita or bun	1/8	1/16
½-1 muffin	¼	1/8
50-125 ml (1/4-1/2 cup) pasta or rice	30 ml (2 Tbsp)	15 ml (1 Tbsp)
4-8 soda crackers	2	1
<b>Vegetables and fruit</b>		
½-1 med. sized vegetable or fruit	¼	1/8
50-125 ml (1/4-1/2 cup) fresh, frozen or canned veg. or fruit	30 ml (2 Tbsp)	15 ml (1 Tbsp)
125-250 ml (1/2-1 cup) salad	60 ml (1/4 cup)	30 ml (2 Tbsp)
50-125 ml (1/4-1/2 cup) juice	30 ml (2 Tbsp)	15 ml (1 Tbsp)

---

**Milk products**

25-50 g cheese	15 g (1 Tbsp)	8 g (1/2 Tbsp)
75-175 g yogourt	45 g (3 Tbsp)	15 g (1 Tbsp)
500 ml (2 cups) milk	250 ml (1 cup)	125 ml (1/2 cup)

**Meat and alternates**

25-50 g meat, fish or poultry	10 g (2 Tsp)	5 g (1 Tsp)
1 egg	1/2	1/4
50-125 ml (1/4-1/2 cup) beans	30 ml (2 Tbsp)	15 ml (1 Tbsp)
50-100 g (1/4-1/3 cup) tofu	30 g (2 Tbsp)	15 g (1 Tbsp)
15-30 ml (1-2 Tbsp) peanut butter	10 ml (2 Tsp)	5 ml (1Tsp)

---

**Table 5. Serving Sizes to be used as cut points for foods**

---

	Recommended serving size
<b>Grain products</b>	
½-1 slice bread	¼ slice
15-30 g cold cereal:	10 g
-125 -250 ml (1/2-1 cup) flaked cereal	- 30 ml (2 Tbsp)
-250-500 ml (1-2 cups) puffed cereal	- 60 ml (4 Tbsp)
-30-75 ml (2 Tbsp-1/3 cup) granola or dense cereal	- 15 ml (1 Tbsp)
75-175 ml (1/3-3/4 cup) hot cereal	30 ml (2 Tbsp)
¼- ½ bagel, pita or bun	¼
½-1 muffin	¼
50-125 ml (1/4-1/2 cup) pasta or rice	25 ml (1 ½ Tbsp)
4-8 soda crackers	1
<b>Vegetables and fruit</b>	
½-1 med. sized vegetable or fruit	¼
50-125 ml (1/4-1/2 cup) fresh, frozen or canned vegetable or fruit	25 ml (1 ½ Tbsp)
125-250 ml (1/2-1 cup) salad	30 ml (2 Tbsp)
50-125 ml (1/4-1/2 cup) juice	25 ml (1 ½ Tbsp)

---

---

**Milk products**

25-50 g cheese	10 g (2 Tsp)
75-175 g yogourt	15 g (1 Tbsp)
500 ml (2 cups) milk	45 ml (3 Tbsp)

**Meat and alternates**

25-50 g meat, fish or poultry	10 g (2 Tsp)
1 egg	¼
50-125 ml (1/4-1/2 cup) beans	10 ml (2 Tsp)
50-100 g (1/4-1/3 cup) tofu	10 g (2 Tsp)
15-30 ml (1-2 Tbsp) peanut butter	5 ml (1 Tsp)

---

### **3.3 ANALYSIS PLAN**

#### **3.3.1 Univariate analysis**

The first step of data analysis was to perform univariate analysis on all the variables. This analysis determined the amount of variation that was present in each variable. The magnitude of the variation was determined using mean and standard deviation for all ratio or continuous variables, while categorical variables were analyzed using frequency distributions. Continuous variables were also retained for further data analysis. Categorical variables were recoded to decrease the number of categories if there were few individuals within the categories of such variables (Hassard, 1991, p.p. 1-11).

#### **3.3.2 Bivariate Analysis:**

The next step was bivariate analysis. Independent variables were examined in relation to each other to determine the presence of any relationships. The two dependent variables (Diet Quality and Diet Diversity) were also examined to determine the presence of any relationships between them. Bivariate analysis was used to determine whether any relationships were present between each independent variable and each dependent variable.

In order to determine the absence or presence of relationships among the variables, the continuous variables were plotted against one another using scatter plots. For those variables following a normal distribution, Pearson's correlation tests were performed as part of this analysis (Hassard, 1991, p.p. 127-134). Categorical variables were analyzed using cross tabulations to determine the presence of any relationships.

Further analysis using Chi Squared tests of association were also performed on these variables (Hassard, 1991, p.p. 110-117).

### **3.3.3 Multivariate analysis**

The analysis of variance was used to determine the relative relationship between independent and dependent variables. This method of analysis compares how much variation the independent variables account for in relation to the dependent variables. The overall variation that may be present in the analysis was split according to the number of variables being analyzed, as well as to random variation that was present (Hassard, 1991, pp .75-84). In order to use this method of analysis the following assumptions was tested prior to applying this method:

1. The dependent variables were continuous and follow a Normal distribution. Continuous variables was plotted in histograms and scatter plots to determine whether 95% of the data points fell within 2 standard deviations of the mean.
2. The independent variables each had similar categories/groups as much as possible. This assumption was met by ensuring that each independent variable to be included in the analysis model had a similar number of categories present (Hassard, 1991, p.p. 75-84 & 194-204).

#### **Residual Analysis**

In meeting the assumptions of the ANOVA model, five errors can occur with this type of analysis. Residual analysis of the ANOVA model was carried out to ensure that these errors were reduced. Plots of the residuals (called residual plots) were used to

determine whether residual error terms or error variance depart from the assumptions of the ANOVA model for residuals. Common residual plots used in analysis of variance models include: 1) plots against fitted values (dependent variables), 2) time or other sequence plots, 3) dot plots, and 4) normal probability plots.

The following errors from the residuals of an ANOVA model were analyzed using residual plots:

1. Nonconstancy of error variance – this error determines whether the factor levels (i.e. the number of categories in each categorical variable) used in the ANOVA model were similar. Residual plots against fitted values or scatter plots were used to test this assumption. The plots for each factor level need to have about the same extent of scatter of the residuals around the zero point. The sample sizes of the different factor levels were also considered in this assumption. When sample sizes for the different factor levels were large, histograms of the residuals for each factor level were used to determine the constancy of the error variance as well as whether the error terms were normally distributed. The histograms for each factor should be arranged vertically and use the same scale. When the error variances were unequal the F test was slightly affected if all factor level sample sizes were equal or do not differ greatly. The level of significance was raised slightly higher than the specified level, thus the F test and related analyses are robust against unequal variances when sample sizes were approximately equal. The use of equal sample sizes for all factor levels minimizes the effects of unequal variances on the F test distribution and also simplifies calculation procedures (Neter, et al., 1990, p.p. 760).

2. Nonindependence of error terms – this error was seen in data that were obtained in a time sequence. A residual sequence plot was prepared to examine if the error terms were serially correlated. This departure can have a serious effect on the F test. This error was difficult to correct and should be prevented whenever possible. Randomisation of observations would reduce the occurrence of correlation errors in observational studies. The ANOVA model may need to be modified where error terms were correlated (Neter, et al., 1990, p.p. 761).
3. Outliers – observations that lie further away from fitted values than do other observations were determined using residual plots. Such observations may cause problems such as recording errors and other measurement errors, hence outliers should be omitted from further analysis. Residual plots against fitted values, residual dot plots, box plots of residuals and stem-leaf plots were used to detect outliers (Neter, et al., 1990, p.p. 762).
4. Omission of important explanatory variables – this occurs when a single factor ANOVA model maybe an inappropriate model to test a hypothesis. A residual plot against the fitted value was used to detect this error. This residual analysis does not invalidate the single factor ANOVA model, but rather it highlights differences that may have been overlooked by using a single factor ANOVA model. This helps the researcher to determine variables that have the most effect on the dependent variable(s) (Neter, et al., 1990, p.p. 762).
5. Nonnormality of error terms – the error terms in an ANOVA model were required to follow a normal distribution. Residuals were plotted as histograms, dot plots, and box plots, and normal probability plots were used to determine whether the

residuals follow a normal distribution. Chi squared goodness of fit tests can also be used to test the normality of the distribution of the error terms. Lack of normality was not considered an important once the deviation from normality was not extreme. Kurtosis of the error distribution (i.e. the number of peaks within a given distribution) was considered more important than the skewness of the distribution in terms of its effects on inferences. The F test was robust against departures from normality; hence it was not affected by a lack of normality either in terms of level of significance or power of the test (Neter, et al., 1990, p.p. 762).

Nonconstancy of the error variance and nonnormality of the distribution of the error terms were common errors found in the residuals of an ANOVA model. The following measures are used to reduce the presence of these errors:

1. If the error terms were normally distributed but the variance of these terms were not constant, then weighted least squares methods were applied to the error terms (Neter, et al., 1990, p.p. 776).
2. If the error terms were not normally distributed and the error terms were also not constant, transformation of the dependent variable was carried out using one of several transformations of data methods (Neter, et al., 1990, p.p. 777).
3. If there were major errors from the ANOVA model and transforming the data was not possible or it was not possible to bring the error distribution to a normal distribution, a nonparametric rank F test may be used (Neter, et al., 1990, p.p. 777).

In the present research the residuals from the ANOVA models was analyzed using histogram plots to ensure that the residuals follow normal distribution. Each categorical

variable had similar number of categories so as to reduce nonconstancy of the error variance.

### Analysis Models

The following analyses models were used to test the main effects of the independent variables on the dependent variables, as well as the main and interaction effects for each dependent variable:

1) ANOVA model to test the main effects of independent variables:

$$y_1 = bx_1 + bx_2 + bx_3 + bx_4 + bx_5 + r$$

2) ANOVA model to test the main effects of the independent variables along with interaction effects of the independent variables:

$$y_1 = bx_1 + bx_2 + bx_3 + bx_1x_2 + bx_1x_3 + bx_4 + bx_5 + r$$

where  $y$  = dependent variable (diet diversity or diet quality)

$x_1$  – mothers work hours

$x_2$  – mothers work schedule

$x_3$  – mothers work schedule flexibility

$x_1x_2$  – interaction effect of mothers work hours and mothers work schedule

$x_1x_3$  – interaction effect of mothers work hours and mothers work schedule flexibility

$x_4$  – licensing of child care arrangement

$x_5$  – family income

$r$  – random variation

## **4.0 RESULTS**

### **4.1 Recoding Data**

#### Work Variables

The telephone interview response for three subjects to questions pertaining to their ability to change their work hours, work days and to get time off to attend to personal/family matters, needed to be recoded. One mother and one father responded 'Don't Know' when asked about their ability to get time off from work to attend to personal or family matters. Another mother also responded "Don't Know" when asked about her ability to change days worked permanently. These subjects were omitted from the analysis.

#### Childcare Variables

In coding for the licensing of childcare arrangements some of the subjects were recoded based on the type of childcare used and the response recorded for the licensing question. Subjects cared for in a daycare and those cared for in their own home by a sibling, relative or non-relative were to skip the question pertaining to licensing of the facility. Whereas subjects cared for in someone else's home by a relative or non-relative were to respond to the licensing question. Unfortunately, some inconsistencies were found in the responses for some questionnaires. In order to recode the licensing question, the food pattern reported in the food diaries was analyzed. The food patterns for each subject were compared with the food pattern suggested by the Manitoba Daycare Association for meals served at licensed institutions for mid morning and afternoon snacks and lunch.

Seven responses to the licensing question were coded as “Not Applicable”, but these subjects were cared for in someone else’s home by a relative (other than a sibling). These participants needed to respond to the question of whether the facility was licensed or not. Based on the food patterns recorded in the food diaries the licensing question for each subject was recoded to “Unlicensed” from “Not Applicable”. Two subjects cared for in someone else’s home by a non-relative were coded as “No Response”. Based on the food pattern in the food diaries the licensing question was recoded to “Unlicensed”. One subject cared for in someone else’s home by a non-relative was coded as “Don’t Know”. Based on the 3-day food patterns for these subjects, the licensing question was recoded to “Unlicensed”.

Two subjects cared for in someone else’s home by a non-relative were coded as “Not Applicable” for the licensing question. Unfortunately the food diaries for these subjects were not available to determine the licensing. Thirty-three percent of the subjects in the study cared for in someone else’s home by a non-relative, of which 11% indicated that the arrangement was “Licensed”. Since more than 80% of the subjects using this arrangement (cared for in someone else’s home by a non-relative) indicated “Unlicensed” for the licensing of the childcare arrangement, these two subjects were recoded to “Unlicensed”.

One subject cared for by a nursery had the licensing question coded as “Unlicensed” when it should have been coded as “Not Applicable”. This subject was therefore recoded. Two subjects cared for in more than one type of childcare also had inconsistencies in the licensing response. Based on the time spent at each arrangement the licensing question was recoded to not applicable from unlicensed.

### Family Variables

Three subjects responded “No Response” to the family income question and one subject responded “Don’t Know”. For these subjects, the average income for mothers and fathers with similar occupations were used to determine their income category. Since the income variable was initially collected as a categorical variable, the responses were recoded to change this variable to a continuous variable. Subjects in each category were recoded to the mid points of their income category to make the variable a continuous variable.

### Nutrient data

For two subjects, the three-day food record contained errors in data recording for two of the three days that the diary was being used. Foods recorded by the parents did not match with food records by the caregiver on days two and three. For these subjects the food record reported on day one of the food diary was used for days two and three. For the diet diversity score 32 subject files were missing from the original study. As a result, analysis of the diet diversity score was carried out for 114 subjects.

## 5.2 Univariate Analysis

### 5.2.1 Work setting

Mothers of the preschoolers in this study spent an average of 6.6 ( $\pm$  4.4) years at their current jobs, while fathers spent an average of 7.7 ( $\pm$ 5.3) years in their current jobs. Mothers worked an average of 35 ( $\pm$  8.7) hours per week ranging from 10 to 78 hours. Fathers worked an average of 45 ( $\pm$  9.4) hours per week with a range of 24 to 91 hours.

Seventy-seven percent (77%) of mothers worked weekdays only (Table 6), while few worked weekdays plus one weekend day or irregular days. The scheduling of the work for most fathers was also weekdays only (64%); few worked weekdays as well as one weekend day or irregular days (Table 6). Eighty-six percent (86%) of mothers began work between 3.30 a.m. and 11.59 a.m., while few worked other hours. The majority of fathers (84%) also began their work between 3.30 a.m. and 11.59 a.m., and few had other scheduling of their hours (Table 7).

Mothers and fathers who worked weekdays only and who started work between 3.30 a.m. and 11.59 a.m. were considered to have standard work schedules (as defined by Staines & Pleck, 1983). All other types of schedules were considered non-standard work schedules. Table 8 summarizes the percentage of standard and non-standard schedules for parents. Seventy-four percent (74%) of mothers had standard work schedules, while 59% of fathers worked standard schedules.

**Table 6. Days of the Week Worked by Mothers and Fathers (n=146)**

	Mothers <sup>a</sup>		Fathers <sup>a</sup>	
	Frequency	Percent	Frequency	Percent
Weekdays only	113	77.4	93	63.7
Weekdays and a weekend day	9	6.2	32	21.9
Irregular days	24	16.4	21	14.4

<sup>a</sup> n=146**Table 7. Hours of the Week Worked by Mothers and Fathers (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Day (start between 3.30am and 11.59am)	126	86.3	122	83.6
Afternoon (start between 12.00pm and 7.59pm)	2	1.4	4	2.7
Night (start between 8.00pm and 3.29am)	0	0.0	2	1.4
Rotating shift	11	7.5	6	4.1
Irregular hours or split shift	7	4.8	12	8.2

**Table 8. Number of Mothers and Fathers Working Standard vs. Non-standard Work Schedules (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Standard <sup>a</sup> work schedules	108	74.0	86	58.9
Non-standard <sup>b</sup> work schedules	38	26.0	60	41.1

<sup>a</sup> Standard work schedules are characterized by working weekdays only and work hours that start between 3.30am and 11.59am

<sup>b</sup> Non-standard work schedules are characterized by all other work day patterns and work hours

The work schedules of both parents were combined to determine the family work schedule (i.e., the mother's and father's combined work schedule). In looking at the family work schedule, 48% of the families had both parents working standard schedules, while 37% of the families had mixed work schedules where either the mother or the father worked a standard schedule while the other parent worked a non-standard work schedule (Table 9).

In assessing work schedule flexibility, the following three questions were asked: the ability to change days worked permanently, the ability to change hours worked permanently and the ability to take time off during their workday for personal or family matters. The mean response from mothers and fathers were used to determine the family's response for each of these questions.

Table 10 shows mothers' perception of how easy it is for her and her husband to permanently change the hours worked. Forty-five percent (45%) of mothers indicated that it was very hard to change their hours worked permanently, while 58% of the mothers perceived that for their husbands it was very hard to change their work hours permanently (Table 10). The perception of the ability to change hours worked for mothers and fathers were combined to determine the family's ability to change hours worked permanently (Table 11). For 54% of the families, both mother and father perceived that it was hard to change their hours worked, permanently (Table 11). The family's ability to change hours worked permanently was 1.86 ( $\pm 0.78$ ), which indicates that it was somewhat hard to change hours worked permanently. This is the mean response for the family's ability to change hours worked permanently.

**Table 9. Combined Family Work Schedule (n=146)**

	Frequency	Percent
Mother standard, Father standard	70	48.0
Mother standard, Father non-standard	38	26.0
Mother non-standard, Father standard	16	11.0
Mother non-standard, Father non-standard	22	15.1

**Table 10. The Ability of Mothers and Fathers to Change Their Hours Worked Permanently (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Not at all hard	22	15.1	13	8.9
Not too hard	28	19.2	14	9.6
Somewhat hard	30	20.6	34	23.3
Very hard	66	45.2	85	58.2

**Table 11. Mothers' Perception of the Ability of the Family to Change Their Hours Worked Permanently (n=146)**

	Frequency	Percent
Mother not hard <sup>a</sup> , Father not hard <sup>a</sup>	10	6.9
Mother not hard <sup>a</sup> , Father hard <sup>b</sup>	40	27.4
Mother hard <sup>b</sup> , Father not hard <sup>a</sup>	17	11.6
Mother hard <sup>b</sup> , Father hard <sup>b</sup>	79	54.1

<sup>a</sup> "Not hard" indicates questionnaire responses for "Not at all hard" and "Not too hard"

<sup>b</sup> "Hard" indicates questionnaire responses for "Somewhat hard" and "Very hard"

Table 12 shows the mothers' perception of how easy it is for her and her husband to permanently change the days they work. Fifty-four percent (54%) of mothers indicated that it was very hard to change the days worked permanently. Seventy-three percent (73%) of the mothers perceived that it was very hard for their husbands to change the days worked permanently. Table 13 shows the family's ability to change their workdays permanently, which is the mother and father response combined (Table 13). For 65% of the families, both mother and father perceived that it was hard to change their days worked, permanently, while for 25% it was not hard for the mother, but hard for the father to change the days worked (Table 13). The mean response for the family's ability to change days worked permanently is 1.63 ( $\pm 0.69$ ).

Table 14 shows the perception of mothers' ability to get time off from work during their workday to attend to personal or family matters. Forty-one percent (41%) of mothers indicated that it was not too hard to get the time off from work. For fathers it was reported by 37% of mothers that it was not too hard for fathers to get time off from work to attend to family or personal matters during the workday (Table 14). Table 15 shows the ability of the family to get the time off from work during their workday to attend to personal or family matters, after combining mother and father responses. Forty percent (40%) of the families did not find it hard to get time from work during their workday to attend to personal or family matters. In 28% of the families it was not hard for mothers to get the time off, but hard for fathers to get the time off (Table 15). The mean response for the family's ability to get time off from work to attend to personal/family matters during the workday was 2.68 ( $\pm 0.74$ ).

**Table 12. Mothers' Perception of the Ability of Mothers and Fathers to Change Their Days Worked Permanently (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Not at all hard	17	11.6	5	3.4
Not too hard	24	16.4	10	6.9
Somewhat hard	25	17.1	25	17.1
Very hard	79	54.1	106	72.6
Don't Know	1	0.7	0	0.0

**Table 13. The Ability of the Family to Change Their Days Worked Permanently (n=146)**

	Frequency	Percent
Mother not hard <sup>b</sup> , Father not hard <sup>b</sup>	5	3.4
Mother not hard <sup>b</sup> , Father hard <sup>c</sup>	36	24.7
Mother hard <sup>c</sup> , Father not hard <sup>b</sup>	10	6.9
Mother hard <sup>c</sup> , Father hard <sup>c</sup>	95	65.1

<sup>a</sup> "Not hard" indicates questionnaire responses for "Not at all hard" and "Not too hard"

<sup>b</sup> "Hard" indicates responses for "Somewhat hard" and "Very hard"

**Table 14. Mothers' Perception of the Ability of Mothers and Fathers to Take Time Off During Their Workday for Personal or Family Matters (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Not at all too hard	39	26.1	24	16.4
Not too hard	60	41.1	54	37.0
Somewhat hard	30	20.6	42	28.9
Very hard	16	11.0	25	17.1
Don't know	1	0.7	1	0.7

**Table 15. The Ability Of The Family to Take Time Off During Their Workday for Personal or Family Matters (n=146)**

	Frequency	Percent
Mother not hard <sup>a</sup> , Father not hard <sup>a</sup>	59	40.4
Mother not hard <sup>a</sup> , Father hard <sup>b</sup>	41	28.1
Mother hard <sup>b</sup> , Father not hard <sup>a</sup>	19	13.0
Mother hard <sup>b</sup> , Father hard <sup>b</sup>	27	18.5

<sup>a</sup> "Not hard" indicates questionnaire responses for "Not at all hard" and "Not too hard"

<sup>b</sup> "Hard" indicates questionnaire responses for "Somewhat hard" and "Very hard"

In order to measure work schedule flexibility, the responses from the following questions were summed: the ability to change hours worked permanently, the ability to change days worked permanently, and the ability to get time off from work for personal or family matters. A three-item, four-point scale of work schedule flexibility was created for mothers and fathers (where 1=inflexible and 4=flexible).

Parents with a flexibility score less than 2.5 were considered to have inflexible work schedules, while parents scoring equal to and above 2.5 were considered flexible work schedules. The mean flexibility score for mothers was 2.2 ( $\pm 0.85$ ) and for fathers it was 1.9 ( $\pm 0.68$ ). Table 16 shows the work schedule flexibility of mothers and fathers as perceived by mothers. Sixty-six percent (66%) of mothers had inflexible work schedule and 85% of mothers perceived that fathers also had inflexible work schedules (Table 16). The work schedule flexibility scores for mothers and fathers were combined to measure the family work schedule flexibility seen in Table 17. The majority of families (58%) had inflexible work schedules, characterized by both mother and father having an inflexible work schedule (Table 17). The mean flexibility score for the family was at 2.06 ( $\pm 0.58$ ).

The occupation of the parents ranged from unskilled to professional work (Table 18). For mothers, 37% worked in clerical and sales occupations, while 39% worked in semi-professional and professional jobs. Amongst the fathers, 35% worked in jobs that were skilled, semi-skilled or unskilled. More than 25% of the fathers worked in semi-professional and professional jobs (Table 18).

**Table 16. Summated Three Item Score for Work Schedule Flexibility<sup>1</sup> of Mothers and Fathers (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Flexible <sup>a</sup> work schedules	49	33.6	21	14.4
Inflexible <sup>b</sup> work schedules	97	66.4	125	85.6

<sup>1</sup> Flexibility is calculated by averaging the responses for each parent to the following questions: ability to take time off during the work day to attend to personal or family matter; ability to change days worked, permanently; and ability to change hours worked, permanently.

<sup>a</sup> Flexible work schedules have a mean flexibility score less than 2.5 on the three-item scale

<sup>b</sup> Inflexible work schedules have a mean flexibility score greater than 2.5 on the three-item scale

**Table 17. Summated Three Item Score for Family Work Schedule Flexibility (n=146)**

	Frequency	Percent
Mother flexible <sup>a</sup> , Father flexible <sup>c</sup>	10	6.9
Mother flexible <sup>a</sup> , Father inflexible <sup>b</sup>	38	26.0
Mother inflexible <sup>b</sup> , Father flexible <sup>a</sup>	11	7.5
Mother inflexible <sup>b</sup> , Father inflexible <sup>b</sup>	85	58.2

<sup>a</sup> Flexible work schedules have a mean flexibility score less than 2.5 on the three item scale.

<sup>b</sup> Inflexible work schedules have a mean flexibility score greater than 2.5 on the three item scale.

**Table 18. Distribution of Mothers' and Fathers' Occupations (n=146)**

	Mothers		Fathers	
	Frequency	Percent	Frequency	Percent
Unskilled	8	5.5	12	8.2
Semi-skilled	6	4.1	18	12.3
Skilled	5	3.4	21	14.4
Clerical/Sales	54	37.0	22	15.1
Small business managers/proprietors	14	9.6	25	17.1
Semi-professional	29	19.9	11	7.5
Large business managers/proprietors	3	2.1	9	6.2
Professional	27	18.5	28	19.2

#### 4.1.2 Childcare setting

Thirty-four percent (34%) of preschoolers were cared for in daycare facilities, while 33% were cared for in someone else's home by a non-relative (Table 19). Nine (9) parents reported that their preschoolers were in more than one type of childcare arrangement (Table 20). Most of the childcare arrangements used (66%) were unlicensed, while the remaining 34% were licensed facilities.

Seventy-six percent (76%) of parents indicated that they were very satisfied with their childcare arrangement (Table 21). Children were in their present childcare arrangement for an average of 18.3 ( $\pm$  11.8) months and had an average of 1.9 ( $\pm$  1.0) different childcare arrangements from birth to the time of the study.

Table 22 shows the meals and snacks preschoolers usually ate with caregivers versus those eaten with parents, as reported by parents. Preschoolers usually ate morning snack (82%), lunch (98%) and afternoon snack (88%) with the caregiver. Few preschoolers usually ate breakfast (24%) and dinner (3.4%) with the caregiver. Fifteen percent (15%) of preschoolers sometimes ate breakfast and morning snack with caregivers. Most preschoolers never ate breakfast (60%), dinner (88%) and evening snack (92%) with the caregiver.

Most caregivers prepared morning snack (77%), lunch (71%) and afternoon snack (79%) for preschoolers. When parents were working, the parent prepared lunch for 16% of preschoolers. Seventeen percent (17%) and 15% of preschoolers had both parents and caregivers prepared morning and afternoon snacks, respectively, while both parents are at work.

**Table 19. The Number of the Different Types of Childcare Arrangements Used by Parents (n=146)**

	Frequency	Percent
Daycare	46	34.5
Care in Own Home - by relative	11	7.5
Care in Own Home - by non-relative	17	11.6
Care in Someone else's Home - by relative	23	15.8
Care in Someone else's Home - by non-relative	48	32.9
Other	1	0.7

**Table 20. The Number of Families Using More Than One Type of Childcare (n=9)**

	Frequency
Daycare and Care in Someone else's Home-relative	1
Daycare and Care in Someone else's Home-non-relative	3
Care in Own Home-relative and Care in Someone else's Home-relative	1
Care in Own Home-by relative and Care in Someone else's Home-non-relative	1
Care in Someone else's Home-non-relative and Care in Someone else's Home-relative	1
Care in Someone else's Home-relative and Care in Someone else's Home-non-relative	1
Care in Someone else's home-relative and Other type of care	1

**Table 21. Parent's Satisfaction with the Childcare Arrangement (n=146)**

	Frequency	Percent
Very Satisfied	111	76.0
Satisfied	31	21.2
Neither Satisfied or Dissatisfied	3	2.1
Don't Know	1	0.7

**Table 22. The Meals and Snacks Parents Reported That Were Usually, Sometimes or Never Eaten With Caregivers (n=146)**

	Usually Eaten		Sometimes Eaten		Never Eaten	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Breakfast	36	24.7	22	15.1	88	60.3
AM Snack <sup>a</sup>	120	82.2	23	15.8	2	1.4
Lunch	143	98.0	2	1.4	1	0.7
PM Snack	128	87.7	16	11.0	2	1.4
Dinner	5	3.4	12	8.2	129	88.4
Evening Snack <sup>b</sup>	0	0.0	4	2.7	135	92.5

<sup>a</sup> One parent gave "No Response"

<sup>b</sup> Seven parents gave "No Response"

### 4.1.3 Family Setting

The preschoolers in this study ranged in age from 26 months to 45 months with the average age of a child being 36 ( $\pm$  5.5) months. Of the 74 males and 72 females in the study, 62 children were two-year olds while 84 children were three-year olds. The average age of mothers in the study was 33.8 ( $\pm$  4.3) years while the average age of the fathers 36.0 ( $\pm$  4.7) years. The average family size was 4 ( $\pm$  0.8) members, which included both parents and children. Sixty-nine percent (69%) of the families in the study had one child under the age of 6, while 38% had two children under the age of six years. Eighty percent (80%) of the mothers and 84% of the fathers were born in Canada. English was the main language spoken in the most homes (88%).

Tables 23 and 24 show the distribution of education reported for mothers and fathers of preschoolers, respectively. Forty percent (40%) of mothers attained some post secondary or completed post secondary education, while 42% had some university education, completed university education or had post-graduate training (Table 23). Amongst fathers, 31% were reported to have some high school education or completed high school, while 52% has some university education, completed university or had post-graduate training (Table 24).

The total family income was reported to be between \$50,000 and \$59,999 by 23% of the families (Table 25). Twenty percent (20%) of the families reported a family income ranging from \$60,000 to \$69,999.

**Table 23. Distribution of Mothers' Education (n=146)**

	Frequency	Percent
Some High School	5	3.4
Completed High School	21	14.4
Some Post Secondary Training (non-university)	21	14.4
Post Secondary Certificate or Diploma	38	26.0
Some university	14	9.6
Completed university	36	24.7
Post-graduate training	11	7.5

**Table 24. Distribution of Fathers' Education (n=146)**

	Frequency	Percent
Some High School	14	9.6
Completed High School	31	21.2
Some Post Secondary Training (non-university)	6	4.1
Post Secondary Certificate or Diploma	20	13.7
Some university	17	11.6
Completed university	43	29.6
Post-graduate training	15	10.3

**Table 25. Distribution of Family Income (n=146)**

	Frequency	Percent
Less than 20,000.00	3	2.1
\$ 20,000 to 29,999	4	2.7
\$ 30,000 to 39,999	16	11.0
\$ 40,000 to 49,999 <sup>a</sup>	17	11.6
\$ 50,000 to 59,999 <sup>b</sup>	34	23.3
\$ 60,000 to 69,999	28	19.2
\$ 70,000 to 79,999 <sup>c</sup>	16	10.9
\$ 80,000 and over	28	19.2

<sup>a</sup> One parent who gave "No Response" was recoded to this income category based on their occupation

<sup>b</sup> Two parents who gave "No Response" were recoded to this income category based on their occupation

<sup>c</sup> One parent gave "No Response" was recoded to this income category based on their occupation

#### **4.1.4 Diet Quality**

##### **4.1.4.1 Nutrient Intake**

Table 26 and 27 show the mean nutrient intake and the mean nutrient density for the preschoolers in this study. For some nutrients there was very little variation in nutrient intake with the exception of Vitamin A, Vitamin C, Calcium, and folate. Similarly for nutrient density there was also little variation present among nutrients with the exception of Vitamin A, Vitamin C, Calcium, and folate.

**Table 26. Three-day Mean Nutrient Intake (n=146)**

Nutrient	3-day Mean Intake (SD)
Protein (gms/d)	44.29 (10.61)
Energy (kcal/d)	1328.08 (254.15)
Calcium (mg/d)	728.38 (231.44)
Iron (mg/d)	8.00 (2.31)
Vitamin A (RE/d)	655.44 (367.50)
Vitamin C (mg/d)	136.60 (62.55)
Thiamin (mg/d)	0.90 (0.29)
Riboflavin (mg/d)	1.19 (0.34)
Niacin (NE/d)	16.70 (4.35)
Folate ( $\mu$ g/d)	118.82 (43.28)

**Table 27. Three-day Mean Nutrient Density (n=146)**

Nutrient	3-day Mean Nutrient Density (SD)
Protein (gms/1000 cal)	33.43 (5.67)
Fat (gms/1000 cal)	33.36 (5.25)
Carbohydrate (gms/1000 cal)	146.80 (14.31)
Calcium (mg/1000 cal)	551.31 (53.05)
Iron (mg/1000 cal)	6.04 (1.19)
Vitamin A (RE/1000 cal)	496.28 (272.87)
Vitamin C (mg/1000 cal)	105.05 (45.67)
Thiamin (mg/1000 cal)	0.68 (0.17)
Riboflavin (mg/1000 cal)	0.90 (0.21)
Niacin (NE/1000 cal)	12.60 (2.38)
Folate ( $\mu$ g/1000 cal)	90.18 (29.74)

#### **4.1.4.2 Prevalence of Nutrient Inadequacy**

Table 28 shows the prevalence of nutrient intake of preschoolers based on the DRI: EAR. The EAR cut-point method was used to determine the prevalence of nutrient inadequacy among the preschoolers. The prevalence of nutrient inadequacy was low for five of six nutrients. With the exception of folate, nutrient intake for preschoolers in this study was above the EAR. For folate the prevalence of inadequacy was 58%; that is, for 58% of the preschoolers, folate intake was below the EAR reference of 120  $\mu\text{g}$  per day (Table 28).

#### **4.1.4.3 Percentage of nutrient intake from meals and snacks**

Table 29 shows the nutrient intake means for all meals and all snacks as a percentage of the total nutrients that were eaten. More than 60% of each nutrient came from the main meals. Meals provided more than 70% protein, vitamin A, thiamine, riboflavin, niacin and energy. Snacks provided less than 30% of calcium, iron, vitamin C, and folate (Table 29).

**Table 28. Prevalence of nutrient intake above and below Estimated Average Requirement (EAR) (n=146)**

Nutrient	DRI - EAR	Prevalence of nutrient inadequacy	
		Percent intake	Percent intake
		below EAR	above EAR
Vitamin A (RE)	210	4.8	95.2
Vitamin C (mg)	13	0.0	100.0
Thiamin (mg)	0.4	1.4	98.6
Riboflavin (mg)	0.4	0.0	100.0
Niacin (mg)	5.0	0.0	100.0
Folate ( $\mu$ g)	120.0	58.2	41.8

**Table 29. Percentage of the mean three-day nutrient intake from meals and snacks (n=146)**

	Meals		Snacks	
	Mean Intake	Percent	Mean Intake	Percent
Protein (gms)	33.35	75	10.94	25
Energy (kcal)	924.85	70	403.22	30
Calcium (mg)	501.70	69	226.67	31
Iron (mg)	5.55	69	2.45	31
Vitamin A (RE)	494.89	76	160.54	24
Vitamin C (mg)	82.96	61	55.64	39
Thiamin (mg)	0.64	71	0.26	29
Riboflavin (mg)	0.84	71	0.36	29
Niacin (mg)	12.50	75	4.20	25
Folate ( $\mu$ g)	82.54	69	36.27	32

Tables 30 and 31 show the nutrient intake as a percentage of the total days intake from the various meals and snacks. More than 25% of protein, total energy, calcium, vitamin A, riboflavin, niacin and folate were consumed at dinner. For calcium, vitamin A, vitamin C, thiamine, and folate, more than 25% of the intake was consumed with lunch (Table 30). Amongst the snacks more than 10% of the nutrients was consumed with the morning snack with the exception of protein and vitamin A. Less than 10% of the nutrients consumed were with the evening snack (Table 31).

Table 32 shows the average energy intake for protein, fat and carbohydrate for the all meals and snacks. Carbohydrates contributed 55% of the energy from all meals, while snacks provided 63% of energy. Amongst the meals and snacks, carbohydrates provided 58% of energy, while fat provided 29% and protein provided 13%.

The Mean Nutrient Adequacy Ratio was 0.95 ( $\pm$  0.04). The highest score was 1.00 while the lowest score was 0.83.

**Table 30. Percentage of the mean three-day nutrient intake from all meals (n=146)**

	Breakfast		Lunch		Dinner	
	Mean Intake	Percent	Mean Intake	Percent	Mean Intake	Percent
Protein (gms)	5.30	12	12.45	28	15.60	35
Energy (kcal)	177.98	13	360.01	27	386.98	29
Calcium (mg)	116.44	16	193.34	27	191.92	26
Iron (mg)	1.83	23	1.83	23	1.89	24
Vitamin A (RE)	60.97	9	236.63	36	197.28	30
Vitamin C (mg)	23.67	17	31.64	23	27.64	20
Thiamin (mg)	0.20	22	0.22	24	0.22	24
Riboflavin (mg)	0.17	14	0.31	26	0.35	29
Niacin (NE)	2.10	13	4.51	27	5.88	35
Folate ( $\mu$ g)	22.10	19	31.24	26	29.20	25

**Table 31. Percentage of the mean three-day nutrient intake from various snacks (n=146)**

	Morning Snack		Afternoon Snack		Evening Snack	
	Mean Intake	Percent	Mean Intake	Percent	Mean Intake	Percent
Protein (gms)	4.05	9	4.37	10	2.51	6
Energy (kcal)	140.32	11	178.20	13	84.70	6
Calcium (mg)	85.36	12	84.13	12	57.18	8
Iron (mg)	1.09	14	0.91	11	0.45	6
Vitamin A (RE)	51.45	8	70.99	11	36.10	6
Vitamin C (mg)	18.35	14	24.91	18	12.19	9
Thiamin (mg)	0.11	12	0.10	11	0.05	6
Riboflavin (mg)	0.13	11	0.14	12	0.09	8
Niacin (NE)	1.61	10	1.67	10	0.93	6
Folate ( $\mu$ g)	14.81	12	14.78	12	6.68	6

**Table 32. Percentage energy and mean energy intake ( $\pm$ standard deviation) from protein, fat and carbohydrate in meals and snacks (n=146)**

	Meals		Snacks		Total	
	3-day Intake (SD)	Percent (SD)	3-day Intake (SD)	Percent (SD)	Mean Intake (SD)	Percent (SD)
Protein (kcal)	133.40 (2.47)	14.2 (2.6)	43.75 (25.56)	10.2 (4.1)	177.25 (42.43)	13.1 (2.2)
Fat (kcal)	291.34 (97.55)	30.6 (5.7)	108.71 (61.33)	25.7 (8.0)	400.04 (102.93)	29.4 (4.7)
Carbohydrate (kcal)	516.98 (140.13)	55.2 (6.7)	261.98 (110.44)	63.9 (10.4)	778.87 (165.99)	57.5 (5.5)

#### **4.1.5 Diet Diversity**

Two hundred and eighty seven different foods were consumed by the preschoolers in this study (Appendix D), of which 61 different foods were eaten by more than 20% of the sample. Table 33 shows a list of the foods eaten at least once during the three-day period by 20% or more of the preschoolers. The mean diet diversity score was recorded at 16 different foods per day for the preschoolers in this study.

**Table 33. Foods eaten by at least 20% of preschoolers**

Food Group	≥75%	≥50%	≥25%	≥20%
<b>Grain Products</b>	White bread	Whole grain breads Plain pasta Saltine crackers	White rolls/buns Plain unsweetened cereal Plain sweetened cereal Whole grain sweetened cereal Whole grain veg. crackers	Plain pancakes
<b>Vegetables and Fruit</b>				
Vegetables		Carrots	Broccoli Corn, frozen/canned Green Peas, canned/frozen Potatoes, boiled/baked Potatoes, fried	Lettuce Potatoes, mashed
Fruit		Apples Bananas Apple Juice, sweetened	Grapes Oranges, fresh Raisins, dried Orange juice, sweetened	Tomatoes, fresh Strawberries, fresh Fruit salad/ cocktail, canned Unsweetened apple juice

Food Group	≥75%	≥50%	≥25%	≥20%
<b>Milk and Milk Products</b>	2% Milk		Milk, homo Milk, 1% Cheddar cheese Mozzarella cheese Proc'd cheddar cheese slices Cheese spreads/ whiz Yogurt with added fruit	
<b>Meat and Alternates</b>	Weiners/ bologna/ Ham (steamed)	Peanut Butter	Ham, baked	Lean ground beef/ hamburger patties Chicken without skin, Baked/boiled
<b>Other Foods</b>		Cookies without grain or fruit Flavoured margarine Tomato based sauce	Carbonated beverages Jams/ Jellies Butter Ketchup Mayonnaise type dressing Pancake/ waffle syrup Ice cream Sugar based candy Cheese based sauce	Milk puddings Cookies with grain or fruit Sugar Chocolate bars/ eggs Fruit leathers

### **4.3 Bivariate Analysis**

#### **4.3.1 Re-categorizing variables**

Before proceeding with the bivariate analysis, the univariate results for the analytical variables to be used in the analysis were reviewed with the help of a statistician (Dennis Murphy, PhD). Since the mean and median for the variables were similar to each other (see univariate results), the mean was selected as the cut point to be used in bivariate and multivariate analysis. The number of levels within the categorical variables was reduced based on the distribution of subjects for these variables. The number of subjects representing the different levels of each categorical variable were not sufficient to carry out further analysis on these variables, hence the number of levels within each variable were reduced. The following tables (Tables 34-40) list the recoded categorical variables.

Work Setting Variables

**Table 34. Mothers' work setting variables (n=146)**

	N
<hr/>	
Mothers' work schedule	
Standard work schedule	108
Nonstandard work schedule	38
Mothers' ability to change hours worked permanently	
Not at all hard/Not too hard	50
Somewhat hard/Very hard	96
Mothers' ability to change days worked permanently	
Not at all hard/Not too hard	41
Somewhat hard/Very hard	105
Mothers' ability to take time off during her workday to attend to family/personal matters	
Not at all hard/Not too hard	99
Somewhat hard/Very hard	47
Mothers' work schedule flexibility	
Flexible work schedule	49
Inflexible work schedule	97
<hr/>	

**Table 35. Fathers' work setting variables (n=146)**

	N
Fathers' work schedule	
Standard work schedule	86
Nonstandard work schedule	60
Fathers' ability to change hours worked permanently	
Not at all hard/Not too hard	27
Somewhat hard/Very hard	119
Fathers' ability to change days worked permanently	
Not at all hard/Not too hard	15
Somewhat hard/Very hard	131
Fathers' ability to take time off during his workday to attend to family/personal matters	
Not at all hard/Not too hard	78
Somewhat hard/Very hard	68
Fathers' work schedule flexibility	
Flexible work schedule	21
Inflexible work schedule	125

**Table 36. Family-work setting variables (n=146)**

Family work schedule	N
Mother and father have standard work schedules	70
Mother and father have either standard or nonstandard work schedules	54
Mother and father have nonstandard work schedules	22

**Childcare setting variables**

**Table 37. Licensing of Childcare arrangement (n=146)**

Licensing of childcare arrangement	N
Licensed childcare arrangement	54
Unlicensed childcare arrangement	92

**Family setting variables**

**Table 38. Mothers' education (n=146)**

Level of Education	N
Completed high school or less	26
Completed post secondary education or some post secondary education (non-university)	59
Completed university education or some university education	61

**Table 39. Fathers' education (n=146)**

Level of Education	N
Completed high school or less	45
Completed post secondary education or some post secondary education (non-university)	26
Completed university education or some university education	75

**Table 40. Family Income (Categorical distribution) (n=146)**

Level of Income	N
Less than 40,000.00	23
\$ 40,000.00 to \$60,000.00	51
Over \$ 60,000.00	72

### 4.3.2 Work Schedule Flexibility

Work schedule flexibility was defined as the summation of responses from the following three questions: 1) ability of parents to permanently change hours worked, 2) ability of parents to permanently change days worked and 3) the ability of parents to get time off from work to attend to personal/family matters during the workday. The responses from the three questions were averaged to determine the work schedule flexibility score. A significant relationship was hypothesized among the questions that made up the work schedule flexibility scale with overall work schedule flexibility score.

Table 41 and 42 show the correlation results for the mothers' and the family work schedule flexibility scores. Each of the responses to the questions in the mothers' and family work schedule flexibility scale were significantly correlated with each other and with the overall flexibility score at a significance level of  $p < 0.001$ . The strongest relationship was seen between two scale items; 1) the ability to change hours worked permanently and 2) the ability to change days worked permanently (Table 41 and Table 42). All three questions had the strongest relationship with overall flexibility score. Since each question was significantly related to the overall flexibility score, the overall flexibility score was used in further analysis.

Staines and Pleck (1983) also found a high correlation among the work schedule flexibility items. Similar to the results in the present study, the three items making up work schedule flexibility were found to be highly correlated with the overall work schedule flexibility score. The relationship between the ability to change hours worked and days worked permanently was also similar to findings by Staines and Pleck (1983).

**Table 41. Spearman's correlation results for mothers' work schedule flexibility score (n=146)**

Variables	1	2	3	4
1. MCH	-	0.53****	0.42****	0.76****
2. MCD	-	-	0.44****	0.78****
3. MGT	-	-	-	0.75****
4. MFLEX	-	-	-	-

*Note.* 1. MCH - Mothers' ability to permanently change hours worked; 2. MCD - Mothers' ability to permanently change days worked; 3. MGT - Mothers' ability to get time off from work to attend to personal/family matters; 4. MFLEX - Mothers' work schedule flexibility-total score

\*\*\*\* p < 0.001

**Table 42. Spearman's correlation results for Family work schedule flexibility (n=146)**

Variables	1	2	3	4
1. FCH	-	0.52****	0.34****	0.71****
2. FCD	-	-	0.37****	0.65****
3. FGT	-	-	-	0.67****
4. FFLEX	-	-	-	-

*Note.* 1. FCH - Family's ability to permanently change hours worked; 2. FCD - Family's ability to permanently change days worked; 3. FGT - Family's ability to get time off from work to attend to personal/family matters; 4. FFLEX - Family's work schedule flexibility-total score

\*\*\*\* p < 0.001

### **4.3.3 Bivariate Results**

The following is a summary of the significant results following the bivariate analysis of independent and dependent variables. The results were considered significant at the probability level of  $p < 0.05$ . Results at a  $p < 0.10$  were considered a trend.

#### **5.3.3.1 Relationships among the independent variables**

Tables 43 and 44 summarize the significant and non-significant relationships among mothers' and family work, childcare and family setting variables. Mothers' work setting variables (mothers' work time, mothers' work schedule and mothers' work schedule flexibility) were not significantly related to licensing of the childcare arrangement and mothers' education. Family work setting variables (family work time, family work schedule and family work schedule flexibility) were not significantly related to licensing of childcare arrangement, mothers' education and family income. The following results indicate the significant relationships found among the independent variables.

#### **Relationships among mothers' work variables**

Mothers' work time was significantly related to mothers' work schedule flexibility ( $\chi^2 = 5.01$ ;  $p < 0.05$ ). Fifty-three percent (53%) of mothers who worked less than 35 hours per week had low work schedule flexibility compared with 72% of mothers who worked more than 35 hours per week. Mothers' work time was significantly related to mothers' work schedule ( $\chi^2 = 3.07$ ;  $p < 0.1$ ). Sixty-four percent (64%) of mothers who

worked less than 35 hours per week, had standard work schedules, compared with 78% of mothers who had standard work schedules.

Mothers' work schedule was significantly related to mothers' work schedule flexibility ( $\chi^2 = 2.88$ ;  $p < 0.1$ ). Seventy percent (70%) of mothers who had standard work schedules also had low work schedule flexibility, compared with 55% of mothers who work non-standard work schedules.

### **Relationships among mothers' work and family variables**

Mothers' work time was significantly related to family income ( $\chi^2 = 3.46$ ;  $p < 0.1$ ). Sixty-two percent (62%) of the mothers who worked more than 35 hours per week reported having a family income less than \$60,000 per year, while 46% of mothers who worked more than 35 hours reported a family income above \$60,000. Thirty-eight percent (38%) of mothers who worked less than 35 hours per week reported a family income above \$60,000, compared with 54% who worked more than 35 hours per week.

**Table 43. Significant relationships between mothers' work setting, childcare setting and family setting (n=146)**

Variables	1	2	3	4	5	6
1. MWT	-	S*	S**			S*
2. MSC		-	S*			
3. MFLEX			-			
4. CC				-		
5. ME					-	S***
6. FI						-

*Note:* S means a significant relationship exists between the two variables.

1. MWT – Mothers' work time; 2. MSC - Mother's work schedule; 3. MFLEX – Mothers' work schedule flexibility-total score; 4. CC - Licensing of childcare; 5. ME – Mothers' education; 6. FI - Family income

\*p < 0.10 \*\*p < 0.05 \*\*\*p < 0.01

### **Relationships among family-work variables**

Family work time was significantly related to family work schedule ( $\chi^2 = 7.89$ ;  $p < 0.05$ ). Sixty-one percent (61%) of families that worked less than 80 hours per week had family work schedules where both mothers and fathers worked standard work schedules, compared with 39% of families that worked more than 80 hours per week. Twenty-five percent (25%) of families who worked less than 80 hours per week had family work schedules where either mothers or fathers worked standard work schedules. This is compared with 46% of families who worked more than 80 hours per week. Fifteen percent (15%) of families that worked more than 80 hours per week had family work schedules where both mothers and fathers worked non-standard work schedules, compared with fifteen percent (15%) who worked more than 80 hours per week.

Family work schedule was also significantly related to family work schedule flexibility ( $\chi^2 = 9.08$ ;  $p < 0.05$ ). Seventy percent (70%) of the families where both mother and father worked standard work schedules, family work schedule flexibility was considered low, compared with 76% of families where either mothers or fathers work standard work schedules also compared with 41% of families where both mothers and fathers work non-standard work schedules. Thirty percent (30%) of families where both mothers and fathers worked standard work schedules had high work schedule flexibility compared, with 24% of families where either mothers or fathers worked standard work schedules. Fifty nine percent (59%) of families where both mothers and fathers work non-standard work schedules reported having high work schedule flexibility.

### **Relationships among family-work and family variables**

Family work time was significantly related to family income ( $\chi^2 = 4.17$ ;  $p < 0.10$ ). Sixty-one percent (61%) of the families that worked less than 80 hours per week had family income less than \$60,000 per year, while 44% of the families worked more than 80 hours per week.

### **Relationship among family variables**

Mothers' education was significantly related to family income ( $\chi^2 = 12.80$ ;  $p < 0.01$ ). Sixty-six percent (66%) of mothers who had some university education, completed university education or had post graduate training reported a family income above \$60,000 per year, compared with 27% of mothers who had some high school or completed high school education. Forty-two percent (42%) of mothers who had some post secondary or completed post secondary education also reported having a family income above \$60,000.

**Table 44. Significant relationships between family work setting, childcare setting and family setting variables (n=146)**

Variables	1	2	3	4	5	6
1. FWT	-	S**				S*
2. FSC		-	S**			
3. FFLEX			-			
4. CC				-		
5. ME					-	S***
6. FI						-

Note: S means a significant relationship exists between the two variables

1. FWT - Family work time; 2. FSC - Family's work schedule; 3. FFLEX - Family's work schedule flexibility; 4. CC - Licensing of childcare 5. ME – Mothers' education; 6. FI - Family income

\*p < 0.10 \*\*p < 0.05 \*\*\*p < 0.01

#### **4.3.3.2 Relationship among dependent variables**

The diet diversity score and the mean adequacy ratio were significantly correlated ( $r = 0.31$ ;  $p < 0.001$ ). This relationship was expected.

#### **4.3.3.3 Diet Quality**

##### **Research Question No.1**

**How do mothers' work, childcare and family settings individually affect the diet quality of the diet of preschoolers in dual-earner families?**

Table 45 summarizes the significant and non-significant relationships between mothers' work, childcare and family variables and diet quality. Two significant relationships were found between mothers' work time, mothers' education and mean adequacy ratio, which measured diet quality. A significant inverse relationship was found between mothers' work time and the diet quality ( $r = - 0.2$ ;  $p < 0.05$ ).

There was also a significant relationship between mothers' education and diet quality ( $\chi^2 = 6.78$ ;  $p < 0.05$ ). Fifty-seven percent (57%) of mothers who had some/ completed university education had preschoolers with a mean adequacy ratio score above 0.95, compared with 34% of mothers who had some/ completed postsecondary education. Forty-two percent (42%) of mothers who had some/ completed high school had preschoolers with a mean adequacy ratio score above 0.95.

No significant relationships found between mothers' work schedule and work schedule flexibility and mean adequacy ratio score. There also were no significant

relationships were found between licensing of the childcare arrangement, family income and diet quality.

## **Research Question No. 2**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility scores) exert an effect on the diet quality of the preschoolers in dual-earner families?**

Table 45 shows the significant and non-significant relationships between family work setting variables and diet quality. Significant relationships were found between family work time, family work schedule and diet quality. No significant relationships were found between family work schedule flexibility and diet quality.

A significant inverse relationship was found between family work time and diet quality (measured using the mean adequacy ratio) ( $r = -0.2$ ;  $p < 0.05$ ). This suggests that as family work time increased the mean adequacy ratio of preschoolers decreased.

Family work schedule was significantly related to mean adequacy ratio ( $\chi^2 = 7.92$ ;  $p < 0.05$ ). In 54% of families where both mothers and fathers worked standard work schedules the preschoolers had a mean adequacy ratio score above 0.95, compared with 31% of families where either mothers or fathers worked a standard work schedule.

**Table 45. Significant relationships between mothers' work and family-work settings, childcare setting, and family setting variables and diet quality**

	Diet Quality (n=146)
1. Mothers' Work Time	S**
2. Mothers' Work Schedule	
3. Mothers' Work Schedule Flexibility	S*
4. Licensing of childcare arrangement	
5. Mothers' Education	S**
6. Family Income	
7 Family Work Time	S**
8 Family Work Schedule	S**
9. Family Work Schedule Flexibility	

Note: S means a significant relationship exists between the two variables

\*p < 0.10 \*\*p < 0.05

#### **4.3.3.4 Diet Diversity**

##### **Research Question 1**

**How do mothers' work, childcare and family settings individually affect the diet diversity of the diet of preschoolers in dual-earner families?**

Table 46 summarizes the significant and non-significant relationships between mothers' work, childcare and family setting variables and diet diversity. There were no significant relationships found between mothers' work time, mothers' work schedule and diet diversity. There also were no significant relationships between licensing of the childcare facility, family income, and mothers' education and diet diversity.

Mothers' work schedule flexibility was related to diet diversity ( $\chi^2 = 2.94$ ;  $p < 0.10$ ). Sixty-nine percent (69%) of mothers who had high work schedule flexibility also had preschoolers with a diet diversity score less than 16.2, compared with 55% of the mothers who had low work schedule flexibility.

##### **Research Question 2**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility scores) exert an effect on the diet diversity of the preschoolers in dual-earner families?**

Table 46 summarizes the significant relationships found between family work setting variables and diet diversity. No significant relationships were found between family work time, family work schedule flexibility and diet diversity.

Family work schedule was significantly related to the preschoolers' diet diversity ( $\chi^2 = 5.43$ ;  $p < 0.10$ ). Seventy percent (70%) of the families where either mothers or fathers had standard work schedules, the diet diversity score for preschoolers was less than 16.2, compared with 64% of families where both mothers and fathers had nonstandard work schedules. For fifty percent of families characterized by both mothers and fathers working standard work schedules, preschoolers had a diet diversity score less than 16.2. Thirty percent (30%) of families characterized by either mothers or fathers working standard work schedules had preschoolers with a diet diversity score above 16.2, compared with 36% of families where both parents worked standard work schedules.

**Table 46. Significant relationships between mothers' and family-work settings, childcare setting, and family setting variables and diet diversity**

	Diet Diversity (n=114)
1. Mothers' Work Time	
2. Mothers' Work Schedule	
3. Mothers' Work Schedule Flexibility	S*
4. Licensing of childcare arrangement	
5. Mothers' Education	
6. Family Income	
1. Family Work Time	
2. Family Work Schedule	S*
3. Family Work Schedule Flexibility	

Note: S means a significant relationship exists between the two variables

\*p < 0.10

#### **4.4 Multivariate Analysis**

Prior to beginning the multivariate analysis, the univariate and bivariate results were reviewed to determine whether the assumptions for analysis of variance were being met. Scatter plots of the diet quality and diet diversity measured were analyzed to determine whether they met the assumptions for analysis of variance. The number of levels in each categorical variable was also analyzed to ensure that all such variables contained similar number of levels. Residual analysis was also done on the residuals from the ANOVA models to ensure that there were no departures from the assumptions (see chapter 4 section 3) for using this model. This analysis included analyzing scatter plots and histograms of the residuals

##### **5.4.1 Testing the assumptions**

Assumption 1. The dependent variables are continuous and follow a Normal distribution.

Scatter plots of the diet quality and diet diversity measures were used to determine whether 95% of the data fell within 2 standard deviations of the mean. The scatter plots for diet quality, measured using a mean adequacy ration score indicated that this variable was skewed to the left. This meant that most of the subjects scored on the higher end of the ratio scale. The scatter plot of the diet diversity score indicated that the responses for this variable were normally distributed around the mean, and 95% of the data fell within 2 standard deviations of the mean.

Assumption 2. The independent variables each have as similar categories/groups as much as possible.

The categorical variables were recoded to ensure that there were either two or three levels in each variable. This ensured that independent categorical variables had similar number of levels.

#### **4.4.1.1 Residual analysis**

##### Diet quality

The residuals from the diet quality ANOVA models were plotted in a histogram, which also indicated that the mean adequacy ratio was skewed to the right. This indicated that the responses for mean adequacy ratio were not normally distributed. It must be noted that the mean adequacy ratio is a bounded variable, which meant that it is comprised of several different factors (i.e. six different nutrient responses). Since it is a bound variable, transformation of the responses to reduce the skewness was not possible. As a result nonparametric F tests also could not be applied to this data. The following are results for the ANOVA models used with the mean adequacy ratio. As stated in a previous chapter (chapter 3, section 3), the skewed data does not significantly affect the results of the F test that was used in analysis of variance methods (Neter, et al, 1990).

##### Diet Diversity

The residuals for the diet diversity score were plotted in scatter plots. The results indicated that the residuals were normally distributed around the mean. No adjustments were necessary for this variable.

#### **4.4.2 Diet Quality**

##### **Research Question 3:**

**What is the relative influence of the family, childcare, and work settings on the quality of the diet of preschool children in dual-earner families in terms of a) mothers' work setting and b) family-work setting?**

Hypothesis:

1. When the work setting is characterized by long work hours and childcare is unlicensed and family incomes are lower, the child's diet will be of lower diversity and quality.
2. This negative effect is expected to increase when, in addition to working long work hours, the work schedule is nonstandard and there is little flexibility in the work schedule.

##### **4.4.2.1 Relative influence of mothers' work, childcare and family setting variables on diet quality**

The main effects of mothers' work, childcare and family variables were not significantly related to mean adequacy ratio ( $F = 0.91$ ;  $p = 0.5$ ;  $r^2 = 0.03$ ). Mothers' work time significantly accounted for 61% of variation seen in mean adequacy ratio ( $F=2.76$ ;  $p < 0.10$ ) (Table 47).

The main effects when analyzed along with hypothesized interaction effects of mothers' work, childcare and family variables were also not significantly related to mean adequacy ratio ( $F=0.81$ ;  $p=0.6$ ;  $r^2 = 0.05$ ). Mothers' work time significantly accounted for 47% of variation seen in the mean adequacy ratio at  $p < 0.1$  (Table 48).

**Table 47. Analysis of Variance Results for main effect of mothers' work, childcare and family variables and diet quality**

Source	df	F Value	Prob
Mothers' work time	1	2.76*	0.1
Mothers' work schedule	1	2.06	0.2
Mothers' work schedule flexibility	1	0.19	0.7
Licensing of childcare	1	0.03	0.9
Family Income	1	0.12	0.7
Error	140	(0.002)	

Note. Values in parentheses represent the mean square errors

\*p < 0.10

**Table 48. Analysis of Variance Results for main and interaction effects of mothers' work, childcare and family variables and diet quality**

Source	df	F Value	Prob
Mothers' work time	1	3.05*	0.1
Mothers' work schedule	1	2.07	0.2
Mothers' work schedule flexibility	1	0.36	0.5
Licensing of childcare	1	0.08	0.8
Family Income	1	0.07	0.8
Mothers' work time * Mothers' work schedule	1	0.01	0.9
Mothers' work time * Mothers' work schedule flexibility	2	0.96	0.4
Error	137	(0.002)	

Note. Values in parentheses represent the mean square errors

\*p < 0.10

#### **5.4.2.2 Relative influence of family-work, childcare and family setting variables and diet quality**

The main effects of family-work, childcare and family variables were not significantly related to mean adequacy ratio ( $F = 0.9$ ;  $p = 0.5$ ;  $r^2 = 0.04$ ). The main and interaction effects of family-work, childcare and family variables were also not significantly related to mean adequacy ratio ( $F=1.16$ ;  $p=0.3$ ;  $r^2 = 0.07$ ). Tables 49 and 50 summaries the results from the analysis of variance for these models.

Further analysis of the interaction effect of family work hours and family flexibility suggests that families who worked less than 80 hours per week and had low work schedule flexibility, had preschoolers with lower diet quality compared to families who also worked less than 80 hours per week but had higher work schedule flexibility. In this study, families who worked more than 80 hours per week and had low work schedule flexibility, had preschoolers with higher diet quality compared to families who worked more than 80 hours per week but had high work schedule flexibility.

**Table 49. Analysis of Variance for main effect of family-work, childcare and family variables on diet quality**

Source	df	F Value	Prob
Family work time	1	1.05	0.3
Family work schedule	2	1.20	0.3
Family work schedule flexibility	1	0.62	0.4
Licensing of childcare	1	0.03	0.9
Family Income	1	0.00	0.9
Error	139	(0.002)	

Note. Values in parentheses represent the mean square errors

**Table 50. Analysis of Variance for main and interaction effects of family-work, childcare and family variables on diet quality**

Source	DF	F Value	Prob
Family work time	1	0.13	0.7
Family work schedule	2	1.23	0.3
Family work schedule flexibility	1	0.48	0.5
Licensing of childcare	1	0.00	0.9
Family Income	1	0.04	0.9
Family work time * Family work schedule	2	0.08	0.9
Family work time * Family work schedule flexibility	2	4.79**	0.03
Error	136	(0.002)	

Note. Values in parentheses represent the mean square errors

\*\*p < 0.05

### **4.4.3 Diet Diversity**

#### **4.4.3.1 Relative influence of mothers' work, childcare and family setting variables on diet diversity**

The main effects of mothers' work, childcare and family variables were significantly related to diet diversity score ( $F = 2.00$ ;  $p < 0.1$ ;  $r^2 = 0.08$ ). Family income accounted for 65% of the variation seen in the diet diversity score ( $f = 6.49$ ,  $p < 0.01$ ) followed by mothers' work time ( $F = 2.56$ ;  $p < 0.1$ ), which accounted for 26% of the variation. The main and interaction effects of mothers' work, childcare and family variables analyzed were not significantly related to diet diversity ( $F=1.42$ ;  $p<0.2$ ;  $r^2 = 0.1$ ). In both models family income accounted the most variation seen in the diet diversity score. Tables 51 and 52 summaries the results from the analysis of variance for these models.

**Table 51. Analysis of Variance for main effect of mothers' work, childcare and family variables on diet diversity**

Source	df	F Value	Prob
Mothers' work time	1	1.28*	0.1
Mothers' work schedule	1	1.02	0.3
Mothers' work schedule flexibility	1	1.09	0.4
Licensing of childcare	1	0.11	0.7
Family Income	1	6.49***	0.01
Error	108	(7.77)	

Note. Values in parentheses represent the mean square errors

\*\*\*p < 0.01

**Table 52. Analysis of Variance for main and interaction effects of mothers' work, childcare and family variables on diet diversity**

Source	df	F Value	Prob
Mothers' work time	1	0.01	0.9
Mothers' work schedule	1	1.20	0.3
Mothers' work schedule flexibility	1	0.27	0.6
Licensing of childcare	1	0.09	0.8
Family Income	1	6.09**	0.02
Mothers' work hours * Mothers' work schedule	1	1.49	0.2
Mothers' work hours * Mothers' work schedule flexibility	2	0.06	0.9
Error	105	(7.77)	

Note. Values in parentheses represent the mean square errors

\*\*p < 0.05

#### **4.4.3.2 Relative influence of family-work, childcare and family setting variables on diet diversity**

The main effects of family-work, childcare and family variables were not significantly related to diet diversity score ( $F = 1.36$ ;  $p < 0.2$ ;  $r^2 = 0.07$ ). The main and interaction effects of family-work, childcare and family variables were also not significantly related to diet diversity ( $F=1.26$ ;  $p < 0.3$ ;  $r^2 = 0.10$ ). Tables 53 and 54 summaries the results from the analysis of variance for these models.

**Table 53. Analysis of Variance for main effect of family-work, childcare and family variables on diet diversity**

Source	Df	F Value	Prob
Family work hours	1	0.35	0.6
Family work schedule	2	0.49	0.6
Family work schedule flexibility	1	0.16	0.7
Licensing of childcare	1	0.32	0.6
Family Income	1	4.96**	0.03
Error	107	(7.85)	

Note. Values in parentheses represent the mean square errors

\*\*  $p < 0.05$

**Table 54. Analysis of Variance for main and interaction effects of family-work, childcare and family variables on diet diversity**

Source	DF	F Value	Prob
Family work hours	1	0.18	0.7
Family work schedule	2	0.53	0.6
Family work schedule flexibility	1	0.02	0.9
Licensing of childcare	1	0.28	0.5
Family Income	1	4.81**	0.03
Family work hours * Family work schedule	2	0.2	0.8
Family work hours * Family work schedule flexibility	2	0.11	0.9
Error	103	(8.10)	

Note. Values in parentheses represent the mean square errors

\*\*p < 0.05

## **5.0 Discussion**

In this section the results from the present study are compared with results from similar research. The univariate section will describe the characteristics of preschoolers in this study.

### **5.1 Discussion of Univariate Analysis**

#### **5.1.1 Work Setting**

The average number of hours worked by mothers and fathers in this study was 35 and 45 hours, respectively per week. Human Resources Development Canada (1994) reported that 48% of working parents worked an average of 40-49 hours per week in 1993. In the present study fathers worked more hours than did mothers, supporting results from the 1993 Labor Force Survey conducted by Statistics Canada (Statistics Canada, 1999) where mothers worked an average of 35 hours per week, while fathers worked an average of 44.5 hours per week. In the present study more fathers than mothers had non-standard work schedules supporting the findings of Staines and Pleck (1983). Staines and Pleck (1983) reported that more fathers tended to work on weekdays and one weekend day than mothers. Human Resources Development Canada (1994) reported that in Canada, 42% of dual earner families have one or the other and sometimes both spouses working a non-standard work schedule. In the present research 52% of the families had either or both spouses working non-standard work schedules. Human Resource Development Canada (1994) also reported that 16% of the adult workers have flextime work schedules. In the present study 58% of the families reported having

inflexible work schedules. This may indicate that although flextime is available to some parents, time when parents need to be away from work is inflexible.

### **5.1.2 Childcare Setting**

In terms of childcare arrangements, 63% of families used unlicensed childcare facilities in the present study. These results do not support those reported in the study conducted by Campbell and Sanjur (1992) where 55% of the preschoolers attended licensed childcare facilities. Results from the 1990 General Survey conducted by Statistics Canada indicate that approximately forty-five percent (45%) of all children in Canada attended licensed childcare facilities.

### **5.1.3 Family Setting**

The present study looked at 146 preschoolers aged 24-36 months in dual-earner families. In each family both parents worked at least 15 hours per week outside of the home. The average family income of \$60,000 per year in this study was similar to the average income reported by Statistics Canada (1999) for dual earner families, which was \$56,000. All the families in this study fell within the 25-44 age group of the Canadian population. This age group (25-44 years) accounted for forty-two percent (42%) of the Canadian population for 1993 (Statistics Canada, 1999).

## **5.2 Discussion of Bivariate Analysis**

### **5.2.1 Diet Quality**

#### **5.2.1.1 Research question 1a**

##### **How do mothers' work, childcare and family settings individually affect the diet quality of the preschoolers in dual-earner families?**

The inverse relationship between mothers' work hours and diet quality, which was measured using a mean adequacy ratio, was found as hypothesized. This correlation ( $r=-0.2$ ) suggested that as mothers' work hours increased the diet quality of preschoolers decreased. The significant relationship between mothers' education and diet quality was also hypothesized. Although mothers' work schedule, work schedule flexibility and childcare were not significantly related to diet quality as had been hypothesized; this may be as a result of other interactions between other variables that were not included in this research. Based on Bronfenbrenner's theory, the work, childcare and family settings are interacting with each other. In order to look at the interaction of these environments, multivariate analysis will be used. For instance, the interactions of these environments may be seen with relationships between variables in the childcare setting and variables in the work setting.

The significant relationship between mothers' education and diet quality suggested that as the level of education increased, so too did the diet quality of preschoolers. Research by Caliendo and Sanjur (1978) found a significant relationship between these two variables. The results suggested that the higher the level of education attained by mothers the better they may be able to understand the importance of the dietary needs of preschoolers.

Campbell and Sanjur (1992) also found an inverse relationship between licensing of childcare arrangement and diet quality. Details of this relationship were not provided. The relationship between licensing of the childcare and diet quality in the present study was not significant. More families (66%) used unlicensed childcare arrangements. Of this total sixty-two percent (62%) of preschoolers with a diet quality score less than 0.95 used unlicensed childcare arrangements, compared with sixty-four percent (64%) of preschoolers who had diet quality score above 0.95.

It must be noted that when using the mean adequacy ratio to assess diet quality, subjects who score below 1.00 are not necessarily at risk of having poor nutrient intake. Similarly, subjects with a mean adequacy ratio score above 1.00 do not indicate that they have an adequate nutrient intake. Preschoolers whose mean adequacy ratio score is above 1.00 have a higher probability of meeting their nutrient needs than preschoolers who have a ratio below 1.00.

#### **5.2.1.2 Research question 2a**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility scores) exert an effect on the diet quality of the preschoolers in dual-earner families?**

The significant relationship between family-work hours and diet quality was found as hypothesized. This relationship suggested that as family work hours increase the diet quality of preschoolers decrease. Previous research also supports this finding. It was suggested when mothers work an increased amount of hours at work outside the

home, there is less time available to attend to household activities (Ortiz, et al, 1987, Statistics Canada, 1997). Results from the 1998 General Social Survey indicate that mothers and fathers who are satisfied with their jobs feel less time stressed, even if they work long hours (Fast et al., 2001)

Family work schedule was significantly related to diet quality, a result that was not hypothesized. The results suggested that the diet quality of preschoolers in families characterized by both parents working nonstandard work schedules is higher than that of preschoolers whose families are characterized by both parents working standard work schedules. Results from the 1998 General Social Survey indicated that mothers and fathers feel less time crunched when they work “shift off” work schedules. The “shift off” work schedule is one that allows one parent to care for the child while the other parent works outside of the home (Frederick & Fast, 2001). Parents may be able to organize their time so that either parent can attend to household activities. It was also reported that fathers have begun to increase their time spent in household work, such as childcare (Fast et al., 2001). As well parents are increasing their time spent in activities with their children and less time on activities such as grocery shopping (Williams, 2002)

It must be noted that when using the mean adequacy ratio to assess overall diet quality of subjects, no conclusions can be drawn above the individuals’ adequacy of nutrient intake. Subjects whose mean adequacy ratio scores are below 1.00 are not necessarily at risk of having poor nutrient intake; similarly a subject whose mean adequacy ratio score is above 1.00 does not indicate that their nutrient intake is adequate. Preschoolers whose mean adequacy ratio is above 1.00 have a higher probability of meeting their nutrient needs than preschoolers who have a ratio below 1.00.

## **5.2.2 Diet Diversity**

### **5.2.2.1 Research question 1b**

#### **How do mothers' work, childcare and family settings individually affect the diet diversity of preschoolers in dual-earner families?**

A trend ( $p = 0.10$ ) was found between mothers' work schedule flexibility and diet diversity in the present study. Campbell and Sanjur (1992) also looked at the effects of work schedule flexibility on the diet diversity of preschoolers. This study found no significant relationships between mothers' work schedule flexibility and diet diversity. Campbell and Sanjur (1992) found a significant inverse relationship between mothers' work hours and diet diversity.

The trend between mothers' work schedule flexibility and diet diversity suggested that although mothers may have high work schedule flexibility, the diet diversity of the preschooler might not necessarily be high. In the present study preschoolers whose mothers had lower work schedule flexibility, also had high diet diversity score. This result contradicts our research hypothesis, which stated that higher work schedule flexibility might lead to increased diet diversity. The results also suggested that mothers, who have high work schedule flexibility, might use their flexibility in time to attend to other household activities such as cleaning. Results of the 1998 General Social Survey support this finding, where it was reported that mothers have decreased the amount of time spent grocery shopping. This may indicate that mothers are not purchasing a wide variety of foods.

The lack of significant relationships between mothers' work, childcare and family setting variables with diet diversity suggest that the effect of these variables may need to be considered in association with each other. Multivariate analysis considered the relative effect of these variables, to determine whether the combined effect of the variables affect the diet of preschoolers.

#### **5.2.2.2 Research question 2b**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility scores) exert an effect on the diet diversity of the preschoolers in dual-earner families?**

The significant relationship between family work schedule and diet diversity that we found supported hypothesis number 2. Mothers and fathers who both worked nonstandard work schedules had preschoolers with a lower diet diversity score than preschoolers who mothers and fathers worked nonstandard work schedules. These results also suggested that it might not be easy for families in which both parents work different work times and schedules to balance their time in order to provide more diverse meals to the preschooler.

Based on Bronfenbrenner's theory, the work, childcare and family setting interact with each other and together they have an effect on the developing child. In the bivariate analysis this research focused on the one to one relationship of variables in each setting and their effect on the diet quality and diversity of preschoolers. To fully explore the interaction of these environments, multivariate analysis considered the effects of the

variables as well as the interaction of these variables on the diet quality and diversity of preschoolers.

### **5.3 Discussion of Multivariate analysis**

#### **Research question 3**

**What is the relative influence of the family, childcare, and work setting variables on the quality and diversity of the diet of preschool children in dual-earner families?**

#### **5.3.1 Diet Quality**

##### **5.3.1.1 Relative effect of family, childcare and mothers' work setting variables on diet quality**

With the exception of mothers' work time, mothers' work, childcare and family variables were not significantly related to the diet quality of preschoolers in this study. These results disagree with findings from the Campbell and Sanjur (1992) research study. Campbell and Sanjur (1992) in their study of preschoolers in single parent families found that work schedule, work schedule control and licensing of the childcare arrangement affected diet quality. Work time was not found to significantly affect diet quality as it was in the present study. It may be that mothers in the current study worked more non-standard hours than mothers in the previous study. Variables such as satisfaction with childcare arrangement, and child's age were not included in this study, but they were found to have an independent effect on the diet of the child in the study by Campbell and Sanjur (1992). The sample size used for our study may not have been large enough to detect sources of variation in the diet quality of preschoolers.

### **5.3.1.2 Relative effect of family, childcare and family-work setting variables and diet quality**

The hypothesized main effects of the family-work, childcare and family setting variables on diet quality were not significantly related to the diet quality of preschoolers in this study. The lack of significance may be due to the fact that each family-work setting variable is a combination of mothers' and fathers' responses, which may confound the results. Considering the effect of variables for each individual parent may allow future research to better understand how the family-work setting may affect diet quality. This may reflect the how each parents' work setting affected the diet quality of preschoolers. The present study looked at the combined characteristics of mothers and fathers in order to determine whether the family setting as whole may have an effect on the diet of preschoolers.

The hypothesized main and interaction effects of family-work, childcare and family settings were not significantly related to the diet quality of preschoolers, with the exception of the interaction effect of family work time and family work schedule on diet quality. We hypothesized a significant relationship between family work time and family work schedule flexibility on diet quality. It was expected that families who worked less than 80 hours per week and had low work schedule flexibility would also have preschoolers with a lower diet quality than families that worked less than 80 hours per week but had high work schedule flexibility. It was interesting to find that the opposite occurred in families that worked more than 80 hours per week. This suggests that families who have less work schedule flexibility spent more time ensuring that the quality of the preschoolers' diet is high. These parents who have low work schedule flexibility

may have less time available to spend in household tasks such as meal preparation. This may also suggest that in families who work more than 80 hours per week, and the work schedule flexibility is high; more time may be spent in other household tasks other than meal preparation or family planning.

Little research has been done linking work setting of parents to diet. Research has been done linking work setting characteristics to other health outcomes such as increased stress and increased work-family conflict (Statistics Canada, 1999, Human Resource Development Canada, 1994). A closer look at how families use their time may be needed to fully understand this relationship to diet quality of preschoolers.

### **5.3.2 Diet Diversity**

#### **5.3.2.1 Relative effect of, family childcare and mothers' work setting variables on diet diversity**

The hypothesized effect of mothers' work, childcare and family setting variables were related to diet diversity of preschoolers. The main effect, mothers' work time, was significantly related to diet diversity, suggesting that a relationship exists between the time mothers spend at work and the diet diversity of the preschool child. Although the main effects of work schedule and work schedule flexibility were not significantly related to preschoolers' diet diversity score, it may be that other factors confounded the results of the present study. Family income was significantly related to diet diversity, suggesting that available financial resources may affect the food choices of mothers, which ultimately may affect the diet diversity of preschoolers.

When the hypothesized main and interaction effects were analyzed, only family income was significantly related to diet diversity. This result differs from the results of the Campbell and Sanjur (1992) study. Campbell and Sanjur (1992) found that work schedule control (also termed work schedule flexibility in the present study), licensing of childcare arrangement and income position had a significant effect on the diet diversity of preschoolers. Non-significant findings in the present study may be as a result of changes that occurred in the nature of the work setting, which could affect our results. The difference in time periods between the Campbell and Sanjur (1992) study and the present study may also account for the lack of significant results. Changes in work, childcare and family environments contribute to the differences in time periods. Campbell and Sanjur (1992) collected their data in 1988 whereas our study collected data in 1993.

#### **5.3.2.2 Relative effect of, family childcare and family-work setting variables on diet diversity**

The analysis of variance model for family-work, childcare and family variables indicated no significant effect on diet diversity of preschoolers. Family income was significantly related to diet diversity, which is similar to the results of the previous ANOVA models. This suggests that the financial resources of the family may affect the food choices parents make for preschoolers.

Using the analysis model, which analyzed the main and interaction effects of the three settings, did not show a significant relationship between diet diversity and the variables for work, childcare and family settings. Family income was significantly accounted for variation in diet diversity, which supports previous results, emphasizing the

importance of this variable. The results of this analysis suggest that the work setting of mothers may be more important than the work setting of the family when looking at the diet of preschoolers. This can only be confirmed with further research that more fully explores the effect of each parents' work setting characteristics along with other childcare and family setting variables on the diet of preschoolers. The inter-relationships between these variables and the diet also need to be explored.

## **6.0 Conclusion and Limitations**

In the following section the research conclusions along with the limitations for the present study will be presented.

### **6.1 Conclusion**

Based on Bronfenbrenner's theory, direct and indirect environments have an effect on human development through interconnections and interrelationships between these environments. In the present research the direct environments were the family and childcare settings. The indirect environment was the work setting for mothers and fathers. The effect of these settings on the diet of preschoolers was assessed in the present study. The following variables from each setting were used to determine their effect on the diet of preschoolers: Work setting – work time, work schedule and work schedule flexibility; Childcare setting – licensing of childcare arrangement; Family setting – family income. Little research has been done looking at the relationship of these settings and variables and how they may affect the diet of the preschooler. Based on the results of the present study the relationship of the work, childcare and family settings are important when trying to understand how both parents working outside of the home in paid employment affects the dietary intake of preschoolers.

#### **Research Question No. 1**

**How do family, childcare, and mother's work settings individually affect the quality and diversity of the diet of preschoolers in dual-earner families?**

Results of the bivariate analysis suggested that mothers' work time and mothers' education significantly affected the diet quality of preschoolers. In terms of the effect of these setting on diet diversity, mothers' work schedule flexibility also had a significant effect. Although the other variables did not appear to significantly affect the diet quality further research is needed in order to confirm that they do not affect the diet quality of preschoolers.

When compared with other studies, research has been done linking mothers' work time to her use of such time (Johnson, et al., 1993, Ortiz et al., 1981). Research has also focused on the effect of maternal work and other health outcomes, such as breastfeeding practices and work place stress. Campbell and Sanjur (1992) are one of few researchers that have done research on how work, childcare and family settings affect the diet of preschoolers in single parent families. From the results of the research done by Campbell and Sanjur (1992) and the present study, further research is needed to identify whether other aspects of the mothers' work, childcare and family setting are affecting the diet of the preschooler, such as work place stress.

**Research Question No. 2:**

**Do the characteristics of the combined family work setting (e.g., the total number of hours worked by mothers and fathers, and their combined work schedule and work schedule flexibility) exert an effect on the diet quality and diversity of the preschooler?**

Results of the bivariate analysis indicate that family work time and family work significantly affect the diet quality. This confirms the research hypothesis for this

question, but requires further research. Further research is needed to fully understand how the family-work setting affects the diet of preschoolers. There has been no documented research looking at the effects of the combined family-work setting on the diet of preschoolers, hence the need for further research. It may be that other aspects of the family work setting such as stress and how parents manage their time affect the diet of preschoolers.

**Research Question no. 3:**

**What is the relative influence of the family, childcare and mothers' work settings on the quality and diversity of the diet of preschool children in dual-earner families?**

Mothers' work, childcare and family settings affected the diet diversity score of the preschoolers. Although the analysis models that looked at these settings on diet quality were not significant, further research is necessary to fully explore these settings and their effects on diet quality and diet diversity. Also, the diet quality measure (MAR) was a bound variable that contained many nutrients. This may have limited the results seen with this variable. The MAR was a measure that was comprised of nutrient intakes for several nutrients. If the measure of diet quality did not contain several nutrients, the effect of these variables on diet quality may be better assessed.

Johnson et al (1992) looked at the effect of maternal employment on the diet quality of young children and concluded that there was no significant effect of mothers' work time on the diet. This study looked at mothers' work time, characterized by whether mothers worked part time or full time. The difference in measurement techniques may account for the lack of significance in that study. In the current study

mothers' work time, characterized by the number of hours that mothers spend at work was significantly related to diet diversity. When compared with Campbell and Sanjur (1992) mothers' work time was not found to be a significant variable but mothers work schedule and work schedule control affected the diet diversity of the preschoolers. This confirms that further research is needed to fully understand the effects of maternal employment on the diet of preschoolers.

**What is the relative influence of the family, childcare and family-work settings on the quality and diversity of the diet of preschool children in dual-earner families?**

No significant results were found when family, childcare and family-work settings were analyzed using ANOVA models. There were no significant effects of diet diversity or diet quality. Although the analysis models were not significant, further research is needed to fully understand how the family work setting may affect the diet of preschoolers. It must be noted that the combined family work setting may need to be measured differently in order to analyze the effects of this setting.

Based on the overall results, the relationships from the present study support the theory that these interrelated settings have an impact on the diet of human development. It is clear that research needs to look not only at the work setting characteristics of parents and its impact on the child's diet but also include other settings that may have direct and indirect effects on the diet of preschooler. Having determined that the work setting may have the most impact on the choices parents make emphasizes the need for research in this area to include this setting when evaluating the diet of preschoolers. The type of childcare arrangement is affected by the family income, which is ultimately

affected by parents' employment. It is valid to look at the work, family and childcare settings to determine how these interconnected settings may affect the food choices parents or mothers. Further research using other variables from these settings may have a more significant effect on the diet of preschoolers. This is further supported by the results of the 1998 General Social Survey that indicated that parents who work full time in paid employment are still struggling to manage their time away from paid employment (Silver, 2001). It is also indicated that mothers still retain most of the responsibility for household activities (Fast et al., 2001). Although fathers have increased the time they spend in childcare activities (Fast et al., 2001), further research is needed to fully understand how the work environment of mothers and fathers affect the diet of preschoolers.

## **7.2 Limitations**

One of the main limitations of our study was the measurement of some of the variables. Work schedule flexibility was a three-item index, which measured the ability to change days worked, hours worked permanently and the ability to get time off from work. Although the three items in this variable were highly correlated with each other, the ability to get time off from work had more variation than the other 2 items. This may have confounded the effect of work schedule flexibility. Other measures of work schedule flexibility may need to be considered in future research. It may be that the individual items that made up work schedule flexibility may have a greater effect on the diet than the combined three-item index.

Few significant relationships were found between the independent variables and the nutrient intake of the preschoolers. Based on the univariate results, the mean adequacy ratio had a small amount of variation. This limited the study by reducing the amount of difference that may be seen with this variable, which may account for the lack of results in the bivariate and multivariate analysis. The mean adequacy ratio is also a bound variable, comprising of nutrient ratios for six nutrients. Future research should focus on the individual nutrients rather than using a measure of overall diet quality to assess the diet.

Another limitation of the study was the power of the tests that were used. The sample population for this research was small, which may lead to an increase in Type II errors occurring during analysis of the data. The power of the tests were calculated close to 0.5, which confirms the fact that the sample size used in this study was not sufficient in order to detect many significant results in the analysis.

Further limitations were encountered when the initial data set contained questionnaire-coding errors. Coding of some questions was incorrect and had to be corrected. The results of the present study cannot be extrapolated to existing dual earners with preschoolers in Winnipeg other than those in the sample due to the coding errors as well as the data may be out dated. The initial data was collected in 1993. Not being able to generalize the data supports the need for further research using more recent data. The data having been collected in 1993 is an indication that present changes in the characteristics of the family, work and childcare settings for dual earners are not accounted for in this research.

## **7.0 IMPLICATIONS FOR FUTURE RESEARCH**

With both parents entering the work force it has become necessary to understand what is taking place in the homes of families with preschoolers and also older children. This research has implications for nutrition educators who plan programs. Nutrition programs can be tailored to meet the needs of mothers who are working and are faced with the challenge of feeding the preschooler. Nutrition education sessions can be planned with mothers to teach them how to deal with the challenges of feeding their preschooler.

Policy makers can better understand the importance of caregivers and their role in the feeding of the preschooler. This increased understanding will allow them to initiate policies that ensure that the child is well taken care of when cared for by non-parent caregivers. Monitoring programs for day care centers can be established so as to ensure that policy guidelines are followed. Nutrition education programs can be developed targeting caregivers on topics of nutrition for preschoolers. Caregivers may also be trained in sharing nutrition information with parents to assist them with feeding their preschooler.

In the clinical environment, diet assessment of the child's diet is mainly in the area of nutrient analysis. The use of a diet diversity score may allow clinical practitioners the ability to identify, with improved accuracy, foods that contribute to the growth of the child. Counseling of parents will not only be on the nutrients that the child needs but parent can also be given a summary of foods that are contributing the growth of the child. This in turn will allow parents to change, not only the nutrients that are provided, but also the types of foods that are served for which they have control.

## REFERENCES

- Baranowski, T., Sprague, D., Baranowski, J.H., Harrison, J.A., (1991) Accuracy of maternal dietary recall for preschool children. *Journal of the American Dietetic Association*, 91,669-674.
- Briley, M.E., Jastrow, S., Vickers, J., and Roberts-Gray, C., (1999). Dietary intake at child-care centers and away: Are parents and care providers working as partners or at cross-purposes? *Journal of the American Dietetic Association*, 99(8):950-954
- Bronfenbrenner, U., (1979) The ecology of human development: Experiments by nature and design. Cambridge, MA: Harvard University Press, pp 3-33
- Bronfenbrenner, U., (1986). Ecology of the family as a context for human development: Research perspectives. *Developmental Psychology*, 22,723-742.
- Bronfenbrenner, U., and Ceci, S.J., (1994). Nature-nature reconceptualized in developmental perspective: A bioecological perspective. *Psychological Review*, 101,568-586.
- Caliendo, M.A., Sanjur, D., (1978) The dietary status of preschooler children: An ecological approach. *Journal of Nutrition Education*, 10(2),69-72.
- Caliendo, M.A., Sanjur, D., Wright, J., Cummings, G., (1977). Nutritional status of preschool children. *Journal of the American Dietetic Association*, 71,20-26.
- Campbell, C., Roe, D.A., Eickwort, K., (1982). Qualitative diet indexes: A descriptive or an assessment tool? *Journal of the American Dietetic Association*, 81,687-694.
- Campbell, M.L., (1988). The impact of work, child care, and family factors on the diet and weight status of preschool children with single working mothers. Unpublished doctoral dissertation, Cornell University
- Campbell M.L., (1993). The nutrient intake, growth and eating pattern of preschool children with single employed mothers. *Journal of Canadian Dietetic Association*, 54(3):151-156.
- Campbell, M.L., Sanjur, D., (1992). Single employed mothers and preschool child nutrition: An ecological analysis. *Journal of Nutrition Education*, 24,67-74.
- Charrette, D., (1995, Summer). Hours of working couples (Perspectives Publication, Catalogue no. 75-001E). Ottawa, ON: Statistics Canada.
- Chery, A., Sabry, J.H., (1984). Portion sizes of common foods eaten by young children. *Journal of the Canadian Dietetic Association*, 45,230-233.

- Church, E., (1999, July 14). Work-home conflict seen on the rise. *The Globe and Mail*, pp B9.
- Cox, D.A., Skinner, J.D., Carruth, B.R, Moran III, J., Houck, K.S., (1997). A food variety index for toddlers (VIT): Development and application. *Journal of the American Dietetic Association*, 97,1382-1386.
- Devin, R.B., Erickson, P.I., (1996). The influences of male care givers on child health in rural Haiti. *Social Science and Medicine*, 43,479-488.
- Dierks, E.C., Morse, L.M., (1965). Food habits and nutrient intakes for preschool children. *Journal of the American Dietetic Association*, 47,292-296.
- Dierge, O.V., Oglesby, A.L., Bassoff, B.Z., (1991) An assessment of nutrition education needs of day care providers. *Journal of the American Dietetic Association*, 91,714-715.
- Drake, M.A., (1992). Menu evaluation, nutrient intake of young children and nutrition knowledge of menu planners in child care centers in Missouri. *Journal of Nutrition Education*, 24,145-148.
- Drewnowski, A., Hendrson, S.A., Shore, A.B., Fischler, C., Prezioso, P., Herchberg, S., (1996). Diet quality and dietary diversity in France: Implications for the French paradox. *Journal of the American Dietetic Association*, 96,663-669.
- Engle, P.L., (1993). Influences of mothers' and fathers' income on children's nutritional status in Guatemala. *Social Science and Medicine*, 37,1303-1312.
- Fast, J., Frederick, J., Zukewich, N., and Franke, S., (2001, Winter). The time of our lives. (Canadian Social Trends Catalogue no. 11-008) Ottawa, ON: Statistics Canada, 20-23
- Frederick, J.A., and Fast J.E., (2001, Summer). Strategy in the struggle to juggle. (Canadian Social Trends Catalogue no. 11-008). Ottawa, ON: Statistics Canada, 8-11
- Frongillo, E.A. Jr., de Onis, M., Hanson, K.M.P., (1997). Socioeconomic and demographic factors as associated with worldwide patterns of stunting and wasting of children. *Journal of Nutrition*, 127,2302-2309.
- Gibb-Clarke, M., (1999, June 4). Work v. family: The \$2.7-billion crisis. *The Globe and Mail*, pp M2
- Goode, W.J., (1960). A theory of role strain. *American Sociological Reviews*, 25:483-496
- Goodwin, R.A., Buchholz, A.C., McKim, M.K., Stuart, B., O'Conner, D.L., (1999).

- Caregiving arrangement and nutrition: Good news with some reservations. *Canadian Journal of Public Health*, 90(1),45-51.
- Guthrie, H.A., and Sheer, J.C., (1981). Validity of a dietary score for assessing nutrient adequacy. *Journal of the American Dietetic Association*, 78,240-245.
- Hall, K., (1999, Summer) Hours polarization at the end of the 1990s. (Perspectives Publication Catalogue no. 754-001-XPE) Ottawa,ON: Statistics Canada, 28-37
- Harper, A.E., (1996). Dietary guidelines in perspective. *Journal of Nutrition*, 126,1042S-1048S
- Hatloy, A., Torheim, L.E., Oshung, A., (1998). Food variety: A good indicator of nutritional adequacy of the diet? A case study from an urban area in Mali, West Africa. *European Journal of Clinical Nutrition*, 52,891-898.
- Hayghe, H.V., (1990, March). Family members in the work force. *Monthly Labour Review*, 14-19.
- Health Canada. (1995). Canada's food guide to healthy eating: Focus on preschoolers Ottawa, ON: Health and Welfare Canada.
- Health and Welfare Canada. (1999) Nutrient Value of Some Common Foods (Revised 1999). Ottawa, ON: Health and Welfare Canada.
- Human Resources Development Canada (1994) The distribution of work, learning, family time, unpaid work and leisure: A lifecycle approach
- Institute of Medicine (1999). Dietary reference intakes for calcium, phosphorous, magnesium, vitamin D, and fluoride. Retrieved February 2002, from National Academy Press Web sit: <http://books.nap.edu/books/0309063507/html>
- Institute of Medicine (2000). Dietary reference intakes for thiamin, riboflavin, niacin, vitamin B6, folate, vitamin B12, pantothenic acid, biotin, and choline. Retrieved February 2002, from National Academy Press Web site: <http://books.nap.edu/books/0309065542/html>
- Institute of Medicine (2000). Dietary reference intakes for vitamin C, vitamin E, selenium, and carotenoids. Retrieved February 2002 from National Academy Press Web site: <http://books.nap.edu/books/0309071836/html>
- Institute of Medicine (2001). Dietary reference intakes: Applications in dietary assessment. Washington, DC: National Academy Press
- Institute of Medicine (2001). Dietary reference intakes for vitamin A, arsenic, boron,

chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. Retrieved February 2002, from National Academy Press Web site: <http://books.nap.edu/books/0309072794/html>

Johnson, R.K., Smiciklas-Wright, H., Crouter, A.C., (1992). Effect of maternal employment on the quality of young children's diets: The CSFII experience. *Journal of the American Dietetic Association*, 92,213-214.

Johnson, R.K., Smiciklas-Wright, H., Crouter, A.C., Willits, F.K., (1992). Maternal employment and the quality of young children's diets: Empirical evidence based on the 1987-1988 Nationwide Food Consumption Survey. *Pediatrics*, 90,245-249.

Johnson, R.K., Crouter, A.C., Smiciklas-Wright, H., (1993). Effects of maternal employment on family food consumption patterns and children's diets. *Journal of Nutrition Education*, 25,130-13.

Johnson, R.K., Guthrie, H., Smiciklas-Wright, H., Wang, M.Q., (1994, May/June). Characterising nutrient intakes of children by sociodemographic factors. *Public Health Reports*, 109,414-420.

Kamerman, S.B., Hayes, C.D., (1982). Families that work: Children in a changing world. Washington, DC: National Academy Press, pp.311-323.

Kant, A.K., Block, G., Schatzkin, A., Ziegler, R.G., Nestle, M., (1991). Dietary diversity in the US population, NHANES II 1976-1980. *Journal of the American Dietetic Association*, 91,1526-1531.

Kant, A.K., Block, G., Schatzkin, A., Ziegler, R.G., Nestle, M., (1991). Food group pattern intake and associated nutrient profiles of the US population. *Journal of the American Dietetic Association*, 91,1532-1537.

Kant, A.K., Schatzkin, A., Harris, T.B., Ziegler, R.G., Block, G., (1993). Dietary diversity and subsequent mortality in the First National Health and Nutrition Examination Survey Epidemiologic Follow-Up Study. *American Journal of Clinical Nutrition*, 57,434-440.

Kant, A.K., Indexes of Overall Diet Quality: A review. *J Am Diet Assoc.* 1996;96:785-791

Kennedy, E.I., Ohls, J., Carlson, S., Fleming, K., (1995). The healthy eating index: Design and applications. *Journal of the American Dietetic Association*, 95,1103-1108.

Krebs-Smith, S.M., (1985). The effects of variety on food choices on dietary quality. Unpublished doctoral dissertation. The Pennsylvania State University

- Krebs-Smith, S.M., Smiciklas-Wright, H., Guthrie, H.A., Krebs-Smith, J., (1987). The effects of variety in food choices on dietary quality. *Journal of the American Dietetic Association*, 87,897-903.
- Lamontagne, J.F., Engle, P.L., Zietlin, M.F., (1998). Maternal employment, child care and nutritional status of 12-18 month-old children in Managua, Nicaragua. *Social Science and Medicine*, 46,403-414.
- Leaman, M., and Evers, S., (1997) Dietary intake by food groups of preschool children in low income communities in Ontario. *Journal of the Canadian Dietetic Association*, 58(4):184-191
- Leung, M., Yeung, D.L., Pennell, M.D., Hall, J., (1984). Dietary intakes of preschoolers. *Journal of the American Dietetic Association*, 84,551-554.
- McNicol, J., Kaplan, B.J., Moghadam, H.K., Conte, R., (1989). Nutrient intakes of preschool aged boys. *Journal of the Canadian Dietetic Association*, 50(1):31-35.
- McNicol, J., and Kaplan, B.J., (1991). Do preschool children eat well in daycare centers at lunch time? *Journal of the Canadian Dietetic Association*, 52(1):30-34.
- Manitoba Family Services Child Day Care Standards (1998, October), Manitoba Child Day Care Standards
- Marshall, K., (1993, Autumn). Employed parents and the division of housework (Perspectives publication, Catalogue no. 75-001E). Ottawa, ON: Statistics Canada
- Marshall, K., (1998, Autumn). Couple working shift (Perspectives publication, Catalogue no. 75-001E). Ottawa, ON: Statistics Canada
- Martorell, R., (1996, April). The roles of nutrition in economic development. *Nutrition Reviews*, 54(4), Supplemental II,S66-S71.
- Miles-Doan, R., Popkin, B.M., (1993). Women's work and infant care in the Philippines. *Social Science and Medicine*, 36,297-304.
- Moe, J.K., Johnson, R.K., Kolodinsky, J., (1995). The impact of conditions associated with maternal employment on diet quality of young children. *Journal of Consumer Studies and Home Economics*, 19:219-223
- Murphy, S.P., Rose, D., Lane, S., (1994). What is the proper use of a diet quality index? *Journal of the American Dietetic Association*,94,968.
- Neter, J., Wasserman, W., and Kutner, H., (1990). Applied Linear Statistical Models: Regression, ANOVA and Experimental Designs. Third edition, Homewood, IL. Irwin Publishers, pp 756-783

- Nett, E.M., (1993). *Canadian Families: Past and Present*. Toronto, Ontario: Butterworth
- Ortiz, B., MacDonald, M., Ackerman, N., Goebel, K., (1981). The effect of homemakers' employment on meal preparation time, meals at home, and meals away from home. *Home Economics Research Journal*, 9,200-206.
- Patterson, R.E., Haines, P.S., Popkin, B.M., (1994). Diet quality index: Capturing a multidimensional behaviour. *Journal of the American Dietetic Association*, 94,57-64.
- Phillips, D.E., Bass M.A., Yetley, E., (1978). Use of food and nutrition knowledge by mothers of preschool children. *Journal of Nutrition Education*, 10,73-75.
- Randall, E., Nichman, M.Z., Contant, C.F. Jr., (1985). Diet diversity and nutrient intake. *Journal of the American Dietetic Association*, 85,830-836.
- Reed, B.A., Habicht, J., Niameogo, C., (1996). The effects of maternal education on child nutritional status depend on socio-environmental conditions. *International Journal of Epidemiology*, 25,585-592.
- Roberts, S.B., and Heyman, M.B., (2000). Micronutrient shortfalls in young children's diets: common, and owing to inadequate intakes both at home and at child care centers. *Nutrition Reviews*, 58(1),27-29.
- Rozin, P., Fallon, A., Augustoni-Ziskind, M.L., (1986). The child's conceptions of food: The development of categories of accepted and rejected substances. *Journal of Nutrition Education*, 18,75-81.
- Schumilas, T.M., Woolcott, D.M., Esler, E.A., (1984). Family characteristics and the dietary intake of preschool children. *Journal of the Canadian Dietetic Association*, 45,119-127.
- Schwartz, N.E., Borra, S.T., (1997). What do consumers really think about dietary fat? *Journal of the American Dietetic Association*, 97(Suppl),S73-S75.
- Sigman-Grant, M., (1992, July/August). Feeding preschoolers: Balancing nutritional and development needs. *Nutrition Today*, 13-17.
- Silver, C., (2000, Summer). Being there: the time dual-earner couples spend with their children. (Canadian Social Trends Catalogue no. 11-008). Ottawa, On: Statistics Canada, 26-29
- Silver, C., Crompton, S., (2001, Winter). No time to relax? How full time workers spend the weekend. (Canadian Social Trends Catalogue no. 11-008) Ottawa, ON: Statistics Canada, 20-25

- Skinner, J.D., Carruth, B.R., Houck, K.S., Coletta, F., Cotter, R., Ott, D., McLeod, M., (1997). Longitudinal study of nutrient and food intakes of infants aged 2 to 24 months. *Journal of the American Dietetic Association*, 97,496-504.
- Staines, G.L., The impact of work schedules on the family.
- Stafford, K., (1983). The effects of wife's employment time on her household work time. *Home Economics Research Journal*, 11,257-266.
- Stanek, K., Abbott, D., Cramer, S., (1990). Diet quality and the eating environment of preschool children. *Journal of the American Dietetic Association*, 90,1582-1584.
- Statistics Canada (1999, September). Characteristics of dual-earner families in 1997 (Catalogue no. 13-215-XIB). Ottawa, ON: Statistics Canada.
- Statistics Canada (1995). Women in the labour force – 1994 edition (Catalogue no. 75-507E). Ottawa, ON: Statistics Canada.
- Stefanik, P.A., Trulson, M.F., (1962). Determining the frequency intakes of foods in large group studies. *American Journal of Clinical Nutrition*, 1,335-343.
- Todd, K.S., Hudes, M., Calloway, D.H., (1983). Food intake measurement: problems and approaches. *American Journal of Clinical Nutrition*, 37,139-146.
- Trumble-Waddell, J.E., (1993). The validity and reliability of the three-day estimated food record of food intakes of preschoolers provided by parents and care givers. Unpublished masters thesis, University of Manitoba, Winnipeg, Manitoba, Canada.
- Trumble-Waddell, J.E., Campbell, M.L., Armstrong, L.M., Macpherson, B.D., (1998). Reliability and validity of the three-day estimated record of food intake. *Canadian Journal of Dietetic Practice and Research*, 59,83-89.
- Tucker, K., Sanjur, D., (1988). Maternal employment and child nutrition in Panama. *Social Science and Medicine*, 26,605-612.
- Tudge, J., Shanahan, M.J., Valsiner, J., (1997). Comparisons in human development: Understanding time and context. Cambridge, N.Y: Cambridge University Press.
- Vanderkooy, P.D.S., Gibson, R.S., (1987). Food consumption patterns of Canadian preschool children in relation to zinc and growth status. *American Journal of Clinical Nutrition*, 45,609-619.
- Walton, D., (1999, July 20). Absenteeism rises as men take more time off. *The Globe and Mail*, pp B1, B4.
- Wayne, T., (1994). Paid work and domestic responsibilities. *Health Visitor* 67(3),84-85.

Williams, C., (2002, Summer) Time or money? How high and low income Canadians spend their time (Canadian Social Trends Catalogue no. 11-008) Ottawa, ON: Statistics Canada

Wolfe, W.E., Campbell, C.C., 1993. Food pattern, diet quality and related characteristics of schoolchildren in New York State. *Journal of the American Dietetic Association*, 93,1280-1284.

Wright, D.E., Radcliffe, J.D., (1992). Parents' perceptions of influences on food behaviour development of children attending day care facilities. *Journal of Nutrition Education*, 24,198-201.

**APPENDIX A**

**TELEPHONE QUESTIONNAIRE TO PARENTS OF SELECTED CHILDREN**

Subject Identification Number ..... / / /  
 Interview's Identification Number ..... / /

**PRERECORDED INFORMATION**

Child's age ..... / /  
 Child's sex ..... / /  
 Father's age ..... / /  
 Mother's age ..... / /

Record of calls	Date	Time	Notes
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

**Fate of the telephone interview:**

- \*no contact
  - telephone not a working line .....01
  - no answer after 8 calls.....02
  - other (specify \_\_\_\_\_) .....03
- \*ineligible
  - not working, not married or living common law,  
 special diet, medical problems .....04
  - language problems.....05
  - no caregiver involved .....06
  - other (specify \_\_\_\_\_) .....07
- \*refusal to participate
  - “too busy”.....08
  - “don't like the idea” .....09
  - other (specify \_\_\_\_\_) .....10
- \*complete telephone interview .....11
- \*complete telephone interview but refuse home visit on the phone .....12
- \*other (specify \_\_\_\_\_) .....13

**Interview Observations:**

- How cooperative was subject?  
 \_\_\_ not cooperative      \_\_\_ somewhat cooperative      \_\_\_ very cooperative
- How well did the subject understand the questions?  
 \_\_\_ poor understanding      \_\_\_ fair understanding      \_\_\_ good understanding
- Did the subject have any difficulty in speaking English?  
 \_\_\_ yes      \_\_\_ no
- How suspicious did subject seem about the study before the interview?  
 \_\_\_ not at all suspicious      \_\_\_ somewhat suspicious      \_\_\_ very suspicious
- Overall, how was the subject's interest in the interview?  
 \_\_\_ very high      \_\_\_ above average      \_\_\_ average      \_\_\_ below average      \_\_\_ very low

Other comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Hello. Is this \_\_\_\_\_?  
(MR/MS AND LAST NAME)

(IF YES, RECORD PARENT INTERVIEWED)

MOTHER.....1  
FATHER.....2

(IF NO  
May I speak with \_\_\_\_\_?  
(MR/MS AND LAST NAME)

(IF NO ONE BY THAT NAME AT THAT NUMBER  
The number I was calling is \_\_\_\_\_. Is this the correct number?)

IF WRONG NUMBER, TERMINATE WITH, EG. I am sorry to have bothered you.)  
IF CORRECT NUMBER.

Has Mr. and Ms. \_\_\_\_\_ ever lived there?)  
\_\_\_ YES \_\_\_ NO

(IF NO. TERMINATE CALL.)

(IF YES. How can get in touch with them?)

\_\_\_\_\_(SPECIFY HOW AND THEN  
TERMINATE WITH, EG. Thank you for your help.)

This is \_\_\_\_\_ calling from the University of Manitoba. We are  
doing a Winnipeg-wide study of the food habits of preschool children with working parents.

1. Last week we sent you a letter explaining the study.  
Did you receive it?

YES.....1  
NO .....2

(IF NO. I'm sorry yours didn't reach you. It was a brief letter we sent so people would know that we  
would be calling. EXPLAIN THE STUDY - USE LETTER AS GUIDE.)

2. Are you now working outside the home for 15 or more hours per week?

YES.....1  
NO .....2

(IF NO. I'm sorry then, we are unable to include you in the study. We would like to include everyone  
in the study, however, this time we can only study preschoolers with both parents working at least 15  
hours per week. However, if you have any questions about feeding children, I'd be happy to answer  
them. (PAUSE). If you would like information, contact the Provincial Department of Health.)

3. Is your spouse or partner working outside the home for 15 or more hours per week?

YES.....1  
NO .....2

(IF NO. I'm sorry then, we are unable to include you in the study. We would like to include everyone  
in the study, however, this time we can only study preschoolers with both parents working at least 15  
hours per week. However, if you have any questions about feeding children, I'd be happy to answer  
them. (PAUSE). If you would like information, contact the Provincial Department of Health.)

4. When you and your spouse/partner are working, do you juggle the care of your preschool child or children between you, or does someone else provide the care?

PARENTS PROVIDE ALL CARE WHEN WORKING (SEE BELOW) .....1  
 OTHERS PROVIDE CARE (GO TO 5) .....2  
 NO RESPONSE (GO TO 5) .....7

**(IF PARENTS PROVIDE ALL CARE:** I'm sorry then, we are unable to include you in the study. We would like to include everyone in the study, however, this time we can only study preschoolers caregivers who are not parents. However, if you have any questions about feeding children, I'd be happy to answer them. (PAUSE). If you would like information, contact the Provincial Department of Health.)

5. When you are working, which meals and snacks does your preschool child or children usually eat at the caregiver's?

	YES	SOMETIMES	NO	NR
Breakfast.....	1.....	2.....	3.....	7
AM Snack.....	1.....	2.....	3.....	7
Lunch.....	1.....	2.....	3.....	7
Afternoon Snack.....	1.....	2.....	3.....	7
Dinner.....	1.....	2.....	3.....	7
Evening Snack.....	1.....	2.....	3.....	7

**(REJECT IF LESS THAN ONE MEAL.** Since your preschooler does not eat at least one meal with the caregiver we are unable to include you in the study, however, this time we are only studying preschoolers who eat at least one meal at the caregivers. However if you have any questions about feeding children, I'd be happy to answer them. (PAUSE). If you would like information, contact the Provincial Department of Health.)

6. And last, are you married, widowed, separated, divorced or living common law?

MARRIED (EXCLUDING SEPARATED) OR COMMON LAW .....1  
 DIVORCED/SEPARATED .....2  
 WIDOWED.....3  
 OTHER (SPECIFY \_\_\_\_\_) .....4

**(IF DIVORCED, SEPARATED, OR WIDOWED.** I'm sorry then, we are unable to include you in the study. We would like to include everyone in the study, however, we won't be including single parents a this time. However, if you have any questions about feeding children, I'd be happy to answer them (PAUSE). If you would like information, contact the Provincial Department of Health.)

7. You meet all the criteria for the study. Are you willing to participate in the study described in the letter?

YES.....1  
 NO (GO TO NON-RESPONDER QUESTIONS - #4) .....2

Thank you for agreeing to participate, we appreciate your help.

Now I'd like to ask a few questions about your family, your work and child care. They are general questions like how many people are in your family and the kind of work you do. They allow us to describe all the families we talk to . The questions should take about 10 minutes. Is this a convenient time, or may I call back?

CALL BACK \_\_\_\_\_(DATE AND TIME)

The first questions are about your family.

8. How many people live at your home, including yourself? /\_\_\_/\_\_\_/  
(STATE NUMBER)

9. How many are children under 18 years? /\_\_\_/\_\_\_/  
(STATE NUMBER)

10. How old are the children, starting with the youngest?  
\_\_\_\_\_(YEARS)  
(REPEAT AGES TO PARENTS AS A CROSS CHECK)

11. In the letter we sent we mentioned that preschool children are the focus on this study. We are particularly interested in two and three year old children. Therefore, your \_\_\_ year old child will be the focus of the study.  
What is is/her name? \_\_\_\_\_

**IF MORE THAN ONE PRESCHOOL CHILD SAY:** In the letter we mentioned that preschool children are the focus of this study. Since we are including only one child from each family, I have randomly selected your \_\_\_ year old. What is his/her name?  
\_\_\_\_\_

**IF TWINS OR TRIPLETS:** In the letter we mentioned that preschool children are the focus of this study. Since we are including only one child from each family, if you give me the names, I will flip a coin and choose one.  
**(NAME CHOSEN ON MASTER LIST)**

12. Is she/he presently on a special diet prescribed by a doctor or dietitian?

- YES (GO TO 13).....1
- NO (GO TO 14) .....2
- NO RESPONSE (GO TO 14) .....7
- DON'T KNOW (GO TO 14) .....8

13. Why is the special diet needed? (CHECK ALL THAT APPLY)

	YES	NO	NR	DK	NA
WEIGHT REDUCING .....	1	2	7	8	9
DIABETIC.....	1	2	7	8	9
HEART DISEASE .....	1	2	7	8	9
ALLERGIES (SPECIFY TYPE _____) .....	1	2	7	8	9
LOW BLOOD SUGAR .....	1	2	7	8	9
HYPERACTIVITY-FEINGOLD .....	1	2	7	8	9
OTHER (SPECIFY) .....	1	2	7	8	9

Since she/he is on a special diet, I'm sorry but we are unable to include him/her in the study. We are interested in children who do not have special diet restrictions. However, if you have any questions about feeding children, I'd be happy to answer them. (PAUSE). If you would like information, contact the Provincial Department of Health.

14. Does she/he have any medical problems that affect his/her growth or make eating difficult?

- YES (SPECIFY PROBLEM \_\_\_\_\_) .....1
- NO (GO TO 15) .....2
- NO RESPONSE (GO TO 15) .....7
- DON'T KNOW (GO TO 15) .....8

(IF YES. I'm sorry then, we are unable to include him/her in the study. We are interested in children who do not have medical problems that affect their growth or make eating difficult. However, if you

have any questions about feeding children, I'd be happy to answer them. (PAUSE). If you would like more information, contact the Provincial Department of Health.)

15. The next few questions are about your present job and that of your spouse/partner.

What is your main occupation? \_\_\_\_\_  
(NOTE: IF MORE THAN ONE JOB DISCUSS MAIN OCCUPATION)

Can you tell me a little more about what you do? \_\_\_\_\_  
\_\_\_\_\_

(NOTE: GIVE JOB TITLE/CLASSIFICATION/RANK IF RELEVANT -EG. RN. ASSISTANT TO SUPERVISOR, UNIT DIRECTOR, CLERK I)

What kind of business, industry or service is that in? \_\_\_\_\_

(NOTE: GIVE DESCRIPTION -EG. PAPER BOX MANUFACTURING, RETAIL FOOD STORE, SECONDARY SCHOOL, FINANCE DEPARTMENT OF GOVERNMENT, ETC.)

16. How long have you been in your present job?

\_\_\_ YEARS  
OR  
\_\_\_ MONTHS  
OR  
DESCRIBE: \_\_\_\_\_

17. How many hours do you work at your job in the average week, including overtime?

\_\_\_ HOURS PER WEEK  
OR  
\_\_\_ PER \_\_\_\_\_  
OR  
DESCRIBE \_\_\_\_\_

18. Do you usually work the same hours each day?

IF YES:

What time do you usually begin work? (CIRCLE TIME)  
And, what time do you usually end work? (CIRCLE TIME)

12-1-2-3-4-5-6-7-8-9-10-11-12-1-2-3-4-5-6-7-8-9-10-11-12  
AM NOON PM

\_\_\_ works split shift or begins work more than  
once a day (SPECIFY START \_\_\_\_\_  
AND STOP TIMES \_\_\_\_\_)

IF NO:

Do you work on a rotating shift so your hours change at regular intervals, or what?

\_\_\_ rotating shift  
(SPECIFY START AND STOP  
TIMES FOR EACH SHIFT  
\_\_\_\_\_)

\_\_\_ other irregularities,  
(SPECIFY START AND STOP  
TIMES FOR EACH SHIFT  
\_\_\_\_\_)

19. How hard do you think it would be to get the hours you begin and end work changed permanently, if you wanted them changed? Would it be:

very hard .....4  
somewhat hard .....3  
not too hard .....2

- not at all hard .....1
- NO RESPONSE .....7
- DON'T KNOW .....8

20. In your present job, do you usually work the same days each week?

IF YES:	What days do you usually work?
	<input type="checkbox"/> MONDAY                    OR <input type="checkbox"/> MON. TO FRI. <input type="checkbox"/> TUESDAY <input type="checkbox"/> WEDNESDAY <input type="checkbox"/> THURSDAY <input type="checkbox"/> FRIDAY <input type="checkbox"/> SATURDAY <input type="checkbox"/> SUNDAY

IF NO:	How many days a week do you usually work?
	<input type="text"/> days per week OR <input type="text"/> per <input type="text"/> OR Describe: <input style="width: 80%;" type="text"/> <input style="width: 80%;" type="text"/>

21. How hard do you think it would be to get the days you work changed permanently if you wanted them changed? Would it be:

- very hard .....4
- somewhat hard .....3
- not too hard .....2
- not at all hard .....1
- NO RESPONSE .....7
- DON'T KNOW .....8

22. How hard is it to take time off during your workday for personal or family matters? Is it:

- very hard .....4
- somewhat hard .....3
- not too hard .....2
- not at all hard .....1
- NO RESPONSE .....7
- DON'T KNOW .....8

23. Now for your spouse/partner:

What is his/her main occupation? \_\_\_\_\_  
 (NOTE: IF MORE THAN ONE JOB DISCUSS MAIN OCCUPATION.)

Can you tell me a little more about what he/she does? \_\_\_\_\_  
 \_\_\_\_\_

(NOTE: GIVE JOB TITLE/CLASSIFICATION/RANK IF RELEVANT -EG. RN, ASSISTANT TO SUPERVISOR, UNIT DIRECTOR, CLERK I)

What kind of business, industry of service is that in? \_\_\_\_\_

(NOTE: GIVE DESCRIPTION -EG. PAPER BOX MANUFACTURING, RETAIL FOOD STORE, SECONDARY SCHOOL, FINANCE DEPARTMENT OF GOVERNMENT, ETC.)

24. How long has she/he been in her/his present job?

\_\_\_ YEARS  
OR  
\_\_\_ MONTHS

OR  
DESCRIBE: \_\_\_\_\_

25. How many hours does your spouse or partner work at his/her job in the average week, including overtime?

\_\_\_ HOURS PER WEEK  
OR

\_\_\_ PER \_\_\_\_\_  
OR

DESCRIBE: \_\_\_\_\_

26. Does your spouse/partner usually work the same hours each day in his/her present job?

IF YES:

What time does/he/she usually begin work? (PAUSE TO CIRCLE TIME)

And, what time does she/he usually end work? (PAUSE TO CIRCLE TIME)

12—1—2—3—4—5—6—7—8—9—10—11—12—1—2—3—4—5—6—7—8—9—10—11—12  
AM NOON PM

\_\_\_ works split shift or begins work more than once a day (SPECIFY START \_\_\_\_\_ AND STOP TIMES \_\_\_\_\_)

IF NO:

Does he/she work on a rotating shift so their hours change at regular intervals, or what?

\_\_\_ rotating shift  
(SPECIFY START AND STOP  
TIMES FOR EACH SHIFT  
\_\_\_\_\_)

\_\_\_ other irregularities,  
(SPECIFY START AND STOP  
TIMES FOR EACH SHIFT  
\_\_\_\_\_)

27. How hard do you think it would be for him/her get the hours he/she begins and ends work changed permanently, if he/she wanted them changed? Would it be:

- very hard .....4
- somewhat hard .....3
- not too hard .....2
- not at all hard .....1
  
- NO RESPONSE .....7
- DON'T KNOW .....8

28. For your spouse/partner, does he/she usually work the same days each week?

IF YES:	What days do you usually work?
	___ MONDAY OR ___ MON. TO FRI.
	___ TUESDAY
	___ WEDNESDAY
	___ THURSDAY
	___ FRIDAY
	___ SATURDAY
	___ SUNDAY

IF NO:	How many days a week do you usually work?
	___ days per week
	OR
	___ per ___
	OR
	Describe: _____
	_____

29. How hard do you think it would be for her/him to get the days she/he works changed permanently if she/he wanted them changed? Would it be:

- very hard .....4
- somewhat hard .....3
- not too hard .....2
- not at all hard .....1
  
- NO RESPONSE .....7
- DON'T KNOW .....8

30. How hard is it for him/her to take time off during his/her workday for personal or family matters? Is it:

- very hard .....4
- somewhat hard .....3
- not too hard .....2
- not at all hard .....1
  
- NO RESPONSE .....7
- DON'T KNOW .....8

Now we have a few questions about child care.

31. Right now, who looks after \_\_\_\_\_ (CHILD'S NAME) when you and your spouse/partner are working?

(PROBE: Is that in your home, in someone else's home, or at a day care centre?)

- |                                                   |       |        |
|---------------------------------------------------|-------|--------|
|                                                   | YES   | NO     |
| DAY CARE CENTRE (What is the name of the centre?) |       |        |
| _____ (GO TO 32).....1                            | ..... | 2      |
| CARE IN OWN HOME                                  |       |        |
| - by child's siblings (GO TO 32) .....            | 1     | .....2 |

- by relative (other than child's siblings (GO TO 32)) ..... 1 .....2
- CARE IN SOMEONE ELSE'S HOME
- by a relative (GO TO 31)..... 1 .....2
- by a non-relative (GO TO 31) ..... 1 ..... 2
- OTHER (Specify \_\_\_\_\_) (GO TO 32) ..... 1 .....2
- NO RESPONSE (GO TO 32) .....1 .....2
- DON'T KNOW (GO TO 32) .....1 .....2

32. Is the home licensed for family day care?

- YES ..... 1
- NO ..... 2
- NO RESPONSE ..... 7
- DON'T KNOW ..... 8
- NOT APPLICABLE ..... 9

33. When did you start using this type of child care for \_\_\_\_\_  
(CHILD'S NAME)

34. Overall, how satisfied are you with your present child care arrangement(s) for \_\_\_\_\_  
\_\_\_\_\_ (CHILD'S NAME)? Are you:

- very satisfied ..... 1
- satisfied ..... 2
- dissatisfied ..... 4
- very dissatisfied ..... 5
- or neither satisfied nor dissatisfied ..... 3
- NO RESPONSE ..... 7
- DON'T KNOW ..... 8

35. How many different child care arrangements have you used since \_\_\_\_\_  
was born, including your present arrangement? (CHILD'S NAME)

- \_\_\_\_(SPECIFY NUMBER ) (CHECK-INCLUDES PRESENT ARRANGEMENT)
- \_\_\_\_(88) DON'T KNOW
- \_\_\_\_(77) NO RESPONSE

36. Who prepares your child's meals and snacks when you and your spouse/partner are working?  
(PROBE FOR SPECIFIC MEALS AND SNACKS)

	CAREGIVER	PARENT	BOTH	OTHER (SPECIFY)	NR	NA
BREAKFAST	1	2	3	4(_____)	7	9
AM SNACK	1	2	3	4(_____)	7	9
LUNCH	1	2	3	4(_____)	7	9
AFTERNOON SNACK	1	2	3	4(_____)	7	9
DINNER	1	2	3	4(_____)	7	9
EVENING SNACK	1	2	3	4(_____)	7	9

**NOTE: USE NA IF MEAL/SNACK NOT GIVEN/PREPARED**

37. What is the highest grade in school or year at college you have completed?  
(DO NOT READ)

- GRADE EIGHT OR LESS ..... 01
- SOME HIGH SCHOOL ..... 02
- COMPLETED HIGH SCHOOL ..... 03
- SOME POST-SECONDARY TRAINING (NON-UNIVERSITY) ..... 04
- POST-SECONDARY CERTIFICATE OR DIPLOMA ..... 05

SOME UNIVERSITY .....	06
COMPLETED UNIVERSITY (HAS DEGREE) .....	07
POST-GRADUATE TRAINING .....	08
NO RESPONSE .....	77
DON'T KNOW .....	88
DESCRIBE IF FOREIGN EDUCATION _____	

38. And for your spouse, what is the highest grade in school or year at college he/she has completed? (DO NOT READ)

GRADE EIGHT OR LESS .....	01
SOME HIGH SCHOOL .....	02
COMPLETED HIGH SCHOOL .....	03
SOME POST-SECONDARY TRAINING (NON-UNIVERSITY) .....	04
POST-SECONDARY CERTIFICATE OR DIPLOMA .....	05
SOME UNIVERSITY .....	06
COMPLETED UNIVERSITY (HAS DEGREE) .....	07
POST-GRADUATE TRAINING .....	08
NO RESPONSE .....	77
DON'T KNOW .....	88
DESCRIBE IF FOREIGN EDUCATION _____	

39. Were you born in Canada?

YES (GO TO 40) .....	1
NO (GO TO 39) .....	2
NO RESPONSE (GO TO 40) .....	7
DON'T KNOW (GO TO 40) .....	8

40. What year did you first move to Canada?

_____ (STATE YEAR) IF EXACT YEAT IS NOT KNOWN, OBTAIN THE BEST ESTIMATE.	
NO RESPONSE .....	7777
DON'T KNOW .....	8888
NOT APPLICABLE .....	9999

41. To which ethnic or cultural group did you or your ancestors belong on first coming to this continent? (DO NOT READ -CHECK AS MANY AS APPLICABLE)

	YES	NO	NR	DK
FRENCH .....	1	2	7	8
ENGLISH (ie., ENGLAND) .....	1	2	7	8
IRISH .....	1	2	7	8
SCOTTISH .....	1	2	7	8
GERMAN .....	1	2	7	8
ITALIAN .....	1	2	7	8
DUTCH (NETHERLANDS) .....	1	2	7	8
POLISH .....	1	2	7	8
JEWISH .....	1	2	7	8
CHINESE .....	1	2	7	8
NATIVE PEOPLE (INUIT, INDIAN, METIS) .....	1	2	7	8
OTHER (SPECIFY _____) .....	1	2	7	8

42. Was your spouse/partner born in Canada?

YES (GO TO 43) .....	1
NO (GO TO 42) .....	2
NO RESPONSE (GO TO 43) .....	7
DON'T KNOW .....	8

43. What year did she/he first move to Canada

\_\_\_\_\_ (STATE YEAR) IF EXACT YEAT IS NOT KNOWN, OBTAIN THE BEST ESTIMATE.

NO RESPONSE .....	7777
DON'T KNOW .....	8888
NOT APPLICABLE .....	9999

44. To which ethnic or cultural did his/her ancestors belong on first coming to this continent  
(DO NOT READ - CHECK AS MANY AS APPLICABLE)

	YES	NO	NR	DK
FRENCH .....	1	2	7	8
ENGLISH (ie., ENGLAND) .....	1	2	7	8
IRISH .....	1	2	7	8
SCOTTISH .....	1	2	7	8
GERMAN .....	1	2	7	8
ITALIAN .....	1	2	7	8
DUTCH (NETHERLANDS) .....	1	2	7	8
POLISH .....	1	2	7	8
JEWISH .....	1	2	7	8
CHINESE .....	1	2	7	8
NATIVE PEOPLE (INUIT, INDIAN, METIS) .....	1	2	7	8
OTHER (SPECIFY _____) .....	1	2	7	8

45. What language is most frequently spoken in your home?  
(DO NOT READ)

ENGLISH.....	1
FRENCH .....	2
GERMAN .....	3
ITALIAN .....	4
UKRANIAN .....	5
OTHER (SPECIFY _____) .....	6
NO RESPONSE .....	7

46. The last question is about your family income. Adding up the income that you and your spouse/partner make from all sources, roughly what is the total yearly income before taxes of your immediate family – include your income and that of your spouse or partner, the wages of everyone else in the family who works, and income from any other sources such as investment income, income from roomers or boarders, and so on.

I will read several income categories. When I come to the category that best describes your family's total yearly income before taxes, please stop me

under \$20,000 .....	01
under \$30,000 .....	02
under \$40,000 .....	03
under \$50,000 .....	04
under \$60,000 .....	05
under \$70,000 .....	06
under \$80,000 .....	07
\$80,000 and over .....	08
NO RESPONSE .....	77

That completes the questions. The last thing I would like to do is discuss how the study will be organized.

As you know, we are interested to learn what preschoolers eat at home and with caregivers while parents are working outside the home. To do this we will ask the parents to keep track of what their child eats at home and ask the caregiver to do the same when both parents are working. We would like to meet with one or both parents and caregiver to show how to keep track of what \_\_\_\_\_ (NAME OF CHILD) eats.

We would like to have the parent who is primarily responsible for feeding \_\_\_\_\_ (NAME OF CHILD) to record what he/she eats at home when you are not working. Would you be that parent or would your spouse/partner or someone else in the household be primarily responsible for feeding \_\_\_\_\_ (NAME OF CHILD)

PERSON PROVIDING FOOD RECORD

- MOTHER ..... 1
- FATHER ..... 2
- BOTH ..... 3
- OTHER (SPECIFY \_\_\_\_\_) ..... 4

We also need to contact the caregiver to arrange a meeting time. I'd be happy to do this if you could give me the name and telephone number of the caregiver or day care center. When I call the caregiver I will mention that you gave me his/her/their name.

NAME OF CAREGIVER/DAY CARE CENTRE: \_\_\_\_\_  
 IF DAY CARE CENTRE: What is the Director's name? \_\_\_\_\_  
 IF DAY CARE CENTRE: Which caregiver does your child know well? \_\_\_\_\_  
 TELEPHONE NUMBER: \_\_\_\_\_  
 ADDRESS: \_\_\_\_\_

We will need to find a suitable time to meet with you and the caregiver. That meeting would take about 20 minutes. During the visit I'd like to show you both how to keep a list of what \_\_\_\_\_ (NAME OF CHILD) eats. Would it be possible to meet when you pick up \_\_\_\_\_ (NAME OF CHILD) at caregiver's place?

(IF UNABLE TO MEET AT CAREGIVER'S PLACE: Would it be more convenient to meet at your home?)

RECORD MEETING: LOCATION: \_\_\_\_\_  
 DATE: \_\_\_\_\_  
 TIME: \_\_\_\_\_

I will need to contact the caregiver and get back to you. Is this a good time to contact you at home?

YES \_\_\_\_\_  
 NO. SPECIFY BEST TIME: \_\_\_\_\_

Thank you very much for helping us with this project. Please remember that any information you provide will be kept strictly confidential.

Do you have any questions before I go (PAUSE)

If any questions come up, you can reach me at \_\_\_\_\_ (INTERVIEWER'S TELEPHONE NUMBER).

**TELEPHONE INTERVIEW FOR CAREGIVERS**

RECORD OF CALLS	DATE	TIME	NOTES
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____
4.	_____	_____	_____
5.	_____	_____	_____

Fate of telephone call to caregiver:

- \*agrees to participate ..... 1
- \*refuses to participate (reason \_\_\_\_\_) ..... 2
- \*other (specify \_\_\_\_\_) ..... 3

**Interviewer Observations**

How cooperative was the caregiver?

\_\_\_ not cooperative    \_\_\_ somewhat cooperative    \_\_\_ very cooperative

How well did the caregiver understand what was being asked of them?

\_\_\_ poor understanding    \_\_\_ fair understanding    \_\_\_ good understanding

Did the caregiver have any difficulty in speaking English?

\_\_\_ yes    \_\_\_ no

How suspicious did the caregiver seem about the study before the interview?

\_\_\_ very high    \_\_\_ above average    \_\_\_ average    \_\_\_ below average    \_\_\_ very low

Other comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**IF A DAY CARE CENTRE:**

Hello, is this (NAME OF DAY CARE DIRECTOR)?

IF NO. May I speak with \_\_\_\_\_?  
(DIRECTOR OF DAY CARE CENTRE)

IF NO. When would be a good time to reach her/him?

RECORD BEST TIME TO CALL: \_\_\_\_\_

This is \_\_\_\_\_ calling from the University of Manitoba. Your name was given to me by Mr. And Mrs. (PARENT'S SURNAME) WHO HAVE A CHILD, (CHILD'S NAME), in your care.

(CHILD'S NAME) parents have agreed to participate in a study funded by Health and Welfare Canada. The study is looking at the food habits of preschool children. We particularly want to study preschool children with two working parents, because of the increasing number in the work force.

The study involves keeping a food diary of what (CHILD'S NAME) eats while in your care. The forms are easy and quick to fill out, and only require a few minutes to complete. (CHILD'S NAME) parents have

suggested that \_\_\_\_\_ (RECOMMENDED CAREGIVER) might be the best person to record what (CHILD'S NAME) eats.

Would this person, or someone else in your centre, be able to record what (CHILD'S NAME) eats while in your care?

**IF NO. TRY TO MOTIVATE AND CONVINCING CAREGIVERS TO PARTICIPATE.**

IF YES. To explain how to keep the diary we would like to visit with this person and one of the parents for about 20 minutes. After the diary is completed, we would pick it up whenever it is convenient for the worker and the parents.

When would be a good time to meet? The parents have suggested that we could all meet when they pick up \_\_\_\_\_ (CHILD'S NAME). Would this be an appropriate time? We will need to meet with the person who will be recording for (CHILD'S NAME). Would their schedule allow us to meet them on \_\_\_\_\_ (DAY) at \_\_\_\_\_ (TIME -USE PARENTS RECOMMENDED TIME). Or would it be best to set this up with \_\_\_\_\_ (CAREGIVER'S NAME).

RECORD MEETING: LOCATION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
TIME \_\_\_\_\_

I will call the parents to confirm this time and then get in touch with you for confirmation.

We really appreciate your help in finding out what preschoolers eating habits are.

If you would like, I'll leave my name and phone number with you.

**IF NO. END INTERVIEW.**

**IF YES: REPEAT YOUR NAME AND PHONE NUMBER. END INTERVIEW.**

.....

**IF NOT A DAY CARE CENTRE:**

Hello, is this (NAME OF CAREGIVER)?

IF NO. May I speak with \_\_\_\_\_?  
(NAME OF CAREGIVER)

IF NO. When would be a good time to reach her/him?  
RECORD BEST TIME TO CALL: \_\_\_\_\_

This is \_\_\_\_\_ calling from the University of Manitoba. Your name was given to me by Mr. And Mrs. (PARENT'S SURNAME) WHO HAVE A CHILD, (CHILD'S NAME), that you are looking after while they are working.

(CHILD'S NAME) parents have agreed to participate in a study funded by Health and Welfare Canada. The study is looking at the food habits of preschool children. We particularly want to study preschool children with two working parents, because of the increasing number in the work force.

The study involves keeping a food diary of what (CHILD'S NAME) eats while in your care for one or two days on two occasions. Her/his parents have agreed to keep the diary at home.

We would like to ask if you would record what (CHILD'S NAME) eats while in your care. The forms are easy and quick to fill out, and only require a few minutes to complete.

**IF NO. TRY TO MOTIVATE AND CONVINCING CAREGIVERS TO PARTICIPATE.**

IF YES. To explain how to keep the diary we would like to visit with this person and one of the parents for about 20 minutes. After the diary is completed, we would pick it up whenever it is convenient for you and the parents.

I wonder when would be a good time to meet? The parents have suggested that we could all meet when they pick up \_\_\_\_\_ (CHILD'S NAME). Would this be an appropriate time? Would your schedule allow us to meet them on \_\_\_\_\_ (DAY) at \_\_\_\_\_ (TIME -USE PARENTS RECOMMENDED TIME).

RECORD MEETING: LOCATION: \_\_\_\_\_  
DATE: \_\_\_\_\_  
TIME \_\_\_\_\_

I will call the parents to confirm this time and then get in touch with you for confirmation.

We really appreciate your help in finding out what preschoolers eating habits are.

If you would like, I'll leave my name and phone number with you.

**IF NO. END INTERVIEW.**

**IF YES: REPEAT YOUR NAME AND PHONE NUMBER. END INTERVIEW.**

**APPENDIX B**  
**HOW TO KEEP A WEIGHED DIARY OF YOUR CHILD'S FOOD INTAKE - TIPS FOR PARENTS**

The most important thing you will be doing for this second Food Diary is weighing and recording everything your child eats or drinks (except water) at home or away from home. Be sure to include foods your child eats between meals, while watching TV or playing with friends, even small snacks like fruit, crackers, candy, soft drinks, etc. We would be grateful if you would keep a weighed Food Diary for three days:

**DAY 1:** \_\_\_\_\_  
**DAY 2:** \_\_\_\_\_  
**DAY 3:** \_\_\_\_\_  
**INTERVIEWER PICKS UP DIARY ON:** \_\_\_\_\_

Use the forms provided and follow these simple instructions:

1. **TIME COLUMN** -Note the time of day when food is eaten in this column. Please write on the form at the time foods, beverages are eaten, or immediately afterwards.
2. **PLACE COLUMN** -Note where the food is eaten in this column. Use the following as a guide:
  - H:** HOME (for food eaten at home)
  - C:** CHILD CARE (for food eaten with the child's caregiver while you are working)
  - AR:** AWAY-REST (for food eaten away from home in restaurants, snack bars, cafeterias, McDonald's, etc.)
  - AH:** AWAY-HOME (for food eaten in another person's home but not at the child's caregiver)
3. **DESCRIPTION OF FOOD OR BEVERAGE** - Include the method of preparation and cooking, brand names (if applicable), etc.
  - \* What type of food is it?
    - If milk, is it skim, 1%, 2%, homogenized?
    - If bread, is it whole wheat, rye, white?
    - Is the food low fat or calorie reduced? (eg. Diet drinks)
  - \* Is it cooked, raw, canned, frozen or fresh?
  - \* Is it boiled, baked, roasted, fried, broiled, etc?
    - If fried, what type of fat? For example, are wieners boiled or fried in butter margarine, oil, shortening, etc?
    - Is soup or cocoa made with water or milk?
  - \* What kind of beverage, if any, is taken with the meal or snack?
  - \* State **brand name** and kind of fruit juices and drinks (eg. Wyler's orange crystals)
    - State brand names for other foods, if applicable (eg. Ritz crackers)
  - \* For **foods eaten together**, like hamburgers, write down each food item (eg. hamburger bun, beef patty, tomato slice, cheese (state kind), ketchup, and pickle slices)
  - \* For **recipes** like spaghetti sauce, stews or casseroles please write recipe on back of Food Diary giving the amounts of each ingredient, number of servings for the recipe, and amount given to your child.
  - \* Remember to record all the "little extras" that are added to or eaten with other foods such as
    - butter or margarine on vegetables, sandwiches, crackers; fat used for frying
    - salad dressing; gravy; sauces on vegetables, ice cream or yoghurt

-sugar on cereal; jam, butter, peanut butter, syrup etc. on toast, pancakes, etc.

4. **AMOUNT SERVED COLUMN** -Follow the instructions below for weighing either FOODS or LIQUIDS.

**WEIGHING FOODS**

1. press "on" button on front of scale
2. wait until a "0" appears on the screen
3. place a dish on the scale
4. press the "on" button again, wait until it reads "0"
5. place one food item on the dish, **read and record** the weight shown (in grams) on the screen
6. check the numbers on the screen to your recorded value
7. press the "on" button and wait until the screen reads "0"
8. **repeat #5-#7 until all food items are weighed**
9. serve your child the dish containing all the weighed foods.

**WEIGHING LIQUIDS**

1. do #1 and #2 above for WEIGHING FOODS
2. place a glass or mug on the scale
3. press "on" button, wait until it reads "0"
4. pour the liquid into the glass, **read and record** the weight shown (in grams) on the screen

5. **EXTRA SERVINGS** -Follow the above instructions for the **AMOUNT SERVED COLUMN**

6. **AMOUNT UNEATEN COLUMN** -Weigh any food left on your child's plate, bowl or glass, etc. and record it in this column. Remember, children don't always eat all that is offered to them.

**WEIGHING LEFTOVERS**

1. use a new plate, bowl, glass or mug
2. follow steps #1-#8 for foods or #1-#4 for liquids
  - continue until all the food your child did not eat is weighed individually
  - remember to weigh **all** leftovers, including bones, apple cores, potato skins, etc.
3. **read and record** each item in the **AMOUNT UNEATEN COLUMN**

7. **COMMENTS COLUMN** - Feel free to add any comments you have in this column (eg. on difficulties you experienced, or problems with recording foods).





## HOW TO KEEP A WEIGHED DIARY OF A CHILD'S FOOD INTAKE – TIPS FOR CAREGIVERS

The most important thing you will be doing for this second Food Diary is weighing and recording everything \_\_\_\_\_ eats or drinks (except water) while in your care. Be sure to include foods even small snacks like fruit, crackers, candy, soft drinks, etc. We would be grateful if you would keep a weighed Food Diary for two days:

**DAY 1:** \_\_\_\_\_

**DAY 2:** \_\_\_\_\_

**INTERVIEWER PICKS UP DIARY ON:** \_\_\_\_\_

Use the forms provided and follow these simple instructions:

1. **TIME COLUMN** -Note the time of day when food is eaten in this column. Please write on the form at the time foods/ beverages are eaten, or immediately afterwards.
  
2. **DESCRIPTION OF FOOD OR BEVERAGE** - Include the method of preparation and cooking, brand names (if applicable), etc.
  - \* What type of food is it?
    - If milk, is it skim, 1%, 2%, homogenized?
    - If bread, is it whole wheat, rye, white?
    - Is the food low fat or calorie reduced? (eg. Diet drinks)
  - \* Is it cooked, raw, canned, frozen or fresh?
  - \* Is it boiled, baked, roasted, fried, broiled, etc?
    - If fried, what type of fat? For example, are wieners boiled or fried in butter margarine, oil, shortening, etc?
    - Is soup or cocoa made with water or milk?
  - \* What kind of beverage, if any, is eaten with the meal or snack?
  - \* State brand name and kind of fruit juices and drinks (eg. Wyler's orange crystals)
    - State brand names for other foods, if applicable (eg. Ritz crackers)
  - \* For foods eaten together, like hamburgers, write down each food item and amount given to the child (eg. hamburger bun, beef patty, tomato slice, cheese (state kind), ketchup, and pickle slices)
  - \* For recipes like spaghetti sauce, stews or casseroles please write recipe on back of Food Diary giving the amounts of each ingredient, number of servings for the dish, and amount given to the child.
  - \* Remember to record all the "little extras" that are added to or eaten with other foods such as
    - butter or margarine on vegetables, sandwiches, crackers; fat used for frying
    - salad dressing; gravy; sauces on vegetables, ice cream or yoghurt
    - sugar on cereal; jam, butter, peanut butter, syrup etc. on toast, pancakes, etc.
  - \* If a Day Care Center, DO NOT RECORD WHAT IS ON THE PRINTED MENU. Instead record what is actually eaten.

3. **AMOUNT SERVED COLUMN** -Follow the instructions below for weighing either FOODS or LIQUIDS.

**WEIGHING FOODS**

1. press "on" button on front of scale
2. wait until a "0" appears on the screen
3. place a dish on the scale
4. press the "on" button again, wait until it reads "0"
5. place one food item on the dish, **read and record** the weight shown (in grams) on the screen
6. check the numbers on the screen to your recorded value
7. press the "on" button and wait until the screen reads "0"
8. **repeat #5-#7 until all food items are weighed**
9. serve your child the dish containing all the weighed foods.

**WEIGHING LIQUIDS**

1. do #1 and #2 above for WEIGHING FOODS
2. place a glass or mug on the scale
3. press "on" button, wait until it reads "0"
4. pour the liquid into the glass, **read and record** the weight shown (in grams) on the screen

4. **EXTRA SERVINGS** -Follow the above instructions for the **AMOUNT SERVED COLUMN**

5. **AMOUNT UNEATEN COLUMN** -Weigh any food left on your child's plate, bowl or glass, etc. and record it in this column. Remember, children don't always eat all that is offered to them.

**WEIGHING LEFTOVERS**

1. use a new plate, bowl, glass or mug
2. follow steps #1-#8 for foods or #1-#4 for liquids
  - continue until all the food your child did not eat is weighed individually
  - remember to weigh **all** leftovers, including bones, apple cores, potato skins, etc.
3. **read and record** each item in the **AMOUNT UNEATEN COLUMN**

6. **COMMENTS COLUMN** - Feel free to add any comments you have in this column (eg. on difficulties you experienced, or problems with recording foods).

**HELPFUL HINTS**

- \***Foods on outings** – if food or beverages are consumed during an excursion, estimate the amount eaten and what was in the food. Record the item in the Food Diary. Include the name of the place the food was eaten in the “comments” section of the Food Diary.
- \***Packaged Foods** - wrappers or packages from candies or nuts can be saved and given to the interviewer. This makes recording easier for you.
- \***Forgotten foods** - as soon as you remember, record what your child ate, the approximate time and estimate the amount.

**INSTRUCTIONS FOR THE DIGITAL SCALE**

- \* KEEP SCALE ON FLAT SURFACE
- \* ALWAYS PRESS “ON” BUTTON AND WAIT FOR 0 (ZERO) TO APPEAR ON THE SCREEN BEFORE WEIGHING ANY FOODS OR BEVERAGES
- \* SCALE SHOULD BE KEPT AWAY FROM WET AND EXCESSIVE HOT OR COLD AREAS

**SAMPLE FOOD DIARY**

ID# /\_/\_/\_/\_/\_/

DAY: #1 #2 #3 (circle one)  
DATE: \_\_\_\_\_

TIME	DESCRIPTION OF FOOD OR BEVERAGE	AMOUNT SERVED (g)	AMOUNT – EXTRA SERVINGS (g)	AMOUNT EATEN (g)	COMMENTS	OFFICE SPACE
9.30 am	Crackers, Ritz, regular size	6 g			Eaten dry, no spread	
	Apple, medium with skin	34 g				
	Milk, 2%	129%				
12.00 noon	Sandwich –white bread	28 g			Ate all	
	-margarine	8 g				
	-ham, processed, Burns	27 g				
	-mustard	5 g				
	Tomato Soup –canned, made with water	129 g		8 g		
3.00 pm	“Dad’s” Chocolate Chip Cookies	24 g				
	Rise’n Shine Orange Crystals Drink	116 g	58 g			

If you have any questions about the Food Diary, please do not hesitate to call me, \_\_\_\_\_, at \_\_\_\_\_ during the day. You can also call Jan Trumble (Project Coordinator), at 474-6874 during the day.

Thank you for keeping your child’s Food Diary. We appreciate your help.

**ALL** information you provide will be kept strictly confidential.

**Have fun keeping the diary!**



## APPENDIX C

### Diet Diversity Coding Template

Table 55 is an example of the coding template to be used to code the foods. All foods item will be assigned a numerical code and these food codes will be used when coding foods items. When a food is eaten a score of one is given and when a food is not eaten a score of zero is given.

**Table 55. Template for coding food items**

<b>Food Codes*</b>	<b>21211**</b>	<b>21212**</b>	<b>21213**</b>	<b>24201**</b>	<b>24202**</b>	<b>24202**</b>
101	1	1	0	0	1	1
102	0	0	0	1	0	0
103	0	0	1	1	0	1
104	0	0	1	0	1	0
105	1	0	1	1	0	1
201	1	1	0	1	0	1
202	0	0	1	0	0	1
203	1	1	0	1	0	1
204	0	0	1	0	1	0
205	1	0	0	1	0	0
301	1	1	1	0	1	0
302	0	0	0	0	1	0
303	0	1	0	1	0	0
304	0	0	1	0	1	1
305	1	0	0	1	0	0
401	0	1	1	1	0	1
402	0	0	0	1	0	0
403	0	1	1	1	1	0
404	1	1	0	0	0	0
405	1	0	0	1	1	1
501	0	0	1	0	1	0
502	1	1	0	1	0	0
503	0	0	1	1	1	1
504	0	1	1	0	0	1
505	1	0	0	1	0	1
<b>Total</b>	10	11	12	15	10	12

\* Food Codes are listed according to food groups. The 100 series represents foods from the Grain group, the 200 series represents foods from the Vegetables and fruit group, the 300 series represents food from the Milk and milk products group, the 400 series represents food from the Meat and alternates food group and the 500 series represents food from the Other foods food group. This in no way reflects the amount of food eaten by the subject.

\*\* The subject identification numbers are used to identify subjects. The first four digits represent the subject and the last digit represents the day of food intake, either day 1, 2, or 3.

Based on the above food codes for two subjects the following Diet Diversity score was calculated for the subjects.

Diet diversity score for Subject 2121 =  $(10+11+12)/3$

11

Diet diversity score for Subject 2420 =  $(15+10+12)/3$

12.3

These scores indicate that subject 2121 eats an average of 11 different foods per day, whilst subject 2420 eats an average of 12.3 different foods per day. This score is not intended to be used in predicting nutrient intake of the subjects but will be used to determine the pattern of food intake for this target group. The diet diversity score will be analysed using bivariate and multivariate analyses to determine whether it is affected by the independent variables in this study.

## APPENDIX D

### List of discrete foods

#### GRAIN PRODUCTS

##### Breads

- White breads
- Whole grain breads
- White rolls/ buns
- Whole grain rolls/ buns
- Plain bagels
- Whole grain bagels
- Breads with added fruit
- Pita bread, plain
- Pita bread, whole grain

##### Cereals

- Plain unsweetened cereals
- Plain sweetened cereals
- Whole grain unsweetened cereals
- Whole grain sweetened cereals
- Cooked cereals (homemade)
- Ready to serve cooked cereal
- Ready to serve –  
sweetened/flavoured cooked  
cereal

##### Pasta

- Plain pasta
- Whole grain pasta
- Egg Noodles

##### Muffins

- Whole grain muffins
- Plain Muffins
- Vegetable/ Fruit muffins
- Tea biscuits, plain
- Tea biscuits, with added fruit
- Fruit/Grain muffins

##### Rice

- White rice
- Brown rice
- Seasoned rice, brown

##### Waffles

- Fruit/ Whole grain Waffles
- Waffles without whole grains

##### Pancakes

- Fruit/ Whole grain Pancakes
- Pancakes without whole grain

##### Crackers

- Saltine crackers, salted
- Cheese crackers
- Whole-grain/vegetable crackers
- Sandwich-type crackers
- Crackers, unsalted
- Taco shells

## VEGETABLES AND FRUIT

### Vegetables

Broccoli  
Cabbage  
Carrots  
Corn, fresh  
Corn, canned/frozen niblets  
Corn, canned/frozen creamed  
Green peas, canned/ frozen  
Lettuce  
Mixed vegetables, frozen/canned  
Bell peppers  
Potatoes, mashed  
Potatoes, boiled/ baked  
Potatoes, fried  
Turnips  
Onions  
Cucumber  
Mushroom, fresh  
Mushroom, canned  
Cauliflower  
Celery  
Spinach  
Plantain, fried  
Bean sprouts  
Green/yellow beans  
Winter squash  
Yams  
Peas and Carrots, canned/ frozen  
Asparagus  
Radishes  
Parsnips  
Artichoke, fresh

### Fruit

Apples, fresh  
Applesauce  
Bananas  
Grapes  
Oranges, fresh  
Oranges/mandarins, canned  
Tomatoes, fresh  
Tomatoes, canned  
Peaches, fresh

### Fruit Cont'd

Peaches, canned  
Kiwi  
Grapefruit, fresh  
Pear, fresh  
Pear, canned  
Strawberry, fresh  
Strawberry, canned  
Blueberries, fresh  
Raspberries, fresh  
Pineapple, fresh  
Pineapple, canned  
Dried raisins  
Fruit salad/cocktail, canned  
Mango  
Cantaloupe  
Watermelon  
Honeydew melon  
Olives  
Plums  
Apricots, fresh  
Apricots, canned  
Apricots, dried  
Papaya, fresh  
Prunes, dried

### Juices/Drinks

Apple juice, sweetened  
Unsweetened apple juice  
Orange juice, sweetened  
Unsweetened orange juice  
Grape juice, sweetened  
Grape juice, unsweetened  
Grapefruit juice, sweetened  
Grapefruit juice, unsweetened  
Grapefruit cocktail  
Cranberry juice  
Cranberry cocktail  
Artificially flavoured drinks with  
added vitamin C  
Artificially flavoured drinks  
without added vitamin C  
Pineapple juice, sweetened

**Fruit Juices/ Drinks Cont'd**

Unsweetened pineapple juice  
Fruit punches  
Raspberry juice, sweetened  
Prune nectar

Tomato juice

Peach/ Orange nectar  
Black cherry nectar

## MILK AND MILK PRODUCTS

### Milk

- Homo milk
- 2% milk
- 1% milk
- Skim milk
- Sweetened flavoured milk
- Condensed milk
- Goat milk
- Soy milk

### Cheeses

#### Hard cheeses

- Cheddar
- Mozzarella
- Parmesan cheese
- Swiss cheese, regular
- Cheddar and Mozzarella marble cheese

### Soft cheeses

- Processed cheese slices
- Cottage cheese, regular
- Cottage cheese, 2% MF
- Cottage cheese, 1% MF
- Cheese spreads/ whiz
- Cream cheese

### Yogurt

- Plain yogurt
- Yogurt with fruit added
- Low fat yogurt with fruit added
- Fruit flavoured yogurt
- Low fat fruit flavoured yogurt
- Low fat plain yogurt
- Frozen yogurt

## MEAT AND ALTERNATES

### Beef

Ground beef/ hamburger patties  
Lean ground beef/ hamburger  
patties  
Baked/Roasted beef  
Beef, boiled for soups/stews  
Corned beef  
Beef, steak  
Beef ribs  
Breaded veal

### Pork

Pork, fresh  
Bacon, side  
Bacon, back  
Ham, baked  
BBQ, Pork spare ribs  
Pork, broiled/ baked  
Pork chops/ loins, baked/ grilled  
Ground pork

### Poultry

Chicken, fresh  
Chicken, baked/ boiled with skin  
Chicken, fried with skin  
Chicken, baked/boiled w/out skin  
Chicken, fried without skin  
Chicken, breaded/fried with skin  
Chicken breaded/fried w/out skin  
Chicken, sautéed  
Turkey, baked/ boiled  
Turkey, ground  
Chicken breaded/baked w/out  
skin  
Chicken burger

### Eggs

Eggs, fresh  
Eggs, scrambled  
Eggs, fried  
Eggs, omelets  
Eggs, boiled/ poached

### Fish

Fish, white, fresh  
Fish, white, baked  
Fish, white, fried  
Fish, white, breaded and fried  
Tuna, canned oil packed  
Tuna, canned water packed  
Salmon, canned  
Sardine, canned in oil

### ALTERNATES

Baked beans in tomato sauce  
Pork and beans  
Peanut butter  
Kidney beans  
Brown beans in tomato sauce

### Processed meats

Wieners/ Bologna/ ham, steamed  
Wieners/Bologna/ham, fried

### Duck

Duck, baked

### Lamb

Lamb, baked/ broiled

## OTHER FOODS

### Puddings

- Rice/ tapioca puddings
- Milk Puddings
- Custards
- Gelatin desert eg. Jello
- Gelatin fruit flavored salads

### Cookies

- Cookies without grains/ fruit
- Cookies with grains/ fruit
- Cream filled cookies
- Biscuit wafers, graham
- Graham crackers

### Cake

- Cake, plain
- Cake with fruit/vegetable
- Wheat cakes

### Soups

- Chicken noodle soup
- Beef noodle soup
- Vegetable noodle soup
- Bean soup
- Noodle soup
- Rice/barley soup
- Cream of chicken soup
- Cream of vegetable soup
- Vegetable chicken soup
- Clear soup
- Seafood chowder/ soup

### Beverages

- Carbonated beverages, regular
- Carbonated beverages, diet
- Beverage syrups/mates
- Tea/coffee
- Sports drinks

### Condiments

- Jams/ Jelly
- Honey
- Butter
- Margarine

### Condiments Cont'd

- Flavoured margarine
- Gravies/Dips
- Ketchup
- Mustard
- Relish
- Pickles
- Pancake/ Waffle syrup
- Pancake/Waffle syrup, lite
- Sugar
- Icing
- Stuffing
- Whip cream

### Snacks

- Potato chips
- Cheezyies
- Corn-based chips
- Popsicles/ frozen lollipops
- Popsicles, milk based
- Granola bars, plain
- Granola bars with fruit/nut
- Granola bars with chocolate coating
- Cereal bars
- Tater gems/ tots
- Ice cream
- Ice cream sandwiches
- Ice cream cone, only
- Doughnut, without fruit or covering
- Doughnut, filled with jam
- Doughnut, covered with icing
- Popcorn, plain
- Popcorn, caramel covered
- Popcorn, cheese flavoured
- Fruit pies
- Sweet buns/ rolls
- Croutons
- Brownie
- Nuts, unsalted
- Nuts, salted
- Nuts, chocolate covered
- Pretzels, salted

Snacks Cont'd

Wantons, fried  
Meat potpies  
Vegetable potpies  
Bean salad

Chocolate/ Candy

Milk Chocolate bars/ eggs  
Milk chocolate bars with fruit/  
nut added  
Milk chocolate, covered  
Fat based candy e.g. toffee  
Sugar based candy e.g. jelly  
beans  
Fruit leathers

Chocolate/ Candy Cont'd

Marshmallows  
Chewing Gum

Salad dressings/sauces

Mayonnaise type dressings  
Oil based dressings  
Whipped cream  
Tomato based sauce/paste  
Cheese based sauces, mixes  
Brown sauces, mixes  
Sour cream  
Lite/Low fat mayo type dressing