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**MOTHERS' EARLY FEEDING PRACTICES AND  
THE ECOLOGICAL FACTORS THAT ARE  
ASSOCIATED WITH IRON INTAKE OF  
9 – 11 MONTH OLD INFANTS IN SOLANA,  
CAGAYAN, PHILIPPINES**

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## ABSTRACT

This study examines early infant feeding practices and the ecological factors that are associated with the diets of 9 – 11 month old infants. A face to face interview using a structured questionnaire was used to obtain the information from mothers of 120 infants in Solana, Cagayan, Philippines. Dietary information was obtained using a 24-hour dietary recall and a one week food diversity checklist. Ninety eight percent of the infants were breastfed but some mothers practiced early introduction of fluids and withholding nourishing foods from the infants. The infants' mean iron intake was found to be inadequate in terms of the RDA, indicating a high risk of iron deficiency. Meat, poultry, and fish were provided in small amounts to the infants and not on a daily basis. Iron fortified foods were also not a significant source of iron. It was found that the infants' food diversity was associated with the infants' iron intake, the higher the food diversity scores of the infants, the higher their iron intake. Factors associated with the infants' diet include maternal educational attainment, maternal attitude to variety of foods and child's sex and age. Attendance at nutrition education activities was not associated with higher iron intake of the infants. Although maternal attendance at bench conferences was associated with higher maternal nutrition knowledge, attendance at bench conference was associated with low iron intake among infants. There was not a clear association between family monthly income and the infants' diet. Maternal nutrition knowledge and the infants' food diversity were found to mediate the relationship between infants' iron intake and family and child's characteristics and nutrition education activities.

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2.2.5 Influences on the Diet Quality, Intake and Nutritional Status of Young Children	26
2.2.5.1 Studies in Other Countries	26
2.2.5.1.1 The child	26
2.2.5.1.2 Household/Family Characteristics	27
2.2.5.1.2.1 Maternal Nutrition Knowledge	27
2.2.5.1.2.2 Maternal Attitude	29
2.2.5.1.2.3 Parental Education	30
2.2.5.1.2.4 Household/Family Size	31
2.2.5.1.2.5 Number of Siblings 0-6 Years Old	32
2.2.5.1.2.6 Household/Family Income	33
2.2.5.1.2.7 Family Food Expenditure	35
2.2.5.1.3 Participation in Nutrition Education Activities	36
2.2.5.2 Studies in the Philippines	38
2.2.5.2.1 The Child	38
2.2.5.2.2 Household/Family Characteristics	39
2.2.5.2.2.1 Maternal Nutrition Knowledge	39
2.2.5.2.2.2 Parental Education	39
2.2.5.2.2.3 Household/Family Size	40
2.2.5.2.2.4 Number of Siblings 0-6 Years Old	41
2.2.5.2.2.5 Household/Family Income	41
2.2.5.2.2.6 Family Food Expenditure	42
2.2.5.3 Summary	43
2.2.6 Dietary Assessment Methods	43
2.2.6.1 24- Hour Dietary Recall	44
2.2.6.2 Diet Record or Diary	45
2.2.6.3 Food Frequency	45
2.2.6.4 Diet History	46
2.2.6.5 Selected Issues Related to Dietary Assessment Methods	47
2.2.6.6 Summary	48
2.2.7 Diet/Food Diversity Score	49
2.2.7.1 Summary	50
2.2.8 Summary	50
<b>CHAPTER 3 MATERIALS AND METHODS</b>	<b>52</b>
3.1 Research Location	53
3.2 Sample Size	55
3.3 Sample Selection	56
3.4 Recruitment	60
3.5 Data Collection	60
3.5.1 Survey	60
3.5.2 Survey Questionnaire	62
3.6 Dietary Assessment Instruments	63
3.6.1 24 - Hour Dietary Recall	63
3.6.2 Food Diversity Checklist	65

3.7 Ethical Considerations	66
3.8 Handling of Data	66
3.9 Data Analysis	67
<b>CHAPTER 4 RESULTS</b>	<b>71</b>
4.1 Response	72
4.2 Socio-demographic Characteristics of the Participants and Index Child	72
4.2.1 Age of Infant	72
4.2.2 Sex of Infant	72
4.2.3 Birth Position Of Infant in the Family	72
4.2.4 Maternal Age	72
4.2.5 Maternal Educational Attainment	73
4.2.6 Family Monthly Income	73
4.2.7 Family Weekly Food Expenditure	73
4.2.8 Number of Household Members	73
4.2.9 Number of Siblings Below Six Years Old	73
4.3 Infant feeding Practices	75
4.3.1 Breastfeeding Practice	75
4.3.2 Provision of Supplementary Feeding	76
4.3.2.1 Provision of Drinks other than Breastmilk	76
4.3.2.2 Provision of “Solid” Foods	76
4.3.3 Foods Withheld from Infants	77
4.3.4 Foods Withheld from Infant When He/She is Sick	78
4.4 Participation in Nutrition Education Activities	79
4.5 Maternal Attitude to Variety of Foods, Meal Planning and Preparation	80
4.6 Maternal Nutrition Knowledge	81
4.6.1 Family Characteristics and Nutrition Education Activities Associated With Maternal Nutrition Knowledge	82
4.6.1.1 Family Characteristics	84
4.6.1.1.1 Maternal Educational Attainment	84
4.6.1.1.2 Number of Siblings Below Six Years Old	84
4.6.1.2 Participation at Nutrition Education Activities	85
4.6.1.2.1 Attendance at Bench Conferences	85
4.7 Infants’ Food Diversity	85
4.7.1 Family and Child’s Characteristics and Nutrition Activities Associated with Infants’ Food Diversity	86
4.7.1.1 Family Characteristics	89
4.7.1.1.1 Family Monthly Income	89
4.7.1.1.2 Maternal Educational Attainment	89
4.7.1.1.3 Maternal Attitude to Variety of Foods	90
4.7.1.2 Child’s Characteristics	90
4.7.1.2.1 Sex	90
4.8 Iron Intake of 9 – 11 Month Old Infants	91
4.8.1 Infants’ Dietary Iron Intake	91

4.8.2 Provision of Iron Supplements	95
4.8.3 Family and Child's Characteristics and Nutrition Education Activities Associated With Infants' Iron Intake	96
4.8.3.1 Family Characteristics	99
4.8.3.1.1 Family Monthly Income	99
4.8.3.2 Child's Characteristics	99
4.8.3.2.1 Age	99
4.8.3.3 Participation in Nutrition Education Activities	100
4.8.3.3.1 Attendance at Bench Conferences	100
4.8.4 Association of Maternal Nutrition Knowledge and Infants' Food Diversity With Infants' Iron Intake	100
4.9 Mediating Effect of Maternal Nutrition Knowledge and Infants' Food Diversity to the Relationship of Family and Child's Characteristics and Nutrition Education Activities With the Infants' Iron Intake	101
4.10 Conceptual Model	104
4.11 Summary	105
<b>CHAPTER 5 DISCUSSION</b>	107
5.1 Methodology	107
5.2 Feeding Practices of Mothers	108
5.3 Maternal Attitude to Variety of Foods, Meal Planning and Preparation	112
5.4 Family Characteristics and Nutrition Education Activities Associated With Maternal Nutrition Knowledge	114
5.5 Family and Child's Characteristics and Nutrition Education Activities Associated with Infants' Food Diversity	115
5.6 Iron Intake of 9 – 11 Month Old Infants	118
5.7 Family and Child's Characteristics and Nutrition Education Activities Associated with Infants' Iron Intake	121
5.8 Association of Maternal Nutrition Knowledge and Infants' Food Diversity with Infants' Iron Intake	123
5.9 Mediating Effect of Maternal Nutrition Knowledge and Infants' Food Diversity to the Relationship of Family and Child's Characteristics and Nutrition Education Activities With the Infants' Iron Intake	124
5.10 Conceptual Model	126
5.11 Limitations of the Study	126
5.12 Summary	127
<b>CHAPTER 6 CONCLUSIONS, RECOMMENDATIONS, AND AREAS FOR FUTURE RESEARCH</b>	129
6.1 Conclusions	129
6.2 Recommendations	132
6.3 Areas for Future Research	136
6.4 Summary	136

<b>REFERENCES</b>	138
<b>APPENDICES</b>	158
Appendix A	Excerpts from Nutrition Information and Education Materials
Appendix B	Map of the Philippines
Appendix C	Map of Philippine Provinces
Appendix D	Map of Cagayan
Appendix E	Map of Solana
Appendix F	Photos from Solana
Appendix G	Information Sheet
Appendix H	Consent Form
Appendix I	Structured Questionnaire
Appendix J	Letter of Research Approval from the Mayor of Solana
Appendix K	Letter of Research Approval from the Municipal Health Officer of Solana
Appendix L	Descriptive Tables

## LIST OF FIGURES

<b>FIGURES</b>		<b>PAGE</b>
2.1	Conceptual model	8
3.1	Diagram of sampling method performed	59
4.1	24-Hour Iron Intake of 9-11 month old infants	91
4.2	Iron sources of infants with low iron intake	92
4.3	Iron sources of infants with medium iron intake	93
4.4	Iron intakes of infants with high iron intake	94

## LIST OF TABLES

<b>TABLES</b>		<b>PAGE</b>
4.1	Socio-demographic characteristics of participants and index child	74
4.2	Duration of exclusively breastfeeding mothers	75
4.3	Foods withheld from infants	78
4.4	Foods withheld from sick infants	79
4.5	Mothers' attendance at nutrition education activities	79
4.6	Factors mothers consider when planning meals	80
4.7	Importance to include variety of foods in planning meals	81
4.8	Importance of feeding children variety of foods everyday	81
4.9	Maternal nutrition knowledge test score	82
4.10	Association of family characteristics and nutrition education activities with maternal nutrition knowledge	83
4.11	Least square means of maternal nutrition knowledge scores for each maternal educational attainment category	84
4.12	Least square means of maternal nutrition knowledge scores for each number of siblings below six years old category	85
4.13	Infants' food diversity scores	86
4.14	Association of family and child's characteristics and nutrition education activities with infants' food diversity	88
4.15	Least square means of infants' food diversity scores for each income category	89
4.16	Least square means of infants' food diversity scores for each maternal educational attainment category	90

4.17	Association of family and child's characteristics and nutrition Education activities with infants' iron intake	98
4.18	Least square means of infants' iron intake for each income category	99
4.19	Least square means of infants' iron intake for each infants' age group	100
4.20	Means of infants' iron intake for each infants' food diversity score tertiles	101
4.21	Mediating effect of maternal nutrition knowledge and infants' food diversity to the relationship of Family and child's characteristics and nutrition education activities with the infant's iron intake	103

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background of the Study

Childhood malnutrition is a major public problem in the developing countries. It has serious effects on the growth and health of children. The death of children under 5 years of age accounts for one in every three deaths in the world (UNICEF, 1988). Protein energy malnutrition (PEM) affects one third of all the children under five in developing countries (UNICEF, 1995).

Aside from protein energy malnutrition, iron deficiency and iron deficiency anemia also have a great effect on the health status and development of children. Inadequate iron intake can reduce immunity and increase susceptibility to infectious diseases (Brock, 1995). Anemia in children, especially at infancy may also cause retarded physical and mental development (Stephenson, 1995). An association between iron deficiency and cognitive performance was seen in infants; anemic infants tend to score lower on mental and/ or motor development tests compared to non-anemic infants (Andraca et al., 1997). Iron deficiency is recognised as the most prevalent deficiency world-wide (WHO, 1972) and children less than two years old are considered as one of the highest risk groups (INACG, 1979). Baynes and Bothwell (1990) cited that prevalence of iron deficiency is estimated at 30% of the world's population, with highest prevalence in developing countries. One of the main causes of iron deficiency anemia in developing countries is poor availability of absorbable iron from the diet (Ohri-Vachaspati & Swindale, 1999).

Breastfeeding protects infants from iron deficiency for the first 6 months of life. Iron deficiency is uncommon in breastfed infants during their first 6 months (Owen et al., 1981; Duncan et al., 1985). Thereafter, infants become dependent upon dietary or supplemental iron to maintain adequate iron stores and to meet the requirements of

rapid growth and development. The emphasis of introducing iron rich foods at 4-6 months is very important (Wharton, 1989).

There are several factors that may influence nutrient intake including social, cultural and economic conditions. Poor people may not be able to buy adequate amounts of iron rich foods and parents of limited education may have the difficulty choosing an infant diet that contains sufficient amount of iron. Some studies show a positive correlation between dietary quality and total family income and between dietary quality and mothers education (Caliendo & Sanjur, 1978; Sanjur, LaChapell & Parker, 1973). Cronin et. al., (1982) also showed that other demographic factors such as age, race and religion significantly affect the selection of some foods and the frequency of their consumption.

Iron deficiency is a significant nutritional problem in the Philippines. A 1993 Nutrition Survey found infants aged 6 months to 1 year have the highest prevalence of iron deficiency anemia (Florentino, Villavieja & Molana, 1996). The 1993 survey found a prevalence of 49.2% in infants 6 months to less than 1 year, this is significantly less than the 70.4% iron deficiency anemia reported in 1987 ( $P < 0.01$ ). This 30.1% reduction was assumed by the National Nutrition Council (1998) to be attributed to the gradual improvement in the Philippine economy. The Council also reported that the supplementation of vitamin A during National Micronutrient Day may have helped improve the iron nutriture of preschoolers, as vitamin A is responsible for the integrity of tissues including mucosal tissues of the gastrointestinal tract where iron absorption takes place.

Despite this improvement iron deficiency anemia still occurs in every region of the country. The 1998 Fifth National (Philippines) Survey showed that anemia among children aged 6-months infants to 5 years old is highest in the Autonomous Region of Muslim Mindanao with a prevalence of 50.6% and lowest at the Northern Mindanao Region with a prevalence of 19.8% (FNRI, 1998).

Breastfeeding in the Philippines is not universal. However, rates of breastfeeding are improving. Zablan (1986) reported a decline in breastfeeding at birth from 87% in 1973 to 85% in 1978 and 83% in 1983. Improvement in these rates were seen in the 1993 and 1998 National (Philippine) Demographic and Health Survey where 82% in urban areas and 93% in rural areas were breastfeeding in 1993 and 83% in urban areas and 92% in rural areas were breastfeeding in 1998 (National Statistics Office, 1994 and 1998).

The duration of breastfeeding in the Philippines is erratic. Zablan (1986) reported a decline in the mean duration of breastfeeding from 12.3 months in 1993 to 11.4 months in 1978 to 9.6 months in 1983. The 1993 National (Philippine) Demographic and Health Survey reported an increased in mean duration of breastfeeding to 14.1 months but again this declined to 13 months in the 1998 National (Philippine) Demographic and Health Survey (National Statistics Office, 1998). The National (Philippine) Statistics Office (1994) stated that this duration is only a slightly shorter than Thailand (14.5) but much shorter than Indonesia (23.3).

Solana is a rural area. There is no information on the prevalence of iron deficiency among infants in the municipality. However, the Cagayan Valley Region, ranked second among all the regions in the country with the highest prevalence of anemia (48.8%) among children aged 6-months infants to 5 years old and Cagayan, where Solana is located ranked second among all the provinces of Cagayan Valley with the highest prevalence of anemia at 51.1% (FNRI, 1998). Therefore it is thought that the infants of Solana are at risk of iron deficiency.

The majority (83%) of women in Solana, Cagayan, Philippines initiate breastfeeding (Rural Health Unit, 1999). Statistics show that majority of women in Solana introduces supplementary foods at the recommended age (4-6 months), however, there is no information on what supplementary foods are given to infants. In particular there is no information as to whether the children are receiving foods which are rich sources of iron and what factors influence their diet quality.

One of the interventions aimed at improving nutritional status of the children in Solana is nutrition education, in which the importance of both diet diversity and including iron rich foods in the diet is explained. It is thought that mothers who attend nutrition education activities such as nutrition classes, individual health teachings, bench conferences and household teachings and learn the information will be more likely to provide iron rich diet to their children.

### **1.2 Purpose of the Study**

The purpose of this study is to describe the early feeding practices and to examine the ecological factors that are associated with diet quality, particularly iron intake, of 9-11 month old infants in Solana, Cagayan, Philippines, so that appropriate nutrition interventions can be planned.

### **1.3 Objectives**

- A. To describe the early feeding practices of mothers with 9 – 11 month old infants in Solana, Cagayan, Philippines.
  
- B. To examine the ecological factors that are associated with the diets of 9-11 month old infants in Solana, Cagayan, Philippines.

Specifically to answer the following questions:

1. What are the early feeding practices of mothers with 9 – 11 month old infants?
  
2. What is the level of iron in the diets of 9 -11 month old infants? Is iron provided in sufficient amounts so that the risk of iron deficiency is low?
  
3. What family and child's characteristics and nutrition education activities are associated with infants' food diversity?

4. What family and child's characteristics and nutrition education activities are associated with infants' iron intake?
5. Is maternal nutrition knowledge and infants' food diversity associated with iron intake of the infants?
6. Is the relationship of family and child's characteristics and nutrition education activities with the infants' iron intake mediated by maternal nutritional knowledge and infants' food diversity?

#### **1.4 Scope and Delimitation**

The study is confined to 9-11 month old infants in Solana, Cagayan, Philippines. The study will examine the early feeding practices of mothers and the ecological factors, particularly the family and child's characteristics and nutrition education activities that have associations with the infants' food diversity and iron intakes. It will also examine if the effects of these factors on the infants' iron intakes are being mediated by the mothers' nutrition knowledge and infants' food diversity.

This thesis contains 6 Chapters. Chapter 2 contains the conceptual framework and a review of the related literature with respect to infant feeding, iron deficiency among infants, and factors affecting diet quality, intake and nutritional status of young children and the dietary assessment methods. The municipal nutrition program of Solana will also be discussed in this chapter. Research methodology will be described in chapter 3. In chapter 4, research results will be outlined. Results will be discussed in chapter 5. The final chapter, that is chapter six, will outline the conclusions, recommendations and areas for future research.