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NOV 2001



THE EFFECT OF BREAST-FEEDING PATTERNS ON DIARRHEA  
AMONG YOUNG INFANTS IN LAOS IN 2000



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A THESIS SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR  
THE DEGREE OF MASTER OF ARTS  
(POPULATION AND REPRODUCTIVE HEALTH RESEARCH)  
FACULTY OF GRADUATE STUDIES  
MAHIDOL UNIVERSITY

2001

ISBN 974-04-0549-5

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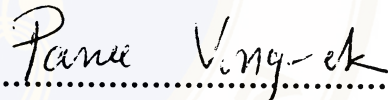
Thesis

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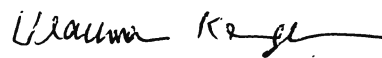
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THE EFFECT OF BREAST-FEEDING PATTERNS ON DIARRHEA  
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was submitted to the Faculty of Graduate Studies, Mahidol University  
for the degree of Master of Arts  
(Population and Reproductive Health Research)

on  
August 27, 2001



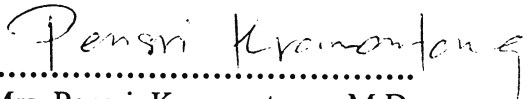
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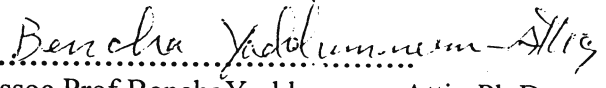
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## ACKNOWLEDGEMENT

Firstly, I would like to express my deep appreciation to the government of the Lao People's Democratic Republic, the Ministry of Health and the World Health Organization (WHO) for providing me a precious opportunity to further my study at the Institute of Population and Social Research (IPSR), Mahidol University, Thailand.

Secondly, I would like to express my sincere thanks and gratitude to my major-advisor, Dr. Panee Vong-Ek for her guidance, valuable assistance, supervision and encouragement throughout the process of my thesis. I am also grateful to my co-advisor, Dr. Wathinee Boonchalaksi for her useful contribution, suggestions, comments and patience. I would like to express my gratitude to Dr. Pensri Kamonthong for her fruitful comments and advice. It was their help that enabled me to complete this thesis.

My appreciation also goes to Dr Bencha Yoddumnern-Attig, Director of IPSR, Dr Uraiwan Kanungsukkasem, Director of the Program and Dr Chai Podhisita formed Director of the Program for their kind support during my study. I wish to express my thanks to all the lecturers of this course and all members committee of my thesis whose contributions have enriched and fulfilled my thesis. I would like to express my sincere thanks to Dr Ramon C. Sevilla, Foreign Expert and Dr Hendro Hendrano S.Kom , Chief of Data Processing, University of Indonesia for helping me with the data for my thesis.

Special thanks to Mr Bounthavy Sisouphanthong, Director of NSC of Lao PDR and all the staff for allowing me to use the Lao Reproductive Health Survey (LRHS) 2000

I also wish to acknowledge the kind assistance that I have received from my friends through out the year during my study, the staff of IPSR, Khum Luxana Nilubol and team work.

Last and the most I would like to thank and express my deepest love to my husband Dr Outhip Sounthavong for giving me the necessary support and encouragement during my study. I would also like to thank and pay my heartiest respect to my parents and all family members for being the most loving and supportive parents and family. My deep appreciation also goes to my lovely daughters Lena, Linda and Lita for their moral support, encouragement and understanding throughout my time of study.

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KEYS WORDS : EFFECT / BREAST-FEEDING PATTERNS / DIARRHEA / YOUNG INFANTS/ IN LAOS IN 2000

KOPKEO SOUPHANTHONG: THE EFFECT OF BREAST-FEEDING PATTERNS ON DIARRHEA AMONG YOUNG INFANTS IN LAOS IN 2000. THESIS ADVISORS: PANEE VONG-EK, Ph.D., WATHINEE BOONCHALAKSI, Ph.D. 64 p. ISBN 974-04-0549-5

Diarrhea is one of the leading causes of child morbidity and mortality and it is also considered as the second major health problem of children in Lao villages. Even though a vast majority of Laotian babies are being breast-fed, the majority of them received supplementary food at an early age. One of the reasons for such major health problems may be attributed to the breast-feeding patterns of mothers. This study has investigated the breast-feeding patterns of mothers in Laos. It has also analyzed the relationship between breast-feeding patterns, socio-demographic characteristics, and household facilities of mothers and infants with diarrhea.

Data from the Lao Reproductive Health Survey 2000 was used for the study. A total of 2590 mothers who were still breast-feeding their infants, 0-4 months, were selected. Bivariate analysis was used to examine the relationship between selected characteristics of mothers, such as: breast-feeding patterns, socio-demographic characteristics and household facilities of mothers and infants with diarrhea. Then, logistic regression analysis was used to study the effect of breast-feeding patterns of mothers in relation to diarrhea among infants.

The study revealed that only a few infants were exclusively breast-fed. The majority of them received mother's milk with two combinations of supplementary food. Infants who were exclusively breast-fed had a lower percentage of getting diarrhea than those who were non-exclusively breast-fed. In Bivariate analysis, it was found that breast-feeding patterns, age and level of education of mothers had a significant relationship with diarrhea in infants. The findings from logistic regression analysis show that infants from young mothers were nearly two times more likely to suffer from diarrhea than those from older mothers.

The findings of the study indicate that age of mothers plays an important role in infants getting diarrhea. Therefore, it could be suggested that both the National Breast-Feeding Promotion Programme and the National Diarrhea Disease Programme should be strengthened with information dissemination, especially to young mothers about the benefits of breast-feeding and prevention of diarrhea for infants. It should also particularly emphasize exclusive breast-feeding for at least up to 4 months.

# CONTENTS

	Page
ACKNOWLEDGEMENT .....	iii
ABSTRACT .....	iv
LIST OF TABLES .....	vii
LIST OF FIGURES .....	viii
CHAPTER I - INTRODUCTION	
1.1 Background of the study .....	1
1.2 Problem identification .....	3
1.3 Rational and justification .....	4
1.4 Objectives .....	6
CHAPTER II - LITERATURE REVIEW	
2.1 Diarrhea .....	7
2.2 The benefits of breast-feeding for child health.....	7
2.3 The impact of breast-feeding for child health and development .....	10
2.4 Empirical research findings about breast-feeding and diarrhea ... ..	11
2.5 Breast-feeding patterns and diarrhea .....	12
2.6 Socio-demographic characteristics of mothers and household facilities and diarrhea .....	14
2.6.1 Age and parity and residence of mothers and infants with diarrhea .....	14
2.6.2 Education and occupation of mothers and infants with diarrhea .....	15
2.6.3 Household facilities and diarrhea .....	16
2.6.4 Age of infants and diarrhea.....	17
2.7 Conceptual Framework .....	17
2.8 Hypotheses .....	19
CHAPTER III - METHODOLOGY	
3.1 Source of data .....	20
3.2 Sampling design .....	20
3.3 Unit of analysis .....	21
3.4 Research instruments .....	21
3.5 Operational definition .....	22

## CONTENTS (Cont.)

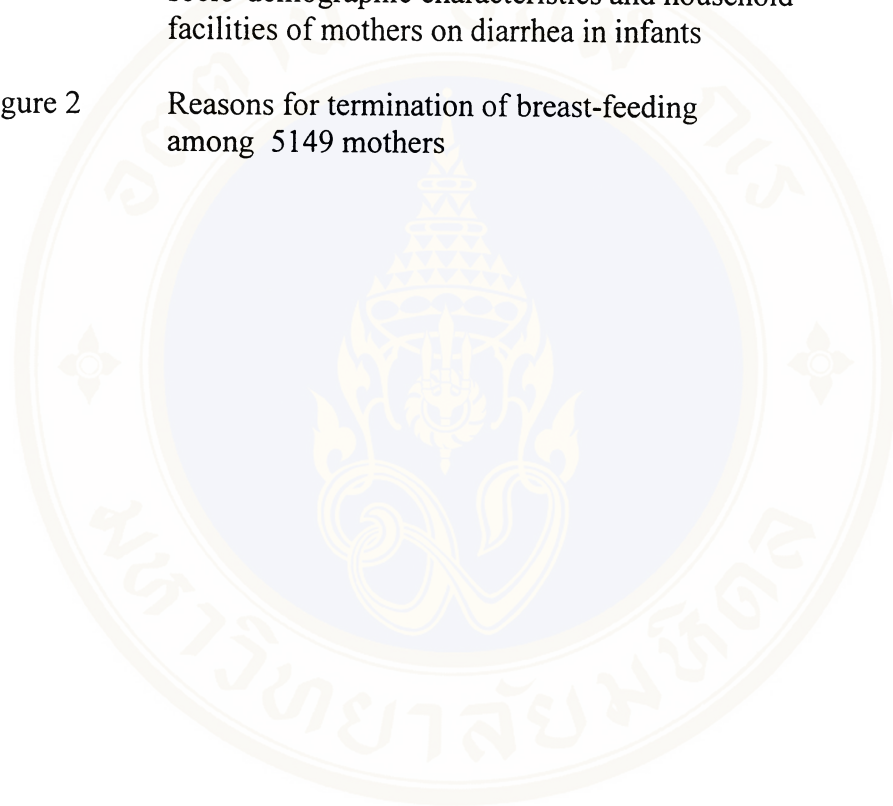
3.1 Method of analysis .....	27
3.2 Limitation of the study .....	27
 CHAPTER IV - RESEARCH FINDINGS AND DISCUSSION	
4.1 Background characteristics .....	29
4.1.1 Breast-feeding status at four months infants .....	29
4.1.2 Household facilities .....	36
4.1.3 Age of infants and diarrhea .....	37
4.2 Bivariate analysis .....	38
4.2.1 Breast-feeding patterns and age of infants.....	38
4.2.2 Breast-feeding patterns and infants with diarrhea .....	40
4.2.3 Socio-demographic characteristics of mothers and infants with diarrhea .....	42
4.2.4 Household facilities and infants with diarrhea .....	44
4.3 Multivariate analysis .....	46
 CHAPTER V - CONCLUSION AND RECOMMENDATIONS	
5.1 Conclusion .....	49
5.2 Recommendations .....	51
 BIBLIOGRAPHY .....	 53
 APPENDIX .....	 59
 BIOGRAPHY .....	 64

## LIST OF TABLES

<b>Table</b>		<b>Page</b>
Table 1	Operational definition of dependent and independent Variables	25
Table 2	Percentage distribution of breast- feeding status at four Months	30
Table 3	Percentage distribution of breast -feeding patterns among infants	33
Table 4	Percentage distribution of socio-demographic characteristics of mothers	35
Table 5	Percentage distribution of household facilities	36
Table 6	Percentage distribution of age of infants and diarrhea	37
Table 7	Percentage distribution of age of infants by breast-feeding patterns	39
Table 8	Percentage distribution of infants with diarrhea during two weeks preceding the survey by breast- feeding patterns	41
Table 9	Percentage distribution of infants with diarrhea during two weeks preceding the survey by socio-demographic characteristics of mothers	43
Table 10	Percentage distribution of infants with diarrhea during two weeks preceding the survey by household facilities	45
Table 11	Logistic regression analysis of all the independent variables and diarrhea disease	48

## LIST OF FIGURES

		<b>Page</b>
Figure 1	Conceptual Framework showing the relationship between breast-feeding patterns, child characteristic, socio-demographic characteristics and household facilities of mothers on diarrhea in infants	18
Figure 2	Reasons for termination of breast-feeding among 5149 mothers	31



## CHAPTER I

### INTRODUCTION

#### 1.1 Background of the Study

The Lao People's Democratic Republic is located in the South East Asia, sharing common boundary with China to the North, Myanmar to the North-West, Thailand to the West, Cambodia to the South and VietNam to the East. It covers an estimated area of 236,800 square kilometers, which is mostly mountainous. It has a total population of 4,6 million living sparsely in more than 12,000 villages of 17 provinces and one special region. Lao P.D.R is one of the least populated countries in South East Asia with an average population density of 19 persons per square kilometer and population growth rate of 2.5 percent. (NSC, 1997).

Lao P.D.R. has a high rate of infant and child mortality compared to other countries in the South-East Asian region with 104 per 1000 live births and 142 per 1000 live births respectively (MOH/WHO, 1999). The leading causes of infant and child mortality are malaria, diarrhea diseases and acute respiratory infection. In Laos, diarrhea disease is the second cause of child mortality after malaria with an estimation of 4,000 under five deaths each year (UNICEF 1996). Diarrhea is also a leading cause of illness and death among young children in developing countries. Overall these children experience an average of 3.3 episodes of diarrhea per year, but in some areas the average exceeds 9 episodes per year. About 80 percent of children died in the first two years of their life, due to the occurrence of diarrhea disease. Where episodes are frequent, young children may spend more than 15 percent of their days

with diarrhea. Diarrhea is most common in children, especially those between 6 months and two years of age. It is also common in babies under 6 months who are not breast-fed. The faecal-oral route usually spreads the infectious agents that cause diarrhea. They may be ingested with faecally contaminated water or food, or by direct contact with infected faeces. A number of specific behaviors help infectious agents to spread and increase the risk of diarrhea including failing to breast-feed exclusively for the first 4-6 months of life, using infant feeding bottle, drinking unsafe water and improper dispose of faeces (WHO, 1995). According to the Lao Social Indicator Survey in 1994, although 95 percent of women breast-feed their babies, almost all of the babies have received supplement feeding too early, within few weeks of birth. Misbelieve regarding colostrum as bad milk causing diarrhea is common among mothers. With an open market economy, due to commercialism, there is a growing number of urban and peri-urban working mothers switching towards feeding their babies with formula milk at an early stage (UNICEF, 1996).

Evidence suggested that there was a doubling in the prevalence of getting diarrhea when the child received liquids such as water or herbal teas in addition to breast milk. Each additional fluid feeding resulted in a 40 percent increase in the risk of death from diarrhea among breast-fed infants (Victora, 1996). Clemens in 1997 revealed that breast-fed infants are more likely to have overall reduction of the risk of severe diarrhea.

Therefore the National Commission on Mothers and children in Laos has called for a national plan of action on Baby Friendly Hospital Initiative (BFHI). Since 1996 some hospitals have announced their commitment to initiate BFHI and start teaching mothers on breast feeding practices (UNICEF, 1996).

## 1.2 Problem identification

Lao P.D.R. is still facing with high infants mortality rate with an average of 104/1000 live births (MOH/WHO, 1999). There is an evidence from household survey on acute respiratory infection and diarrhea diseases, which was carried out in 1993 and 1996, indicated that the population consider diarrhea disease as a second major health problem in Lao villages (Tegnell, 1996). A survey conducted by UNICEF in 1994 showed that mothers did not have much knowledge about diarrhea. 70 percent of them considered it as dangerous, while only 12 percent (13 out of 110) of respondents really understand what causes diarrhea. It was believed that having clean food, boiled water and hygienic living conditions could help preventing diarrhea. Regarding breast feeding for child with diarrhea, most mothers keep feeding children with breast milk because children cry for it, and they do not know what else to give (UNICEF/MCHI, 1994) According to mothers' belief and practice, some newborn babies do not receive colostrum which is considered as a bad or sour milk. Eventhough 95 percent of Laotian women breast-feed their new born, only one in every three mothers practice exclusive breast-feeding up to four months and over 40 percent of mothers begin giving pre masticated rice to infants at an early age (UNICEF , 1996).

The majority of children, around 75.1 percent ceased breast-feeding before reaching the age of two years. The main reason for ceasing breast-feeding may include that a mother has got a new pregnancy and a belief that bottle-feeding is more modern, advertisement of infant formula, difficulty in breast feeding while at work, fear of becoming less sexually attractive and belief that one cannot breast-feed adequately. About 10 percent of children in the age of 6-9 months received an

appropriate supplementary food, more often in urban than in rural areas (WHO, 1995; MOH/NSC., 2000). In rural areas there is a difficulty in accessing to safe drinking water and proper toilet. 70 percent of rural household have no proper toilet while around 70 percent of urban households have normal or modern toilet. Further, 96 percent of rural households get their drinking water from river, bore, well and pump while 56 percent of urban household obtain their drinking water from piped and filtered water system (NSC/UNFPA., 2001).

Regarding literacy issue, 40 percent of the Lao population had never been to school. There were also significant differences in school attendance between people in urban and rural areas. In urban areas 14 percent had never been to school compared to 43 percent in rural areas. Females in rural areas had the highest percentage of never been to school which is 53 percent (NSC, 1997).

### **1.3 Rational and justification**

Among all the serious health problems, diarrhea is the most important health problems of infants and children under five years of age in Laos. More over, the knowledge of mothers on this disease seem to be limited. (Tegnell, 1996). The main reason that mothers breast-feed their infants is for the health of their child. Breast milk promotes normal infant development because it is the natural extension of life after the womb. Human milk provides many protective factors that can enhance the immune system of a new born child against infection (Oddy et al., 2001) Almost all countries generally accept that breast-feeding is the best form of feeding during the first six months of infancy. In Laos, breast-feeding is universal. There are slightly over 95 percent of children are being breast-fed. It was found that a small percentage

of children are exclusively breast-fed, that is 11 percent below 4 months. Almost all-Laotian babies are breast-fed with supplementation at a very early age. This practice is not recommended by the health authority or WHO (NSC/UNFPA, 2001).

There is an evidence considered that breast-feeding may be the most effective measure of all GOBI-FFF interventions, as its key role in each of the other Mother and Child Health priorities underlines. Breast milk can provide a form of passive immunization against infection. Bottle-fed babies are more likely to be malnourished and contacted with diarrhea infection, because milk powder being over diluted with unclean water in unsterilized feeding bottle that is often left to stand in the tropical heat. Breast-feeding is not only important for the growth and nutrition of the infant but it also can prevent and protect against diarrhea related morbidity and mortality. Breast-fed infants are more likely to have overall reduction of the risk of severe diarrhea (Price, 1994; Victoria, 1996; Clemens , 1997 ).

Hence this study will examine the relationship between breast-feeding patterns and diarrhea disease among infants in Laos. The results of this study will be used for targeting intervention campaigns at the most vulnerable age group and would be useful for future plan of action for related health sectors in order to reduce infant and child morbidity and mortality especially due to diarrhea disease. It will help the Breast-feeding Program of the country in increasing awareness among all women about the importance of colostrum feeding and exclusive breast-feeding up to four months. It will also serve as a baseline data and information for formulating a practical strategy plan of action in order to promote effective breast-feeding and prevention of diarrhea.

#### 1.4 Objectives

- To investigate breast-feeding patterns of mothers with infants in Laos.
- To examine the relationship between breast-feeding patterns and diarrhea among infants in Laos which is controlled by socio-demographic factors .
- To study the effect of breast-feeding patterns on diarrhea.

This thesis is organized in the following manner: The background, problem identification, rational and justification and the objectives of the study are given in this first chapter. The chapter two will reveal the literature review of the previous studies related to the issue of breast-feeding and diarrhea disease. This chapter will include the conceptual framework and hypotheses of the study. The third chapter will give the description of the source of data used and method of analysis including the operational definition. The fourth chapter will present the research findings and discussion. Finally the fifth chapter will conclude the research findings, followed by the suggestion and recommendations for further study.

## CHAPTER II

### LITERATURE REVIEW

#### 2.1 Diarrhea

Recently throughout the world, it was found that each year children under 5 suffer over 1.3 billion episodes of diarrhea, which is a major killer of these children. The World Health Organization estimates that in 1990 diarrhea caused 3.2 million deaths in children under 5 years of age. Half of the diarrhea deaths were due to dehydration. Most of the deaths could have been prevented with simple and cheap treatment. . In many developing countries over two- thirds of admissions to pediatric wards in hospitals are for diarrhea (WHO, 1996). For a long time it has been thought that any steps of improving hygiene or the cleanliness of food, water and the environment will help prevent diarrhea. Recent research shows that some preventive interventions are particularly effective and affordable which include: breast-feeding, improved weaning practices, the use of plenty of clean water, hand washing, the use of latrines, proper disposal of babies' stools and measles immunization (WHO, 1995).

#### 2.2 The benefits of breast-feeding for child health

It has been well recognized by more than two decades of research that breastmilk is a complete and balanced food and contains both antibodies and antibiotic properties that provide important immunological protection against infection. Breast-feeding enhances immunological mechanisms of protection against specific diarrhea disease (WABA, 1998; Guerrero et al., 1999; WHO/UNICEF,

2000). The primary benefits of breast milk for infants is nutritional and more hygienic that protect infants from illness and it is also cheaper than bottle feeding . Breast milk is perfectly suited to nourish infants ,and the particular value of breast-feeding has been under emphasized. It was view that human milk is made for human infants and it meets all their specific nutrient needs. It is more hygienic because breast milk come straight from the breast which is always sterile. It has never contaminated by polluted water or dirty bottles, which can also lead to diarrhea in the infant. It also contains immunoglobulins, phacocytes, T lymphocytes, enzymes such as lysozymes and many other factors that help protect an infant against infections, including cells, antibodies, hormones and other important constituents that could not find in infant formula. Breast milk has a protective components which are directly responsible for reducing the incidence of many illnesses in infancy and childhood including acute diarrhea, lower respiratory tract infection and ear infections and other less common disease such as bacterial meningitis, urinary tract infections and sudden infant death syndrome. Breast-fed babies have fewer illnesses compared to the non breast-fed ones, as human milk transfers to an infant a mother's antibodies to prevent diseases. About 80 percent of the cells in breast milk are macrophages, cells that kill bacteria, fungi and viruses. Furthermore, mothers produces antibodies to what ever disease is presented in their environment, making their milk custom-designed to fight the disease that their babies are exposed to as well (Chayovan et al., 1990; Forste, 1994; Williams, 1995 ; Laham , 1999; PAHO/WHO, 2000; Oddy, 2001). Health experts say increased breast-feeding rates would save consumer's money spent both on infant formula and in health care and would enhances a child's development, intelligence and would also protects environment as well. For instance one family can save 808 \$

per year if a women breast-feed each of her child for at least 6 months (William, 1995; Wall, 1999). Therefore mother's milk involves no expenditure nor preparation time . It is an ideal food for infants, and it is much more economical than any breast milk substitute(Grant, 1986; Teran , 1991).

In addition it has been shown that Breast-feeding not only provide benefits for children but for women who breast-feed their babies as well. The advantages of breast-feeding for women are increasingly recognized . For instance women who practice breast feeding have a contraceptive effect through inhibiting ovulation which temporally reduce in fertility . Further, a rapid return to normal weight, a reduction in women's risk for pre menopausal breast cancer , ovarian cancer and osteoporosis in their later years are seen (Grant, 1986 and WABA, 1998) It is now recognized that breast-fed baby's digestive tract contains large amounts of *Lactobacillus bifidus*, beneficial bacteria that prevent the growth of harmful organisms (Williams, 1995)

In contrast to the above finding, Shadigian et al,(1998) argue that while most physicians agree that breast-feeding is the best, many feel that bottle feeding is nearly equivalent. This argument has a great effect on people, for instance, some patients and a few clinicians subscribe to the concept that formula milk is a good as breast milk. More over, the influence of the argument is an obstacle to those who support the idea that breast milk is the best. However, there is no clear evidence to prove that the above argument is correct. On the other hand, there are evidences justified that breast-feeding has proved to be superior to artificial supplements for mental, financial, social and psychological reasons. Accordingly, formula milk increases health risk to children when it is unnecessarily used to replace breast milk (Moreland et al., 2000). There are suggestions that mothers should be able to breast-feed their infants

exclusively for at least the first four months or six months without food or liquid supplementation if it is possible for infants' lives. Likewise, mothers should continue to breast-feed their infants with appropriate and adequate complementary food for up to the age of two years or beyond. Many infants who are not breast-fed in the first few weeks or months, will have a high risk of illness, malnutrition and death (NCSE, 1994; WHO, 1998). PAHO/WHO (2000) justified that infants at the age range of 4 to 6 months were recommended to be exclusively breast-fed because of the need for a transitional period in order to allow them to adjust to solid foods and begin to receive a variety of locally available and safely prepared foods.

### **2.3 The impact of breast-feeding for child health and development**

Adair et al., (1993) reported that, duration of breast-feeding which postulates the concern about the promotion of proper infant feeding patterns is wide spread. The effect of breast-feeding on an infant and a mother, especially exclusively and partial breast-feeding, are profound. Of a particular importance to infants are protection from diarrhea morbidity and the enhancement of the growth. There seems to be a general agreement on impact of breast-feeding on child health which convinces that if bottle feeding commenced before the age of three months, the number of infant mortality from bottle fed babies was three times more than in those from breast-fed babies. Bottle-feeding threatens the lives of million of children. Besides, bottle fed babies is more likely to be malnourished and to get diarrhea infection. Therefore, breast-feeding was a major factor in child survival (Ebrahim, 1989; Price, 1994). Further, there is an evidence of a link between having been breast-fed as a child and a strong intellectual development, and a reduction the risk of several chronic diseases.

Increasingly, studies support that breast-feeding has significant benefits for children. Breast-feeding, particularly exclusive breast-feeding, has great benefits for health through out the life cycle (Shadigian et al., 1998; PAHO/WHO, 2000).

Recent investigations have also shown that human milk contains the right amount of fatty acids, lactose, water, and amino acids for human digestion, brain development and growth. More over, nursing may also have psychological benefits for an infant as well as creating an early attachment between mother and child. Besides, the act of suckling is a form of intimate communication between a mother and her infant, and it contributes to the creation of the love bond between them (Ebrahim, 1989; Williams, 1995; Moreland, 2000).

#### **2.4 Empirical research findings about breast-feeding and diarrhea**

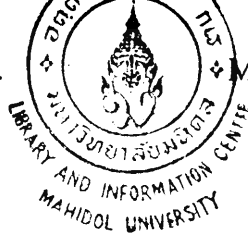
Regarding breast-feeding and diarrhea disease , one of the great arguments in favour of the advantages of breast-feeding has long been its anti-infectious properties. Breast-fed infants can thrive in the in the areas of poverty under deficient sanitary conditions, because the anti-infectious properties of human milk consisted of a very high resistance to infection in general, and particularly to diarrhea (Grant, 1986). Failing to breast-feed infants until at least one year of age caused an increase in the incidence of diarrhea and a risk of death (WHO, 1995). Studies of breast-feeding practices indicate the importance of protective components in human milk on diarrhea disease: for instance breast-feeding reduces the incidence of diarrhea. In addition, for children who have already developed diarrhea, breast-feeding reduces the severity of the episode and a risk of dehydration or case fatality rate. The case fatality rate was three to four times lower for those who were breast-fed. Breast-feeding strongly

protects infants against diarrhea mortality. But there is a clear effect of age with the greater protection among young infants. Children who continued to be breast-fed during the second and third years of life did not experience any reduction to the risk of severe diarrhea. Additionally, infants who are recently weaned may be more vulnerable (WHO,1995; Victoria, 1996; Shadigian et al.,1998; Wall, 1999; Oddy, 2001). Therefore it is time that everyone accept breast-feeding as the biological norm, in terms of both feeding and caring for human infants. As non-breast fed babies have more diseases and poorer psychological development than breast-fed babies.

## **2.5 Breast-feeding patterns and diarrhea**

Despite the high prevalence of breast-feeding, only a small proportion of infants below four months of age are exclusively breast-fed in developing countries. The number of diarrhea morbidity and mortality has increased by the introduction of other milk or gruel. However, when breast-fed infants develop shigellosis or cholera, the risk of severe disease is less. Studies from countries with low infant mortality rates show that infant fed by artificial milk require hospital treatment up to five times more often than those who are fully or partially breast-fed. The maximum protection, however, is provided by exclusive breast-feeding (Haider et al., 1996)

A major issue raised in the last decade is the importance of exclusive breast-feeding for the prevention of diarrhea. . Results of Peruvian longitudinal study show the percentage of days in which a child had diarrhea was related to feeding patterns. Evidence indicated that infants who were weaned during the first week of life had a risk of diarrhea three times greater than those who were exclusively breast-fed. In addition, children receiving only artificial milk were at a particular high risk of



diarrhea. An addition of any supplements, either artificial milk or food resulted in at least two to threefold increase in the risk of having diarrhea. The incidence of diarrhea is higher in weaned children than in partially breast-fed children (Molbak et al., 1994; Victora, 1996). Many studies consequences of breast-feeding have included non nutritive supplements in the definition of exclusive breast-feeding which is no other liquid or solid enters the infant's mouth. Since research has shown that even minimal supplement have an effect on morbidity, nutritional status and mortality in infants. Accordingly, data from Demographic and Health Survey shows that even the addition of water alone increases the risk of diarrhea (Labbok et al., 1990; Laurence et al., 1996). Non breast-fed infants were 21 times more likely to die of diarrhea than exclusively breast-fed infants (Molback et al., 1994; Williams, 1995; Victoria, 1996; Laham, 1999). Initiation of breast-feeding shortly after delivery may enhance breast-feeding's protective effect against diarrhea because of the protective properties of human colostrum contained in early breast milk. (Clemens et al., 1999). According to Hotchner in 1984 (Cited in Vong Ek, 1990) identified that the greatest benefit of colostrum is the accumulation of antibodies in the baby (Vong Ek, 1990). In developing countries breast-feeding has been documented to reduce their risk of diarrhea. In addition, ingestion of maternal colostrum, produced in breast milk during the first days after delivery, has long been thought to confer additional protection against infantile diarrhea, because of the immune and nonimmune properties of colostrum. Studies found that infants in whom breast-feeding was initiated early had a 26 percent lower rate of diarrhea than those initiate late. Conversely, relative to infants who were not breast-fed, infants who were breast-fed exclusively had 33

percent lower rate of diarrhea, and infants who were partially breast-fed had 28 percent lower rate of diarrhea (Clemens et al., 1999).

In comparison with other feeding modes, exclusive breast-feeding was associated with a significant reduction of risk of diarrhea, cough or wheeze as well (Clemens, 1997; Raisler et al., 1999). Similarly, an observational studies of PAHO/WHO, (2000) and studies from Division of Child Health and Development,/WHO (1991)demonstrate that the increased risk of diarrhea during the 4 to 6 months period caused by an introduction of complementary foods compared to exclusive breast-feeding such as giving water and/or teas in addition to breast milk. WHO has estimated that promotion of breast-feeding could lead to a 25 percent reduction in diarrhea mortality in the first six months of life (Haider et al., 1996).

## **2.6 Socio-demographic characteristics of mothers and household facilities and diarrhea**

### **2.6.1 Age and parity and residence of mothers and infants with diarrhea**

Al-Barakani et al., 1999 have identified that levels of mortality of children are related to the age of mothers. Infant and child mortality rates are higher in children born to very young mothers under 20 years of age. However, mortality rates for children born to women aged 40-49 are not substantially different from those for children born to women aged 20-39.(Al-Barakani et al. , 1999) . The mean duration of breast-feeding increases with age and parity, through the age effects are stronger in population in which women breast-fed for relatively long period (Trussel et al., 1992). Although, with the increase of maternal age, the duration of breast-feeding is lengthened, the duration of exclusive breast-feeding is shortened. The older mothers

and urban residents are more likely to supplement their infant earlier (Adair et al., 1993). An evidence from the WHO collaboration study on breast-feeding shows that the expected percentage of mortality due to diarrhea among children under five years of age is 1 percent for long duration of breast-feeding and 14.8 percent for short duration of breast-feeding (Victora, 1996).

### **2.6.2 Education and occupation of mothers and infants with diarrhea**

The powerful effect of maternal education on child survival has been observed by many developing countries. Formal education of mothers is important to the promotion of child health and disease prevention (Muhuri, 1995). The finding of Schultz, 1993; World Bank, 1993 (cited in Desai et al., 1998) validated the above argument and it demonstrated a strong correlation between maternal education and child health\_ for example children of educated mothers experience lower mortality than those of uneducated mothers. As noted above, maternal education and child health has shown a strong correlation and educated mothers are more likely to engage in health promoting behavior (Desai .et al., 1998). Education of mother is also an important predictor of breast-feeding. In industrialized countries, educated women are more likely to breast-fed their babies and for the longest period. On the other hand in developing countries maternal education has been associated with lower rate of breast-feeding with both the initiation and the length of breast feeding (Chayovan et al., 1990; Trussel et al., 1992; WHO, 1998). Women who are employed may be more likely to wean their infants at a very early age and cease breast-feeding earlier which may effect breast-feeding duration (Adair et al., 1993). However there has been considerable debate that maternal education does not have a significant effect on

the incidence of diarrhea. Similarly argument regarding the reduction in diarrhea deaths, with better implementation of oral rehydration therapy by educated mothers fail to focus on the importance of this behavior to actual mortality (Jensen et al., 1996; Desai et al., 1998). Therefore the debate in relationship between mother education, maternal occupation and diarrhea disease in children is not conclusive and needs to be investigated.

### 2.6.3 Household facilities and diarrhea

WHO (1996) indicated that every eight seconds a child die of water related diseases. Every year more than five million human being die from illnesses linked to unsafe drinking water, unclean domestic environment and improper excreta disposal. Therefore, improving water and sanitation can reduce morbidity and mortality rates of some of the most serious diseases by 20 to 80 percent. The finding of Sastry , (1996) and Al-Barakani et al., (1999), maintain the above statement and conclude that type of toilet is one of the most influential environmental factors affecting child health. Neonatal, infant and under five mortality in dwellings with no toilet are 47, 108 and 157 deaths per 1000 live births respectively. These rates drop to 34, 65 and 81 deaths per 1000 live births respectively in dwellings with modern toilets. A 10 percent increase in the proportion of households receiving water from a well is associated with a 10 percent reduction in mortality. Similarly , the finding of Habishi, Davanzo and Butz, 1988 (cited in Sastry , 1996) show that in developing countries sanitation facilities have been found to be more important than water supply in reducing mortality levels. In contrast the finding of Victora et al., 1986 ; and Victora et al., 1988 (cited in Sastry , 1996) mention that toilet facilities are related very

weakly to the risk of child mortality. Women with better cooking facilities were likely to breast-feed for a shorter time and this lead to an earlier giving of supplementation and total weaning (Adair et al., 1993). Hence there is a need for finding out the relationship between the availability of toilet and safe drinking water and place of living and availability of cooking facilities which influence on diarrhea disease.

#### **2.6.4 Age of infants and diarrhea**

The incidence of diarrhea is highest between 6 and 11 months of age, when weaning is most likely to begin (WHO, 1995). Reviewed studies on diarrhea incidence of Feachem and Koblinsky (cited in Victora, 1996) indicated that there was a clear protection associated with breast-feeding, but this varied according to the child age. The relative risk for non breast-fed infants comparing with those who were breast-fed, either exclusively or partially, were 3.0 up to two months of age, 2.4 at three to five months, and about 1.4 there after. According to this review, the protection after infancy was not evident. Similarly this evidence justifies that the incidence of diarrhea increased from about one episode per 100 days in children less than 4 months of age to a maximum of three episodes in children 10 months old. (Molbak et al., 1994).

#### **2.7 Conceptual framework**

The literature review has demonstrated that most of the previous studies indicated that breast-feeding patterns have an effect on children in getting diarrhea. Especially exclusive breast-feeding indicated the importance protective components in human milk on diarrhea disease. This protection is varied according to the age of

children. The socio-demographic characteristics of mothers and household facilities are used to be control variables.

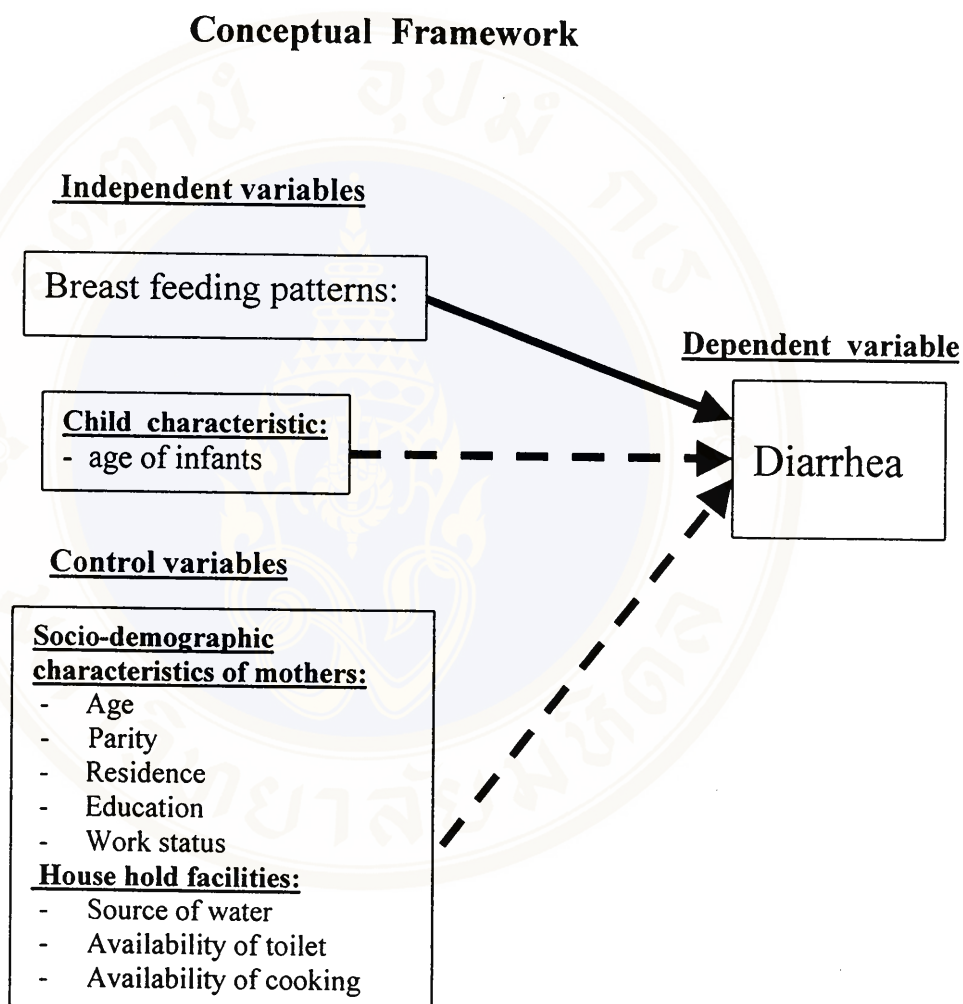


Figure 1. Conceptual framework showing the relationship between breast-feeding patterns, child characteristic, socio-demographic characteristics and household facilities of mothers on diarrhea .

## 2.8 Hypotheses

From the literature review and conceptual framework, hypotheses of this study can be stated as the following:

- Non exclusive breast -feeding infants are more likely at risk of diarrhea than exclusively breast-fed infants.
- There is an association between breast-feeding patterns and infants with diarrhea.



## **CHAPTER III**

### **METHODOLOGY**

#### **3.1 Source of data**

This study is a cross sectional, descriptive study using secondary data from the Lao reproductive Health Survey 2000 (LRHS 2000) which was supported by the United Nations Population Fund (UNFPA) who also provided substantial technical support from oversea. The survey was implemented within a collaborative effort of the National Statistic Center (NSC), Maternal and Child Health Center (MCHC) of the Ministry of Health (MOH) and other relevant agencies in 17 provinces and one special zone. The fieldwork was conducted from late April to June 2000. The LRHS 2000 was under taken with the purpose of providing up-to-date information on fertility levels, determinant of fertility, fertility preferences, family planning, infant and child mortality, reproductive health and child health, including breast feeding and knowledge of RTIs /STDs and HIV/AIDS (NSC/UNFPA, 2001).

#### **3.2 Sampling design**

The survey was conducted using two-stage stratified cluster sample method, covering 17 provinces and one special zone. The 1999 Agriculture Census provided lists of villages and lists of households (kept by village chief), which were used as sampling frame. First stage, 40 villages in each province were selected by applying systematic probability proportionate to size ( SPPS ) sampling. Second stage, within

each sample village, a fixed number of 30 households was selected using systematic sampling. This selection procedure resulted in a total of 21,067 households distributed in 720 villages in the sample. With the sample of 21,067 households, 12,759 women aged 15-49 and a sub sample of 3,060 men (husbands) aged 15-59 years were selected for interview. In the present study, women of reproductive age (15-49 years) having infants aged 0-4 months were selected.

### **3.2.1 Unit of analysis**

The purpose of this study is to investigate breast-feeding patterns of mothers and to examine the relationship between breast-feeding patterns and diarrhea among infants in Laos. Therefore, the unit of analysis is mothers aged between 15-49 years who are still breast-feeding their babies up to 4 months. A total of 2590 mothers were interviewed to find out the incidence of diarrhea among their infants.

### **3.3 Research instruments**

The questionnaires of LRHS 2000 were adopted from the 1994 Lao's Fertility and Birth Spacing Survey. The contents of the questionnaires have been adjusted to take into consideration to local situation. The questionnaire package consisted of three separate folders that included household questionnaire, individual questionnaire for women and individual questionnaire for men (husbands). The household questionnaire was designed to obtain basic information about household characteristics, fertility and mortality. The household questionnaire was used to identify eligible person for interview using the individual questionnaire. The individual questionnaire for women was used to collect information on background

characteristics (such as age, sex, marital status, residence, region, education and literacy), reproductive history including breast-feeding and child health. This study will use questionnaires, which were selected from household questionnaire and individual questionnaire for women.

### 3.4 Operational definition

#### **Dependent variable:**

##### **Diarrhea :**

Refers to the presence or absence of diarrhea disease in infants, which is defined here as a child having diarrhea or not in the last two weeks before the survey. According to WHO, diarrhea is defined as three or more loose or watery stools in a day (24 hours). Usually, young infants who passed soft stool 3-4 times a day, it is considered as normal.

#### **Independent variables:**

##### **Breast-feeding patterns:**

Refers to the action that mothers breast-feed their babies which is categorized as: 'exclusive breast -feeding' if a child is given only breast milk and no other foods or fluids were given since birth up to four months of age and. 'non exclusive breast-feeding' if a child is given breast milk and other supplementary food. Non-exclusive breast-feeding is categorized as: ' Breast-feeding with one combination of supplementary food ' if a child is given breast milk and also receiving one supplementary food which is a combination of one of these four elements: plain water, bottle milk, any other liquids and any solid or mushy food. ' Breast-feeding

with two combinations of supplementary food ' if a child is given breast milk and also receiving two combinations of these four elements. And ' Breast-feeding with three combinations of supplementary food ' if a child is given breast milk and also receiving three combinations of these four elements.

**Age of a child:**

This variable refers to the age of infant 0-4 months of age at the time of survey. This variable is measured as nominal scale, in which the age of infant is from 0-1 month and 2-4 months.

**Socio-demographic characteristics of mothers:****Age**

This variable refers to the current age in year of mothers at the time of survey which is grouped into: age 15-19 years, and age 20 -49 years of age.

**Parity**

This variable indicate the number of live births and still births that mothers had delivered is categorized into: less than 5 children; 5 children or more.

**Residence**

Refers to respondents' place of living, which is either urban or rural. This is nominal scale, if respondents are living in rural areas it is coded as 1 and 2 otherwise

**Education**

This variable refers to the level of education of mothers This variable has been categorized as: 'no education' if mothers have not attended any kind of formal or non formal education; 'primary school' if mothers have attended partial or complete

primary education; 'secondary school or higher' if mothers have attended partial or complete secondary school or higher.

**Work status**

Refers to occupation of mothers during the last 12 months at the time of survey. If mothers work outside home this is considered as 'outdoor working mothers' and it is coded as 1 and if mothers work at home as house wife or self business at home this is considered as 'indoor working mothers' and it is coded as 2.

**Household facilities****Source of water**

Refers to the source of water used for drinking washing and cooking in every day life in the household. This variable is categorized into: households obtain water from river/stream, households get water from pump or well and households use water from tap or filtered water system.

**Availability of toilet**

Refers to the existing of toilet used in a household, which is categorized into: households have no toilet, and households have toilet.

**Availability of cooking facilities**

Refers to the kind of main heating that the household uses for cooking in every day life. This is categorized into: electricity or gas and non-electricity or gas.

Table 1: **Operational definition of dependent and independent variables.**

<b>Variable name</b>	<b>Description</b>	<b>Measurement scale</b>
<b>Dependent variable</b>		
Diarrhea	The presence or absence of diarrhea	Nominal 1 = yes 2 = no
<b>Independent variables</b>		
Breast-feeding patterns	Breast-feeding action of mothers	Nominal 1 = exclusive breast-feeding 2 = breast-feeding with one combination of supplementary food 3 = breast-feeding with two combinations of supplementary food 4 = breast-feeding with three combinations of supplementary food
Age of a child	Age of a child since birth up to four months	Nominal 1 = 0-1 month; 2 = 2-4 months

Table 1: (Cont.)

Variable name	Description	Measurement scale
<b>Control variables</b>		
<b>Socio-demographic characteristics of mothers</b>		
Age	The current age in year of mothers	Nominal 1 = age 15-19 years 2 = age 20-49 years
Parity	The number of children That mothers have delivered	Nominal 1 = less than 5 children 2 = 5 or more than 4 children
Residence	Respondents ' place of living	Nominal 1 = rural 2 = urban
Education	Level of education of mothers	Nominal 1 = no education 2 = primary school 3 = secondary school or higher
Work status	Occupation of mothers	Nominal 1 = outdoor working mothers 2 = indoor working mothers
<b>Household facilities</b>		
Source of water	Source of water used in a household	Nominal 1= from river/steam 2= from pump/well 3= from tap/filtered system
Availability of toilet	The existing of toilet used in a household	Nominal 1= have no toilet 2= have toilet
Availability of Cooking facilities	Main heating used in a household	Nominal 1= non electricity or gas 2= electricity or gas

### 3.5 Methods of Analysis

The Statistical Package for Social Sciences ( SPSS ) version 7.5 is to be used for the purpose of analysis. The analysis includes both descriptive and analytical statistics. Frequency distribution according to selected characteristics of mothers and young children is presented. Bivariate analysis ( cross tabulation ) and chi-square test is used to demonstrate the relationship between independent variable such as breast-feeding patterns of mothers, child characteristic and other selected characteristics of mothers and dependent variables which is diarrhea disease. To examine the effect of breast-feeding patterns on diarrhea, among infants 0-4 months which is controlled by maternal and household characteristics, logistic regression is used.

### 3.6 Limitations of the study

This study is based on secondary data of Lao Reproductive Health Survey 2000 (LRHS). The objective of the LRHS is to provide information on Reproductive Health which is intended to assist program managers and other concerned agencies in planning, designing, implementing, improving and evaluating the Reproductive Health program. Therefore, this study had carried out within the framework of the previous resolved sample size and questionnaires. Obviously there are many factors which may influence a child to get diarrhea. Some of the behaviors that increase the risk of diarrhea are: failing to breast-feed a new born babies exclusively for the first 4-6 months of life, using infant feeding bottles, storing cooked food at room temperature, drinking water contaminated with faecal bacteria, failing to wash hands and failing to adequately dispose of faeces (WHO, 1995). Regarding breast-feeding patterns and diarrhea in infants, most of the factors is mothers behaviour in breast

feeding such as, cleaning nipples before giving to infants to suckle and washing hands. However, this study has focussed only on breast-feeding patterns which was selected depending on the variables available in the above mentioned data sets which have very limited questions that can be used for the analysis of the study.



## **CHAPTER IV**

### **RESEARCH FINDINGS AND DISCUSSION**

This chapter considers socio-demographic characteristics of mothers, breast-feeding status, breast-feeding patterns, and reasons for termination of breast-feeding, household facilities among sampled population. It also examines potential relationships between breast-feeding patterns and diarrhea. Issue considered includes socio-demographic characteristics of mothers, household facilities and infants with diarrhea. Accordingly, association between breast-feeding patterns, socio-demographic characteristics of mothers, household facilities and diarrhea will be then examined by logistic regression.

#### **4.1 Background characteristics**

##### **4.1.1 Breast-feeding status at four months infants.**

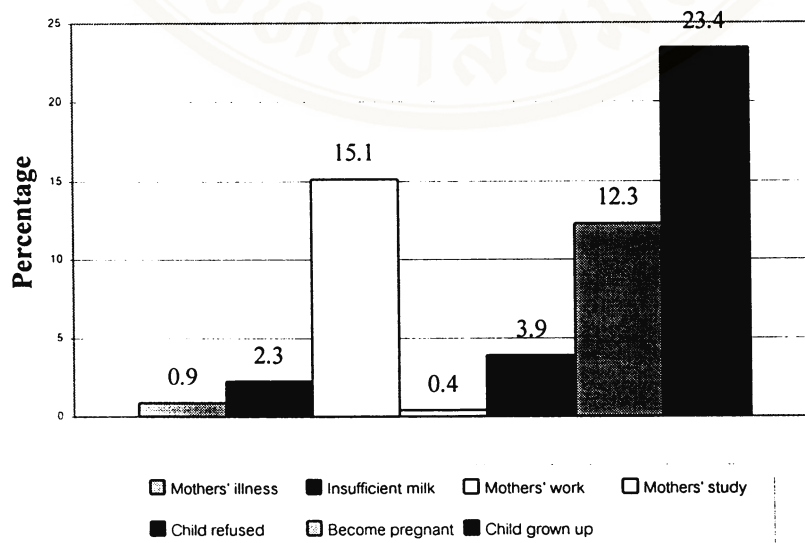
Table 2, presents the percentage breast-feeding of 7739 sample of mothers in this study. There are approximately 97.6 percent at the time of the survey that mothers in the sample had ever breast-fed their babies at least up to 4 months, while there is only a small percentage of those that had never breast-fed at all (2.4 percent). Of these mothers only one third are still breast-feeding their babies up to four months, while 63.6 percent did not continue to breast-feed their babies.

**Table 2. Percentage distribution of breast-feeding status at four months.**

<b>Breast-feeding status</b>	<b>Percent</b>	<b>N</b>
<b>Ever breast-feed</b>		
No	2.4	186
Yes	97.6	7553
Total	100.0	7739
<b>Still breast-feeding at 4 months</b>		
No	63.6	4922
Yes	36.4	2817
Total	100.0	7739

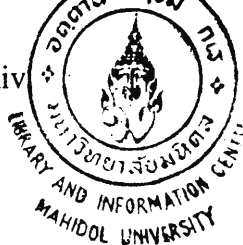
Of 7739 mothers who breast-feed their babies, the majority of them (5419) have terminated breast-feed, only 2590 mothers who are still breast-feeding their babies. Some reasons for termination of breast-feeding are nearly one fourth (23.4 percent) of mothers reported that they terminated breast-feeding their babies because a child has grown up. In addition, there are about 15 percent of mothers who stopped breast-feeding their babies due to mothers' work, 12.3 percent mothers become pregnant, 3.9 percent child refused to breast-feed, 2.3 percent mothers had insufficient milk, and less than one percent is caused by mothers' illness (0.9 percent) and mothers' study (0.4 percent) (See figure 2).

**Figure 2 : Reasons for termination of breast-feeding among 5149 mothers**



Regarding breast-feeding patterns, which considered in this study, exclusive breast-feeding is defined here as infants receiving only breast milk and no other liquid or solid entering their mouths. For non exclusive breast-feeding, which is categorized as breast-feeding with one combination of supplementary food, it was considered as infant receiving breast milk with a combination of one of these four elements: plain water, bottle milk, any other liquids and any solid or mushy food. If infants received two combinations of those four elements, it is defined as breast-feeding with two combinations of supplementary food in addition to breast milk. Prior to breast-feeding with three combinations of supplementary food it would be clarified as infants receiving breast milk with three combinations of those four elements.

Regarding breast-feeding patterns, there was 5 percent of infants who ever breast-fed exclusively. It was observed that for non exclusive breast-fed babies, nearly 50 percent of them had given two combinations of supplementary food in addition to breast milk, and more than 30 percent of them receiving three combinations of supplementary food in addition to breast milk (see table 3).

**Table 3. Percentage distribution of breast-feeding patterns among infants.**

Breast-feeding patterns	Percent	N
Exclusive breast-feeding	4.8	124
Breast-feeding with one combination of supplementary food	16.2	419
Breast-feeding with two combinations of supplementary food	45.4	1177
Breast-feeding with three combinations of supplementary food	33.6	870
Total	100.0	2590

Table 4 shows percentage distribution of socio-demographic characteristics such as age, parity, place of living, level of education and work status of mothers who were selected. It was found that only 7.4 percent of mothers are at the age of less than 20 years, whilst majority of mothers (92.6 percent) fall into the age of 20-49 years. The mean age of mothers in the study is 28.8 years. About, 63.6 percent of mothers had less than 5 children and 90.4 percent of mothers lived in rural areas. . When looking at the level of education of mothers, nearly half of them (46.8 percent) had never attended school. The percentage of mothers who finished primary school was also high (41.5 percent). While only 11.8 percent had finished secondary school. In addition, a vast majority of mothers (93.3 percent) worked outside the home, while only 6.7 percent worked at home.

**Table 4. Percentage distribution of socio-demographic characteristics of mothers .**

<b>Socio-demographic characteristics of mothers</b>	<b>Percent</b>	<b>N</b>
<b>Age</b>		
15-19 years	7.4	192
20-49 years	92.6	2398
Total	100.0	2590
<b>Mean age</b>	<b>28.8</b>	
<b>Parity</b>		
< 5 live births	63.6	1647
>=5 live births	36.4	943
Total	100.0	2590
<b>Residence</b>		
Rural	90.4	2341
Urban	9.6	249
Total	100.0	2590
<b>Education</b>		
No education	46.7	1211
Primary school	41.5	1074
Secondary school	11.8	305
Total	100.0	2590
<b>Work status</b>		
Outdoor working mothers	93.3	2417
Indoor working mothers	6.7	173
Total	100.0	2590

#### 4.1.2 Household facilities

The table 5 shows percentage distribution of infants with their housing characteristics. It was found that more than half (55.3 percent) of infants whose mothers obtaining drinking water from river/stream, and 38.5 percent using water from pump/well and only 6.2 percent having water from tap or filter. Regarding the availability of toilet in a household, nearly three-quarter (78.9 percent) of infants whose households having no toilet. There is a vast majority of the mothers (98.4 percent) using non electricity or gas for cooking, whilst only 1.6 percent use electricity or gas for cooking in every day life.

**Table 5 . Percentage distribution of household facilities.**

<b>Household facilities</b>	<b>Percent</b>	<b>N</b>
<b>Source of water</b>		
Water from river/stream	55.3	1432
Water from pump/well	38.5	998
Water from tap/filtered	6.2	160
Total	100.0	2590
<b>Availability of toilet</b>		
No	78.0	2019
Yes	22.0	571
Total	100.0	2590
<b>Availability of cooking facilities</b>		
Non electricity or gas	98.4	2548
Electricity or gas	1.6	42
Total	100.0	2590

#### 4.1.3 Age of Infants and diarrhea

Table 6, shows percentage distribution of infants' aged from 0-4 months. There are 80.8 percent that infants were at age 0-1 month and nearly one-fifth belonged to the age of 2-4 months. Besides, mothers were asked whether their children have had diarrhea in the last two weeks before the survey. Consequently, It was found that 14.1 percent of them have had diarrhea in the last two weeks before the survey.

**Table 6. Percentage distribution of age of infants and diarrhea.**

<b>Characteristic of infants</b>	<b>Percent</b>	<b>N</b>
<b>Age</b>		
0-1 month	80.8	2093
2-4 months	19.2	497
Total	100.0	2590
<b>Diarrhea</b>		
No	85.9	2224
Yes	14.1	366
Total	100.0	2590

## 4.2 Bivariate analysis

### 4.2.1 Breast-feeding patterns and age of infant.

This section will examine the relationship between patterns of breast-feeding and some selected variables of mothers and diarrhea disease in infants. As seen from literature review, infants who had ever been breast-fed or exclusively breast-fed were less likely to suffer from diarrhea (WHO, 1995). Therefore the relationship between exclusive breast-feeding and infants with diarrhea will be excluded.

Table 7, shows the prevalence of exclusive breast-feeding declined from 94.4 percent at age of 0-1 month to 5.6 at age of 2-4 months. However, the prevalence of breast-feeding with supplementary food increased at older age. Despite the higher percentage of infants who have ever been breast-fed, most all-Laotian babies were fed with supplementary food at a very early age. The decline of exclusive breast-feeding and an increase in the introduction of complementary feeding to babies at a very early age might have caused by lacking knowledge on the benefits of exclusive breast-feeding. Further people believed that bottle-feeding is more modern, and that one can not breast-feed adequately, they were also influenced by advertisement of infant formula (WHO, 1995). On the other hand, because some mothers believed that breast milk alone is not enough for the baby. It only temporarily fills up the baby's stomach as compared to other solid foods. According to their beliefs, to keep baby avoiding from hunger, the best way is to feed them with rice in addition to breast milk (Vong Ek. 1990).

**Table 7. Percentage distribution of age of infants by breast-feeding patterns.**

<b>Breast-feeding patterns</b>	<b>0-1 month</b>	<b>2-4 months</b>	<b>Total(%)</b>	<b>N</b>
Exclusive breast feeding	94.4	5.6	100.0	124
Breast feeding with one combination of supplementary food	90.0	10.0	100.0	419
Breast feeding with two combinations of supplementary food	80.2	19.8	100.0	1177
Breast feeding with three combinations of supplementary food	75.3	24.7	100.0	870
Total	80.8	19.2	100.0	2590
<b>Chi-square:</b>	54.763			
<b>P-value:</b>	0.000			

#### 4.2.2 Breast-feeding patterns and infant with diarrhea

Table 8 illustrated that infants, whose mothers breast-feed them exclusively, have lower percentage of getting diarrhea (10.3 percent) compared to non exclusively breast-fed infants. It could be explained that, under such circumstance it may be feasible that complementary feeding are supplied in poor hygienic conditions (WHO, 1995). The greatest percentage at risk of having diarrhea is found in infants who received two combinations of supplementary food in addition to mothers' milk. The chi-square statistics clearly show that the relationship between breast-feeding patterns such as exclusive breast-feeding or breast-feeding with supplementary feeding and diarrhea disease is highly statistically significant ( $p < 0.01$ ). It is important to note that breast-feeding with complementary feeding for infants 0-4 months is not recommended by pediatric authority. Likewise, they suggested that, all infants should receive exclusive breast-feeding over the first four to six months of their lives (ICPD, 1994).

Therefore the hypothesis stated that non exclusively breast-fed infants are more likely to be at risk of diarrhea than exclusively breast-fed infants is not rejected.

**Table 8. Percentage distribution of infants with diarrhea during two weeks preceding the survey by breast-feeding patterns .**

<b>Breast-feeding patterns</b>	<b>Diarrhea</b>	<b>Without diarrhea</b>	<b>Total (%)</b>	<b>N</b>
Exclusive breast-feeding	10.5	89.5	100.0	124
Breast-feeding with one combination of supplementary food	13.1	86.9	100.0	419
Breast-feeding with two combinations of supplementary food	16.7	83.3	100.0	1177
Breast-feeding with three combinations of supplementary food	11.7	88.3	100.0	870
Total	14.1	85.9	100.0	2590
<b>Chi-square:</b>	12.028			
<b>P-value:</b>	0.007			

#### **4.2.3 Socio-demographic characteristics of mothers and infants with diarrhea**

Socio-demographic characteristics of mothers may have caused diarrhea in infants. Interestingly, young mothers were more likely to have infants with diarrhea (20.8 percent) than the older ones (13.6 percent) ( $p < 0.01$ ). This is partly because the young mothers may have less experience in taking care of their infants than the older ones (Al-Barakani et al., 1999). As indicated in the table 9, the study found that uneducated mothers (14.7 percent) and less educated mothers (14.8 percent) were more likely to have infants with diarrhea than well educated mothers (9.5 percent). The chi-square statistics shows moderated significant relationship between education of mothers and infants with diarrhea ( $p < 0.05$ ). It is believed that well educated mothers may take a good care of children and they are more likely to prepare proper food to their children. Similarly mothers with more schooling are more likely to enhance the action to the exposure to suitable information and more ready to access to health care services (Teran, 1991; Muhuri, 1995; WHO, 1996; Desai et al., 1998). However, there are no association between working status of mothers, parity, residence and infants with diarrhea.

**Table 9. Percentage distribution of infants with diarrhea during two weeks preceding the survey by socio-demographic characteristics of mothers.**

<b>Socio-demographic characteristics of mothers</b>	<b>Diarrhea</b>	<b>Without diarrhea</b>	<b>Total (%)</b>	<b>N</b>
<b>Age</b>				
15-19 years	20.8	79.2	100.0	192
20-49 years	13.6	86.4	100.0	2398
Total	14.1	85.9	100.0	2590
<b>Chi-square :</b>	7.676			
<b>P-value :</b>	0.006			
<b>Parity</b>				
<5 live births	13.4	86.6	100.0	1647
>=5 live births	15.4	84.6	100.0	943
Total	14.1	85.9	100.0	2590
<b>Chi-square :</b>	1.895			
<b>P-value :</b>	0.169			
<b>Residence</b>				
Rural	14.5	85.5	100.0	2341
Urban	10.8	89.2	100.0	249
Total	14.1	85.9	100.0	2590
<b>Chi-square :</b>	2.454			
<b>P-value :</b>	0.117			
<b>Education</b>				
No education	14.7	85.3	100.0	1211
Primary school	14.8	85.2	100.0	1074
Secondary school	9.5	90.5	100.0	305
Total	14.1	85.9	100.0	2590
<b>Chi-square:</b>	6.094			
<b>P-value :</b>	0.047			
<b>Work status</b>				
Outdoor working mothers	14.3	85.7	100.0	2417
Indoor working mothers	11.6	88.4	100.0	173
Total	14.1	85.9	100.0	2590
<b>Chi-square:</b>	1.010			
<b>P-value :</b>	0.315			

#### 4.2.4 Household facilities and infants with diarrhea

Regarding source of water that the households used, it is interesting to see in table 10 that no significant was found in terms of source of water and diarrhea. The results informed that infants whose households obtained water from tap or from water filtered system have lower prevalence of diarrhea (10.6 percent) compared to those whose households got water from pump/well and river/steam (14.6 percent and 14.2 percent respectively). This is partly due to some reasons such as water from river/steam or pump/well may be unclean or contaminated which will cause diarrhea (WHO, 1995). Similarly, it was observed that infants from the households with toilet were less likely to suffer from diarrhea (11.9 percent) than those from the households with no toilet (14.8 percent). This could be explained by the unhygienic disposal of the stool of young children, because diarrhea are spread by the stools of infected persons. Therefore, hygienic disposal of the stools of young children is important. In some communities, however, the stools of infants and young children are considered harmless. Yet, these stools are dangerous because they transmit diseases to other children and other people as well, hence they should be disposed of quickly and hygienically (WHO, 1995). However this study found that there is no significant difference between the availability of toilet and infants with diarrhea. When analyzing the availability of cooking facilities and infants with diarrhea, this study also found that there is no significant relation ship between the availability of cooking facilities and diarrhea. This table illustrated that infants whose households used electricity or gas as the main heating for cooking have seen with lower percentage (11.9 percent) of getting diarrhea compared to those who used non-electricity or gas (14,2 percent).

This could be due to women with better cooking facilities were more likely to give earlier supplementary food to their infants (Adair et al., 1993).

**Table 10. Percentage distribution of infants with diarrhea during two weeks preceding the survey by household facilities.**

Household facilities	Diarrhea	Without diarrhea	Total (%)	N
<b>Source of water</b>				
Water from river/stream	14.2	85.8	100.0	1432
Water from pump/well	14.6	85.4	100.0	998
Water from tap/filtered	10.6	89.4	100.0	160
Total	14.1	85.9	100.0	2590
	<b>Chi-square : 1.827</b>			
	<b>P-value : 0.401</b>			
<b>Availability of toilet</b>				
No	14.8	85.2	100.0	2019
Yes	11.9	88.1	100.0	571
Total	14.1	85.9	100.0	2590
	<b>Chi-square : 2.981</b>			
	<b>P-value : 0.084</b>			
<b>Availability of cooking facilities</b>				
Non electricity or gas	14.2	85.8	100.0	2548
Electricity or gas	11.9	88.1	100.0	42
Total	14.1	85.9	100.0	2590
	<b>Chi-square : 0.174</b>			
	<b>P-value : 0.676</b>			

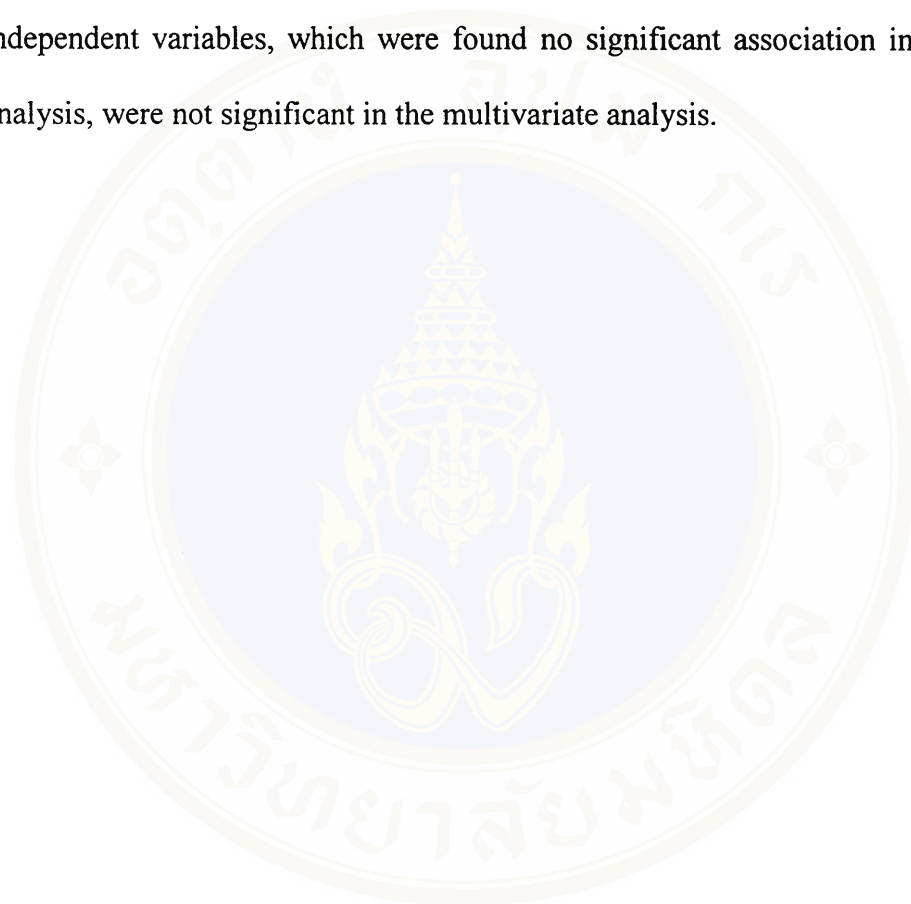
### 4.3 Multivariate analysis

In order to better understand the influence of background characteristics of mothers such as breast-feeding patterns, socio-demographic characteristics of mothers and household facilities which affect infants with diarrhea disease, multivariate analysis using logistic regression has been carried out. The logistic regression analysis examined all independent variables at the multivariate level. The variables, which were significant at the bivariate, were reexamined and controlled for other variables in the multivariate analysis which produce a clearer identification of the significant factors.

Table 11. presents estimated odds ratios and 95 percent confidence intervals from logistic regression analysis showing the likelihood of infants getting diarrhea using different combinations of independent variables of mothers. By looking at the results, variables significance at  $p$ -value  $<0.05$  is noted as moderated significance. As shown in this table, it is observed that there is only one independent factor that is statistically significant. Of the socio-demographic characteristics of mothers, age of mothers is a variable that had a positive and moderated statistically significant impact on diarrhea. When looking at the age of mothers as presented in the table 11, age of mothers has a positive significant impact on diarrhea. The results show that infants from young mothers were more likely to get diarrhea than infants from older mothers. Infants from young mothers at age 15-19 years, the estimated odds of getting diarrhea were 2 times more compared to infants from older mothers at age 20-49 years .

Regarding to the other variables existed in table 11 such as, breast feeding patterns , parity, residence , level of education, the working status of mothers, and household facilities such as the availability of cooking facilities, the availability of

toilet and source of water, the results show that these variables have no effect on diarrhea. In the other words, there are no associations between breast-feeding patterns of mothers, their place of living, parity, kind of work, and level of education and household facilities on diarrhea. In this multivariate analysis, it is observed that some independent variables, which were found no significant association in the bivariate analysis, were not significant in the multivariate analysis.



**Table 11. Logistic regression analysis of all the independent variables and diarrhea disease.**

<b>Variables</b>	<b>Coefficients(B)</b>	<b>S.E</b>	<b>Odds Ratios</b>
<b><u>Breast-feeding patterns</u></b>			
Breast-feeding with one combination of supplementary food	2.62	0.32	1.30
Breast-feeding with two combinations of supplementary food	0.53	0.30	1.70
Breast-feeding with three combinations of supplementary food	0.15	0.31	1.17
Exclusive breast-feeding #			
<b><u>Socio-demographic characteristics of mothers</u></b>			
<b>Age</b>			
15-19 years	0.58	0.27*	1.78
20-49 years #			
<b>Parity</b>			
< 5 live births	-0.20	0.12	0.82
>=5 live births #			
<b>Residence</b>			
Rural	0.08	0.25	1.07
Urban #			
<b>Education</b>			
No education	0.38	0.29	1.47
Primary	0.40	0.23	1.50
Secondary #			
<b>Work status</b>			
Outdoor working mothers	-0.02	0.27	0.98
Indoor working mothers #			
<b><u>Household facilities</u></b>			
<b>Source of water</b>			
From river/steam	0.06	0.31	1.06
From pump/well	0.15	0.31	1.15
From tap/filtered #			
<b>Availability of toilet</b>			
No	0.14	0.16	1.15
Yes #			
<b>Availability of cooking facilities</b>			
Non electricity or gas	-0.04	0.50	0.96
Electricity or gas #			

\*p&lt;0.05; # Reference category

## CHAPTER V

### CONCLUSION AND RECOMMENDATIONS

#### 5.1 Conclusion

The main objective of this study is to investigate breast-feeding patterns of mothers, to examine the relationship between breast-feeding patterns and diarrhea among infants and to study the effect of breast-feeding patterns on diarrhea among infants in Laos . The data used in this study was drawn from the Lao Reproductive Health Survey 2000. To study the effect of breast-feeding patterns on diarrhea in infants, some selected characteristics of mothers including their breast-feeding patterns, household facilities and infants characteristics were considered in this study.

At the current situation in Laos, diarrhea disease is one of the common causes of child morbidity and mortality and it is also considered as the second major health problem. Evidence suggested that breast-feeding have positive effects on infants' health and well being (Clemens et al., 1999). Even though a vast majority of Laotian babies are being breast-fed, the majority of them received chewed glutinous rice at their early age (UNICEF, 1996). Many studies revealed that infants who are non-exclusively breast-fed were more likely to expose to diarrhea than those who were exclusively breast-fed (WHO, 1995).

Based on the findings of this study, it is therefore concluded that:

Only 4.8 percent of infants were exclusively breast-fed. Most Laotian babies are being breast-fed with supplementary food at a very early age. The practice of exclusive breast-feeding declined from 94.4 percent with infants at the age of 0-1 month to 5.6

percent with infants at the age of 2-4 months. The findings found the significant relationship between breast-feeding patterns and infants with diarrhea. In the other words, infants who were exclusively breast-fed indicated the lower percentage of getting diarrhea (10.5 percent) than those who were non-exclusively breast-fed. Infants who received mother's milk with two combinations of supplementary food were more likely to get diarrhea (16.7 percent) than those who received mother's milk with one combination of supplementary food. Infants of young mothers were found to be more likely to get diarrhea (20.8 percent) than those of older mothers (13.6 percent). The chi-square statistic shows the significant relationship between age of mothers and infants with diarrhea. It also found the significant relationship between education of mothers and infants with diarrhea. In the other words, infants from uneducated mothers (14.7 percent) and less educated mothers (14.8 percent) were more likely to get diarrhea compared to those from well-educated mothers (9.5 percent).

In the logistic regression analysis, the findings of the study revealed that of the selected characteristics of mothers such as breast-feeding patterns, socio-demographic characteristic, and household facilities, the study found that age of mothers was statistically significant in relation to the diarrhea of infants. The results indicated that infants from young mothers (15-19 years) were nearly two times more likely to suffer from diarrhea than those from older mothers. The rest was found not to be statistically significant in relation to the diarrhea of infants. Since this study utilized secondary data from the Lao Reproductive Health Survey 2000, there were very limited questions in which can be used for the analysis of the study. Therefore, it has resulted in missing particular questions for studying of breast-feeding patterns

and diarrhea. In addition, this issue is primarily related to a belief, attitudes and practices of mothers regarding breast-feeding patterns. The analysis from the secondary data did not cover the information related to breast-feeding patterns of mothers, for example behaviour, attitudes and practices of breast-feeding and knowledge on prevention of diarrhea.

## 5.2 Recommendations

Practical suggestions for revisions to the Breast-feeding Promotion Policy based on the findings of this research are as follow:

### ❖ Recommendations for policy implication:

Efforts should be made to focus on young mothers and less educated mothers on health education concerning the value of breast-feeding and prevention of diarrhea.

The National Breast-feeding Promotion Programme should strengthen information dissemination about the benefits of breast-feeding for infants. It should particularly emphasized on exclusive breast-feeding for at least 4 months.

The National Breast-Feeding Promotion Programme should be strengthened by integrating into on going health-related programmes. For example, the Control of Diarrhea Disease Programme should also co-ordinate their activities jointly in areas of common interest to ensure those mothers know the benefits of breast-feeding at least up to 4 months.

As on going programmes and activities are being expanded toward community level, the need remains to strengthen the existing Breast-Feeding Programme and the Control of Diarrhea Disease Programme to develop information education and

communication (IEC) materials focussing separately to young mothers and less educated mothers.

In addition, it is highly recommended that national guidelines for the provision of integrated breast-feeding and prevention of diarrhea should be developed and implemented. Maternal and child health staff at each level of health facilities should be trained in the concepts of integrated service provision and importance of clients counseling especially for young mothers and with less educated mothers.

Such an effort will need to have support and cooperation of the different organizations working to improve Breast-Feeding and Control of Diarrhea Disease Programme, and calls for a joint effort from donors and government.

❖ **Recommendations for Further Study:**

Due to the limitation of this study, there will be a need to undertake further study on the effect of breast-feeding patterns on diarrhea among young infants in Laos. Much more research is required to study both quantitative and qualitative methods. These research should be included the need for more detailed information on knowledge, attitudes and practices of mothers including birth weight of infants.

It is suggested to take into consideration the importance of questionnaire, which will be asked. It should be clarify the definition of diarrhea and exclusive breast-feeding.

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## APPENDIX

### QUESTIONNAIRE SELECTED

#### Reproductive Health Survey 2000

##### ◆ Household characteristics

Q 4 What kind of the main heating does your household use for cooking?

Electricity = 1

Gas / coal = 2

Charcoal = 3

Wood = 4

Sawdust = 5

Others = 6

Q 5 Does your household have toilet?

Yes = 1

No = 2

Q 7 What is the household's main source of water for drinking?

Mineral water = 1

Piped water = 2

Well = 3

Bore = 4

River / steam = 5

Other = 6

**◆ Female questionnaire****♣ Section 1: Respondent's background**

\* Area

Urban = 1; Rural = 2

Q 102 How old are you now ?

Age = □□

Q 103 Have you ever attended school ?

Yes = 1; No = 2

Q 104 What is the highest grade you studying / completed ?

Grade = □□

Q 110 What kind of work do you usually do in the last 12 months ?

Main work = □□

**♣ Section 2: Reproduction**

Q 202 Do you have any son or daughter now living with you ?

Yes = 1; No = 2

Q 203 How many son and daughter living with you ?

Sons at home □□

Daughter at home □□

Q 204 Do you have any son or daughter now living elsewhere ?

Yes = 1; No = 2

Q 205 How many sons and daughter now living elsewhere ?

Sons elsewhere □□

Daughter elsewhere

Q 207 How many son and daughter have died ?

Sons dead

Daughter dead

Q 208 Total number given alive birth ?

Q 215 Is he/she still alive ?

Yes = 1; No = 2

Q 216 How old is he/she now ?

**❖ Section 3: Pregnancy and breast-feeding**

(For children birth since March 1995)

Q 324 Did you ever breast-feed (Name) ?

Yes = 1; No = 2

Q 327 Are you still breast-feeding (Name) ?

Yes = 1; No = 2

Q 328 At any time yesterday was (Name) given any of the following in addition to

breast milk:

Plain water : Yes =1; No =2; DK= 3

Condensed milk: Yes =1; No =2; DK= 3

Any other liquids: Yes =1; No =2; DK= 3

Any solid or mushy food; Yes =1; No =2; DK= 3

Q 330 Why did you stop breast feed (Name) ?

Child died = 01; Mothers study = 05

Mothers' illness = 02 Child refused = 06

Insufficient milk	= 03	Become pregnant	= 07
Mothers' work	= 04	Child has grown up	= 08
Other (specify)	= 96		

**❖ Section 3B: Child Health**

Q 337 Has (Name) had diarrhea in the last two weeks ?

Yes =1

No = 2

DK= 3

Map of Lao P.D.R.





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