FACTORS INFLUENCING UTILIZATION OF IMMUNIZATION SERVICES AMONG MOTHERS WITH CHILDREN AGED 12-24 MONTHS, IN PAKNGEUM DISTRICT, IN VIENTIANE CAPITAL, LAO PDR

CHANSAY PATHAMMAVONG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF PRIMARY HEALTH CARE MANAGEMENT FACULTY OF GRADUATE STUDIES MAHIDOL UNIVERSITY 2011

Thesis
entitled

FACTORS INFLUENCING UTILIZATION OF IMMUNIZATION SERVICES AMONG MOTHERS WITH CHILDREN AGED 12-24 MONTHS, IN PAKNGEUM DISTRICT, IN VIENTIANE CAPITAL, LAO PDR

.....

Mrs. Chansay Pathammavong
Candidate

.....

Lect. Bang-on Thepthien,
Ph.D.
Major advisor

.....

Lect. Supattra Srivanichakorn,
M.D., M.P.H.
Co-advisor

.....

Assoc. Prof. Boonyong Keiwkarnka,
Dr.P.H.
Co-advisor

.....

Prof. Banchong Mahaisavariya,
M.D., Dip.Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

.....

Lect. Supattra Srivanichakorn,
M.D., M.P.H. (Health Development),
Dip.Thai Board of Preventative Medicine
(Epidemiology)
Program Director
Master of Primary Health Care
Management
ASEAN Institute for Health Development
Mahidol University

Thesis
entitled

FACTORS INFLUENCING UTILIZATION OF IMMUNIZATION SERVICES AMONG MOTHERS WITH CHILDREN AGED 12-24 MONTHS, IN PAKNGEUM DISTRICT, IN VIENTIANE CAPITAL, LAO PDR

was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Primary Health Care Management
on
April 29, 2011

.....
Mrs.Chansay Pathammavong
Candidate

.....
Lect. Supattra Srivanichakorn,
M.D., M.P.H.
Member

.....
Ms. Ratanotai Plubrukarn,
M.D., M.H.P. Ed.
Chair

.....
Assoc. Prof. Boonyong Keiwkarnka,
Dr.P.H.
Member

.....
Lect. Bang-on Thepthien,
Ph.D.
Member

.....
Prof. Banchong Mahaisavariya,
M.D., Dip.Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

.....
Lect. Supattra Srivanichakorn,
M.D., M.P.H. (Health Development),
Dip.Thai Board of Preventative Medicine
(Epidemiology)
Director
ASEAN Institute for Health Development
Mahidol University

ACKNOWLEDGEMENTS

I would like to express my deep and sincere gratitude to the Lao Government, in particular, the Ministry of Health and the concerning to Personal-Human Resource Department, and I am also thankful to MNCHC office, Dr Kaisone Chounlamany, Dr Khampieu Sihakang Director/Deputy of MNCHC, for pleasantly granting me the opportunity of undertaking the MPHM course at AIHD, MU.

I would like to express my deepest thanks and appreciation to my major-advisor Dr. Bang-on Thepthien for her enthusiasm, constant guidance and valuable suggestion and reviewing my research work until final completion. I also would like to express my grateful appreciation to my co-advisor Lect. Supattra Srivanichakorn and also Associate Professor Boonyong Kiewkarnka, for kind suggestion from the beginning to the end of my research.

I am very grateful to my external-advisor Dr Ratanotai Plubrukarn, for her valuable suggestion and comment to complete to my thesis. I would like to express my thanks to all my teachers, staff of MPHM office, staff of library and also in the common room for support to my study.

I am very thankful to my sponsor, Lux-Development for giving me this opportunity to achieve my goal from this academic MPHM course. I also thankful the Vientiane Capital health department and Pakngeum distric health office for helping me collecting data. I express my thanks Dr Anonh Xeuthvongsa, Dr Wibowo Soenardi, Dr Outavong Pathammavong for spending their time consulting my thesis, and also thankful Dr Southanou Nanthanontry, Dr Panom Sayamoungkone, and Mr Masanori Honda to teach me to analyze SPSS. I eager to say "**Thank you very much**" to my classmates who always support me, especially to dr. Verawaty Erni ,dr. Imran Pambudi, and dr. Saputra Wijaya for helping me improving my thesis.

Finally, my deepest heartfelt appreciation to my husband, parents, and my children for their love, believe, and consistent support me all time. Thank you

Chansay Pathammavong

FACTORS INFUENCING UTILIZATION OF IMMUNIZATION SERVICES AMONG MOTHERS WITH CHILDREN AGED 12-24 MONTHS, IN PAKNGEUM DISTRICT, IN VIENTIANE CAPITAL, LAO PDR

CHANSAY PATHAMMAVONG 5338134 ADPM / M

M.P.H.M.

THESIS ADVISORY COMMITTEE: BANG-ON THEPTHIEN PH.D, SUPATTRA SRIVANICHAKORN M.D., M.P.H, BOONYONG KEIWKARNKA, Dr.P.H.

ABSTRACT

This cross-sectional study aimed to describe the utilization of immunization services among mothers with children aged 12-24 months, in Pakngeum district in Vientiane Capital, Lao PDR, and the association with related factors such as socio-demographics, knowledge, perception, accessibility, availability, and satisfaction. Data was collected by interview using a structured questionnaire from 265 respondents in 20 villages in four health centers randomly selected from a total of nine health centers. The data was analyzed using descriptive statistics, Chi-square test and multiple logistic regression.

About 73% of children received full immunizations according to the scheduled times. It was revealed that 50.6% of mothers were 25-34 years old; 42.6% had one child, and 78.1% were farmers. Almost respondents had a low perception of benefits (97.7%) of immunization utilization services. There was a significant association between education, family income, and a mother's perception of the utilization of immunization services. Distance from home to vaccination post, and time spent at the vaccination post, were also found to have a significant association with immunization services. When adjusted to other variables, it was revealed that families with high incomes and mothers with a high perception were almost two times more likely to have fully immunized their children.

Perception and income of the mothers were the most important determinants to improve the utilization of immunization services. The Ministry of Health should cooperate with other sectors to promote the importance of immunization by creating a community campaign to improve the mothers' perceptions.

KEYWORDS: UTILIZATION / IMMUNIZATION SERVICES / CHILDREN 12-24 MONTHS

100 pages

CONTENTS

CONTENTS (cont.)

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

Lao PDR	:	Lao People's Democratic Republic
NIP	:	National Immunization Program
EPI	:	Expended Program on Immunization
MCH	:	Maternal and Child Health
MNCHC	:	Maternal Neonatal and Child Health Center
VTC	:	Vientiane Capital
WHO :	:	World Health Organization
UNICEF	:	United Nation Children's Fund
JICA	:	Japanese International Cooperation Agency
NGO	:	Non Government Organization
MDG	:	Millennium Development Goals
GAVI	:	Global Alliance for Vaccine and Immunization
IMR	:	Infant Mortality Rate
MICS	:	Multiple Indicator Cluster Survey
NOH	:	Ministry of Health
BCG	:	Bacillus of Calmette and Guerin
DPT	:	Diphtheria, Pertussis, Tetanus vaccine
HepB	:	Hepatitis B vaccine
Hib	:	Hemophilus and pneumonia type B vaccine
OPV	:	Oral Polio Vaccine
MVC	:	Measles Containing Vaccine
MPHM	:	Master Primary Health Care Management
AIHD	:	Asian Institute and Health Development
HBM	:	Health Belief Model
MU	:	Mahidol University

CHAPTER I
INTRODUCTION

1.1 Rationale and justification

Approximately 10 million children in developing countries die annually before reaching five years of age. Child deaths in developing countries are attributable to five main causes of death: peri-natal conditions, respiratory infections, diarrhea diseases, malaria, and vaccine-preventable diseases two million children under five die each year from diseases that could be prevented through immunization but they fail to get the shots they need (1).

Childhood immunization is a widely accepted public health strategy and indicator of adequate health care. Vaccinations are one of the simplest and most effective approaches to protecting the health of children (2). Childhood immunization is one of the most cost-effective of all health interventions. In the past two decades, immunization has prevented an estimated 20 million deaths globally from vaccine-preventable diseases (3).

Although great efforts have been exerted by the world Health Organization (WHO) to reduce the public health burden, disease remains the leading cause of vaccine-preventable child morbidity and mortality worldwide, particularly in developing countries where immunization coverage is low. Globally, more than 20 million measles cases are reported annually with 345,000 deaths in 2005. This represents 50% to 60% of the estimated 1.6 million deaths attributed each year to vaccine-preventable diseases of childhood (4).

Immunization has become the most cost-effective public health intervention, and has saved over 20 million lives and has protected countless children from illness and disability during the last two decades. Recently, global immunization against Diphtheria, Pertussis, and Tetanus (DPT3) coverage reached 81% and 82% for measles. Immunization coverage in developing countries, however, remains low in comparison with developed countries (5).

In the Lao People's Democratic Republic (Lao PDR), one in 10children still dies before 5 years of age. About 10% die from vaccine preventable illnesses. Routine immunization coverage has stagnated since the mid-1990s and has declined since 2000 (6).

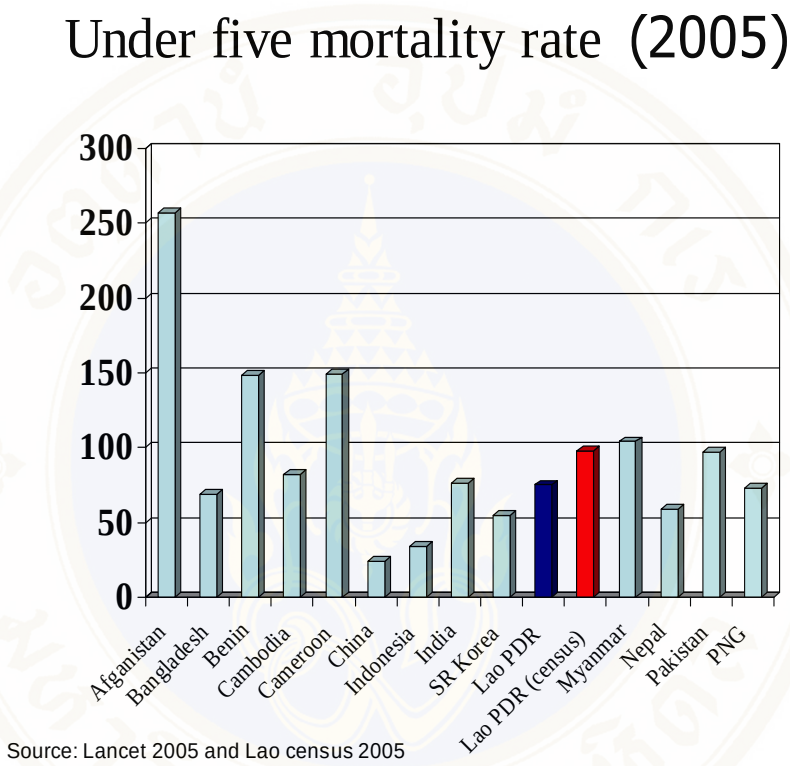


Figure 1.1 Under five years mortality rate
Source: Lancet 2005 and Lao census 2005

Cause specific mortality data is not available for Lao PDR but WHO modeling estimates that child deaths are due to common preventable and treatable conditions including pneumonia, diarrhoea and prenatal conditions.

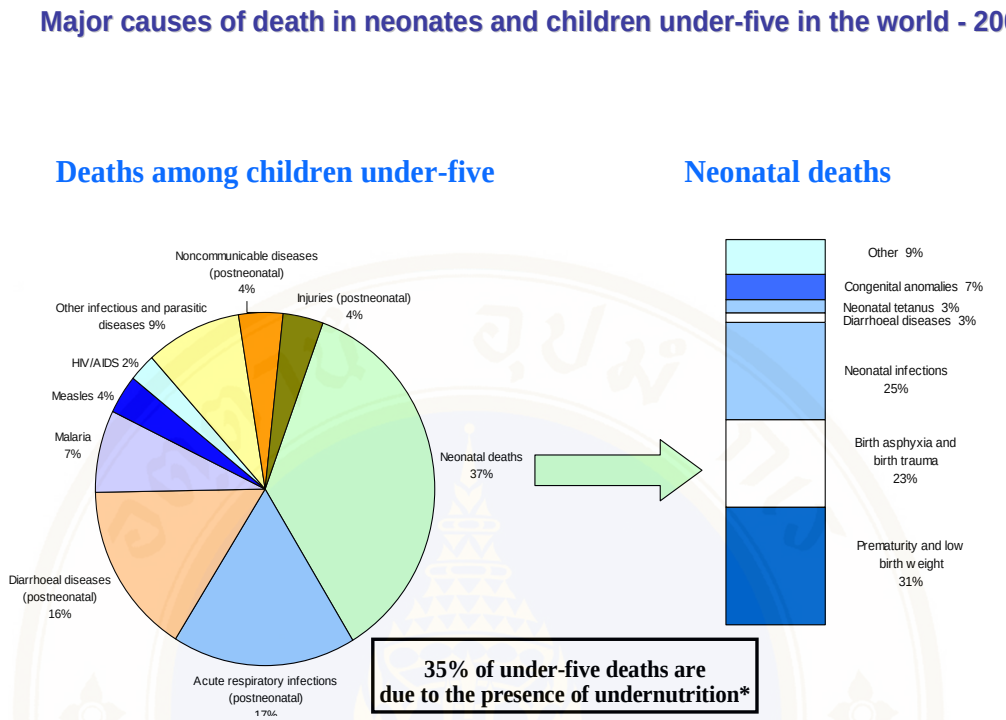


Figure 1.2 Cause of death in Neonatal of children under 5 years 2004

Source : WHO. The Global Burden of Disease: 2004 update (2008)

Neonatal and infant mortality rates are high at 26 per 1,000 live births and 70 per 1,000 live births respectively (2005 Census) with a significant percentage likely attributable to tetanus. The routine Neonatal Maternal and Child Health (MNCH) reporting system of the Maternal and Child Health Centre (MCH) in 2006 reported only 51 maternal deaths from hospitals suggesting that more than 90% of mothers died at home without access to health services. In fact, approximately 85% of women give birth at home, and, overall, skilled attendance at birth is only 20% (Lao Reproductive Health Survey, 2005) (7, 8).

Lao PDR is on track to reach the target of the national Social-economic development plan, and to achieve MDG4 if current trends continue.

Nevertheless, the under- five mortality rate in Lao PDR is still unacceptably high. The current progress may slow down or stagnate because of poor

coverage of key child health interventions, including immunization and neonatal interventions.(source: UNICEF MICS database and MOH Lao) (9).

Only about 50% of Lao children are fully immunized before 12months of age.6 Unless current trends are reversed, Lao PDR cannot meet the 2015 Millennium Development Goal (MDG) target of reducing child mortality by two - thirds(9).

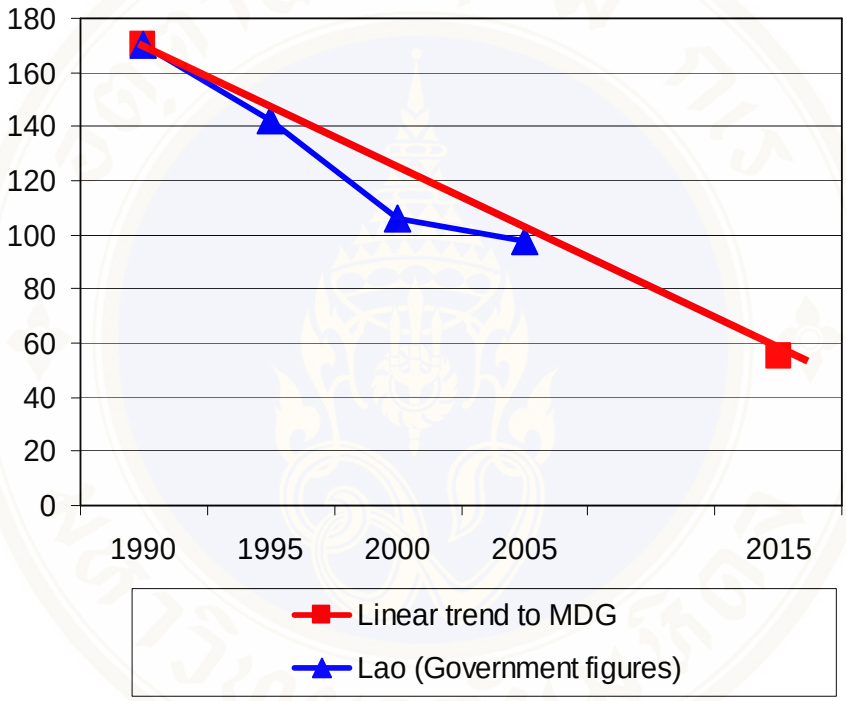


Figure 1.3 Millennium Development Goal of LAO PDR

Source : UNICEF MICS database and MOH Lao

In the Lao PDR, the Expanded Program on Immunization (EPI) was initiated in 1979. In 1982, the EPI covered only two of 18 provinces and 10 of 121 districts. In 1992 it covered 97 of 121 districts (80%).The Lao PDR has a polio eradication program, providing substantial mass oral polio vaccination, and established a surveillance system for acute flaccid paralysis in 1992.

In 2000, the Lao PDR officially announced the achievement of polio eradication(10) Immunization coverage dramatically increased from 1979 to 1994(DPT3 20% to 73%) (10, 11).

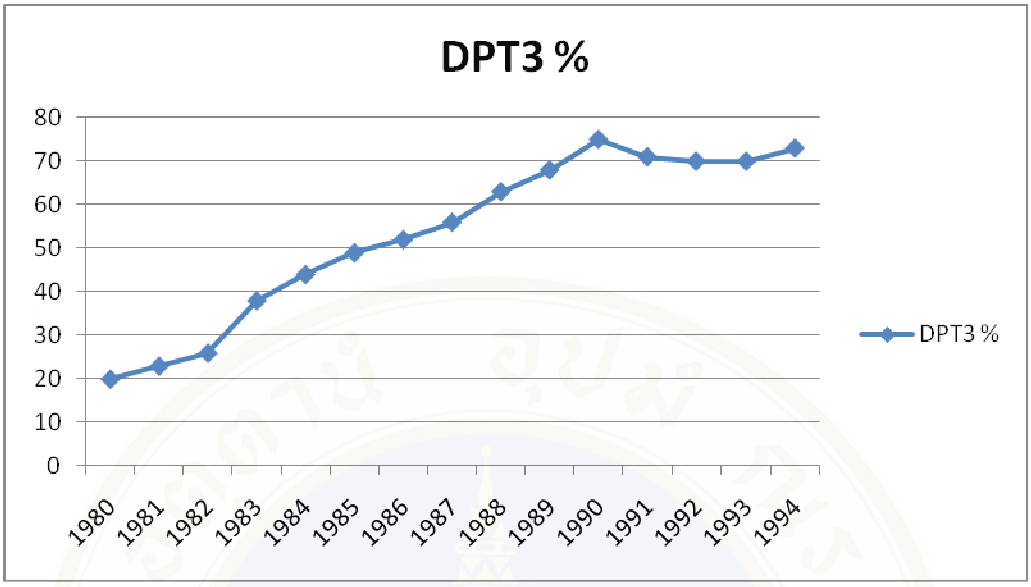
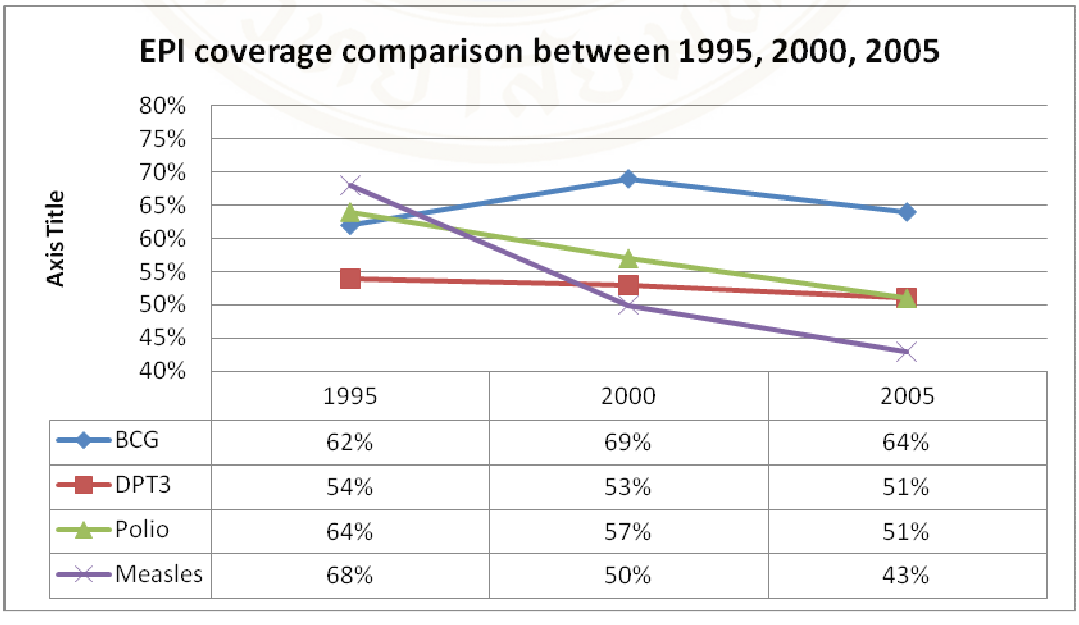


Figure 1.4 Report EPI coverage of children under 1 year

Source : Report by NIP Ministry of Health

In 1995, coverage of BCG, DPT_3, OPV_3 and Measles was 62%, 54%, 64% and 68%, respectively. From 2000 to 2005, however, immunization coverage decreased. In 2000, coverage of BCG, DPT_3, $Polio_3$ and Measles was 69%, 53%, 57% and 50% respectively; while in 2005, coverage was 64%, 51%, 51% and 43% respectively (5, 11).



	1995	2000	2005
BCG	62%	69%	64%
DPT3	54%	53%	51%
Polio	64%	57%	51%
Measles	68%	50%	43%

Figure1.5 EPI coverage comparison between 1995, 2000, 2005

Source: Reported by NIP Ministry of Health

Immunization situation in Vientiane Capital

Vientiane capital has 9 districts, 4 districts inside and 5 districts outside capital. It was selected one district, reported from the Vientiane Capital EPI coverage still low. Pakngeum district was selection because it had the lowest immunization coverage especially DPT compared with other districts in Vientiane.

Therefore, this study tries to find out the factors influencing utilization of immunization services among mothers of children 12-24 months to provide information for better utilization of services and improving the coverage of immunization.

1.2 Research question

1.2.1 What is the utilization of immunization services among mothers with children aged 12-24 months?

1.2.1 What factors are significantly related to utilization of immunization services of children aged 12-24 months in Pakngeum district?

1.3 Research objectives

1.3.1 General Objective

To determine the utilization of immunization services among mothers with children aged 12-24 months in Pakngeum district in Vientiane capital, of the Lao PDR.

1.3.2 Specific Objectives

1.3.2.1 To describe the utilization of immunization services of mothers with children age 12-24 months in Pakngeum district in Vientiane.

1.3.2.2 To describe the Socio-demographic characteristic, knowledge, perception, accessibility, availability and Satisfaction of mothers with

immunization services of mothers with children aged 12-24 months in Pakngeum district in Vientiane.

1.3.2.3 To determine the relationship between the utilization of immunization services and socio-demographic characteristics, knowledge, perception, accessibility, availability and satisfaction of immunization services.

1.3.2.4 To determine predictors for utilization of immunization services in Pakngeum district, Vientiane Capital.

1.4 Conceptual framework

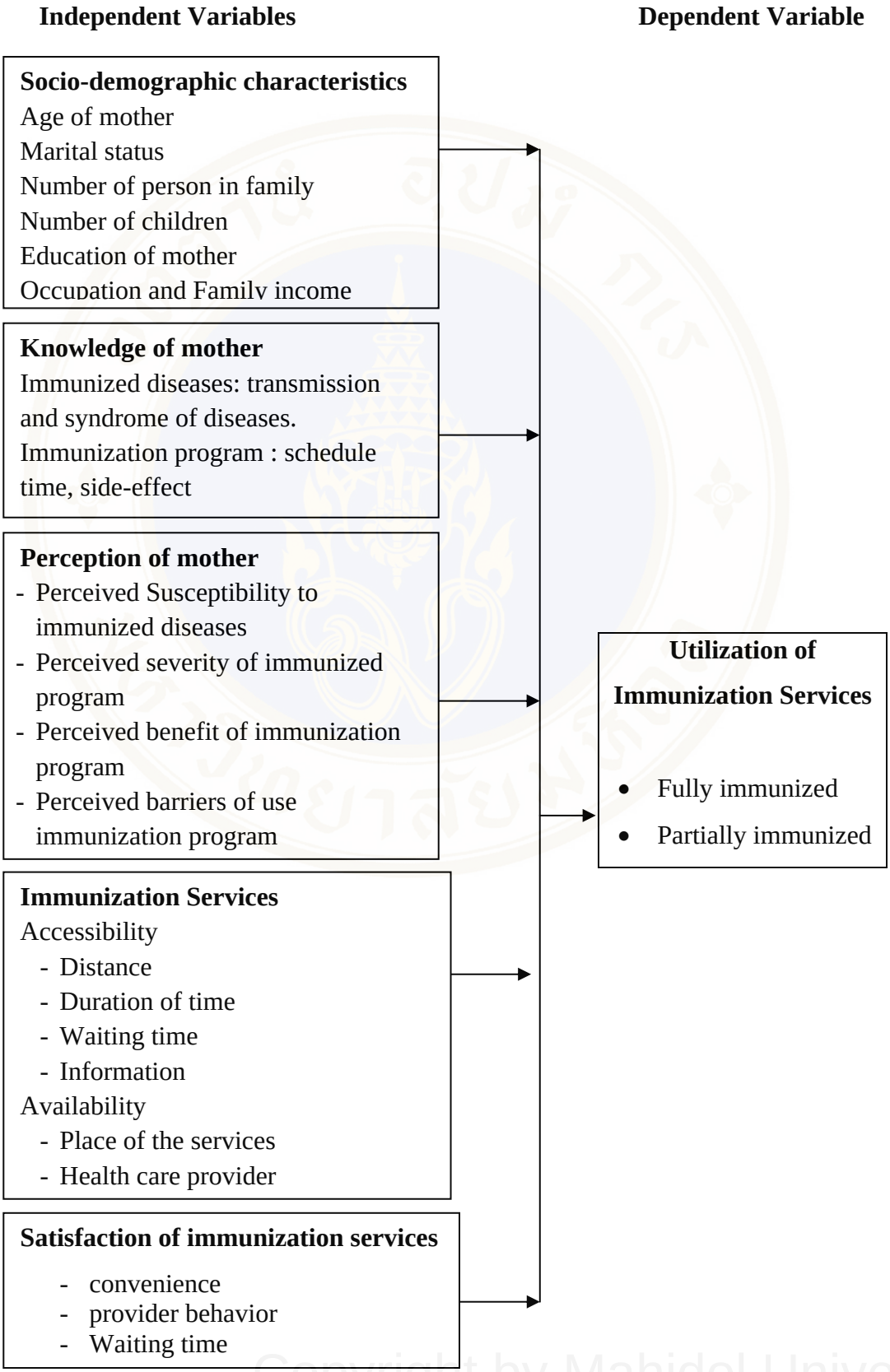


Figure 1.6 Conceptual framework

1.5 Operational Definitions

1.5.1 Utilization of Immunization Services

Refers to mother utilize vaccination services in order to get children's under 1 year to immunization status according National Immunization Program NIP schedule (WHO standard).

Full immunization: Means children under 1 year who received all vaccination (BCG, DPT-HepB-Hib,OPV3, Measles) of immunization, according to the NIP schedule.

Partial immunization: Means children who has missed one or more dose of vaccination, or who never received any vaccine (BCG, DPT-HepB-Hib3,OPV3,Measles) of immunization, according to the NIP schedule.

Table 1.1 National Immunization Program (NIP) Schedule for Children under 1 year

	Age (months or week)				
Vaccine	**Birth**	**1 and half**	**2 and half**	**3 and half**	**9-11**
BCG	Dose 1				
Hepatitis 0	Dose1 (0-7days)				
(DPT-HepB-Hib) -Diphtheria -Pertusis -Tetanus - Hepatitis B - Hemophilus - pneumonia type B		Dose 1	Dose 2	Does 3	
Polio(OPV)		Dose 1	Dose 2	Dose 3	
Measles (MVC)					Dose1

National Immunization Program in Lao PDR Schedule follow by standard WHO) BCG = Bacillus of Calmette and Guerin, DPT-HepB-Hib = Diphtheria,Pertusis,Tetanus, Hepatitis B, Hemophilus and pneumonia type B,OPV = Oral polio vaccine , MVC = Measles Containing Vaccine.

1.5.2 Socio-demographic characteristic

- **Age** of mothers refers to the age of respondent at the interview of this study and defined in years.
- **Marital status to** whether the respondents are single, married, or widowed/divorced/separated.
- **Number of family member** refers the total persons in the family.
- **Number of children** refers number of children 12-24 months in the family or number of children aged 12 to 23 months and 30 days before their birth day, that the respondent has in her family.
- **Occupation** of mothers: refers to the work/job she is doing currently for the livelihood.
- **Education** of mothers: refers to formal education that graduated from school
- **Family income** refers to the amount of money a family earns per month.

1.5.3 Knowledge refers to mothers understanding about immunization preventable diseases by vaccine (eight vaccines) such as transmission and syndrome of diseases and immunization program such as immunization schedule, side-effect after children get vaccination.

1.5.4 Perception of mother

- **Perceived susceptibility** mean the mother's belief about the likelihood of her child will develop vaccine-preventable disease.

- **Perceived severity** refers to the personal belief of the mother about the seriousness of the consequences that her child has to deal with from the vaccine-preventable disease.
- **Perceived benefit** is the personal belief of mother about whether adhering to the recommended childhood immunization schedule will prevent the occurrence of the vaccine preventable diseases.
- **Perceived barrier** refers to mother's belief regarding the obstacle of utilizing the immunization service in reducing the threat of the vaccine-preventable disease. Barriers could prevent the child from timely receipt of the recommended series of immunization status.

1.5.5 Immunization services

- **Accessibility of immunization services** mean the mothers' information about how difficulty or easily to get immunization in the vaccination posts in terms of its distances, duration time from house to vaccination post, waiting time for receiving the vaccination, appropriate times to get the vaccination and including reminding from health personnel, friends, health volunteers and village head, .
- **Availability** is mean the mothers' information to the distribution of vaccination services provide by government in the immunization services. The distribution of vaccination services are depicted in term of numbers of places giving vaccination, number of health personnel and their readiness to provide the services, amount of vaccines.

1.5.6 Satisfaction of immunization services refers to mothers' appraisal about their received immunization service. It is influenced by health providers' rapid responds, convenience including the room cleanliness when the mothers utilized the service.

1.6 Limitation of study

This study could not cover the target in 20 villages, because in this study was selected only children with vaccination card or yellow book, and also only mothers who living in the village during conducted data.

Regarding to bias in collecting data, some respondents are subjected to recall bias.

1.7 Expected outcomes

This study it was generate reliable information about:

1.7.1 This information will be useful to improve the immunization program and increase immunization coverage above 85% by the National Immunization Program (NIP) target.

1.7.2 The results of this study will be improved the fixed site services and mobile services to access in remote areas.

CHAPTER II
LITERATURE REVIEW

A review of the literature was conducted to provide an empirical base for this study. This chapter focuses on (a) general information about immunization; (b) immunization programs; (c) theoretical models (the health belief model and Andersen's model) related to utilization of immunization services; and (d) research about the relationships of socio-demographic, knowledge, and perception, accessibility factors, respectively, and satisfaction with immunization services.

2.1 General information about immunization

Immunization is one component of the preventive services delivered by health personnel. At present many studies have shown that if children get vaccines and complete immunization following the NIP they can prevented from getting eight communicable diseases (i.e. Tuberculosis, Diphtheria, pertusis, tetanus, Hepatitis B, Haemophilus influenza type B(Hib), polio and Measles) by making immunization accessible to children and women aged 15 to 45 years, but focusing on pregnant women. Tuberculosis is first and foremost a disease of the lungs. The virus is spread through direct human to human conduct and manifests itself within the host by means of airborne droplets (from a cough, sneeze, etc.). The virus multiplies in the lungs and if the initial immune response fails to stop the spread, the central nervous system (CNS), lymphatic system, circulatory system, bones, and joints may also be affected.

What is immunization?

Immunization is a process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body's own immune system to protect the person against subsequent

infection or disease. The immunization target were children under 5 years, because they have low immunity special under 2 year, their need more immunized for protect in their body by vaccines and they have higher risk to get diseases.

The immunization strategy in Laos focuses on the following eight diseases in the NIP:

Tuberculosis vaccine, also known as the BCG vaccine, was first developed in 1921 at the Paris Pasteur Institute by Albert Calmette and Camille Guerin, two French bacteriologists. The vaccine, not recommended for immune-compromised individuals, is prepared from weakened bovine tuberculosis bacillus (12). Since its initial development, over 100 million people have been vaccinated against tuberculosis using the BCG vaccine.

DPT-HepB-Hib vaccine is amulti-purpose vaccine, protecting against diphtheria, pertussis, tetanus, hepatitis B and hemophilus pneumonia type B.

Diphtheria, is a bacterial disease transmitted from person to person. It may be carried in the mouth, nose, throat or skin. Symptoms may include headache, fever, and sore throat.

Pertussis is more commonly known as the ‘whooping cough’. Symptoms include coryza and persistent or sometimes violent coughing. The bacterium is transmitted from person to person through airborne droplets.

Tetanus is a highly fatal yet ultimately preventable, non-contagious disease that results when the Clostridium titani bacterium producer of the tetanus pasmin neurotoxin. The bacterium found in agricultural soil and in the feces of a variety of farm animals, infects its host through breaks in the skin. The symptoms may include, but are not limited to, stiffness in the neck and back, difficulty swallowing, muscle rigidity in the abdomen, fever, and diaphoresis.

Hepatitis B is a virus that causes inflammation of the liver. Chronic (long-lasting), hepatitis B can cause liver cell damage, which can lead to cirrhosis (scarring of the liver) and cancer. It is d that 5,000 people die each year in the United States due to complications of cirrhosis and liver cancer as result of HBV(13).

Haemophilus influenzae type B, or Hib, is a bacterium estimated to be responsible for some three million serious illnesses and an estimated 386,000 deaths per year, chiefly through meningitis and pneumonia. Almost all victims are children

under the age of five, with those between four and 18 months of age especially vulnerable (12, 14).

Measles is a virus spread directly from person to person by airborne droplets. It is known to be highly contagious, infecting 90% of people (without immunity) who come into close contact with infected persons (12).

Polio is a highly infectious disease spread through direct person to person contact. The virus most often infects its new host through the mouth as a result of locally contaminated water or food. Polio virus symptoms may range from headache, fever, sore throat, and muscle stiffness, to paralysis of limbs, breathing difficulty, and death (12).

2.2 Immunization programs

2.2.1 Immunization globally

Immunization is a widely accepted health strategy and indicator of adequate health care. Vaccination is one of the simplest and most effective approaches to protecting the health of children. Immunization is one of the most successful and effective health interventions (15). Immunization will help to achieve the Millennium Development Goals of reducing child mortality, and improving immunization coverage. At present WHO and UNICEF have worked together to develop a Global Immunization Vision and Strategy (GIVS) to the implemented between 2006 and 2015 (16).The global strategy comprises four main features : 1) protect more people against diseases in a changing world; 2) introduce new vaccines and technologies; 3) improve immunization liked health intervention and surveillance in health systems; and 4) immunizing in the context of global inter-dependence. Global interdependence has increased the vulnerability of people everywhere to the uncontrolled spread of diseases through epidemics (16).

The mounting threat of an influenza pandemic highlights the need to strengthen international solidarity, mutual support and work through partnerships to contribute to improving global health and security. The development of the country comprehensive Multi Year Plan (cMYP) based on GIVS server is an important first

step towards GIVS strategies at the country level. At least 40 countries are developing cMYPs that include estimates of the cost and financing of all immunization activities and outline future initiatives to improve coverage and reach the unreached. WHO's key strategy for increasing routine immunization coverage of 53 countries including the Lao PDR have improved routine immunization in every province and district(16).

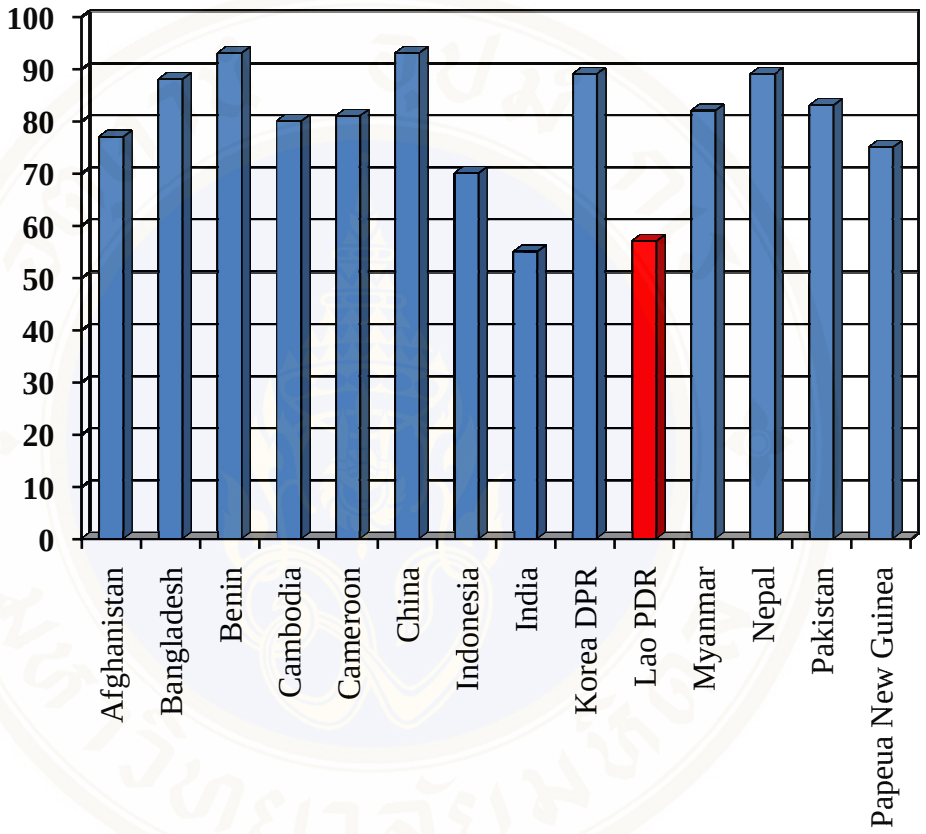


Figure 2.1 Routine coverage of DPT-HepB3

Source : WHO 2008

2.2.2 Immunization programs in the Lao PDR

In the Lao PRD, since the early 1980s, the Lao Government has made NIP one of its highest priorities. It has recognized that the rationale for investing in immunization is very compelling. The program is low-risk with a proven track record of decreasing the burden of disease. It is largely a public welfare program and is highly cost-effective. The NIP was implemented in 1982. Since then, the networks have been systematically extended throughout the whole country. The NIP now covers all provinces (17 provinces, 143 districts, and 10,500 villages) on regular basis 4 to 6

times a year. The project has been supported by JICA, UNICEF, WHO, GAVI and Luxembourg. Since 1980, the Government of the Lao PDR has been supporting the NIP as one of its key interventions to improve child health (Ministry of Health 2002). The NIP administration in Laos has applied a zone based strategy (17). The catchment areas for each health facility are divided into four zones: 1) zone zero containing villages within 3 kilometers of a health facility for immunization delivery; 2) zone one, villages to which a vaccinator can walk or ride by bicycle; 3) zone two, villages which a vaccinator can reach with mechanized transport and conduct a vaccination session and return within one day; and 4) zone three, villages which require more than one day's travel to reach and to conduct an immunization session (Maekawa M, Douangmala.S et al.2007). Except in zone zero and zone one, children will receive immunization by outreach health workers(18). In the present, the immunization coverage has been improved by introducing the micro planning based on two strategy; one strategy is to provide immunization services in fix site in the hospital(every day) and health center(1-2 times /week) , the second is to provide immunization by mobile services (one times/three months). Another thing that has been done is to provide refrigerator to each health center so immunization services can be held every day.

During the 1990s, the government and donors sponsored a mass nationwide campaign to eradicate polio, which had a positive impact on other routine immunization programs. According to figures reported by WHO to international organizations, coverage of DTP3 increased from 34% in 1992 to 69% in 1999 (WHO 2008)(11). However, child immunization coverage began to stagnate after polio had been eradicated in 2000 and administrative data shows that DTP3 coverage remained at around 60% in 2000 (DPT-HepB3 in 2003: 49%; DPT-HepB3 in 2004: 45%; DPT-HepB3 in 2005: 51%)(WHO 2008). Nevertheless, NIP networks are spreading and covering all communities of different strata with efforts of the government along with assistance from various international organizations and partner countries. Although the transportation infrastructure is being developed at better stage, the current rate of immunization is still low(10).In 2000, according to UNICEF/WHO official estimates, only 42% of children received immunization against measles and this coverage has declined even further to 40%. The current coverage of other antigens is also low

(DPT3 50%, and Polio3 46% in 2007) and the percentage of children who have received all eight recommended vaccinations by their first birthday is 27%.(9, 17).

National immunization coverage for 10 years

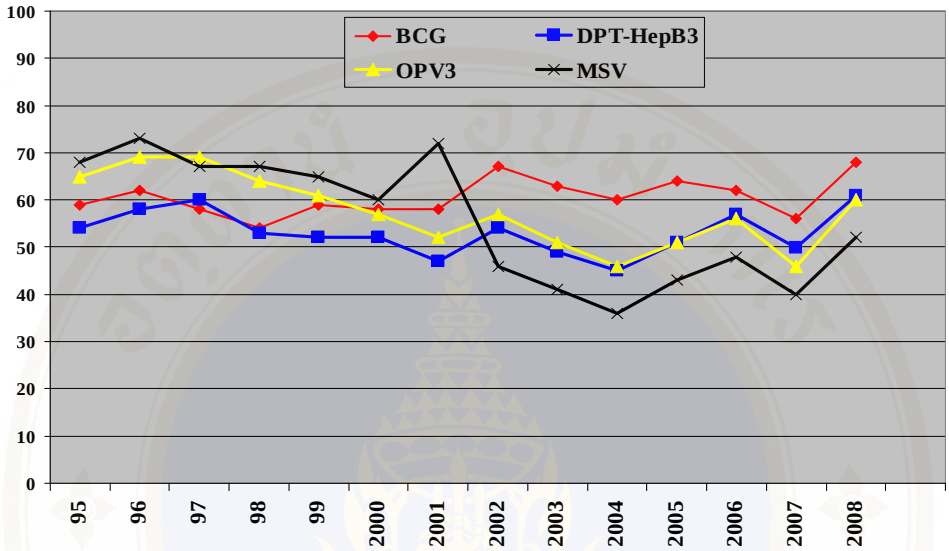


Figure 2.2 NIP routine coverage 1995 – 2008

Source: Denominator is from MoH estimation

The national census in 2005 showed the illiteracy rate for all ages was high, up to 43.9%. Community mobilization is essential for the NIP to access particularly mothers in remote areas throughout the country. In order to improve routine coverage it is important for mothers in particular to understand and know the significance of immunization activity (7).

According to the Lao immunization schedule, a child should receive a BCG vaccination to protect against tuberculosis, three doses of DPT to protect against diphtheria, pertussis, tetanus, hepatitis B and hemophilus, three doses of polio vaccine, and one dose of measles, by the age of 12 months. The last National Health Survey in 2001 reported that 32% of children aged 12-23 months had received the eight recommended vaccinations (were fully immunized) (6).

There has been significant improvement in surveillance in the past three years, but incomplete disease reporting continues to limit the reliability of reported incidence of most vaccine preventable diseases. There is still significant under-

reporting of these, and measles and neonatal tetanus are known to be significant childhood disease problems. The burden of other vaccine preventable diseases such as pertussis is still largely unknown.

At present, the system of immunization coverage reporting is not integrated with the system of service delivery. The zone classification system has primarily been used as a method to distribute different rates of per diem allowances to vaccination teams for outreach activities. In order to assess and monitor performance in each zone, especially with the revised classification of villages, it is envisaged that coverage will also be reported by zone.

Reporting of coverage rates in this fashion was assessed by WHO using data from three pilot districts for DPT-Hepatitis B vaccine introduction. Results have been positive, and reporting in this format does not require the collection of additional information, just the presentation of current coverage data in a more useful way in line with the delivery strategy (11, 17).

2.3 Theoretical models

Two theories, Health Belief Model (HBM) and Andersen's theory, were applied as the basic theoretical model in this study. The HBM was used because mothers' perceptions about immunization affect their utilization of immunization services for their children. However, utilization of service may also be influenced by consumer satisfaction which is not mentioned in the HBM. Andersen's Behavioral Model for Health service utilization can complement the HBM to include satisfaction as one factor influencing immunization service. As Andersen explains, there are 4 factors which affect utilization of health services : predisposing factors, enabling factors, need factors and perceived service which is affected by satisfaction with care (19).

2.3.1 Health Belief Model (HBM)

The HBM was developed initially in the 1950's by social psychologists in the U.S. Public Health Service to explain the widespread failure of people to participate in programs to prevent and detect disease (20).

Another HBM (2004) the framework that has been useful in explaining health-seeking behavior is that of the Health Belief Model (21). This psychological model states that health behaviors are a function of three main factors: individual perceptions, modifying factors, and the likelihood of action. The HBM has been used to explain preventative health behaviors, and may be applied to the topic of immunization.

In order for someone to seek preventative medicine, individuals must:

1. Believe that the negative health outcome (*e.g.* measles, polio, tetanus) is a perceived threat and that it may be prevented;

2. expect that by taking preventative measures (*i.e.* being immunized) that the negative health outcome will be avoided;

3. feel comfortable and confident in the treatment regimen (*i.e.* immunization); feel that the benefits will outweigh any potential negative outcomes (21).

The HBM has four aspects representing the perceived threat and net benefits: perceived **susceptibility,** perceived **severity**, perceived **benefits,** and perceived **barriers**. These concepts were proposed as accounting for people's "readiness to act." An added concept, **cues to action**, would activate that readiness and stimulate overt behavior. A recent addition to the HBM is the concept of **self-efficacy**, or one's confidence in the ability to successfully perform an action. This concept was added by Rosenstock and others in 1988 to help the HBM better fit the challenges of changing habitual unhealthy behaviors, such as being sedentary, smoking, or overeating.

Perceived Susceptibility means one's opinion of chances of getting a condition.

Perceived Severity refers to one's opinion of how serious a condition and its consequences are.

Perceived Benefits means one's belief in the efficacy of the advised action to reduce risk or seriousness of impact.

Perceived Barriers refers to one's opinion of the tangible and psychological costs of the advised action.

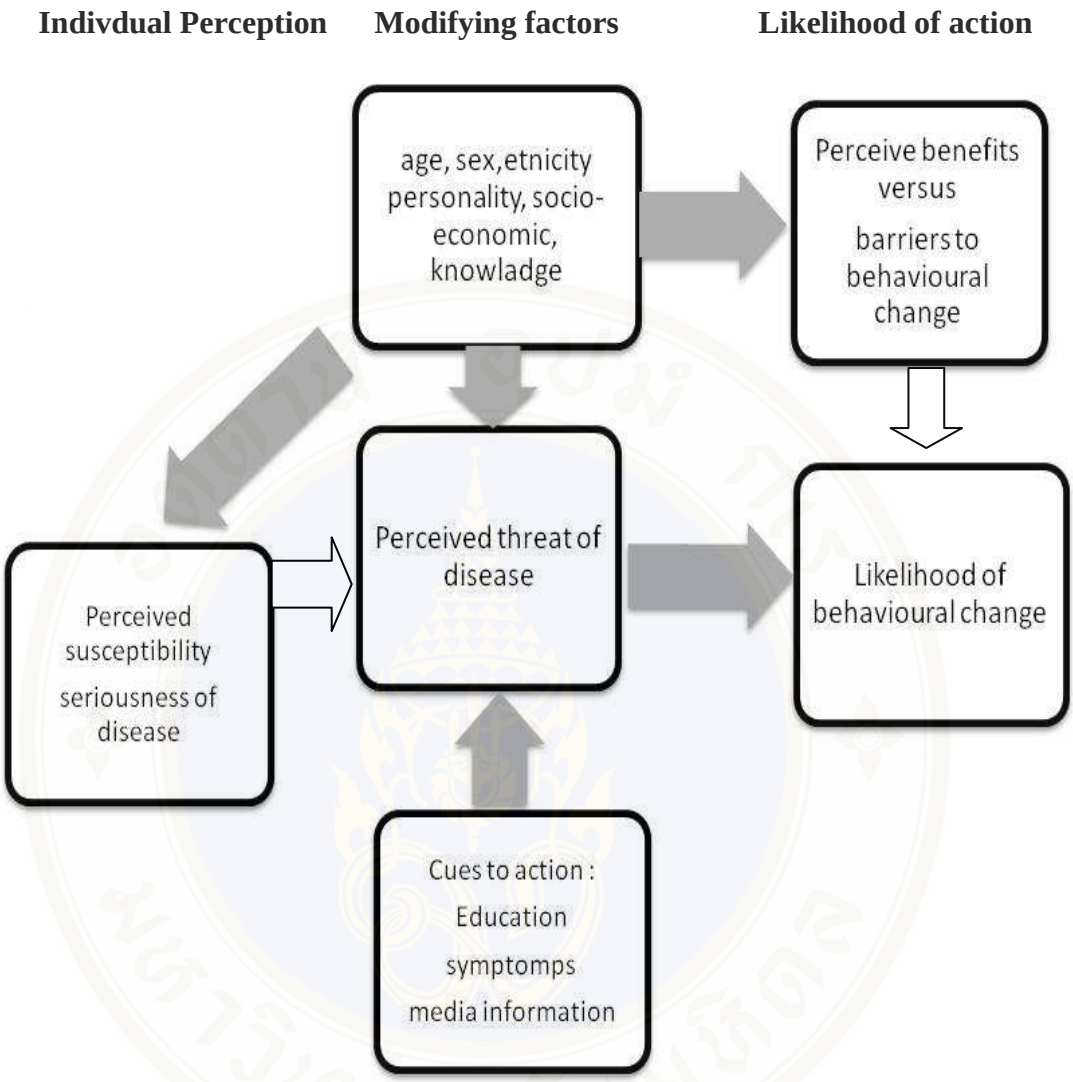


Figure 2.3 Health Belief Model (HBM) (Scope and Application)

Cues to Action refers to strategies to activate "readiness"

Self-Efficacy refers to confidence in one's ability to take action

The Health Belief Model has been applied to a broad range of health behaviors and subject populations. Three broad areas can be identified (Conner & Norman, 1996): 1) Preventive health behaviors, which include health-promoting (e.g. diet, exercise) and health-risk (e.g. smoking) behaviors as well as vaccination and contraceptive practices. 2) Sick role behaviors, which refer to compliance with recommended medical regimens, usually following professional diagnosis of illness. 3) Clinic use, which includes physician visits for a variety of reasons (21).

2.3.2 Andersen's Model of Determinants of Healthcare Use

In the early 1970's, Ronald Andersen created a framework for the study of access to health care services (22). This framework has been widely used to explain the use of an array of healthcare services, including immunization availability and uptake. Although the model has been modified over the years, three general principles embedded in the framework have remained constant over time: predisposing factors (*i.e.* age, sex, education level, health beliefs), enabling factors (*i.e.* income, insurance, regular sources of care), and need (22).

Andersen developed a behaviour model in 1960 to explain why families or individuals use a particular health service. He suggested that relevant factors can be grouped into three main catagories: predisposing characterisics, enabling resources, the need for health care and consumer satisfaction (19).

In this research, accessibility were added to support the conceptual framework. Understanding utilization is central to improvements in quality of life. Understanding which factors are most important to health care utilization, this can assist in disease prevention and treatment through creation of effective health campaigns, policies, and promotion programs. The study of utilization can further prepare health care organizations for the impending growth of aged and heterogeneous populations. Ultimately, this knowledge will facilitate the understanding of who uses which services, why they access these services, and when those services will be utilized (22).

Consumer satisfaction is the result of consumer expectation and consumers' experience receiving certain services. Consumers will be satisfied when

their expectations meet with their received services. Their expectations are influenced by their experience (22).

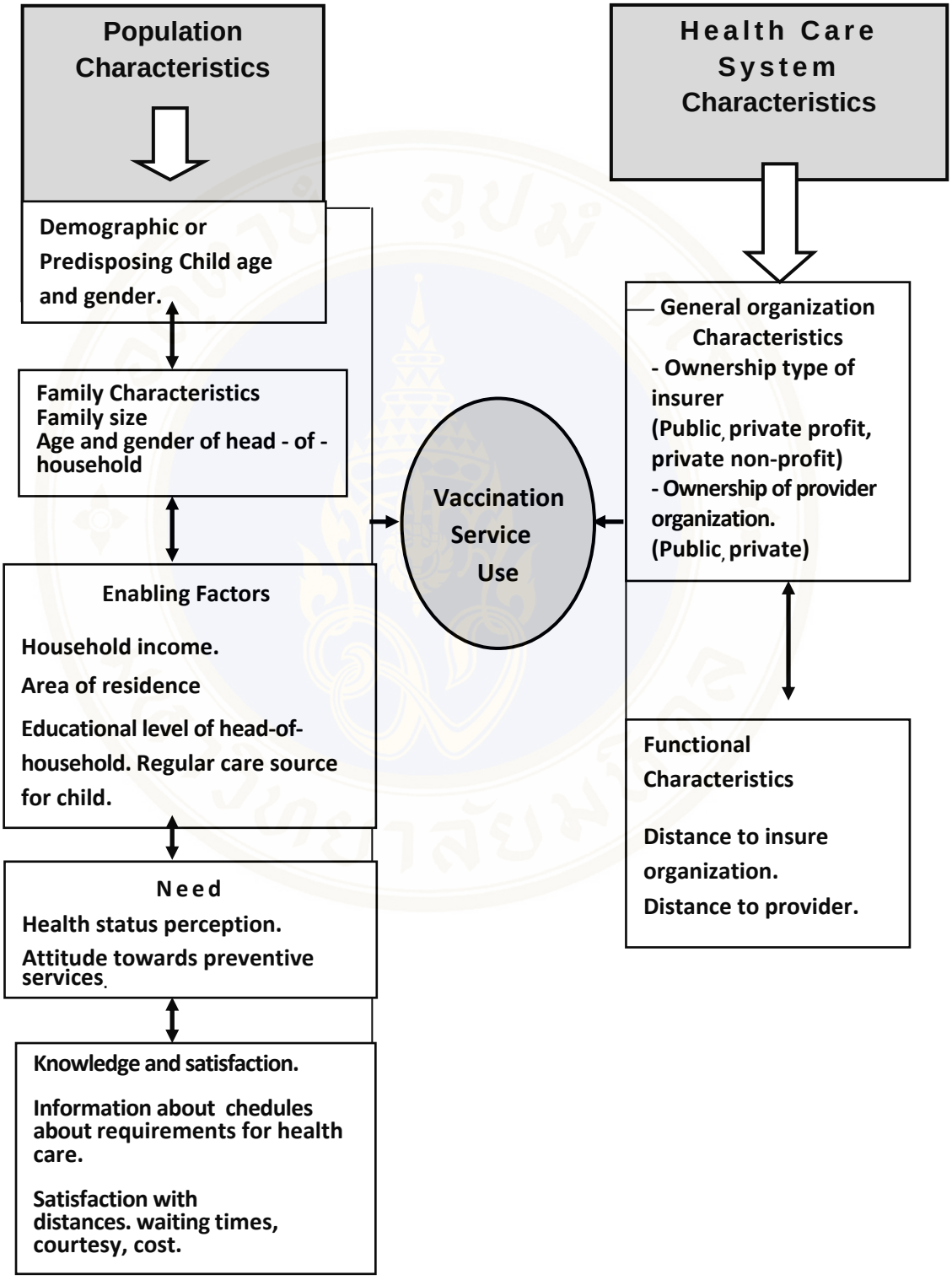


Figure 2.4 Adapted version of Andersen's Behavior Model of Health Services Utilization

2.4 Review related to research

Extensive research has been done about immunization programs. In the following review was consider study variables of this present study

2.4.1 Studies related to socio-demographics characteristic

The previous study by Takashi Senda found that education of caregiver (women) was significantly associated with EPI coverage ($p<0.001$). Those caregivers with child got higher education had a better EPI coverage (95.0%) than those who had low education and those who hadn't get education. Monthly income of household members also was significantly associated with EPI coverage (p-value=0.021). Those who got average monthly income more than 6,000 Taka had better EPI coverage (92.9%) than those who got average less than 6,000 Taka. However, other variables i.e, caregiver age, occupation of caregiver had no statistical association with EPI coverage (24).

Rajeev Gera study in 2010 showed that, there was significant statistical association between level education of mother and immunization status of child (p-value=0.002). Mother who had high education and above their children were completed immunization (58.3%) than those who had low and no education. For the other independent variable such as: age of mother, occupation of mother and father, and monthly family income did not show any significant association with completed immunization in children (25).

Study by Ajay Panswar in 2009, Occupation of mother grouped into housewife and working group found that the housewife group had 74.5 percent ever received immunized children as compared with working group. There was significant statistical association with immunization status ($p<0.001$). For the number of children also there was significant association between the number of children and immunization status ($p<0.001$). Mother who had one to two children had 68.1 percent ever received immunized children than those who had three or more than three children (31.8%) (26).

Kongxay P study in Lao PDR the result showed that mother who had literacy had completely immunized children (92.5%) higher than those who had illiterate. There was a significant association between mother education and immunization status ($p<0.001$). For other variables there was no statistical significant association with immunization status i.e occupation of mother, number of children, family income (27).

Study conducted by Daokeo S there was significant association between mothers' education and utilization of immunization services ($p<0.001$). The mothers' who had literacy (secondary/above, primary school) had completely immunized children (79.3%, 61.6%) higher than mothers' who had illiterate (29.2%). Also mothers' occupation found that the children who mothers were farmers were completed immunization their children (41.8%) higher than those mother who had another occupation. There was a significant association between mothers' occupation with utilization of immunization services (28).

With previous study in 2009 by Bondy JN found that the majority of household were composed of more than six people; only about 20 percent of mothers had more than two children under age of five in their homes. Thaere was a not significant determinant of children immunization (29).

One study by SA Kinshasa, Democratic Republic 2008 showed that marital status per se was not a predictor of immunization status , the husband's involvement showed a significant impact (30).

Topuzoglu A study found that the odds of children with a high socio-economic status backgrounds being fully immunized were 2.41 times the odds of children from low socio-economic status backgrounds (31).

The study done by Mosiur Rahman,MSc 2010 there was a significant association between mother age with complete immunization coverage of children. showed that mothers aged between 20 and 34 years were more likely to be fully immunized than children of younger mothers aged under 20 years and older mothers aged more than 35 years (32).

2.4.2 Studies related to the knowledge

Study Daokeo S found that mothers who had good, fair and poor level of knowledge on immunization received complete immunization about (88.7%, 62.8%, and 49.1%) respectively. There was significant relationship with utilization of immunization ($p<0.001$) (28).

Rajeev Gera study showed that there it had significant association with immunization status($p<0.001$). The percentage of incomplete immunization in children with mothers having poor level of knowledge was 73.2% whereas it was 53.3% in children with mother having good level of knowledge (25).

A study SA in Sudan 2007 the mothers' knowledge and attitudes to vaccination showed a strong relationship with the vaccination status of their children. Mothers of children from urban areas reported correct vaccination more than mothers of children in rural areas (79.2% and 35.9% respectively) (33).

Study by Nazish Siddiqi showed that mother who had higher knowledge score were more likely to have appropriately vaccinated children. Knowledge was found to have positive association with appropriate vaccination children (34).

Study by Pakistan A. immunized in 1999, mothers' knowledge about Immunization diseases and immunization program found that most mothers in this study had poor to fair knowledge. However, even those mothers who had good knowledge did not have completely immunized children (35).

Nazish's study in Pakistan said that one of the limitations of the study was that a brief nested questionnaire was used to assess knowledge rather than a more detailed tood. Mothers' knowledge was not significantly associated with appropriate vaccination of their children (34).

Ashraf UA in Thailand (1989) showed that 82.4% of mother who had adequate knowledge completely immunized children than mothers who had indadequate knowledge. It was no association between the knowledge and completeness immunization (36).

2.4.3 Studies related to perception

Perception is the process by which individuals receive information or stimuli from their environment and transform it into psychological awareness. These differences in interpretation can be understood if some general principles of perception are considered. First, perceptions are relative rather than absolute. Second, perceptions are selective; and third, perceptions are organized (36).

Individual perceptions that affect the perception of illness or disease deal with the importance of health to the individual. Variables representing individual perception include: perceived susceptibility, perceived severity, perceived benefits, and perceived barrier regarding a disease or condition. These variables directly affect one's predisposition to take prevention action (36).

Perceived susceptibility

The results conducted by RAJEEV GERA the study showed that perceived susceptibility had significant association (p,0.001) with 79.6% children with mothers and caretakers having low to moderate level of perception were completely immunized than mother having high level of perception susceptibility (25).

Perceived severity

According the perceived severity. 73.8% mothers and caretakers who had low and moderate level incomplete immunization than mother and caretakers who had high perceived severity(59.8%) was found to be significant (p-value=0.007) (25).

Perceived benefits

Concerning the perceived benefit was significant association with immunization status ($p<0.001$). 88.8 percent of mothers and caretakers having low and moderate level of perception of benefit had incomplete immunization than who had high perceived benefit (55.1%) (25).

One study by U Manjunath found, Majority of the mothers was able to mention at lest one benefit of immunization as preventing illness, paralysis, or death. Mothers of fully and partially immunized children mentioned more than one benefit in general (38).

Perceived barriers

The study done by Takashi Senda in 2005 considered several barriers to obtaining immunization for children : inconvenient clinic hours, transportation

difficulties, and confusing vaccination schedules. Mothers believed that vaccines were not important for their children and they assumed when their children got vaccinated, they get sick. Common indentified barriers to vaccination included the inconvenience of leaving work to take their children to health care service and limited access to the services (including time). Geography is may also be a barrier for mothers to get the information from health care centres or from health volunteersIf they live in the mountains or far from a village, the health service cannot access them house by house (25).

Although transportation may also be a problem. Some parents expressed frustration when they look their child to be vaccinated according to schedule, but were refused because the child had a cold or other illness. Many mothers mentioned that local, neighborhood immunization sites such as grocery stores or mobile vans might increase immunization rate (25).

Salsberry's study in 1993 found that mothers who used private clinics tended to listen to their physicians for information about immunization schedules. Physicians reported that they perceived that forgetting immunization or not knowing when immunization was due were significant parental barriers.

Barrier may also differ between more and less affluent populations, and the most commonly reported barriers to immunization were cost and failure of insurance to cover immunization. These barriers were reported as important among focus group participants using private health care, but not as important among those using public health clinics (25).

Study by Rajeev Gera study (25) there was not significant association with immunization status. Mother/caretakers who had low and moderate of perceived barriers were completely immunized children (69.3%) than who had high perceived of barrier (62.4%).

2.4.4 Studies related to the accessibility and availability

The study by Ibnouf AH in 2007 showed that children living in urban areas were more likely to be vaccinated than those living in rural areas. The effect on accessibility to services in terms of walking time was also found to be a very

significant factor, and walking or travelling time and distance are probably key factors that influence the utilization of health care services (33).

Research conducted by Daokeo S showed that the distance and mode of transportation from house to the vaccination centers. 72.2% of children whose mothers lived more than three kilometers from a vaccination center received complete immunization more than half of them (54.2%) whose mothers lived less than one kilometer from vaccination posts (28). There was a significant relationship between the utilization of immunization services and distance from the vaccination posts and their houses (41). Also the waiting time at the vaccination center, 84.2 percent mothers wait less than 30 minutes more complete vaccination more than mothers who wait 30 minutes, there was found a significant relationship between utilization of immunization services and expenditure for travelling to the vaccination posts (28).

The study by Rajeev Gera, Regarding the accessibility to immunization like distance, time spent, cost and source of information with immunization status. A significant association was found between time spent in waiting time at immunization site, access to other source of immunization and visit by health worker/community volunteer at home prior to immunization session, and immunization status (25).

Daokeo S study in 2003 the places for giving vaccination service were found that significant relationship with utilization of immunization services (28).

2.4.5 Studies related to satisfaction

Recently, many investigations have discussed not only equity of health services utilization, but also the importance of consumers' satisfaction. However, those kinds of investigation have rarely been conducted in low or middle income countries. Also, there are a few in-depth analyses about why people choose a health service and of their needs (42). Access to adequate health care is among the factors suggested to be associated with child mortality; improved access holds great potential for a significant reduction in under-five deaths in developing countries. Theory and corresponding frameworks indicate a wide range of factors affecting access to health care, such as traditionally measured variables (distance to a health provider and cost of obtaining health care) and additional variables (social support, time availability, and caregiver autonomy). Access to health care is multidimensional; factors other than

distance and cost need to be considered by those planning health care provision if child mortality rates are to be reduced through improved access (39).

The results of the study by Ashley H. in 2007 show that parents' satisfaction with their children's health care at an early age is related to the children's later immunization, independent of socio-demographic characteristics, infant health status, and patterns of maternal health care utilization. (If compared with children of parents reported excellent satisfaction were significantly less likely to have obtained the age-appropriate 2 month well child visit and had significantly fewer total age-appropriate visits by 24 months of age. Children of parents who reported good satisfaction with care were not significantly different from children of parents reporting excellent satisfaction in their receipt of age-appropriate well-child care (40).

A study of client satisfaction by Bratati Banerjee in 2003 found that the main reason for dissatisfaction was inconvenient timing and long waiting times which are common problems in many free service facilities. On the other hand it was said that the health facility centre provides good service, the staff are friendly and show great care, the doctors give good treatment and also sufficient time to attend to them., found was significant association between satisfaction with utilization of immunization relevance (41).

U Manjunath study in 2003 showed that all the mothers of fully immunized (100%) children are satisfied and the number decreased (86.5%) for partially and not immunized (61.3%) was found a significant association between satisfaction with utilization of immunization services (38).

2.4.6 Studies related to utilization of immunization services

The previous study by U Manjunath total of 166 children aged 12-24 months. 50.0 percent of the children aged 12-24 months who had received fully immunized children, 31.3 percent were partially immunized and 18.7 percent not at all immunized (38).

Masaharu study in Lao PDR 2007 . The fully immunized children coverage of 60% was equal to the national target, and only 3.5% were not fully immunized (10).

Gera in 2010, found that only 34.6% of the children were completely immunized for all the recommended vaccines in first year of life. Meanwhile 65.4% of them had incomplete immunization (25).

Kongxay P study in 2007 showed that the children were complete immunization only 37%,and incompletely immunized children about 63% (27).

Study from Daokeo in 2003 found that 62.5% of the children were fully immunized, and 37.5% of them were not fully immunized children (28).

CHAPTER III
RESEARCH METHODOLOGY

3.1 Research design

The study design was a cross - sectional and descriptive study, and was conducted on January to February 2011 period of the study. The aim of the study based on the factors related to the utilization of immunization services.

3.2 Study population

The study selected mothers who had children aged 12 to 24 months, and mothers who took their children to get vaccinations (focus only on mothers) who had vaccination cards, and who were living in villages in Pakngeum district, Vientiane Capital.

Table 3.1 Immunization coverage in Vientiane Capital and Pakngeum district in 2007-2008 year

Area	Type of Vaccine	2007	2008
Vientiane Capital	BCG	86%	86%
	DPT-HepB3	76%	76%
	OPV3	64%	76%
	Measles	43%	52%
Pakngeum distric	BCG	55%	64%
	DPT-HepB3	50%	54%
	OPV3	34%	54%
	Measles	43%	52%

Source : From NIP annual report (MOH)

3.3 Sample size

The sample size (n) was calculated using the proportion formula:

$$\mathbf{n} = \frac{\mathbf{Z^2NP(1-P)}}{\mathbf{Z^2P(1-P)+(N-1)E^2}}$$

$$= \frac{(\mathbf{196})^2(\mathbf{2{,}174})(\mathbf{0.5})(\mathbf{1-0.5})}{(\mathbf{1.96})^2(\mathbf{0.5})(\mathbf{1-0.5})+(\mathbf{2.174-1})(\mathbf{0.06})^2}$$

$$\mathbf{n} = \frac{\mathbf{2087.91}}{\mathbf{8.7832}} = 237 \sim 238 \text{ (plus 10\% = 262)}$$

n = 262

CI = 95% (confidence interval)

E = 6% (acceptance error)

Z = 1.96 (standard normal score at 95% of confidence interval)

N = 2,174 (total population of mother who had children 12 – 24 months, who are living in the villages)

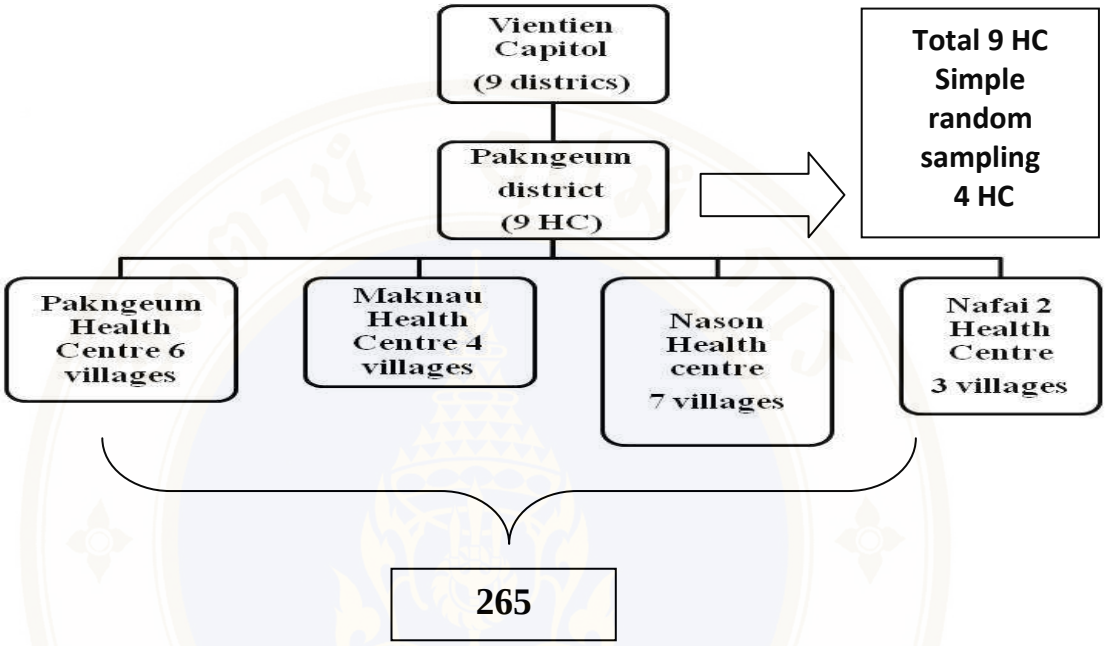
P = 0.5 (the largest proportion)

From the calculate of sample size, the sample size was planned **n=262**. This included the more 10% of sample size to prevent information loss from incomplete data. After data collection the total sample size 265 of the respondents selected who had vaccination card in all target population 12-24 months in 20 villages belong in 4 health centers.

3.4 Study area

Pakngeum district is one of nine districts and outside district in Vientiane Capital. The north shares a border with Thathom district in Vientiane province, the west with Xaythany district in Vientiane Capital, the east with Thailand, and the south with Bolikhamxay province. The total population was 50,555; it had 53 villages, and 9

health centers. This study conducted in 4 health centers and 20 villages in Pakngeum district in Vientiane capital.



(Total of respondents interviewed were 304, selected only 265 who had the vaccination card)

Figure 3.1 Sampling area

3.5 Sampling technique

Sampling technique was a simple random sampling. 4 health center were selected from the total 9 health centers by generating random numbers. The total of 20 villages in the catchment areas in 4 health centers, selected mothers who living in the village and have children aged 12-24 months included the vaccination card. The total of mothers 265 interviewed for this study.

3.6 Research instrument

The data was collected using a structure questionnaire eliciting information related to factors (i.e. socio-demographic characteristics, knowledge, perception, accessibility and satisfaction factors), influencing the utilization of immunization services by mothers with children aged 12 to 24 months.

Independent variables comprised:

Part 1: Socio-demographic characteristics

This part consisted of 5 questions dealing with the socio-demographic factors for utilization of immunization services: age, family member, number of children in the family, education, marital status, occupation, and family income.

Part 2: Knowledge

This part consisted of 28 questions related to the knowledge of the respondent mothers about immunization. It included questions about immunized diseases such as transmission, syndromes, and immunization programs, including immunization schedules and vaccination side-effects.

Each respondent was requested to select the only one answer from multiple choices. A correct answer scored 1, and an incorrect or unsure answer scored 0. In this study, knowledge was divided into three categories according to Bloom's criteria:

1.Good : respondents who got > or equal to 80% of the total possible score in the knowledge questions.

2.Moderate : respondents who got 60-79% of the total possible score in the knowledge questions.

3.Poor : respondents who got < to 60% of the total possible score in the knowledge questions.

Part 3: Perception

The perception part comprised 16 positive or negative statements designed to elicit information about mothers' perceptions regarding immunization programs. Respondents selected the most appropriate answer by making a tick [√]. Answer choices were: agree, not sure and disagree, and were scored as follows:

- For positive statements :agree : 3 points; not sure: 2 points; disagree: 1 point
- For negative statements :agree: 1 point; not sure: 2 points;disagree: 3 points

Perception was divide in three categorized according to Bloom's criteria:

1. High : total score ≥ 80%
2. Moderate : total score 60% - 79%
3. Low : ≤ 60%

Perception was devided into 4 parts: perceived susceptibility; perceived severity; perceived benefits, and perceived barriers:

Group1: there were 2 positive questions and 2 negative questions about perceived susceptibility.

Group1: there were 4 positive questions about perceived severity.

Group 3: there were 2 positive questions and 2 negative questions about perceived benefits of immunization.

Group 4: there were 4 positive questions about perceived barriers to Immunization.

The total score of perception ranged from 16 to 48. It was categorized into 2 groups: low perception (≤ 24 score); moderate perception (>25 score).

Part 4: Immunization services

Accessibility of immunization services included the distance from home to immunization posts, waiting times at places for giving vaccination, appropriate time to get vaccination, and the sources of information about immunization. There were 11 questions in this part, and respondents were asked to select the most appropriate answer from multiple choices.

Availability of immunization services included the sufficiency of places for giving immunization. The presence of vaccines and health staff providing the services. There were 4 questions in this part.

Part 5: Satisfaction with immunization services

There were 5 questions about satisfaction with immunization services, comprising the respondents' appraisals of different aspects of their last immunization care : health provider rapid response, provider behavior,

convenience ,waiting time, and cleanliness of immunization rooms.These questions were answered according to the following rating scale: very satisfied, slightly satisfied, fair, slightly dissatisfied, or very dissatisfied The answers were scored as follow: very satisfied: 5 points; slightly satisfied: 4 points; fair: 3 points; slightly dissatisfied: 2 points; very dissatisfied: 1 point.

Regard to the total score of satisfaction was divided in three groups for descriptive data: low(<60%), moderate(60-79%), and high satisfaction(≥80%) . (Bloom's criteria) For analysis using chi-square, it was divided in to two categories: satisfied (greater than the median score) or not satisfied (equal to, or less than, the median score).

Dependent variable

This part consisted of questions dealing with the utilization of immunization services for children aged 12 to 24 months. (In this study was mainly examined with the characteristics of well child vaccination card keep with the mother. (checked record vaccination date). After interviewed checking the vaccination card, the utilization were fully or partially immunized children.

3.7 Pretest of questionnaire

The original Questionnaire was in English, and was translated into Lao language before data collection, the questionnaire was pre-tested interviewing 37 mothers. The pre-test was conducted on 28-29 December 2010. The results of reliability test were divided in 3 parts. The most satisfactory was satisfaction part in the reliability test:

Knowledge part (28 questions) = 0.736, Perception part (16 questions)=0.656, and satisfaction part (05 questions) = 0.966.

3.8 Data collection

The data were collected by interviewers using a structured questionnaire. After getting permission from the ethics committee, data was collected as follows:

1) Asked permission from Health department in Vientiane Capital, District Health Office, chief of Health Centre and health community in the villages by letter from AIHD's Director and from MCHC director.

2) Translated questionaire from English into Lao.

3) Coordinated with District Health Office and Chief of Health Centre in 4 health centers included 20 villages in Pakngeum district.

4) One day training to introduce the questionnaire and ethical issues to the interviewers for NIP staff at Maternal and Child Health Center, Ministry of Health (MOH).

5) Asked mothers who had children aged 12 to 24 months in the village. Before interviewing the mothers, the interviewers explained the purpose of the research and assured them that the collected data would be kept secure and confidential, and that they could skip questions or refuse to answer.

6) Informed consent was obtained from each participant.

7) The investigator and assistant then started interviewing the respondents. It took approximately around 45 minutes (minimum) to complete the questionnaire. If a participant did not understand the meaning of a question, the investigator or the assistant explained the question. If the participant felt uncomfortable answering the question it could be left blank.

3.9 Data management and analysis

The data was coded using Epi data and analyzed by SPSS software. Descriptive statistics was used to calculate frequency, mean, standard deviation and percentage were used to describe the distribution. Chi-square test was used to analyze the associations between the independent and dependent variables, and multiple logistic regression was used to find predictors of the model.

CHAPTER IV
RESULTS

This research was conducted in Pakngeum district in Vientiane capital. Data was collected from 12th January, 2010 to 30th February, 2011. The target population was mothers who had children aged 12 to 24 months old, and the data was collected by interview using a structured questionnaire. The study group was selected by random sampling in 4 study sites (4 health centers) and comprised 265 mothers with children aged 12 to 24 months. This was a cross- sectional study. The results are presented in the form of number and percentage tables. The quantitative data is shown with mean, median, standard deviation (SD), quartile deviation (QD), minimum and maximum. Chi – square tests and multiple logistic regressions were used to determine the relationship between the independent variables and utilization of immunization services.

The results from the study are presented in 8 parts as follows:

4.1 Utilization of immunization services

4.2 Socio-demographic characteristics

4.3 Knowledge of immunization

4.4 Perception of immunization

4.5 Accessibility and availability of immunization services

4.6 Satisfaction with immunization services

4.7 Relationship between study factors influencing to utilization of immunization services.

4.8 Factors influencing to utilization of immunization services

4.1 Utilization of immunization services

More than two-thirds of the respondents had children with fully immunized and only less than one-third with partially immunized as shown on Table 4.1.

Table 4.1 Number and percentage of respondents classified by whether the children fully or partially immunized

Immunization Utilization	Number n=265	Percentage (%)
Fully immunized	193	72.8
Partially immunized	72	27.2

4.2 Socio-demographic characteristics of the respondents with fully immunized children

The respondents were investigated from a socio-demographic perspective (age group, family member, total number of children **,** number of children under 2 years, marital status, education level, occupation and family income).

Mother's age group

One-third of the respondents were aged between 20-24 years old. Less than one third of the respondents were aged between 25-29 and 30-34 years old.. However, about 15 percent of the respondents were aged between 16-19 and 35-45 years old.

Number of family members

More than half of the respondents had 3-5 families members. However, respondents with 6-12 family members were less than half.

Number of children, less than half of the respondents has only one child, nearly two-fifths had two children. Less than one-fifths of the respondents had three children and 3.4 percent had more than four children.

Number of children under 2 years

Most of the respondents (99.6%) had one child under 2 years, the other (0.4%) had only 2 children under 2 years.

Marital status, Most respondents (97%) lived together with their husbands and families. Only few (3%) were widows.

Education level:

Less than half of the respondents had primary, almost one-third had secondary school education, only 3.8% had no-education or attended college or university. 14.3 percent The respondents who had high school education were 14.3% of the respondents had high school education.

Mothers' occupations,

Most of the respondents (78.1%) were farmers, less than 10% worked in trade, government sector and private business sector. However, 10% were housewives.

Husbands' occupations

More than two-thirds of the respondents' husband had had occupation as farmer, the rest work in trade, government sector, worker and private business were only less than 10 percent.

Family monthly income

Less than one-third of the respondents had income between 700,001-100,000. The rest of respondents had income < 300,000, 300,000-500,000, 500,001-700,000, and >1,000,000 were only less than 21 percent.

Table 4.2 Number and percentage of respondents classified by level socio-demographic characteristics

Socio-demographic characteristics	Number (n=265)	Percentage (%)
Age group of mothers (year)		
16 – 19	13	4.9
20 – 24	90	34.0
25 - 29	77	29.1
30 – 34	57	21.5
35 - 45	28	10.6
Mean=26.95 , SD= 5.57, Min=16, Max=45		

Table 4.2 Number and percentage of respondents classified by level socio-demographic characteristics (cont.)

Socio-demographic characteristics	Number (n=265)	Percentage (%)
Member of family (person)		
3-5	144	54.3
6-12	121	45.7
Mean = 5.57, SD= 1.802, Min=3, Max=12		
Number of children (person)		
1	133	42.6
2	108	40.8
3	35	13.2
≥4	9	3.4
Mean = 1.79, SD= .858, Min =1, Max = 6		
Number of children under 2 years (person)		
1	264	99.6
2	1	0.4
Marital		
Live together	257	97.0
Divorce	8	3.0
Education level		
No-Education	10	3.8
Primary school	120	45.3
Secondary school	87	32.8
High school	38	14.3
College/University	10	3.8
Mother occupation		
Farmer	207	78.1
Trade	17	6.4
Government sector	12	4.5
Housewife	27	10.2

Table 4.2 Number and percentage of respondents classified by socio-demographic Characteristics (cont.)

Socio-demographic characteristics	Number (n=265)	Percentage (%)
Private business	2	0.8
Husband Occupation(n=258)		
Famer	192	74.4
Trade	15	5.8
Government sector	18	7.0
Worker	15	5.8
Private business	18	7.0
Family income (kip)		
< 300.000	40	15.1
300,000-500,000	54	20.4
500,001-700,000	41	15.5
700,001-1,000,000	76	28.7
≥1,000,000	54	20.4

4.3 Knowledge of the respondents regarding immunization

The knowledge part of the questionnaire consisted of 28 questions (as follow in Table B1 in appendix B). They were divided into 4 parts: knowledge about immunization schedules, knowledge about types of vaccine, knowledge about disease transmissions and knowledge about symptoms of disease.

There were 10 questions asking about immunization schedules. Mothers who answered correctly were given a point. More than half of the respondents (67.1%) had good knowledge about the immunization schedule. Regarding the type of vaccine, more than half of the respondents (65.7%) had moderate knowledge. According to the disease transmission, the respondents had moderate knowledge were 50.9 percent. Concerning to the symptoms diseases, more than a half of the respondents had moderate knowledge as shown in the Table 4.4.

For the of knowledge part, the respondents who had moderate knowledge were about half (50.2%) and 35.1% respectively. However, few of the respondents (14.7%) had good knowledge about immunization preventable.

Table 4.3 Number and percentage of respondents classified by total knowledge score

Level of mother's knowledge	**Number (n=265)**	**Percentage (%)**
Poor (<16.56 score)	93	35.1
Moderate (16.57-24.2 score)	133	50.2
Good (> 24.3 score)	39	14.7
Median = 21, SD =3.86, Min = 8, Max = 27, QD=2		

Table 4.4 Number and percentage of respondents by level of knowledge about immunization diseases and vaccination by iterm

Mother's knowledge	**Number (n=265)**	**Percentage (%)**
Immunization schedule		
Poor (<6 score)	23	8.7
Moderate (6-8 score)	64	24.2
Good (>8 score)	178	67.1
Median= 9.0 , Min= 0.00, Max= 10.00, QD= 0.5		
Type of vaccination		
Poor (<3 score)	75	28.3
Moderate (3-5 score)	174	65.7
Good (>5 score)	16	6.0
Median= 4.0 , Min= 0.00, Max= 6.00, QD= 0.1		
Disease transmission		
Poor (<3 score)	99	37.3
Moderate (3-5 score)	135	50.9
Good (>5 score)	31	11.8
Median= 4.0, Min= 0.00, Max= 6.00, QD= 1		

Table 4.4 Number and percentage of respondents by level of knowledge about immunization diseases and vaccination by item (cont.)

Mother's knowledge	**Number (n=265)**	**Percentage (%)**
Symptoms of diseases		
Poor (3 score)	70	26.4
Moderate (3-5 score)	156	58.9
Good (>5 score)	39	14.7
Median= 4.0, Min= 0.00, Max= 6.00, QD= 1		

4.4 Perception of respondents regarding preventable diseases for immunization

The perception aspect of the questionnaire consisted of 16 statements: 10 positive statements and 6 negative statements (as follow Table B2 in appendix B). They were described into 4 parts: perception about immunization susceptibility, perception of severity, perception of benefit and perception of barrier to immunization.

There were 4 questions asking about susceptibility toward eight preventable diseases on immunization program. Half of the respondents (50.6%) had low perception and only 49.4% of mothers had high perception who believed that children would have preventable disease after getting vaccination.

With regard to mother's perceptions about the severity of vaccine preventable diseases, almost two-thirds of the respondents had low perception. The respondents with high perception were 32.5 percent.

Regarding perception of benefits about immunization, most respondents (97.7%) had low perception; only few (2.3%) had high perceptions .

For perceptions regarding barriers to immunization, almost two-thirds of the respondents had low perception. 30.2 % had high perceptions .

Table 4.5 Number and percentage of respondents by level of perception regarding immunizable diseases and vaccination by item

Mother's perception	**Number (n=265)**	**Percentage (%)**
Perception of susceptibility		
Low (≤7 score)	134	50.6
High (>7 score)	131	49.4
Median= 7.00, Min= 4.00, Max= 12.00, QD= 1.5		
Perception of severity		
Low (≤7 score)	179	67.5
High (>7 score)	86	32.5
Median= 7.0, Min=4.00, Max=12.00, QD=1		
Perception of benefit		
Low (≤7 score)	259	97.7
High (>7 score)	6	2.3
Median= 7.0, Min=4.00, Max=12.00, QD=1		
Perception of barrier		
Low (≤6 score)	185	69.8
High (>6 score)	78	30.2
Median= 6.0, Min=4.00, Max=11.00, QD=2		

Table 4.6 Number and percentage of respondents classified by total score Respondents

Level of mother's perception	**Number (n=265)**	**Percentage (%)**
Low (≤24 score)	146	55.1
High (>25 score)	119	44.9
Median = 24, Min = 17, Max = 38, QD=4		

For overall perception of respondents, more than half (55.1%) had low perceptions, and only 44.9 percent had high perceptions about immunizable diseases and vaccine.

4.5 Accessibility and availability of immunization services

The Accessibility to immunization services was categorized by the place of immunization services from home, the distance between their home to vaccination post, and also regarding the time to reach vaccination, waiting time at the vaccination post, the appropriate time to get the vaccination, other information about immunization services.

With regard to place of immunization services, more than half of the respondents accessed the immunization services from mobile services. The others used health centers (32.8%) less than 12% used district and center hospitals.

Regarding to the distance from community houses to the site of immunization services, most of the respondents (87.5%) were less than 1 km or close enough to the vaccination post. the rest of respondents were only less than 10 percent lived more than 1 km from that post.

Concerning duration of time spent to get immunization services, more than two-thirds of the respondents (72.8%) were less than 10 minutes. 23.4% spent time between 11 and 30 minutes and 3.8% spent time more than 30 minutes.

More than half respondents (60%) did not wait too long to get immunization services (6-10 minute). Less than 24 percent of respondents waited about less than 5 minutes for getting the services. However only few respondents waited more than 11 minutes(16.2%).

Almost all (99.6 %) of the respondents were interviewed in the morning which was the most suitable timing for the parents to bring their children for immunization.

More than half of the respondents knew information from local public announcements placed in the villages. Others (34.3%) got the information from health workers. More than two-thirds of the respondents received information about the vaccination service only one day before the services.

Consistent with communication channel mentioned above, village head (66.4%) was the most active leaders to remind the parents to bring their children to be immunized. 81.9% respondents always received advice about type of vaccine before vaccination.

Mostly (94.0%) respondents were given advice every time about the location/post for immunization. 88.7% of the respondents always received information from health workers about side effects of the vaccines. Every respondent knew that the vaccination services were free of charge.

Concerning the availability of immunization services, most (98.9%) of the respondents knew the place for vaccination services, 98.9% had Health Workers to prepare the vaccination post. Almost all (99.2%) of the respondents agreed that the health workers were ready to provide vaccination services. Most (91.7%) of the respondents agreed that the vaccines was always available in immunization services.

Table 4.7 Number and percentage of respondents by accessibility and availability of immunization services

Accessibility and availability of immunization services	**Number** (n=265)	**Percentage** (%)
Place of immunization services		
Center hospital	9	3.4
District hospital	30	11.3
Health center	87	32.8
Mobile service	139	52.5
Distance travel to vaccination post		
<1 km	168	87.5
1-3 km	64	9.4
>3 km	33	3.0
Median= 500, Min= 10, Max=57.000 (meter)		
Duration of time to vaccination post		
1 – 10 (minute)	193	72.8
11 – 30 (minute)	62	23.4
> 31 (minute)	10	3.8
Median=10, SD=12.46, Min=2, Max=120 (minute)		

Table 4.7 Number and percentage of respondents by accessibility and availability of immunization services (cont.)

Accessibility and availability of immunization services	Number (n=265)	Percentage (%)
Appropriate time to get vaccination		
Morning	264	99.6
Afternoon	1	.4
Received information from whom		
Health worker	91	34.3
Friend	4	1.5
Health volunteer	2	0.8
Head village	12	4.5
Public announcement	155	58.5
Others(family, yellow card)	1	0.4
How many day received information before		
One day	209	78.9
Two days	2	0.8
>3 days	54	20.4
Who remind to get the vaccination		
Health volunteer	8	3.0
Head village	176	66.4
Health worker	57	21.5
Friend	9	3.4
Others	15	5.7
Advise time about type of vaccine before provided vaccination		
Always	217	81.9
Some time	32	12.1
Never	16	6.0
Advise about vaccination post		
Always	249	94.0
Some time	15	5.7

Table 4.7 Number and percentage of respondents by accessibility and availability of immunization services (cont.)

Accessibility and availability of immunization services	**Number** (n=265)	**Percentage** (%)
Never	**1**	**0.4**
Advise about side effect of vaccine		
Always	235	88.7
Some time	26	9.8
Never	4	1.5
Vaccination Free		
Yes	265	100.0
No	0	0
Many place of vaccination services		
Yes	262	98.9
Don't know	2	0.8
Not sure	1	0.4
Health worker prepare for giving vaccination post		
Yes	262	98.9
Don't know	0	0
Not sure	3	1.1
Health worker prepare before provide vaccination		
Yes	263	99.2
Don't know	1	0.4
Not sure	1	0.4
Available vaccine		
Yes	243	91.7
Don't know	11	4.2
Not sure	11	4.2

Table 4.7 Number and percentage of respondents by accessibility and availability of immunization services (cont.)

Accessibility and availability of immunization services	**Number** (n=265)	**Percentage** (%)
Received information from whom		
Health worker	91	34.3
Friend	4	1.5
Health volunteer	2	0.8
Head village	12	4.5
Public announcement	155	58.5
Others(family, yellow card)	1	0.4
How many day received information before		
One day	209	78.9
Two days	2	0.8
>3 days	54	20.4

4.6 Satisfaction with immunization services

Satisfaction aspect of questionnaire consisted of 5 questions, finally, it was divided in to three categories (low, moderate and high satisfaction).

More than half of the respondents had high satisfaction. However, less than half of the respondents had moderate satisfaction and a few (0.4%) of the respondents had low satisfaction of immunization servives.

Table 4.8 Number and percentage of respondents by satisfaction of immunization services

Level mother's satisfaction of immunization services	**Number** (n=265)	**Percentage** (%)
Low (0-15score)	1	0.4
Moderate(16-20score)	106	40.0
High(21-25score)	158	59.6

4.7 Relationship between study factors influencing to utilization of immunization services

In order to determine the relationship between the utilization of immunization services and socio-demographic factors, knowledge factors, perception factors, immunization services and satisfaction of immunization services-cross tabulation and chi-square tests were carried out in this study.

4.7.1 Relationship between socio-demographic characteristics and utilization of immunization services

This part describes the relationship between mothers' socio-demographic characteristic and their children's utilization of immunization services. Chi-square tests were used to identify of the impact of these factors on the children's utilization of immunization services.

Table 4.9, shows that the72.0% of the children of mothers age 16-24, 74.4% of the children of mothers aged 25-34, and 69.6% of the children of whose mothers age 35-45 years old, received full immunization. Comparing these groups mothers in the 25-34 years old age group had the highest percentage of fully immunized children. The values as shown in this table indicate that there was no significant relationship between a mother's age and the utilization of immunization services.

With regard to family size, 76.0% of children with, it was found that most children who mothers had more than 5 family's member received full immunization (76.0%) were higher than those with less than 5 family's members, which were 70.1 percent. There was no significant relationship between family's members and the utilization of immunization services.

The results also show that mothers who had one child received full immunization (77.0%) got higher percentage than those with more than two children (69.7%). However, the number of children was not statistically significant associated with the utilization of immunization services.

73.2% of the children of mothers who lived together with their husbands, and 62.5% of those whose mothers were divorced, were fully immunized. It was

higher than those. However, there was no significant association between marital status and the utilization of immunization services.

Table 4.9, shows that 50.0% of the children of mothers with no-education, 71% of those with mothers with low-education, and 85.4% of those with high education, were fully immunized. By comparison between three groups, the children who mother had high education had fully immunized higher than other. The values shown in this table indicate that there was a significant relationship between mothers' education and the utilization of immunization services (**p-value = 0.033).**

The utilization of immunization was not significantly associated with mother's occupation and husband's occupation. In mother's occupation, the farmer group had a higher percentage of fully immunized children with (74.4%) than other groups. However, with regard to husband's occupation, the non farmer group had a higher percentage of fully immunized children with (80.3%) than the farmer group.

The results also show that 78.9% of children of mothers with high family income, 63% of children of mothers with moderate family incomes, and 60% of children of mothers with low family incomes were fully immunized. Family income was found to be statistically significantly associated with the utilization of immunization services **(p-value = 0.010).**

Table 4.9 Relationship between socio-demographic characteristics and utilization of immunization services

Socio-demographic characteristics	**Immunization utilization services**				**p-value**
	Fully immunized n=193		**Partially immunized** n=72		
	n	%	n	%	
Age group of mothers (year)					
16 – 24	90	72.0	35	28.0	
25 – 34	87	74.4	30	25.6	
35 – 45	16	69.6	7	30.4	0.634

Table 4.9 Relationship between socio-demographic characteristics and utilization of immunization services (cont.)

Socio-demographic characteristics	Immunization utilization services				p-value
	Fully immunized n=193		Partially immunized n=72		
	n	%	n	%	
Member of family(person)					
3-5 years	101	70.1	43	29.9	
6-12 years	92	76.0	29	24.0	0.283
Number of children(person)					
1 child	87	77.0	26	23.0	
>2 child	106	69.7	46	30.3	0.189
Marital					
Live together	188	73.2	69	26.8	
Divorce	5	62.5	3	37.5	0.505
Education level					
No-Education	5	50.0	5	50.0	
Low-education	147	71.0	60	29.0	
High-education	41	85.4	7	14.6	**0.033***
Mother occupation					
Farmer	154	74.4	53	25.6	
Non farmer	39	67.2	19	32.8	0.279
Husband occupation					
Farmer	136	70.8	56	29.2	
Non farmer	53	80.3	13	19.7	0.134
Family income (kip)					
< 300,000	24	60.0	16	40.0	
300,000-500,000	34	63.0	20	37.0	
>500,000	135	78.9	36	21.1	**0.010****

4.7.2 Relationship between knowledge of mothers and utilization of immunization services

Level of mother's knowledge on immunization was not significantly related with utilization of immunization services among children (p-value=0.225). Table 4.10 shows that 73.3% of mothers with good knowledge had fully immunized children and this was not different from the numbers of mother with moderate knowledge (75%). On the other hand, there were only 61.5 % of mother with poor knowledge who had fully immunized children. Chi-square test did not detect any significant relationship between level of mother knowledge and utilization of immunization.

Table 4.10 Relationship between utilization of immunization services and Mother's knowledge classified about Immunization

Level of mother's knowledge	**Immunization utilization services**				**p-value**
	Fully immunized n=193		**Partially immunized** n=72		
	n	%	n	%	
Poor	24	61.5	15	38.5	
Moderate	147	75.0	49	25.0	
Good	22	73.3	8	26.6	0.225

4.7.3 Relationship between mother's perception and utilization of immunization services

There was a association between perception and utilization of immunization services **(p-value=0.042).** Mothers with moderate levels of perception were more likely to have children with fully immunized children with (78.9%) than those with low perception.

Table 4.11 Relationship between perception of respondents and utilization of immunization services

Level of mother's perception	Immunization utilization services				p-value
	Fully immunized n=193		Partially immunized n=72		
	n	%	n	%	
Low	99	67.8	47	32.2	
Moderate	94	78.9	25	21.0	**0.042***

4.7.4 Relationship between accessibility and availability with utilization of immunization services

Table 4.12 shows majority of the respondents (75.5%) whose children with fully immunized used mobile services. This was higher than those who used the health facility (69.8%). There was no significant association between place of immunization service and utilization of immunization services.

When utilization of immunization services was cross-tabulated with accessibility of immunization services, it was seen that the distance from the vaccination post had an effect on child immunization. Table 4.12 shows that 81.8% of the children of respondents living far or more than three kilometers from vaccination post, 76.8% of the children of respondents who lived near to a vaccination post (<1km), and 57.8% of the children of respondents who lived between 1-3 kilometers from a vaccination post were fully immunized. There was a significant relationship between the distance from hom to immunization post and utilization of immunization services **(p-value = 0.007).**

Regarding travel time to an immunization post. 76.7% of the children of mothers who took 1-10 minutes to reach a vaccination time to immunization post, and 62% of the children of mothers who took more than 11 minutes, were fully immunized. There was significant relationship between the travel time to an immunization post and the utilization of immunization services **(p-value= 0.021).**

With regard the waiting time at a vaccination post, it was found that there was no significant relationship between waiting time and the utilization of

immunization services. 73.9% of the respondents with children who were fully immunized waited less than 10 minutes and 67.4%of those who waited more than 11 minutes were fully immunized.

73.0% of the respondents with fully immunized children received information from community such as health volunteer or village head, friend. and got the information more than three days before the vaccination services (74.1%). If it compared with those who received information from health worker (72.5%) and got that information less than three days (72.5%), there was too small difference. Therefore information was not significantly associated with the utilization of immunization services.

According the reminder about vaccination schedule, the respondents who children with fully immunized got reminder from community(Village head, health volunteer or friend) (73.1%) higher percentage than those who got reminder from health workers (71.9%). There was no significant association between reminder about vaccination schedules and the utilization of immunization services.

In terms of advice about type of vaccine and vaccination post, more than two thirds of the respondents with children fully immunized always got those advices. However, there were no significant association between advice about type of vaccine, or advice about vaccination posts and the utilization of immunization services.

Regarding advice about side effect of vaccine, the difference between the group who always got advice and only sometimes got that advice was only 0.5%. There was no significant relationship between the advice about side effect of vaccine and the utilization of immunization services.

73.3% of the respondents with fully immunized children knew many places for giving vaccination, and only 33.3% did not.

Table 4.12 Relationship between immunization utilization and accessibility and availability of immunization services

Accessibility and availability of immunization services	Immunization utilization services				p-value
	Fully immunized n=193		Partially immunized n=72		
	n	%	n	%	
Place of immunization services					
Health facility	88	69.8	38	30.2	
Mobile service	105	75.5	34	24.5	0.298
Distance travel to vaccination post					
<1 km	129	76.8	39	23.2	
1-3 km	37	57.8	27	42.2	
>3 km	27	81.8	6	18.2	**0.007****
Duration of time to vaccination post					
1 – 10 (minute)	148	76.7	45	23.3	
>11 (minute)	45	62.5	27	37.5	**0.021***
Waiting time at vaccination post					
1 – 10(minute)	164	73.9	58	26.1	
>11 (minute)	29	67.4	14	31.6	0.385
Received information from whom					
Health worker	66	72.5	25	27.5	
Community	127	73.0	47	27.0	0.936
How many day received information before					
One – two days	153	72.5	58	27.5	
>3 days	40	74.1	14	25.9	0.818
Who remind to get the vaccination					
Health worker	41	71.9	16	28.1	
Community	152	73.1	56	26.9	0.863

Table 4.12 Relationship between immunization utilization and accessibility and availability of immunization services (cont.)

Accessibility and availability of immunization services	Immunization utilization services				p-value
	Fully immunized n=193		Partially immunized n=72		
	n	%	n	%	
Advise time about type of vaccine before provided vaccination					
Always	160	73.7	57	26.3	
Sometimes	33	68.8	15	31.2	0.483
Advise about vaccination post					
Always	183	73.5	66	26.5	
Sometimes	10	62.5	6	37.5	0.338
Advise about side effect of vaccine					
Always	171	72.8	64	27.2	
Sometimes	22	73.3	8	26.7	0.948
Many place for giving vaccination					
Yes	192	73.3	70	26.7	
No/not sure	1	33.3	2	66.7	0.122

4.7.5 Relationship between satisfaction and utilization of immunization services

There was no significant association found between level of mother's satisfaction with immunization services and utilization of immunization services. 77.1% of the respondents with high satisfaction levels had fully immunized children. This was higher than those with low satisfaction (69.3%).

Table 4.13 Relationship between satisfaction and utilization of immunization services

Level mother's satisfaction of immunization services	Immunization Utilization Services				p-value
	Fully immunized n=193		Partially immunized n=72		
	n	%	n	%	
Low	102	69.3	45	30.7	
High	91	77.1	27	22.9	0.160

4.8 Factors influencing to utilization of immunization services

Multiple logistic regression analysis was used to identify the association between the independent factors (mother's education, family income, mother's perception, distance and distance time to immunization post) and the utilization of immunization services which were found statistically significant in chi-square test.

Mother's family income and mother's perception were significantly associated with utilization of immunization services (p-value 0.041; 0.033 respectively), although mother's education, distance from house and travel to a post were not significantly associated with utilization of immunization services when adjusted with other factors as shown in the model in Table 4.14.

The final model in Table 4.14 illustrates that two selected factors each had a significant association with utilization of immunization services. Children of the respondents who had high incomes were more likely to have received full immunization services than the children respondents with low incomes (OR,CI).

Regarding mother's perception, the mothers who had high perception scores were almost two times more likely to be fully immunized children than the mother who had low perception with utilization of immunization services (p-value=0.033).

Table 4.14 The Multiple logistic regression model of immunization utilization services

Variables	Adj. odds ratio	95% C.I.for OR		p-value
		Lower	Upper	
1.Mother's education				
Low	1			
High	2.20	0.89	5.42	0.085
2.Family income (kip)				
<300,000	1			
≥300,000	1.85	1.02	3.34	**0.041***
3.Mother's perception				
Low	1			
High	1.90	1.05	3.42	**0.033****
4.Distance from house to immunization post				
<1 km	1			
≥1 km	1.62	0.84	3.12	0.145
5.Duration of time to immunization post				
>11 (minute)	1			
1-10 (minute)	1.55	0.77	3.09	0.211

*Significant p<0.05

CHAPTER V
DISCUSSION

This study is a cross-sectional study and the objectives were to describe the factors affecting utilization of immunization services of children aged 12-24 months and to identify the association between the utilization of immunization and socio-demographic, knowledge, perception, accessibility and satisfaction factors of immunization services. Discussion in this chapter covered:

5.1 Utilization of immunization services
5.2 Socio-demographic characteristics
5.3 Knowledge of mother about immunization
5.4 Perception of mothers regarding immunization
5.5 Accessibility and Availability
5.6 Satisfaction with Immunization services

5.1. Utilization of immunization services

Utilization of immunization services were categorized as fully immunized and partially immunized. Fully immunized children received all vaccination by using schedule by National Immunization Program (NIP) in Lao PDR (BCG DPT-HB-Hib3, OPV3, Measles) before they were one year old. Partially immunized children never received any vaccination, received some vaccination or dropout some vaccine when their age past one year (17).

In the present study shows that the coverage of fully immunized children (BCG, DPT-HB-Hib3, OPV3 and Measles) was 72.8% which was still low compared to regional target (85%). This study had wider immunization coverage compared to previous study in Lao PDR by Daokeo S was found that 62.5 percent of children received complete vaccination by immunization schedule (28), and also compared coverage to previous study by Gera in India showed that only 34.6% of the children were completely immunized for all the recommended vaccines in first year of life (25).

5.2 Socio-demographic factors

5.2.1 Mother's age group

In this study, Chi-square test showed that most mothers aged between 25-34 years old were more likely to have full immunized children compared to those in other age groups. However, in this present study there was no statistically significant association between mothers' age and utilization of immunization services. This finding was similar to previous studies by Daokeo S in Lao PDR also found that there was no significant association between age groups and utilization of immunization services (28). Also Rajeev Gera in India study found that the mothers were between the ages of 22-30 years did not find any significant association of age with immunization status (25).

This finding was inconsistent with Mosiur's study which found there was significant association between age and the utilization of immunization services (32). Mothers aged between 20-34 years old were more likely to have fully immunized children than mothers of younger age (under 20 years) and older mothers aged more than 35 years old (32).

For a reason why in age between 25-34 was higher fully immunized children than other groups, the explanation is that mothers in this age span were in good reproductive age and also had good knowledge about immunization services.

5.2.2 Family member

The result showed that three quarters of the mothers who had more than six people in the family were more likely to have fully immunized children than those who had less than five people in their families. There was no significant relationship between number in family and utilization of immunization services. This result was similar with previous study in 2009 by Bondy JN which found that the majority of households were composed of more than six people; only about 20 percent of mothers had more than two children under the age of five in their homes. There was a not significant determinant of children immunization (29).

The reason why the children of mothers who had more than six people in the family were more likely to be fully immunized children than children in small

families was that in Lao PDR most people have close relationship with family and other member of the family can take care of the children to get immunization by schedule, not only parent.

5.2.3 Number of children

Regarding the number of children of mothers, the result showed that three quarters of the mothers with one child had their children fully immunized and that this was more than mothers who had more than two children. However, the number of children was not significantly related to utilization of immunization services. The two previous studies found no significant associations. Kongxay P study found that two-thirds (74.0%) of those who had only one or two children had their children completed immunization this was more than mothers who had three or more than four children (27).

Yin Myo Aye's study found that 28.8 percent of mothers who had two children and 37.1 percent of mothers with more than three children had incomplete immunized children (43).

The finding in this study was different Daokeo's study found that 72.4 percent of children of mothers with one or two children received complete immunization compared with mothers who had three to four or more than four children. There was a significant relationship between utilization of immunization services and number of children (p-value =0.004) (28). Panwar A study in 2009 also showed that mothers with one or two children were more likely to have fully immunized children than those who had 3-4 or more children. There was a significant association between number of children and utilization of immunization services in previous studies (26).

The explanation in this study mothers who had one or two children had more time to take care of their children to get full immunization than mothers who had more than three children (26).

5.2.4 Education

There was a significant association between mother's education and the utilization of immunization services (p-value=0.033). The mothers with high education level (finished college, university) had higher percentage of children with

fully immunized than other groups (no and low education (study in primary and secondary school)). This result was similar to a study by Mosiur M 2010which found that 70.1 percent of mothers with higher education were fully immunized children compared to 63.0 percent of those with secondary, primary school(60.6%) and with no education (55.5%) respectively(33). Moreover study by Kongxay P found that those mothers who were literate more of their children completely immunized (69.4%) than those who were illiterate (p-value=0.010) (27). Daokeo S study also found that children of mothers who had higher high education were received complete immunization more than others group. One point to note is that mother who had high education also will have high knowledge of vaccine preventable disease and advantage of immunization program than mothers who have low education or illiterate (28).

Using multiple logistic regression, it was found that mothers with high education level were 2.2 times more likely to have full utilization of immunization services than those with low education level as shows in Table 4.14. However this variable was not significant as a predictor when adjusted with other variables.

The result form odds ratio (OR)were difference with Bondy JN study found the mothers of children who attended post-secondary education were nearly two and a half times more likely to receive all , if compared to the children of mothers with less education(p-value=0.009) (29).

SA Sudan study in 2007 showed that the mother’s of education had a statistically significant influence on the odds of the child being correctly vaccinated. Mothers with intermediate, secondary, university and higher education were 1.99 times more likely to report correct vaccination of their children than were those with no schooling or with primary schooling (33).

The reason in this study, almost half of the respondents only finished primary school because they do not consider education as very important in life, their priorities is to get married soon and help their family business. Working as a farmer does not require high education level, yet they can earn more money, that is way most respondents preferred just to finish their primary school so they can get basic skills needed, such as counting and writing or reading.

5.2.5 Occupation

Table 4.9 shows that most mothers (74.4%) who were rice farmers had fully immunized children with utilization of immunization compared to those with other types of occupation. The results of the present study showed no significant relationship between occupation and utilization of immunization services. Similar with previous studies, there was not a significant association, Kongxay found that more than half of mothers who were rice farmer had completely immunized children than other occupation groups (27). Another study by Rajeev Gera found that 45.5 percent of the mothers who were working had fully immunized children compared with34.3% of mothers who were house wife or unemployed. There was no significant association between the occupation of the mother and the utilization of immunization services (25).

The results of the present study were different from previous study by Mosiur M found that mothers' occupation and antenatal care were found to be significantly associated the acceptance of full immunization coverage. Mothers engaged in paid job are usually more educated and aware of health of their family members and therefore know the harmful effects of non-immunization (32). Moreover, one finding from Daokeo S found that most of mothers' occupation was farmer more fully immunized children (41.8%) than other group occupation. There was a significantly associated between mothers' occupation and the utilization of immunization services (p-value =0.006) (28).

The result of the present study most of the mothers who had worked in non farmer their must leave their house to go working outside early morning but vaccinator usually visit the village in the official time or some time they get information late from head village(Nai Ban) before their leave from their house. For the mothers who had worked in rice farmer group have better information and more free times to bring their children to get vaccination more than who had worked in non farmer.

5.2.6 Family income

The family income of the mothers was classified in Lao's currency kip per month. The result using by Chi-square test shows, the mothers who had high income more than 500,000 kips (78.9%) with fully immunized children more than those with middle income (63.0%) and low income (60.0%). This study there was a significantly

associated between family income and the utilization of immunization services (p-value=0.010). This study was similar with Takashi Senda study found that monthly income of household members was also significantly associated with EPI coverage (p-value=0.021). Those who got average monthly income more than 6,000 Taka had better EPI coverage than those who got less than 6,000 Taka (24).

When analysis using by multiple logistic regressions showed that family income were statistically significant as predictors of utilization of immunization services, when adjusted with other variables. Mothers with high family income were almost two times more likely to have fully immunized children than those who had low income. There were strongly to statistically significant association with utilized fully immunized children (p-value = 0.041). This may due to distance travel was strong enough as a predictor compare to other variables when they were taken together (see in Table 4.14).

Even though immunization service is free; many lower income families could not afford the transportation to go to health facility, and also most of them were away from their house to earn money at the time the mobile service came, so they missed vaccination schedule. Those who get high monthly income, it seems that they are more educated people. That is why they are likely to know consequence of immunization more than low income groups (24).

5.3 Mother's knowledge about immunization

In this present study, there was no significant relationship between knowledge and utilization of immunization services. This result was similar as Pakistan's study in 1999, about mothers' knowledge about Immunization diseases and immunization program found that most mothers in this study had poor to fair knowledge. However, even those mothers who had good knowledge did not have completely immunized children (35). Moreover in Ashraf's study in Thailand (1989) showed that 82.4% of mother who had adequate knowledge completely immunized children than mothers who had inadequate knowledge, there was no statistical significance between mother's knowledge and immunization schedule completion (36).

Moreover, Nazish's study in Pakistan said that one of the limitations of the study was that a brief nested questionnaire was used to assess knowledge rather than a more detailed tool. Mothers' knowledge was not significantly associated with appropriate vaccination of their children (34). In this present study also found there was no relationship between knowledge and utilization. It could be happened may due to in this present study also had the same study limitation as Nazish's study (34). Majority of the respondents's education were primary school so the questionnaire in knowledge part only asked the general knowledge and could not use the detailed questions to measure the knowledge of mothers about utilization of immunization services (34).

Even though there was no statistical significant association between knowledge and utilization of immunization services, the proportion of fully immunized children from mothers with good (73.3%) and moderate knowledge (75.0%) were higher than those with poor knowledge (61.5%), see in Table 4.10.

The finding of this study was inconsistent with Daokeo S study which found that mothers who had good, fair and poor level of knowledge on immunization received complete immunization about (88.7%, 62.8%, and 49.1%) respectively. There was significant relationship with utilization of immunization ($p<0.001$) (28).

Overall knowledge of respondents about type of vaccination, diseases of the symptoms, and symptoms of disease was in moderate level. Only few respondents were in high knowledge level. It might happen because most of respondents had low education level. Finally it also linked with the result that most respondents had low perception, specially perceived benefit about utilization of immunization services. However the coverage of utilization immunization services in Lao PDR was more than 72%, it may be due to the respondents went to the immunization posts were not always based on their knowledge on immunization but most of the respondents obey the advice from Village Head (Nai Ban) to immunize their children since the Nai Ban has the power to issue the Family / individual ID card. Moreover, there was mobile immunization services in Lao PDR so the mothers could reach easily the mobile services to utilize the vaccination services.

5.4 Mother's perception about immunization

The perception of mothers toward immunizable diseases was assessed by using questionnaires concerning susceptibility and severity of vaccine preventable diseases, the benefit and barrier perception about immunization in general, as shown in Table 4.5.

The result using Chi-square, More than a half of the mothers had low perception. Mother's who had high perception fully immunized children (78.9%) more than those with low perception (67.8%) as shows on Table 4.11. This study shown that mother's perception was a significantly associated with utilization of immunization services (p-value=0.042). This finding was similar with previous study by Kongxay P found that the mothers group with complete immunization of their children had high perception (22.2%), moderate (66.7%) and low perception(11.1%) respectively. There was a significant relationship between mother's perception and immunization status (p-value=0.037) (27). Moreover previous study in 1999 by Busby L found that only the perception variables was analyzed. It was found to be statistically significant (p-value= 0.011). In this case, perceived benefit was the only perception variable significantly related to the likelihood of adherence to the recommended childhood immunization schedule (35). Also study by Takashi Senda in 2005 found that perception of immunization was significantly associated with EPI coverage ($p<0.001$). Those who think immunization isn't harmful (82.8%) were higher EPI coverage than those who think immunization is harmful (47.8%) (24). In 2002 Saleumsack's study showed that mothers' perception in the completely immunized group was higher (13 scores) than in the incompletely immunized group(12 scores). There was a significant association between mothers' perception and immunization receipt ($p<0.001$) (42).

When analysis using by multiple logistic regressions showed that mother's perception was statistically significant as a predictor of utilization of immunization services, when adjusted with other variables. Mothers with high perception were almost two times more likely to have fully immunized children than those who had low perception. They were strongly with utilized fully immunized children (p-value = 0.033). This may due to distance travel was strong enough as a predictor compare to other variables when they were taken together (see in Table 4.14).

Keochanthala S study in 2002 said that the mothers have high perception or high attitude toward immunization services; it may contribute them to have good practices with the utilization of immunization services (42) .

5.5 Accessibility and availability of immunization services

5.5.1 Accessibility

More than half of the mothers who used mobile services were fully immunize children (75.5%), it was higher than those who used health facility (69.8%) as shows in Table4.12. There was no statistically significant association between place of immunization services and the utilization services (p-value= 0.007). Similar with Saleumsack study in Lao PDR 2002 showed that 87.5 percent were offered at outreach services and the children who had complete immunization were higher than those from the district hospital services (42).

The result were difference with previous study by Takashi Senda in 2005 showed that mothers used others service (83.9%) had children fully immunized more than those who used outreach center. There was no statistical association was found between accessibility and EPI coverage (24). For this children can access immunization more easily near their houses within 30 minute by walk. For the Government policy of EPI, there is an outreach center in each community (24). Every family can access immunization in their community. Nevertheless those who go to other site such as hospital, NGO clinic to get immunization are likely to believe those facilities has more reliability to skill of immunization more than outreach center. That is why, even though, they had to spend money for transportation, and they want to get a good quality of health service (24).

Some children missed vaccination schedule because the mobile service provided vaccination in each village only one time/three months, and also in the health center provided the vaccination only one day/month. This study found that most mothers whose children missed the vaccination schedule will simply wait for the next round of immunization.

Chi-square test in Table 4.12 shown that, Mothers with the distance from house to vaccination post more than 3 kilometers (81.8%) had children fully immunized more than those with distance less than 1 kilometer (76.8%) or 1-3 kilometers (57.8%). There was a significant relationship between distance travel to vaccination post and the utilization of immunization services (p-value=0.007) (see in Table 4.12). The present study similar with previous by Daokeo Sfrom the Chi-square test found that the mothers group who had their house far from the vaccination post 1-3 kilometers and more than 3 kilometers had higher proportion of complete vaccination than another mother group who had their house less than 1 kilometer (28). Moreover, same as previous study by Mosiur MSc found that the mode of transport to the vaccination post was significantly associated with the utilization of immunization services and distance from their house to the vaccination post (p-value<0.001) (32).

The result from multiple logistic regression shown that mothers with distance more than 1 kilometer from house to vaccination post were to be more likely to fully immunized of their children, compare with those with distance less than 1 kilometer. However, this variable was not significant as a predictor of fully immunized, when adjusted with other variables. This may due to distance travel was not strong enough as a predictor compare to other variables when they were taken together (see in Table 4.14).

Most mothers' utilized mobile immunization services because the distance was not far from their house, it was less 1 kilometer. It could be concluded that the distance was not the key factors of utilization of immunization services, however the most important factor was the quality of immunization services. Mothers who walked to the vaccination post did not pay money, mothers using utilization of immunization services which were more than 3 kilometer from their house paid only for transportation (28).

The result Chi-square test showed that mothers spent time from house to vaccination post spent less than 10 minutes (76.7%) had children fully immunized more than those with spent time more than 11 minute (62.5%). There was a significant association between duration time to vaccination post and the utilization of immunization services (p-value=0.021) as shows in Table 4.12. This finding similar with previous study by Ibnouf Sudan in 2007 ound that mothers who walked less than 30 minutes (78.3%) had children completed immunization more than those with

walking time more than 30 minutes (47.6%). There was a significant association between walking time to vaccination facility and immunization coverage (p-value=0.001) (33).

From result using multiple logistic regression analysis to test for statistically significant predictors of duration of time to vaccination post shown that mothers spent time 1-10 minutes were almost two times more likely to fully immunized children than mothers who had spent time more than 11 minutes. There was not significant as a predictor when adjusted with other variables. This may due to duration time was not strong enough as a predictor compare to other variables when they were taken together (as shows in Table 4.14).

Regarding the waiting time at the vaccination post, Mothers with waiting time in the vaccination post about 1-10 minute (76.7%) had children fully immunized more than those with waiting time more than 11 minutes (67.4%). Similar with previous study by Daokeo S found that most of mothers (84.2%) wait less than 30 minutes to get received vaccination for their children at the vaccination post (28). Only few of them wait more a half of one hour, there was no significantly associated between waiting time at vaccination post and the utilization of immunization services. Other previous study by Senda T showed that, There was no significant relationship between waiting time and utilization of immunization services (p-value>0.05) (24).

One study by Rajeev Gera found that more than thirds-fourth of the mothers through that waiting time at immunization site was acceptable. There was significant association between waiting time at immunization post and utilization of immunization services (p-value=0.031) (25).

The reason from one study showed that waiting times do not pose problem when attempting to access immunization (29).

In term of source of immunizable information, more than two-fourth of the mothers received information from the community (73.0%) with fully immunized children more than who had received information from health worker (72.5%). There was no significantly associated between received information and the utilization of immunization services.

Table4.7 shows that received information from community (health volunteer, friend, public announcement from head village). For the local public announcement, shown that 58.5 percent of the respondents received information by

public announcement than others group. The local public announcement were permanently placed at the house of village head or in the temple, was an effective way to communicate to mobilize the community at the neighborhood level to immunize their children, followed by direct communication which was done by health worker one-third of the mothers. This study was similar with previous study by Kongxay P found that most of the respondents, most mother were received information from community about 79.7% more than those who received information from health worker (20.3%). There was not significant association between source of information and immunization status (27).

Another study finding from Panwar A study found that only 32.9 percent gypsy mothers received information on immunization. Most common mode of receiving information about immunization among these mothers was through friends (49.3%) and health personnel (42.5%). There was significant association found between source information and child immunization ($p<0.001$) (26).

Rajeev Gera study was also found to be significant ($p<0.001$) between the prior visit by health worker and volunteer, and the immunization status in children. In cases where visits were made, the percentage of incomplete immunization was 51.5%, whereas this was 76.6% in children where no visit was made by health worker and volunteer (25).

The study in 2003 Daokeo S showed that more than half of the respondents received information from health personnel, the rests were from community (44.2%).There was significant association found between source information and utilization of immunization services (p-value<0.05) (28).

In term of the health worker advise time about type of vaccine to mother, Most mother who received advise always (73.7%) with fully immunized children more than mothers who received sometimes (68.8%). There was no significant association between health worker advise time about type of vaccine and the utilization of immunization services. Regarding the health worker advise about side effect of vaccine. Mothers who received advise between always and sometimes difference only 0.5 percent with fully immunized children (see in Table 4.12). The result there was no significant association between health worker advise about side effect of vaccine and the utilization of immunization services. The finding of this study similar with previous study conducted by Saleumsack's study in 2002revealed that there was only

knowledge about side effects of DPT/Measles vaccines with a significant association of children's immunization status. Nearly half (46.7%) of those who had children with complete immunization received information from Village Commitment Mother and child (VCMC), while more than one-third of respondents (38.4 and 34.5%) received information from health care personnel and experience respectively (42).

5.5.2 Availability

The result of this study there was not significant association between the place for giving vaccination and the utilization of immunization services. Most mother who knew the place for giving vaccination service (73.3%) with fully immunized children more than who did not know (33.3%). There was no significant association between availability of available vaccine, health staff preparedness before providing vaccines and utilization of immunization services.

The present of this study difference with previous study by Daokeo S The places for giving vaccination services were found that to have significant relationship with utilization of immunization services (p-value<0.05). Most mother who knew the place for giving vaccination (64.4%) with fully immunized children than those who did not know place for giving vaccination (44.4%) (28).

One study 2003 said that, It can be explained that this mothers group may have good perception toward the services of health personal both in the mobile services and hospital services. When they knew many place for giving vaccination they fell enough the availability of services and can select any vaccination center that can make her good satisfaction (28).

5.6 Satisfaction of immunization services

Table shows that most of mother who had high satisfaction with immunization services were more fully immunized than mothers who had low satisfaction. In this study they were still associated with utilization of immunization services, although there is no statistically significant association due to insufficient sample size. This study was similar with previous study by Manjunath 2003 which found that satisfaction was more strongly and consistently related to immunization.

There was no significant association between satisfaction and utilization of immunization services.(p-value=0.160 (41).

When they knew many place for giving vaccination they fell enough the availability of services and also they have to believe and friendly with health worker. They can select any immunization post that can make her good satisfaction (28).

5.7 Methodological concern

This study was cross-sectional descriptive study. It fulfilled the objectives to describe the factors affecting utilization of immunization services, i.e socio-demographic characteristics, knowledge, perception, accessibility, and satisfaction on immunization services in Laos.

This study used a structured questionnaire to interview respondents. Questionnaire was constructed from Health Belief Model and focused on knowledge and perception of individuals. Anderson's Model was also used to determine the accessibility and satisfaction to immunization services. This is reviewed by experts from ASEAN Institute for Health Development.

304 mothers participated in the study. However, only 265 respondents were selected for data analysis for the following reasons. 39 respondents did not have a record on vaccination, i.e yellow card. 2 mother out of the mentioned 39 respondents did not received any immunization for their children. 5 of them did not remember the date of birth of their children. Remaining 32 were also excluded for unreliable record for the birth dates of their children.

Regard to data collection time, interviews were conducted at night to obtain better participation from respondents since most respondents were farmers and had to work in the day on the farms and rice fields. Interviewers tried to obtain accurate information according to questionnaire based on their familiarity with the respondents and their lifestyle.

CHAPTER VI
CONCLUSION AND RECOMMENDATION

6.1 Conclusion

This study was a cross-sectional and descriptive study, and was conducted on January 2011 by interviewing 265 respondents in 20 villages in 4 health centers in Pakngeum district, Vientiane Capital. The aims of the study were to describe utilization of immunization services and determine related factors influencing the utilization. Socio-demographic characteristics, knowledge, perception, accessibility, availability, and satisfaction of immunization services among mothers with children aged 12-24 months were the factors included as independent variables.

Based on the finding and interpretation of the results, it can be concluded: Major finding of the study found that more than two-thirds of the respondents had fully immunized children and less than one-third of them partially immunized according to the immunization schedule.

Regarding the socio-demographic characteristics, more than one-thirds of respondents were in the age of adolescence. More than half of the respondents had small number of family members, also less than half of them had only one child, and almost all of them had only one child under two years old and lived together with their husbands/family. Almost half of the respondents had finished primary school, more than three-quarters of them were farmers, and almost one-third of the respondents had income between 700,001 to 1,000,000 kips.

More than half of the mothers had good knowledge about immunization schedule. On the other hand, the majority only had moderate knowledge about type of vaccination, disease transmission, and symptoms of disease. In terms of knowledge, with the exception of immunization schedule, almost one-third of mothers had poor knowledge.

Regarding mother's perception, more than half of the respondents had moderate perception about susceptibility and severity. 97.7% of the respondents had low perception of benefit and less than two-thirds had low perception of barrier.

Considering accessibility, more than half of the respondents had access to immunization provided by mobile service, more than two-thirds of them had distance to the vaccination post less than one kilometer, and about less than two-thirds of the respondents spent time less than ten minutes, and 60% of them had waiting time about six to ten minutes. Almost all of the respondents said the appropriate time was in the morning, more than half of the respondents received information from public announcement and 78.9% of the respondents got the information before one day. Almost two -thirds of the respondents were reminded to get vaccination from village head, more than three-quarters of them always advised about type of vaccine, 94% of the respondents always advised about vaccination post, and 88.7% of the respondents always advised about side effect. All of the children got vaccination for free.

According to availability, 98.9% of the respondents knew the place to receive vaccination services, almost all of the respondents answered that health workers prepare place and vaccines before providing vaccination, and 91.7% of the respondents knew whether the vaccine available or not.

Concerning mother's satisfaction, more than half of the respondents had high satisfaction with the immunization services.

Based on Chi-Square test, socio-demographic characteristics shown that two variables had significantly associated with utilization of immunization services. Mothers who had high education (85.4%) with fully immunized children than those who had low and no education. Also mother who had high income (78.9%) with fully immunized children than mothers who had moderate and low income.

With regards to mother's perception, there was a significant association between perception and utilization of immunization services**.** Mothers with high level of perception were more likely to have children with fully immunized (78.9%) than those with low perception.

According to the distance from the house to vaccination post, mothers who living far more than three kilometers their children were fully immunized (81.8%) than lived less than three kilometers from their house to vaccination post. Moreover to

the duration of time to vaccination post children fully immunized (76.7%) whose mothers spent 1-10 minutes to vaccination post had high percentage than those whose mothers spent more than 11 minute (62.5%). There was significant relationship between the distance, duration of the time to immunization post and the utilization of immunization services

Based on multiple logistic regression, after adjusted with other variables, only family income and mother's perception which were significant predictors for immunization utilization services.

6.2 Recommendation for implementation

1. Based on the findings in this study, more than half mothers had low perception about utilization of immunization services especially about perceived benefit of utilization. Perception of the mothers was one of the most important determinants to improve the utilization of immunization service so The Ministry of Health should cooperate with other sectors such as Lao Women's Union, the Ministry of Education, and the Ministry of Information and Culture to promote the importance of immunization by creating a community campaign to improve mothers' perceptions. Furthermore, the health provider should promote about the importance to immunization program in the community such as village head, health voleenture, mothers and also promote activities in the school. The community leaders (i.e. head of village and health volunteers) should include the immunization program into the community meeting and informing mothers having children in immunization schedule and about the advantages of immunization services. They should more active to encourage mother by using public announcement.

2. The study found that almost half mothers only had primary education. It also found that education was significantly associated with the utilization of immunization services. Mothers who had low-education and low income can benefit from special education program which enable them to increase their income such as the program from Lao Women Union. Also the study result showed that only one-thirds of mothers had high income. Income was one of the most determinant factor to increase the coverage of utilization of immunization services. One way to increase

family's income is by cooperating with agencies such as the Lao Women's Union. This union has the policy to promote self sufficient economics by income generating program in the community. Mothers can be informed about this program and the requirements to get the fund from the agency.

3. From this study found that more than half of mothers used the mobile immunization service so Ministry of Health should improve quality of the fixed site service, and improve the integrated mobile services team such as antenatal care, Child growth monitoring, family planning to access in urban, and remote area. In order to increase the accessibility of the mothers to get their children fully immunized, especially for those who live nearby the health centers, the usage of mobile service and the working time in the health centers should be improved., and the working days of the fixed site services such as health centers should be available maximum three times per week such as for HepBo and DPT-HepB-Hib vaccines. The health providers should inform the mothers about the vaccine time schedule and the kind of vaccines they provide three times perday, so the mothers can use the services effectively.

Recommendation for further research

Further research to monitoring the progress of the immunization coverage might be needed to understand factors releted to the utilization of immunization service, to obtain deeper understanding about the causality underlies the utilization of immunization service, and to follow up about the progress or change.

It is also interesting to explore the explanation of why HepBo coverage was still low

REFERENCES

1. Black RE, Morris SS, Bryce J. Where and why are 10 million children dying every year. Lancet. 2003 Jan;361 (9376):2226–34.
2. Kim SS, et al. Effects of maternal and provider characteristics on up-to- date immunization status of children 19-35 months. American journal of public health. 2007 Feb 97(2):259-66. Eputb 2006 Dec 28.
3. GIVS Global Immunization Vision and Strategy [Online] Available from: http:// www.who.int. [Accessed 2010 Jul 8]
4. Mayxay M, et al. Factors association with a measles outbreak in children admitted at Mahosot hospital, Lao PDR. BMC public health 2007;7:193.
5. Douangmala S. Country report-Lao PDR. Manila: World Health Organization; 1997.
6. National Statistics Center. Lao census. Vientiane Capital: NSC;2005.
7. LMICS. Multiple Indicator Survey for LAOPDR. UNICEF; 2005.
8. WHO. The Global Burden of Disease, Undernutrition; 2008. [Online] Available from: http://www.who.int [Accessed 2010 Jul 8]
9. MICS database 2006. [Online] Available from:http://www.Unicef.org [Accessed 2010 Jul 5].
10. Maekawa M, et al. Factors affecting routine immunization coverage among children aged 12-59 months in Lao PDR. Biosci Trends. 2007 Aug;1(1):43-51
11. World Health Organization. World Health Statistics 2008. Geneva: WHO; 2008.
12. Program NI. CDC. [Online] Available from: http://cdcgov/nip/publications/pink. [Accessed 2010 Jul 5].
13. Omobosola A, Henry K. Current trends in the treatment of HIV infections, 2003. University of Minnesota Department of Medicine, USA. [Online] Available from:http://www.ncbi.nlm.nih.gov/pubmed/12834213. [Accessed 2010 Aug 14]

14. World Health Organization Immunization, Vaccine and Biological , Geneva WHO; 2005.
15. World Bank. Using immunization coverage rate. Health sector performance; 2000. [Online] Available from:http://devdata.world bank.org/ict/Lao_ict. pdf [Accessed 2010 Sep 15]
16. Unicef. The global Immunization vision and strategy (GIVS). Newyork: Unicef, 2010.
17. Ministry of Health. National Immnunization Program Financial sustainability Plan; Report prepared by MOH with assistance from WHO. Lao PDR: the Ministry;2002.
18. Health Belief Model 2008. Champion VL, Skinner CS. Health Behavior and Health Education. San francisco, CA: John Wiley & Sons; 2008.
19. Hochbaum. HBM social-psychologists in US. [s.l;s.n.];1958.
20. University of twent t. Health Belief Model. [Online] Available from:http://www.utwente.rl. [Accessed 2010 Mar 2].
21. University of Twente. Health Belief Model. [Online] Available from: http://www.utwente.nl/cw/theoreeenoverzicht/theory%20clusltes/health% 20 communication/Health_belief_model.doc/ [Accessed 2011 Mar 3]
22. Aday L, Adersen R. Framework of study of access to medical care. Health service research. 1997 fall; 9(3):208-20.
23. Thind A, Cruz AM. Determinants of children's Health services utilization in Philippine. Journal of Tropical Pediatrics. 2003;49(3):421-9.
24. Senda T. Factors related to EPI coverage in Brahmanbaria Sadar. Upazila, Brahmanbaria District, Bangladesh. [M.P.H.M.] Nakhonpathom: Faculty of Graduate Studies, Mahidol University; 2005.
25. Gera R. factors associated with Immunization status in children under one year in rural areas of district Barkailly, India. [M.P.H.] Bangkok: Faculty of Graduate Studies Mahidol University; 2005.
26. Panwar A. Immunization status of gypsy children age 1-5 year in Muzaffarnagar district, Ultar Pradesh India. [M.P.H.] Bangkok : Faculty of Graduate Studies Mahidol University, 2009.

27. Pounphenghack K. knowledge and perception of mother about immunization of children under 3 years Xaythany district in Vitiane Capital ,LAO PDR. [M.P.H.M Thesis in Primary Health Care Managemenr]. Nakhonpathom: Faculty of Graduate Studies, Mahidol University; 2007

28. Siharath D. Utilization of immunization services among mothers with children 2-5 years of age In Sanakam district, Vientiane pro, Lao PDR. [M.P.H.M Thesis in Primary Health Care Management] Nakhonpathom: Faculty of Graduate Studies, Mahidol University; 2007.

29. Bondy JN, et al. Identifying the determinants of childhood immunization in the Philippines. Journal homepage:www.elsevier.ccom/locate/vaccine 27(2009) 169-75.

30. Mapatano MA K, Piripiri L, Nyandwe K Immunisation related knowledge, attitudes and practices of mothers In Kinshasa, Democratic, Republic of the Congo 2008. [Online] Available from: http://www:jpma.org. pk/full_ARTICLE. [Accessed 2010 Sep 15].

31. Topuzoglu A, et al. Assessment of sociodemographic factors and socio-economic status. Affecting the coverage of compulsory and private immunization. 2005; Oct;119(10):862-9.

32. Rahman M, Obaida-Nasrin S. Factors affecting acceptance of complete immunization. Salud Publica Mex. 2010;Mar-abril:52(2) 135-40.

33. Ibnouf AH, et al. Factors influencing immunization coverage among children under five years of age in Khartoum State, Sudan. SA Fam Pract 2007. 2007;49(8):14-14f.

34. Nazish Siddigi, et al. Mothers, knowledge about EPI and its relation with age - appropriate vaccination of in peri lurban Karachi 2007.[Online] Available from: http://www.jpma.org.pk/full_article. [Accessed 2011 Mar 15]

35. Immunization in Pakistan. 1999. [Online] Available from: http://www. from:http://www:jpma.org.pk/full_article. [Accessed 2010 Sep 15]

36. Ahmed AU. Factors affecting immunization acceptance amongst mothers of one year old children in Kabinburi district, Prachinburi province, Thailand. [M.P.H.M. Thesis in Primary Health Care Managemenr]. Nakhonpathom: Faculty of Graduate Studies, Mahidol University;1989.

37. Glanz K, Rimer BK, Viswanath K BKR, K. Viswanath, editor. Health behavior and health education: Theory, research, and practice. 4th ed. San Fancisco, CA:Jossey-Bass; 2008.

38. ManjunathU RP. Maternal knowledge an perceptions about the routine immunization programme. study in a semiurban area in Rajasthan. Indian Journal of Medical Sciences 2003:57(4):158-63.

39. International Encyclopedia of the Social & Behavioral Sciences. The Study from socio-economic status and Health care Social and Behavioral Sciences. 2004.

40. Schempf AH,et al. Parental Satisfaction with early pediatric care and immunization of young children. Arch Pediatr Adolesc Med. 2007 Jan;161(1):50-6.

41. Manjunath U, Pareek RP. Utilization of immunization for mother. Indian Journal of community Medicine 2003 Oct-Dec: 28(4); 153-6

42. Keochanthala S. Knowledge and perception of mother with children under 2 years Immunization. [M.P.H.M. Thesis in Primary Health Care Management] Nakhonpathom: Faculty of Graduate Studies, Mahidol University; 2002

43. Yin Myo Aye. Factor related to the complete immunization among 1-5 years myamar Migrand Children of Mahachai District, Samutsakon Province Thailan. [M.P.H]. Bangkok: Faculty of Graduate Studies, Mohidol University; 2006.

APPENDICES

APPENDIX A

Questionnaire

Province……District……:……Health center……..

Village ……

Date……..

Part 1. Socio-demographic of Mothers

Please put a tick [√] in the appropriate box to answers the question

Basic information

1. How old are you?----------years.
2. How many people in your family?----------persons
   2.1. How many children do you have ?----------children
   2.2. How many children under 2 years do you have?…… Children
   2.3. Marital status
   - ☐ 1) Living together (family/husband)
   - ☐ 2) Single
   - ☐ 3) Widow
   - ☐ 4) Divorced
3. What is your education?
   - ☐ 1) No education
   - ☐ 2) Primary school
   - ☐ 3) Secondary school
   - ☐ 4) High school
   - ☐ 5) College/University
   - ☐ 6) Other, (specify)----------
4. What is your occupation?
   - ☐ 1) Farmer
   - ☐ 2) Trader
   - ☐ 3) Government employee
   - ☐ 4) House wife
   - ☐ 5) Private company
   - ☐ 6) Other, (specify)----------

4.1 What is husband's occupation?

☐ 1) Farmer ☐ 4) Unemployed

☐ 2) Trader ☐ 5) Private company

☐ 3)Government employee ☐ 6) Other, (specify)----------

5. What is your family income per month?

☐ 1) < 300,000 kips ☐ 4) 700,000-1,000,000 kips

☐ 2) 300,000 – 500,000 kips ☐ 5) >1,000,000 kips

☐ 3) 500,000-700,000 kips

No	Knowledge of mother	Yes	No	Don't know
6	The meaning of immunization is to give immunity by immunization			
7	Immunization protected child from eight diseases			
8	The child can be protect from the Tuberculosis if BCG vaccine is given			
9	Polio drop can protect children from lifelong paralysis.			
10	The child can be protected child from tetanus if there are injected Tetanus Toxoid (TT) vaccine.			
11	DPT-HepB-Hib disease can be prevented in children by vaccine			
12	Poliomyelitis can be transmitted directly from person to person.			
13	Permanent paralysis is the symptom of poliomyelitis.			
14	Tuberculosis can be transmitted to the children			
15	Coughing for a long time with losing weight are the symptom of tuberculosis			

16	Pregnant mother who is positive with hepatitis B can transmit the disease to her baby			
17	The symptom of hepatitis B are cirrhosis and ascites			
18	Measles is transmitted through infectious air			
19	Measles symptom are fever and red spots on the face and chest			
20	All the children, even if they are healthy, should be given immunization after birth			
21	Diphtheria is transmitted through food			
22	A child age 0-11 months should receive immunization according to the NIP schedule			
23	The children should received the immunization by schedule before 1 year of age			
24	A child should first time be completely immunized against 8 diseases by the aged of 1 year			
25	Tuberculosis should be given one time after child birth.			
26	DPT-HepB-Hib should be given three times beforechildren reach 1 year old			
27	A child age 0-11 months should receive immunization according to the NIP schedule			
28	The children aged 9-11 months should be given measles vaccine.			

29	Measles vaccine should be given one time before children1 year old.			
30	Children have high fever after immunization to protect against eight diseases.			
31	After immunization fever or redness at the site of injection are normal.			
32	Children having diarrhea more than 4 time per day should not be given the vaccination			
33	DPT-HepB-Hib can cause fever, after child get immunization			

Part 2. Knowledge of mothers about immunization

Please read questionnaire very carefully before you select your answers, you choose one answer for each question

Part 3. Perception of mothers

Please indicate your level of agreement or disagreement with the following statements, using the scale as follows: Agree, Not sure, Disagree put a tick [√] into the appropriate box, only one answer.

No	Perception toward immunization	Agree	Not sure	Disagree
	Susceptibility			
34	If the child is healthy, it is not necessary to bring her/him to get vaccination.			
35	If someone in my village is infected with tuberculosis, it is not necessary to keep my children away from them.			
36	If any of my family member has measles, my children will easily get infected.			

37	Children under two years of age will be get infected easily if there is polio case in my village.			
	SEVERITY			
38	Poliomyelitis can cause permanent paralysis resulting to death in some cases.			
39	It is a normal condition when there is a children with measles in my village.			
40	Tuberculosis is very dangerous for my children			
41	Measles can cause severe pneumonia, and acute diarrhea.			
	Benefit			
42	If your children get full immunization, they will have healthy life.			
43	Vaccine increases the ability of a child natural immune system to fight the diseases			
44	Immunization cannot cause severe side effect to weak children			
45	Is better for children to be fully immunized rather than not to be fully immunized.			
	Barrier	Agree	Not sure	Disagree
46	Each immunization, cause me a lot of time			
47	Does not take a long waiting time to get vaccination the at Health center			
48	I can postpone taking my children to get vaccination, if I am busy			
49	If my children have common cold, I cannot cancel bringing them to get vaccination.			

Part 4. Immunization Services

4.1. Accessibility Immunization Services

Please put a tick [√] in the appropriate box to mark answer the question

4.1.1 Distance:

50. Where do you go to have children immunized?

☐ 1) Central hospital ☐ 3) Health center

☐ 2) District hospital ☐ 4) Mobile services

☐ 5) Other,(specify)_____

51. How far is your house from a vaccination post? and how long does it take to go there? (example: hospital, Health center, mobile team shoot)

----------Km, ----------Minutes

4.1.2 Time :

52. What are the average times you have to wait for immunization at the immunization post?---------- Minute

53. What is the appropriate time for you to get your child vaccinated?

☐ 1) Morning ☐ 3) Not specific time)

☐ 2) Afternoon ☐ 4) In the evening

4.1.3 Information

54. Where did you get information about immunization from ?

☐ 1) Health worker ☐ 3) Health volunteers

☐ 2) Friends ☐ 4) Head village

☐ 5) Public announcement ☐ 6) Other,(specify)----------

55. How many days notice did you receive the information before the immunization day?

☐ 1) One day ☐ 3) Three days

☐ 2) Two days ☐ 4) More than four days

56. Who reminded you to come and bring your children to the immunization post?

☐ 1) Health volunteers ☐ 3) Health worker

☐ 2) Head Village ☐ 4) Friends ☐ 5) Other,(specify)_____

57. How often health worker inform you what type and dose of vaccine your children should received?
    - ☐ 1) Every time
    - ☐ 2) Some time
    - ☐ 3) Never
58. How often do the health worker inform you?, about time and place your children should go to next immunization session
    - ☐ 1) Every time
    - ☐ 2) Some time
    - ☐ 3) Never
59. Did health workers advise you about the side-effect of vaccine at session site
    - ☐ 1) Every time
    - ☐ 2) Some time
    - ☐ 3) Never
60. Did you get vaccination services free of charge?
    - ☐ 1) Yes If yes, How much you paid money……
    - ☐ 2) No

4.2 Availability of Immunization Services

61. Are there many places giving vaccination to your children?
    - ☐ 1) Yes, (specify)----------
    - ☐ 2) No
    - ☐ 3) Not sure
62. Does the health personnel prepare (information, target, time) the immunization post before providing the services?
    - ☐ 1) Yes
    - ☐ 2) No
    - ☐ 3) Not sure
63. Are there health personnel ready (vaccine, syringes, card/card) to provide vaccination services?
    - ☐ 1) Yes
    - ☐ 2) No
    - ☐ 3) Not sure

64. Is there enough vaccine for your child at the immunization post?

☐ 1) Yes

☐ 2) No

☐ 3) Not sure

Part 5. Satisfaction with Immunization Services

Please indicate your level of satisfaction to the following statements, using the scale as follows: very satisfied, slightly satisfied, Not satisfied, Slightly dissatisfied, very dissatisfied Put a tick [√] into the appropriate box ,only one answer.

No	**Satisfaction**	Very satisfied	Slightly satisfied	Fair	Slightly dissatisfied	Very dissatisfied
65	Schedule for immunization service					
66	Location site of immunization (difficult to travel or far from the house)					
67	Health workers attitude/ behavior (smile, friendly, explain about immunization)					
68	Waiting room's condition (cleanliness, convenient).					
69	Arrangement at the immunization post including the time of immunization service. (convenient , not long waiting time)					

Part 6. Utilization of Immunization services

Examine and record immunization status card?

70. Ask about vaccination card or refer to in records book

	Child No: 1	Child No:2	Child No: 3
1. Immunization card	1.Yes 2. No	1.Yes 2. No	1.Yes 2. No
2.Date of birth	…../…./…	…../……/……	…../……/
3.Sex	1.Male 2.Female	1.Male 2. Female	1.Male 2.Female
4.BCG	…../……/	…../……/…	…../……/
5.Hepatitis B	…../……/…	…../……/…	…../……/
6.DPT-HepB-Hib1	…../……/	…../……/…	…../…
7.DPT-HepB-Hib2	…../……/	…../……/…	…../……/
8.DPT-HepB-Hib3	…../……/…	…../……/…	…../……/
9.OPV1	…../……/	…../……/……	…../……/
10.OPV2	…../……/	…../……/…	…../……/
11.OPV3	…../……/	…../……/…	…../……/
12.Measles	…../……/	…../……/	…../……
13.Fully immunized			
14.Partially immunized			
15. Not received			

Thank You

APPENDIX B

Table B1 Number and percentage of respondents classified by correct answers related to knowledge on immunization

Mother's knowledge of immunization	Correct		Not correct	
	n=265	%	n=265	%
Immunization schedule				
1.All the children, even if they are healthy, should be given immunization after birth	239	90.2	26	9.8
2.A child age 0-11 months should receive immunization according to the NIP schedule	254	95.8	11	4.2
3.The children should received the immunization by schedule first time before 1 year of age	255	96.2	10	3.8
4. A child should be completely immunized aginst 8 diseases by the age of 1 year.	241	90.9	24	9.1
5.Tuberculosis should given one time after birth	220	83.0	45	17.0
6 .DPT-HepB-Hib should be given three times brfore children 1 year old.	229	86.4	36	13.6
7. Polio should be given three times brfore children 1 year old.	243	91.7	22	8.3
8.The children aged 9-11 months should be got measles vaccine	239	90.2	26	9.8
9. Measles should be given 1 time before children 1 year old.	225	84.9	40	15.1
Type of vaccines				
10.Children have high fiver after immunization	104	39.2	161	60.8

Table B1 Number and percentage of respondents classified by correct answers related to knowledge on immunization (cont.)

Mother's knowledge of immunization	Correct		Not correct	
	n=265	%	n=265	%
11.The child can be protect ed from the tuberculosis if BCG vaccine is given full immunization	207	78.1	58	21.9
12.Polio drop can protect from lifelong polio	226	85.3	39	14.7
13.The child can be protected from tetanus if they are injected by tetanus toxoid (TT) vaccine	200	75.5	65	24.5
14.DPT-HepB-Hib diseases can be prevented by vaccine	215	81.1	50	18.9
Disease of transmission				
15. The meaning of immunization to give immunity by immunization	252	95.1	13	4.9
16. Immunization protect child from eight diseases	228	86.0	37	14.0
17.Poliomyelitis can be transmitted directly from person to person	63	23.8	202	76.2
18. Tuberculosis can be transmitted to children	236	89.1	29	10.9
19. Pregnant mother who has positive hepatitis B can be transmit the disease to baby	137	51.7	128	48.3
20. Measles is transmitted through infectious air	123	46.4	142	53.6
21. Diphtheria is transmitted through food	57	21.5	208	78.5
Symptom of disease				
22. Coughing for a long time with losing weight are the symptoms of tuberculosis	227	85.7	38	14.3
23. The symptom of hepatitis B are cirrhosis and ascites	131	49.4	134	50.6
24. Measles symptom are fever and red spots on the face and chest	214	79.6	54	20.4

Table B1 Number and percentage of respondents classified by correct answers related to knowledge on immunization (cont.)

Mother's knowledge of immunization	Correct		Not correct	
	n=265	%	n=265	%
25.Permanet paralysis is the symptom of poliomyelitis	178	67.2	87	32.8
26. After immunization mid fever or redness at the site of injection are normal	246	92.8	19	7.2
27. Children having diarrhea more than 4 time perday should not be given the vaccination	124	46.8	141	53.2
28. DPT-HepB-Hibcan cause fever, after child get vaccination	175	66.0	90	34.0

Table B2 Number and percentage of respondents classified by answers related to perception on immunization

Mother's perception of immunization Susceptibility	Agree		Not sure		Disagree	
	n=265	%	n=265	%	N=265	%
1.If the child is healthy, it is not necessary to bring her/him to get vaccination.	179	67.5	9	3.4	77	29.1
2.If someone in my village is infected with tuberculosis, it is not necessary to keep my children away from them.	139	52.5	22	8.3	104	39.2

Table B2 Number and percentage of respondents classified by answers related to perception on immunization (cont.)

Mother's perception of immunization	Agree		Not sure		Disagree	
	n=265	%	n=265	%	N=265	%
Susceptibility						
3.If any of my family member has measles, my children will easily get infected.	74	27.9	66	24.9	125	47.2
4.Children under two years of age will be get infected easily if there is polio case in my village.	112	42.3	67	25.3	86	32.5
SEVERITY						
5.Poliomyelitis can cause permanent paralysis resulting to death in some cases.	35	13.2	66	24.9	164	61.9
6.It is a normal condition when there is a children with measles in my village.	66	24.9	12	4.5	187	70.6
7.Tuberculosis is very dangerous for my children	10	3.7	9	3.3	246	97.4
8.Measles can cause severe pneumonia, and acute diarrhea.	53	19.5	108	39.7	104	38.2

Table B2 Number and percentage of respondents classified by answers related to perception on immunization (cont.)

Mother's perception of immunization	Agree		Not sure		Disagree	
	n=265	%	n=265	%	N=265	%
Benefit						
9.If your children get full immunization, they will have healthy life.	3	1.1	10	3.7	252	92.6
10.Vaccine increases the ability of a child natural immune system to fight the diseases	3	1.1	14	5.1	248	91.2
11.Immunization cannot cause severe side effect to weak children	65	23.9	14	5.1	186	68.4
12.Is better for children to be fully immunized rather than not to be fully immunized.	1	0.4	5	1.9	259	97.7
Barrier						
13.Each immunization, cause me a lot of wasted time	194	73.2	12	4.5	59	22.3
14.Does not take a long waiting time to get vaccination the at Health center	190	71.7	19	7.2	56	21.1

Table B2 Number and percentage of respondents classified by answers related to perception on immunization (cont.)

Mother's perception of immunization	Agree		Not sure		Disagree	
	n=265	%	n=265	%	N=265	%
15.I can postpone taking my children to get vaccination, if I am busy	184	69.4	13	4.9	68	25.7
16.If my children have common cold, I cannot cancel bringing them to get vaccination.	64	24.2	46	17.4	155	58.5

BIOGRAPHY

NAME	Chansay Pathammavong
DATE OF BIRTH	31 July, 1968
PLACE OF BIRTH	Savannakhet province, Lao PDR
INSTITUTION ATTENDED	Vientiane University, 1982 - 1988 Medical Doctor Mahidol University, 2010 - 2011 Master of Primary Health Management
SCHOLARSHIP RECEIVED	Government of Lao PDR (Lux-Development)/LAO/017 Project
RESEARCH GRANT	Lux-Development
PRESENT POSITION	Deputy of National on Immunization Program in MCHC Ministry of Health Lao PDR
EMPLOYMENT ADDRESS (If any)	Ministry of Health Hygiene-Prevention Department, Maternal and Child Health Center Tel. office +856-21-312352; 452519-20 Fax: +856-21-312120 Mobile: +856-20-55606480 E-Mail : chansay_epi@yahoo.com