MATERNAL EDUCATION AND PRE-SCHOOL CHILD MORBIDITY: AN ANALYSIS OF KANCHANABURI DEMOGRAPHIC SURVEILLANCE SYSTEMS 2000

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ABSTRACT

The purpose of this study was to examine the relationship between maternal education and pre-school child morbidity in Kanchanaburi 2000. Maternal education was categorized in three levels (1) formal education (2) receiving health knowledge from the mass media (3) membership of community development group. The unit of analysis of this study was pre-school children whose ages were 0 to 6 years old. They were divided into three groups by physical development: infant, toddler, and child at pre-school age. Multinomial Logistic Regression was used to examine the effect of maternal education on pre-school child morbidity when controlled by maternal factors, child factors, household nutrition, and community factors.

The overall study found that in the group who had received maternal education only though formal education, child morbidity was adversely affected. Considering the probability of sickness of pre-school children, infants and children of pre-school age of mothers with formal education only were more likely to be sick with a communicable disease than a non-communicable disease. The same applied to these mothers toddlers were.

This study demonstrates a correlation between maternal education and pre-school child morbidity. Education is an essential determinant factor on child health, thus investment in women's education is important for lowering infant and child morbidity and mortality and child health.

KEY WORDS: PRE-SCHOOL CHILD / INFANT / TODDLER /PRE-SCHOOL CHILD MORBIDITY/ MATERNAL EDUCATION/ KANCHANABURI

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ระดับการศึกษาของมารดาและภาวะเจ็บป่วยของบุตรก่อนวัยเรียน : กรณีศึกษาระบบการเฝ้าระวังการเปลี่ยนแปลงทางประชากรของจังหวัดกาญจนบุรี 2543 (MATERNAL EDUCATION AND PRE-SCHOOL CHILD MORBIDITY: AN ANALYSIS OF KANCHANABURI DEMOGRAPHIC SURVEILLANCE SYSTEMS 2000)

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บทคัดย่อ

การศึกษานี้มีวัตถุประสงค์เพื่อค้นหาความสัมพันธ์ระหว่างระดับการศึกษาของมารดาและภาวะเจ็บป่วยของบุตรก่อนวัยเรียน จังหวัดกาญจนบุรี การศึกษาของมารดาแบ่งเป็น 3 ระดับ คือ ระดับการศึกษาของมารดา การได้รับความรู้ด้านสุขภาพจากสื่อและการเป็นสมาชิกกลุ่ม องค์กรพัฒนาของชุมชน หน่วยในการวิเคราะห์และกลุ่มตัวอย่างคือ เด็กที่เป็นกลุ่มเสี่ยงต่อการเจ็บป่วยคือ เด็กที่มีอายุระหว่างอายุ 0-6 ปี ที่แบ่งเป็นกลุ่มอายุตามหลักทางพัฒนาการ 3 กลุ่มด้วยกัน คือ เด็กทารก (0 -1 ปี) เด็กวัยเตาะแตะ (มากกว่า 1-3 ปี) และเด็กวัยก่อนเรียน (มากกว่า 3- 6 ปี) ในขณะที่ภาวะสุขภาพอนามัยของเด็กวัดจาก ภาวะการเจ็บป่วยในรอบ 1 เดือนที่ผ่านมาก่อนการสำรวจ โดยใช้สถิติมัลติโนเมียล (Multinomial Logistic Regression) ในการหาความสัมพันธ์ระหว่างระดับการศึกษาของมารดาและภาวะเจ็บป่วยของบุตรก่อนวัยเรียน และได้นำปัจจัยด้านอื่นๆ ของมารดา ปัจจัยของเด็ก ภาวะโภชนาการของครัวเรือนและปัจจัยระดับชุมชน เข้ามาเป็นตัวแปรควบคุมในการศึกษาด้วย

ผลการวิเคราะห์ปัจจัยด้านการศึกษาของมารดาที่มีผลต่อการเจ็บป่วยของเด็กก่อนวัยเรียนทั้ง 3 กลุ่ม จะเห็นได้ว่ามีเพียงตัวแปรระดับการศึกษาของมารดาเท่านั้นที่มีผลต่อการเจ็บป่วยของบุตรก่อนวัยเรียนทั้ง 3 วัย และเมื่อพิจารณาตัวแปรระดับการศึกษาของมารดากับการเจ็บป่วยของเด็กก่อนวัยเรียนทั้ง 3 กลุ่ม ในกลุ่มเด็กวัยทารกและเด็กวัยก่อนเรียนจะป่วยด้วยโรคติดเชื้อมากกว่าโรคไม่ติดเชื้อ ในขณะที่เด็กวัยเตาะแตะนั้นป่วยด้วยโรคไม่ติดเชื้อมากกว่าโรคติดเชื้อ ผลการศึกษาที่ได้ บ่งบอกถึงความสัมพันธ์ระหว่างระดับการศึกษาของมารดาและภาวะเจ็บป่วยของบุตร การศึกษาจึงเป็นปัจจัยสำคัญที่จะกำหนดภาวะสุขภาพของเด็ก ดังนั้นการลงทุนด้านการศึกษาของสตรีจึงสำคัญต่อการลดการเจ็บป่วย การตาย และเสริมสร้างการมีสุขภาพที่ดีของเด็ก

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CHAPTER I
INTRODUCTION

1.1 Background and Rationale of Study

In developing countries, there are high child mortality rates, especially in children at pre-school age. The main causes of morbidity and mortality came from the state of malnutrition and infection related to the public health, environment, socioeconomics of the household, and the infants' family. These factors directly a effect the physical development of the child (Bone, 1976:237). Morbidity and mortality could be protected via the supports of nutrition, sickness protection, and well proper supervision of the child's mother or the other members of the family.

The states of health, morbidity, and mortality of the child are the indices showing the state of social and public health development of the country. Morbidity and mortality in children present the qualities of medical and public health service systems, the differences of the public health service system, the level of welfare, status of economy and society, and environment conditions of a person (Santhat Sermsri, 1995:377). The United Nations reports the infant and child mortality trend has decreased in developing countries. Especially in Thailand, the rate of child and infant mortality has decrease gradually. The mortality rate of children under 5 years was 31.3 percent: 32.9 percent for males and 29.9 percent for females. (The National Statistics Office, 1995-1996). The mortality rate presented the low standard in child bearing. The cause possibly came from the lack of knowledge in child bearing of the parents. Since a child's the immune system is not well developed, so a child could more easily become infected. Immunization and other body mechanisms are actually fully developed after a child is over two years (U-Phaiwan, 1985:29). Additionally a child, especially an infant could not take care of himself; thus, they needed to be in a

good and safe environment, nutritions, food, and others to keep healthy and immunization ability to against sicknesses. There was the physical problem when an infant got sick; he needed close and proper treatment because he could not take care of himself.

Normally, the person who had the most important role in child rearing after birth was the child's mother. The society put the role on the mother to look after her child about health, mind, characteristic and the ability to join society. Her role in taking care of her child started since pregnancy, delivery, and looking after her infant to be a perfect human resource of the society. Then mother was the important person who had the major role in looking after her child to maintain a healthy state with no sickness. The National Statistics Office presented the information getting from Child and Youth Research in 1997 that children at pre-school age, from 0-5 years, were looked after by their parents for 78.6 percent and the rest were looked after by others.

Although, the rate of the children at pre-school age who were taken care of by their parents was at 78.6 percent, child health was at different states depending on the socioeconomics in each family especially the characteristics of the mother. The child's mother had to take care of the following factors: her health, the child bearing method, infant nourishment, nutrition, and immunization. These factors had some effects on child health. However, the current societal conditions have caused the difference in population and family, either the family economics or society. Education was an important factor having the impacts on different ways of infant treatment. Education indicated the level of knowledge and understanding. A child's mother who was well educated or had child bearing knowledge was able to look after her child perfectly especially regarding health and sickness protection.

Therefore, there was a question whether the different states of maternal education related to the different states of sickness in a child. From the developed countries, there is some evidence and discoveries that the rate of infant survival was related to the level of maternal education. The information gotten from Latin-America, Africa, and Asia also presented the reverse relationship between maternal

education and the level of child mortality rate. Cleland (1990) reported that education is linked to family socioeconomic situation, which in itself is a determinant of child health. But above and beyond this, maternal education is hypothesized to bring about certain changes in individual behavior that result in better child health. Caldwell (1993) suggests two potential paths: (1) education that improves child 's health solely by enhancing the use of modern health services; and (2) education results in a wide range of favorable behaviors mostly connected with child care that plays a role in improving child health. We probably said that a well-educated mother had major roles in support, child health treatment, and sickness protection. In Thailand, there was a study about the relationship and effect between child treatment methods of mothers and the health states of children at pre-school age. Although there was a study about maternal occupation that resulted in child and infant mortality, the study about the mother's qualification, especially education that resulted in child sickness, was still rare.

Considering the studies, there were two categories. First, Formal Education. It was the study in a school or an institution following the program curriculum. The student who graduated would receive a certificate to present the knowledge level, etc. Second, Informal Education. It was the study in unofficial education system such as training, education media. Education media could be grouped into two kinds that were Two-way Communication and One-way Communication. Two-way Communication was the method that each party could play both knowledge provider and receiver roles. A party could express his opinion and share other ideas. One-way Communication was the method that a person only received knowledge from the media.

Thus, this study concentrated on the relationships between maternal education and health state of children at pre-school age that could be grouped according to child development as the following: Infant, Toddler, and Child at pre-school age. The study domain was only in Kanchanaburi because Kanchanaburi is the center province of the Western region and it is the borderland presenting a variety of racial mixes in population. Kanchanaburi is located near Bangkok, so both industry and tourism are active in Kanchanaburi. Residents of Kanchanaburi presented a variety of occupations

and education levels. All factors caused Kanchanaburi to be interesting sampling. Additionally, the rate of mortality and sickness of children at pre-school age was still high compared to the other provinces. Actually, the rate of mortality and sickness of children at pre-school age has already decreased. The advantages of this study were the good presentation for the analysis of the relationships between maternal education and the health states of children at pre-school age. The expected results of the study could be applied for maternal education support and to figure out the methods to support the health state of children at pre-school age in the other societies.

1.2 Objective

The objective of this study was to find the relationships between maternal education levels that resulted in a sickness state of children at pre-school age in Kanchanaburi.

1.3 Operational Definitions

1. **Pre-school child**: The child whose age is 0-6 years old. This study Divided the sample into three groups by physical development: Infant, Toddler, and child at pre-school age.
2. **Infant**: The child whose age is 0-1 years old.
3. **Toddler**: The child whose age is over 1-3 years old.
4. **Child at pre-school age**: The child whose age is over 3-6 years old.
5. **Sickness**: Sickness is the state to indicate a disease or something wrong with the body.

This study research used three markers of morbidity in the child: not sick, communicable diseases, and non-communicable diseases using the household data from the baseline survey of Kanchanaburi project 2000. The state of disease had occurred one month before collecting data.

6. Communicable Disease: These sicknesses are the health problems of

humans. This disease could be spread to the others by the vectors such as germs.

7. Non-communicable Disease: These sicknesses are the health problems of humans but they could not spread to others. These diseases occur from behavior change, heredity, treatment, and accident.

1.4 Limitation of the study

As this study used secondary data, this study has some limitations in terms of considering the variables. The literature review has shown interesting variables that include the relationship between child morbidity and maternal education, such as a person who looks after the child and the house structure that can show the environment around the house. Because of the limitation of the baseline data, this study could not considered both of the variables in the analysis.

CHAPTER II
LITERATURE REVIEW

2.1 An Analytical Framework about the Determinants of Child Morbidity and Mortality by Mosley and Chen

Mosley and Chen (1984) studied various factors that could influence child morbidity and mortality in developing countries. Commenting on traditional child morbidity studies, they have said that the sociological research focused on the relationship between socioeconomic factors, such as income earned and the education of mothers, with the level of mortality, without giving proper weight to other causes that may be from a purely medical perspective. Medical research, on the other hand, focuses its study on biological

Mosley and Chen divided the proximate determinants into five groups such as maternal factors, environmental contamination, nutrient deficiency, injury and personal illness control. The socioeconomic determinants are grouped into three broad categories of variables: individual level, household level and community lever. Mosley and Chen's analytical framework is shown in figure 2.1.

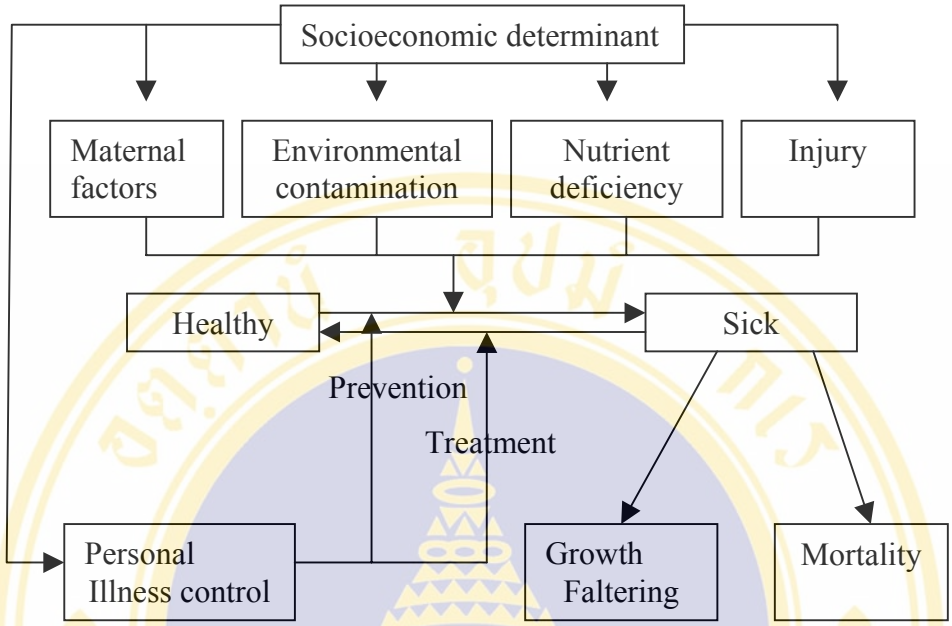


Figure 2.1 Operation of the five groups of proximate determinants on the health dynamic of a population
Source : Mosley and Chen, 1984.

The key to the model is the identification of a set of proximate determinants, or intermediate variables, that directly influence the risk of morbidity and mortality. All social and economic determinants must operate through these variables to affect the child survival.

2.2 Factors Affecting Child Health

Jariya Kompayak and U-Dom Kompayak (1981) reported factors affecting on child health that could be grouped as the following:

1. Factors involving child condition.

- Natural Protection depends on the function and feature of the

organ that functions as infection protection such as the hair, tear glands, sweat glands, slime glands, tactile nervousness, white blood cell count, etc.

- Immunization. There are natural and unnatural immunizations. Natural immunization include immunizations that a child got from his mother or that the child's body self-adopted. The unnatural immunizations were created via vaccine receiving or the immunizations given to a child in order to treat some sicknesses such as Antitoxin for diphtheria and Antitoxin for tetanus, etc.

2. Maternal Factors

The mother is important roles since the child is born and after the child is given birth. The maternal health during pregnancy influences and affects the baby still in her uterus. Childbearing after the first child also had some effects to the state of child health. Some factors, physical, emotional, and societal, directly affected child health especially an infants. The factors were:

- **Age of mother**. The age of a mother during pregnancy affected the baby in her uterus. Being too young or too old affected the risk of an infant about pre-delivery and the level of intelligence of an infant. If a mother's age was over 40 years, an infant's intelligence level could possibly be lower than normal.
- **Number of delivery experiences.** The first delivery presented higher risk than the next delivery because the mother's vagina had never experienced the incident and it presented low flexibility. These factors caused difficulty in delivery and long time needed in the delivery process. If there had a problem about the pelvis, the delivery process would be more dangerous.
- **The period of non-pregnancy**. The period of non-pregnancy affected child health. A period of non-pregnancy that was less than two years caused a higher risk in a baby compared to the risk of a baby whose mother had a longer non-pregnancy period from 2-4 years. A mother could better recover her health from the long period of non-pregnancy.
- **Maternal nutrition.** Good nutrition or malnutrition of a mother affected a child. For example, a mother with a weight under standard or over standard could cause higher risk in a baby.

- **Maternal morbidity.** The sicknesses of the mother affected the baby health state, for example, infection diseases, blood-cell disorders and hereditary disorders.

- Mother habit on health concern. A mother who smoked and drank alcohol too much during her pregnancy period possibly caused weak and low weight baby problems. Additionally, these bad habits affected the level of the baby's intelligence and development, too.

- Mother's body structure. A mother whose height was lower than 1.40 cm, had an abnormal body structure that would cause higher risks to her baby compared to a mother with normal body structure.

- Social Problems of the mother. Mothers who had social problems, influenced their child, for example, low-education, single mother, working for an industry, and unhappy family life

3. **Socioeconomic and cultural factors of the family** included the behaviors about sickness treatment, quality and location of the public health center. All of these factors influenced child health. The study presented and grouped the factors as the following:

- Water consumption behavior. Water that was used in a household directly affected a child's health. The contaminated water resources of a household could cause a high chance of contracting diarrhea.

- Occupation. A mother whose occupation was risky could hazard her child too. (Jariya Kompayak, and U-Dom Kompayak:1981).

2.3 Factors Affecting Sicknesses

Somchai Supanvanich (1976) presented that theory of a disease that there were three factors that caused sickness in a person. The three factors were presented as follows:

1. **Agent.** Agent was the element or the cause of a sickness. It might be

either living things or non-living things. Getting those things too much or too slightly might cause a sickness. Agents that could cause sickness could be separated into seven groups as the following:

- Physical factors, for example, included light, sound, warmth, coldness,etc.
- Chemical factors; for example, included external chemicals, irritating substances, and internal chemicals. The chemicals, for example, included pesticides, acids, alkalis, dust, water, air, hormones, cholesterol, etc.
- Physical factors, for example, included the youth state, pregnancy occurring outside a mother's uterus, etc.
- Mental factors. These factors actually caused the disorder of blood circulation such as high blood pressure, problems in breathing and digestion problems.
- Heredity factors. These factors caused some disorders such as blood problem, Down's syndrome, etc.
- Consumption factors. Too much or too little food consumption, and consuming non-beneficial food could cause a sickness.
- Both toxic and non-toxic infections might be from humans or animals.

2. **Human Host.** The human host is the element involved with humans. The elements are age, sex, heredity, race and behavior in health care that humans experience. Just as chemical elements cause differences in immunizations, human behaviors could be differentiated by the level of human sickness.

3. **Environment.** Environment means things that surround a person such as geographic characteristics of air, ground, water, etc. The economic and societal surrounding are also regarded as environment such as revenue, occupation, culture, tradition, and beliefs.

All three factors function together to keep the body in balance. If a body lost the balance, a sickness possibly followed. Studying these factors could bring an understanding about the basis of sickness that include the factors that a person could change or act upon to lessen the degree of sickness and to decrease the period of sickness. These factors are biology, human physique, human habits on health

treatment, and socioeconomic status. These three factors involve with humans. A person could manage all three factors to benefit his health (Somchai Supanvanich, 1976:12-21)

2.4 Supervision on Child Health

A healthy child means strength, vigor, youthful, intelligence, suitable growth, and suitable development. A healthy child should be able to happily and beneficially adopt himself to join a society. Thereby, the child health supervision must be controlled, supervised, and supported continually. Sickness protection, sickness diagnosis, sickness treatment, and a child's ability for resuscitation deviated. In medical processes, a doctor took 70-80 percent of the time to diagnose and treat a normal sickness such as breathing disorder or diarrhea. However, a doctor took only 20-30 percent of the time to serve a well-cared for child or child with health supervision. (Jariya Kompayak, and U-Dom Kompayak : 1981)

Therefore, the health service for a healthy child is important to the child and the child's family until the child is 6. This period is the physical development period especially about the child's brain that rapidly develops. It is also the element for all other developments including physicalness intelligence, mind and society. Good and suitable childcare during this period could be counted on as a strong fundamental for child development to become a qualified adult.

The direction of child development (fundamental needs of a child) specified about child health that a child needed support on health, development, and sickness protection from any disease that could be avoided. A child had to receive vaccines to support body immunization on time. A child also should receive immunizations to protect from both infectious and non-infectious diseases. When a child got sick, he should receive fundamental treatment to cure and to resuscitate his abilities (Special Committee to specify the fundamental needs and services for children and youths,

1993). This direction indicates that family played the roles to supervise a child health in protection, treatment, and support functions.

2.5 Research on Child Health

The review of compositions involved in the research was conducted because the study aim is the relationships between maternal education and sickness of the pre-school child. Thus, the research would concentrate more on the review of the variables and, the level of maternal education than the other variables that would be regarded as the control variables in this study. The result of the review of involving compositions could be separated according to the variables that were used in this study as follows:

2.5.1 Maternal Education

The outcome of the study of Sonalde Desai and Soumya Alva (1998), maternal education and child health is that there is a strong causal relationship; they found that maternal education has a statistically significant impact on infant mortality. Congruently, following a pioneer paper in Nigeria by Caldwell (1979), it has often been argued that children of educated mothers experience lower mortality than do children of un-educated mothers. This conclusion relies on the many demographic studies that demonstrate a strong correlation between maternal education and child health (Schultz:1993).

A person who was well educated would be healthier than a person who was not well educated would. Pensri Phichaisanith et al (1988) found that parents with high education levels showed better childcare for children at pre-school age than low educated parents did. Similarly, the study of Angkana Jirajin (1990), found children whose mothers graduated higher than primary school level would have better consumption habits than children whose mothers finished education on only primary school level or were not educated. Pender (Pender, 1987) said that maternal education

has a positive relationship to child health because education caused intelligence, knowledge, rationality in knowledge acquirement, and abilities to select and to perform the right health care. Correspondingly, Dale, Glanoille and Hason (Dale, Glanoille, & Hason, 1988), reported that maternal education indicated the cognizant vision in child health. The economic and education levels of a mother influenced the response of a child due to the relationship between maternal education and the childcare pattern of parents (Bradshow, 1988). This report was supported by the study of Salith Janhome (1987). He found that the level of maternal education related to the occurrences of sudden infections in the breathing system in 200 children under 5 years. These children were treated at the Pediatric Hospital.

2.5.2 Age of Mother

The age of the mother was a factor that related to the sickness of a child because the age of a mother indicated the experiences in childbearing. The study of Prakrith Ratchawatra et al (1994:181) was about the involving factors to childcare during the first year of a mother whose baby got sick and did not get sick with sudden infections in the breathing system. The study found that the age of a mother has a statistically significant impact on childbearing. An older mother could look after her child better than a younger mother.

2.5.3 Maternal Occupation

Laddawan Rodmanee (1980:133-134) studied about the sickness and health of children. She found that children whose mothers worked for an organization showed a higher rate of sickness than children whose mothers did not work. However, children whose mothers did not work for any organization showed a higher rate of sickness than children whose mothers worked as a housewife. The study of Aranya Puranan (1985) found that children who went with their mothers to a farm had chances to get sick with fever, flu, and cough. The causes of these sicknesses were from being under the sun, being in the rain, and not getting enough rest.

2.6 The Conceptual Framework

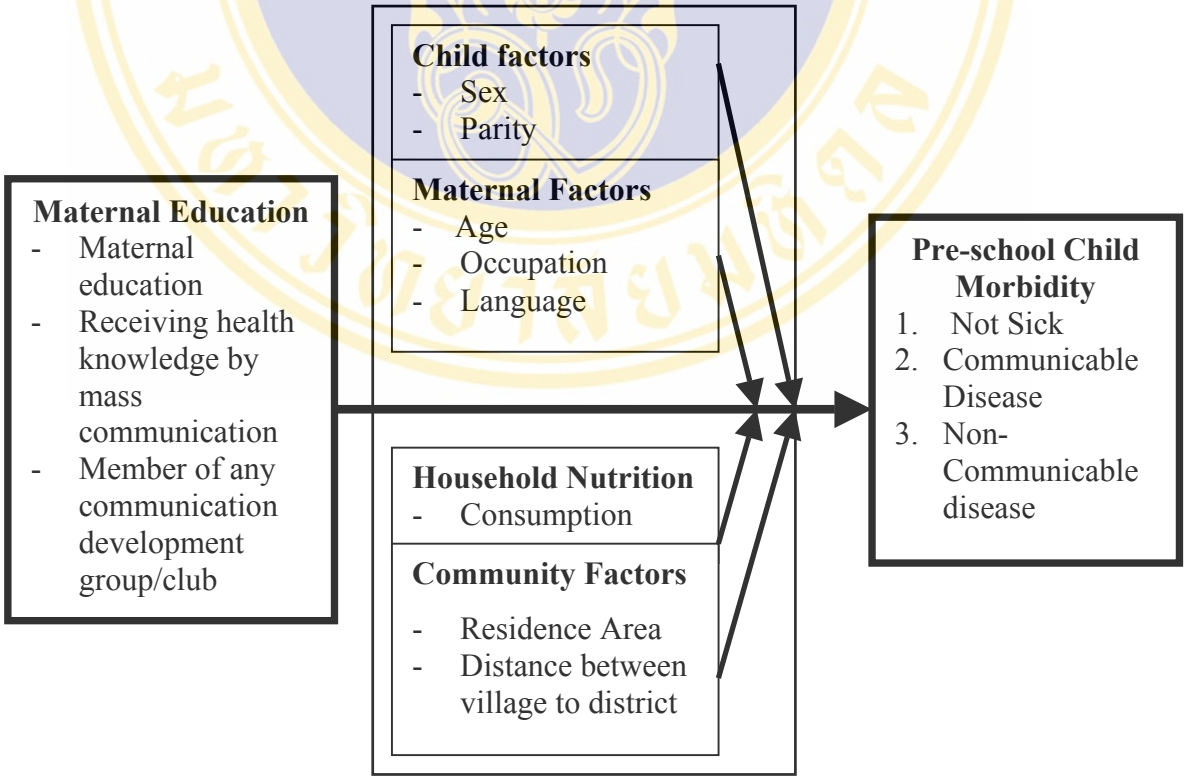
According to theories, concepts, and research on child health that have already been reviewed, the causes of sicknesses and mortality of pre-school child are related to the following:

1. **The sickness of a family member especially of a child.** It is related to the family pattern, parents' characteristics, and family economic and societal level.
2. **Factors** that influence child health and sickness are societal and economic about the knowledge or education of parents especially of the mother and the family financial status.
3. **Differences in Health Habits** of each person. The differences of health habit come from the differences in knowledge and perception. These differences affected the different states of health and sickness.

The conceptual framework of this study could conclude that the causes of sickness or weakness state of the pre-school child derives from incomplete infection protection and the inability to take care of themselves. A child needed good childbearing from a close person and the most important was the child's mother. Therefore, to perform good childbearing in order to have a child whose health was perfect with no sickness, a mother should be well educated, and have childbearing knowledge, because education could support a mother to perceive and to understand the steps and processes of childbearing correctly. Additionally, a mother could access the health service center if the child had a health problem. A mother possibly understood that the methods of sickness awareness and protection are nutrition, supervision, immunization, and treatment during the sickness period.

Furthermore, the mother was the main factor involved in the health of the pre-school child. There were the other factors that influenced the health of children such as socioeconomic and cultural factors, the household and the child himself. However, the researcher reviewed the related compositions and concepts and found that maternal education presented both positive and negative consequences to the sickness of

children at pre-school age. Related compositions and concepts include the studies of Sonalde Desai and Suomya Alva (1998), Caldwell (1979), and Nomradee Jongjpayuha (1975). Therefore, in this study, the researcher selected only the mother variable, that was maternal education. Previous research and the related reports conducted in Thailand and other countries about the importance of maternal education, the maternal education reported the importance of the role because it affected the perception and understanding in childbearing. Additionally, education was regarded as an important factor that brought on the other factors of each person such as the factors about society and economics. Therefore, the researcher specified the conceptual framework of the factors related to education only. The factors about society, economics, household, community, and the child himself were the controlled variables. The conceptual framework of this analysis is as the follows:



2.7 Hypothesis

1. Pre-school children of educated mothers are less likely to sickness than Pre-school children of uneducated mothers.

2. Pre-school children receiving health knowledge from medical staff, neighbors, and co-workers of their mothers are less likely to sickness than pre-school children receiving health knowledge from radio and television.

3. Pre-school children receiving health knowledge from medical staff, neighbors, and co-workers of their mothers are less likely to sickness than pre-school children of receiving health knowledge from printed materials.

CHAPTER III
RESEARCH METHODOLOGY

3.1. Source of data

This study is the crossectional research design that want to study the situation of the Pre-school child recent illness within the past one month before collecting data. The household heads and other member in household are the answer about disease and situation of illness to expect that occur from the exogenous factors and it's the effect of differential in maternal education in the social context. Therefore this study used the secondary data from the base line survey round 1(year 2000) that is the one of the studies carried out under the Kanchanaburi Project by Institute for Population and Social Research, Mahidol University. Its objectives are to study the population change in the study areas owing to the changes in economics, social, and environment. The study areas are 100 villages/census blocks in Kanchanaburi province.

The Institute for Population and Social Research (IPSR) will collect, on an annual basis, data using a population census for every household and interviewing each individual aged 15 years and over in each village/block that has been selected in the study area. The data which have been and will continue to be collected includes population, economic, social and health related information.

3.2 Sample of the Study

The objectives of this study is to study the relationship between maternal education and Pre-school Child Morbidity (years 0-6) living with their mother. Therefore, 3,398 Pre-schools Child (years 0-6) that living with their mother in Kanchanaburi province were the unit of analysis. And divided the sample by the physical development into three groups: 680 infants (year 0-1), 1,131 toddlers (year > 1-3) and 1,587 pre-school ages (year >3-6). Pre-school child.

3.3 Data Collection

The sample of the villages for the Kanchanaburi project was selected using a stratified systematic sample design. The primary sampling units for rural areas were villages and for urban areas were census blocks.

The data for sample selection were collected from the Kanchanaburi provincial offices of various ministries concerning the amount of agriculture land in each village, the amount of wet rice crops grown, the amount of plantation crops grown, and the number of adult workers employed in industry and the population.

The study area of 86 villages and 14 census blocks in Kanchanaburi Project was divided into five strata, which were categorised according to the main occupation of the population and land use patterns. These strata are; urban/semi-urban (industrialised), rice producing, plantation, upland areas, and mixed economy.

The method used for data collection was structured interview and entailed the use of three sets of questionnaires: village, household and individual.

3.4 Variables and Measurement

The variables in this study consisted of three groups: Independent variables, Dependent variables and Control variables. Maternal education was the independent variable that had divided into three groups: 1) maternal education, 2) receiving health knowledge and 3) the membership of any community development group. The dependent variables were the child morbidity considered to illness by exogenous factors such as Communication disease and Non-communication disease. And maternal factors, child factors, household nutrition, and social community factors were the control variables.

Table 1 Variables measurement

Variables	Measurement	Description	The cause
1. Dependent Variable			
Sickness	Nominal	1. Not Sick 2. Communicable Disease 3. Non-communicable Disease	
2. Independent Variables			
Maternal Education - Non -education - primary - secondary or higher	Nominal	Dummy Variables 1 = Non education 0 = others 1 = primary 0=others 1 = secondary 0= others	To measure the health knowledge of mother. Mother who have educated must more have the knowledge and can applied to take care her child than the mother who has non-education.

Table 1 Variables measurement (Cont.)

Variables	Measurement	Description	The cause
2. Independent Variables			
Receiving health knowledge by mass communication. - radio and TV - printed matters -medical staff/neighbor/ co-worker	Nominal	Dummy Variables 1 = radio/TV 0 = others 1 = printed matters 0 = others 1 = medical staff/neighbor/ co-worker 0 = others	To measure the health knowledge of mother
Member of any community development group/club	Nominal	Dummy Variables 1 = Yes 0 = No	To measure the knowledge of mother
3. Control Variables			
3.1 Child Factors			
Sex	Nominal	Dummy Variables 1 = male 0 = female	To measure the difference of the body.
Parity	Interval		To measure the experience in childbearing. The mother who had ever pregnant must more take care her child than the mother who had not ever pregnant.
3.2 Maternal Factors			
Age	Interval	The mother who was over 15 year olds	To measure the experience in childbearing

Table 1 Variables measurement (Cont.)

Variables	Measurement	Description	The cause
3.2 Maternal Factors			
Occupation - Not work - Agriculture - Out of agriculture	Nominal	Dummy Variables 1 = Not work 0 = others 1=Agriculture 0 = others 1 = Out of agriculture 0 = Others	To measure the type of maternal occupation.
Language is normally used in daily	Nominal	Dummy Variables 1 =Thai 0 = Others language	To measure the receiving health service. Speaking Thai mothers could be greater contact with the medical staff more speaking other language mothers.
3.3 Household Nutrition			
Consumption	Nominal	Dummy Variables 1 = raw or half-cooked food 0 = Others food	To measure the consumption of the household which show us about the consume behavior
3.4 Community Factors			
Distance between community and district	Interval		To measure the receiving health service.
Residence Areas - Urban/semi-urban - Upland - Rice - Plantation -Mixed Economic	Nominal	Dummy Variables 1 = Urban/semi-urban 0 = Others 1 = Upland 0 = Others 1 = Rice 0 = Others 1 = Plantation 0=Others 1 = Mixed Economic 0 = Others	To measure the difference in geography and environment

3.5 Data Analysis

1.The Statistical Package for Social Science (SPSS) has been used to describe the background characteristics of the sample population with the mean and percentage.

2. STATA was utilized to perform multinomial logistic regression analysis to analyze the correlation between maternal education and pre-school child morbidity. The usual presentation of the multinomial logistic result includes a table of coefficients, with each choice being compared with a single reference category. It is more desirable to present the implications of the multinomial logistic coefficients in terms of expected probabilities. The table of probabilities gives a more intuitive meaning by presenting the change in probabilities of each category of the dependent variable.

CHAPTER IV
RESULTS

This study was an analysis about the different levels of maternal education that possibly affected the sickness of pre-school age children. The researcher analyzed the social context of the mother and the family of the child. The sampling was separated into three groups; infant, toddler, and child at pre-school age. Therefore, the study result is explained according to each sampling group. The explanations are separated into two groups as follow:

4.1 The general characteristics of the sampling.

4.2 The relationship analysis: Maternal Education and Pre-school Child Morbidity.

4.1 The general characteristics of the sampling.

Infant

There were 680 infants that were enrailed as the sampling of this study in Kanchanaburi. The sampling consisted of males more than females; i.e.,males, 52 percent and females, 42 percent. Most of the infants were the second child of the mother.

Maternal Factors. The researcher found that the average age of the mother was 27 years and the level of maternal education was mostly at primary school, 52.6 percent, rather than high school, 30 percent, and no education, 17.4 percent. Considering receiving health knowledge by mass communication, the researcher found

that 70 percent of mothers received health knowledge from radio and television, 64.6 percent of mothers got health knowledge from printed materials, and 70 percent of mothers received health knowledge from medical staff, neighbors, and co-workers. Only 8.4 percent of mothers were the members of a community development group.

Considering the occupation of a mother, 51.8 percent of mothers had no occupation or worked as a housewife, 23.1 percent of mothers worked as farmers, and 25.1 percent of mothers worked outside the scope of agricultural occupation that comprised merchants, government officers, state enterprise employees, etc. For the language used in daily life, 75.3 percent of mothers used Thai language and the rest used other languages such as Burmese, Cambodian, and local dialects. (Table 2).

Considering household nutrition regarding food consumption in each household, 66.9 percent of households did not consume raw or medium-raw foods; however, 33.1 percent of households still consumed raw or medium-raw food in their daily life. Considering the societal community factors, most infant's families were in the upland area; the remainder were at urban/semi-urban areas, at rice areas, plantation areas, and mixed economy areas, sequentially. The average distance from the village to the district where the sample resided was about 20.3 kilometers and the farthest village from the district was 120 kilometers.

Table 2 Percentage of Infant by child factors, maternal factors, household nutrition, and community factors.

Variable				Percent	Number(N=680)
Child factors					
Sex					
	Male			52.1	354
	Female			47.9	326
Parity	Mean = 2.11	S.D.= 1.26	Min.= 1		Max. = 8
Maternal factors					
Maternal Education					
	Non-Education			17.4	118
	Primary			52.6	358
	Secondary or Higher			30.0	204
Age	Mean = 26.77	S.D. = 6.01	Min. = 16		Max. = 44
Receiving health Knowledge by radio and TV					
	No			30.0	204
	Yes			70.0	476
Receiving health knowledge by poster					
	No			35.4	241
	Yes			64.6	439
Receiving health knowledge by doctor/colleague					
	No			30.0	204
	Yes			70.0	476
Member of any community development group/club					
	No			91.6	623
	Yes			8.4	57
Occupation					
	Not work			51.8	352
	Agriculture			23.1	157
	Out of agriculture			25.1	171

Table2 Percentage of Infant by child factors, maternal factors, household nutrition, and community factors.(Cont.)

Variable	Percent	Number(N=680)
Maternal Factors		
Language is normally used in daily		
Thai	75.3	512
Other languages	24.7	168
Household nutrition		
Consumption		
Raw or half-cooked food	33.1	225
Other food	66.9	455
Community Factors		
Residence		
Urban/semi-urban	16.6	113
Upland	37.3	253
Rice	15.7	107
Plantation	15.4	105
Mixed Economy	15.0	102
Distance between community and district	Mean = 20.30	S.D. = 22.56
Min. = 1 Max. = 120		

Toddler

There were 1,131 toddlers that were enrolled as the sampling in this analysis. Comprising 51 percent males and 49 percent females. The number of each sex of toddler was close enough that the analysis might assume that there was no sex difference of children in this sampling group. Considering the ranking of the child in each family, most of the toddlers were the second child of the mother (Table 3).

Maternal Factors. The average age of mother was 28 years. Most of the mothers (56.5 percent) of toddlers graduated in primary school, 25.8 percent of toddlers' mothers graduated in high school or higher, and 17.8 percent of toddlers' mothers had no education. About receiving health knowledge by mass communication, it was found that 70.8 percent of mothers received health knowledge from radio and television, 62.6 percent of mothers received health knowledge from printed materials, and 71.3 percent of mothers received health knowledge by medical staff, neighbors, and co-workers. The last media, receiving childcare knowledge from medical staff, neighbors, and co-workers, was Two-way Communication. Both parties could exchange their comments. About the status of being a member in any community development group, 91.3 percent of toddlers' mothers were not a member of any group. Only 8.7 percent of mothers of toddlers were a member of a group or a community development group.

In view of the occupation of a toddler's mother, 36.4 percent of toddlers' mothers had no occupation, 35.5 percent of toddlers' mothers worked as a farmer, and 28.1 percent of toddlers's mothers were in the other occupation. Most of toddler mothers, 77.5 percent, used Thai language to communicate in their daily life.

Regarding household nutrition of toddlers' families, 66.1 percent of households did not prefer to take raw or medium-raw food but the rest 33.9 percent of households, preferred to take raw and medium-raw food. About the distance of the community where the toddler resided, the average distance from district was 18.56

kilometers. The families of toddlers were situated mostly at upland, urban/semi-urban, rice, plantation area, and mixed economy area, consecutively.

Table3 Percentage of Toddler by child factors, maternal factors, household nutrition, and community factors

Variable	Percent	Number(N=1,131)
Child factors		
Sex		
Male	51.0	577
Female	49.0	554
Parity Mean= 2.16 S.D. = 1.30	Min = 1	Max = 8
Maternal factors		
Maternal Education		
Non-Education	17.8	201
Primary	56.5	639
Secondary or Higher	25.8	291
Receiving health Knowledge by radio and TV		
No	29.2	330
Yes	70.8	801
Receiving health knowledge by poster		
No	37.4	423
Yes	62.6	708
Receiving health knowledge by doctor/colleague		
No	28.7	325
Yes	71.3	806
Member of any community development group/club		
No	91.3	1,033
Yes	8.7	98
Age Mean = 28.85 S.D.= 5.92	Min = 16	Max = 47
Occupation		
Not work	36.4	412
Agriculture	35.5	401
Out of agriculture	28.1	318

Table3 Percentage of Toddler by child factors, maternal factors, household nutrition, and community factors(Cont.)

Variable	Percent	Number(N=1,131)
Maternal Factors		
Language is normally used in daily		
Thai	77.5	876
Other languages	22.5	255
Household nutrition		
Consumption		
raw or half-cooked food	33.9	383
Other food	66.1	748
Community Factors		
Residence		
Urban/semi-urban	18.3	207
Upland	32.0	362
Rice	17.3	196
Plantation	15.4	174
Mixed Economy	17.0	192
Distance between community and district	Mean = 18.56	S.D. = 21.44
Min = 1 Max = 120		

Child at Pre-school Age

There were 1,587 children at pre-school age that were used as the sampling in this analysis. There were 52.6 percent of male and 47.4 percent of female. From the figure, it presented no major different. Considering the ranking of child in his family, most of children at pre-school age were the second child (Table 4)

Considering the mother's age, the average age of the mother of children at pre-school age was 31 years. About education factor, there were 16.6 percent of mothers who had no education, 62.1 percent of mothers who finished only primary school, and 21.3 percent of mothers who finished high school or higher. About the mother's health knowledge received from mass communication, 72.25 percent of mothers received health information from radio and television media, 63.2 percent of mothers received health information from printed materials, and 71.4 percent of mothers received health information from medical staff, neighbors, and co-workers. About the member in any community development group, only 12.7 percent of mothers were the member of a group (Table 4).

Considering the mothers'occupation of children at pre-school age, most mothers of children at pre-school age, 42.3 percent, were farmers, 28.8 percent of mothers worked in the other areas of occupation than farmers, and 28.9 percent of mothers had no occupation. About the language used in daily communication, only 21.3 percent of mothers of children at pre-school age used an other language besides Thai to communicate in their daily life.

Considering the food consumption of each household that a child was a member, only 32.6 percent of households preferred to consume raw or medium-raw food and the rest, 67.4 percent of households, did not prefer to consume raw or medium-raw food. In consideration of the residence area, 30.6 percent of households of children at pre-school age were in upland areas, 19.5 percent of households were in urban/semi-urban areas, 18.8 percent of households in mixed economy areas, 15.8 percent of households were in rice areas, and 15.4 percent of households were in

plantation areas. Considering the distance between the village where a child's household was located and the district, the average distance from the village to the district was 17.98 kilometers (Table 4).

Table 4 Percentage of Child at pre-school age by child factors, maternal factors, household nutrition, and community factors

Variable			Percent	Number(N=1,587)
Child factors				
Sex				
Male			52.6	834
Female			47.4	753
Parity	Mean = 2.17	S.D. = 1.29	Min = 1	Max = 8
Maternal factors				
Maternal Education				
Non-Education			16.6	263
Primary			62.1	986
Secondary or Higher			21.3	338
Receiving health Knowledge by radio and TV				
No			27.8	441
Yes			72.2	1,146
Receiving health knowledge by poster				
No			36.8	584
Yes			63.2	1,003
Receiving health knowledge by doctor/colleague				
No			28.6	454
Yes			71.4	1,133
Member of any community development group/club				
No			87.3	1,386
Yes			12.7	201
Age	Mean = 31.00	S.D. = 5.95	Min = 19	Max = 48
Occupation				
Not work			28.9	458
Agriculture			42.3	672
Out of agriculture			28.8	457

Table 4 Percentage of Child at pre-school age by child factors, maternal factors, household nutrition, and community factors(Cont.)

Variable	Percent	Number(N=1,587)
Maternal factors		
Language is normally used in daily		
Thai	78.7	1,249
Other languages	21.3	338
Household nutrition		
Consumption		
raw or half-cooked food	32.6	517
Other food	67.4	1,070
Community Factors		
Residence		
Urban/semi-urban	19.5	309
Upland	30.6	485
Rice	15.8	250
Plantation	15.4	245
Mixed Economy	18.8	298
Distance between community and district	Mean = 17.98	S.D. = 20.86
Min = 1 Max = 120		

4.2 The relationship analysis: Maternal education and Pre-school Child Morbidity

The purpose of this study was to investigate the effect of maternal education on sickness of a pre-school child. This study also brought the social context and communication of a child's household to be controlled variables. In the analysis section, this study separated the sampling into three groups that were infant, toddler, and child at pre-school age because when the age was increased, there were both physical and mental developments. Therefore, the chance of getting sick depended considerably on the development of each age. The Multinomial Logistic Regression was used to analyze the information because of the need to test the influence of the independent variable on the dependent variable. The independent variable was maternal education and the dependent variable was the sickness of the child at each group, in the same time the other variables were controlled. Thus the analysis result would present the Regression Coefficient of an incident compared to another incident that was the comparison value in each pair of dependent variables. Therefore, there were three comparison group as follow: (1) The sickness with communicable diseases and no sickness. (2) The sickness with non-communicable diseases and no sickness. And 3) The sickness with communicable diseases and non- communicable diseases. Additionally, there was the calculation to figure out the probability.of the chance of a child to get sick compared to no sickness or about a chance of child to become sick with communicable or non- communicable diseases. A simulation model was used to consider the maternal education, receiving health knowledge by mass communication, and a member in any community development group

.

The analysis of each sampling group was done to figure out precisely the relationship between the factors that were of interest in this study. The analysis processes were separated into 3 models as follow:

Model 1 This model would brought only the control variables of sex and parity, and the maternal factors of age, occupation, household nutrition, and the factors about the society including residence area and the distance from village to district.

These factors were used to analyze this model to present the important and the level of relationships of the factors to the sickness regarding statistical significance. The result was presented as the first algebraic equation.

Model II The independent variables were taken into the algebraic equation to check whether the dependent variables and independent variables had any relationship value. The independent variables were the maternal education, receiving health knowledge by mass communication, and member in any communication development group of a mother. It was done to focus the proof of the relationship between the dependent variables and independent variables without the control of the other control variables that were already proven to have important roles on the child sickness in the first algebraic equation.

Model III. This process would take the algebraic equation from the first and the second models to analyze together with independent variables that were controlled by the control variables. It was done to prove that the maternal factors that were already considered with the other factors would affect a child sickness. The factors that were considered with the maternal factors were socioeconomic factors, public health factors and the distance from village to district, which was assumed as the center to spread knowledge and technologies about childcare to the community. This process should generate the actual result to this study.

However, before taking the information into the Multinomial Logistic Regression, the association between all independent variables and control variables were measured by the Pearson correlation. The measure of association indicated that there was no independent variable that had no interaction. For example, its value was less than 0.75 in both Collinearity and Multicollinearity (Blalock, 1971). It meant that all independent variables and control variables were independent from each other and there was no pair of variables that presented statistical significance under the linear model.

4.2.1 The relationship analysis: Maternal Education and Infant Morbidity.

The analysis outcome from the first model (Table 1 in Appendix), using the comparison method presented that only the parity of an infant in his family affected the sickness of the infant. The control variables in this model were the maternal factor of age, occupation, nutrition, and language used in daily life, societal factors about the society: the areas of residence and the distance from the village to district, and the factors about an infant: sex and parity were put into the algebraic equation to analyze the relationship to the sickness of an infant. A pair of sicknesses was matched to process the comparison method. The analysis would be performed via the comparison of each pair. At least two pairs out of three were needed to present the statistical relationship in order to conclude that a factor affected a sickness in an infant.

However, considering the value of the chi-square model to forecast the level of confidence of the algebraic equation, value was found to be 43.50 at the degree of Freedom at 24 with a statistically significance of 0.00. This outcome indicated that all of the control variables taken into the algebraic equation in the first model had the important roles in the sickness of an infant.

The analysis of the second model was the process that took the independent variables of this study into the analysis of the relationship with the sickness of an infant. The independent variables were the level of maternal education, the health knowledge receiving, and a member in any communication development group. When comparing the sickness of each pair, the outcome showed that the sickness of an infant had no effect from the level of maternal education. However, considering the value of the chi-square model, that was 11.67, the degree of freedom was 10 and showed a statistical significance of 0.01; therefore, the outcome indicated the independent variable of maternal education in the algebraic equation derived from the second model played a role with the sickness of an infant to a statistical significance (Table 2 in Appendix).

The analysis of the third model was performed by taking the control variables from the first model and the independent variables from the second model into the algebraic equation in the third model. Considering the different value of the chi-square model from the first model (43.50) and the third model (63.68), the outcome reported that the different value was 20.18. Taking the different value to compare with the value displayed in the Model Chi-Square Distribution Table at a value of the degree of freedom at 10, the value was greater than the value displayed in the table at 18.30. It meant that the independent variable taken into the algebraic equation increased the degree of prediction to the algebraic equation. The outcome of the analysis was that if the variable was controlled to be at a constant value, the factors would present an effect on the sickness of an infant. The factors were maternal occupation, not working in a farm area, the parity of an infant and the level of maternal education, primary school and high school or higher (Table 5). To analyze the direction of the relationship between variables, the level of maternal education and sickness of an infant, a comparison was made of the relationship of each pair as follows:

A mother graduate of primary school level. Comparing the sickness from communicable diseases and no sickness by controlling the other variables to be at a constant state, infants whose maternal education was at primary level were sick with communicable diseases more than infants whose mothers had no education were (the correlation coefficient was equal to 0.0512). Comparing the sickness from non-communicable diseases and no sickness, infants whose maternal education was at primary level were sick with non- communicable diseases less than infants whose mothers had no education (the correlation coefficient was equal to –0.7692 as presented in Table 5).

A mother graduate of high school level or higher. Comparing the sickness from communicable diseases and no sickness of infants, the outcome indicated that mothers with a high school or higher level of education showed a positive correlation coefficient with the sickness from communicable diseases of infants. This outcome also found that when comparing the sickness of infants whose mothers had high

school or higher education with the infants of un-educated mothers. The infants whose mothers finished high school or higher education were less likely to get sick with communicable diseases than the infants of un-educated mothers. Similarity, infants whose mothers graduated in high school or higher were less likely to get sick with non- communicable diseases than infants of un-educated mothers

Table 5 Coefficient for Maternal education from Multinomial Logistic Regression of Infant Morbidity

Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Age	0.0196	0.0322	0.0125
Occupation			
Agriculture	0.3231	-0.1327	-0.4559
Out of agriculture	-0.2167	0.5838**	0.8005***
Not work (Reference)			
Consumption			
raw or half-cooked food (=1)	0.0878	0.3498	0.2619
Language is normally used in daily			
Thai(=1)	0.5120*	1.1176*	0.6055
Residence			
Urban/semi-urban(=1)	-0.4303	-0.7977	-0.3674
Rice(=1)	0.1006	0.5347	0.4340
Plantation(=1)	-0.5163***	-0.4720	0.0443
Mixed Economy(=1)	-0.7259***	-0.0687	0.6572
Upland(Reference)			
Distance between community and district(Kilo)	-0.0051	0.0040	0.0091

Table 5 Coefficient for Maternal education from Multinomial Logistic Regression of Infant Morbidity (Cont.)

Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Sex of child			
Male(=1)	0.0651	-0.1689	-0.2341
Parity	-0.1212*	-0.3573*	-0.2361
Maternal Education			
Primary(=1)	0.0512	-0.7692*	-0.8204**
Secondary or Higher(=1)	-0.0321	1.2946***	-1.2624***
Non-education (Reference)			
Receiving health knowledge by mass communication			
Radio/TV(=1)	0.0991	0.1308	0.0316
Doctor/neighbor/colleague	0.3634*	0.4160	0.0525
Printed materials(Reference)			
Member of any community development group/club(=1)	-0.2980	-0.9933*	-0.6953
Constant	-0.7096**	-2.3818****	-1.6721***

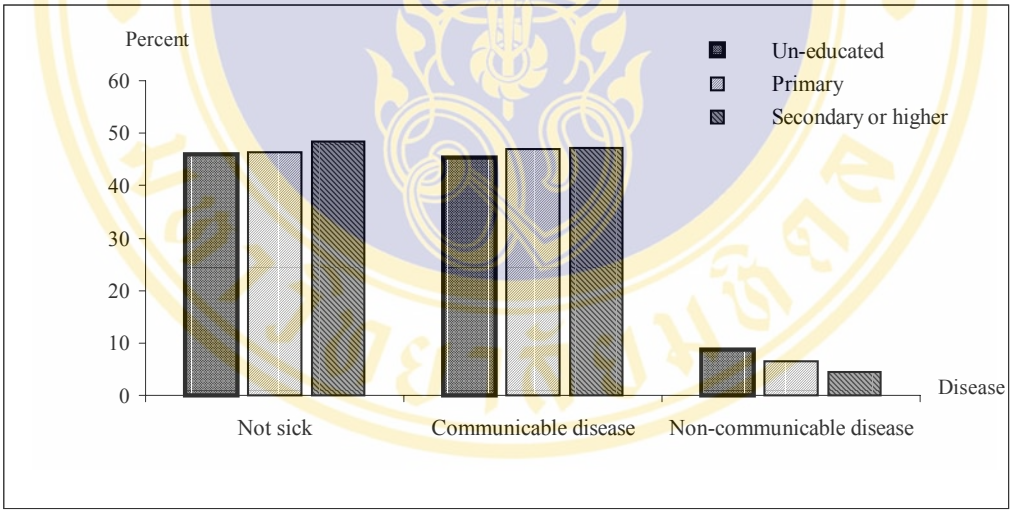
Case = 680 Model Chi-Square=63.68 df = 34 Probability Chi-Square=0.00
LR = -605.28 *P value<0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Considering the different probability of the infant's sickness and considering the level of maternal education from the simulation presented at the first graph, the higher the education level of the mother the higher chance to get no sickness in an infant. It demonstrates that the level of education that was higher according the sampling group seemingly affected the different probability of an infant's sickness. Similarly, the chance to get sick with communicable diseases was higher if a mother had a higher education level. This assumption might be explained as mothers might have to work for an organization so the others might look after the infants instead.

This event might be a cause for the high chance of sickness with communicable diseases of infants. Whereas, an infant whose maternal education was low presented higher rate of sickness with non- communicable disease than an infant whose maternal education was high. It should be noted that the chances of getting sick with communicable diseases of infants whose maternal education level was different presented no major differences.

Possibly, the infant period is the period that needs a high degree of careful attention because an infant has lower immunization and a higher chance to become infected with a disease. Therefore, every mother whose education was different then provided attention in childcare at the same level.

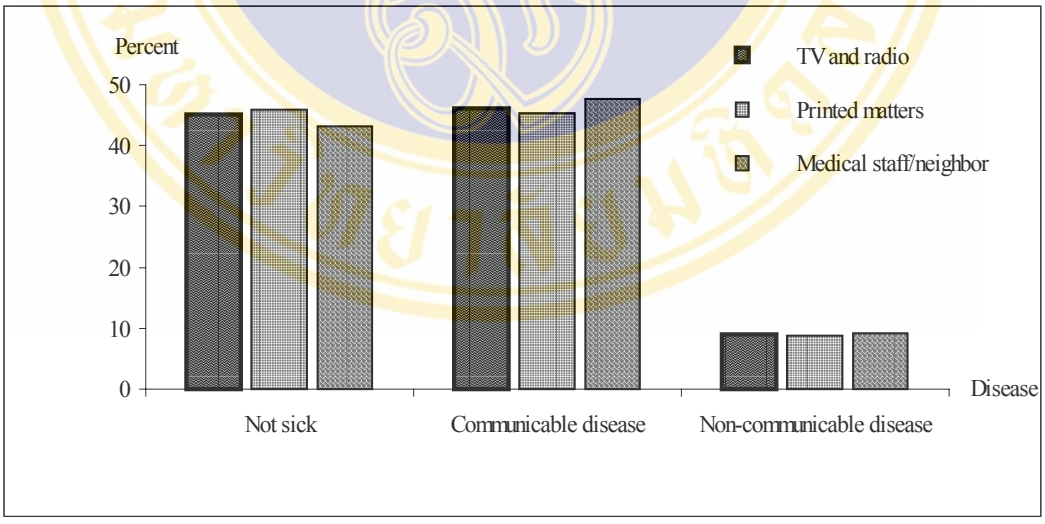
Figure 1 Probability to Sickness of Infant by Maternal Education



The second graph presents the probability of getting sick at different degrees of infants. This probability was considered from health knowledge from mass communication of the mother. The chance of getting no sickness with communicable diseases and non-communicable diseases presented no major different if a mother received knowledge from mass communication. However, an infant whose mother received health knowledge from the medical staff, neighbors, and co-workers presented a lower chance of getting no sickness than an infant whose mother received

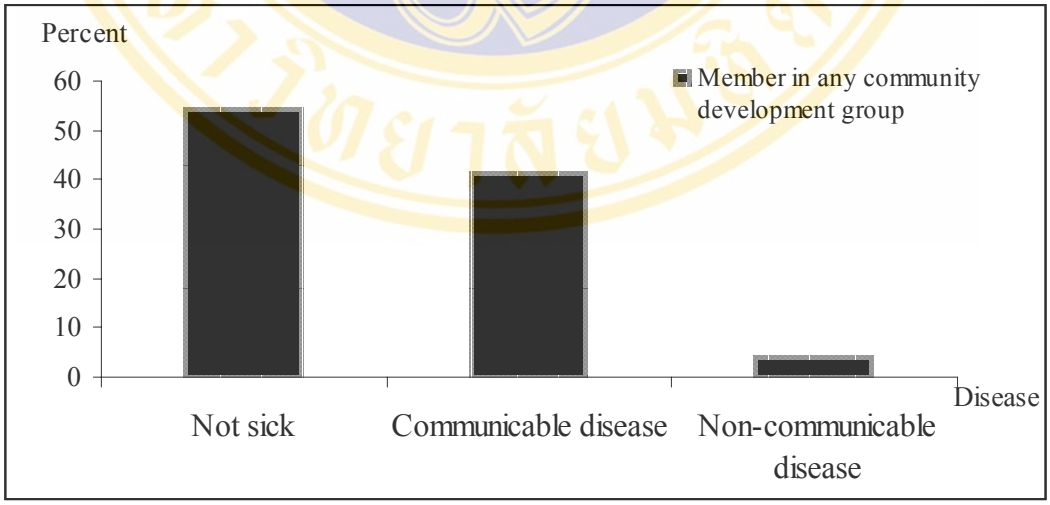
health knowledge from the radio and television and printed materials. Simultaneously, an infant whose mother received health knowledge from the medical staff, neighbors, and co-workers presented a higher chance of getting sick with communicable diseases than an infant whose mother received health knowledge from radio and television and printed materials. This incident might be explained by the fact that getting health knowledge from various media might cause better understanding of infant sickness so a mother was able to correctly report the infant sickness. Additionally, too much knowledge about childbearing might cause a high degree of awareness affecting the low immunization in an infant, so the infant might easily be infected by a disease. The chance of sickness with non-communicable diseases presented no difference. It meant that the difference in health knowledge from mass communication yielded no effect to the probability of an infant to get sick with non-communicable diseases.

Figure 2 Probability to Sickness of Infant by Receiving health knowkedge from mass communication of the mother



Viewing the probability difference of infants to become sick from the factors about being a member in any community development group of infants' mothers, the result was that more than half of the infants had no sickness. However the result presented a higher chance to get sick with communicable diseases than non-communicable diseases. The member in any community development group of a mother indicates a higher chance of learning and perception from society. For example, a mother who is a member of a health care group might get knowledge about sickness treatment and protection. Thus, the mother might be able to apply the knowledge to her infant. This incident is involved with the simulation result that an infant whose mother is a member in any community development group presented the least chance of no sickness. However, some infants still were sick with communicable diseases and non-communicable diseases though their mothers had knowledge about sickness treatment and protection due to the infant condition, easiest to become infected with a disease.

Picture 3 Probability to Sickness of Infant by member in any community development Group of mother



4.2.2 The relationship analysis: Maternal Education and Toddler Morbidity.

The first model analysis (Table 4 in Appendix) was done by taking the control variables of this study into the algebraic equation to analyze the relationship with the sickness of toddlers. The outcome indicated that language and residence area were the factors that affected the sickness in toddlers at a statistical significance of 0.05. Viewing the value of the model chi-square, the value used to forecast the confidence of the algebraic equation. The value of the model chi-square was at 118.09 at the degree of freedom at 24 and the confidence value at 0.00. This means that all of the control variables that were taken into the algebraic equation of the first model had an important role in the sickness of toddlers to a statistical significance.

The analysis of the second model regarding toddlers used the variables of maternal education, receiving health knowledge from mass communication, and being a member in any community development group. The results indicated that the level of maternal education, receiving health knowledge from mass communication, and the member in any community development group affected the sickness of toddlers. Viewing the value of the model chi-square the value was 40.30 at the degree of freedom at 10 and statistically significant at 0.00. It means that all of the variables of the level of maternal education, that was taken into the algebraic equation in the second simulation analysis had important roles with the sickness of toddlers to a statistical significance. (Table 5 in Appendix)

The analysis of the third model was conducted by taking the control variables from the first model and the independent variables from the second model. The difference values derived from the chi-square model first (118.09) and third (239.42), the outcome reported a different value was 121.33. Comparing the values of the degree of freedom at 10, the value was greater than the value displayed in the table at 18.30. It means that the independent variables, the level of maternal education, receiving health knowledge from mass communication, and being a member in any community development group of a mother, taken into the algebraic equation

increased the degree of prediction to the algebraic equation. The outcome of the analysis was the effect on sickness of toddlers implied a mother with a primary level of education. However, the factors about the health knowledge received from mass communication and being a member in any community development group of a mother presented no effect on the sickness of toddlers (Table 6). The explains the relationship between the factors about maternal education, primary level, and the sickness of a toddler as follow:

A mother graduate of primary school level. The correlation coefficient about the relationship was positive with the sickness with communicable diseases (0.3106) and non-communicable diseases (0.6996). It means: toddlers whose maternal education level was at primary level had more communicable diseases and non-communicable diseases than toddlers whose mothers had no education. It also means that a higher level of education of a mother affected the sickness probability of a toddler. Comparing non-communicable diseases and communicable diseases and mother graduates of primary school level and mother with no education, toddlers would get sick more with non-communicable diseases than communicable diseases. The non-communicable diseases; for example, were accident, injury, etc.(The correlation coefficient was equal to 0.3890, Table 6). From the outcome it can possibly be assumed that toddlers whose maternal education was at primary level probably were sick from accident and injury. It might come from the method of childbearing.

Table 6 Coefficient for Maternal education from Multinomial Logistic Regression of Toddler Morbidity

Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Age	-0.1003	-0.0366	-0.0263
Occupation			
Agriculture	0.1452	0.2373	0.0921
Out of agriculture	-0.1426	-0.1524	-0.0097
Not work (Reference)			
Consumption			
raw or half-cooked food (=1)	-0.0337	0.1529	0.1867
Language is normally used in daily			
Thai(=1)	0.3811**	0.7070**	0.3259
Residence			
Urban/semi-urban(=1)	0.4130**	0.1451	-0.2679
Rice(=1)	0.6802***	0.5866**	-0.0935
Plantation(=1)	-0.0328	0.7445**	-0.7117**
Mixed Economy(=1)	-0.0106	-0.0304	-0.0198
Upland(Reference)			
Distance between community and district(Kilo)	0.0028*	0.0002	-0.0025
Sex of child			
Male(=1)	0.0486	-0.2288	-0.2775
Parity	0.0122	0.0625	0.0503
Maternal Education			
Primary(=1)	0.3106*	0.6996**	0.3890
Secondary or Higher(=1)	0.1954	0.2491	0.0537
Non-education (Reference)			

Table 6 Coefficient for Maternal education from Multinomial Logistic Regression of Toddler Morbidity (Cont.)

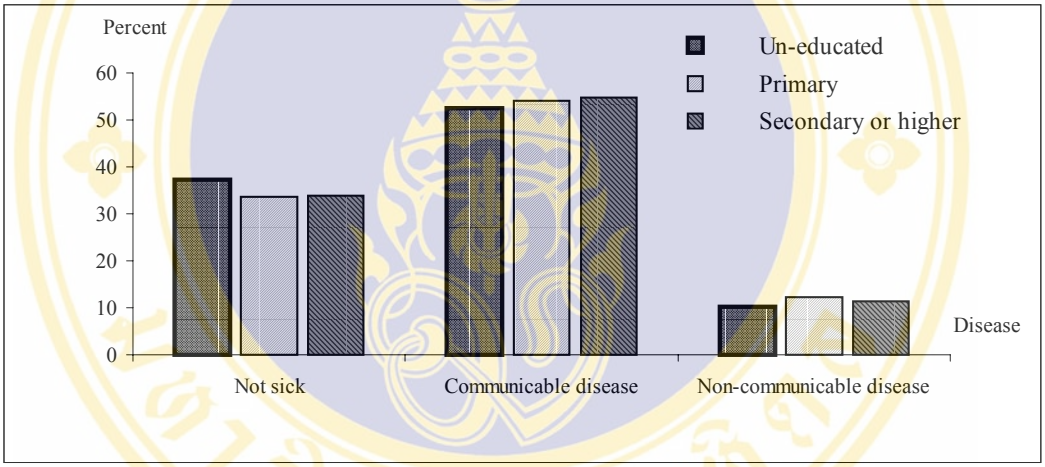
Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Receiving health knowledge by mass communication			
Radio/TV(=1)	0.1353	-0.3191	-0.4544**
Doctor/neighbor/colleague/(=1)	0.0190	0.3296	0.3106
Printed materials(Reference)			
Member of any community development group/club(=1)	-0.1394	0.1871	0.3265
Constant	-0.2428	-1.4288**	-1.1859**

Case = 1131 Model Chi-Square =239.42 df = 34 Probability>Chi-Square=0.00
LR = -1031.89 *P value<0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Considering the maternal education level, from picture 4, viewing varieties of maternal education levels, the results presented no major differences in the sickness probability of toddlers, both communicable and non-communicable diseases. However, viewing the sickness with communicable diseases trend, the result indicated that those toddlers, whose maternal education level was high, had a high probability to get sick with communicable diseases. Additionally, more than half of toddlers presented a higher probability to become sick with communicable diseases than non-communicable diseases. It might be assumed that the chances came from the childbearing methods done by other persons because the toddlers' mothers had to work and were often away from their houses. It should be noted that toddlers whose mothers had no education had higher chances to get no sickness than toddlers whose mothers had higher education. It probably means that mothers with no education had different occupations from mothers who had higher education levels because education is related to occupation. Mothers with higher education level might need more time for their occupation and might have to be away from homes during working

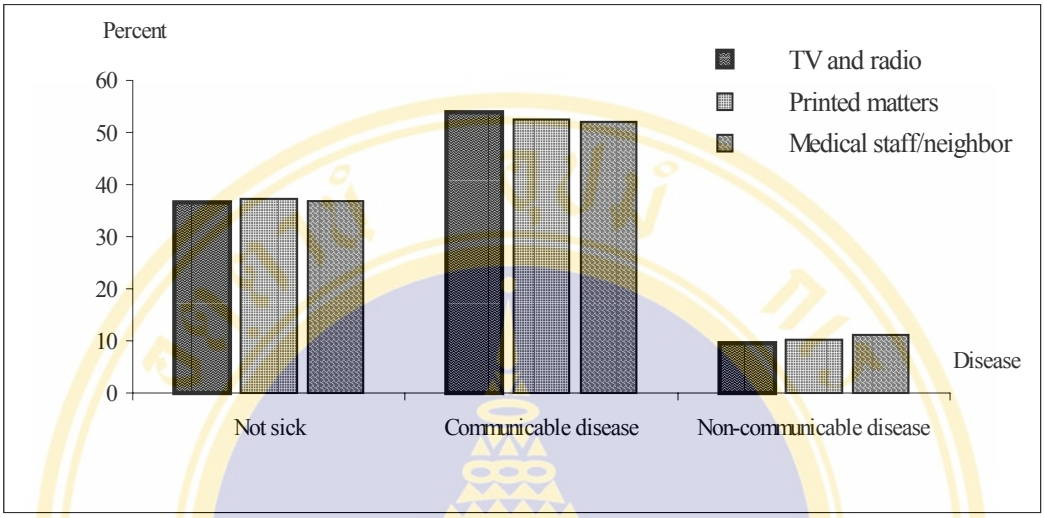
hours. They might ask others to look after their toddlers instead. Mothers with no education might work at home or work nearby their houses. Thus, they have more chance to closely supervise and monitor their children. Additionally, the toddlers' immunization development was better than the infants' immunization because mothers allowed toddlers to learn about the surroundings themselves. For example, mothers might allow toddlers to walk around and to touch things. These allowed toddlers to contact germs and infection. Thus, it was also the chance to become infected from the surroundings too (Mosley and Chen, 1984).

Figure 4 Probability to Sickness of Infant by Maternal Education



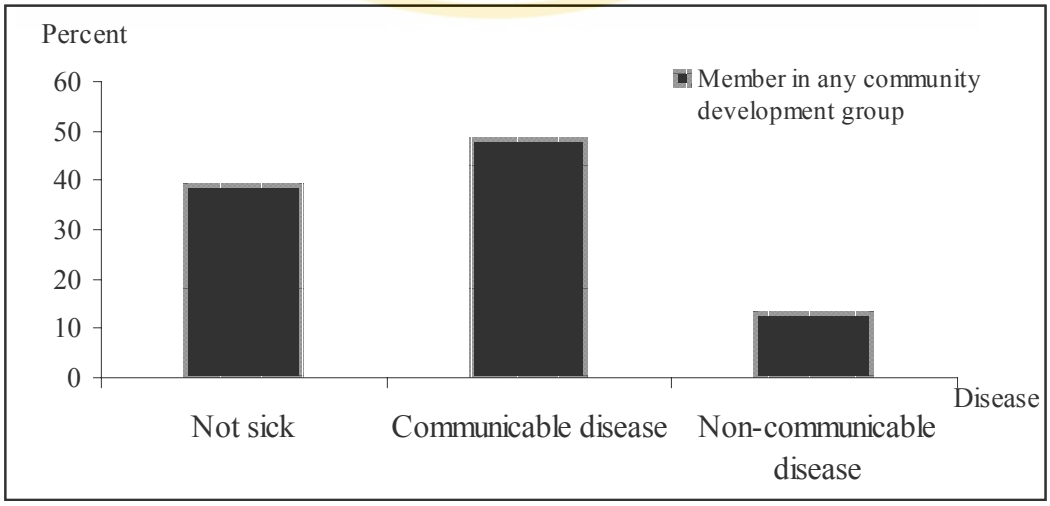
Considering receiving health knowledge from mass communication of mothers;toddlers presented a close probability of sickness with communicable diseases and non-communicable diseases. Viewing sickness with communicable diseases, toddlers presented a higher chance to become sick with communicable diseases than non-communicable diseases though mothers had already been educated about health care from various media. This incident might occur congruently with the incident happening in infant's case. Though toddlers had better development and immunization than infants, the sickness with communicable diseases probability was still high. The toddler's development involves touching things with germ and the other causes of infection. Although mothers were well educated about health, their toddler's behavior risked exposure to diseases.

Figure 5 Probability to sickness of Toddler by receiving health knowledge from mass communication of mother



Considering being a member in any community development group of mother, toddlers were more likely to have communicable diseases than non-communicable diseases

Figure 6 Probability to sickness of Toddler by the member in any community development group of mother.



4.2.3 The relationship analysis: Maternal Education and sickness of children at pre-school age.

The first model analysis of children at pre-school age was done by taking the control variables of this study into algebraic equation analysis. The value of the model chi-square was at 128.24 at the degree of freedom at 24 and the confidence value at 0.00. It means that all of the control variables that were taken into the algebraic equation of the first model had important roles to the sickness of children at pre-school age to a statisticall significance. Each control variable that was taken into the algebraic equation, related to sickness of children at pre-school age. (Table 7 in Appendix) The variables were occupation of mothers in agricultural sector, consumption of raw or medium-raw food, language used in daily life, and residence area in urban/semi-urban, and rice production area.

The analysis of the second model took the following variables into algebraic equation analysis. The level of maternal education, receiving health knowledge from mass communication, and being a member in any community development group. The results showed that the level of maternal education: primary and high school level affected the sickness of children at pre-school age. The value of the model chi-square was used to forecast the confidence of the algebraic equation. The value of model chi-square was at 43.71 at the degree of freedom at 10 and the confidence value at 0.00. It means that all of the variables in the second model had important roles with the sickness of children at pre-school age to a statistical significance. (Table 8 in Appendix)

The third model was analyzed by taking the variables from the first and third models. Considering the value from the first model (128.24) and the third model (207.80), the outcome reported a difference of 79.56. Comparing with the value displayed in the Model chi-square Distribution Table at value of the degree of freedom at 10, the value was greater than the value displayed in the table at 18.30. It means that the variable, the level of maternal education, increased the degree of prediction to the algebraic equation. The outcome of the analysis was that the level of maternal

education: primary and high school or higher influenced sickness of children at pre-school age. These results could explain the relationship direction of each pair as follows:

A mother graduate of primary school level. Considering the factors about maternal education, primary level, by comparing with the sickness with communicable diseases and having no sickness, the outcome showed a positive correlation coefficient (0.7753) to sickness with communicable diseases. When comparing sickness with communicable diseases of children at pre-school age whose maternal education was at primary level to children at pre-school age whose mother had no education. The outcome showed the children at pre-school age whose maternal education was at primary level had higher chances to become sick with non-communicable diseases than children at pre-school age whose mother had no education did. Considering the sickness with communicable disease and non- communicable disease, children at pre-school age whose maternal education was at primary level presented higher chances to become sick with non- communicable diseases than children at pre-school age whose mother had no education. (The correlation coefficient equals 0.1193) This incident might be explained by the fact that the higher education of mother might cause her to work for an organization so mothers had to be away from their homes reducing the time to look after their child themselves, so the risk to become sick with communicable diseases was high. Mothers with no education might look after their children themselves so children had a lower chance to become sick with communicable diseases. Comparing sickness with communicable and non-communicable diseases, children whose mother had a primary education level had less chance to become sick with non-communicable diseases than to become sick with communicable diseases. It means that a mother graduate from primary school was educated about childbearing to protect from communicable diseases possibly did not supervise her child causing contact to infection. (Table 7)

A mother graduate of high school level or higher. Comparing the sickness from communicable diseases and no sickness of children at pre-school age, the outcome indicated that children at pre-school age whose mothers was educated

showed higher chances to get sick with communicable diseases than children whose mother had no education (the correlation coefficient equals 0.6466). Comparing the sickness with communicable and non- communicable diseases, children at pre-school age whose mothers had a high school or higher education level presented a negative correlation coefficient (–0.1294). Controlling the other variables to at constant state, children at pre-school age whose maternal education level was at a high school or higher education level contracted non-communicable diseases less than children at pre-school age whose mother had no education. Children at pre-school age whose mother graduated in high school or higher had higher chances to acquire communicable diseases than non- communicable diseases. From these incidents, the education factor was possibly regarded as having a Chain Relationship to the other factors. For example, education brought occupation and revenue. Currently, mothers with a high education level have no time to foster their children so they might let others look after their child instead. The person who looked after their child could be a relative, or a baby-sitter. These persons might have no childcare knowledge. Additionally, children at pre-school age are curious, which causes contact with germs and infection in their surroundings. Children at pre-school age might start having their own social group such as friends in their kindergarten, so their might be a spread of some diseases.

Table 7 Coefficient for Maternal education from Multinomial Logistic Regression of Child at pre-school age Morbidity

Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Age of mother	-0.0001	0.0237	0.0239
Occupation			
Agriculture	0.4727****	0.1341	-0.3385*
Out of agriculture	0.1110	-0.1288	-0.2398
Not work (Reference)			
Consumption			
raw or half-cooked food (=1)	0.0479	0.3489***	0.3009**
Language ‘s normally used in daily			
Thai(=1)	0.2445	0.4195*	0.1749
Residence			
Urban/semi-urban(=1)	0.7757****	0.4994*	-0.2762
Rice(=1)	0.7411****	0.8229***	0.0817
Plantation(=1)	0.1620	0.0857	-0.0763
Mixed Economy(=1)	0.6046****	0.2292	-0.3754
Upland(Reference)			
Distance between community and district(Kilo)	0.0019	0.0012	-0.0006
Sex			
Male(=1)	-0.1496	-0.2745*	-0.1248
Parity	0.0046	0.0669	0.0623
Maternal Education			
Primary(=1)	0.7753****	0.1193	-0.6559**
Secondary or Higher(=1)	0.6466***	-0.1294	-0.7761***
Non-education (Reference)			

Table 7 Coefficient for Maternal education from Multinomial Logistic Regression of Child at pre-school age Morbidity (Cont.)

Variable	Communicable Disease VS Not sick	Non-communicable Disease VS Not sick	Non-communicable Disease VS Communicable Disease
Receiving health knowledge by mass communication			
Radio/TV(=1)	-0.1154	0.1318	0.2473
Doctor/neighbor/colleague/(=1)	-0.0514	0.2313	0.2827
Printed materials(Reference)			
Member of any community development group/club(=1)	-0.0025	-0.2906	-0.2880
Constant	-1.3580****	-3.0914****	-1.7333****

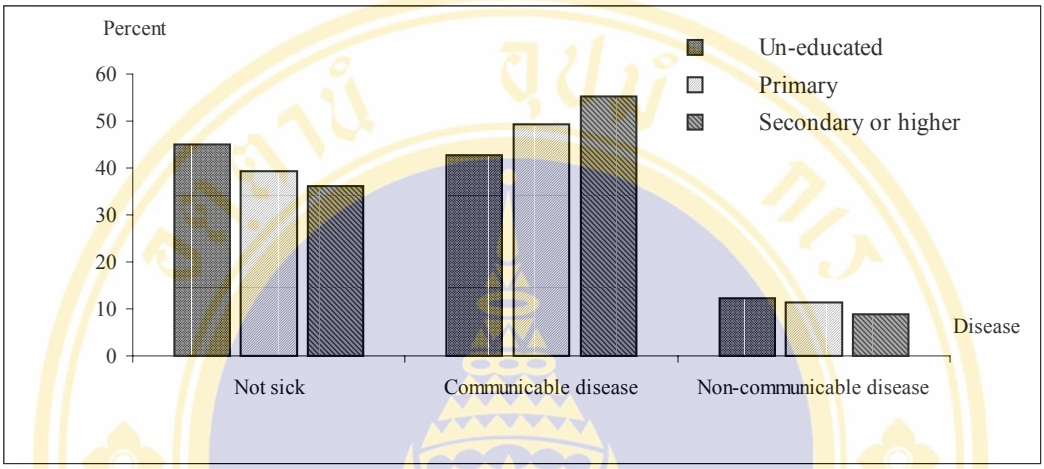
Case = 1587 Model Chi-Square=207.80 df = 34 Probability Chi-Square=0.00
LR = -1491.28 *P value<0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

The different probabilities of sickness for children at pre-school age by simulated incident (Table 9 in Appendix) with the level of maternal education was considered. The outcome was that differences in maternal education caused differences in sickness probability; a higher education level of a mother cause a lower chance of contracting no sickness. Examining children at pre-school age, the outcome indicated that the higher the education level of the mother the higher the chance of contract communicable diseases. Conversely, the higher the education level of the mother the lower the chance of acquiring sickness with non-communicable diseases. (Figure 7)

From the outcome of the simulation, it might be assumed that mothers with a high education level could supervise and protect their children from non-communicable diseases better than they could supervise and protect their children from communicable diseases. This incident might assume that children at pre-school age had better development. Parents preferred to send their children to a kindergarten or a nursery place. Those places might not be able to manage the childcare processes

effectively. Therefore, children might contract some infection from their friends and food more easily.

Figure 7 Probability to sickness of Child at pre-school age by maternal education.

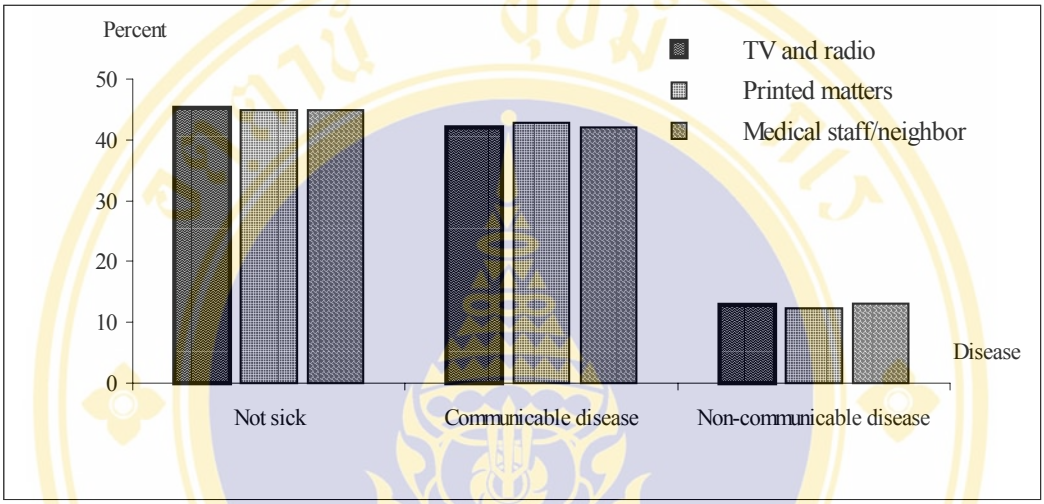


Considering receiving health knowledge from mass communication of mothers, the probability of not contracting sickness of children at pre-school age was higher than acquiring sickness with communicable and non-communicable disease. Children whose mothers received health knowledge from radio and television media presented the percentile of acquiring no sickness at 45.2. However, 42 percent of children had a chance to become sick with communicable diseases and 12.8 percent of children had a chance to become sick with non- communicable diseases.

A children whose mother received health knowledge from printed materials and from medical staff, neighbors, and co-workers had the chance to not contract sickness and to become sick with communicable diseases at close levels, i.e., 42.8 percent and 42.2 percent consecutively. (Table 9 in Appendix) From picture 8, there were almost no differences in not becoming sick, contract communicable diseases and contract non-communicable diseases. In conclusion, it could possibly be assume that the difference in health knowledge obtained various media yielded no effect to the probability of acquiring sickness or not acquiring sickness in children at pre-school

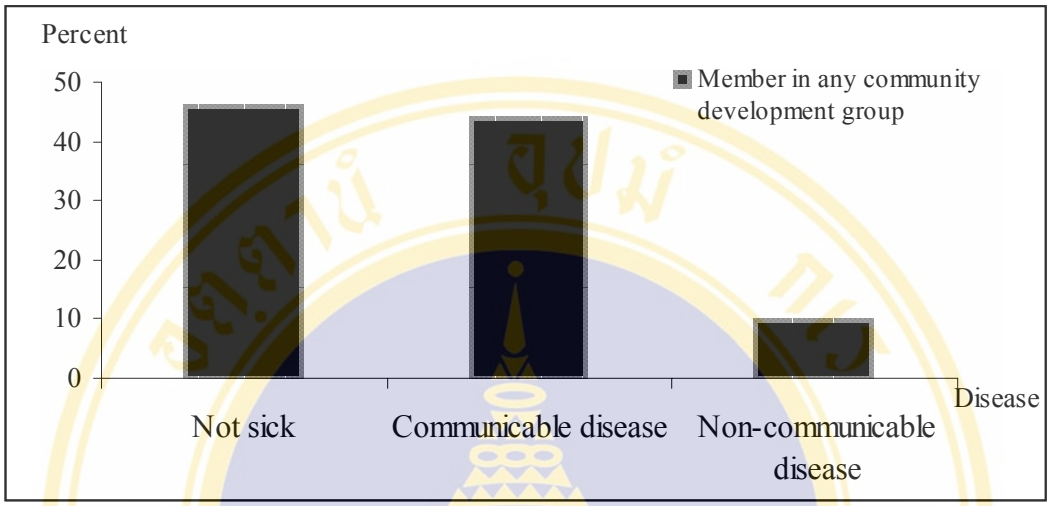
age. Physical development is possibly the most important factor that affected the risk of infection by touching and by accident, etc.

Figure 8 Probability to sickness of Child at pre-school age by receiving health knowledge from mass communication of mother.



Considering being a member in any community development group of mothers (Table 9 in Appendix), children at pre-school age whose mothers were members in any community development group had a 46 percent probability of not contracting sickness. The rest of the children showed as 44 percent chance of contract communicable disease and 10 percent of children had chances of getting sick with non-communicable diseases. From picture 9, the chances of not becoming sick and contracting communicable diseases of children at pre-school age whose mothers were a member in any community development group were not very different compared to the chance of acquiring sickness with non-communicable diseases that showed the least chance. The possible cause of this incident might be related to physical development of children, and the member status of children in a social group such as kindergarten or nursery. The childcare knowledge from Two Way Communication should not be the cause of this incident.

Figure 9 Probability to sickness of Child at pre-school age by the member in any community development group of mother.



CHAPTER V
CONCLUSIONS AND SUGGESTIONS

5.1 Conclusions of the study

The conclusion was based on the relationship analysis between the maternal education and the sickness of pre-school child that was separated into three groups; i.e, infant, toddler and children at pre-school age. The control variables included child factors, maternal factors, household nutrition, and society at village level factor. The outcome could be analyzed as follows:

Infant

The result of the study about the effects of maternal education on sickness of infants was that factors about maternal education: mothers who graduated from primary school and mothers who graduated from high school or higher, related to the sickness of infants. Infants whose mothers finished primary school presented higher rates of contract communicable diseases than contract non-communicable diseases and contracting no sickness. Infants whose mother finished high school or higher presented higher rates of contract communicable diseases than contract non-communicable diseases. However, comparing contract communicable and non-communicable diseases and not becoming sick, infants whose maternal education was high presented no sickness, because mothers with a high level of education should care well for their infants and are interested in inquiring childbearing knowledge especially about methods to prevent communicable diseases that might occur to an infant. Due to the incomplete immunization of infants, infants are easily infected. Therefore, they needed special looking after (U-phaiwan Suvevat, 2528).

Considering the different probability of sickness of infants by considering the maternal education level, receiving health knowledge from mass communication and being a member in any community development, the outcome was that if mothers had a high level of education, the chance of not becoming sick in infants was high too. Congruently, the sickness from communicable diseases of infants was increased whereas the chance of contract non-communicable diseases of infants decreased. Considering receiving health knowledge from mass communication of mothers, the outcome was the chances for not contraction communicable diseases of infants were not seriously different. Considering the factors about receiving health knowledge from mass communication and being a member in any community development group of a mother, more than half of infants a had chance to have no sickness whereas the other group of infants had a chance to become sick with communicable diseases and non-communicable diseases sequentially.

Toddler

The result of the study about the effects of maternal education on sickness of toddlers was that the factor about maternal education, mothers who graduated in primary school, affected the sickness of toddlers. Toddlers whose mothers finished primary school presented higher rates of contract communicable diseases than contract non-communicable diseases than toddlers whose mothers had no education. Comparing the sickness with communicable to non-communicable diseases of toddlers whose mother finished only primary school, toddlers become sick with non-communicable diseases more than communicable diseases; whereas the other variables did not relate to the sickness of toddlers. Though toddlers started having physical development more than infants, toddlers still needed as much looking after and immunization provision as infants did. Therefore, every mother at every education level should equally provide proper supervision, care and monitoring for toddlers. The factors about maternal education, receiving health knowledge from mass communication, and member in any community development group did not have a high effect on the sickness of toddlers.

Investigating the different probabilities for sickness of toddlers, toddlers whose mothers had no education presented higher chances of not becoming sick than toddlers whose mothers had high education level. For sickness with communicable diseases, toddlers whose mother had a high level of education presented a high chance to become sick with communicable diseases. For sickness with non-communicable diseases, toddlers whose mother had only a primary level of education level presented a higher rate of sickness with non-communicable diseases than toddlers whose mothers were at the other education levels. Considering the factor about health knowledge received from mass communication, toddlers had higher chances to sick with communicable diseases than non-communicable diseases. Similarly, toddlers whose mothers were members in any community development group presented higher chances of contract communicable diseases than not becoming no sick and contracting non-communicable diseases.

Children at pre-school age

The results of the study about the effects of maternal education on sickness of children at pre-school age were that the factor about maternal education, mothers who attained primary education level and mothers with high school or higher education levels, effected the sickness of children at pre-school age. However, the factors about receiving health knowledge from mass communication, and receiving health knowledge from mass communication of mothers had no effect on the sickness of children at pre-school age.

Considering the simulation model to see the probability differences of sickness probability of children at pre-school age with maternal education level, the outcome clearly presented that the higher the education level of mothers, the lower the chance of having no sickness. Conversely, the chances of contract communicable diseases were increased but the chances of getting sick with non- communicable diseases was decreased if the children's mother had a high education level.

Considering childcare knowledge receiving of mothers, though mothers received childcare knowledge from different media, the chances of having no sickness, having sickness with communicable diseases and non-communicable diseases were not seriously different. Additionally, children at pre-school age had the least chance in having no sickness but the chances of contract communicable diseases and having sickness from non-communicable diseases were lower, sequentially. About receiving health knowledge from mass communication of a mother, the outcome presented that the chances of having no sickness and having sickness with communicable diseases of children at pre-school age were not seriously different though the chance of having no sickness was higher.

From the third simulation, the analysis results about the effects of the maternal education factor on the sickness of children at pre-school age in all three groups, the outcome was that the maternal education variable affected the sickness of children in all three groups. The variables, receiving health knowledge from mass communication and receiving health knowledge from mass communication, had no effect on the sickness of children in all three groups. Considering the maternal education level and the sickness of children at pre-school, all three groups, infants, toddlers and children at pre-school age become sick with communicable diseases higher than contract non- communicable diseases whereas toddlers become sick with non-communicable diseases more than communicable diseases. The maternal education factor can be regarded as the Exogenous Factor, which is important to the sickness of the baby. However, it was important at a certain degree because there were Endogenous Factors such as ailment and biological factors that are involved in immunization that are also important factors to the sicknesses. Children at pre-school age who comprised the research with sampling were easily infected to diseases especially infants. Infants were the easiest to become infected with diseases because the immunization mechanism could not work completely. The body mechanism on immunization would be fully developed after an infant passed his second year of age. (U-Phaiwan Suvira, 2528: 29). Therefore, infants needed to be looked after closely. The person who was important in childcare was the mother of the infant. The maternal education level would support the knowledge and selection of sickness

protection to the baby. Education was the connection to the occupation, social status and economic status of the family that affected the infant's health.

Regarding toddlers, they need for started development and learning obviously, which created the immunization. The immunization system of toddlers was better than the immunization of infants. Becoming infected with a disease of toddlers was more difficult becoming infected with a disease of infants. Toddlers started having physical developments that included the ability to walk, to catch things, and to be interested in their surroundings. Toddlers had a higher chance to become sick with non-communicable diseases such as sickness from an accident than to become sick with communicable diseases.

Considering the children at pre-school age who had higher chances to get sick with communicable diseases than to get sick with non- communicable diseases, the causes of this incident are probably that children at pre-school age had both physical and mental development. They started running learning new things by themselves, and attending school. Therefore, children in this age are close to surroundings that are contaminated by infection. For example, they might get infection from touching objets or varieties of food consumption. The role of the mother to look after children at pre-school age would diminished because their of children attended school. The persons who replace the roles of mothers were teachers and their friends. Therefore, the sickness protection to children could not be as effecting as the earlier period though the children's mothers had a high education level.

From the simulation of the sickness probability of children at each age, it should be marked that considering the maternal education, which comprised the independent variables of this study of children from each group, infant, toddler and child at pre-school age, the outcomes of the simulation were similar. From the sampling groups, that were infant, toddler, and child at pre-school age, if their maternal education level was higher, the chances of getting sick decreased. This outcome agreed with the study assumption. The assumption was that children at pre-school age whose mothers had a high education level would present a lower chance of

becoming sick than children at pre-school age whose mothers had a low education level. However, the children at pre-school age whose mothers had a high education level would present a higher chance of contract communicable diseases and the chance of contract non- communicable diseases was decreased. This incident might come from the maternal education factor that was the indication of knowledge and understanding in childcare. Additionally, maternal education was the connection to the social status and household economics. These factors are also the indicators of the child's health. Additionally, maternal education was the major factor that would cause behavior change of a person especially the mother herself. The change in the mother's behavior affected the health of the child (Cleland, 1990).

Considering the childcare knowledge received from various media of mothers, the outcome presented that children at pre-school age whose mothers received childcare knowledge from medical staff, neighbors and co-workers presented lower chances of becoming sick than children at pre-school age whose mothers received childcare knowledge from radio and television and printed media. Similarly, infants and children whose mothers received childcare knowledge from medical staff, neighbors, and co-workers presented lower chances in having no sickness than infants and children whose mothers received childcare knowledge from printed media. This outcome was different from the study assumption.

5.2 Suggestions

5.2.1 Suggestion for the next study

1. From the study result, some of independent variables that were childcare knowledge received from various media and heving member status of a group or an development organization presented little effect on the sickness of children at pre-school age. Actually, the receiving of childcare knowledge played very important roles to mothers. For example, the combination of these variables to the algebraic the equation would cause an increase in the confidence in the equation, model chi-square.

It meant that the variable was important to the sickness of children. Therefore, in the next study, this variable should be included in the analysis because mothers and other persons were able to learn about childcare knowledge with no time limitation.

2. From the study, a higher education level of mothers a effected higher chances of children at pre-school age to become sick with communicable diseases. Actually, mothers with a high education level should lower the chance of contract communicable diseases. Therefore, in the next study, incisive information gathering by interviewing mothers and the person who looked after children for them about childcare processes should be done to get more specific details and clearer information.

3. Information providers for this study were the heads of households or other members in the household that were not the children' mother. Therefore, in the next study, the information provider should be only the mothers who answer the questions about her child to ensure more valid and accurate information.

5.2.2 The suggestion on the policy

The result of this study confirms that maternal education affects the sickness of children at pre-school age. Therefore, education is important to the sickness of children. There should be a policy to support the education provided to women and children to be able to study at the education subjected level. This policy might improve childcare knowledge for children at pre-school age of mothers. Also higher education levels of mothers cause them to work away from home and a cause of having less time to look after her child closely. However, the higher education level would bring about better household management regarding hygiene, reducing no infecting and causing less accident. This management would better suit the sickness protection of children at pre-school age.

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APPENDICES

Appendix A1 Coefficient for control variables from Multinomial Logistic Regression of Infant morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Age of mother(Year)	0.0176	0.0264	0.0088
Occupation			
Agriculture	0.3363*	0.1614	-0.4977
Out of agriculture	-0.2062	0.4334	0.6397**
Not work (Reference)			
Consumption			
raw or half cooked food (=1)	0.1237	0.3651	0.2414
Language normally used in daily			
Thai(=1)	0.6297**	0.8633	0.2335
Residence area			
Urban/semi-urban(=1)	-0.3351	-0.8848*	-0.5496
Rice(=1)	0.1619	0.4422	0.2802
Plantation(=1)	-0.4309	-0.4175	0.0134
Mixed Economy(=1)	-0.6667**	-0.2273	0.4393
Upland(Reference)			
Distance to district(Kilo)	-0.0046	0.0026	0.0073
Sex of children			
Male(=1)	0.0851	-0.0710	-0.1562
Parity	-0.1205*	-0.2971*	-0.1766
Constant	-0.5154	-2.5411****	-2.0257***

Case = 680 Model Chi-Square = 43.50 df = 24 Probability>Chi-Square=0.00
LR = -611.51 *P value < 0.10 **P value < 0.00 *** P value < 0.01 **** P value < 0.001

Appendix A2 Coefficient for independent variables from Multinomial Logistic Regression of Infant morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Maternal Education			
Primary(=1)	0.1545	-0.2265	-0.3811
Secondary or higher(=1)	-0.0075	-0.4594	-0.4519
Un-educated (Reference)			
Receiving health knowledge from mass communication			
TV and Radio(=1)	0.1887	0.4186	0.2299
Medical staff/neighbor/ co-worker(=1)	0.3878*	0.4311	0.0432
Printed matters(Reference)			
Member in any community development(=1)	-0.1501	-0.7398	-0.5896
Constant	-0.4778***	-1.9577****	-0.1479****

Case = 680 Model Chi-Square =11.67 df = 10 Probability>Chi-Square=0.01

LR = -624.63 *P value < 0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Appendix A3. Percentage of probability to sickness of the Infant by maternal education, receiving health knowledge, and member in community development group of the mother

Variable	Not sick	Communicable disease	Non-communicable disease	Total
Maternal Education				
Un-educated	45.9	45.4	8.7	100.0
Primary	46.4	47.0	6.6	100.0
Secondary or higher	48.5	47.1	4.4	100.0
Receiving health Knowledge				
TV and radio	45.1	46.0	8.9	100.0
Printed matters	45.9	45.4	8.7	100.0
Medicalstaff/neighbor/co-worker	43.2	47.6	9.2	100.0
Member in any community development group	54.3	41.5	4.2	100.0

Appendix A4 Coefficient for control variables from Multinomial Logistic Regression of Toddler morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Age of mother(Year)	-0.0113	-0.0361	-0.0248
Occupation			
Agriculture	0.1327	0.2485	-0.0248
Out of agriculture	-0.1579	-0.1980	-0.0401
Not work (Reference)			
Consumption			
raw or half cooked food (=1)	-0.0273	0.1581	0.1854
Language normally used in daily			
Thai(=1)	0.4993****	0.8625***	0.3632
Residence area			
Urban/semi-urban(=1)	0.5093***	0.1543	-0.3549
Rice(=1)	0.7784****	0.7194***	-0.0590
Plantation(=1)	0.0602	-0.6500**	-0.7102**
Mixed Economy(=1)	0.1006	0.0613	-0.0393
Upland(Reference)			
Distance to district(Kilo)	0.0034**	0.0018	-0.0015
Sex of children			
Male(=1)	0.0569	-0.1910	-0.2480
Parity	-0.0019	0.0642	0.0662
Constant	-0.0308	-1.1552*	-1.1243**

Case = 1131 Model Chi-Square =118.09 df = 24 Probability>Chi-Square=0.00

LR = -1037.47 *P value < 0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Appendix A5 Coefficient for independent variables from Multinomial Logistic Regression of Toddler morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Maternal Education			
Primary(=1)	0.5567****	1.0292****	0.4725
Secondary or higher(=1)	0.4481***	0.6223*	0.1742
Un-educated (Reference)			
Receiving health knowledge from mass communication			
TV and Radio(=1)	0.2416*	-0.1894	-0.4310*
Medical staff/neighbor/ co-worker(=1)	0.0435	0.3228	0.2793
Printed matters(Reference)			
Member in any community development(=1)	-0.1732	0.1444	0.3176
Constant	-0.2654*	-2.1527****	-1.8873****

Case = 1131 Model Chi-Square = 40.30 df = 10 Probability>Chi-Square=0.00
LR = 1049.87 *P value < 0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Appendix A6. Percentage of probability to sickness of the Toddler by maternal education, receiving health knowledge, and member in community development group of the mother

Variable	Not sick	Communicable disease	Non-communicable disease	Total
Maternal Education				
Un-educated	37.2	52.4	10.3	100.0
Primary	33.6	54.1	12.3	100.0
Secondary or higher	33.9	54.8	11.3	100.0
Receiving health Knowledge				
TV and radio	36.7	53.8	9.5	100.0
Printed matters	37.2	52.4	10.3	100.0
Medicalstaff/neighbor/ co-worker	36.8	52.1	11.1	100.0
Member in any community development group	38.9	48.3	12.8	100.0

Appendix A7 Coefficient for control variables from Multinomial Logistic Regression of child at pre-school age morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Age of mother(Year)	0.0002	0.0218	0.0216*
Occupation			
Agriculture	0.4420***	0.1181	-0.3238*
Out of agriculture	0.0844	-0.1716	-0.2560
Not work (Reference)			
Consumption			
raw or half cooked food (=1)	0.0397	0.3667***	0.3270**
Language normally used in daily			
Thai(=1)	0.4343***	0.5338***	0.0995
Residence area			
Urban/semi-urban(=1)	0.8843****	0.5151****	-0.3692
Rice(=1)	0.8811****	0.8691****	-0.0119
Plantation(=1)	0.2304	0.1540	-0.0763
Mixed Economy(=1)	0.7383****	0.2783	-0.4600
Upland(Reference)			
Distance to district(Kilo)	0.0038	0.0018	-0.0020
Sex of children			
Male(=1)	-0.1330	-0.2523	-0.1193
Parity	-0.0189	0.0579	0.0769
Constant	-1.0607****	-2.8644****	-1.8036****

Case = 1587 Model Chi-Square = 128.24 df = 24 Probability>Chi-Square=0.00

LR = -1501.90 *P value < 0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Appendix A8 Coefficient for independent variables from Multinomial Logistic Regression of child at pre-school age morbidity

Variable	Communicable disease VS Not sick	Non-communicable disease VS Not sick	Non-communicable disease VS Communicable disease
Maternal Education			
Primary(=1)	1.1067****	0.3368	-0.7699***
Secondary or higher(=1)	1.0477****	0.1089	-0.9387****
Un-educated (Reference)			
Receiving health knowledge from mass communication			
TV and Radio(=1)	0.0313	0.2476	0.2162
Medical staff/neighbor/ co-worker(=1)	0.0557	0.2542	0.3099
Printed matters(Reference)			
Member in any community development(=1)	0.0369	-0.2013	-0.2383
Constant	-0.9547****	-1.8617****	-0.9070****

Case = 1587 Model Chi-Square = 43.71 df = 10 Probability>Chi-Square=0.00

LR = -1526.49 *P value < 0.10 **P value < 0.05 *** P value < 0.01 **** P value < 0.001

Appendix A9 Percentage of probability to sickness of the child at pre-school age by maternal education, receiving health knowledge, and member in community development group of the mother

Variable	Not sick	Communicable disease	Non-communicable disease	Total
Maternal Education				
Un-educated	44.9	42.8	12.3	100.0
Primary	39.3	49.3	11.3	100.0
Secondary or higher	36.1	55.2	8.8	100.0
Receiving health Knowledge				
TV and radio	45.2	42.0	12.8	100.0
Printed matters	44.9	42.8	12.3	100.0
Medicalstaff/neighbor/co-worker	44.8	42.0	13.0	100.0
Member in any community development group	46.1	44.0	9.8	100.0

BIOGRAPHY

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