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Original Article

Factors Relating Theutilization of Full Immunization Services Among Mothers with Children Aged 12-24 Months; in Pakngeum District, Vientiane, LAO P.D.R.

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Abstract

This cross-sectional analytical study aimed to describe the utilization of immunization services among mothers with children aged 12-24 months in Pakngeum district in Vientiane, Lao P.D.R., and the association of such utilization with selected factors, such as socio-demographics, knowledge, perceptions, accessibility, availability, and satisfaction. Data were collected by interviews using a structured questionnaire with 265 respondents in 20 villages in four health centers randomly selected from a total of nine health centers. The data were analyzed by using descriptive statistics, chi-square and multiple logistic regressions.

About 73% of the children received full immunizations at the scheduled times. It was revealed that 50.6% of the mothers were 25-34 years old; 45.3% of them had only a primary school education. The majority (78.1%) was farmers and 28.7% of them had high incomes. A high percentage of the mothers had a moderate level of knowledge (50.2%). More than half of the mothers (55.1%) had low perceptions but high satisfaction with the service. The majority of the mothers (52.5%) used the mobile immunization service. Moreover, 87.5% of the mothers had to travel less than one kilometer from their house to the vaccination post. The majority of mothers (58.5%) received information about immunization from their village leader. There was a significant association between education, family income, and a mother's perception of the utilization of immunization services. The distance from home to the vaccination post, and the time spent at the vaccination post were also found to have a significant association with immunization services. When adjusted for other variables, families with high incomes (AOR=1.85, CI=1.02-3.34) and mothers with a high perception were almost two times more likely to have fully immunized their children (AOR=1.90, CI=1.05-3.34).

The mother's perception and family income were the most important determinants for improving the utilization of immunization services, including more than half of the mothers used the mobile immunization service. The Ministry of Health should cooperate with other sectors to promote the importance of immunization through proactive implementation rather than passive implementation by using community participation and campaigns to more access service.

คำสำคัญ: *Utilization, Immunization service, Children 12-24 months*

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นิพนธ์ต้นฉบับ

ปัจจัยที่มีความสัมพันธ์กับการมารับบริการฉีดวัคซีนในกลุ่มมารดาที่มีบุตรอายุระหว่าง 12–24 เดือน ในตำบลปากหงึม นครเวียงจันทร์ ประเทศลาว

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บทคัดย่อ

การศึกษาแบบตัดขวางในครั้งนี้มีวัตถุประสงค์เพื่อศึกษาการมารับบริการฉีดวัคซีนในกลุ่มมารดาที่มีบุตรอายุระหว่าง 12–24 เดือน ในตำบลปากหงึม นครเวียงจันทร์ ประเทศลาว และศึกษาปัจจัยที่มีความสัมพันธ์กับการมารับบริการฉีดวัคซีนประกอบด้วยลักษณะทางสังคมและประชากร ความรู้ การรับรู้ประโยชน์ของวัคซีน รวมทั้งความพึงพอใจในการมารับบริการ การเก็บรวมข้อมูลโดยการสัมภาษณ์ด้วยแบบสัมภาษณ์ กับมารดาที่มีบุตรอายุระหว่าง 12–24 เดือนจำนวน 265 ราย ใน 20 หมู่บ้าน ที่อยู่ภายใต้เขตบริการของศูนย์บริการสาธารณสุขจำนวน 4 แห่งที่ได้มาจากการสุ่มศูนย์บริการสาธารณสุขจำนวน 9 แห่ง สถิติที่ใช้ในการวิเคราะห์ประกอบด้วย สถิติพรรณา และวิธีวิเคราะห์ความสัมพันธ์ด้วยการทดสอบไคกำลังสอง และการถดถอยลอจิสติคพหุคูณ

ประมาณร้อยละ 73 ที่มารดาพาเด็กมารับบริการวัคซีนได้ครบตามกำหนด ในการศึกษาครั้งนี้ร้อยละ 50.6 เป็นมารดาที่มีอายุระหว่าง 25–34 ปี ร้อยละ 45.3 จบการศึกษาระดับประถมศึกษา ส่วนใหญ่มีอาชีพเกษตรกรรมและร้อยละ 28.7 มีรายได้ค่อนข้างสูง ประมาณครึ่งหนึ่งมีความรู้ในระดับปานกลาง มากกว่าครึ่งหนึ่งมีการรับรู้ในระดับต่ำแต่มีความพึงพอใจกับบริการในระดับสูง ส่วนใหญ่แล้ว (ร้อยละ 52.5) มารดาพาเด็กไปรับบริการวัคซีนกับบริการเคลื่อนที่ อย่างไรก็ตาม ร้อยละ 87.5 ที่จะต้องเดินทางไปรับบริการน้อยกว่า 1 กิโลเมตร จากบ้านไปยังสถานที่ให้บริการฉีดวัคซีน มารดาส่วนใหญ่ (ร้อยละ 58.5)ได้รับข้อมูลเกี่ยวกับบริการวัคซีนจากหัวหน้าหมู่บ้าน ปัจจัยด้านการศึกษา รายได้ครอบครัว และการรับรู้ประโยชน์ของวัคซีน ของมารดามีความสัมพันธ์การมารับบริการฉีดวัคซีนอย่างมีนัยสำคัญรวมทั้งระยะทางจากบ้านมายังสถานบริการ และระยะเวลาในการรอรับบริการ มีความสัมพันธ์การมารับบริการฉีดวัคซีนด้วยเช่นกัน เมื่อปัจจัยครอบครัวที่มีรายได้สูง (AOR=1.85, CI=1.02-3.34) และมารดาที่รับรู้ประโยชน์ของวัคซีนในระดับที่สูงจะพาเด็กไปรับบริการฉีดวัคซีนมากกว่า 2 เท่า (AOR=1.90, CI=1.05-3.34).

การรับรู้ประโยชน์ของวัคซีนและรายได้ครอบครัวเป็นปัจจัยที่สำคัญในการกำหนดการมารับบริการวัคซีนของมารดา รวมทั้งมารดาครึ่งหนึ่งที่มารับบริการเคลื่อนที่ ดังนั้นกระทรวงสาธารณสุขควรที่จะมีมาตรการให้มีบริการในลักษณะที่เป็นเชิงรุกมากว่าการตั้งรับในสถานบริการสาธารณสุขและควรให้ชุมชนเข้ามามีส่วนร่วมในการจัดบริการด้วย

Keyword: *การใช้บริการ, บริการให้วัคซีน, เด็กที่มีอายุระหว่าง 12–24 เดือน*

Introduction

Approximately 10 million children in developing countries die annually before reaching the age of five. Child deaths in developing countries are attributable to five main causes: peri-natal conditions, respiratory infections, diarrhea, malaria, and vaccine-preventable diseases. Two million children under five die every year from diseases that could be prevented through immunization (Black, Morris, & Bryce, 2003).

Childhood immunization is a widely accepted public health strategy and an indicator of adequate health care. Vaccinations are one of the simplest and most effective approaches to protecting the health of children (Kim, et al., 2007). Childhood immunization is one of the most cost-effective strategies of all health interventions. In the past two decades, immunization has prevented an estimated 20 million deaths globally from vaccine-preventable diseases (GIVS Global Immunization Vision and Strategy, 2010). Although great efforts have been exerted by the World Health Organization (WHO) to reduce the public health burden; diseases remain the leading cause of vaccine-preventable child morbidity and mortality worldwide, particularly in developing countries where immunization coverage is low. Globally, more than 20 million measles cases were reported annually with 345,000 deaths in 2005. This represents 50 to 60% of the estimated 1.6 million deaths attributed each year to vaccine-preventable childhood diseases (Mayxay, et al., 2007).

Globally, under-five mortality has decreased by 47%, from an estimated rate of 90 deaths per 1000 live births in 1990 to 48 deaths per 1000 live births in 2012. The average annual rate of reduction in under-five mortality has accelerated—from 1.2% a year over the period 1990–1995 to 3.9% for 2005–2012—but remains insufficient to reach MDG 4. About 17 000 fewer children died every day in 2012 than in 1990, the baseline year for measuring progress.

While progress has been made, it is unequally distributed. At the regional level, the decline in under-five mortality rates between 1990 and 2012 were over 60% for three WHO regions: the Americas, European and the Western Pacific. This means that the WHO African region has increasing share of under-five deaths.

By 2050, 37% of the world's children under age five will live in Sub-Saharan Africa; while close to 40% of all live births will take place in that region. Therefore the number of under-five deaths may stagnate or even increase without more progress in the region. Despite Sub-Saharan Africa's relatively high rates of under-five mortality, there are signs of progress in the region. The pace of decline in the under-five mortality rate has accelerated over time --increasing from 0.8 % per year in 1990-1995 to 4.1% per year in 2000-2012.

Despite nearly 20 years of immunization efforts, globally about 1.4 million children under the age of five and 0.7 million adults dies of preventable diseases in 2002. A quarter of the world's children (about 34 million infants) are not immunized against polio, diphtheria, tuberculosis, pertussis (whooping cough), measles, and tetanus.Immunization is one of the most costeffective and safest public health interventions and in the developing world, prevents about three million child deaths each year. Childhood illness has been contained with the help of vaccines, but these will re-emerge if immunization coverage drops. In the Lao People's Democratic Republic (Lao PDR), one in 10 children still dies before 5 years of age5 About 10% die from vaccine preventable illnesses. Routine immunization coverage has stagnated since the mid-1990s and has declined since 2000 [5].Cause-specific mortality data is not available for the Lao P.D.R .but WHO modeling estimates that child deaths are due to common preventable and treatable conditions including pneumonia, diarrhea and prenatal conditions. In 2000, the Lao P.D.R. officially announced the achievement of polio eradication[6]. Immunization coverage dramatically increased from 1979 to 1994 (DPT3 20% to 73%) (Maekawa, et al., 2007; WHO, 2008)

In 1995, coverage for BCG, DPT_3, OPV_3 and measles was 62%, 54%, 64% and 68%, respectively. From 2000 to 2005, however, immunization coverage decreased. In 2000, coverage for BCG, DPT_3, $polio_3$ and measles was 69%, 53%, 57% and 50% respectively, while in 2005, coverage was 64%, 51%, 51% and 43%respectively (WHO, 2008; Douangmala, 1997).

Only about 50% of Lao children are fully immunized before 12 months of age. Unless current trends are reversed, Lao PDR cannot meet the 2015 Millennium Development Goal (MDG) target of reducing child mortality by two thirds. The Lao expanded program of immunization (EPI) is delivered through

four vaccination campaigns each year, organized by each provincial team, in addition to static service delivery points at hospitals and some health centers. Eighty percent of routine immunization services must be delivered through mobile outreach teams. Low-paid health workers walk for days to reach isolated villages—often difficult to access during the rainy season—which also limits people's access to hospitals. However, there are other supply and demand problems affecting the immunization program. On the supply side, these include funding and logistical problems. The network of static service delivery points is also limited due to staff and operational constraints. The Ministry of Health (MOH) has taken drastic steps to address supply problems. For example, each vice-minister has been asked to oversee the immunization program in one part of the country, and senior headquarter officers have each been assigned a province to help the provincial team improve coverage. Resolving these supply issues will help improve uptake of immunization in the general population.

However, they often make less effort in accessing immunization services for various reasons, including unfamiliarity with potential benefits and side effects of vaccination, language barriers, staff attitude, and concern about affordability of services. The MOH has been making efforts to address these through a successful village health worker program, and by training ethnic minority persons as "primary health care workers" and posting these people back to the health center nearest to their home. This also includes scholarships for prevocational education.

However, more effort is needed to improve demand for immunization. Better understanding of immunization and enhanced relationships between health workers and communities are critical to increasing immunization coverage. The United Nations Children's Fund (UNICEF) studies in LuangPrabang province during 2003–2004 (Landy & Mackay, 2006) showed that demand for immunization services was low because of poor knowledge of the benefits and risks of immunization and the quality and timing of services. Health workers themselves admit they often lack the communication skills to engage families from different ethnic groups to bring their children to the immunization sessions

Vientiane has nine districts, four districts inside and five districts outside the capital. This study was conducted in Pakngeumdistrict(outside the capital).As reported by the nine districts in Vientiane, the EPI coverage in 2008 was still low as compared with the national target (>85%); for example DPT-HepB3 coverage was 76%.Panknqeum district was selection because it had the lowest immunization coverage especially DPT compared with other districts in Vientaine. Therefore, this study aimed to identify factors influencing the utilization of immunization services among motherswith children aged 12-24 months in Pakngeum district, Vientiane, Lao P.D.R.

Methods

This study design was cross-sectionalanalytical study and was conducted to identify factorsrelatingthe utilization of immunization services among mothers with children aged 12-24 months in Pakngeum district in Vientiane, Lao P.D.R. Four health centers and all villages (20 villages) were selected from nine health centers by random sampling.

The study selected mothers who had children aged 12 to 24 months, and mothers who took their children to get vaccination cards and who were living in villages at least 3 months inPakngeum district, Vientiane capital. The sample size was calculated using the proportion formula ($n=Z^2NP(1-P)/Z^2P(1-P)+(N-1)E^2$) and planed n= 262. This included the more 10% of sample size to prevent information loss from incomplete data. The total population of Pakngeum district was 50,555; it had 53 villages and 9 health centers. This study conducted by using cluster sampling in 4 health centers and 20 villages in Pakngeum district, Vientiane capital. The total of respondents interview were 265, selected only who had the vaccination card. (Exclude 39 cases who no vaccination card)

After getting approval from the ethics committee of Mahidol University in Thailand and ethics committee in Lao P.D.R., the researched pre-tested the questionnaires for reliability by selecting 37 mothers from Naquiat district in Vientiane. The reliability result for the knowledge part was 0.73; that for the perceptions and satisfaction partswere 0.65 and 0.96, respectively. Responses from the sample of 265 respondents were collected by means of structured questionnaire in Lao,

on January 2011.Mothers of children aged 12 to 24 monthswho lived in the village and who had vaccination cards or record books were interviewed.

The questionnaire used in the study consisted of five parts, namely; socio-demographics, knowledge, perceptions, accessibility and availability, and satisfaction with the immunization services. Questions about knowledge, perceptions and satisfaction were related to the utilization of immunization services.

The questionnaires were coded, and data were entered using Epi-Data and later converted to descriptive statistics were used to calculate frequency, percentage, mean, median, maximum, minimum, quartile deviation and standard deviation for the independent and dependent variables. The chi-square test was used to assess the significance of the associations between each independent and dependent variable. Multivariate analysis was used to show the strength of the association between the independent variables and the utilization of immunization services among mothers with children aged 12-24 months.

Results

1. Utilization of immunization services

The results show that almost two-thirds (73%) of the respondents had fully immunized children (Infants who received one dose of BCG, three doses each of OPV, DPT, and Hepatitis B vaccines, and one dose of measles vaccine before reaching one year of ageand less than one-third (27%) had partially immunized children.

2. Socio-demographic characteristics of mothers

The socio-demographic characteristics of the mothersconsisted of their age, number of children, education, occupation, and family income. Less than half of the motherswereyoungbetween 16 and 24 years old. The mean age was around 27 years (median), with a minimum age of 16years and a maximum age of 45 years. Most 45.3% were primary school level. The majority (78.1%) were farmers and 28.7% had an income between 700,000 and 1,000,000 kips.

The most of the mothers used mobile services (52.5%) for immunizations. The distance from their house to the vaccination post for the majority of mothers (87.5%) was less than one kilometer. Most of the mothers (72.8%) spent less than 10 minutes to arrive at the vaccination post. The majority of the mothers (58.5%) received information about immunization schedules from local announcements by the village head or health volunteers. Moreover, the mothers almost always (88.7%) received information from health staff about side effects of the vaccines (Table 1).

3. Levels of knowledge, perceptions and satisfaction

The results for the knowledge section show that mothers with poor knowledge account for 35.1%.More than half of the mothers (55.1%) had low perceptions and high satisfaction, and only a few had low satisfaction (Figure 1).

Table 2 shows the association between socio-demographic characteristics, knowledge, perceptions, accessibility and satisfaction and the need for utilization of immunization services. Significantly more children of mothers with a high educational level were fully immunized (85.4%) than were children of those who had a low level of education or no education. Moreover, there was a positive relationship between family income and utilization of immunization services. Fully 78.9% of children of mothers with high incomes were fully immunized as compared to 63.0% of those whose mothers had less income. However, mother's knowledge was not associated with utilization of immunization services. Mothers who had moderate knowledge more had fully immunized children than did mothers who were in the good and poor knowledge groups. There was also an association between mother's perceptions and utilization of immunization services. Mothers with a high level of perception were more likely to have fully immunized children than were those with low perception. Access to the immunization site was not associated with utilization of immunization services. There was a statistically significant association between distance from house to immunization site and utilization of immunization services. The results show that significantly more mothers who lived three or more kilometers from the immunization site had their children fully immunized than did those who lived less than three kilometers from the site. The time spent travelling from home to the immunization site was also significantly associated with utilization of immunization services. The effect of the source of information and the utilization of immunization services. Fully 73.0% of mothers of fully

immunized children were encouraged by village heads or volunteers to bring their children to an immunization site.

To control for the confounding factors, the data were analyzed by multiple logistic regression. Two factors were found to be significantly associated with a fully immunized child family income (AOR= 1.85, 95% CI=1.02-3.34), and mothers' perceptions of immunization (AOR=1.90, 95%CI=1.05-3.34). (Table 3)

Discussion

This study shows that 72.8% of children under one year old in Pakngeum district Vientiane, Lao P.D.R. were fully immunized (BCG, DPT-HepB-Hib3,OPV3, Measles),which did not reach the national target (>85%) (Ministry of Health, Lao PDR., 2002). However, this study found wider immunization coverage than was found in a previous study by Daokeo in Lao P.D.R.at 2003 year; that study found only around 62% (Siharath, 2007) of children were fully immunized. Similarly, a study in India reported that only 34.6% of the children were completely immunized with all vaccines in the first year of life (Gera, 2005).

The study also found that the majority of the mothers from the high income group were almost two times more likely to have fully immunized children than were those who had low incomes. A similar finding was observed in a study by Senda (2005) who found that the monthly household income of members was significantly associated with EPI coverage. Those who had average high income had better EPI coverage than those with low incomes. Even though immunization services are free, many lower income families could not afford the transportation to the health facility, and also most of them were away from their houses to earn money at the time the mobile service came, so they missed that vaccination opportunity.

In this present study, there was no statistically significant association between knowledge and utilization of immunization services. A recent study in Pakistan had a similar result in that it found that most mothers had poor to fair knowledge. However, even those mothers with good knowledge did not have fully immunized children. A study by Ahmed (1989) also showed that more mothers with adequate knowledge completely immunized their children than did mothers who had inadequate knowledge, but there was no statistically significant relationship between a mother's knowledge and the immunization schedule. Siddigi et al. (2011) mentioned a limitation of his study was that a brief questionnaire was used to assess knowledge rather than a more detailed tool which should be used. This study also found no relationship between knowledge and utilization. This may be due to the same study limitation as found in Siddigi's study. The majority of the mothers' were only educated to the primary level so the knowledge part of the questionnaire only asked about general knowledge and could not measure in detail the knowledge of mothers about the utilization of immunization.

This study revealed a positive association between mothers' perceptions and the utilization of immunization services. The percentage of fully immunized children among mothers with a high level of perception percentage was higher than that among mothers with a low level of perception. This finding is similar to a previous study in Lao P.D.R. and Bangladesh study which found that the mothers with complete immunization of their children had high levels of perception (Pounphenghack, 2007; Senda, 2005). Mothers with a high level of perception or a good attitude toward immunization services might attempt to follow good practice in the utilization of immunization services (Keochanthala, 2002). A statistically significant association with utilization of services was found with fully immunized children.

This study also revealed that the mobile services approach to immunization was successful in each village; the mothers who used mobile services had a higher rate of fully immunized children than did mothers who used a health facility. A previous study in the Lao P.D.R. showed that more children of mothers who were offered mobile services were fully immunized than were those whose mothers used the district hospital services (Keochanthala, 2002). There was no statistically association between accessibility and utilization of immunization service. The mothers could access immunization more easily near their houses than vaccination post;because of the Lao government policy of EPI, there is an outreach center in each community. Nevertheless, those who went to other sites such as district hospitals or center hospital were likely to believe that those facilities had betterimmunization results than

the outreach center. Even though they had to pay for transportation, they wanted to get a good quality of health service (Ibnouf, 2007).

Apart from living in urban area, accessibility to services in terms of walking time or travel time and duration time of travel were also found to have a significant association with the vaccination site and utilization of immunization. This is similar to studies in the Lao P.D.R. and Bangladesh.

The results showed that distance and time spent to reach vaccination post were not were not key factors in the utilization of immunization services; the most important factor was the quality of immunization services. Neither mothers who walked to the vaccination post nor mothers who used mobile services paid for the travel. Only mothers who utilized immunization services which were far from their houses paid for their transportation (Siharath, 2007).

The study also revealed that mothers received information from the village head, health volunteers or friends before the utilization of immunization services. The information was primarily received from local a public announcement which was an effective way for communicating or mobilizing the community at the neighborhood level, followed by interpersonal communication which was done by health workers. There was no significant association between source of information and utilization of immunization services. This finding is similar to that of a study in the Lao P.D.R. which found the same results.

However this study shows no significant association between satisfaction with immunization servicesand the resultsare similar to those of a study by Siharath (2007) & Schempf, Minkovitz, & Strobino, (2007), who reported that when mothers knew many places where vaccination could be obtained, they felt the availability of the services was sufficient, and they also trusted and were friendly with the health staff. They could select any immunization post that could provide good satisfaction

It is important to note the limitations of this study. Of the total of 304 mothers who participated, only 265 of the mothers were selected in the villages; only children whose mothers had vaccination cards for data analysis were chosen. For the children whose mothers were not keep vaccination cards may not fully immunization.

The limitation of this study could not cover all the targets in 20 villages because in this study was selected only children with vaccination card or yellow book, and also only mothers who living in the village during conducted data. Further study, Lao's EPI has serious demand problems, in particular among some of ethnic minorities constituting about 33% of the population. So this should be explains some of the observed difference in vaccination coverage.

Conclusion

Based on the findings and interpretation of the results, it can be concluded that a major finding of the study was that more than two-thirds of the mothers fully immunized their children. The chi-square test revealed that education, family income, mother's perception, distance and time spent from home to vaccination post variables had a statistically significant association with utilization of immunization services. After adjusting for other variables by using multiple logistic regressions, only family income and mother's perceptions were significant predictors for the utilization of immunization services.

Recommendations

Based on in the findings of this study, many recommendations are offered in order to increase immunization coverage and ensure that children are fully immunized: Policy efforts to improve the level of perception of mothers, and the utilization of immunization services should be undertaken. The Ministry of Health should emphasize the role of the health education program to increase mothers' knowledge about disease transmission and their levels of perception, especially regarding the susceptibility and severity of immunization preventable diseases. The Ministry of Health should cooperate with other sectors, such as the Ministry of Education and the Ministry of Information and culture to promote the importance of immunization by creating community campaigns to improve mothers' perceptions. Furthermore, health providers make use of opinion leaders, such as the village head and health volunteers to stress the importance of the immunization program in the community and also promote activities in the schools. The study found that mothers who had a low level of

education and low income should benefit from a special education program such as the program from Lao Women Union which might enable them to increase their income,. In this study more than half of the mothers preferred using the mobile immunization services rather than fixed site services, so the Ministry of Health should improve the quality of the mobile services and improve the integrated mobile services teams(such as antenatal care, child growth monitoring, family planning) especially in rural and remote areas.

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Table 1 Number and Percentage of Respondents Classified by Socio-Demographic Characteristics(n = 265)

Variables	Number	Percentage	Variables	Number	Percentage
Age of mother (years) median=26 Min=16,Max=45			**Occupation of mother**		
20 – 24	90	34.0	Farmer	207	78.1
25 – 29	77	29.1	Housewife	27	10.2
30 – 34	57	21.5	Trader	17	6.4
35 – 45	28	10.6	Government employee	12	4.5
16 – 19	13	4.9	Private business	2	0.8
Educational level			**Family income (kip)**(1)		
Primary school	120	45.3	700,001-1,000,000	76	28.7
Secondary school	87	32.8	>1,000,000	54	20.4
High school	38	14.3	300,000-500,000	54	20.4
No education	10	3.8	500,001-700,000	41	15.5
College/University	10	3.8	< 300000)	40	15.1
Location of immunization services			**Distance from home to vaccination post**		
Mobile service	139	52.5	<1 km	168	87.5
Health center	87	32.8	1-3 km	64	9.4
District hospital	30	11.3	>3 km	33	3.1
Center hospital	9	3.4	**Sources of information**		
Time spent to reach vaccination post			Public announcement	155	58.5
1 – 10(minutes)	193	72.8	Health worker	91	34.3
11 – 30 (minutes)	62	23.4	Village head	12	4.5
> 31 (minutes)	10	3.8	Friend	4	1.5
Advice about side effects of vaccines			Health volunteer	3	1.2
Always	235	88.7			
Sometimes	26	9.8			
Never	4	1.5			

(1) 1 USD = 7824 .91 Kip

Table 2 Relationship between socio-demographic characteristics, knowledge, perception, accessibility, availability, satisfaction and utilization of Immunization services.

Variables	Utilization of Immunization Services				X^2	p-value
	Fully immunized (n=193)		Partially immunized (n=72)			
	n	%	n	%		
Educational level					6.822	0.033*
No education	5	50.0	5	50.0		
Low level of education	147	71.0	60	29.0		
High level of education	41	85.4	7	14.6		
Family income (kip)					9.218	0.010**
<300,000	24	60.0	16	40.0		
≥300,000	169	75.1	56	24.9		
Mother's knowledge					2.983	0.225
Poor	24	61.5	15	38.5		
Moderate	147	75.0	49	25.0		
Good	22	73.3	8	26.6		
Level of mother's perceptions					4.144	0.042*
Low	99	67.8	47	32.2		
High	94	78.9	25	21.0		
Location of immunization services					1.085	0.298
Health facility	88	69.8	38	30.2		
Mobile service	105	75.5	34	24.5		

Table 2 Relationship between socio-demographic characteristics, knowledge, perception, accessibility, availability, satisfaction and utilization of Immunization services. (Cont.)

Variables	Utilization of Immunization Services				X^2	p-value
	Fully immunized (n=193)		Partially immunized (n=72)			
	n	%	n	%		
Distance from home to vaccination post					9.970	0.007**
<1 km	129	76.8	39	23.2		
1-3 km	37	57.8	27	42.2		
>3 km	27	81.8	6	18.2		
Time spent to reach vaccination post					5.331	0.021*
1 – 10 (minutes)	148	76.7	45	23.3		
>11 (minutes)	45	62.5	27	37.5		
Sources of information					0.006	0.936
Health worker	66	72.5	25	27.5		
Community	127	73.0	47	27.0		
Level of mother's satisfaction					1.995	0.160
Low	102	69.3	45	30.7		
High	91	77.1	27	22.9		

** p-value<0.05, ** p-value < 0.01*

Table 3 Multiple Logistic Regression Analysisof Utilization of Immunization Services

Factors	n	% fully immunization	Crude OR	95% CI	Adjusted OR	95% CI	p-value
Family income (kip)							
<300,000	24	60.0	1		1		
≥300,000	169	75.1	2.53	1.12-5.73	1.85	1.02–3.34	0.041*
Mother's perceptions							
Low	99	67.8	1		1		
High	94	78.9	2.12	1.02-4.41	1.90	1.05-3.42	0.033**

** P-value<0.05, ** p-value < 0.01*

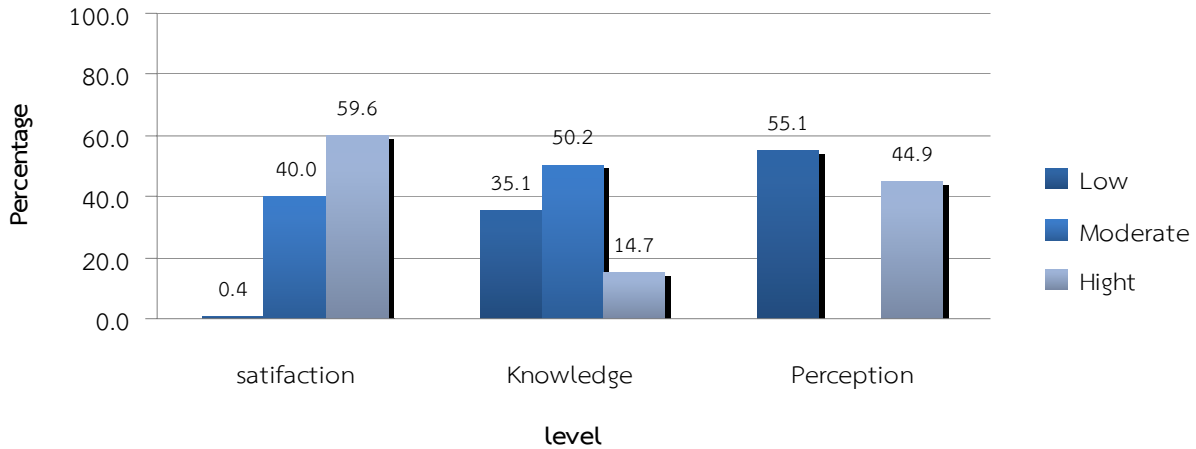

Figure 1 Percentage of Respondents Classified by Knowledge, Perceptions, and Satisfaction (n=265)