



## Maternal Knowledge on Routine Childhood Immunization: A Community Based Cross-sectional Study in Rural Area of Mon State, Myanmar

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### Authors' contributions

All authors designed the study, searched the literatures, took part in data collection and management, performed the statistical analysis and interpreted the results of data analysis. Author AZH wrote the protocol. Author WMO prepared the first draft of the manuscript. All authors read and approved the final manuscript.

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### ABSTRACT

**Aims:** To determine the knowledge on routine childhood immunization and the factors associated with it among mothers in rural area of Mon State, Myanmar during 2017.

**Study Design:** A community based cross-sectional study.

**Place and Duration of Study:** Rural area of Mon State, Myanmar, between June and August 2017.

**Methodology:** We included 302 mothers who had 18 to 23 months old children using multistage random sampling. Face-to-face interview was applied in data collection. Chi-square test and multivariate logistic regression analysis were utilized in data analysis.

**Results:** More than three fourths of mothers (76.2%) had good knowledge level on routine childhood immunization. There was a significant association between maternal knowledge and immunization status of their children ( $p < 0.001$ ). Logistic regression showed that the husband's occupation was significantly associated with maternal knowledge ( $p = 0.02$ ).

**Conclusion:** Majority of mothers have good knowledge on routine childhood immunization. However, health education campaign should be intensified to improve their knowledge level, especially among mothers whose husbands are blue-collar workers.

*Keywords:* Childhood immunization; EPI; immunization status; maternal knowledge; Mon; Myanmar.

## 1. INTRODUCTION

Immunization is an effective and useful tool in prevention and control of communicable diseases. It could even eradicate the infectious diseases. Therefore, the Expanded Programme on Immunization (EPI) was developed by WHO in 1974. Although it has prevented millions of deaths and disabilities, inequitable accessibility remains a big issue in many countries [1-3].

In Myanmar, EPI has been established since 1978. At the beginning, only BCG (Bacillus Calmette-Guerin), DPT (Diphtheria-Pertussis-Tetanus) and TT (Tetanus Toxoid) vaccines were included. In 1987, Measles and OPV (oral polio vaccines) were introduced into the EPI programme. HepB (Hepatitis B), Pentavalent [DPT-HepB-Hib (Haemophilus influenza b)], MR (Measles-Rubella), IPV (Inactivated Polio Vaccine) and PCV (Pneumococcal Vaccine) vaccines were incorporated in 2003, 2014, 2015, 2015 and 2016, respectively [4-6].

However, immunization coverage is still not sufficient enough. National coverage on BCG, 3<sup>rd</sup> dose of Pentavalent, 3<sup>rd</sup> dose of OPV and 1<sup>st</sup> dose of Measles vaccines in 2015 were 87.8%, 62.3%, 67% and 77.1%, respectively. In Mon State, the coverage of these vaccines were 95.4%, 68.7%, 75.3% and 84.4%, respectively and 2.3% of children did not receive any vaccine in 2015 [7].

About 70% of Myanmar people are living in rural area [6,7] and maternal knowledge is found to have significant relationship with immunization status of their children [8-12]. Therefore, this study is conducted to determine the knowledge on routine childhood immunization and the factors associated with it among mothers in rural area of Mon State, Myanmar during 2017.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

The present study used cross-sectional study design.

### 2.2 Area and Participants of the Study

This study was done in rural area of Mon State during 2017 (from June to August). Participants were mothers of 18-23 months old children and living in Mon State continuously for at least two years.

### 2.3 Sample Size Determination and Sampling

Epi Info version 7 software was used in sample size calculation where an estimated proportion of mothers who had good knowledge on routine childhood immunization was assumed to be 75% [8,9,13], confidence level 95% and confidence limit (precision) 5%. So minimum sample size requirement was 288 mothers who had 18 to 23 months old child.

Multistage random sampling procedure was applied in selecting the samples. In Mon State, there were two districts namely Mawlamyine and Thaton. Two out of six townships were selected from Mawlamyine district and one township out of four from Thaton district by using simple random sampling method. Then two village tracts were selected from each selected townships by simple random sampling. After that, participants were selected proportional to size of mothers who had 18-23 months old child from each village tract by using simple random sampling procedure.

### 2.4 Data Collection and Analysis

Face-to-face interview was applied using an interviewer administered questionnaire to collect the data. Epi-data version 3.1 statistical software was used for data entry and validation, and STATA version 11.0 statistical package for data analysis. Chi-square test and multivariate logistic regression analysis with backward deletion strategy were utilized.

### 2.5 Main Variables of the Study

Maternal knowledge on routine childhood immunization (i.e., EPI) was assessed using a

questionnaire which consisted of 24 items. One point (score) was given to each correct answer and zero to incorrect or don't know response. Therefore, total knowledge scores ranged from 0 to 24. Finally maternal knowledge was divided into good and poor categories based on total knowledge scores of a respondent. A cut-off point used in this study was 80% of the highest possible total knowledge scores (i.e., 19 out of 24). If total knowledge scores of a mother was lower than 19 (i.e., 0 to 18), her knowledge on routine childhood immunization was considered as poor. Otherwise, she was assigned into a group of good knowledge level.

Parental characteristics such as age, education and occupation (of both mothers and fathers), and attributes of children such as age, sex, birth order and place of birth were considered as possible independent variables. Those variables whose p value was  $\leq 0.25$  in univariate analysis were selected as candidate variables for multivariate analysis.

Maternal occupation was categorized into housewife and others that meant a respondent had any kind of job for earning. Husbands of the respondents were grouped into white-collar and blue-collar based on their occupation. A white-collar worker was defined as a worker who performed a professional, administrative, managerial, or office work either in private or public sector. Otherwise he was considered as a blue-collar worker. So in this study, fathers working as labourers in an agricultural sector or fishermen or any other manual/unskilled workers were included in blue-collar category.

Immunization status of a child was regarded as complete in the present study if a particular child had been completed all doses of vaccines as scheduled in EPI, Myanmar (a single dose of BCG, {3 doses of DTP-HepB-Hib, OPV, PCV}, and two doses of Measles) at the time of data collection. The information on status of immunization had been obtained from vaccination card and/or immunization registers kept in a respective health centre.

## 2.6 Validation of Questionnaires on Maternal Knowledge

The structured questionnaire to determine maternal knowledge on routine childhood immunization was developed by researchers and was prepared in Myanmar language. The questionnaire was checked by experts from

University of Public Health, Yangon and from Department of Public Health. Final version was established after necessary revision has been made based on their opinion and suggestions. Then pre-test was done in neighbouring township (n=30 mothers). Internal consistency or reliability was checked using Cronbach's alpha. The coefficient of Cronbach's alpha for questionnaire was 0.88.

## 3. RESULTS

Altogether 302 mothers who had 18 to 23 months old children were included. Their mean age (sd = standard deviation) and range were 32.2 (6.5) and 19-48 years, respectively. Their socio-demographic features including knowledge on EPI are shown in Table 1. Mean knowledge scores (sd) and range were 20.3 (3.3) and 4-24. The main source of information on childhood immunization for mothers was health staff. More than 90% of mothers (275 out of 302 or 91.1%) reported that they received the information concerning with childhood immunization from local health staff.

Table 2 shows the characteristics of the respondents' husbands such as age, education and occupation. Their mean age (sd = standard deviation) and range were 34.4 (7.1) and 20-57 years, respectively.

Characteristics of the children including their immunization status and place of delivery are shown in Table 3. Complete immunization coverage among them was 83.1%.

Table 4 reveals the relationship between maternal knowledge on EPI and socio-demographic characteristics of them as well as their husbands. Only their husbands' occupation was found to have significant association ( $p=0.018$ ).

The association between maternal knowledge on EPI and characteristics of their children is shown in Table 5. No significant association has been detected. However, there was a positive and significant association between maternal knowledge on EPI and immunization status of their children (Table 5).

Although the variables, namely age and education of respondents, age and occupation of their husbands, and characteristics of their children such as sex and place of delivery were chosen to be included in model building (i.e.,

multivariate analysis), husband's occupation alone was included in the final model (Table 6). Based on the results of multivariate logistic regression analysis, maternal knowledge on EPI was significantly influenced by her husband's

occupation (p = 0.02). If her husband had a white-collar job, maternal knowledge on EPI was two times higher than that of their counterparts whose husbands were engaged in blue-collar job.

**Table 1. Characteristics of the respondents including their knowledge on EPI**

Variables	Frequency (n=302)	Percent
<b>Age-group (Years)</b>		
19 – 24	40	13.3
25 – 39	219	72.5
> 39	43	14.2
<b>Education</b>		
Low (No formal education)	33	10.9
Middle (Primary and Middle school level)	212	70.2
High (High school and University)	57	18.9
<b>Occupation</b>		
Housewives	195	64.6
Others (Having any kind of job for earning)	107	35.4
<b>Knowledge level</b>		
Poor	72	23.8
Good	230	76.2

**Table 2. Characteristics of the respondents' husbands**

Variables	Frequency (n=302)	Percent
<b>Age-group (Years)</b>		
20 – 24	22	7.3
25 – 39	208	68.9
> 39	72	23.8
<b>Education</b>		
Low (No formal education)	61	20.2
Middle (Primary and Middle school level)	192	63.6
High (High school and University)	49	16.2
<b>Occupation</b>		
Blue-collar workers	214	70.9
White-collar workers	88	29.1

**Table 3. Characteristics of the children including their immunization status**

Variables	Frequency (n=302)	Percent
<b>Age-group (Months)</b>		
18 – 20	159	52.7
21 - 23	143	47.3
<b>Sex</b>		
Male	147	48.7
Female	155	51.3
<b>Birth order</b>		
First	114	37.8
Second	88	29.1
Third and above	100	33.1
<b>Place of birth</b>		
Home	127	42.1
Health centre (Hospital or Clinic)	175	57.9
<b>Immunization status</b>		
Complete	251	83.1
Incomplete	51	16.9

**Table 4. Maternal knowledge according to characteristics of them and their husbands**

Variables	Maternal Knowledge		Total	p-value*
	Good	Poor		
<b>Age-group<sup>R</sup></b>				0.098
19 – 24	34 (85.0%)	6 (15.0%)	40	
25 – 39	168 (76.7%)	51 (23.3%)	219	
> 39	28 (65.1%)	15 (34.9%)	43	
<b>Education<sup>R</sup></b>				0.169
Low	21 (63.6%)	12 (36.4%)	33	
Middle	163 (76.9%)	49 (23.1%)	212	
High	46 (80.7%)	11 (19.3%)	57	
<b>Occupation<sup>R</sup></b>				0.886
Housewives	148 (75.9%)	47 (24.1%)	195	
Others	82 (76.6%)	25 (23.4%)	107	
<b>Age-group<sup>H</sup></b>				0.152
20 – 24	20 (90.9%)	2 (9.1%)	22	
25 – 39	159 (76.4%)	49 (23.6%)	208	
> 39	51 (70.8%)	21 (29.2%)	72	
<b>Education<sup>H</sup></b>				0.398
Low	46 (75.4%)	15 (24.6%)	61	
Middle	143 (74.5%)	49 (25.5%)	192	
High	41 (83.7%)	8 (16.3%)	49	
<b>Occupation<sup>H</sup></b>				0.018
Blue collar	155 (72.4%)	59 (27.6%)	214	
White collar	75 (85.2%)	13 (14.8%)	88	

\* p-values are based on Chi-square test results. <sup>R</sup> Respondents; <sup>H</sup> Husbands

**Table 5. Maternal knowledge on EPI according to characteristics of their children**

Variables	Maternal knowledge		Total	p-value*
	Good	Poor		
<b>Age-group</b>				0.571
18 – 20	119 (74.8%)	40 (25.2%)	159	
21 – 23	111 (77.6%)	32 (22.4%)	143	
<b>Sex</b>				0.181
Male	107 (72.8%)	40 (27.2%)	147	
Female	123 (79.4%)	32 (20.6%)	155	
<b>Birth order</b>				0.283
First	88 (77.2%)	26 (22.8%)	114	
Second	71 (80.7%)	17 (19.3%)	88	
Third and above	71 (71.0%)	29 (29.0%)	100	
<b>Place of birth</b>				0.196
Home	92 (72.4%)	35 (27.6%)	127	
Health centre	138 (78.9%)	37 (21.1%)	275	
<b>Immunization status<sup>(a)</sup></b>				< 0.001
Complete	205 (89.1%)	46 (63.9%)	251	
Incomplete	25 (10.9%)	26 (36.1%)	51	

\* p-values are based on Chi-square test results. <sup>(a)</sup> The percentage shown is column percent

#### 4. DISCUSSION

In this study more than three quarters of mothers (76.2%) had good knowledge on routine childhood immunization. Various findings had been reported by similar studies done in Lithuania (63.6%) [10], India (93.3% and 58%) [14,15], Malaysia (>50%) [16], Iraq (66.2%) [17],

Nigeria (59%) [18] and Ethiopia (71.2%) [8]. The differences in socioeconomic status among study populations and place of study whether urban or rural would explain these findings. Besides, use of different questionnaires and/or different cut-off points to classify maternal knowledge into good and poor might be responsible.

**Table 6. Results of univariate and multivariate logistic regression analyses**

Variables	Univariate Analysis		Multivariate Analysis	
	OR <sub>crude</sub> (95%CI)	p-value	OR <sub>adj</sub> (95%CI)	p-value
<b>Characteristics of mothers</b>				
Age-group <sup>(1)</sup>				
19 – 24	1.00			
25 – 39	0.58 (0.23, 1.46)	0.249		
> 39	0.33 (0.11, 0.96)	0.042		
Education <sup>(1)</sup>				
Low	1.00			
Middle	1.90 (0.87, 4.14)	0.106		
High	2.39 (0.91, 6.29)	0.078		
Occupation <sup>(2)</sup>				
Housewives	1.00			
Others	1.04 (0.60, 1.81)	0.886		
<b>Characteristics of fathers</b>				
Age-group <sup>(1)</sup>				
20 – 24	1.00			
25 – 39	0.32 (0.07, 1.44)	0.138		
> 39	0.24 (0.05, 1.13)	0.072		
Education <sup>(2)</sup>				
Low	1.00			
Middle	0.95 (0.49, 1.85)	0.884		
High	1.67 (0.64, 4.35)	0.292		
Occupation <sup>(1)</sup>				
Blue-collar	1.00		1.00	
White-collar	2.20 (1.13, 4.25)	0.020	2.20 (1.13, 4.25)	0.020
<b>Characteristics of children</b>				
Age-group <sup>(2)</sup>				
18 – 20	1.00			
21 - 23	1.17 (0.68, 1.98)	0.572		
Sex <sup>(1)</sup>				
Male	1.00			
Female	1.44 (0.84, 2.45)	0.182		
Birth order <sup>(2)</sup>				
First	1.00			
Second	1.23 (0.62, 2.45)	0.548		
Third and above	0.72 (0.39, 1.34)	0.302		
Place of birth <sup>(1)</sup>				
Home	1.0			
Health centre	1.42 (0.83, 2.42)	0.197		

<sup>(1)</sup> Not included in the final model although it has been selected as a candidate variable in multivariate analysis;

<sup>(2)</sup> Not included in multivariate analysis

Majority of respondents (91.1%) said that they received information concerning with knowledge on routine immunization from local health personnel in the present study. Previous studies done in different countries also reported that the main source of information was either health staff [10,13,19] or health centre [20,21].

As reported by previous studies conducted in different countries [8-12,19], maternal knowledge was found to have significant relationship with immunization status of their children in this study.

It means that the higher the knowledge level of mothers on routine childhood immunization the more likely their children have been immunized completely. The present study revealed that the complete immunization coverage among 18-23 months old children was 89.1% although their mothers have good knowledge on routine childhood immunization. About 11% of their children have incomplete immunization status. This might be due to any other reason (not related to maternal knowledge) such as being sick or having problem in transportation or

presence of other social reason at the time of vaccination. This study mainly focused on maternal knowledge and did not collect the data concerning with the reasons of having incomplete immunization status.

Although maternal education [10,14,16,17,20, 22], occupation [16,20,22] and age [16,20,22] were identified as factors influencing the maternal knowledge on childhood vaccination in some studies conducted in different countries, the association was not statistically significant in the present study. A Lithuanian study [10] also reported that there was no significant association between maternal age and knowledge. This might be due to the differences in socioeconomic status among study populations and place of study whether urban or rural.

The present study considered father's age, education and occupation as independent variables. However, only father's occupation was found to have a significant association with maternal knowledge on routine childhood immunization in both univariate and multivariate analyses. Working environment (especially in white-collar jobs) might promote the father's knowledge and then it would be disseminated or shared to his wife. Similar studies done in Iraq [17] and Turkey [22] reported that maternal knowledge on childhood vaccination was influenced by father's occupation [22] and education [17,22].

Children's characteristics such as age, sex, birth order and place of birth did not show any significant relationship with maternal knowledge in this study. An Indian study [14] also revealed that birth order of a child was not related to maternal knowledge on immunization whereas birth place was found to have significant effect in a study done in Iraq [17].

## 5. CONCLUSION

Majority of mothers have good knowledge on routine childhood immunization. However, health education campaign should be intensified to improve their knowledge level, especially among mothers whose husbands are engaged in blue-collar jobs.

## CONSENT

All authors declare that written informed consent was obtained from the participants not only for participation in the study but also for publication of this research article.

## ETHICAL APPROVAL

All authors declare that Institutional Technical and Ethical Review Board of the University of Public Health, Yangon, Myanmar has approved the present study with the reference number of "ITERV(2017)/Research/8."

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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