

**Factors influencing measles vaccine coverage with
the routine immunization schedule in Myanmar:
A Literature Review**

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A thesis submitted in partial fulfilment of the requirement for the degree of Master of Science in International Health


by
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List of Abbreviations

ASEAN	Association of South East Asian Nations
BCG	Bacillus Calmette–Guérin
BHS	Basic Health Staff
CCR	Central Cold Room
CDM	Civil Disobedience Movement
CHE	Current Health Expenditure
DHS	Demographic Health Survey
DPT	Diphtheria-Pertussis-Tetanus
EPI	Expanded Programme of Immunization
GDP	Gross Domestic Product
GNI	Gross National Income
GAVI	Global Alliance on Vaccine and Immunization
HA	Health Assistant
HPV	Human Papilloma Virus
HSS	Health System Strengthening
IMR	Infant Mortality Rate
JE	Japanese Encephalitis
LHV	Lady Health Visitor
LMIC	Low and Middle Income Countries
MCV1	Measles Containing Vaccine- first dose
MCV2	Measles Containing Vaccine- second dose
MDG	Millennium Development Goals
MMR	Maternal Mortality Ratio
MMR	Mumps Measles Rubella
MR	Measles Rubella
MoHS	Ministry of Health and Sports
NHA	National Health Account
NLD	National League Democracy
OOPPs	Out of Pocket Payments

PHC	Primary Health Care
PHS 2	Public Health Supervisor 2
RHC	Rural Health Center
SCDU	Special Disease Control Unit
SIA	Supplementary Immunization Activities
TT	Tetanus Toxoid
U5MR	Under-five Mortality Rate
UNICEF	United Nations International Children's Emergency Fund
USD	United States Dollar
UHC	Urban Health Centre
VU	Vrije Universiteit
WHO	World Health Organization

Glossary

Adverse event following immunization (AEFI) is “any untoward medical occurrence which follows immunization and which does not necessarily have a causal relationship with the usage of the vaccine.”

Cold chain is “the process used to maintain optimal conditions during the transport, storage, and handling of vaccines, starting at the manufacturer and ending with the administration of the vaccine to the client. The optimum temperature for refrigerated vaccines is between +2°C and +8°C. For frozen vaccines the optimum temperature is -15°C or lower. In addition, protection from light is a necessary condition for some vaccines.”(3)

Crash program is “the type of catch up campaign targeting children age 6 to 59 month and this strategy is applied in hard to reach areas where regular monthly visit is difficult”.

Fixed Strategy “means Regular routine immunization services provided at hospitals, health centers or sub health centers”.

Hard to Reach populations “can be classified as rural hard to reach, urban hard to reach and socio-economic hard to reach who have little or no regular access to routine immunization services”.

Herd immunity means " The indirect protection of susceptible individuals from infection when a sufficient portion of the population is immune so that chains of transmissions cannot be established(9)”

Herd immunity Threshold means “The point at which the proportion of a population that is susceptible falls below the level needed for transmission”

Immunization is “the process whereby a person is made immune or resistant to an infectious disease, typically by the administration of a vaccine. Vaccines stimulate the body’s own immune system to protect the person against subsequent infection or disease. (1)

Immunization coverage means “Proportion of individuals in the target population who are immunized”.(2)

Immunization coverage target means “ A goal that is prepared for a health facility that states what proportion of individuals in the target population will be immunized with specific vaccines in a given time period”. (2)

Live attenuated vaccine is "a vaccine created by reducing the virulence of a pathogen, but still keeping it viable" (18)

MCV1 coverage is defined as "the number of children < 1 year of age given the first dose of measles vaccination divided by the total number of children < 1 year of age". (1)

MCV2 coverage is "the number of children < 2 years of age given the second dose of measles vaccination divided by the total number of children < 1 year of age" (1)

Measles Elimination is defined as "the interruption of measles transmission in a defined geographical area that has lasted at least 12 months, and is verified after it has been sustained for at least 36 months".(1)

Microplanning: "Microplanning is one of the tools that health workers use to ensure that immunization services reach every community. Microplanning is used to identify priority communities, to address barriers, and to develop workplans with solutions".

Mobile Strategy: "Monthly routine immunization services provided by a midwife (health staff) away from his/her resident village in areas which are easily accessible. These areas should be within 5 miles distance or 1 hour traveling time".

Outreach Strategy: " Routine immunization services provided by a midwife (health staff) away from his/her resident village in area which are not easily accessible or beyond 5 miles. Services may or may not be given monthly, but a minimum of 6 times a year".

Supplementary Immunization Activities: are "immunization campaigns which have been used to rapidly scale-up coverage of key immunizations".

Target population: Group of individuals who are included in the immunization services based on their age and the area in which they live.

Abstract

Background: Myanmar has recent measles outbreak in 2019 has highlighted that there is low coverage areas. Immunisation coverage of both measles vaccine never reached at optimal vaccine coverage which is 95% to develop herd immunity. Moreover, Myanmar has failed to achieve measles elimination status in 2020 and the timeline was extended to 2023.

Objective: This study aimed to explore the factors influencing measles vaccine coverage in Myanmar in order to inform strategy to increase vaccination coverage and make recommendations to strengthen strategy of measles elimination in Myanmar

Methodology A literature review is conducted using “conceptual framework for vaccine coverage” by David E. Phillips et.al to determine three principal factors such as “Intent to vaccinate”, “Facility Readiness” and “Community Access”. Using several databases, we retrieved published literatures, scientific publications, and grey literatures, as well as reports from UNICEF, GAVI, and WHO, all of which are relevant to the measles vaccine and vaccination in Myanmar. The timeframe used was 2000 through 2021. Literatures not relevant to immunization are excluded.

Results Literatures related with knowledge was segmented and cannot determine status of knowledge level. Antenatal care visit was found significant to increase MCV1 coverage. Village leaders and women groups play a role to increase vaccine coverage in community. Financial and educational level of mothers are related with intent to vaccinate. In facility readiness, workforce shortage, insufficient capacity building, low government spending and high dependency on external funding are seen. Geographical , pollical barriers are hindering access to measles vaccine.

Conculsion To improve measles vaccine coverage, all stakeholders are important. To plan KAP survey. To strengthen cold chain management and to advocate MoHS to invest in allocation of human resources and budget are key recommendations. In short term, EPI should plan for outbreak response.

Key words: “Measles”, “Vaccine Coverage”

Word counts: 9600

Introduction

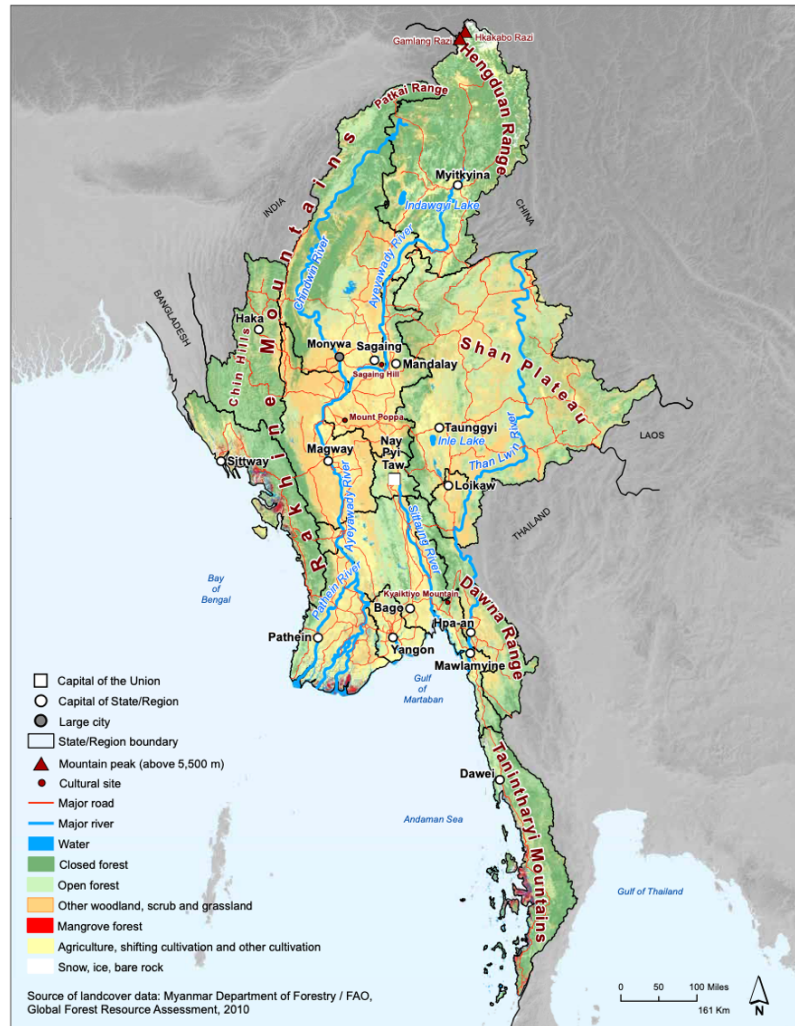
During my medical internship, I have seen a lot of children suffering from measles in pediatric ward. I feel sorry for them as they hadn't got measles vaccine and their mothers had no awareness on measles as well as measles vaccine. After graduation, I have worked with one of the International non-governmental organizations (INGOs) as a medical doctor to provide emergency medical aid to cyclone affected areas in Delta area of Myanmar. There I also had witnessed to see mass measles outbreaks in the temporary camps and villages where people lived displaced by cyclone. My organisation supported Ministry of Health to conduct the rapid mass measles vaccination for that groups and I also assisted the team. Since then, I was interested to understand more on measles disease and vaccination. After that, I got opportunity to learn immunization system of Myanmar while I worked with UNICEF and PATH to support nationwide measles rubella campaign in 2015 and nationwide Japanese Encephalitis (JE) campaign in 2017. I came to know the health system barriers in Myanmar. During this master course, I was also taught on theoretical knowledge about measles vaccine and immunization program. With these knowledge, I would like to contribute improving measles vaccine coverage in Myanmar and decided to conduct this study.

Factors influencing measles vaccine coverage at routine immunization schedule in Myanmar

Background

1.1 Geographical and Administrative Profile

Myanmar is situated in Southeast Asia region surrounded by the Bay of Bengal and the Andaman Sea(1). It possesses approximately 676 578 square kilometres being one of the largest countries in the region. It shares borders with the Republic of China to the east and north, India to the north and west, Laos to the east, and Thailand to the east. Bangladesh is in the northwest of the country. Myanmar is composed of seven regions (“Ayeyawady”, “Bago”, “Magway”, “Mandalay”, “Sagaing”, “Taninthayi”, and “Yangon”), seven states (“Chin”, “Kachin”, “Kayah”, “Kayin”, “Mon”, “Shan”, and “Rakhine”), and Union Territory (1). “Nay Pyi Taw” is the capital city of the country .There are also five self-administered zones and one self-administered division for six minority ethnic groups. States and regions are sub-divided into 74 districts and then 330 townships altogether.



Diverse geographic areas range from hilly regions at the North, delta, and plain areas at the central to coastal areas at the South(1).

1.2 Demographic profile

Officially, the country has eight primary ethnic groups: Bamar, Shan, Kayin, Kachin, Kayah, Chin, Mon, and Rakine, with over 130 indigenous minor ethnic groups. Among them, Bamar accounts for 68 percent of population(1,2). In 2020, the estimated total population is 54.8 million with the annual population growth rate of 0.87 percent (3) . Among them, about 52% of the population are female. There are 4.9 millions of under-five population and one million of infant population (3) approximately . Almost 70 percent of population are residing in rural area. Among states and regions, the Yangon region has the highest population density where 825 people live in one square kilometer whereas Chin state is the least dense area where only 15 people live in one square kilometer (1,3).

1.3 Socio Economic Profile

Myanmar is a lower middle-income country. Agriculture is the principal source of national income contributing more than 50% of Gross Domestic Product (GDP) . The rest of the income depends on trading of natural resources such as oil, gas and teak wood. Gross National Income (GNI per capita) in 2017 is 1271 USD and 24.8 percent of the population lived below the national poverty line (4). Rural areas have a higher proportion of impoverished people than metropolitan areas, with 6.7 times the number of poor individuals. Furthermore, the poverty rate varies greatly across states and regions. Chin and Rakhine states have highest rate, 60% and 40% respectively whereas Taninthayi, Mandalay and Yangon regions have lowest between 13% and 14%(4). The level of education varies according to the generation. Young people and adults are generally more educated than the oldest. Historically, there were more educated men than women. Though the gender gap has been closed in recent years, adult literacy rate was noted as 72% in female and 80% in male in 2016 (5). In addition, a female participation with a high school education(20.8%) is lower than male participation which is 26.1 percent (4). Around two out of every three of adults at the age of working from Myanmar are working on the workforce, but there is a significant difference in the participation of the residential area. Reflecting the gender role in Myanmar, women workforce can be much lower than those of the men.

1.4 Political Context

In 1948, Myanmar, then Burma, declared independence from British colonial authority. Ethnic groups in Karen, Kachin, Shan, Chin, and Kayah fought for a semi-autonomous state after independence. Because of the tension and arm conflict between the central government and ethnic arm groups, the political situation has been unstable since then. Military coups were undertaken twice in 1962 and 1988 with the reason of restoring peace in the country. After more than 60 years of military dictatorship, a new constitution was approved in 2008, and elections were held in 2010. Since 2010, a civilian administration had been in place, and the National League Democracy (NLD) party was re-elected in 2015. Myanmar has been governed by the

NLD for the past five years, and during that time, the nation has made three major transitions: towards peace in the border areas, democratic government, and a market-oriented economy. Significant improvements in people's livelihoods followed from the shift, moving a quarter of the population out of poverty by 2017. After that, the most recent election was conducted in November 2020. In that election, the NLD triumphed once more. However, tensions between the military and the NLD party grew, prompting the military to try another coup in February 2021. Since then, people and pro-democracy groups have demonstrated against the dictatorship and the military declared state of emergency for one year. The socio-economic position of the country has deteriorated as a result of the political turbulence that has erupted across the country .

1.5 Overview of Health System and Health Status

The Ministry of Health and Sports (MoHS) is the leading organization in public health care system and responsible to provide comprehensive health care for all population. It is made up of health departments at central , state or regional level and township level. At the central level, MoHS has made up of six main departments. They are Department of Public Health, Department of Medical Services, Department of Health Professional Resource Development and Management, Department of Medical Research, Department of Food and Drug Administration and Department of Traditional Medicine (7).

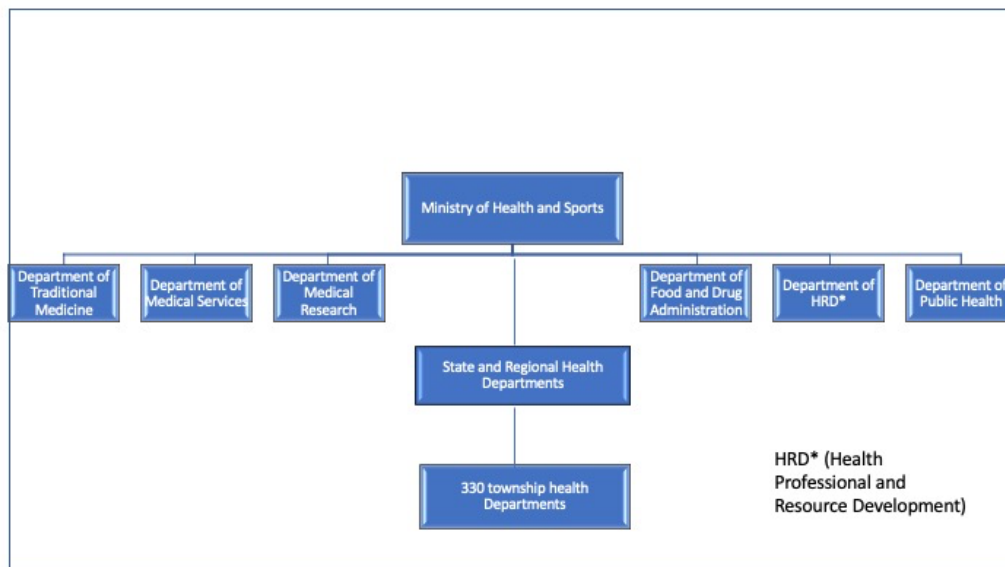


Figure 2. Administrative structures supporting healthcare in Myanmar (5)

State or regional health departments supervise health care operations in townships .At the township level, each has a township hospital which mainly delivers curative services. Urban health center(UHC) is responsible for public health services including immunization services. Under township health unit, station health unit has a station hospital which provides both curative services and public health services provided by basic health staff. Then rural health

center is responsible for offering primary health care services at community level and it supervises 4 to 5 subcenters within its catchment area where one midwife and one public health supervisor 2 (PHS) are usually assigned. The township health system is the basic structure of national health system and serves as the major backbone of the public health service delivery component through a primary health care (PHC) approach.

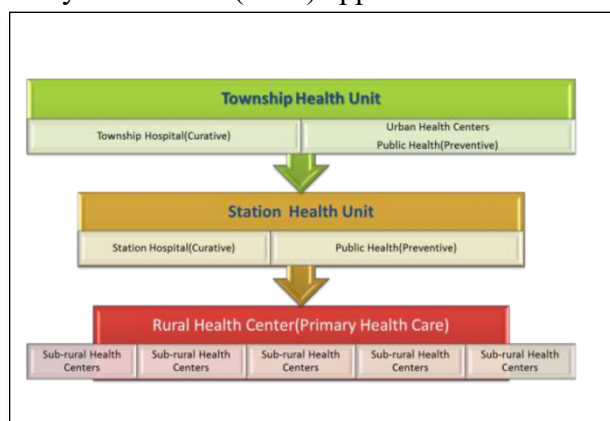
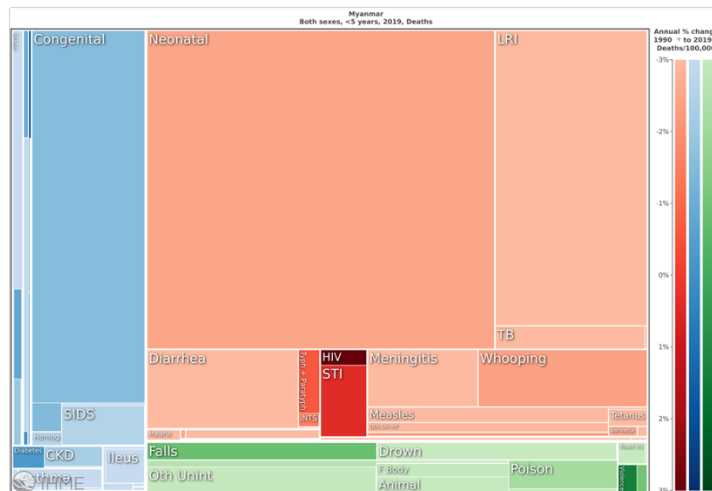


Figure 3. Health care unit from township level to primary health care level(43)

According to 2014 health data, there were 31542 medical doctors (13099 in public sector and 18443 in private sector), 29532 nurses, 2062 health assistants (HA), 3467 lady health visitors (LHV), 21435 midwives, 652 PHS 1 and 4998 PHS 2 (8). Myanmar had 1.33 health workers per 1000 population in 2016 which is lower than WHO's recommended threshold of 4.5 per 1000 population (8).

National Health Account (NHA) (9) described that current health expenditure (CHE) was 5% of Gross Domestic Product (GDP) and however, government health expenditure in Myanmar at 3% of general government expenditures, is the lowest among countries in the South-East Asia and Western Pacific Regions. Out of pocket payments (OOPs) continued as a significant share of health spending, representing 76% of CHE (9).

Among the association of Southeast Asian Nations (ASEAN) countries, Myanmar had the lowest life expectancy at birth which was 67 years, followed by Laos PDR, which had 68 years at birth. Myanmar had the highest maternal mortality ratio (MMR) at 282 deaths per 100,000 live births, followed by Laos PDR with 220 per 100,000 live births in 2016. The under-five mortality rate (U5MR) and the infant mortality rate (IMR) were 45 deaths per 1,000 live births and 36 per 1,000 live births respectively, ranking at the highest level together with Laos PDR(3) among ASEAN countries. Global burden of disease revealed that communicable diseases including vaccine preventable diseases represented the large proportion of the causes of U5MR in Myanmar as per the following figure (6).



In this figure, red boxes represent death due to the communicable diseases. Blue boxes represent deaths due to the non-communicable diseases and green boxes represent deaths due to the accidents.

Figure 4 Causes of under 5 mortalities in Myanmar (2019)(6)

1.6 Expanded Program of Immunization (EPI) in Myanmar

EPI program has been implementing under guidance of Department of Public Health. The routine vaccination program began in 1978 in 104 townships with the introduction of Bacillus Calmette–Guérin (BCG), Diphtheria-Pertussis-Tetanus (DPT), and Tetanus Toxoid (TT) vaccines, and was later expanded to 305 townships in 1995. Currently, 13 antigens (shown in fig. 5) have been added to the routine immunization (RI) program, which has been implemented in all townships across the country. The target population under the program now under 2 years of age children whereas target group of Human Papilloma Virus (HPV) vaccine is adolescent girls (9-13 years old).

ROUTINE IMMUNIZATION SCHEDULE		
AGE	VACCINES	PREVENTABLE DISEASES
At Birth	BCG*	TB meningitis, Disseminated TB
	Hepatitis B	Hepatitis B
2 months	BCG*	TB meningitis, Disseminated TB
	Oral Polio Vaccine - OPV (1)	Poliomyelitis
	Rotarix (1)	Rotavirus gastroenteritis
	Pneumococcal Conjugate Vaccine - PCV (1)	Pneumococcal Diseases
	Penta (1)	Hepatitis B, Meningitis/Pneumonia
4 months	Oral Polio Vaccine - OPV (2)	Poliomyelitis
	Rotarix (2)	Rotavirus gastroenteritis
	Pneumococcal Conjugate Vaccine - PCV (2)	Pneumococcal Diseases
6 months	Inactivated Polio Vaccine - IPV	Poliomyelitis
	Penta (2)	Hepatitis B, Meningitis/Pneumonia
	Oral Polio Vaccine - OPV (3)	Poliomyelitis
9 months	Pneumococcal Conjugate Vaccine - PCV (3)	Pneumococcal Diseases
	Penta (3)	Hepatitis B, Meningitis/Pneumonia
	Measles - Rubella - MR (1)	Measles, Rubella
18 months	Japanese Encephalitis - JE	Japanese Encephalitis
	Measles - Rubella - MR (2)	Measles, Rubella
9 years	Penta (4)	Hepatitis B, Meningitis/Pneumonia
	HPV Vaccine (1)	Human papillomavirus infection and cervical cancer
10 years	HPV Vaccine (2)	Human papillomavirus infection and cervical cancer

Newborn babies who were delivered at health centers must be immunised by Hepatitis B vaccine during 24 hours after birth.
*Children must receive BCG before and at 2nd month along with other vaccines if they did not receive at birth.

Source - cEPI, DOPH

Figure 5 Routine Immunization Schedule for under two children in Myanmar(43)

EPI program is led and managed by the central expanded program of immunization (CEPI) unit at the central level and state and regional public health offices take responsibility to supervise the basic health staff delivering services at the community level. The Central Epidemiology Unit (CEU) under Disease Control Division cover prevention and control of infectious diseases, disease surveillance, outbreak investigations, and capacity building of the staff. The Special Disease control units (SDCU's) provide supervisory, monitoring and technical support to the EPI unit at State/Regional level.

EPI services are available at fixed locations, as well as monthly outreach and mobile sessions, as well as a crash approach for hard-to-reach communities. Midwives are the primary health-care professionals at the community level (2). Myanmar is one of the Global Alliance on Vaccines and Immunization (GAVI) funding eligible nations for developing its vaccination system and introducing new vaccines, hence the program is primarily sponsored by the government budget and the GAVI. The GAVI fund is managed in-country by UNICEF and WHO. Some financing comes from the World Bank and the 3 Millennium Development Goals (3MDG)fund which is also called Access to Health Fund.

Problem Statement and Justification

This chapter will present about the problem statement and justification of the study.

Measles is a highly contagious virus that may be transmitted through direct contact or through the air. The virus enters the human body via the respiratory tract before spreading throughout the body. Children under the age of five are the most typically infected, although it can also affect adults. Fever, rash, and a runny nose are the most common symptoms. Complications such as pneumonia and severe diarrhea can develop in underweight and immunocompromised young children, leading to mortality (10).

Vaccines can help prevent measles. The vaccine is available alone and in combinations, such as the Mumps Measles Rubella (MMR) vaccine (a cross between the rubella vaccine and the mumps vaccine) and the Measles Rubella (MR) vaccine (a combination of the rubella vaccine), which are referred to as measles-containing vaccines (11). The live attenuated measles vaccine (12) is the most effective of the available vaccinations and has been used safely for almost 60 years (11).

However, because the basic reproduction number (R_0) of measles infection is 12-18, which is the highest among pediatric illnesses, over 95 percent vaccination coverage for measles is recommended for achieving herd immunity and controlling transmission (13,14).

Despite the availability of safe and efficient immunizations, Measles continues to be a leading cause of mortality among young children across the world. More than 142,000 measles-related deaths were recorded in 2018 (11), and more than 95% of these deaths were seen in low-income countries with fragile systems.

In Myanmar, the incidence of measles has been declining since the measles vaccine was introduced into the routine immunization schedule last 35 years ago. However, the epidemic curve shifted upwards in 2011 and 2012, with 1,810 and 2,096 cases reported at the same time period (15). After 5 years, there was a dramatic increase in cases for three years in a row, with 1,293 cases in 2017, 1,389 cases in 2018, and a peak of 5,252 cases in 2019. (15).

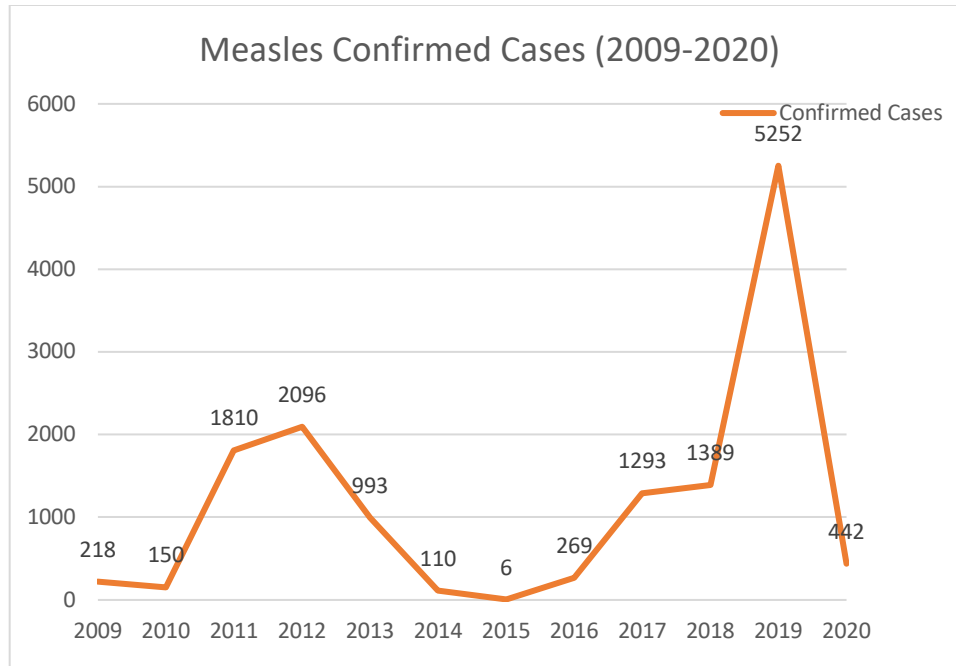


Figure 6 Trend showing Measles confirmed cases (2009-2020) (15)

This significantly sharp rise in cases highlighted, in some ways, the presence of places in the country with insufficient vaccination coverage. In Myanmar, 73 percent of measles cases were detected in the five regions with the lowest vaccination coverage. Children under the age of five were the most impacted. Furthermore, the monitoring data revealed that more than 80% of measles cases occurred in townships where MCV coverage was less than 95 percent. From 2014 to 2018, the "first dose of measles vaccination" (MCV1) had a coverage rate of 83 to 93 percent per year, according to coverage data. The "second dose of measles vaccination" (MCV2) has a coverage rate of 78 percent to 87 percent per year. Only 60% of cities (199 out of 330) have MCV1 coverage of greater than 95%. Despite the fact that the WHO recommends maintaining a vaccine coverage rate of at least 95% (16) to develop herd immunity against measles, the national measles vaccination coverage rate in 2019 (84 percent MCV1 and 80 percent MCV2) (Fig.7) was still lower than the ideal coverage rate (17).

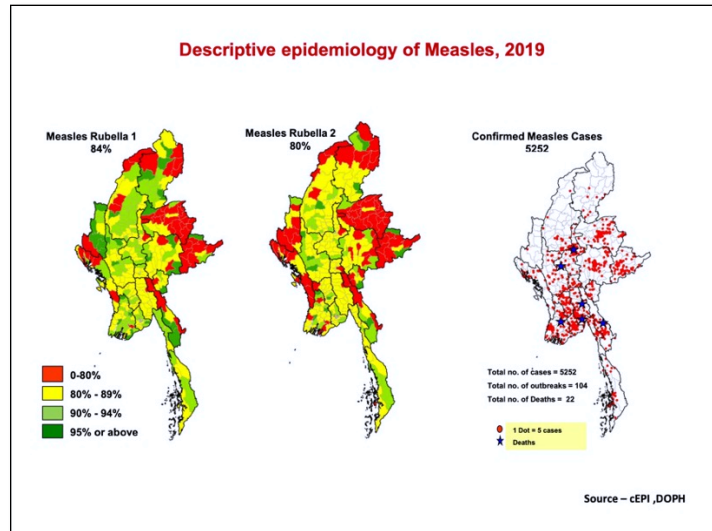


Figure 7. MCV1, MCV2 coverage and Measles Outbreak in 2019 (43)

During the 2017-2019 EPI program evaluation, it was also discovered that 328,566 children did not receive their first dose of measles vaccination, indicating that 10% of 1 million target children were missing MCV1 (3). Even though Myanmar conducted Supplementary Immunization Campaign for 5 times, immunity gap still exists (18).

According to the Global Vaccine Action Plan, Myanmar has established a target of eliminating measles by 2020(19). Despite the fact that more children are being vaccinated in Myanmar than ever before, UNICEF reports that finishing recommended vaccine doses, such as the second dose of measles, remains a major difficulty (20). While Myanmar is impacted by various geographical, political, and social contexts, immunization system faces both demand and supply constraints in providing equal access to all targeted populations. The country was unable to reach a 95 percent coverage rate for both doses of the measles vaccination and hence could not proclaim the elimination status in 2020 .With barely one year left, the elimination was extended to 2023. However, there has been no specific study in recent years to investigate factors linked to low measles vaccination coverage, and this has remained a knowledge gap in Myanmar .

2.1 Research Objectives

General Objective

To explore the factors influencing measles vaccine coverage in Myanmar in order to inform strategy to increase vaccination coverage.

Specific Objectives

To understand factors influencing on intent to vaccinate by mothers or caregivers

To understand the factors influencing on facility readiness in Myanmar that will ensure vaccination services ready to meet the demand

To explore the factors effecting on community access

To make recommendations to Ministry of Health and Sports in Myanmar strengthening strategy for elimination of Measles

Methodology

This chapter will present about the methodology of this study.

1.7 Study Design

The design of this study is the literature review to explore the factors influencing measles vaccine coverage in Myanmar.

1.8 Search Strategy

Literatures and published peer review articles are searched through using search engine such as google scholar and Vrije Universiteit (VU) library, database such as PubMed and Cochrane. Grey literatures, program reports and donor reports are accessed from WHO, UNICEF, GAVI, Ministry of Health and Sports (MoHS) web pages and University of Public Health and Department of Medical Research databases. Since Myanmar has limited literatures regarding with immunization, strategy documents, guidelines, program reports were also retrieved to get more insights on the study. The technical information are referenced from WHO and UNICEF guidelines. English is the main language used in searching the literatures and reports. Burmese is also used to find EPI manuals and training guidelines .The published timeline was broadened between 2000 and 2021. The key words and phrases used are “Measles Vaccine” , “ Immunization” , “ Intent to vaccinate”, “ Facility Readiness”, “ Community Access”, “ Myanmar” and “ Asia”. Then search terms are broadened according to requirement of the study objectives (shown in table 1). Boolean operator OR, AND are used to retrieve more relevant data.

Table 1: Search Strategy Table

Objectives	Key Words	Literature	Sources
Objective 1	“Attitude”, “Norms”, “ Control”, “Intent”, “Measles vaccine”, “Demand side”, “Myanmar”, “Southeast Asia”	Published peer review articles, Systematic review	search engine :google scholar and VU(Vrije Universiteit) library, database: PubMed and Cochrane
	“Mother Education”, “Poverty”, “Social Economic ” AND “Myanmar”	Grey literature, program review, program reports, Myanmar DHS survey 2015-2016	Web page from WHO, UNICEF, MOHS, University of Public Health, Department of Medical Research Databases
Objective 2	“Facility Readiness”, “Supply”, “Cold Chain”, “Human Resource”, “Measles Vaccine”, “Immunization”, “Myanmar”, “Southeast Asia Countries”	Published peer review articles, Systematic review	search engine ;google scholar and VU(Vrije Universiteit) library, database ; PubMed and Cochrane
	“Supply”, “Cold Chain”, “Human Resource”, “Measles Vaccine” “Waste disposal”, “Financing”, “Myanmar”, “Southeast Asia Countries”	Grey literature, program reports, Myanmar Health Statistics 2020, Manual, Training guidelines, Expanded Program on Immunization Multi Year Plan 2017-2021	WHO, UNICEF, GAVI and Myanmar's Ministry of Health and Sports (MOHS) websites,
	“Cold Chain”, “Financing Data”, “Supply Chain”	Program Review Data, GAVI Joint appraisal report	EPI program
Objective 3	“ Community Access”, “Conflict”, “Barriers”, “Immunization”, “Myanmar”, “Southeast Asia Countries”	Published peer review articles, Systematic review	search engine: google scholar and VU(Vrije Universiteit) library, database :PubMed and Cochrane
	“Measles Immunization Coverage” , Myanmar”, “Southeast Asia Countries”	Program Report, MDHS survey	EPI program

1.9 Inclusion and Exclusion Criteria

While searching the literatures, we included the following criteria.

- Literature written in English language, Training document in Burmese Language
- Publication year is from 2000 to 2021– with inclusion of relevant older articles accessible
- Focus on not only measles vaccine but also immunization – EPI or SIA for children under-two
- Scientific peer-reviewed journals and articles
- grey literature related with immunization
- Systematic review

Exclusion criteria are

- Article written in language other than English and Burmese
- Publications older than 2000
- Literature focusing on immunization in animals
- Study focusing on population not relevant to childhood immunization

1.10 Conceptual Framework

The findings will be gathered and presented by using the following conceptual framework in figure 5. It is a framework generated from a systematic review by David E. Phillips et.al (21) which is a synthesis of multiple existing theories including health system building block and health belief models (22,23). This framework presents not only the determinants on vaccine coverage which are the results of evidence based findings, quantitatively testable, concise, and comprehensive.

Moreover, this framework is also suitable to be applied in low and middle-income countries.

There are three principal determinants of vaccine utilization discussed in this framework:

- "Intent to Vaccinate"– mainly looks at “attitudes, norms and perceptions of mothers or caregivers that results demand for vaccines” (21)
- "Facility Readiness" – will explore the “factors influencing on availability of resources from the supply side (by the health system) to meet the demands”(21)
- "Community Access "- looks at “challenges and enablers between supply and demand sides”(21)

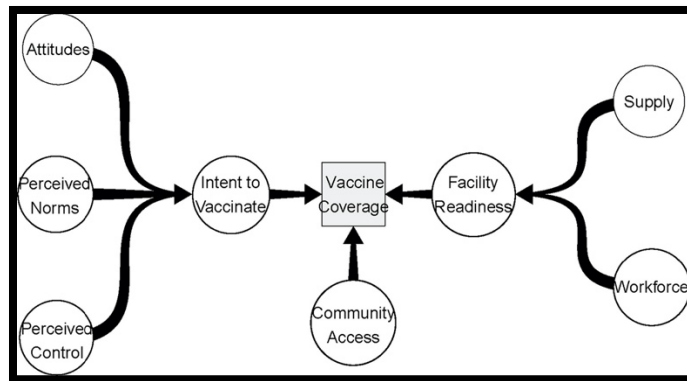


Figure 8. Conceptual Framework for vaccine coverage (21)

1.11 Limitations

Myanmar's research capacity on health is limited. Literature on immunization, particularly on specific diseases, is not widely available or accessible. Moreover, The study period coincides with the outbreak of the COVID 19 pandemic and the country's coup. As a result, the method used in this study was only a literature review, and some of the findings could not be validated with other methods due to difficulties in interviewing key informants in the country.

Study Findings

In this chapter, the findings of the determinants will be presented according to three main categories according to aforementioned conceptual framework.

1.12 Intent to vaccinate

Apparently, utilization of health care services for children including vaccination are influenced by decision of mothers or caregivers (24). Thus, we will mainly emphasize on factors related to mothers or caregivers in this chapter.

Attitudes

Attitude towards utilization of vaccine links with knowledge about disease and vaccine, belief in safety, effectiveness of vaccine and perceived needs by caregivers(25). If they have good knowledge on risk of infection and believe that immunity produced by vaccine is essential to prevent the disease which is safe and effective, these perceptions can drive them towards intention to vaccinate. In contrast, concern of parents on vaccine safety, contraindication and belief on natural immunity contribute lower vaccinate rates. Generally, limited knowledge of caregivers on the importance of immunization, knowledge on vaccination schedule, and fear of side effects among the public, are the main contribution factors to low uptake of vaccine (26). Owais et. al proved that high level of maternal knowledge on importance of vaccine could significantly improve the utilization rate of vaccine (27).

In Myanmar, we noted that there is no update national Knowledge Attitude Practice survey about immunization and specific to measles vaccine. A study done in North Okkalapa Township, Yangon Region during Mass Measles Campaign (MMC) in 2012 revealed that , 67.2% of mothers had low level of knowledge on measles and MMC(28). A study conducted in rural areas of Mon State in 2017 described that 72.3% of mothers had good knowledge on childhood immunization(29). Another study was conducted in Hlaing Tharyar Township, Yangon Region in 2018 to observe knowledge and attitude related to Measles Rubella immunization among caregivers. In this study, 12 % of caregivers had low knowledge score and 42.0 % of had poor attitude scores in this study (30).

Knowledge of caregivers about eligible age of the children can influence on utilization of the vaccine. A study conducted in 3 townships in Myanmar found out the significant association between missed opportunities for immunization among under-two children by getting adequate

information for immunization service (place and time) and getting explanation about the vaccines (31). EPI has been used a variety of communication channels to disseminate health messages to the community, including leaflets, posters, mass media such as television, radio, folk media, and social media such as Facebook. However, they are mostly developed and produced on an ad hoc basis to promote community awareness about campaigns and are constrained by funding. As a result, various Information Education Communication (IEC) materials for routine immunization are not widely available. EPI joint monitoring review team in 2017 also observed that IEC materials were not sufficient and not available in local language of places they monitored (32). MR campaign monitoring report in 2015 found out that interpersonal communication was the main communication channel to know about vaccine and campaign. EPI joint monitoring review team in 2017 reported that inadequate communication with mothers and caregivers on the immunization schedule, benefits and importance of complete does was one of common findings in supervisory visits (32). Moreover, vaccination cards play a role to inform about the children's vaccination schedule. However, only 45% of mothers who had 12-23 months old children kept vaccination cards during the survey and the others can be loss of cards or not receiving at all (33).

A study in India by Panda et. al found that another significant associated factor with MCV1 coverage is the number of maternal antenatal care (ANC) visits(34). During visits, pregnant mothers would receive not only health education and knowledge about antenatal care and delivery but also postnatal and child health including childhood vaccination. The more ANC visits shows the higher acceptance of and compliance to healthcare services. Nozaki et. al (35) found that this ANC factor was relevant to Myanmar context and reported that 65.4 % children whose mother had got more than four ANC visit, received full vaccination while only 37.7% of children whose mother had got no or less than 4 ANC visit, received full vaccination.

Perceived Norms

Perceived norms – “what parents’ social group considers to be appropriate health behavior”(36) –can determine the caregivers’ decision about vaccine utilization. Parents decide to vaccinate their children because other parents do that action and they perceive this act is responsible and beneficial to them. Social norms can be influenced by social context, cultural and traditional beliefs (37).

In Myanmar society, religious leaders and elder persons are powerful in the community who can influence social services including health and immunization services. Village leaders served as a bridge between vaccinators and targeted communities, according to a 2017 EPI review report (32) to track unimmunized children in the community and conduct social mobilization activities throughout the campaign. Moreover, mothers from both sides and women group influence the parenting practices in the family. Sometimes traditional practices inherited from generation to generation can alter the search for appropriate health care services.

Since boys are considered more precious than girls in the society, gender is one of the social norms to influence on health seeking practices including vaccination. However, according to data this kind of discrimination in utilization of immunization was not much significant in Myanmar (35,37) though it was observed in the neighbouring country, India (38).

Although distrust in vaccine is not widely seen in major population, people belong to minor ethnic group have concern about side effects and purpose of vaccination due to ethnicity or racial related beliefs about the value of immunization (32). As measles vaccine is an injection, some parents had fear of AEFI due to multiple injections at one visit. Some parents still believe that immunizations cause fever in their children (32). India implemented community-based women support groups to overcome vaccination mistrust, resulting in increased vaccine uptake (39).

Perceived Control

Perceived control is strongly linked with socio-economic status, education of parents and role of women in society and perceived right in decision making. Socioeconomic status determines ability to pay services and transportation cost to immunization posts which in turn influence decision to vaccinate (24). Disparity in socioeconomic status creates a massive gap in health service utilization (37). According to a research conducted in Cambodia, disparities in financial status induce gaps in vaccine coverage equity (40). In Myanmar, DHS (2015-2016) revealed that more children from rich family (77%) receive complete vaccination than those from poor families(41%)(35). For measles vaccination, 75% was seen in lowest wealth quantile whereas 92% came from highest wealth quantile (35)

Parental education can modify the immunization status of children primarily through safety of vaccine and distrust in medical professional (26). Educated parents have less concern about safety of vaccines and less distrust in health staff resulting in strong sense of control which in turn increase vaccine utilization (26). A systematic review by Taulil et.al proved (41) that low maternal education status and low socio-economic status were associated with lower vaccination coverage. In the global context, complete childhood vaccination coverage is likely to be 2.3 times higher in the children whose mothers completed secondary or higher education than those mothers who have no education (42). These findings are also applicable in Myanmar context. According to DHS survey (35), full vaccination coverage was observed in 80 percent of children whose mothers have more than a secondary education while there were only 41% of children whose mothers have no education.

Although women from the majority of the family had less power in making financial decisions and seeking medical treatment, this factor did not play a significant effect in influencing the intention to vaccinate the children in Myanmar (35).

1.13 Facility Readiness

According to framework, findings on supply and workforce will be presented under facility readiness.

Supply

Under the supply section, availability of vaccine and injection devices, cold chain and logistics management determine the delivery of the vaccine and its coverage.

In Myanmar, the monovalent measles vaccine was introduced in 1987, 9 years after EPI program started(2). Under the implementation of comprehensive measles control, second dose of measles vaccine was added in 2007. Since then, it is administered in two doses at the routine immunization schedule in line with WHO's recommendation: the first dose is given at nine months of age and the next dose at one and a half years to boost immunity. In 2015, it was switched to a bivalent measles and rubella vaccine with five dose vial just after nationwide campaign in 2014(43). Joint external evaluation by International Health Regulation (IHR) mission reported that there was no stock-out of vaccines including measles vaccines at central level, State, Region level or township level during 2016 (44). Comprehensive Multi Year Plan (CMYP) estimated that resource requirement for procuring vaccine was doubled in 2021 compared to 2015 (2). It has been budgeted under government funding. However, this study was unable to acquire more information for a budget prediction of vaccine procurement beyond 2021. Cold chain management is crucial in effective use of vaccine. Like other traditional vaccines, the ideal temperature for storage of measles vaccine is within 2 – 8 degree Celsius. For storage of vaccine, there are one central cold room (CCR) in Yangon, 2 main stores in Mandalay and Magway, 22 sub stores in other cities. CCR distribute vaccine supplies to sub-depots biannually, then to townships quarterly. In general, each township has a cold room for vaccine storage. However, because proper cold chain infrastructure is limited at the public health facilities below the township level, vaccinators at the sub-centers are given vaccine carriers to pick up vaccines from their respective township's cold rooms. One of the study revealed that 75% of vaccinators collected vaccines at townships while 25% collected at RHC level (45). The joint review team also discovered that delivery of routine immunization vaccines from sub-depots to townships and from townships to RHCs/RHSCs was not financed. They also observed that vaccines were not transported together with injection devices in some areas (32).

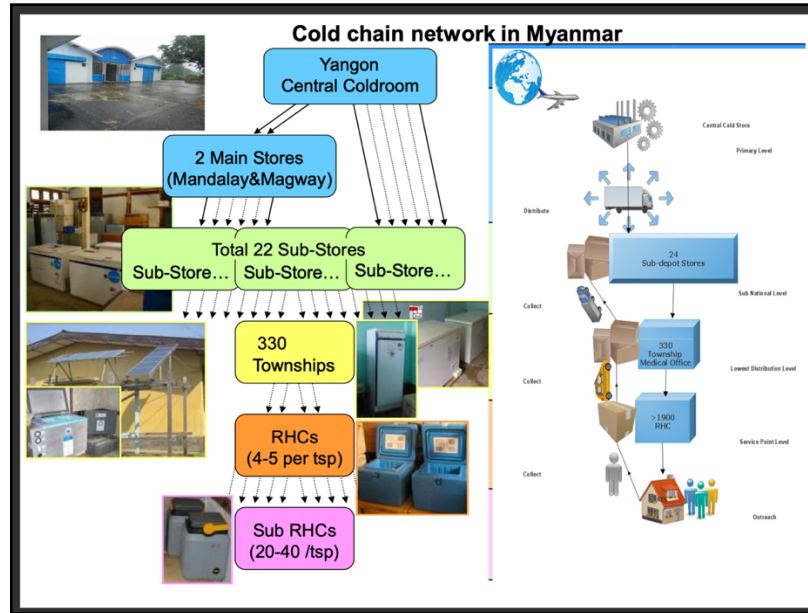


Figure 9. Cold chain Network in Myanmar (43)

Mostly, vaccinators use ice packs to keep the optimal cold chain in vaccine carrier. Nevertheless, as the township health department is inadequately capable of providing ice packs, the another option for maintaining an optimal cold chain is to use wet ice. According to GAVI health system strengthening plan, cold chain facilities will be expanded up to RHC level and 41% of cold chain equipment had been installed in 2020. 100% coverage is targeted by 2022 (46).`

The EPI LMIS in Myanmar had been entirely manual, except for an Excel spreadsheet to monitor stock at the central store. Although the system was carefully maintained at all levels of the supply chain with accurate and prompt paper-based reporting, information could take several days or more to be prepared and submitted. Consequently, it hindered the ability of the CEPI to respond to supply chain issues in a timely manner or accurately identify performance issues. Furthermore, it was difficult to track stock movements across levels of the supply chain and time-consuming to know the stock situation at a given time at any level of the supply chain. There was also a lack of real-time monitoring of vaccine stock temperature and no automated alert system when there are temperature excursions.

Thus, discussions about an electronic LMIS (eLMIS) for EPI began during development of a Health Sector Strengthening (HSS) proposal to the GAVI Alliance in 2016. UNICEF began supporting CEPI to improve the use of data in the immunization supply chain in 2015. As a next step toward standardizing and streamlining data flow, UNICEF is also supporting the MoHS in selecting and implementing an appropriate eLMIS approach.

Workforce

One of the most fundamental determinants for vaccine coverage is the workforce in immunization service (47). They take crucial role not only delivering vaccine but also providing appropriate health information about benefits of vaccination to convince parents to bring children get vaccinated. Provider is one of the main persons who can build trusted relationship with parents to have confidence in the immunization process(48). Therefore, it is essential to allocate adequate number of workforce as well as to provide them quality training for improving their performance.

Midwives are the primary vaccinators, and they are assigned to each sub center. However, human resources for health in Myanmar have historically been under-resourced. According to 2020 health statistics, the highest distribution of health personnel is seen in Chin State, which has 128 midwives per 100,000 population, while Rakhine State has the lowest distribution of health personnel, with 33 per 100,000 population (3). Due to critical shortage and disparity in health worker density, midwives are dealing with a variety of challenges when providing services. They are responsible not only for immunization but also for other primary care services such as antenatal care, delivery, and post-natal care, nutrition promotion services, health education, environmental sanitation, and activities in other vertical programs such as Tuberculosis (TB) case identification. Furthermore, depending on geographical location, each midwife is assigned to cover 3,000 to 10,000 of population ; a minimum catchment area of five villages and a maximum catchment area of 25 villages or wards (3,49). Inequality in the distribution of health care workers across states and regions exacerbates already overburdened workloads. In addition to that, a study by Nwe H et.al found out that operational cost provided by government is limited and vaccinators need to spend their own money on transportation, such as hiring vehicles and boats depending on location, in order to visit large catchment areas while conducting routine immunization activities (45) .

In order to address workforce shortage at primary care level, MOHS had implemented community health workers (CHW) program especially for rural communities. They play as a significant volunteer workforce by assisting midwives in social mobilization and health awareness activities in outreach visits (50,51). CHWs are well accepted by the community in providing services as they are recruited from the respective community (52). A study in India also proved that CHW program is an effective intervention in expanding immunization coverage in rural areas (53). In Myanmar, more than 30,000 CHWs has been trained to support in delivery of basic health services, including immunization.

For increasing coverage of hard to reach areas and ethnic areas, MOHS collaborated with ethnic health organization under “Health Convergence Model” and EPI trained locally recruited

vaccinators to conduct vaccination activities in their respective regions (53). However, as being longstanding crisis areas, there has been trust issue between both implementing partners and it take longer time to achieve the targets. In addition to that, capacity of local vaccinators are limited and intensive trainings are required (53).

Preservice and in-service trainings are mandatory for vaccinators because they are responsible not only for service delivery but also for "immunization safety". Moreover, continuous training on immunization for vaccinators can help improving vaccination coverage(54). Immunization become one of the topic in core curriculum of preservice training of basic health staff (BHS). Immunization in practice is the main guideline for BHS(55). Refresher training are provided at monthly meeting on ad hoc basis. The majority of the training plans are centralized, and no regular training plans have been produced at the township level (32).

Monitoring and Supervision system of the program is in place from service delivery level to central level. Monitoring is conducted through field visits, desk reviews of the data reported in the reporting formats and in the Health Management Information System (HMIS) at each level using standardized monitoring indicators such as coverage rates, drop-out rates and vaccine wastage. For measles, as it is one of vaccine preventable disease (VPD) under surveillance, health staff have to do weekly reporting to respective township. According to an EPI evaluation from 2017, townships were unable to analyze provided data, and the surveillance system was experiencing a workforce shortage as a result of several empty positions at the township level. Furthermore, it was discovered that there was no specific plan for surveillance training to basic health professionals(32). Supervision is crucial for improvement of the program . Supervisors usually observe the quality of the microplans, interpersonal communication, vaccine handling and wastage, as well as conduct post training follow up. At the township level, the township medical officer (TMO), Township Health Assistant, and Township Community Health Nurse are the supervisors. Monitoring report stated that about 50% of supervisory visits were recorded in 2019 because current reporting system could not capture that information (56). Report noted that findings of the supervisory visits were very useful. They were well addressed by the central team and the challenges and weaknesses were strengthened with follow up training.

CMYP calculated that total estimated immunization expenditures without shared costs (personnel, buildings, transport, etc.) per year were approximately \$58 million and \$67 million with shared costs(2). Routine immunization costs \$30 million whereas supplementary immunization activities cost \$28 million. While cost of one fully immunized children is 46.97 US dollars, measles vaccine cost is 0.82 US dollars per dose and 3.71 US dollars per child. In 2015, the government shared 14% of costs for personnel, maintenance, buildings, 30 % by GAVI for new and underused vaccines, and 27% by UNICEF/3MDG covering cold chain. The rest were 9% by UNICEF for cold chain, 5% by WHO/CDC for surveillance, and 4% by WHO/GAVI for monitoring, training, IEC, and program management. Projected budget for 2017-2021 to meet all the objectives by program were 316 millions US dollars whereas funding

gap was estimated to be 39 millions US dollars and 12.3% of total. In 2019-2020, government is investing only 10 millions US dollars on vaccines which is 1% of Current Health Expenditure (CHE). Therefore, program highly depend on the external findings for vaccine and injections supplies. GAVI has considerably supported Myanmar Health System Strengthening 2 (HSS2) grant from 2019 to 2021 to improve immunization system in terms of demand creation, cold chain expansion and improvement plan, leadership and management, equitable access to service delivery, EPI data strengthening. Then, GAVI co-financing scheme is phasing out in 2030.

1.14 Community Access

The Reach Every District (RED) method has been used by the EPI program to make immunization services available to every community. Vaccinators prepare community-level microplanning to identify target groups and organize service delivery. Immunization services are provided primarily through fixed, outreach, mobile, and crash strategies (43,54). In urban settings, Maternal Child Health (MCH) Centres, Urban Health Centres (UHC), and township hospitals function as immunization posts, whereas in rural areas, RHC and Sub-Centres are fixed posts. Sessions usually take place during the first and second week of each month. The fixed sessions are held at the health facility or community places, outreach sessions take place in villages within 5 kilometers of the health center that the staff can visit in a day, and mobile sessions are conducted in areas beyond outreach sites where the staff requires overnight stay and cannot cover in a day. During the dry seasons, which are normally scheduled for at least three times each year, a crash strategy is used to catch up unimmunized children, especially in hard-to-reach locations. It does, however, need more financing and human resources. Myanmar, like other LMICs, has a large population that can only be addressed through outreach; as a result, roughly two-thirds of immunisation services are provided through this method (44). In addition to these routine strategies, the EPI program has worked to enhance access to immunization services for the urban poor by establishing immunization clinics at tertiary hospitals with 100 or more beds (57). The pilot project in Yangon using geospatial data to incorporate into microplanning was a remarkable effort in EPI to increase coverage in 2018 (58). This project was supposed to expand nationwide in a year, however it was put on hold owing to other competing priorities.

Despite these initiatives, heterogenous geographical landscape across the country largely influences accessibility of health services in Myanmar which in turn determine the vaccine coverage (49). Being a poor country, road networks are underdeveloped and transportation systems are poor mostly in rural areas and hilly regions. Community in remote areas need to spend days to reach nearest health centers and get necessary health interventions including immunization services. Health staff also have to travel several days or weeks to provide outreach services to those living in grassroot areas. DHS data revealed that high percentage of women living in Chin (52.1%), Ayarwaddy(35.1%), Naypyidaw(30.4%), Shan (33.6%), Kayin(31.6%),

Kachin (29.8%), Rakhine(29.7) had difficult to access health care due to distance to health centres (35). Furthermore, the hilly region has a higher incidence of missed immunizations (44%) than the delta and central regions of the country (31% and 17% respectively)(33) .A study by Aiko Kaji (59) stated that children from migrant and mobile populations are less likely to be fully immunized with recommended doses of vaccines. According to UNICEF(20), the percentage of fully immunized children against childhood illnesses, including measles, was significantly lower in hard-to-reach and underserved regions.

In addition to that, arm conflict and civil unrest between Myanmar army and ethnic arm organization are ongoing in most of the ethnic regions such as Kachin, Kayin, Shan North and Rakhine. These situations exacerbated the population in these areas displaced and mobile who are also overly represented in the under-immunized population(46). EPI review in 2020 highlighted that gap in immunization coverage is associated with areas affected by conflicts, geographically hard to reach areas, self-administrative regions and among urban poor groups (46). Review reported that 96 out of 330 townships falls under these pocket areas.

Apparently, ‘social distance’ is regarded as main determinants of immunization access. “Social distance in this context can be described as the sense of distance that clients experience from health facilities and providers, as determined by the level of acceptability or affordability of their access to health care”. In Myanmar, operation hours of immunization services at community level is restricted and midwives are not able to spend enough time at one place as they have responsibility to cover catchment areas monthly and conduct the session only during first and second weeks. Sometimes midwives have other duties such as delivery, training and reporting to township and may not be present at her duty station for long periods. Due to time and resource constraints, there may not be enough exposure to the community, and as a result, misunderstandings between service providers and the community may arise. For this issue, village leaders and community health workers are key to assist in midwives. Acceptability is interlinked with demand side factors such as attitude, perceived norms and perceived control as mentioned above.

In term of affordability, it is found as not a great barrier in access to services as childhood immunization services including measles vaccine in public sector provided by MOH are available free of charge in Myanmar. Nevertheless, there are no evidence found addressing the opportunity cost such as missed time from work of mothers or parents. There are also operational cost of basic health staff for collecting vaccines, cold chain maintenance and delivering services varied depending on geographical area but it is not budgeted in routine immunization plan (44). Moreover, poor people and those living in hard to reach areas are facing some challenges in terms of transportation cost to immunization posts (35).

Besides existing supply and demand side barriers, COVID 19 pandemic has significantly disrupted delivery of health services in LMIC. The preventive measures during surge of COVID 19 pandemic consisted of temporary suspension of health services including immunization

across the country to avoid crowds and mitigate the spread of infection(58). Consequently, childhood vaccine coverage fell down in 2020 including measles vaccine and supplementary immunization campaigns were postponed (59). WHO also reported that only 84% of targeted children in the globe including Myanmar received only one dose of measles vaccine in 2020 which was a significant fall of coverage since 2010(59,60) . Moreover, it imposed 22.3 millions of children are susceptible to get measles infection (61).

Myanmar also received its first case of COVID-19 in March 2020 (62) , and all basic health care services were temporarily halted while all efforts were focused on COVID 19 interventions.

Later, military coup happed in February 2021 and most of health workers involved in civil disobedient movement (CDM) to protest against the coup(63). Since then, delivery of immunization services has been encountering lack of human resource and are not able to resume during this political turbulence. Experts also predicted this interruption leads to a huge immunity gap in the targeted group of children currently(59).

Discussion

This session will discuss the summary of the findings on factors influencing measles vaccine coverage in Myanmar. Due to the limited literatures specific to measles vaccine, this study also looked at the factors related with immunization in general.

Intent to vaccinate

The crucial demand side factor to determine vaccine coverage is knowledge and attitude of mothers and caregivers on benefits of measles vaccine to prevent their child from deadly disease.

This study found out that literatures regarding with knowledge of caregivers on measles vaccine in Myanmar are segmented and it cannot be concluded whether knowledge level is increasing or decreasing. Inadequate exposure to health information through health staff was noted. It varied across different locations in Myanmar depending on accessible to health care and geographical barriers mostly seen in ethnic states and regions. Evidence also suggested that ANC visit is the influencing factor for the utilization of immunization services. The more prenatal care visits mothers had throughout their pregnancy, the more likely their children were to receive vaccinations during early childhood. Therefore, intensifying ANC visits of pregnant mothers and providing health messages during ANC visit can help improve decision to vaccinate.

In Myanmar, social and family network such as women peers and mothers play main role influencing social norms like getting vaccines. They can disseminate information benefits of vaccine and address the concern about vaccine among mothers. Women support group approach in India will help to address fears of vaccines in some areas of Myanmar.

Parental education largely influence the utilization of immunization. In Myanmar, mothers are primary caregivers of the children and however, lower female literacy rate can be linked with lower immunization utilization, especially rural populations. Another important factors determining the vaccination coverage is financial status of family. Literatures revealed that children from richer households are more likely to get childhood vaccination than those from poorer households. One of the reasons might be due to ability to pay for transportation cost and ability to make time for bringing children to vaccination sessions although vaccination service from public facilities is available free of charge. However, women role in financial decision making does not determine childhood vaccination rate including in Myanmar.

Vaccine uptake is hampered by the country's numerous complicated social, political, and geographic contexts, resulting in areas with vaccination coverage disparities. The current demand generation activities by Ministry of Health are not adequate and designed to reach these populations. Moreover, they do not sufficiently address routine immunization. An additional issue is that there is no strategic plan to raise the capacity of the basic health staff to address concerns

raised by parents and communities and enhance community trust, particularly that of hard-to-reach communities.

Significant improvements in coverage and programme sustainability are possible if individuals and communities understand the benefits and risks of immunization, are encouraged to seek services, are empowered to make demands on the health system and have ownership of the planning and implementation of programmes within their local communities.

Facility Readiness

In Myanmar, EPI program under department of public health has been implementing to deliver the immunization services for over 40 years. As more vaccines have been added to the routine immunization schedule in accordance with WHO guidelines, and coverage has increased over time, the program has been deemed a success.

Reports revealed that EPI in Myanmar has established systematic cold chain management system from central level to sub center level despite the dearth of resources. Although there is a plan to expand cold room facilities up to the sub centre level, vaccinators are facing with issue on cold chain management. Due to the lack of ice packs, sometimes they have to use wet ice to keep cold chain in optimal condition. That additional workload can make vaccinator perform poorly on routine immunization activities. In GAVI HSS2 plan, EPI program at national level planned to extend 100 percent coverage of cold chain facilities at RHC level in 2022. This plan is expected to accommodate more vaccines while also reducing the workload of vaccinator operational cost. Though cold chain expansion plan is in place, another big shortfall is there is no regular budget for distribution of vaccines which should be addressed by next funding cycle.

Because of the immunity gap during the COVID 19 epidemic and the coup, Myanmar might have a high need for measles vaccination in addition to routine immunization. However, budget for vaccine procurement beyond 2021 is not evident which should be immediately addressed.

For supply chain improvement, EPI has collaborated with UNICEF to establish the eLMIS system for stock management. However progress cannot be reported in this study.

Primary workforce in immunization service in Myanmar are midwives. Midwives serve the function of vaccinator in addition to providing other maternal and child health care activities. As a result, they are overburdened with workloads.

Furthermore, existing human resource challenges such as workforce shortages and inequity in health staff allocation worsen the disparity in vaccine coverage across the country. Workload shortage is also significant in conducting monitoring and supervision. Only half of the targeted supervisory visit are done and reported.

Like other developing countries, Myanmar also applied CHW program to support basic health care services in rural and hard to reach areas. Evidence also suggested that they are also useful in delivery of immunization and improving coverage. In order to expand the coverage in ethnic

regions, MOHS also discussed with ethnic health organization and implemented the training of vaccinators to reinforce the workforce in immunization services.

According to monitoring reports, capacity building of the vaccinators about knowledge of vaccine and VPDS are not adequate and trainings are limited by budget. These factors can hinder ability of health workers to communicate with the community and perform the activities, resulting in lower vaccination rate.

As Myanmar health sector has been ignored under military government for many years, government budget for health is very limited. One percent of health spending is utilized for immunization services. Therefore, program is depending on external funding. However, when Myanmar is no longer listed under LMIC according to World Bank threshold, the country will not be eligible to receive GAVI co-financing .

Therefore, as immunization facilities in terms of workforce, vaccine supply and cold chain logistics are heavily depending on availability of adequate financing, program should advocate to government to invest funding sources to sustain and strengthen the immunization services.

Community Access

Immunization program has been using RED approach and services were available monthly at fixed, outreach and mobile clinics. Crash programs are designed for hard to reach populations. Moreover, the program has made several efforts to boost access and coverage by opening hospital immunization clinics for poor people in urban areas, improving microplanning by using geospatial data and collaborations with ethnic health organization for training of immunization volunteers. Notwithstanding, diverse geographical locations play a large role in making a difference in access to health services in Myanmar, especially mountainous areas and ethnic regions. It is associated with poor road networks and poor transportation in rural areas. Longstanding civil unrest and conflicts in ethnic areas sabotage implementation of immunization provision services. In 2020, EPI program reviewed that lower immunization coverage was found in hard to reach areas and conflict areas.

As measles vaccine has been widely used in routine immunization and campaigns, vaccine hesitancy was not observed in Myanmar unlike other countries. However, the limited time and insufficient capacity of midwives can alter social interactions with community and create distance. In terms of affordability, government financed vaccine cost and made available free of charge which in turn makes the easier access to vaccine. However, transportation cost to vaccination posts at distance locations can hinder access to service by poor population. For this issue, EPI should strengthen the capacity of vaccinators to improve microplanning to locate underserved groups. From demand sides, as there was an inadequate supply of budget for operation cost which will delay vaccination sessions resulting in poor vaccination coverage, EPI should advocate to allocate budget for operational cost incurred.

Sometimes, the access to immunization has been driven solely by the service providers and the evidence showed that monthly immunization services have been received lesser focus and

attention by public. In addition to the access problem, full utilization in the form of completing the recommended doses is the challenge to the programme to fulfil the quality of immunization. The gaps in attitude towards access to immunization, full utilization of the services and the social barriers to meet the immunization services are the areas where health system supports cannot be filled.

In addition to that, Myanmar has been facing unstable political situations together with COVID pandemic. Its impact on health sector is massive leading to severe shortage of human resources in addition to existing barriers. Amidst the disruption of measles vaccine, many populations are displaced due to crisis and therefore EPI should prepare for outbreak response and supplementary immunization to close the immunity gap.

1.15 Limitations of the findings

KAP (Knowledge, Attitude, and Practice) findings in previous literatures are patchy and cannot represent the entire country.

In this study, we cannot present updated coverage data and analyze the up to date information because the data are available.

Conclusion and Recommendation

1.16 Conclusion

In conclusion, due to high level government commitment and engagement from the international community, the EPI program has been evolving. Since the measles vaccine was introduced, cases were dramatically reducing in the country. However, recent measles outbreaks in 2019 highlighted low vaccination areas in the country and shortfall of the program. Despite the programme is supported by a dedicated and hard-working staff which cannot compensate for the human resource shortage and limited capacity in specific subject areas. In addition, Myanmar faces complex social, cultural and political factors leading to pockets of unimmunized children, and which may also contribute to under-reporting of diseases; many of these factors require context-tailored approaches. This situation is compounded by service delivery challenges which have been identified and seek to be addressed.

1.17 Recommendation

It is important that all stakeholders in immunization program should participate in strengthening access to services. As Myanmar now is facing increase of displacement during crisis and emergency period, mass measles vaccination for displaced people is urgently required to prevent spread of measles infections and outbreak in these populations. Later, the following evidence based recommendations will help to improve measles vaccination coverage in Myanmar.

For community

- Having awareness raising session on knowledge about measles and benefits of measles vaccine with tailored message content according to their ethnic groups through different media are suggested.
- Raising awareness on keeping vaccination card to remember schedule of both doses of measles vaccine.

For Health Care Workers

- Allocation of more health care workers according to local needs and coverage
- Budgeted Transportation and Operation cost for vaccinators
- Regular capacity building of vaccinators on importance of measles vaccine and measles elimination should be conducted.
- Regular training plan on disease surveillance

For EPI program

- Nationwide KAP survey on immunization would be beneficial
- Development of tailored messages about immunization and importance of measles vaccine for ethnic community
- Prioritized on strengthening service coverage for hard to reach areas and ethnic areas
- Reinforcement on expansion of cold chain by GAVI HSS2 plan to achieve as targeted in order to increase vaccine storage at sub centre level and reduce operation cost for vaccinators.
- Advocate Ministry to allocate more budget and human resources on measles elimination
- Make efforts on strengthening of immunization information management system

For Development partners

- Engagement with EPI program for implementation of GAVI HSS2 plan

Research institutions

- Engagement with EPI program for putting input to implement KAP survey
- To conduct more research on immunization related topics

Ministry of Health and Sports

- More budget allocation on strengthening of childhood immunization and increased investing in procurement of measles vaccines

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Annex