Factors influencing the implementation of the Maternal Death Surveillance and Response System (MDSR) in Myanmar: A Literature Review

Yu Mon Myint
The Republic of the Union of Myanmar

57th Master of Public Health/International Course in Health Development

KIT (Royal Tropical Institute)
Vrije Universiteit Amsterdam (VU)

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A thesis submitted in partial fulfillment of the requirement for the degree of
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by
Yu Mon Myint
The Republic of the Union of Myanmar

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Abbreviations

ANC	- Antenatal Care
AIDS	- Acquired Immunodeficiency Syndrome
ARR	- Annual Rate of Reduction
BEmOC	- Basic Emergency Obstetric Care
BHS	- Basic Health Staff
CEmOC	- Comprehensive Emergency Obstetric Care
COPD	- Chronic Obstructive Pulmonary Disease
CPR	- Contraceptive Prevalence Rate
CSO	- Civil Society Organizations
EHO	- Ethnic Health Organizations
EPHS	- Essential Packages of Health Services
FMO	- Fund Management Organization
FP	- Family Planning
GDP	- Gross Domestic Product
HCP	- Health Care Providers
HIS	- Health Information System
IDP	- Internally Displaced Persons
INGO	- International Non-governmental organizations
LHV	- Lady Health Visitor
LMIC	- Low and middle-income countries
LTR	- Lifetime Risk
HCP	- Health Care Providers
HIV	- Human Immunodeficiency Virus
MCH	- Maternal and Child Health
mCPR	- Modern Contraceptive Prevalence Rate
MDG	- Millennium Development Goal
MDHS	- 2015-16 Myanmar Demographic and Health Survey
MDR	- Maternal Death Review
MDSR	- Maternal Death Surveillance and Response
MOHS	- Ministry of Health and Sports
MPDSR	- Maternal and Perinatal Death Surveillance and Response
MMA	- Myanmar Medical Association
MMCWA	- Myanmar Maternal and Child Welfare Association
MMEIG	- Maternal Mortality Estimation Interagency Group
MMR	- Maternal Mortality Ratio
MMRate	- Maternal Mortality Rate
MNCAH	- Maternal, Newborn, Child and Adolescent Health
MRH	- Maternal and Reproductive Health

MSI	- Marie Stopes International
MW	- Midwife
NCD	- Non-communicable Diseases
NGO	- Non-governmental Organizations
NHP	- National Health Plan
PSI	- Population Services International
RMNCAH	- Reproductive, Maternal, Newborn, Child, and Adolescent Health
SDG	- Sustainable Development Goals
SEA	- South-East Asia
SEARO	- WHO Regional Office for South-East Asia
SMO	- Station Medical Officer
TFR	- Total Fertility Rate
TMO	- Township Medical Officer
TOR	- Terms of Reference
UHC	- Universal Health Coverage
UN	- United Nations
UNDP	- United Nations Development Programme
UNFPA	- United Nations Population Fund
UNICEF	- United Nations Children's Fund
VA	- Verbal Autopsy
WB	- World Bank
WHO	- World Health Organization
3MDG	- Three Millennium Development Goal Fund

Glossary

(1) Definitions used for Maternal Mortality

These definitions are from the International Statistical Classification of Diseases and Related Health Problems (ICD-10) (World Health Organization, Fifth Edition 2016) (1).

(1.1) Maternal death

"A maternal death is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. Maternal deaths are subdivided into two groups:

- Direct obstetric deaths: those resulting from obstetric complications of the pregnancy state (pregnancy, labour, and puerperium), from interventions, omissions, or incorrect treatment, or from a chain of events resulting from any of the above.
- Indirect obstetric deaths: those resulting from previous existing disease or disease that developed during pregnancy and that was not due to direct obstetric causes but was aggravated by physiologic effects of pregnancy."

(1.2) Late maternal death

"A late maternal death is the death of a woman from direct or indirect obstetric causes of more than 42 days but less than one year after termination of pregnancy."

(1.3) Pregnancy-related death (Death occurring during pregnancy, childbirth, and puerperium)

"A pregnancy-related death (death occurring during pregnancy, childbirth, and puerperium) is the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the cause of death (obstetric and non-obstetric)."

(1.4) Lifetime Risk of maternal death

"The lifetime risk (LTR) of maternal death is the risk that a woman who survives to the age of 15 will die of maternal death at some point during her reproductive lifespan, given the current rates of maternal mortality and morbidity."

(2) Approaches for Measuring Maternal Mortality

(2.1) Incompleteness

It refers to "incorrect coding in civil registration due to an error in the medical certification of cause of death or error in applying the correct code." (2)

(2.2) Misclassification

It refers to "incomplete death registration and includes both the identification of individual deaths in each country and the national coverage of the register." (2)

(2.3) Under-reporting

It is "a combination of misclassification and incompleteness." (2)

(3) Measures Used for Maternal Mortality

"The number of maternal deaths in a population (during a specified period, usually one calendar year) reflects two factors:

(a) The risk of mortality associated with a single pregnancy or a single birth (whether live birth or stillbirth); and

(b) The fertility level (i.e., the number of pregnancies or births experienced by women of reproductive age 15-49 years)." (3)

(1) Maternal Mortality Ratio (MMR)

"MMR is defined as maternal deaths during a given period per 100,000 live births during the same period. It quantifies the risk of maternal death relative to the number of live births and essentially captures the first factor mentioned above." (3)

(2) Maternal Mortality Rate (MMRate)

"MMRate is defined and calculated as the number of maternal deaths divided by person-years lived by women of reproductive age in a population. It captures both the risk of maternal death per pregnancy or per birth (whether live birth or stillbirth) and the level of fertility in the population (i.e., both factors mentioned above)." (3)

Factors influencing the implementation of the Maternal Death Surveillance and Response System (MDSR) in Myanmar: A Literature Review

Abstract

The national priority of Myanmar in the Maternal and Reproductive Health is to reduce the Maternal Mortality Ratio (MMR) up to 91 deaths per 100,000 live births in 2030. MMR was still the highest within the South-East Asia region, about 250 deaths per 100,000 live births according to trends in Maternal Mortality (2000-2017).

To reduce preventable maternal mortality, the Ministry of Health and Sports adapted to the Maternal Death Surveillance and Response System (MDSR) in 2016. The thesis aims to analyze the factors contributing to the improvement or hindering of the MDSR implementation.

The study is a kind of literature review to explore the factors influencing the MDSR in practice. The conceptual framework of Maternal and Perinatal Death Surveillance and Response (MPDSR) in low- and middle-income countries was used to identify the scoping review of implementation factors of the MDSR system.

The study identifies the current implementation status of MDSR, the health care providers' perspectives, the internal and external factors of the organizational structure.

The significant challenges of the system implementation are insufficient technical knowledge and skills of health care providers, blaming culture, weak coordination among stakeholders, the role of external professional associations, and community engagement. For sustainability, budget allocation, human resources, and the necessary guidelines, protocols, and tools are the basic requirements needed to fulfill.

The recommended actions are to integrate the MDSR in the pre-service and the undergraduate training curricula of the medical schools, conduct advocacy to the stakeholders, and develop a review meeting protocol for maternal deaths at all levels.

Key Terms: Maternal Death Surveillance and Response (MDSR), Maternal Death Review (MDR), Maternal Mortality, Myanmar, Preventable Maternal Deaths

Word Count: 12,700

Introduction

I am Yu Mon Myint, public health officer (Maternal and Reproductive Health Division) working for the Ministry of Health and Sports since 2016. My essential duties and responsibilities are providing maternal and reproductive health care services by creating a favorable environment and expanding sexual and reproductive health information and services. Besides, I participate in other activities; capacity building for all health staff at the subnational level, stakeholder engagement, coordination, and collaboration with international and local non-governmental organizations and partners.

As a public health officer, I have a bird's-eye view of our health care system and decided to do my best to gain valuable work-related skills and opportunities to improve in the global public health context. Moreover, I am the focal person in the implementation of the Maternal Death Surveillance and Response System (MDSR) at the national level. In addition, I have had a chance to participate in the reformed process of Maternal Death Review (MDR) to Maternal Death Surveillance and Response System (MDSR) in 2016.

However, there is no systemic evaluation process for implementing the Maternal Death Surveillance and Response System (MDSR) and the advantages of system reforming over four years. In addition to the system monitoring and evaluation process, I want to explore the underlying factors of maternal deaths in another aspect of "***beyond the numbers***." I want to monitor, evaluate, and analyze the system's current contribution to ending preventable maternal mortality in Myanmar.

Therefore, I choose this thesis topic named "***Factors influencing the implementation of the Maternal Death Surveillance and Response System (MDSR) in Myanmar: A Literature Review"*** as one of my academic milestones in life. I believe the study findings, results, and recommendations from the thesis will be beneficial to achieve the following objectives:

- To call attention to the set up of the MDSR System in Myanmar
- To reflect on the current implementation status of the MDSR System
- To provide the overview of factors contributing to the performance of the system
- To adapt the lesson learned and gaps in the future scale-up plan for the improvement of the MDSR System
- To use this information in the advocacy process to policymakers and the further strategies how to tackle preventable maternal deaths

Chapter 1: Background Information of Myanmar

This chapter explains the background information about the demographic situation, the overview of the health system, and status of health care service utilization, and the scope of maternal health care in Myanmar.

(1.1) Demography

Myanmar, well-known as Burma and the Golden Land (4), is a country situated within South-East Asia (SEA) Region (5) (Shown in ***Figure 1***), including the lower-middle-income countries (6). It has a total area of 676,578 km^2 wide (4), and population density in 2020 was 81 people per km^2 (5). The site has surrounded by the Bay of Bengal, the Gulf of Mottama, and the Andaman Sea (5).

The neighboring countries are in the north: China, in the northeast: Bangladesh, in the northwest and west: India, in the southeast: Thailand and Laos, called the area of the Golden Triangle. The total population (2020 estimation) was about 54.82 million, with an annual growth rate of 0.87%. The female population was 52.1% of the total population, while the male population was 47.9%. Urban and rural population distribution (2017) was 28.8% and 71.2%, respectively. Young people below 30 years occupy more than half of the entire population, the whole nation's workforce (5).

The country comprises 15 sub-divisions: 7 States, 7 Regions, and 1 Union Territories. Yangon (Rangoon) was the previous capital city with the highest population density but still the economic core of the country. Nay Pyi Taw has established as the new administrative capital city of Myanmar in 2005 (4). About 135 ethnic groups have been living in the country, and major ethnic groups in Burma (68%), Shan (10%), Kayin (7%), Rakhine (4%), Chinese (3%), Mon (2%) and Indians (2%) (7).

Burmese is the official spoken language, and the other ethnic languages are Kachin, Kayah, Karen, Chin, Mon, Rakhine, and Shan (4). Related to the religions, most people (87.9%) are Buddhist, 6.2% are Christian, and 4.3% are Muslim (7).

Figure 1: Map of Myanmar

Source: *https://www.nationsonline.org/oneworld/map/Myanmar-political-map.htm* (4)

According to World Bank data, from 1960 to 2019, the crude death rate significantly decreased from 21.953 to 8.215 per 1,000 people and the crude birth rate from 43.583 to 17.397 per 1,000 people (8). Total Fertility Rate (TFR) also fell from 6.051 in 1960 to 2.138 births per woman in 2019 (Shown in ***Figure 2***) (9). Life Expectancy at Birth (2020) for both sexes was 67 years, 62.6 years for males, and 71.6 years for females (10).

In 2017, the percentage of literacy among the age of 15 years and above was 92.8% in the male population and females; 85.6% (5). In 2019, the country's Gross Domestic Product (GDP) was 76.09 Billion USD with an annual growth rate of 2%, GDP per capita: 1,608 USD, GDP per capita PPP: 5,142 USD (11). The total unemployment rate of the nation was only 1.8% in 2020. In 2017, the population living below the National Poverty Line was 24.8%. The employed population below $1.90 PPP a day was 1.1% (12).

The income of Myanmar is mainly from agricultural products, forestry, and fishing. Besides, legal and illegal transportation pathways of teak and germs complement the economy. The northern part of Myanmar primarily distributed opium as one of the significant sources worldwide (13).

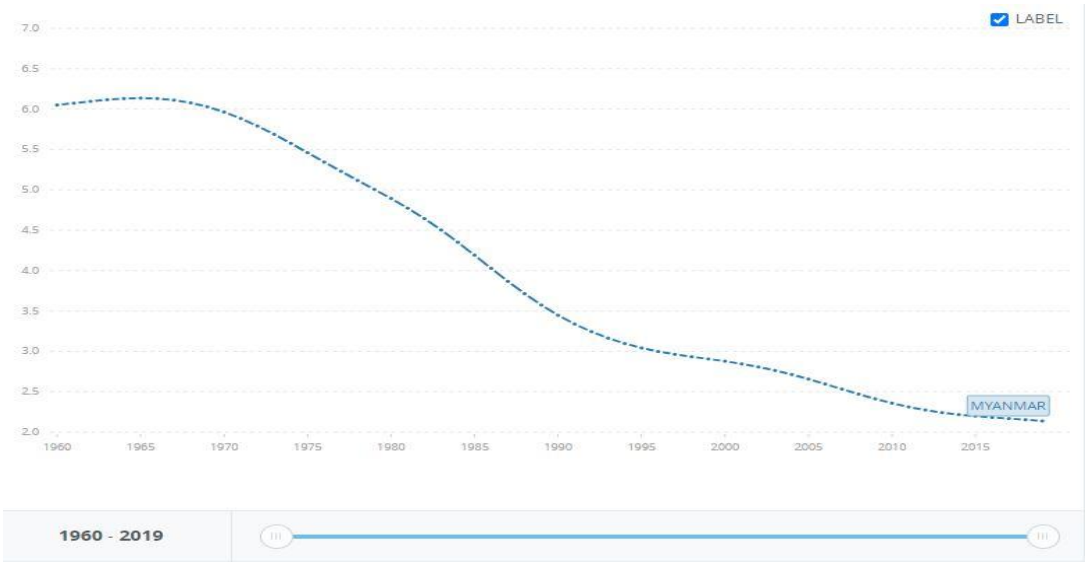

Figure 2*:* Total Fertility Rate (TFR), 1960-2019

Source: *Fertility Rate, total (births per woman) – Myanmar|Data, https://data.worldbank.org* (9)

The Military detained the current President, the State Counselor, and the National League Democracy (NLD) leaders, which won the 2020 Elections and seized power on Feb 1, 2021. The country faces a path to failed state due to several protests, Civil Disobedience Movement (CDM), and general strikes in all cities (14).

(1.2) Overview of Current Health System

Over these years, the health system in Myanmar has not been established well due to the continuing political and transitional socio-economic changes. This situation has caused consequences such as

inadequate human resources for health, lack of infrastructure, ineffective provision of quality and comprehensive health care services at all levels, and high out-of-pocket money expenditure. The health system is responsible by the Ministry of Health and Sports (MOHS) (Shown in ***Figure 3***), which implements all health care services in line with the National Health Policy and National Health Plan (NHP 2017-2021). Despite this, there are still inequalities in accessibility and availability of health care services depending on the geographical structures and socio-economic conditions (15).

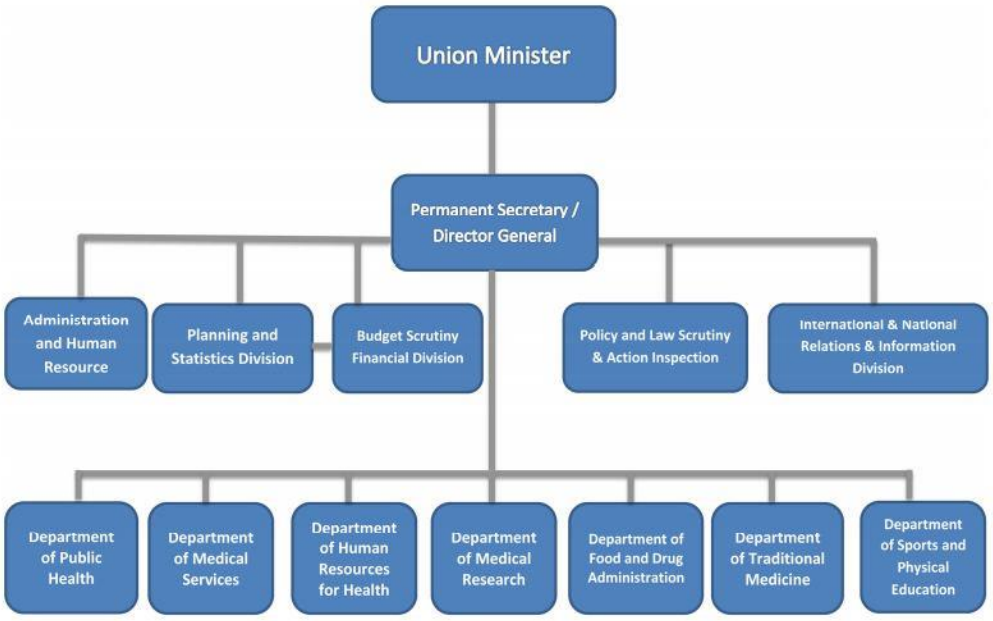

Figure 3: Ministry of Health and Sports (MOHS) Organogram

Source: *MYANMAR HUMAN RESOURCES FOR HEALTH STRATEGY (2018-2021)* (16)

Non-communicable diseases (NCD) such as stroke, ischemic heart diseases, chronic obstructive pulmonary disease (COPD), Diabetes, Cirrhosis, Chronic Kidney Diseases, Asthma, and infectious diseases such as Lower Respiratory infections, Neonatal disorders, Tuberculosis, Diarrhea diseases, and Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS) were the leading causes of deaths in 2019 (Shown in ***Figure 4***) (17).

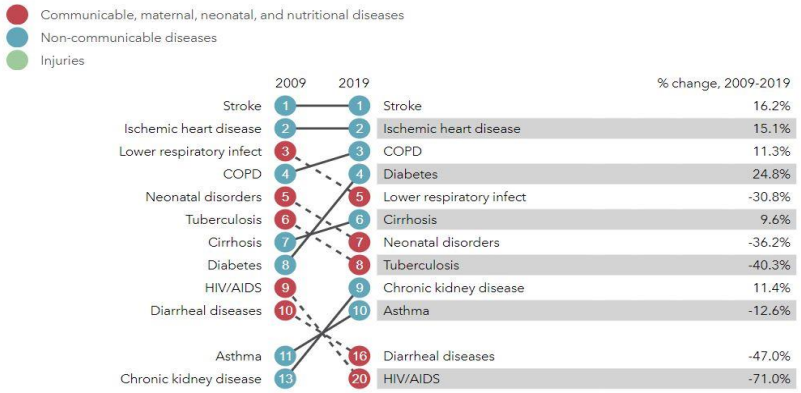

Figure 4: Top 10 causes of the total number of deaths in 2019 and percent change 2009–2019, all ages combined

Source: *Myanmar/Institute for Health Metrics & Evaluation, http://www.healthdata.org/myanmar* (17)

Among the causes of deaths, NCD accounts for nearly 40% of all deaths. Therefore, this new striking NCD problem calls the national priority to set up further immediate planning and implementation activities in Myanmar (16). To improve the population's overall health status, the Ministry puts all the efforts into increasing government expenditure for the health care sector. As a result, 4.791% of Gross Domestic Product (GDP) was allowed in 2018 compared to 1.701% in 2000 (Shown in ***Figure 5***) (18).

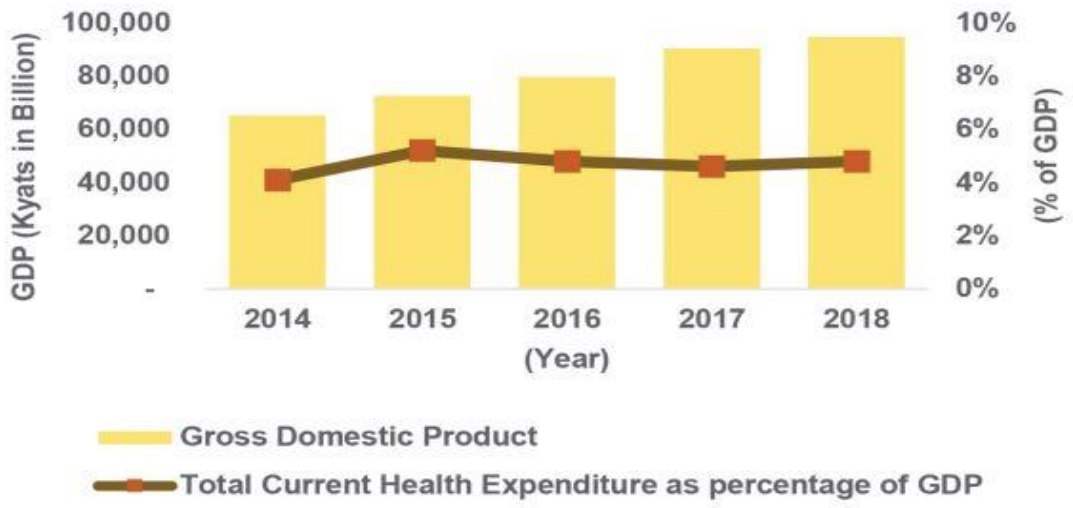

Figure 5: Total Current Health Expenditures as Percentage of GDP in Myanmar, 2014-2018

Source: *Myanmar National Health Account Report (2014-2018) and Health Expenditures Report (2016-2018), Ministry of Health and Sports* (10)

For total health care spending, out-of-pocket expenditure is still the primary source to ensure health care services for all households. The investment of service delivery for the essential health care packages in the public sector is much lower to reach Universal Health Care Coverage (UHC). In addition, unequal distribution of human resources and building infrastructures is also challenging for implementing health care programs at all levels. MOHS's project planning was not based on evidence-based decision-making due to limited facts and available data resources from the current health care system (16).

As health service delivery points, the whole health system has 1,815 rural health centers under the leadership and direct supervision of Township Medical Officers (TMO). There are 330 townships nationwide, and each township provides primary and secondary health care services between 100,000 to 300,000 people. Township hospitals, urban health centers, maternal and child health centers (MCH), school health teams, tertiary, and referral hospitals mainly provide healthcare services in urban settings (17).

In rural areas, township hospitals, rural health centers, sub-centers, and outreach or mobile clinics services provide the necessary services for the community. As stated in NHP, 1.33 health workers (doctors, nurses, and midwives) served for health care delivery per 1,000 population in 2016, lower than a minimum threshold of 2.3, recommended by the World Health Organization (WHO) (15). Medical doctor coverage completely differs from 53 per 100,000 population in Yangon Region up to only 7 in Rakhine Region in the public sector (10).

The majority of the teaching hospitals and specialist hospitals are well structured in large cities like Yangon, Mandalay, and the capital city, Nay Pyi Taw. It contributes to a high density of health care professionals in those hospitals areas (10). The range of distribution for other health care service providers per 100,000 population ranges from 1 to 8 in dental surgeons, 26 to 135 in nurses, 33 to 128 in both Lady Health Visitors (LHV) and Midwife (MW), and 27 to 120 in Health Assistants and Public Health Supervisors depending upon the geographical situations and community interests for their professional life (10).

(1.3) Health Care Service Utilization

There are two sources of health care provision sectors: public and private. Within 2019, one in five people went to primary care health centers to seek the available health care services. In 2018, 600 to more than 10,000 out-patients and 350 to over 12,000 in-patients per day attended the hospitals for comprehensive health care services. The number of patients varies through the different states and regions based on easy transport and population density feasibility (10).

Especially Yangon and Mandalay regions have the highest number of patients for out-patient and in-patient care because of ensuring access to care in specialized care hospitals, tertiary hospitals with modern diagnostic facilities, and emergency transportation services for referral cases if needed (10).

The vaccination coverage for BCG, Penta-3, OPV-3, and PCV-3 was above 90% starting from 2017, where that of Measles-2 ranged between 81% to 88% (10).

Percentage of antenatal care (ANC) coverage improved 75% to 88% (Shown in ***Figure 6***) from the period of 2012 to 2019 except Yangon and Shan (East) regions (10). In the Yangon region, ANC services utilization is higher in the private sector due to pregnant women's concerns and surging demand. The institutional delivery rate was 70% in where 62% are in both public and private hospitals, while the skilled birth attendance rate was 87% in 2019 (10).

According to the 2015-2016 Myanmar Demographic and Health Survey (MDHS), the contraceptive prevalence rate (CPR) among married women of reproductive-aged (15-49 years) was 52%, while 51% used modern contraceptives and only 1% of traditional methods. More than half of the clients using modern contraceptive methods (54%) got the drugs from public hospitals, health care centers, and mobile clinics. Unmet need for family planning was 16% (19).

Demand satisfaction for using modern contraceptive methods was 75% among those women (19). In 2019, utilization of modern contraceptives increased to 54% due to the private-public partnership of

the family planning implementation programs (20). The adolescent fertility rate was 27.9 births per 1,000 women aged 15-19 years (21).

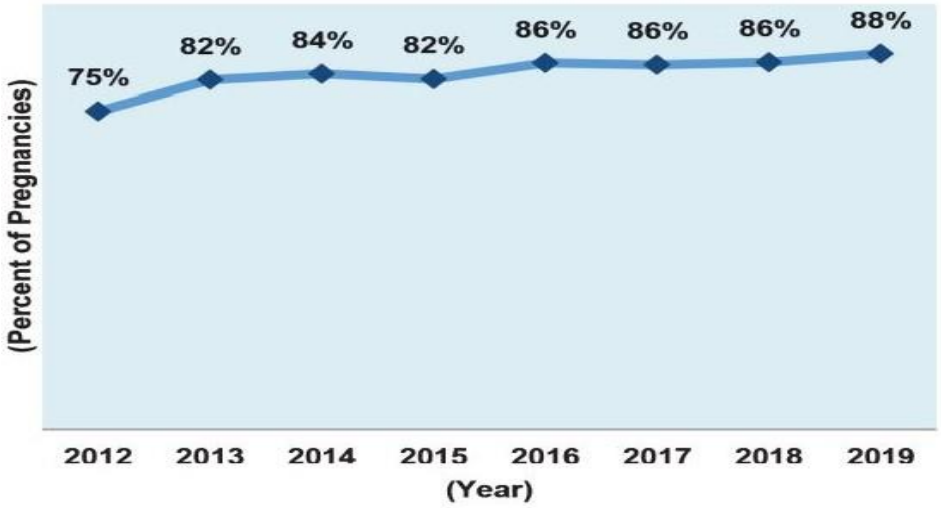

Figure 6: Antenatal care coverage from 2012 to 2019

Source: *Public Health Statistics, Health Management Information System Division, Ministry of Health and Sports* (10)

(1.4) Emphasis on Maternal Mortality

Myanmar did not reach the Millennium Development Goal (MDG) target of a 75% reduction in maternal mortality in 2015 (22). In the 2014 Myanmar Population and Housing Census, Maternal Mortality Ratio (MMR) was 282 deaths per 100,000 live births (23). It slightly reduced to 250 deaths per 100,000 live births (Shown in ***Figure 7***) mentioned in trends in Maternal Mortality (2000-2017) report. However, it is still the highest within the Southeast Asia regional countries (3).

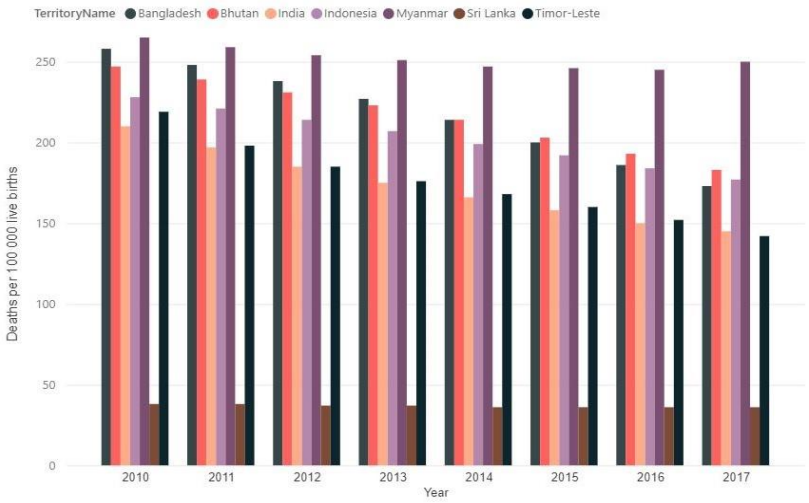

Figure 7: Maternal Mortality Ratio (per 100,000 live births) in South-East Asia Region from 2010-2017

Source: *https://www.who.int/data/maternal-newborn-child-adolescent-ageing/indicator-explorer-new/mca/maternal-mortality-ratio-(per-100-000-live-births)* (24)

The lifetime risk (LTR) of maternal death in Myanmar was 1 in 190 compared to 1 in 1900 in Thailand and 1 in 1300 in Sri Lanka (3). The average annual reduction rate was 3.7% (1990-2010), 2.8% (2010-2015), and lower than the required 5.5% to the Sustainable Development Goal (SDG) target (25). Pregnant women mostly died due to bleeding and infection causes, which are manageable complications at the health care facility level (26).

Limited accessibility to health care services and low health literacy status about pregnancy-related complications contribute to high MMR in pregnant women with low income and illiterate (26). Thus, Myanmar has set up the national priority in reducing MMR to 91 per 100,000 live births in 2030 (25). In order to attain Universal Health Coverage, reinforcement of maternal, newborn, and child health care services is the first thing to implement in the country (26).

So, the Ministry put Reproductive, Maternal, Newborn, Child, and Adolescent Health (RMNCAH) services in the basic essential packages of health services (EPHS) to cover the whole country without financial hardship. The aim is to grant no disparity on attaining the essential primary health care services at the township level and below and reduce maternal mortality and morbidity (26).

(1.5) Overview of Maternal Death Surveillance and Response System (MDSR)

The Maternal Death Surveillance and Response System (MDSR) is one of the interventions implemented to reduce preventable maternal deaths in Myanmar. If a woman of reproductive-aged (15-49 yrs) dies in the village and housing estate (the community) or the hospital, it will be assumed as a probable maternal death in the MDSR System. Midwives in the community must identify and notify TMO about the death within 24 hours and also to the State/Regional MDSR team and the focal person at the National level within the same day with maternal death notification form (Form 1) used for deaths in the community (Shown in ***Figure 8***) (27).

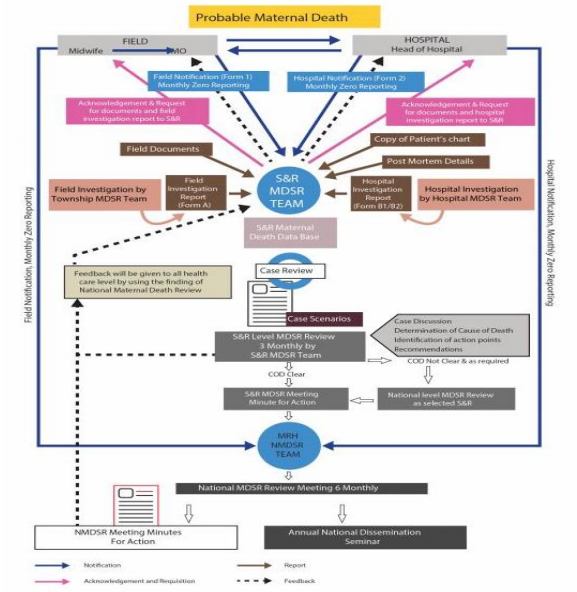

Figure 8: MDSR Mechanism in Myanmar

Source: *Maternal Death Surveillance and Response (MDSR) Manual for Basic Health Staff* (27)

If the death is at the hospital, the person in charge must notify with a maternal death notification form (Form 2) like the community side. If the notification form does not reach the time mentioned, the collected information can send via mail, Viber message, or instant messaging. The information sharing and communication channel between the community and the hospital sides must be vice versa, not miss any maternal deaths. Although there is no maternal death within a month, the TMO must report zero maternal death reporting with the provided format as part of the surveillance system (27).

The surveillance system has been built with four maternal death surveillance teams: field MDSR team, hospital MDSR team, state/regional MDSR team, and national MDSR team. The field MDSR team, also known as the township MDSR team, investigates and reviews maternal death cases at the community level. The hospital MDSR teams are at district and state/regional levels and review all maternal death cases. After the state/regional MDSR team receives notification forms, the team will send the acknowledgment letter to the reporting township (27).

Moreover, the team requests to send all the documents (Field investigation report form (Form A), Hospital investigation report forms (Form B1 or B2), post-mortem examination findings, and the copies of the patient's record if possible) to send within 21 days for the review process. Before sending the necessary documents, the township MDSR team must conduct the Verbal Autopsy (VA) with field investigation report form (Form A) with the family members within 14 days after the funeral process. State/Regional level MDSR team collects all the reports from both community and hospitals (27). All types of forms used in the MDSR mechanism are explained below.

After receiving the maternal death reports, the review meetings are conducting quarterly and biannually at the national level. If the cause of death or something is missing from the data, the national MDSR team will follow up with the state/regional team for further clarification. The state/regional MDSR team discussed all the cases, defined the causes of death according to ICD 10, identified the action points that need improvement, made recommendations in the review meeting, and sent the report to the national level. The findings and situation reports of maternal deaths are endorsed annually at the seminar and advocacy meetings (27).

Forms used in the Maternal Death Surveillance and Response (MDSR) Mechanism

No	Types of Form	Usage
1.	Form 1	Notification of probable maternal death from the community
2.	Form 2	Notification of probable maternal death from the hospital
3.	Form B1	Hospital investigation report (Pregnancy less than 22 weeks) by hospital MDSR team
4.	Form B2	Hospital investigation report (Pregnancy more than 22 weeks) by hospital MDSR team
5.	Form A	Field investigation report by Township MDSR team
6.	Acknowledgment form	Request for documents and field investigation report to State and Regions

Chapter 2: Problem statement, Justification, and Objectives

This chapter describes the problems related to maternal deaths and MDSR globally, South-East Asia region, and Myanmar. The current evidence regarding this topic, the research gap and rationale for the thesis, and the specific objectives will reveal.

(2.1) Problem Statement

Globally, in 2017, nearly 295,000 women died during pregnancy, childbirth, and within the postnatal period. Every day, about 810 women lose their life due to preventable causes during pregnancy and childbirth. Approximately 94% of all maternal deaths were from low and lower-middle-income countries. Among them, one-fifth (58,000) maternal deaths were from the Southern Asia Region. From 2000 to 2017, MMR declined from 384 to 157 per 100,000 live births as the most significant impact of success within this region (28).

The global target of reducing MMR is less than 70 deaths per 100,000 live births by 2030 (29). Additionally, no country should have more than 140 deaths per 100,000 live births, two times higher than the global target developed by United Nations (UN) agencies, international funds, donors, country stakeholders, and other development partners in April 2014 (29). Women and children's health plays a crucial role in global development (30).

The availability of data about maternal and neonatal birth and deaths, stillbirths, and complications during delivery for each country is quite challenging (30). Registering the data of the causes of maternal deaths, accessibility of quality, and comprehensive maternal and newborn health care services are essential to attain Universal Health Care (UHC) coverage (30). Even though the estimation of the statistical data will raise the awareness of the maternal death problem in the global context, the required information for timely response cannot be laid out by countries (31).

Since the MDSR system is applied worldwide, a few countries face barriers to integrate the system into the current health information system (HIS) to maintain sustainability. The monitoring system lacks or is not well-formed in some countries like Kenya, Cambodia, and Nepal and needs improvement (32).

In the ***South-East Asia Region***, 37 million children were born, 61,000 pregnant women, and 894,000 neonates died every year. So, it is essential to get the required data and accurate information from the vital registration systems and other available resources at national and sub-national levels to increase the authorities' interest in Maternal and Child Health (MCH). Therefore, WHO recommended the project of the Maternal Death Surveillance System (MDSR) with the approach of "Beyond the Numbers" from the previous version of Maternal Death Review (MDR) (33).

WHO and other organizations have urged the implementing countries to improve the MDSR system since 2013. The improvement in data availability and necessary knowledge of maternal mortality is challenging due to the scarcity of registration platforms. The process of MDR is a good start for the

initiation of MDSR from 2003 to 2015 in the Southeast Asia Region. Many countries are challenging to strengthen data quality, the importance of reporting in time, and data analysis until now (33).

The recommendations from the maternal review and the actions taken are not correlated and need to improve significantly. The linkage between MDR with CRVS and Health Information System (HIS) is on track in Sri Lanka and Thailand. A Survey of MDSR highlighted that the system is implementing according to the adapted structure, but gaps exist in the operation process. Ten countries in the SEA region constituted the National MDSR committee, but apart from this, three countries held the national level meetings biannually (33).

The trend of maternal health issues in ***Myanmar*** has been changing in those decades; increased maternal deaths, the unequal fertility rate among states and regions and still outweighed the direct obstetric cause of deaths than the other causes. So, to handle the uplifted maternal mortality obstacle, it is necessary to explore the quality of care issues and erase the three types of delays in the existing health system (34).

The prevailing gaps in reporting form of maternal deaths are socio-demographic facts, obstetric care conditions, unclear causes of deaths at home, and other important information from hospital admission charts, ANC record book, and unavailable post-mortem reports for all cases. Another gap is the follow-up plan about the implementation process of the solutions and recommendations generated from the national level review meeting (34). In hard-to-reach areas, timely reporting and complete verbal autopsy information of maternal deaths are challenging (34).

Reporting rate of maternal deaths from the routine communication channel increased after one year of system set-up. However, the investment for capacity-building training regarding the classification of causes of death, filling the data and information in the reporting system is needed (34).

(2.2) Justification

Information and data from the MDSR system reflect maternal mortality and morbidity (34). A yearly country report of maternal deaths was published starting from 2013 with a comprehensive approach for a call for action to higher-level authorities (22). MDSR is a vicious cycle in community and facility levels that comprise maternal death identification, notification, reporting, review, and response (34).

Additionally, the response actions from the review meeting are essential to ensure affordability and accessibility of quality and comprehensive obstetric and newborn health services in routine care and emergencies to prevent maternal deaths. The Sustainability of MDSR has been affected by the high turnover rate of health staff, incomplete data collection tools, and reluctance to report maternal deaths. (34).

According to 2017 MDSR reported data, the women of the 25-39 year age group were significant among all maternal deaths, and the educational level of most maternal death reports was illiterate in Myanmar (34). In developing countries like Myanmar, the high Maternal Mortality Ratio (MMR) has

been a challenging public health problem for the last three decades. MOHS has to reduce preventable maternal mortality to attain a target of Sustainable Development Goals. To reach the SDG, Maternal and Child Health has been integrated as the prioritized area in the National Health Plan (25).

Evidence shows that MDSR can improve the quality and comprehensive health care services in maternal, newborn, and child health in routine and emergencies based on the community's needs (35). Vital Statistics system also gathers this information, and MDSR should link with CRVS accordingly (34). This information can integrate into policy, strategic plan, and program activities (33).

Regarding the performance of MDSR, the literature points out that the efficacy and sustainability rely on these facts: (1) learning perception of the implementers creating the favorable environment than the blaming culture at all levels (2) thorough review meeting with the well-organized team to produce the recommendations for the respective level of the health system (3) collection of all available data from both community and facility levels up to the national level to point out the crack in the quality of health service delivery; the challenges within the system (4) appreciation of the efforts to prevent deaths especially in resource-limited settings (32).

The priority issue of the MDSR system to solve at the global level is to scale up and reinforce the response mechanism (32). MDSR is the gateway to reach the SDG and primary requirement to catch up with the global target of MMR, which is less than 70 maternal deaths per 100 000 live births by 2030 (34). In Myanmar, the Ministry established the reformed system for about four years and did not assess its effectiveness. This thesis will focus on implementing the MDSR system to end preventable maternal mortality as a platform to achieve the SDG. It will access the factors influencing the implementation.

The study results can guide strategic plans integrated into public health care interventions and awareness-raising, monitoring the impact, and reflect the gaps and challenges which can be used in the advocacy to policymakers and the key stakeholders. The recommendations and results from this thesis will bring new inspiration to the fundamental cooperation and collaboration process to end preventable maternal deaths in Myanmar.

(2.3) Study questions

What factors influence the improvement or hindering upon the implementation of the Maternal Death Surveillance and Response System (MDSR) in Myanmar?

(2.4) Objectives

(2.4.1) General Objective

This thesis will analyze the factors influencing the Maternal Death Surveillance and Response System (MDSR) implementation in Myanmar.

(2.4.2) Specific Objectives

The following specific objectives will provide to fulfill the ultimate aim of this thesis.

- To explore the current implementation status of the MDSR system in the aspects of notification, review, analysis, and response
- To identify the societal factors influencing the implementation of the MDSR system
- To find out the service delivery factors involving in the performance of the MDSR process
- To establish the health system-related factors affecting the practice of the MDSR system at all levels
- To make recommendations for the policymakers and stakeholders to integrate into the strategies to end preventable maternal mortality in Myanmar

Chapter 3: Methods and analytical framework

This chapter provides the scope of the methodology used, the literature search strategy, and the analytical framework to explore the factors affecting the performance of the MDSR system.

(3.1) Methodology

This thesis is a literature review that will study the factors influencing the implementation of the MDSR System in Myanmar and the experiences of other implementation countries. It will base on the published documents in Maternal Mortality, Strategies to End Preventable Maternal Mortality, MDR and MDSR Reports, Maternal and Reproductive Health Care policies from the Ministry of Health and Sports (Myanmar).

Other sources are the 2015-16 Myanmar Demographic and Health Survey (MDHS), the 2014 Myanmar Population and Housing Census Report, Civil Registration and Vital Statistics (CRVS), National Health Accounts (NHA). Grey Literatures, guidelines, papers, reports, and peer-reviewed articles from international organizations: WHO, UNFPA, UNICEF, World Bank, UNDP, Institutional website. All other available resources aim to spot contributing factors on MDSR in Myanmar after the system is implemented. Information will extract from those search engines and online databases such as PubMed, Google Scholar, Google, The Lancet, VU Library, NCBI, Research Gate, Cochrane, and the International Journal of Obstetrics and Gynecology.

Key Words: Maternal Death Surveillance and Response (MDSR), Maternal Death Review (MDR), Maternal Mortality, Myanmar, Preventable Maternal Deaths, Maternal and Child Health Care (MCH), Universal Health Care Coverage, Sustainable Development Goals (SDG), Beliefs, Culture, Barriers, Socio-economic status, and Reproductive Health, Accessibility, Health care services

Inclusion Criteria

Yearly Reports of MDR (2013 to 2016) and MDSR (2017 and 2018) from the Ministry of Health and Sports, Myanmar, reports from the South-East Asia Region on strengthening MDSR/MPDSR, journals, published papers from the implementing MDSR/MPDSR in low and middle-income countries from 2005 onwards with available in English or Myanmar are reviewed.

Exclusion Criteria

Literature and studies before MDR and MDSR practice, the articles only discuss the overview of maternal deaths, types of delays, obstetric related complications and do not evaluate the factors influencing the implementation process of MDSR in low and middle-income countries (LMICs) are excluded.

(3.2) Literature Search

Table 1: Keywords used for search strategy

Geographical Area	*Keywords*	*Objective 1*	*Objective 2*	*Objective 3*	*Objective 4*
Myanmar South-East Asia -Nepal -India -Sri Lanka -Bangladesh Low and middle-income countries -Ethiopia -Tanzania -Zambia	-MDR -Maternal Death Review -Maternal Death Surveillance and Response -MDSR -Maternal Mortality -Maternal Deaths -Reproductive Health -Accessibility -Health care services	-Notification -Review -Analysis -Response -Implementation -Maternal health -Mortality -Preventable -Morbidity -Audit -Zero reporting -Coverage -Under-reporting -Recommendation	-Community -Society -Age -Beliefs -Culture -Discrimination -Education -Ethnicity -Family -Gender -Marital status -Male involvement -Poverty -Religion -Socio-economic status -Stigma -Engagement -Orientation -Coordination -Collaboration -Outcome -Attitude	-Utilization -Accessibility -Quality of care -Acceptance -Communication -Counseling -Integrated services -Perspective (provider/client) -Performance -Health facilities -Private sector -Public sector	-Policies -Strategies -Protocol -Guideline -Political concern -Maternal and reproductive health -Intervention

(3.3) Analytical framework

Maternal and Perinatal Death Surveillance and Response System (MPDSR) is still implementing as an MDSR System in Myanmar. This framework has chosen for the study because it was the adapted framework for low-and middle-income countries. It provides a broader perspective of factors and their linkage affecting the implementation status of MDSR. The components of the framework are the same context in the implementing MDSR mechanism within the country.

With this framework, the ongoing status of the MDSR system, the societal, service delivery, and health system-related factors contributing to or hindering upon implementation of the system can be explored based on the four domains with three different lenses. The conceptual framework (Shown in ***Figure 9***) reveals the MDSR system's operational process on five levels: community, facility, sub-national, national, and global.

The linkage and information flow are vital because the system is mainly based on the reporting mechanism from the community up to the national level regularly by bottom-up and top-down approaches (36). It includes two parts: (1) The theoretical concept: it explains the structure of the MDSR system in the country adopted guidelines developed with the local context (2) The implementing system: the operational status of MDSR within the country.

The framework includes four main domains: the intervention, individual, inner and outer settings (36).

1. Intervention refers to the MDSR system.
   Service delivery lens: Components and execution, costs
   Societal lens: Framing: Source, evidence, and relative advantage
   System lens: Trialability, Adaptability
2. The Individual domain means the health care providers involving in the implementation of the system.
   Service delivery lens: Skills and knowledge
   Societal lens: Self-efficacy, Motivation, and Ownership
   System lens: Individual orientation
3. The inner setting reflects the internal factors of the organization.
   Service delivery lens: Readiness, team composition, incentives
   Societal lens: Team relationships
   System lens: Implementation culture and climate, Engaged leaders
4. The outer setting explains the external factors contributing to the operation process of the MDSR system.
   Service delivery lens: Policies, Resource support
   Societal lens: External actors, Political priority
   System lens: Pressures, Linkages, and Networks

The analysis of each domain will be under three different lenses.

(a) Service delivery lens, which reflects the efforts needed for implementation of MDSR

(b) Societal lens, which includes the interactions between the community: perception and acceptance and health care providers: motivations, ability to adapt and communicate for information gaps and

(c) System lens explores the changes from the results of continuous assessment that did not include before (36).

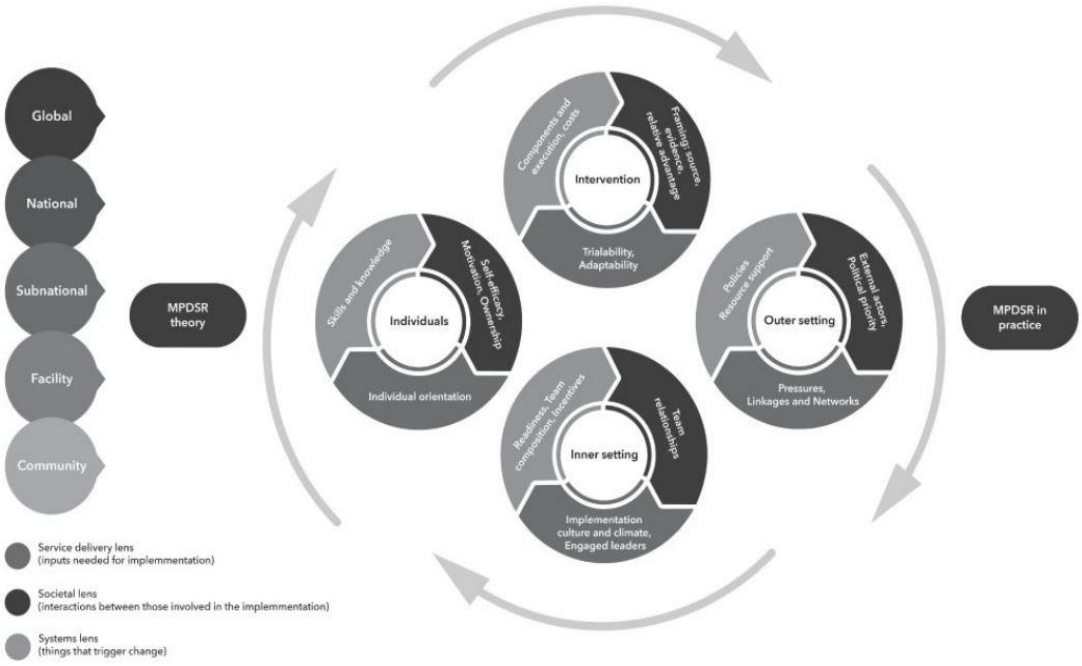

Figure 9: Theoretical Framework for studying MDSR Implementation in Myanmar

Source: *Maternal and perinatal death surveillance and response in low- and middle-income countries: a scoping review of implementation factors, Health Policy and Planning, 2021* (36)

Chapter 4: Study Findings

This chapter explores the findings of the implementing MDSR System in Myanmar. It analyses and evaluates the MDSR system in four main concepts: intervention itself, the individual factors, the inner setting, and the outer setting with three lenses: the societal, service delivery, and system lens.

(4.1) Intervention

The intervention reveals the functional status of the MDSR system. It consists of

(1) Components, execution, and costs

(2) Framing: source, evidence, relative advantage

(3) Trialability, Adaptability

(4.1.1) Components and execution, costs

This section reflects the steps of the MDSR system: notification, report, review, analysis, response actions, and the expenses for data collection, meetings, and capacity building.

(4.1.1.1) Components and execution

The components of MDSR consist of (1) the routine identification and notification of maternal deaths, (2) report and review the maternal death, (3) analyze those maternal deaths to provide the actions that need to be taken and make recommendations (4) responds to the findings and monitor the response. This continuous monitoring and evaluation cycle has been applied in Myanmar as the basic MDSR system as recommended by World Health Organization (WHO) (Shown in ***Figure 10***) (31).

Figure 10: Maternal Death Surveillance and Response (MDSR) monitoring and evaluation (M&E) cycle

Source: *WHO Maternal death surveillance and response: technical guidance information for action to prevent maternal death* (31)

The first step of the MDSR system is to ***identify and notify maternal deaths***. If a probable maternal death occurs, focal persons from the community and facility levels must notify state/regional and national MDSR teams within 24 hours. In Myanmar, there is no systematic collection of notification and recorded data on whether maternal death is notified within 24 hours or not at both state/regional

and national levels. Via phone messaging, Viber, Messenger, or mobile phone calls have been allowed as the communication channel to solve the issue of timely notification (35).

Compared to other low and middle-income countries in 2015, Myanmar partially implements the MDSR program (Shown in ***Figure 11***). Notification of suspected death of pregnant women is still under-reporting due to the unaccomplished and incompetent structure of the system (37).

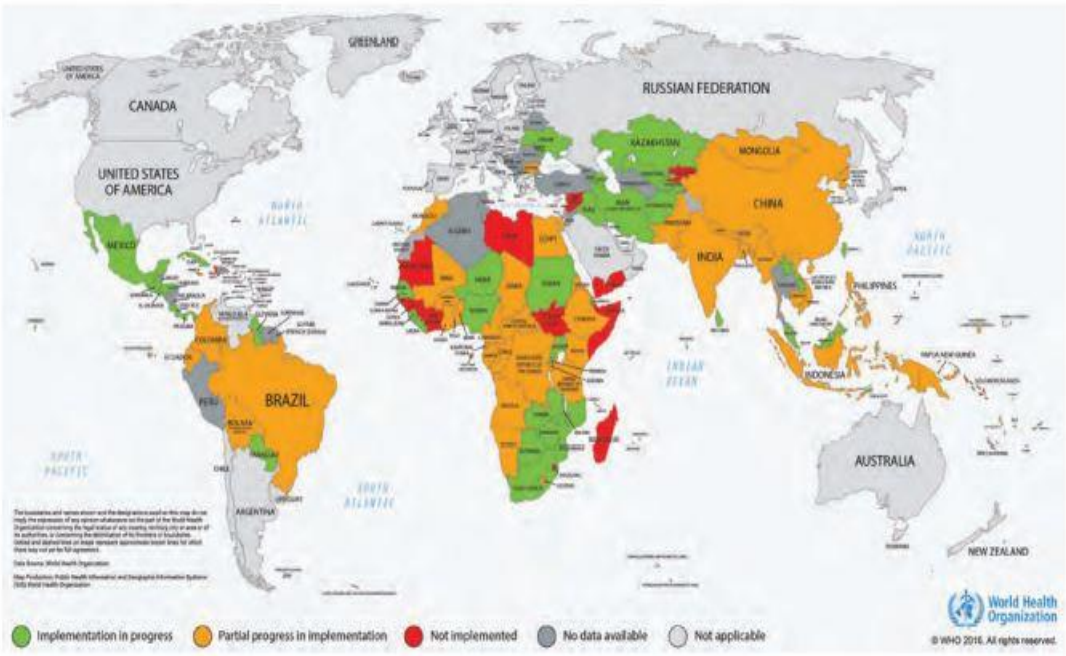

Figure 11: MDSR implementation status in low-and middle-income countries

Source: *WHO-UNFPA MDSR Baseline Survey 2015 and WHO MNCAH Policy Indicator Database 2014* (37)

In Myanmar, the ***reporting*** mechanism of maternal deaths is standardized. Information is not reaching just in time due to delays in reporting from the community level and the review process at the township, state, and regional levels (26). MDR report (2013) mentioned that inadequate MDR forms are another challenge for late reporting in the community and health facility level (38). Literature about the evaluation of the MDSR system in Zimbabwe states that insufficient awareness of maternal deaths, lack of accessibility of the guidelines and notification forms are the factors related to the late notification process of health care providers (HCP) at the health facilities level (39).

The reported maternal deaths have been ***reviewed*** at the state/regional level quarterly (26). Starting from 2011, the Ministry recorded the reported maternal deaths and the number of review cases. The number of maternal deaths reported and review rate steadily increased from 94% in 2013 to 100% in 2018, except in 2015 (26) (Seen in ***Table 2***).

Table 2: Maternal Death Reporting and Review Rate in Myanmar from 2011-2018

Year	Source	Number of death	Number of review	Percent
2011	2,000 (MMEIG) estimate	1,517	478	32%
2012	2,000 (MMEIG) estimate	1,208	670	55%
2013	1,900 (MMEIG) estimate	922	863	94%
2014	MDR reported	846	846	100%
2015	MDR reported	861	674	78%
2016	MDR reported	823	815	99%
2017	MDSR reported	949	873	92%
2018	MDSR reported	929	929	100%

Source: *National Maternal Death Surveillance and Response Report (2018), Ministry of Health and Sports* (26)

Even though the Maternal and Reproductive Health (MRH) Division implemented the transformed MDSR system in 2017, the MDSR review meeting at the central level has not been conducted yet because of delays in the development of the central MDSR committee. The hospital MDSR team reviewed maternal deaths regularly and effectively than at the community level. The state/regional MDSR team did not routinely review maternal death cases because of late township reporting and financial support for the review step. Therefore, the meetings were held biannually instead of quarterly (26).

For ***analysis***, the data, including in the field investigation report forms, have been recorded with the excel sheets by the state/regional MDSR team. The national team compiled all those data from community-based and facility-based MDSR teams for data completeness and consistency. The fund management organization (FMO) team from the Three Millennium Development Goal (3MDG) Fund helped the national team in the data cleaning and analysis stages (34). Although the Ministry has built the national database at the central level and distributed the same format to all states and regions, it has requirements to meet the standard criteria for analyzing and interpreting the social determinants of maternal deaths (26).

The analysis has been done for the overview of maternal death-related information providing the distribution of state/regions maternal death incidences, obstetric conditions, cause, the timing of deaths, care-seeking history since 2013. In 2017, besides the existing data, the additional surveillance and response mechanism on the incidence of death were added to reflect the success and benefits of the MDSR in reducing maternal mortality (26).

The reformed MDSR system was implemented in 2017 but needed to monitor and evaluate the effectiveness of surveillance and ***response actions***. The theory of surveillance aims to cease the loophole but was still weak to apply (34). Lack of feedback and response actions causes inadequate data reporting and vice versa. As stated in MSDR 2018 report, the community and health facilities

responded to 56.6% (526 out of 929) of maternal deaths in the respective areas with specific actions (26).

Awareness-raising about maternal mortality was the typical action taken at the community and tertiary health care levels, and it was about 35.7% (188) of the total responses. These activities include health education about the danger signs and risks during pregnancy, delivery, and postnatal periods, the value of early referral, birth plan, and benefits of institutional delivery (26).

Capacity building about managing obstetric emergencies for all health care providers was the second recommendation to take action and accounts for 18.3% (96) of the total responses. The third one was Antenatal Care (ANC) and Family Planning (FP) awareness-raising activities at the community and institutional level, and it was about 16.5% (87) of total responses. Provision of essential medicines for maternal and reproductive health was the only feedback for procurement and supply. Provision of contraceptive drugs to township hospitals was about 4.2% of responses (Seen in ***Table 3***) (26)**.**

Table 3: Specific Responses of Health Facility based on case-wise maternal deaths at their areas

Item	Sub-items	Frequency	Percent
A. Ensuring adequate coverage of emergency services by skilled providers	A1. Addressing the essential obstetric medications or supplies	11	4.2
	A2. Improving knowledge or skills of providers in the management of obstetric emergencies	96	18.3
	A3. Improving services such as antenatal care or family planning	42	8.0
B. Monthly, quarterly, or semiannual reviews (depending on numbers) of aggregated findings	B1. Annual summarisation of its maternal mortality findings	5	1.0
	B2. Contributing the findings to continuous quality improvement plans	21	4.0
	B3. Health-system strengthening and retaining staff, mobilising resources	29	5.5
	B4. community and institutional awareness raising of maternal mortality	188	35.7
	B5. Fostering community–facility partnerships and building alliances with the private sector	12	2.3
	B6. Conducting advocacy activities	17	3.2
	B7. Community and institutional awareness raising of ANC and family Planning activities	87	16.5
C. State/Region level responses	C1. Non-specific Feedback to district level HF	7	1.3

Source: *National Maternal Death Surveillance and Response Report (2018), Ministry of Health and Sports* (26)

(4.1.1.2) Costs

In Myanmar, WHO and UNFPA are the major implementing partners in technical and financial support throughout the MDSR system. There is no specific data on the implementation cost spent in the operational process of MDSR (26). The health care providers used their money for all expenses, and the Ministry provided only the necessary forms and instructions to follow the guidelines (40). The

absence of funding support is the most significant challenge for MDSR in practice. Subsequently, the countries require more implementation costs from the donor funds and international non-governmental organizations for training, travel support, supportive supervision, monitoring, and evaluation (37).

Even if the countries like Sri Lanka, Nepal, India, Pakistan, and the Maldives are also implementing the MPDSR system, there is not much literature related to the actual implementation costs for the maternal death review and also the Verbal Autopsy (VA) processes in low-income countries (41).

The implementation steps of the MDSR system in Myanmar are similar to those in Bangladesh. Before starting the intervention program, the estimated program cost was calculated for the planning process. For example, in the maternal and neonatal review program study, Biswas et al. show the average field implementation cost at a district level (Seen in ***Table 4***). The facility death review meeting and the social autopsy costs are the most expensive ones to conduct (41).

Table 4: Actual field implementation cost

Average implementation cost	Cost (in BDT)	Cost (in $INT)
Community death notification	100	4.09
Conduction of verbal autopsy	200	8.18
Conduction of social autopsy	400	16.35
Facility death notification	50	2.04
Facility death review meeting	500	20.44

Source: *The economic cost of implementing maternal and neonatal death review in a district of Bangladesh* (41)

Like Myanmar, the program cost of maternal and neonatal death review program was spent mainly for technical meetings to develop guidelines and tools, office expenditure, monitoring and evaluation of the program implementation site, travel costs, and per-diem of health care providers in capacity-building training in the program starting year 2010 (Seen in ***Table 5***) (41).

The development of tools and guidelines and capacity building costs remain unchanged within these three-year periods. The overall cost of the program implementation in 2010 was nearly two times higher than in 2012 (41).

Table 5: Programme cost of maternal and neonatal death review during 2010-2012

Programme cost (in BDT)	2010	2011	2012
Technical meeting	13,0691	111,248	36,870
Development of tools and guidelines	75,178	75,178	75,178
Capacity development	214,589	214,589	214,589
Office setup	885,000	915,750	624,000
Office expenditure	830,826	304,674	231,167
Project office cost	933,219	792,367	541,303
Monitoring	284,877	492,684	97,004
Travel and per-diem	1,063,229	919,847	626,203
Personnel cost	6,485,145	4,382,658	4,175,852
Total cost	10,902,754	8,208,995	6,622,166
Cost in $INT (1 $INT = 24.46)	445,738	335,609	27,0735

Source: *The economic cost of implementing maternal and neonatal death review in a district of Bangladesh* (41)

(4.1.2) Framing: source, evidence, relative advantage

This section defines data sources, evidence to reduce maternal deaths, and the relative advantage of implementing MDSR as an intervention to prevent and reduce maternal deaths. In Myanmar, birth and death data (including maternal deaths) are available in the Central Statistical Organization (CSO) of the Ministry of Population and Immigration. Nevertheless, the data collectors were the public health care professionals who record births and deaths of the whole population. Then, the data has been reported to Health Planning, Maternal and Child Health (MCH) sections, and CSO (38).

Although Maternal Mortality Ratio (MMR) can be computed from the available data, it can only reflect maternal deaths and not the related causes and social determinants. Each maternal death has its own story related to the social determinants and underlying causes. Thus, applying this data (MMR) for program planning, interventions, and strategies is inadequate to end preventable maternal mortality (38).

The Ministry of Health started the Maternal Death Review (MDR) pilot projects to receive total maternal deaths in 2005 (38). Later in 2016, the Ministry transformed the MDR to MDSR, adapted to Maternal Death Surveillance and Response: technical guidance information for action to prevent maternal death of WHO (34). Based on the available data from the MDSR system, maternal deaths can be compared yearly and applied to prioritize the activities to reduce preventable maternal deaths (26).

Preventable maternal deaths: postpartum haemorrhage, pre-eclampsia/eclampsia, abortion/septic induced abortion, sepsis, prolonged labor, and antepartum haemorrhage were the most common causes of death over these years. Therefore, in 2016, the Ministry scaled up the Basic Emergency Obstetric Care (BEmOC) training nationwide to all basic health staff, increasing the availability of maternal and reproductive health drugs, ensuring quality and comprehensive contraceptive methods by the provision of Family Planning training and long-acting reversible contraceptives. After three years of evidence-based interventions, these preventable causes significantly reduced (26).

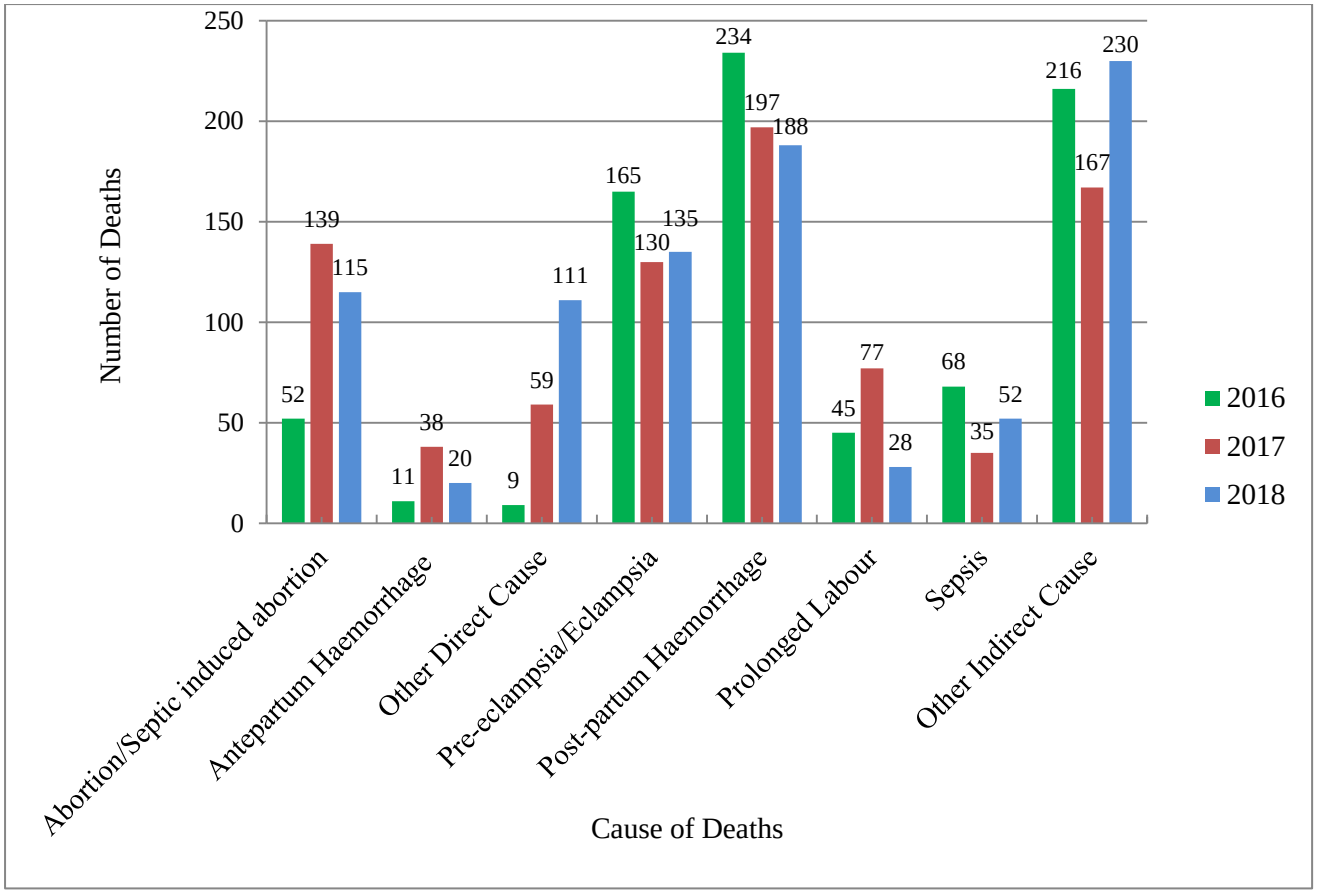

Figure 12: Comparison of the number of different causes of deaths from 2016 to 2018

Source: *National Maternal Death Surveillance and Response Report (2018), Ministry of Health and Sports* (26)

It is scanty regarding the relative advantage of the system in low and middle-income countries (LMIC). Although no direct evidence is available in the context of Myanmar about the relative advantage of implementing an MDSR system, other indirect evidence is available from other LMIC. The study of Maternal Death Surveillance and Response in East and Southern Africa (42) stated that

> ***"The Maternal Death Surveillance and Response System (MDSR) is one of several low cost-marked effects strategies for reducing maternal mortality."***

For example, Kalter et al. point out that the maternal death review and response process is the ideal implementation tool for exploring the contributing factors of maternal deaths in Ethiopia. The country put the MDSR system into the current national disease surveillance and assessed causes for maternal mortality effectively. The operational process of the system has both advantages and disadvantages: it highly relies on political commitment, well-described roles, and responsibilities of the different teams and is in line with the national health policies (43).

The system provides reliable and quality data, additional information about the other determinants, improved motivation, and communication for better results as the benefits (43). Smith et al. mentioned that the government of Nigeria supports the implementation of MDR by spending more budgets on maternal health, integrating into the existing policies and national strategy. In Kenya, all

health care facilities provide free maternal health care services. The government built mandatory maternal death notification and placed MDR in the national health care system (44).

Kabuya et al. conclude that maternal death due to infections during the postnatal period and uterus rupture declined after MDR practice in Zambia, not including the postpartum hemorrhage. The recommendations and actions from MDR meetings are the models to improve the quality of care in hospital settings to reduce MMR (45).

(4.1.3) Trialability, Adaptability

This section illustrates the ability to apply the system as the pilot projects, revise, and adapt to the organization's requirements. Maternal and Child Health Section (MCH) from the Ministry of Health, Myanmar, started to gather maternal death notifications in the public sector of the health care system in 2003 (38). Not only notification, but the division also collected additional information about the cause, time, place of death, and the type of health care service provider before death (34).

The pilot projects of MDR started to implement in 30 townships across Myanmar in 2005 and later expanded nationwide. Back in 2011, the country participated as one among five countries in the evaluation process of MDR by WHO/SEARO (46). Maternal Death Review (MDR) was established in 2011 to get complete information on maternal death reports. MDR was reformed as Maternal Death Surveillance and Response System (MDSR), adding surveillance and response mechanism in 2016. MDSR System rolled out nationwide to obtain more accurate and complete data of maternal deaths since then (34).

In the issue of adaptability, since the health care organizational structure is dynamic, the focal persons of MDSR are not the same from time to time (34). After two years of MDSR performance, the implementation teams were mindful of gathering maternal mortality data and the importance of notification to the higher-level authorities. Community and facility MDSR teams review the cases and made recommendations based on preventable factors as the system's significant impacts of applying a systematical approach (26).

Based on the workload, the state/regional and township public health departments and hospitals attached one to two persons to follow-up notification and missing facts of maternal deaths. Although the MDSR team from the public health departments shares the information about the deceased woman to narrow the gaps in filling the reports with group messaging platforms, communication between hospitals was lacking (26).

In summary, the findings of the intervention domain show that even though the MDSR system has been implementing in adaptation with the country context, it has been facing issues including under-reporting of notification, delay, and late reporting, insufficient response actions, and inadequate human resource in the analysis at the central level. The only progress of the system is the increased review rate of maternal deaths. It is rare evidence about the relative advantage, the implementation cost, and the reduction in maternal mortality.

(4.2) Individual

The individual section calls the perception of the health care providers related to the MDSR system. It mainly composes of

(1) Skills and Knowledge

(2) Self-efficacy, Motivation, and Ownership

(3) Individual orientation

(4.2.1) Skills and Knowledge

For the technical skills and knowledge of health care providers about the MDSR system, the Ministry developed the National Technical Guideline on MDSR system (English Version) in 2016 and the Training Manual for Basic Health Staff (Myanmar Version) in 2018 (27). Capacity building of networking and practice about the MDSR mechanism can increase the efficient skills of health care professionals (47). The necessary actions are to distribute the ICD 10 definitions and MDSR guidelines to all healthcare facilities and train all health staff involved in the implementation (39).

Training includes knowledge-sharing sessions: birth plan preparedness, emergency management, early referral systems for all obstetric complications, danger signs maternal death reporting with involvement of all stakeholders at the regional level (47). Knowledge, Attitude, and Practice (KAP) regarding implementing the MDSR system were still low. Some basic health staff face challenges of language barriers in filling the investigation form (written in English) stated in MDSR 2018 Report (26).

Implementation Research conducted in 2017-2018 at Tanintharyi Region, Myanmar; find out that that refresher training will improve the KAP of HCP. The MOHS provides refresher training to all MDSR focal assigned persons at state and regional levels to improve the KAP and awareness of their implementation roles in 2018 and 2019. In addition, the Ministry plans to add the MDSR system into the curriculum in medical universities and pre-service training in midwifery schools as the first step (26).

At the township level, the TMOs are responsible and shared the experiences of maternal death review cases to all health staff at monthly Continuous Medical Education (CME) sessions regularly. Only comprehensive emergency obstetric care (CEmOC) training was provided to the Station Medical Officers (SMO), and they do not want to join MSDR training. The system itself is adequate and reasonable to apply, but it is not accessible to every health care staff (39).

The situation of Myanmar is quite similar to the settings of the African countries. For example, the study of assessment of facility-level MPDSR in Sub-Saharan African countries highlighted that the limited capacity, motivation, and staff time of HCP affects the implementation of the system. Strong administrative support, staff responsibility, and frequent review meetings can progress the performance skills (48).

Additionally, the descriptive study about the evaluation of MDSR in Zimbabwe expressed that among 99% of the nurses implementing the system, 62% of the respondents knew the exact definition of maternal death. 98% accepted that the system was practically feasible to implement, 68% replied to notify the maternal deaths confidently, 62% knew all the information of the death case, and 80% can analyze the data and apply it in the monitoring and evaluation process (49).

Only 31% of the participants shared the results of the findings with the stakeholders. There was no zero reporting from the community level. Nearly 97% of the HCP were eager to participate in the future implementation of MDSR. It concluded that the community participation and leadership of the higher-level authorities, lack of health care professionals, and capacity building are the prohibiting factors for the system practice (49).

(4.2.2) Self-efficacy, Motivation, and Ownership

This section demonstrates the health care providers' capacity, motivation, and responsibility to the MDSR system. Although the overall MDSR system is well-organized and structured, the awareness of zero reporting at the township, state, and regional levels was not improved. Focal persons in the MDSR system have to solve missing data; they do not have clear instructions or feedback mechanisms for further procedure. Hence, at the township level, TMOs used the monitoring checklists or reminders to get the necessary reports of MDSR to avoid incomplete documentation in their way (26).

In addition, the blaming culture upon healthcare providers and lack of financial support for the verbal autopsy reduce the efficacy and motivation in implementation. Regarding identification and notification of probable maternal death, health care professionals can report to higher-level within 24 hrs without any technical issue (26) and conduct the verbal autopsy without a supply of transportation costs to go to the deceased woman's home in Myanmar (38). Geographical obstacles, imperfect legal frameworks, limited staff numbers, resources, and lack of infrastructure restrain the operational process of MDSR (37).

One study in Tanzania explores the perception of health care professionals about the MDSR system of reflecting the two thoughts: "Accomplishing by ambitions" and "A flawed system." The explanation is that all health care professionals (HCP), including higher-level authorities, have a passion for MDSR with their prosperous intention for successful implementation with timely notification, maternal death review meetings, and the recommended action plans (50).

The opinion of HCP regarding the system is that it needs to transform in some aspects of health care services delivery: the changes in policies, the practice of maternal health care, and increased accountability. No specific training, the issues inside the organization, weak coordination in reporting and quality assurance mechanisms, the blaming culture, and lack of motivation are the challenges for the system (50). The barriers for healthcare providers in implementing MPDSR in Rwanda are no community participation and increased workload resulting in low motivation (Seen in ***Table 6***) (51).

Table 6: Barriers to implementing maternal and perinatal deaths surveillance and response (MPDSR) of Rwanda

Barriers	Number (Percentage) of HFs
	13 (%)
Lack of community engagement	7 (54)
Inadequate personnel with necessary up-to-date clinical competencies	5 (38)
Limited number of qualified personnel	4 (31)
Inadequate support from facility leadership	3 (23)
Inadequate support from district leadership	3 (23)
Lack of communication across levels	3 (23)
Inadequate referral system	2 (15)
Limited resources/finances	2 (15)
Lack of essential commodities	1 (8)
Existence of harmful local practices	1 (8)

Source: *Assessing Implementation of Maternal and Perinatal Death Surveillance and Response in Rwanda* (51)

(4.2.3) Individual orientation

This section outlines the health care providers and the Ministry's opinion and analytical reasoning as an implementer to improve the MDSR system. There is little literature about this concept of HCP in LMIC countries as well.

The MDSR system has been implemented nationwide, but HCP in private and military hospitals do not fully participate. The advocacy to the private sector and Military is essential for better surveillance actions. The linkage between the community and referral hospitals is vital for better case review and response action by the focal persons. At the township level, monthly maternal death review meetings among HCP create an alternative way for information sharing and better collaboration for maternal deaths in the migrant population (26).

Private Sector involvement is essential since the start of the MDSR practice. The Ministry tried to engage the private sector to report maternal deaths and participate in community awareness activities to prevent maternal deaths in 2016 and military hospitals in 2017. The reports of maternal deaths from the urban areas, the private hospitals, and the migrant population are still missing. Most of the reports are available from the public hospitals under the control of the government. The HCP expresses that community participation and engagement with local authorities and civil society organizations are essential in better coordination and collaboration in the scale-up of the system to reduce preventable maternal mortality (26).

Regarding the individual domain, it seems that issues of HCP related to MDSR implementation are insufficient technical knowledge and skills, lack of motivation due to no community engagement and financial support, the culture of blaming each other due to maternal death cases. Moreover, weak coordination and collaboration between public, private health sectors and military hospitals, increased workload, and poor quality insurances of HCP drawback the implementation status of the MDSR system in Myanmar.

(4.3) Inner Setting

The inner setting of the conceptual framework establishes the organization's internal factors contributing to the MDSR system's practice.

(1) Readiness, team composition, and incentives

(2) Team relationships

(3) Implementation culture, climate, and Engaged leaders

(4.3.1) Readiness, team composition, and incentives

This section reveals the feasibility of establishing the system, the membership, the team's nature, and rewards for HCP in the implementation process. In Myanmar, the MDSR mechanism has been adapted to the country context for implementation readiness. For successful implementation of MDSR, the MDSR teams have formed at all levels: township (both public health and hospital), state and regional, and national for better communication and collaboration. According to the guidance of MOHS, as part of the routine system, the township MDSR team has to review the maternal deaths monthly, the state/regional MDSR team on the review meeting quarterly, and the central level MDSR team biannually (34).

Although the guideline pointed out the terms of reference (TOR) for each team, the teams at all levels cannot operate as mentioned. Therefore, the focal persons recommended that the state/regional level review meetings be organized biannually instead of quarterly and initiate the financing mechanism and sufficient human resources for better system performance. Furthermore, there were no protocol and technical guidance for effective review meetings (26). Each MDSR focal person was appointed in every public health department and hospital setting (34).

The team composition of the Township MDSR team (Field MDSR team) at the community level was as follows (27):

(1) Township Medical officer - Team Leader

(2) Township Health Officer/Team Leader (Maternal and Child Health) - Secretariat

(3) Station Medical Officer/Township Health Nurse - Member

(4) Health Assistant/Lady Health Visitor - Member

(5) Midwife (Rural Health Centre/Sub-centre) where the maternal death occurs - Member

The hospital MDSR team composition was as follows (27):

(1) Medical Superintendent - Team Leader

(2) Professor/Head (Obstetrics and Gynaecology)/Assigned Focal Person - Secretariat

(3) Obstetrics and Gynaecologist/Ward In-charge where the maternal death occurs - Member

(4) Anesthetist In-charge - Member

(5) Forensic Surgeon/Assistant Surgeon - Member

(6) Physician/Surgeon - Member

(7) Matron/Nurse In-charge - Member

The barrier for team composition was that the national MDSR team had not been constitutionalized yet (27).

The field MDSR team and hospital MDSR teams operate mainly the MDSR mechanism. The field MDSR team is the critical player in the whole MDSR mechanism because it reflects all the maternal deaths and sources of the information flow (26). Due to the limited budget, the health care providers in the field spent the cost for MDR forms due to inadequate supply and causes delays in the reporting (38).

There is no practice and no specific budget for incentives in Myanmar and even limited studies in the implementing countries. As the financial support, NGOs provide the refreshment, per-diem, and travel support of capacity building training for health care providers and the higher-level authorities concerned about the incentives as a demotivating factor and negative impact of sustainability (26).

(4.3.2) Team relationships

The section demonstrates the linkage and communication of teams in the MDSR mechanism. If the maternal death occurs at either community or hospital level, the responsible MDSR team informs and reports the deaths to the MDSR focal person through their supervisors (TMO or MS, respectively). It is wasting time and sometimes causes an unnecessary delay in reporting. TMOs delights that the notification rate of maternal deaths from BHS is in outstanding achievements (26).

The assigned focal person in the township manages the whole process of maternal death reporting: filling the forms, collecting the documents, documenting the findings, and reporting to the higher level. The barriers between team relationships were the zero reporting and the data validity of the information. The township team has concerned about informing zero reporting because it is challenging to conclude that there is no maternal death in the reporting area and can be beyond the coverage of BHS (26).

Between state/regional and township teams, the regular follow-up for the necessary information and feedback mechanism for response actions are the main obstacles in implementing the MDSR system in 2018. The gaps between the central level and the other teams were delayed in distributing recommendations of the yearly report to the community level and advocating these recommendations to politicians in Myanmar (26). There is no study for the participants' behaviors involved in the maternal death review process in Myanmar.

One study of Nigeria about achieving accountability complaints that the head of the MDSR team, the senior medical doctors, and the maternal death officer mainly discussed the most unclear parts of the reported cases in the review meeting. The nurses, pharmacist, laboratory technician, and other social health workers did not cooperate reasonably until the argument was not related to the corresponding

topics (52). The nature of participation of team members in the MDR of Nigeria is similar to that of Myanmar.

(4.3.3) Implementation culture, climate, and Engaged leaders

This section points out the organization's accountability, the stage of implementation, and the leadership of the Ministry. There is no regular zero reporting of maternal death to state and regional levels because of a lack of health care professionals' knowledge, instructions, feedback practice, and monitoring process for all necessary reports at the township level (26). Though the technical guideline of MDSR mentions "No Name, No Blame" culture in the reporting system, there is still a blaming habit in the areas of maternal deaths occurring, which affects the participation of the health staff and all other professionals totally in the reporting system of the MDSR mechanism (37).

The four years of experience establishing the MDSR system in Myanmar reflect the system's requirements, especially in providing health care services. MOHS coordinates and collaborates with implementing partners and donors for awareness-raising and service provision at townships of high maternal mortality. Promoting the quality of health care service delivery for maternal and child health is effective at the community level (26).

The Ministry started to scale up the MDSR system with community participation, stakeholder engagement: Non-governmental organizations (NGOs), Ethnic Health Organizations (EHOs), and policymakers by an all-inclusive approach. They integrate community awareness activities, hotline channels for more contact information, Active AN searches, and Risk mother tracking systems in the community, including internally displaced persons (IDP camps) for breaking new ground. The sense of ownership and responsibility of TMO is vital in the implementation of MDSR (26).

For example, the Medical Superintendent (MS) of Hsipaw township, Shan State in Myanmar, solves quality health care problems in hard-to-reach areas by appointing Midwives after training basic emergency obstetric care (BEmOC) for increased coverage of institutional delivery. The coordination and collaboration of TMOs with the community leaders reflect the precision of the operational process. For example, cultural barriers and social beliefs affect the case review of abortion for the HCP at the community level. Therefore, the review team has to orient the deceased family about the verbal autopsy process and confidentiality of information, or otherwise, resulting in incomplete data for reporting (26).

Negligence to take specific action of HCP is the significant effect of under-reporting. A study in Ethiopia explains that deceased women's families have litigated healthcare providers after maternal death in the community. BHS and Politicians like bureaucrats complain that they have already experienced the immense strain not to report the maternal deaths as this death can draw back the government's actions to reduce maternal mortality (53).

In conclusion, even if the Ministry successfully adopted MDSR in the health system, the barriers like no national MDSR team, incentive practice for all health staff, weak information sharing among the

teams, and gaps in community engagement, coordination, and collaboration with EHOs and NGOs forbid the implemented MDSR in Myanmar.

(4.4) Outer Setting

The outer setting of the framework informs the organization's external factors affecting the MDSR system.

(1) Policies, Resource support

(2) External actors, Political priority

(3) Pressures, Linkages, and Networks

(4.4.1) Policies, Resource support

This section gives the status of policies, guidelines, and planning activities integrated for the MDSR system and support from the government. In Myanmar, although the Reproductive Health (RH) Policy 2002 has already been integrated for maternal and reproductive health activities, the sexual and reproductive health status of Myanmar is underprivileged among the South-East Asia region. In 2017, the new National Sexual and Reproductive Health and Rights (SRHR) Policy with six thematic areas was developed in coordination and collaboration with the framework to include all access to quality and comprehensive SRHR health services (54).

One of the six thematic areas was maternal, newborn, and child health. In the newly drafted policy, establishing a data collection system including MDSR was the priority-focused area (54). At the community level, the passion of TMO is the crucial player in the response, taking actions, and monitoring components of the system (26). The Ministry put the maternal health activities as one of the key priority areas in the National Health Plan (NHP) (15).

As an example, Mathur et al. express that the findings of the MDSR system within the SEA region are used in the development of additional policies and strategic plans to increase service delivery. The potential benefits of the system include institutional management like the composition of review teams and committees, the implementation guideline and manuals, strong will of higher health care personnel, participation of community leaders, and motivation of the BHS if they understand that all joint inputs can contribute the positive impact (55).

Literature of Legal and Ethical Considerations during Maternal Death Surveillance and Response highlighted that the existence of law could influence in accessing the information of hospital admission charts, in serving as a shield for the persons involving in the MDSR (health care providers, the analyst, and their family members) and in applying the results (56).

Some issues in implementing the MDSR system are incomplete, preliminary plan, insufficient health staff, lack of motivation, the blaming culture, poor attitude, and concern of BHS. The form of MDR itself causes some difficulties in filling. The survey of MDSR explores that policies for the notification and review of maternal deaths have been integrated into most countries since the

beginning of the MDR process. Nearly 58 countries, including Myanmar, had a national policy to review all maternal deaths in 2011 and raise to 76 countries in 2015 (55).

The proportion of countries with national and sub-national MDSR committees was 76% (76 out of 100) and 65% (64 out of 99), respectively. About 46% (46/100) countries apply to conduct the review meetings at the national level biannually (55).

(4.4.2) External actors, Political priority

This section contributes to the professional associations' awareness, concerns, and political prioritization to implement the MDSR system. There is less participation of the external actors in the MDSR system in Myanmar and LMIC countries because of the confidentiality issue of maternal deaths. In Myanmar, concerns from policymakers and community leaders are vastly influential in the operational process of the MDSR system (26).

The State Counselor of Myanmar stated in the Book of Letters of Burma about the importance of maternal health (25) as

> ***"Some of the best indicators of a country developing the right lines are healthy mothers giving birth to healthy children who are assured of good care and a sound education that will enable them to face the challenges of a changing world.. Our dreams for the future of the children of Burma have to be woven firmly around a commitment to better health care and better education."***

Besides, the country promised to attain the Sustainable Development Goals in 2030 and promote the health and welfare of the mothers, children, and adolescents health according to the Global Strategy for Women, Children, and Adolescent Health by adopting evidence-based interventions based on the practice of quality data. The Ministry plans to monitor all the activities by strengthening maternal and perinatal death surveillance at all levels. The analysis of reported data has been applied for further planning and program management with civil society organizations, health care providers, and the community in an all-inclusive approach (25).

Ethiopia also highlighted the political prioritization of the MPDSR system (53) as

> ***"Maternal deaths are classified as a public health emergency, and the government proclaims that No mother should die while giving birth."***

Kerala Federation of Obstetrics and Gynaecology (KFOG) professional association of India takes the leadership role in the maternal deaths review process and the secretariat at the central level (57).

(4.4.3) Pressures, Linkages, and Networks

This section expels out the connection and communication between different levels and peer pressure for the MDSR process. Many countries, including Myanmar, used the MDR to spot the social and quality of health care problems reflecting the status of maternal survival (58). No available and quality data are the driven force to implement the MDSR system (54).

The provided data, forms, and sources are vital for reducing preventable maternal mortality by resource allocation and policymakers. MDSR system is responsible for obtaining the actual number of maternal deaths and response way in low coverage of CRVS system. The data point out the necessary actions to improve the quality of care at national and subnational levels for better planning, effective policies, and equitable implementation activities (54).

One success story of the linkage between different levels was the community, public, and private partnership program to reduce MMR in 2017. According to the reported MDSR data, one township called Hlaing Thar Yar in Yangon Region had the highest maternal deaths due to unsafe abortion. The place was the industrial zone, and most of the workers were migrants. The central MDSR team decided to take action, and the township team confirmed the cause of maternal deaths and reviewed the cases (26).

Then, short-term activities: health talk sessions, service provision of contraceptive methods, peer education programs were conducted together with partner organizations: MMCWA, MMA, PSI, and MSI. Long-term programs include safe motherhood activities and family planning counseling and methods on weekends for two consecutive years. The result was undoubtedly a reduction in abortion cases. It can prove that good communication and linkage between the levels bring better response action of the MDSR system (26).

The findings of the outer setting summarizes that the policy to notify and review all maternal deaths has already existed in Myanmar. The resources for health are limited, no participation of the external professional association due to data confidentiality, the networking and engagement between the non-governmental organizations, private and public health sectors improved in the community awareness activities of reduction in maternal mortality.

Chapter 5: Discussion

This chapter discusses the summary of the findings of Myanmar in comparison to other countries, the best practices to overcome the MDSR challenges, the impact of the COVID 19 pandemic upon the maternal health interventions, and study limitations.

(5.1) Summary of the findings of MDSR in Myanmar compared to other settings

The World Health Organization (WHO) guided the member countries to form the Maternal Death Review (MDR) mechanism by a guideline named "Beyond the Numbers-Reviewing Maternal Deaths and Complications To Make Pregnancy Safer" since 2004 (46). Myanmar started implementing the Maternal Death Review (MDR) in 2005 as a pilot project and eventually extending to the nationwide system.

In 2016, the MDR was adapted to the Maternal Death Surveillance and Response System (MDSR). The newly developed MDSR concept was to get the information and identify all the measures in time to know the underlying causes of maternal deaths, the types of delays and explore the factors contributing to maternal deaths beyond the numbers (46). It also aims to reduce preventable maternal mortality by learning experiences of the other implementing countries.

This thesis found that the main challenges for MDSR implementation were under-reporting of notification, delay, and late reporting, only half of the responses taking into action, and inadequate human resources for analysis, little evidence of relative advantage, the costs, and reduction of maternal mortality. The intervention's strength was the increased review rate of maternal deaths and the system adapted into the country context.

Regarding individual factors, insufficient technical knowledge and skills, lack of motivation, a blaming culture, weak coordination and collaboration, increased workload, and poor quality insurances of health care providers are significant drawbacks to the implementation status of the MDSR. Even though the Ministry has successfully integrated the MDSR into the health system, the gaps still existed: no national MDSR team, no incentive culture to health staff, weak community engagement, coordination, and collaboration with other stakeholders.

The national policy to notify and review all maternal deaths has developed in the country. Factors like limited resources for health and no participation of the external professional association in implementation due to data confidentiality hinder the MDSR implementation process. Community awareness activities in reducing maternal mortality are conducted by networking and engagement of stakeholders and public-private partnerships.

Based on the overall findings of MDSR implementation in Myanmar, the system needs to improve most parts of the MDSR mechanism, especially low identification and notification of maternal deaths, the review process, and coverage of MDSR implementation. In low and middle-income countries, the implementing staus of MDSR/MPDSR are pretty similar to the Myanmar context.

In the MPDSR system of Ethiopia, although 87.7 % of health posts made early identification of maternal deaths, 82.2 % did not notify the higher level within 24 hours (59). However, Sri Lanka was recognizable for reducing preventable maternal mortality and successfully implementing the MDSR system. The Family Health Bureau (FHB) has received nearly all maternal death information since 1995. Every maternal death case notifies this FHB within 24 hours, and the review process had been conducted at the community, facilities, district, and national levels afterward (60).

At first, the system has data gaps, but the country made changes significantly to solve the problem. As a result, FHB collects 99% of both community and death investigation reports from facilities in 2014. Post-morterm examinations must be done in every maternal death and informed to all coroners by instruction of the Ministry of Justice and Law since 2009 (60).

In Ethiopia, nearly 64% of health care facilities have a maternal death review committee. Only 5.5% uploaded the maternal death review cases to the data platform of the national MDSR system (61). A study about MDR review in Tanzania points out that 49% of the review cases are incomplete, and 1% has complete narrative summaries. The critical information like the demographic component, the time between critical illness and the treatment received, the laboratory findings, the causes of referral to tertiary centers, and the findings from analysis of the cases are still lacking (62).

Nearly 85% of the suggestions from the review cases have to apply at the facility level, and among them, 42% are related to health care service delivery (62). In Nepal, the Ministry of Health developed a hospital-based online platform for maternal death to fill the cause of death, explore the preventable causes, and get technical guidance from the MDR committee within three days to the facility (33).

The developed recommendations and the prioritized responses are essential to developing strategies to improve the quality and comprehensive care: revising the management guidelines, health promotion activities, implementation research to identify the health care knowledge and social determinants, policies, and regulations (63).

The study of the achievements, prospects, and challenges of MPDSR in Ethiopia explains little significance in early identification, notification, review, and response. Reinforcement of surveillance mechanisms and community engagement, capacity building, and enrollment of more health emergency workers (HEW) improve the MPDSR practice (64).

Most of the country's case findings explained that the Ministries and Department of Health lead implementers to operate MDR and develop the federal and the province levels. Together with UNFPA, UNICEF, International Federation of Obstetrics and Gynecology (FIGO), technical assistance from WHO was the driving force in developing the guidelines and launching the MDR in many countries (35).

Implementation coverage of MDSR in the health care facilities of Ethiopia was still low (61). A study about MPDSR implementation in Rwanda shows that out of thirteen facilities (ten hospitals and three health centers), the implementation level of all health facilities is at stage 4 and above. Four hospitals

and two health facilities are in practice, another five hospitals and one facility in the routine and integration of the system, and one hospital is in the stage of sustainable practice (51).

Finally, the WHO technical guidance on MDSR mentioned that identifying and monitoring any probable maternal death was a continuing groundwork and must integrate into the country's routine Civil Registration and Vital Statistics (CRVS) system for sustainability (31).

(5.2) Impact of the COVID 19 pandemic upon the maternal health interventions

The COVID-19 has been striking the health system of all countries (65). This crisis disrupts the provision of maternal health care interventions in three aspects: social change, usage, and the supply of available health care services. This situation carried out that the health care providers in low and middle-income countries did not gather the regular data, including maternal deaths (66).

The study about the effects of this pandemic on maternal and perinatal outcomes interpreted that the impact of this crisis severely affects women's and children's health, causing the rise in the number of maternal deaths, stillbirth, ruptured ectopic pregnancies, and depression cases. The results can differ between high-income and low-income countries. The countries have to set a strategic plan for prioritization and increased accessibility of quality and comprehensive maternal health care services within the crises (65).

In Myanmar, the health system is nearly collapsed, including no data collection of maternal deaths because most healthcare providers are participating in the civil disobedience movement due to the military coup. Nearly all hospitals cannot function well, and people cannot go to public hospitals due to military control, lockdowns, and high COVID cases (67).

Nevertheless, there is a significant change in maternal and neonatal health in the South-East Asia regional situation: increase in maternal (16% rise) and neonatal deaths, about 3.5 million unintended pregnancies, and 400,000 more adolescent pregnancies (68). As of July 26, 2021, although COVID 19 cases are gradually declining in Indonesia, the maternal death rate is still increased nearly two times that of 2020. The study points out that the improvement in reducing maternal mortality has been severely damaged due to this pandemic (69).

(5.3) Limitations of the study

The studies about MDSR in Myanmar are extremely limited. Only MDR and MDSR reports of MOHS during 2013 to 2018 are primary references for this study, and the national MDSR Report, 2019 of Myanmar, is still in drafting. Besides, implementation research about MDSR is rare. WHO 2015 MDSR Baseline Survey and the MDSR articles in LMIC are also available sources for this literature review.

Additional information like Key informant interviews (KII) of the health care providers' perspectives on the MDSR system cannot be added due to limited time, COVID 19 pandemic, and unstable

political situations in Myanmar. But, this thesis still adds the evidence-based findings based on the published reports of MDR/MDSR reports from the Ministry, and these recommendations developed can use in the advocacy to stakeholders and higher-level authorities.

Some literature related to the components of the MDSR system: identification and notification, reporting, costs are found in conducting as only pilot projects that mostly show the health system approach. There is little clear evidence in the studies exploring the entire MDSR/MPDSR procedure or each specific part of the system. Nevertheless, most of the literature is too generalizable; there are no relevant facts about the relative advantage and individual orientation.

Chapter 6: Conclusion and recommendations

(6.1) Conclusion

This literature review brings insight into factors contributing to or hindering the MDSR implementation in Myanmar. The system notably improves in the reporting, review process, data analysis, and response actions. The lack of financial support, limited resources, and no available data for maternal death identification and notification remain unchanged since the program's start. These are the main challenges in the MDSR system because it is a multi-sectoral approach and needs the coordination and collaboration of all layers of health care providers, community engagement, and public-private partnerships.

The evidence reflecting the reduction of maternal mortality, relative advantage, and the individual orientation of MDSR is insufficient. The implementation status of the MDSR system of Myanmar is on track, and there are still gaps in information sharing among the teams, no national MDSR team, the leadership, and commitment of the higher-level authorities.

In healthcare providers, the knowledge, skills, motivation, and sense of ownership need to improve and depend on their will, support, and community participation. The government did not provide routine incentive practices for all health care professionals within the country, so this issue is still controversial. The policies and strategies for ending preventable maternal mortality have already developed, there are requirements in support for human resources, the concern of the politicians, and the donor funds.

As a low and middle-income country, the country's health care system also prioritized the maternal and child health care services in National Health Plan. The networking and linkage between private and public sectors improved in response actions to reduce maternal deaths at the community level. According to the data confidentiality of maternal deaths, the professional associations cannot participate in the MDSR review process. The overall performance of the system is better over these four years of the implementation period.

WHO and UNFPA contribute technical and financial support; there is no specific government budget for MDSR. Health care providers are the key players in the whole process of MDSR, and their motivation, skills, knowledge, and participation reflect the data quality and timely reporting of maternal deaths. The political priority issues and the government investment in reducing maternal mortality are struggling to get attention compared to communicable and non-communicable diseases. The findings of this study can consider the scale-up plan of the MDSR system and strategic plan to reduce preventable maternal mortality in Myanmar.

(6.2) Recommendations

The following recommendations are established based on the findings of the study. The Ministry of Health and Sports will implement the proposed activities with different stakeholders at the community, township, state/regional, and national levels.

- To engage the Village Health Committee, Civil Society Organizations (CSO), and community health workers and community leaders for further verbal autopsy processes
- To conduct the review meetings monthly, including the experience sharing session of the current MDSR implementation status with NGOs
- To strengthen the practice of zero-reporting by the township to the state/regional and national level
- To provide capacity building training to especially SMO and newly appointed health staff regularly
- To reinforce supervision and monitoring trip to access reporting, review, and response actions of township health departments
- To form the national MDSR review committee for better coordination and collaboration with Ethnic Health Organizations, International Non-governmental Organizations, and NGOs
- To advocate the policymakers about the specific budget allocation for the MDSR system
- To develop the review meeting protocol of maternal death to make the response actions and recommendations based on the local context
- To integrate the MDSR system and reduction of maternal mortality into the pre-service training and the curriculum of undergraduate courses of medical universities with the Ministry of Education

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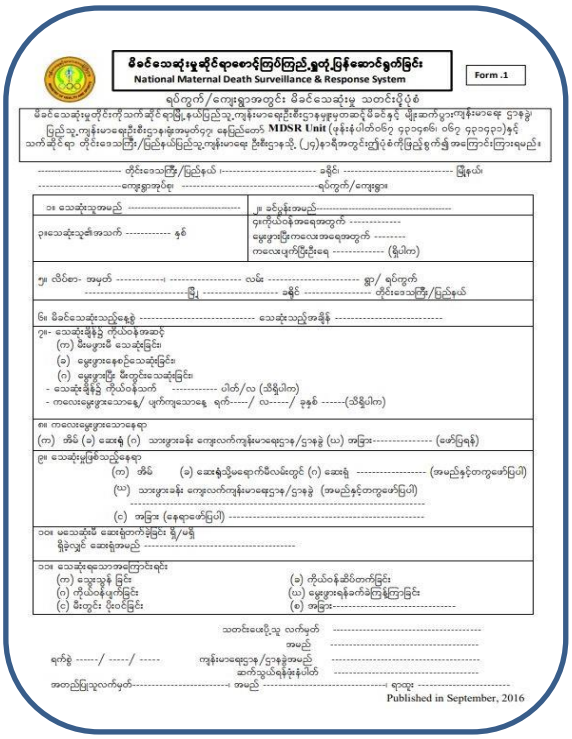
Annex

These forms are used in the implementation of the MDSR process in Myanmar (27).

Form 1

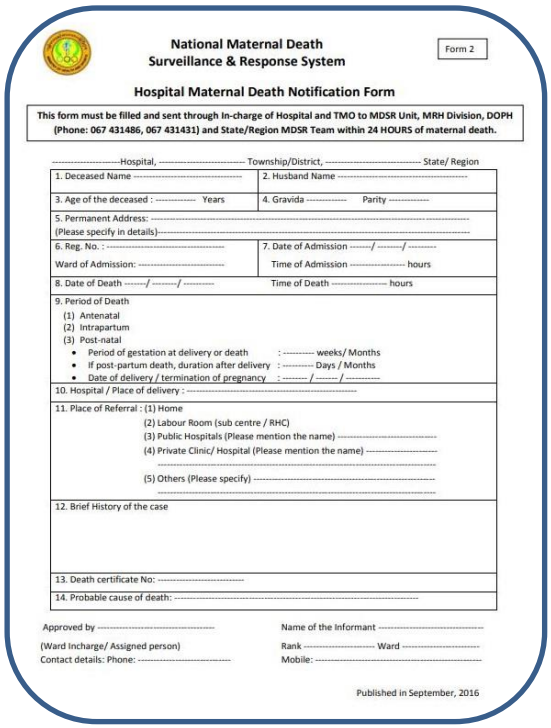


မိခင်သေဆုံးမှုဆိုင်ရာစောင့်ကြပ်ကြည့်ရှုတုံ့ပြန်ဆောင်ရွက်ခြင်း
National Maternal Death Surveillance & Response System

Form .1

Published in September, 2016

Form 2



National Maternal Death Surveillance & Response System

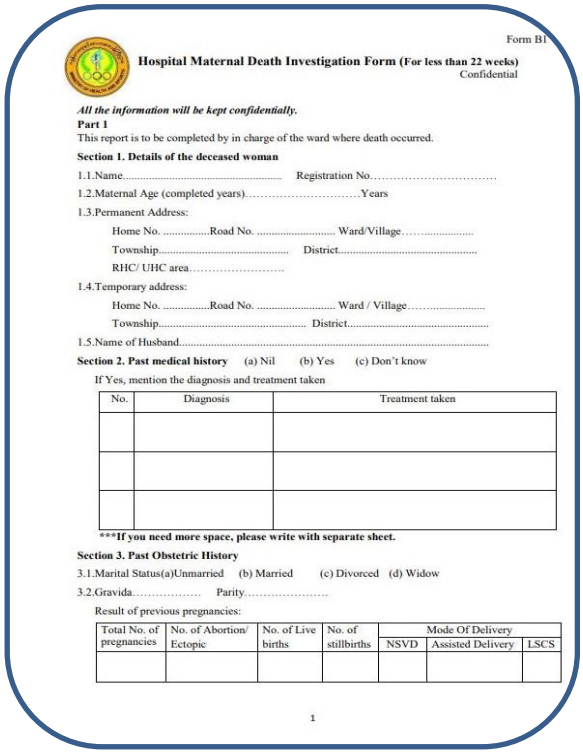
Form 2

Hospital Maternal Death Notification Form

This form must be filled and sent through In-charge of Hospital and TMO to MDSR Unit, MRH Division, DOPH (Phone: 067 431486, 067 431431) and State/Region MDSR Team within 24 HOURS of maternal death.

Published in September, 2016

Form B1

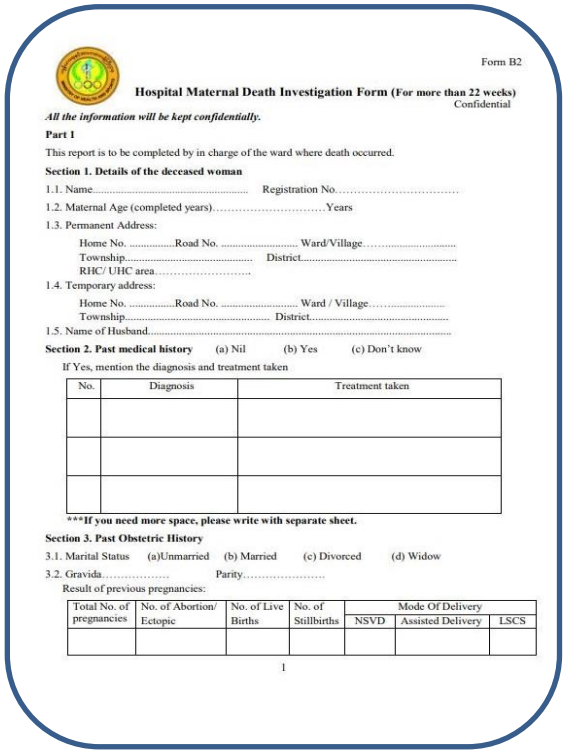


Form B1

Hospital Maternal Death Investigation Form (For less than 22 weeks)

Confidential

Form B2



Form B2

Hospital Maternal Death Investigation Form (For more than 22 weeks)

Confidential

Form A

ပုံစံ (က)

ရင်တွက်/ ကျေးရွာအတွင်း မိခင်သေဆုံးမှု စစ်ဆေးဖမ်းမြန်းခြင်းပုံစံ လျှို့ဝှက်

ဤပုံစံကိုဖြည့်နယ်ကျန်းမာရေး ဦးစီးဌာနမှူးသည် မိခင်သေဆုံးသည့်အိမ်သို့ ကိုယ်တိုင်သွားရောက် စုံစမ်းမေးမြန်း ပြီး ကုသမှုခံယူခဲ့သော အထောက်အထားများ အားလုံးနှင့် တကွ ပြန်လည်၍ ပေးဝို့ရပါမည်။

ရရှိလာသောအချက်အလက်များအားလုံးကိုလျှို့ဝှက်ထားပါမည်။

ပထမပိုင်း

အပိုင်း (**ခ**)သေဆုံးမိခင်၏အသေးစိတ်အချက်အလက်များ

ခ .၁ ။အမည်.....မှတ်ပုံတင်အမှတ်.....

ခ . ၂ ။အသက် (ပြည့်).....နှစ် လူမျိုး..... ..... ဘာသာ.....

ခ . ၃ ။အဖြတ်မိန့်ရပ်လိပ်စာ: အမှတ်. .....လမ်း. ..... ရွာ/ရပ်ကွက်.....

မြို့နယ်..... ခရိုင်.....ကျေးလက်/မြို့နယ်ကျန်းမာရေးဌာန.....

ခ . ၄ ။ယာယီနေရပ်လိပ်စာ: အမှတ်. .....လမ်း. ..... ရွာ/ရပ်ကွက်.....

မြို့နယ်..... ခရိုင်.....

အပိုင်း (၂)သေဆုံးမိခင်နှင့်ဝင်ပွန်းဖ၏အခြေခံအချက်အလက်များ

၂. ၁ ။ဝင်ပွန်းအမည်..... .....

၂. ၂ ။ပညာအရည်အချင်း

	စာမတတ်	ရေးတတ် ဖတ်တတ်	မူလတန်း	အလယ်တန်း	အထက်တန်း	တက္ကသိုလ်	ဘွဲ့ရ
သေဆုံးမိခင်							
ခင်ပွန်း							

၂. ၃ ။အလုပ်အကိုင်

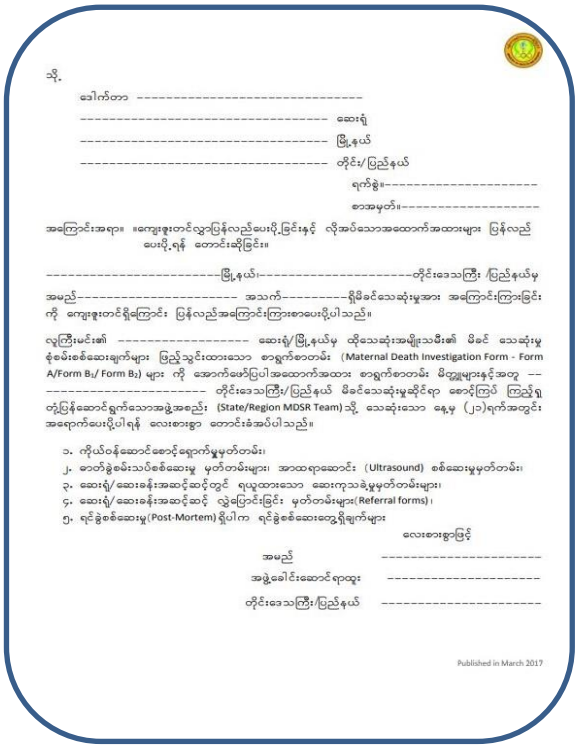
	မိုးခို	လယ်သမား	နေ့စား	ကုန်သည်	အစိုးရဝန်ထမ်း	ကျောင်းသား	အခြား
သေဆုံးမိခင်							
ခင်ပွန်း							

၂. ၄ ။ဗီသာစုလစဉ်ဝင်ငွေ ..... ကျပ်

အပိုင်း (၃)ယခင်ဆေးကုသခဲ့ဖူးသောရာဇဝင် (က)ရှိ (ခ)မရှိ (ဂ)မသိ

1

Acknowledgment form



သို့

ဒေါက်တာ ----------

---------- ဆေးရုံ

---------- မြို့နယ်

---------- တိုင်း/ပြည်နယ်

ရက်စွဲ။----------

စာအမှတ်။----------

အကြောင်းအရာ။ ။ကျေးရွာတင်လွှာပြန်လည်ပေးပို့ခြင်းနှင့် လိုအပ်သောအထောက်အထားများ ပြန်လည်ပေးပို့ရန် တောင်းဆိုခြင်း။

----------မြို့နယ်----------တိုင်း၊ဒေသကြီး /ပြည်နယ်မှ အမည်---------- အသက်----------ရှိမိခင်သေဆုံးမှုအား အကြောင်းကြားခြင်းကို ကျေးရွာတင်ရှိကြောင်း ပြန်လည်အကြောင်းကြားစာပေးပို့ပါသည်။

လူကြီးမင်း၏ ---------- ဆေးရုံ/မြို့နယ်မှ ထိုသေဆုံးအမျိုးသမီး၏ မိခင် သေဆုံးမှုစုံစမ်းစစ်ဆေးချက်များ ဖြည့်သွင်းထားသော စာရွက်စာတမ်း (Maternal Death Investigation Form - Form A/Form B_1/ Form B_2) များ ကို အောက်ဖော်ပြပါအထောက်အထား စာရွက်စာတမ်း မိတ္တူများနှင့်အတူ --- ---------- တိုင်းဒေသကြီး/ပြည်နယ် မိခင်သေဆုံးမှုဆိုင်ရာ စောင့်ကြပ် ကြည့်ရှုတဲ့ပြန်ဆောင်ရွက်သောအဖွဲ့အစည်း (State/Region MDSR Team) သို့ သေဆုံးသော နေ့မှ (၂၁)ရက်အတွင်း အရောက်ပေးပို့ပါရန် လေးစားစွာ တောင်းခံအပ်ပါသည်။

၁. ကိုယ်ဝန်ဆောင်စောင့်ရှောက်မှုမှတ်တမ်း၊

၂. ဓာတ်ခွဲစမ်းသပ်စစ်ဆေးမှု မှတ်တမ်းများ၊ အာထရာဆောင်း (Ultrasound) စစ်ဆေးမှုမှတ်တမ်း၊

၃. ဆေးရုံ/ဆေးခန်းအဆင့်ဆင့်တွင် ရယူထားသော ဆေးကုသခဲ့မှုမှတ်တမ်းများ၊

၄. ဆေးရုံ/ဆေးခန်းအဆင့်ဆင့် လွှဲပြောင်းခြင်း မှတ်တမ်းများ(Referral forms)၊

၅. ရင်ခွဲစစ်ဆေးမှု(Post-Mortem) ရှိပါက ရင်ခွဲစစ်ဆေးတွေ့ရှိချက်များ

လေးစားစွာဖြင့်

အမည် ----------

အဖွဲ့ခေါင်းဆောင်ရာထူး ----------

တိုင်းဒေသကြီး/ပြည်နယ် ----------

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