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The National Maternal Mortality Report 2018

Jordan, towards eliminating preventable maternal deaths

This national report was developed by the Ministry of Health and the National Advisory Group with support from USAID Health Service Delivery. The data and findings presented in this report are drawn from Jordan's Maternal Mortality Surveillance and Response (JMMSR) system implemented by the Ministry of Health in collaboration with USAID Health Service Delivery.

USAID Health Service Delivery is implemented in Jordan by Abt Associates and is made possible by the generous support of the American people through the United States Agency for International Development (USAID).



Jordan's Maternal Mortality
Surveillance & Response System
النظام الوطني للرصد والاستجابة لوفيات الأمهات

Acknowledgement

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Jordan, towards eliminating preventable maternal deaths



FOREWORD

Pregnancy is a complex condition that not only involves the health and well-being of a mother and her baby but is also linked to various factors surrounding it. Childbirth may be a happy ending to a pregnancy for the mother and her family, yet, the risks are always there, and the birth of a baby could end up in severe life-threatening complications and mortality for either or both mother and her baby. Such serious outcomes may happen anywhere, but the risks are highest in low and middle-income countries due to several factors including inadequate or lacking resources or measures within healthcare systems. Thus, deaths associated with pregnancy and childbirth are considered as an important indicator of the overall condition of a population and performance of a country's healthcare delivery system.

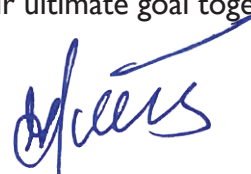
Saving a mother's life is not simply preventing a family disaster as it goes far beyond that. Maternal death may lead to increased chances of subsequent infant and child morbidity and mortality, the disruption of the family and even long-term consequences such as negative effects on children's education, the loss of economic opportunities and higher prevalence of poverty for the nation. Every mother's death has a sad story behind it yet a big lesson to be learned, for the health care delivery system, to avoid similar cases in the future.

Jordan's Maternal Mortality Surveillance and Response (JMMSR) system is an important advancement toward assessing maternal mortality for the country in a more accurate and reliable manner. This is also a big achievement for Jordan because, to calculate their maternal mortality ratios (MMRs), countries in the Eastern Mediterranean Region mostly rely on estimates which are obtained through different mortality measurement techniques, including population-based studies, reproductive age mortality surveys (RAMOS), sisterhood methods, and other approaches. Considering the comprehensive nature of data collected through the JMMSR system, which addresses most of the issues related to maternal mortality measurement, within the National Strategy for the Health Sector (2015-2019), Jordan's Ministry of Health is on the right path towards reducing maternal mortality and contributing to the health targets for Sustainable Development Goal 3. Jordan's Ministry of Health is confident that the MMR and other results obtained through the JMMSR system and presented in this national report are accurate and reliable. Reporting the calculated MMR for the year 2018 for Jordan will help in establishing a more precise baseline. However, we still have a long journey ahead because, in order to eliminate preventable maternal deaths, we need to translate the responses provided in the current report into actions that are implemented and monitored nationwide. Our ultimate goal will be achieved through the collection of more reliable and accurate data, more in-depth analysis of each case and formulating more appropriate responses for averting maternal deaths.

Let us go through our journey hand in hand to accomplish our ultimate goal together.



Dr. Saad Jaber
Minister of Health
The Hashemite Kingdom of Jordan



Dr. Abdel-Monie' Al-Suleimat
Chairman of the JMMSR National Advisory Group
The Hashemite Kingdom of Jordan



ACKNOWLEDGEMENT

We would like to express our deepest gratitude to all the key players in the implementation of Jordan's Maternal Mortality Surveillance and Response system, the first of its kind in the Kingdom.

We would first like to acknowledge the Ministry's Secretary General Dr. Hekmat Abu Alfoul for his leadership and continuous support throughout the system implementation steps.

We would also like to convey a special note of appreciation to the United States Agency for International Development (USAID) for their generous support to the Government of Jordan over the years, especially for the development and implementation of this system under their USAID Health Service Delivery. Particularly, we thank Mr. Daniel Sinclair the Director of the Population & Family Health (PFH) Office, and Dr. Nagham Abu Shaqra, the Senior Population and Health Advisor / Project Management Specialist at the PFH Office in USAID Jordan, for their continued support.

Furthermore, we would like to recognize the National Advisory Group members for their unwavering commitment to reviewing each maternal death case, assigning its main cause and contributing factors, analyzing the aggregated data and deciding on the appropriate national-level responses to avert similar deaths in the future.

We also extend our sincere appreciation to all the Directorate Advisory Group members nationwide from the Ministry of Health (MOH), the Royal Medical Services (RMS) and the private health sector for their diligent efforts in identifying cases of maternal deaths and conducting the maternal death reviews at both the facility and household levels.

In addition, we would like to thank the designated focal points from all the public and private health sector hospitals and forensic medicine departments for their dedication in performing the critical first step in the system by notifying all deaths among women of reproductive age, as mandated by the Public Health Bylaw no. 10 for year 2016.

Moreover, we recognize the significant role of the Ministry's Non-Communicable Diseases Directorate for hosting this national system and leading efforts in developing and disseminating the policies and procedures to standardize and monitor implementation among all health sectors. Also, we recognize the Ministry's E-transformation and Information Technology Directorate efforts in hosting the electronic information system which enables authorized users to access the information related to maternal deaths while preserving the confidentiality of the information collected and processed at all stages.

In addition, we acknowledge the international organizations who have provided the needed references and technical guidelines to develop the system model for Jordan, particularly the WHO and the UNFPA.

We also thank all the healthcare managers and service providers for their earlier care to the deceased women and also for their cooperation during the maternal death review process at facilities by providing the needed information that shed light on the conditions leading up to death.

Our sincerest appreciation goes to the families of the deceased women for providing valuable insights during the household questionnaires regarding the circumstances surrounding the death, while grieving the loss of their loved one.

We also extend our deepest gratitude to the authors and contributors to the National Maternal Mortality Report 2018 for their expertise and commitment in developing this first of its kind national report that will guide the relevant responses and future actions at all levels of the health care system to avert maternal deaths.

Last but not least, we dedicate a special acknowledgement to the USAID Health Service Delivery team for paving the way to self-reliance for this national system, from building the technical competence at all levels of implementation with their partner EMPHNET, to providing the needed equipment and tools, to the establishment of the relevant information system, as well as a monitoring and evaluation system to ensure that Jordan's Maternal Mortality Surveillance and Response System achieves its ultimate goal of eliminating preventable maternal deaths in Jordan.



TABLE OF CONTENTS

FOREWORD	I
ACKNOWLEDGEMENT	III
TABLE OF CONTENTS	V
ACRONYMS	VIII
TERMS AND DEFINITIONS	IX
EXECUTIVE SUMMARY*	I
BACKGROUND	3
THE JMMSR SYSTEM DESCRIPTION	4
GOALS AND OBJECTIVES OF THE JMMSR SYSTEM	4
1. MAIN GOAL	4
2. OVERALL OBJECTIVES	4
3. SPECIFIC OBJECTIVES	4
THE JMMSR SYSTEM IMPLEMENTATION STEPS	5
1. NOTIFICATION OF ALL DEATHS AMONG WOMEN OF REPRODUCTIVE AGE	5
2. IDENTIFICATION OF MATERNAL DEATH CASES	5
3. REVIEW OF MATERNAL DEATH CASES	6
4. ANALYSIS AND INTERPRETATION OF MATERNAL DEATH DATA	7
5. RESPONSE AND DISSEMINATION	8
THE JMMSR SYSTEM MONITORING AND EVALUATION	10
METHODOLOGY	11
THE JMMSR INFORMATION SYSTEM	11
DATA COLLECTION AND FLOW	11
1. NOTIFICATION OF ALL DEATHS AMONG WOMEN OF REPRODUCTIVE AGE	11
2. IDENTIFICATION OF MATERNAL DEATH CASES	12
3. REVIEW OF MATERNAL DEATH CASES	12
A) Directorate Advisory Group Review	13
B) National Advisory Group Review	13

*The Executive Summary is available in Arabic on the reverse side of this document.

MONITORING AND EVALUATION	14
1. NOTIFICATION INDICATORS	14
2. IDENTIFICATION INDICATORS	14
3. MATERNAL DEATH REVIEW INDICATORS	14
4. DATA QUALITY INDICATORS	14
DATA ANALYSIS	15
1. QUALITATIVE ANALYSIS	15
2. QUANTITATIVE ANALYSIS	15
CONFIDENTIALITY AND ETHICAL CONSIDERATIONS	15
RESULTS	16
JORDAN'S MATERNAL MORTALITY RATIO	16
DEMOGRAPHIC CHARACTERISTICS	16
1. MATERNAL DEATHS BY AGE AT DEATH	16
2. MATERNAL DEATHS BY NATIONALITY	17
3. MATERNAL DEATHS BY EDUCATIONAL LEVEL	17
4. MATERNAL DEATHS BY EMPLOYMENT STATUS	18
5. MATERNAL DEATHS BY PLACE OF RESIDENCE AND PLACE OF DEATH	19
CLINICAL CHARACTERISTICS	19
1. MATERNAL DEATHS BY PARITY	19
2. MATERNAL DEATHS BY TIMING OF DEATH	20
3. MATERNAL DEATHS BY ANTENATAL CARE	21
4. MATERNAL DEATHS BY MODE OF DELIVERY	22
5. MATERNAL DEATHS BY FETAL OUTCOME	22
6. MATERNAL DEATHS AND MATERNAL ANEMIA	23
CAUSES OF MATERNAL DEATH	23
1. DIRECT CAUSES	24
A) <i>Obstetric Hemorrhage</i>	24
B) <i>Pulmonary Embolism</i>	25
C) <i>Amniotic Fluid Embolism</i>	26
D) <i>Pre-Eclampsia/Eclampsia</i>	26
E) <i>Sepsis</i>	26

2. INDIRECT CAUSES	27
A) <i>Diseases of the Circulatory System</i>	27
B) <i>Neoplasms</i>	27
C) <i>Diseases of the Respiratory System</i>	28
D) <i>Blood Transfusion Complications</i>	28
CONTRIBUTING FACTORS TO MATERNAL DEATH	29
1. DELAY I: SEEKING CARE	29
2. DELAY II: REACHING CARE	29
3. DELAY III: RECEIVING CARE	29
LATE MATERNAL DEATHS	31
DATA LIMITATIONS	32
RESPONSE	33
CONCLUSION	35
CONTRIBUTORS	36
REFERENCES	40
ANNEX I: TABLES OF RESULTS	43
TABLE I.1: DISTRIBUTION OF MATERNAL MORTALITY RATIO BY MATERNAL AGE GROUP	43
TABLE I.2: MATERNAL DEATHS BY DEMOGRAPHIC CHARACTERISTICS	43
TABLE I.3: MATERNAL DEATHS BY PLACE OF RESIDENCE AND PLACE OF DEATH	44
TABLE I.4: MATERNAL DEATHS BY REPRODUCTIVE AND CLINICAL CHARACTERISTICS	45
TABLE I.5: MATERNAL DEATHS BY CAUSES OF DEATH	46
TABLE I.6: MATERNAL DEATHS BY TYPE OF OBSTETRIC HEMORRHAGE	47
TABLE I.7: MATERNAL DEATHS BY TYPE OF CIRCULATORY DISEASE	48
TABLE I.8: MATERNAL DEATHS BY LEVEL OF DELAY	48



ACRONYMS

ANC	Antenatal Care
BP	Blood Pressure
CPR	Cardiopulmonary Resuscitation
CSPD	Civil Status and Passports Department
DAG	Directorate Advisory Group
FMD(s)	Forensic Medicine Department(s)
HAD	Health Affairs Directorate
ICD	International Classification of Diseases
ICD-MM	International Statistical Classification of Diseases and Related Health Problems-Maternal Mortality
ICU	Intensive Care Unit
IT	Information Technology
JMMSR	Jordan's Maternal Mortality Surveillance and Response
JMMSR IS	Jordan's Maternal Mortality Surveillance and Response Information System
MDR	Maternal Death Review
MDSR	Maternal Death Surveillance and Response
MMSR	Maternal Mortality Surveillance and Response
MMR	Maternal Mortality Ratio
MOH	Ministry of Health
NAG	National Advisory Group
NCDD	Non-Communicable Diseases Directorate
RMS	Royal Medical Services
UNFPA	United Nations Population Fund
USAID	United States Agency for International Development
WHO	World Health Organization

TERMS AND DEFINITIONS

Avoidable Death: A maternal death can be classified as avoidable if it might have been avoided by a change in patient behavior, provider/institutional practices, or healthcare system policies. The determination of avoidability does not follow rigid criteria, and it is often open to interpretation.

Direct Obstetric Deaths: Maternal deaths resulting from obstetric complications of the pregnancy state (pregnancy, labor or puerperium), from interventions, omissions, or incorrect treatment, or from a chain of events resulting from any of the above.

Directorate Advisory Groups (DAG): A multidisciplinary committee of technical experts from all health sectors in a given Health Affairs Directorate (HAD) formed by the Director of the HAD. There is one DAG committee for each HAD, making up the 14 DAGs for the JMMSR system implementation. Based on Article no. 5 (Public Health Bylaw no. 10 of the year 2016), DAG members include:

- Head of the DAG: A gynecologist/obstetrician from the Ministry of Health (MOH) or any other public sector with 10 years of experience.
- DAG rapporteur: a public health physician.
- A gynecologist/obstetrician representing other health sectors.
- Head of the Maternal and Child Health Department in the HAD.
- Forensic physician.
- Experienced midwife.

Grand Multipara: A woman who has given birth to five or six infants beyond 24 weeks of gestation.

Great Grand Multipara: A woman who has given birth to seven or more infants beyond 24 weeks of gestation.

Health Facility: Any hospital or Forensic Medicine Department (FMD) in all health sectors (public and private). According to the JMMSR Bylaw 10 (described below) Article no. 4, all health facilities in Jordan are mandated to notify all deaths among women of reproductive age.

Health Facility Focal Point: A trained individual from the medical records department at any hospital or FMD in the public or private sector responsible for the notification of all deaths among women of reproductive age to the relevant HAD.

Indirect Obstetric Deaths: Maternal deaths resulting from previously existing disease or disease that developed during pregnancy. These deaths are not due to direct obstetric causes but are aggravated by the physiological effects of pregnancy.

JMMSR Bylaw: His Majesty King Abdullah II decreed the establishment of Bylaw no. 10 of the year 2016 of the Public Health Law (no. 47 of year 2008) which mandates the notification of all deaths among women of reproductive age (15 – 49 years of age). The Bylaw calls on the MOH to establish, implement and monitor a national maternal mortality surveillance and response system across all health sectors.

The JMMSR Guidelines for Implementation: A comprehensive reference providing a detailed description of the JMMSR system implementation steps and tools to guide implementers and managers throughout all stages and functions of the JMMSR system to achieve its overall objectives.

The JMMSR Policies and Procedures: A set of brief statements approved by the MOH describing the roles and responsibilities of stakeholders in standardizing the JMMSR system implementation.

Late Maternal Deaths: A maternal death which occurred more than 42 days but less than one year after the end of pregnancy.

Maternal Death: The death of a woman while pregnant, during labor, or within 42 days of the end of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes (accidents, homicide).

Maternal Death Surveillance and Response (MDSR) Technical Guidance: Published by the World Health Organization (WHO) in 2013, as a global framework for action to prevent maternal death. This publication introduces the critical concepts of MDSR, including goals, objectives and specific instructions for implementing each surveillance component.

Maternal Mortality Ratio: The total number of maternal deaths per 100,000 live births in the same period of time.

- Numerator: Maternal deaths.
- Denominator: Live births.
- Multiplying by 100,000.

Multipara: A woman who has given birth more than once (one to four times).

National Advisory Group (NAG): A national level technical advisory group representing all health sectors, formed according to a ministerial decree issued by the Minister of Health at the time of establishing the JMMSR system. It consists of senior obstetrics/gynecology specialists from all health sectors in Jordan. This group functions at the national level and includes the following members:

- Chairman of the NAG: Chief of the Obstetrics and Gynecology Specialty at the MOH.
- The NAG Deputy Chairman and Rapporteur/ Head of the Maternal Mortality Section at the NCDD/MOH.
- Head of the National Registry of Deaths at the NCDD/MOH.
- An obstetrics and gynecology specialist from the RMS.
- Two obstetrics and gynecology specialists from the private sector.
- An obstetrics and gynecology specialist from each of Jordan University Hospital and King Abdullah University Hospital.
- Director of the National Center for Forensic Medicine.
- Director of the Woman and Child Health Directorate at the MOH.

Nullipara: A woman who has never given birth.

Parity: The number of previous pregnancies carried to a viable gestational age (24 weeks and above) and resulting in live births or stillbirths, including the pregnancy that led to the woman's death.

Postmortem Autopsy: The examination of a body after death to determine the cause of death.

Probable Maternal Death: Any death among women of reproductive age during pregnancy, labor, or within 42 days of the end of pregnancy.

Public Sector: One of the main service providers in Jordan that is owned and operated by the government. This includes the MOH, the RMS and university hospitals (including University of Jordan Hospital and King Abdullah University Hospital).

Suspected Maternal Death: Any death among women of reproductive age.

Three Delays Model: A framework developed by Thaddeus, S. and Maine, D. in 1994 that helps identify the points at which delays can occur in the management of obstetric complications. The model proposes that pregnancy-related mortality is often due to the following delays:

- Delay in seeking care.
- Delay in reaching care.
- Delay in receiving care.

Women of Reproductive Age: Women aged between 15-49 years old.

EXECUTIVE SUMMARY

The healthcare system in Jordan is one of the best in the Eastern Mediterranean Region, due to the secure and stable conditions in the Kingdom. This is also attributed to the effective development projects which include health as an essential component of sustainable development. As a result, Jordan's health sector witnessed remarkable improvement which reflected positively on the health status of its citizens. This can be measured by general health indicators that reflect the quality and efficiency of delivered health services. Maternal mortality is a key indicator of health and is associated with the accessibility and quality of maternal healthcare services among others in a country. Over the past decade, Jordan achieved substantial progress in improving maternal health. However, existing data still shows that mothers are dying from preventable causes.

Measurement and analysis of maternal mortality in Jordan, at the national level, remained a challenge and a high degree of discrepancy in results from previous national studies prevented accurate analysis of avoidable factors and hindered progress in averting maternal deaths. This discrepancy raised uncertainty in the actual reflection of registered maternal deaths, demonstrating a need to establish a more robust information source that will present authorities with an ongoing and systematic method for estimating the maternal mortality ratio over time. Therefore, the need for a new active surveillance system was recognized to promptly track all maternal deaths, identify their causes and stimulate a response to prevent future deaths.

Building on the above and the momentum achieved by national safe motherhood programs led by the MOH under predecessor USAID Health System Strengthening Projects, USAID Health Service Delivery, in collaboration with the MOH and other national stakeholders, established Jordan's Maternal Mortality Surveillance and Response (JMMSR) system to help eliminate preventable maternal deaths and support the Government of Jordan to achieve its national and international goals to reduce maternal mortality. The JMMSR system is designed as a customization of the WHO Maternal Death Surveillance and Response Technical Guidance published in 2013 with the overall objectives to count every maternal death, calculate the maternal mortality ratio (MMR), which will permit an assessment of the true magnitude of maternal mortality and provide information to decision makers, healthcare managers, healthcare providers and communities that effectively informs actions to eliminate preventable maternal mortality at health facilities and in the community.

To support effective implementation of the JMMSR system, successful advocacy efforts resulted in the amendment of the Public Health Law, mandating the formation of the JMMSR system and the notification of all deaths among women of reproductive age on a national level. Efforts also included the engagement of key stakeholders and capacity building at all levels to implement and manage the system, as well as the establishment of an information system to collect, analyze and use data to inform improvements.

In January 2018, implementation began with the reporting of deaths among women of reproductive age nationwide. Trained focal points from all public and private hospitals, as well as forensic medicine departments (FMDs) began notification of all deaths among women of reproductive age in their facilities. Subsequently, trained Directorate Advisory Groups (DAGs) from all Health Affairs Directorates (HADs) identified cases of maternal deaths and conducted maternal death reviews (MDRs) at the facility and household levels for all identified maternal death cases. Then, the National Advisory Group (NAG) reviewed the maternal death cases,

assigned the main cause of death and contributing factors, analyzed the aggregated data and decided on the appropriate national-level responses that are included in this report. The MOH Non-Communicable Diseases Directorate (NCDD) monitors and evaluates all implementation steps and will ensure that disseminated responses are implemented. To improve the timeliness, quality and completeness of information, a monitoring and evaluation logical framework was developed and used to monitor the progress and evaluate the main functions of the system.

The National Maternal Mortality Report 2018 is the first report for Jordan that provides comprehensive information about each maternal death that took place during the reporting period of January-December 2018 based on active surveillance. The data and findings presented in this report have been drawn from Jordan's Maternal Mortality Surveillance and Response Information System (JMMSR IS) after intensive reviews at different levels by trained multidisciplinary teams of healthcare providers and managers and have been discussed and approved by the NAG. The JMMSR Bylaw guaranteed that data generated through the JMMSR system will not be used for litigation purposes. The JMMSR IS deployed high security protocols to preserve the confidentiality of the collected and processed data at all levels.

Quantitative and qualitative analysis of data and findings have resulted in a better understanding of maternal mortality in Jordan. From January to December 2018, a total of **1,247** deaths among women of reproductive age were notified through the JMMSR IS, of which a total of **62** maternal deaths were identified. MDRs were conducted for all maternal death cases at the HAD and national levels through DAGs and the NAG respectively. The total number of live births for the same period was **207,917** and Jordan's MMR for the period of January-December 2018 was calculated at **29.8 per 100,000 live births**.

Out of the 62 maternal death cases, the main cause of death was assigned to 56 cases, while the cause of death could not be specified for the remaining 6 cases. Of the 56 cases, 35 cases (62.5%) were due to direct obstetric causes while 21 cases (37.5%) were due to indirect causes. Obstetric hemorrhage was the most common direct cause of maternal deaths and the most frequent cause-specific maternal mortality factor in 17 cases. On the other hand, cardiac disease was the most common indirect cause of deaths in 8 cases. Overall findings indicate that 41 out of the 56 cases (73.2%) were avoidable. The NAG identified contributing factors that led to maternal deaths from MDR reports and case summaries. The most common contributing factors identified were presented using the "Three Delays Model". DELAY III: Receiving Care, contributed to 36 of the maternal death cases (58.1%), in 14 of these the main cause of death was obstetric hemorrhage. DELAY I: Seeking Care, contributed to 14 of the maternal death cases (22.6%), in 6 of the 14 the main cause of death was cardiac disease.

The above findings enabled DAGs and the NAG to identify patterns of significant problems that contributed to maternal deaths and led to the development of responses tailored to address the main causes of maternal deaths and their contributing factors. Improving quality of antenatal care and delivery care were important elements of the response at the health facility level. The NAG will lead the efforts to translate the "Response" into actions and monitor their implementation at respective levels of Jordan's healthcare delivery system in collaboration with the NCDD at the MOH. As expected, there were some limitations in the first year of the JMMSR system implementation. These were mainly related to missing or inconsistent documentation on medical records, which constituted a challenge for the NAG to present a complete analysis for some variables. In order to address the root causes of these limitations, the NAG, in collaboration with the MOH NCDD, met and agreed on recommendations to improve data collection and analysis for subsequent years.

BACKGROUND

The healthcare system in Jordan is one of the best in the Eastern Mediterranean Region, due to the secure and stable conditions in the Kingdom. This is also attributed to the effective development projects, which include health as an essential component of sustainable development. As a result, Jordan's health sector witnessed remarkable improvement which reflected positively on the health status of its citizens. This can be measured by general health indicators that reflect the quality and efficiency of delivered health services. The overall average life expectancy increased from 70.6 years to 72.5 for males and from 72.4 to 74.0 for females from 2006 to 2016¹.

Maternal mortality remains a universally recognized public health priority, despite efforts and some success in addressing this issue. Maternal mortality is also a key indicator of health and is associated with the accessibility and quality of maternal healthcare services among others in a country. Over the past decade, Jordan achieved substantial progress in improving maternal health. This included upgrading the physical infrastructure of 20 obstetrics departments in public sector hospitals, procuring essential and state of the art medical equipment, developing human resources for safe motherhood and establishing and strengthening a cluster of health systems to support and enhance maternal health. However, existing data still shows that mothers are dying from preventable causes.

Measurement and analysis of maternal mortality at the national level remained a challenge and a high degree of discrepancy in results from previous national studies prevented accurate analysis of avoidable factors and hindered progress in averting maternal deaths. Previously reported MMRs in Jordan were according to local surveys. In 1995, the MMR in Jordan was reported to be 41/100,000 live births which decreased to 19/100,000 in 2008². However, for the same time period, the WHO reported these ratios to be 73/100,000 in 1995 and 58/100,000 in 2008³. This discrepancy raised uncertainty in the actual reflection of registered maternal deaths, demonstrating a need to establish a more robust information source that will present authorities with an ongoing and systematic method for estimating the MMR over time. Therefore, the need for a new active surveillance system was recognized, to promptly track all maternal deaths, identify their causes, and stimulate a response to prevent future deaths.

Building on the above and the momentum achieved by safe motherhood programs under predecessor USAID Health System Strengthening Projects, USAID Health Service Delivery, in collaboration with the MOH, and other national stakeholders, established the JMMSR system to help eliminate preventable maternal deaths and support the Government of Jordan to achieve its national and international goals to reduce maternal mortality.

Jordan was ready to establish and successfully operate a national surveillance system for maternal mortality. This was evident from the Kingdom's existing well-established national registries and surveillance systems including the National Cancer Registry, Death Registry, Thalassemia Registry and End Stage Renal Failure Registry in addition to the Communicable Diseases Surveillance System. The health system also has a well-recognized collaboration between the MOH and other national stakeholders and partners. Moreover, almost 98% of births take place in hospitals⁴, and at the time being, hospitals and FMDs are the only entities entitled to issue a death notification form.

THE JMMSR SYSTEM DESCRIPTION

The JMMSR system is designed as a customization of the WHO Maternal Death Surveillance and Response Technical Guidance⁵ published in 2013. Accordingly, the goal and objectives of the JMMSR system were set as described below.

GOALS AND OBJECTIVES OF THE JMMSR SYSTEM

1. MAIN GOAL: TO ELIMINATE PREVENTABLE MATERNAL MORTALITY

The primary goal of the JMMSR system is to contribute to eliminating preventable maternal mortality by obtaining and using information on each maternal death to guide public health actions and monitor their impact.

2. OVERALL OBJECTIVES

- 1) To count every maternal death, permitting an assessment of the true magnitude of maternal mortality and the impact of actions taken to reduce it.
- 2) To provide information to decision makers, healthcare managers, healthcare providers and communities that effectively guides actions to eliminate preventable maternal mortality at health facilities and in the community.

3. SPECIFIC OBJECTIVES

- 1) To collect accurate data on all maternal deaths, including number, causes of death, contributing factors and review all maternal deaths at the facility and household levels.
- 2) To analyze and interpret data collected, including trends in maternal mortality, causes of death (medical) and contributing factors (quality of care, non-medical factors), avoidability of the deaths, focusing on those factors that can be remedied, risk factors and groups at increased risk.
- 3) To use the data to make evidence-based responses for action to avert further deaths. Responses may address a variety of areas, such as: patients/community education and involvement, timeliness of referrals of high risk cases, access to and delivery of services, quality of care, training needs of healthcare providers, regulations and policy.
- 4) To disseminate and discuss findings and responses with civil society, healthcare providers, decision-makers and policy-makers to increase awareness about the magnitude, social effects and avoidability of maternal mortality.
- 5) To monitor the implementation of responses.
- 6) To inform programs on the effectiveness of interventions and their impact on maternal mortality.
- 7) To allocate resources more effectively and efficiently by identifying specific needs.
- 8) To enhance accountability for maternal health.
- 9) To guide and prioritize research related to maternal mortality.

THE JMMSR SYSTEM IMPLEMENTATION STEPS

The JMMSR system is designed to track all deaths among women of reproductive age in Jordan, identify each maternal death among those, conduct review at the facility and household levels, analyze data to assign a main cause of death and contributing factors, as well as stimulate a response aimed at preventing similar deaths from occurring in the future. The JMMSR system consists of the following five main implementation steps:

I. NOTIFICATION OF ALL DEATHS AMONG WOMEN OF REPRODUCTIVE AGE

Timely notification of maternal deaths is critical if the JMMSR system is to be successful. The JMMSR system begins with the notification step. This includes the notification of deaths among women of reproductive age and “zero reporting” when no deaths among women of reproductive age have occurred. Zero reporting assures that there is an active process of notifying suspected maternal deaths, whether or not any have actually occurred and constitutes a form of continuous active surveillance. Due to their importance, notification and weekly zero reporting of all deaths among women of reproductive age are mandatory according to Articles no. 3 and 4 of the JMMSR Bylaw no. 10 of the year 2016.

His Majesty King Abdullah II decreed the establishment of Bylaw no. 10 of the year 2016 of the Public Health Law (no. 47 of the year 2008) which made the death of a woman in reproductive age a notifiable event. This has resulted in the JMMSR Bylaw. This obligatory notification makes maternal mortality a national priority, underlining the fact that every maternal death matters. Focal points from all reporting health facilities are trained to timely notify all deaths among women of reproductive age as described in the JMMSR system implementation guidelines.

Notification of all Deaths among Women of Reproductive Age

Role: trained health facility focal points.

Timeframe: within 24 hours of the death.

Tools: death notification form.

Monitoring and Evaluation: DAG rapporteur and MOH NCDD.

Outcome: HAD receives notifications of suspected maternal death cases from respective health facilities.

Zero Reporting

Role: trained health facility focal points.

Timeframe: on a weekly basis (on Sundays).

Tools: zero report form.

Monitoring and Evaluation: DAG rapporteur and MOH NCDD.

Outcome: HAD receives weekly zero reports from respective health facilities.

2. IDENTIFICATION OF MATERNAL DEATH CASES

According to the JMMSR Bylaw no. 10 of the year 2016 and the MOH JMMSR policies and procedures, it is mandatory to carry out a primary investigation of each suspected death among women of reproductive age to identify probable maternal death cases. The trained DAG rapporteur or/and DAG member visits the facility where the death was notified and reviews the deceased woman’s medical records to complete the identification process.

This step involves answering two main questions: (1) Did the death occur during pregnancy, labor, within 42 days of the end of pregnancy, or more than 42 days but less than one year after the end of pregnancy? If the answer is 'Yes', this is identified as a “probable maternal death” case and triggers the second question: (2) Was the death due to incidental or accidental causes (accident, homicide)? If the answer is 'Yes', the type of accident that occurred will need to be specified. If the answer is 'No', then the case is classified as a “maternal death”. In the case that the death occurred more than 42 days but less than one year after the end of pregnancy and was not due to incidental or accidental causes then, it is classified as a “late maternal death”. In the case that more information is needed to ascertain the death as maternal, the DAG member interviews healthcare providers at the facility.

Identification of Maternal Deaths

Role: trained DAG rapporteur or/and any appointed DAG member.

Timeframe: within 72 hours of notification.

Tools: identification form.

Monitoring and Evaluation: DAG rapporteur and MOH NCDD.

Outcome: HAD receives confirmed maternal death cases from respective health facilities.

3. REVIEW OF MATERNAL DEATH CASES

Once a maternal death case is identified, the next step of the JMMSR system is to conduct the maternal death review (MDR). MDR is an essential component of the JMMSR system and includes quantitative and qualitative in-depth investigations of the causes and contributing factors of each maternal death case. The MDR occurs at two subsequent levels: the HAD level by DAGs and the national level by the NAG.

MDR is performed by a multidisciplinary team composed of members with technical and management expertise. MDR requires data collection about the deceased woman from the facility and household levels, as appropriate. The combination of facility and household data and reviews provides data that help to understand the woman's medical history, the course of pregnancy and the circumstances surrounding the death.

Data collection is carried out through the completion of the health facility and household questionnaires. Once the questionnaires are completed for all maternal death cases, a DAG MDR session is held to review collected maternal death data for each case and complete the DAG worksheet. The DAG worksheet must include a case summary that describes the main highlights of the circumstances surrounding each death and the final DAG decision.

Once maternal death cases have been reviewed by the DAGs, the NAG meets to conduct their own MDR session of each maternal death case. It is worth noting that at this level, all cases are presented to the NAG in a de-identified state to protect the confidentiality of patients, facilities and healthcare providers.

Maternal Death Review by DAGs

Role: two trained DAG members (DAG rapporteur and an obstetrician/ gynecologist) for completion of data collection and all DAG members for MDR session.

Timeframe: health facility questionnaires need to be completed within 72 hours of identification, and household questionnaires need to be completed within 1 month of identification. DAG MDR sessions should be held within one month of the completion of the household questionnaires.

Tools: health facility and household questionnaires and DAG worksheet.

Monitoring and Evaluation: DAG rapporteur and MOH NCDD.

Outcome: a main cause of death assigned, avoidability determined, contributing factors that led to death identified, specific recommendations to address avoidable cases and avert similar maternal deaths specified, immediate and short-term responses recommended and followed up with the HAD Director.

Maternal Death Review by the NAG

Role: NAG members.

Timeframe: at least every 3 months.

Tools: NAG worksheet.

Monitoring and Evaluation: NAG rapporteur and MOH NCDD.

Outcome: classification of cause of death according to WHO-ICD 10 assigned, avoidability determined, classification of cause of death as direct/indirect, contributing factors that led to death identified, the Three Delays Model applied and long-term responses recommended and followed up with the Minister of Health and the maternal death case closed.

4. ANALYSIS AND INTERPRETATION OF MATERNAL DEATH DATA

Data analysis and interpretation of compiled results are critical components of the JMMSR system to guide and orient appropriate public health measures for prevention and health promotion.

Trained DAG members initiate data analysis at the HAD level for individual maternal death cases. At the national level, the NAG is convened at least semi-annually to conduct analysis on aggregated data for all maternal death cases reported by the DAGs from all the Kingdom's HADs. The aim of aggregated data analysis is to identify causes of death and subgroups at highest risk, identify factors contributing to maternal deaths, assess emerging data patterns and prioritize the most important health problems to improve public health response.

For example, a large number of deaths may occur among mothers who had but did not appreciate warning signs of illness, such as headaches, swollen legs or vaginal bleeding. The intervention to prevent such deaths will be the education of the mother, family and community about the symptoms of illness during antenatal care (ANC) visits and through community education.

Analysis of Maternal Deaths

Role: DAGs, NAG members and MOH NCDD.

Timeframe: Semi-annually.

Tools: Three Delays Model.

Monitoring and Evaluation: DAG rapporteur, NAG rapporteur and MOH NCDD.

Outcome: Descriptive and indicator analysis of maternal death data to aid in identifying appropriate national level responses.

Contributing factors to maternal deaths may be grouped as:

- 1) Women and family factors (e.g. delay in recognizing problems, delay in seeking medical care, unwanted pregnancy, no or inadequate use of ANC).
- 2) Service provider factors (e.g. substandard ANC or delivery care).
- 3) Health facility factors (e.g. inadequate number or distribution of facilities, lack of blood, drugs, supplies and equipment, or anesthesia or lack of transport for referrals).

The JMMSR system applies the “Three-Delays” analysis framework⁶ (see Figure 1) to analyze contributing factors that led to maternal deaths. The framework proposes that maternal mortality is mainly due to delays in:

- 1) Seeking care.
- 2) Reaching care.
- 3) Receiving care.

This framework was used to analyze all maternal deaths that occurred in Jordan since the start of the JMMSR system and is clearly described under the results section.



Figure 1: The Three Delays Model

5. RESPONSE AND DISSEMINATION

Findings from MDRs and analyses will lead to responses and actions to prevent similar deaths at health facilities and in the community. These responses may be short-term or long-term, depending on the circumstances. Identification of patterns of particular problems contributing to maternal deaths or geographical areas where deaths occur in greater numbers should result in more comprehensive responses.

Responses should be tailored to address the problems identified in the community, healthcare facility, and healthcare system, as well as across relevant sectors. The type of action taken will depend on the level at which the decisions are being made, the findings of the analyses and the stakeholders involved. Improving quality of care is an important element of response at the health facility. The JMMSR system guiding principles for response include:

- Starting with the avoidable factors identified during the MDRs.
- Using evidence-based approaches.
- Prioritizing actions (based on feasibility, resources, health system readiness).
- Establishing a timeline (immediate, short, medium and long-term).
- Integrating recommendations within annual health plans and health system packages.
- Deciding how to monitor progress, effectiveness and impact.
- Monitoring to ensure recommendations are being implemented.
- Developing and implementing a plan for disseminating the JMMSR system results.

Response and Dissemination

Role: DAG, NAG and MOH.

Timeframe: Immediate, semi-annual and annual.

Tools: Single-facility death review report, annual reports (national, facility-level), policy briefs, info-graphs and community awareness sessions.

Monitoring and Evaluation: MOH.

Outcome: Appropriate responses at the health facility, community and national levels.

The NAG will be fully involved in developing the responses to address the entire country, and work with the MOH, RMS and other stakeholders on planning and promoting their implementation and acting as advocates for change.

At the HAD level, DAGs will lead the development, implementation and monitoring of immediate and short-term responses. When disseminating the responses, data will be de-identified so individual families or healthcare providers cannot be identified, recommendations will be fed back to the health facility or community where the information was collected, as appropriate.

Language and dissemination methods will be tailored to the target audiences and legal safeguards will be in place to prevent the use of the review findings in litigation (Article no. 8 of the JMMSR system Bylaw). Key messages must get to those who can implement the recommendations and make a real difference towards saving mothers' lives.

THE JMMSR SYSTEM MONITORING AND EVALUATION

To improve the timeliness, quality and completeness of information and ensure that the major steps of the JMMSR system are adequately functioning, a monitoring and evaluation logical framework was developed and used to monitor the progress and evaluate the main functions of the system (see Figure 2).

The monitoring of the JMMSR system is carried out primarily at a national level by the MOH NCDD through a cluster of indicators that were carefully selected for this purpose. The monitoring and evaluation of the JMMSR system is done for all the JMMSR system steps and functions with particular attention to the accuracy and timeliness of notifying, identifying and reviewing all maternal death cases.

The JMMSR system includes mechanisms to monitor the dissemination and implementation of responses and actions to avert maternal deaths.

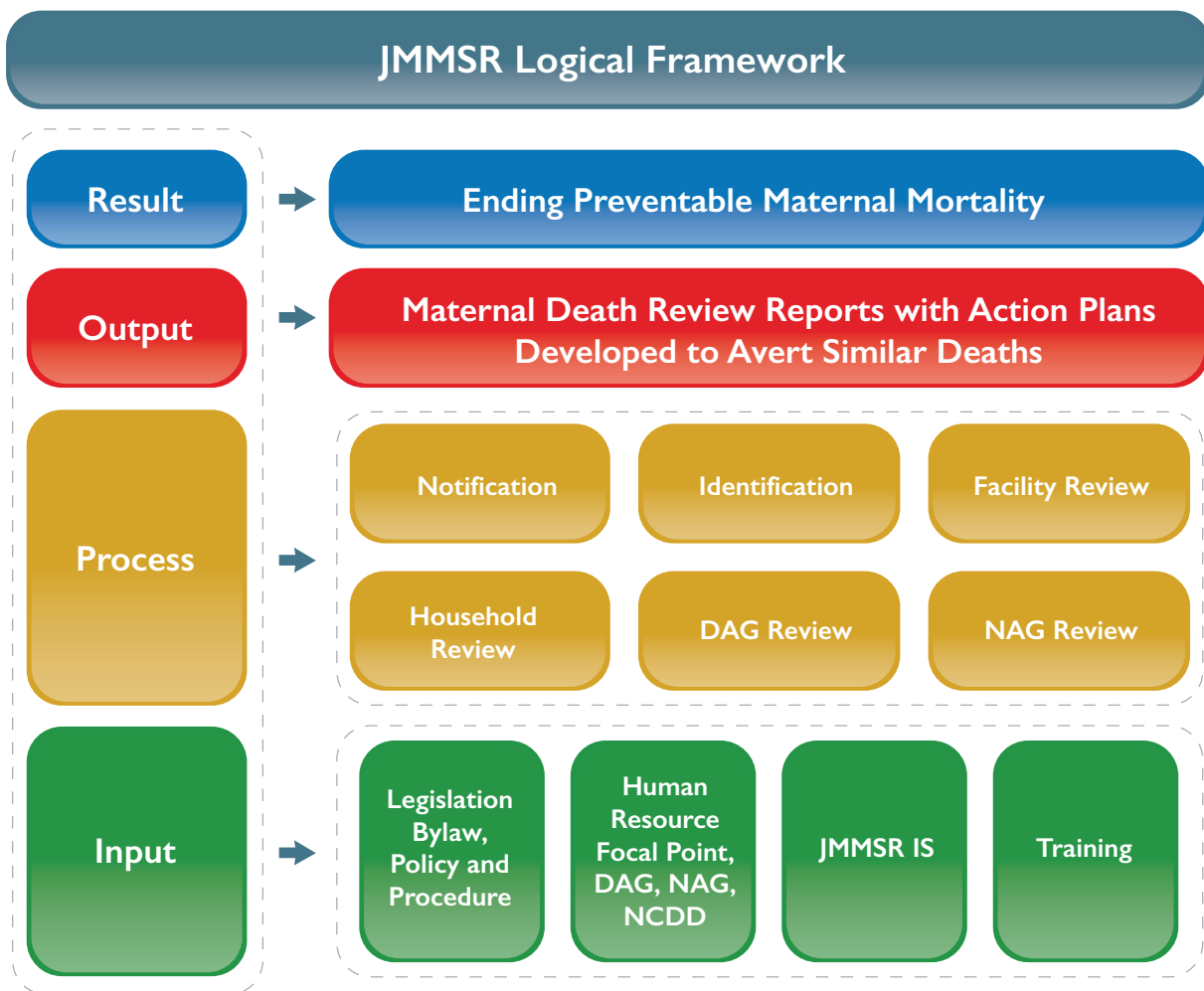


Figure 2: The JMMSR System Logical Framework

METHODOLOGY

The National Maternal Mortality Report 2018 is the first report for Jordan that provides comprehensive information about each maternal death that took place during the reporting period based on active surveillance through the JMMSR system. It provides an opportunity to strengthen the health system in Jordan, with the aim of improving maternal health and eliminating preventable maternal deaths.

The data and findings presented in this report have been drawn from the JMMSR Information System (JMMSR IS) after intensive reviews at different levels by trained multidisciplinary teams of healthcare providers and managers.

THE JMMSR INFORMATION SYSTEM

JMMSR is a system that aims at preventing maternal deaths and improving the quality of care through the dissemination and use of data and information for appropriate decision-making. Data is collected at different levels of the healthcare system to support the implementation and monitoring of different functions of the JMMSR system.

In order to standardize and facilitate the different stages of data collection, analysis and reporting, USAID Health Service Delivery, in full collaboration with the MOH, designed the JMMSR Information System (JMMSR IS) as a secure web-based application hosted on secure servers at the MOH E-transformation and Information Technology Directorate. A helpdesk system was also set up to address immediate questions from reporting sites nationwide and provide the necessary technical support.

All personnel involved in operating and managing the JMMSR system were trained on the use of the JMMSR IS. IT equipment were provided and installed in all reporting sites. Following pilot testing of the JMMSR IS, a final version was developed and fully utilized with the start of the JMMSR system implementation on January 1st, 2018. Users of the system were granted secure access and privileges based on their role.

DATA COLLECTION AND FLOW

To standardize the data collection process and improve its efficiency, desktop and portable computers (tablet devices) were made available to collect information to support the operations of the JMMSR system implementation as follows:

I. NOTIFICATION OF ALL DEATHS AMONG WOMEN OF REPRODUCTIVE AGE

This step was carried out by trained focal points at the 122 reporting sites from public and private sectors hospitals and 17 FMDs. Two trained focal points were responsible for the notification of all deaths among women of reproductive age to their respective HAD. This was done through completing an electronic death notification form on the JMMSR IS within 24 hours of the time of death.

To ensure active surveillance, focal points were also responsible for submitting zero reporting through the JMMSR IS at the start of each week on Sundays, if no deaths occurred in the previous week.

The JMMSR IS utilizes the national ID for Jordanians and passport number for non-Jordanians as a unique identifier to avoid duplication of reporting (especially between hospitals and FMDs).

2. IDENTIFICATION OF MATERNAL DEATH CASES

Once deaths among women of reproductive age are notified, the second step of the JMMSR system requires users to identify which deaths were maternal. Identification was carried out by the assigned DAG members.

Identified maternal deaths included all deaths that occurred during pregnancy, labor, within 42 days of the end of pregnancy, or more than 42 days but less than one year after the end of pregnancy excluding deaths due to incidental or accidental causes (accidents or homicide).

3. REVIEW OF MATERNAL DEATH CASES

Once a case was identified as a maternal death case, the next step was to conduct the MDR. This involved in-depth investigations of the causes and contributing factors that led to death. The JMMSR system utilized two MDR tools; the health facility questionnaire and the household questionnaire. These were adapted and customized from the WHO Maternal Death Surveillance and Response Technical Guidance⁵ to establish a framework for an accurate assessment of maternal mortality. Forms were in Arabic, but users were able to input answers in Arabic or English through the JMMSR IS.

Health facility reviews and questionnaire filling were conducted by an Ob/Gyn specialist who is a member of the DAG in addition to another DAG member within 72 hours of a maternal death case identification, while household reviews were conducted by a DAG member within one month of identification.

At the health facility level, the main sources of information were the attending physicians, midwives, and nurses who provided healthcare services to the deceased woman. Medical staff were interviewed and asked to give full details of a woman's medical condition from admission to death. The questionnaire comprised of questions on reproductive history, the pregnancy that led to death, ANC, main complaints, provisional diagnosis, cause of death, autopsy reports and contributing factors associated with the maternal death.

At the household level, the main sources of information were close relatives of the deceased woman and those who accompanied her during the time of her illness and up to the time of death. In-depth interviews were conducted to ask questions around the woman's health and how the death occurred and obtain relevant information that were not available during the health facility review.

Data linkages between the facility and household reviews allowed to obtain a better picture of the circumstances and contributing factors surrounding maternal deaths.

A) DIRECTORATE ADVISORY GROUP REVIEW

Following the completion of the health facility and household MDRs, DAGs reviewed collected maternal death data in order to:

- Determine the main cause of the death.
- Identify contributing factors that led to maternal death.
- Classify the maternal death as avoidable or unavoidable.
- Issue specific recommendations (immediate and short-term responses) to address avoidable cases.

DAG members were required to complete a DAG worksheet for each reviewed maternal death case through the JMMSR IS. The worksheet included the following components:

- A case summary.
- Information on ANC.
- Information on the pregnancy.
- Information on delivery.
- Information on the postpartum period.
- The DAG decision on the cause of death, contributing factors, avoidability, and recommendations.

Once the DAG worksheet was completed on the JMMSR IS then, the case was ready for review by the NAG.

B) NATIONAL ADVISORY GROUP REVIEW

De-identified data on each maternal death was presented to NAG members whereby the NAG rapporteur presented the DAG worksheets and health facility and household questionnaires to the NAG for review. Whenever needed, the NAG was able to return the case to the DAG to request additional information.

At the end of their review of each maternal death case, the NAG was required to:

- Confirm the cause of death.
- Determine whether it was due to direct or indirect obstetric causes.
- Classify the maternal death as avoidable or unavoidable.
- Identify contributing factors that led to the maternal death.
- Issue specific recommendations related to the maternal death case.

To improve data comparability, standardized cause of death aggregations were applied from the WHO Application of ICD-10 to Deaths during Pregnancy, Childbirth and the Puerperium: ICD-MM⁷. The NAG rapporteur then completed the NAG worksheet on the JMMSR IS with decisions on the above. Once completed, the individual maternal death case was closed.

MONITORING AND EVALUATION

To improve the timeliness, quality, and completeness of data collected through the system, a monitoring and evaluation framework was developed and implemented. This was used to evaluate the main functions of the system and ensure its major steps were functioning adequately. The monitoring was primarily carried out at the national level by the MOH NCDD.

The JMMSR IS served as a data source for indicators of the five steps of the JMMSR system implementation, allowing users to monitor and evaluate each step as follows:

1. NOTIFICATION INDICATORS

- Percent of deaths among women of reproductive age notified within 24 hours of time of death.
- Percent of health facilities in all HADs notifying deaths among women of reproductive age or submitting zero-reports.

2. IDENTIFICATION INDICATORS

- Percent of suspected cases identified by DAG members within 72 hours of death notification.

3. MATERNAL DEATH REVIEW INDICATORS

- Percent of facility reviews conducted for maternal deaths within 72 hours of identification.
- Percent of household reviews conducted for maternal deaths within one month of identification.
- Percent of maternal deaths reviewed by the DAG with action plans developed to avert similar deaths.
- Percent of maternal death cases analyzed by the NAG with action plans developed to avert similar maternal deaths.

4. DATA QUALITY INDICATORS

The Civil Status and Passports Department (CSPD) in Jordan is the body responsible for recording vital events in the population (births, deaths, marriages and divorces). It relies on self-reporting, therefore, data is not recorded at the actual point of occurrence of the event. However, it is the only reference against which collected JMMSR system data could be validated. The MOH NCDD monitored data quality and completeness by comparing data collected through the JMMSR IS with other data sources such as health facility records and the CSPD for validation purposes. The two data quality indicators for the JMMSR system evaluation were:

- Percent of deaths among women of reproductive age captured by the JMMSR system compared to CSPD data.
- Percent of deaths of women of reproductive age checked to ensure that they were correctly identified as non-maternal death cases based on the electronic medical record system.

At the directorate level, DAG rapporteurs were also able to monitor and supervise the health facilities pertaining to their respective HAD through the system. JMMSR IS indicators allowed users to monitor the progress of each maternal death case as it went through the five implementation steps. Moreover, it enabled DAG rapporteurs to follow up with specific health facilities to ensure data collection was being carried out in a timely manner.

DATA ANALYSIS

I. DATA QUALITY INDICATORS

Case summaries were developed and analyzed to gain an understanding of the problems that led to a maternal death. The course of the mother's pregnancy and descriptions of where and how care was provided were carefully studied. Moreover, essential interventions that took place at all levels and any problems that may have contributed to the mother's death were explored. This approach was used to analyze the main causes of maternal deaths, contributing factors and preventability. The Three Delays Model framework⁶ was deployed to help identify common delays associated with three components; seeking care, reaching care and receiving care.

2. QUANTITATIVE ANALYSIS

The number of registered live births for the year 2018 was obtained from the Department of Statistics to serve as the denominator to calculate the MMR. The total number of maternal deaths was obtained from the JMMSR IS. Stata statistical package was used to perform the descriptive analyses.

CONFIDENTIALITY AND ETHICAL CONSIDERATIONS

The JMMSR Bylaw guaranteed that information generated through the JMMSR system will not be used for litigation purposes. The JMMSR IS deployed high security protocols to preserve the confidentiality of the collected and processed information at all levels.

When conducting household reviews, family members were contacted ahead of time to arrange for the visit. During the visit, the main interviewer explained the purpose of the interview, voluntary participation and confidentiality of collected information. In the event of refusal to participate, the reason for refusal was captured. The data collection team also provided the household questionnaire respondents with contact details in case they have any questions.

RESULTS

The results in the following section are described for the reporting period of the collected data which occurred from January to December 2018.

JORDAN'S MATERNAL MORTALITY RATIO

During the reporting period, 1,247 deaths among women of reproductive age were notified through the JMMSR IS, of which a total of 62 maternal deaths were identified. MDRs were conducted for all maternal death cases at the HAD and national levels through DAGs and the NAG respectively. The total number of live births for the same period was 207,917 and Jordan's MMR was calculated at 29.8 per 100,000 live births (refer to the summary Table 1.1 in Annex 1). The MMR showed increasing trend with age starting at 8.7 in the age group 15-19 years and lower and reaching 110.8 for women in the age group 40-49 years (see Figure 3).

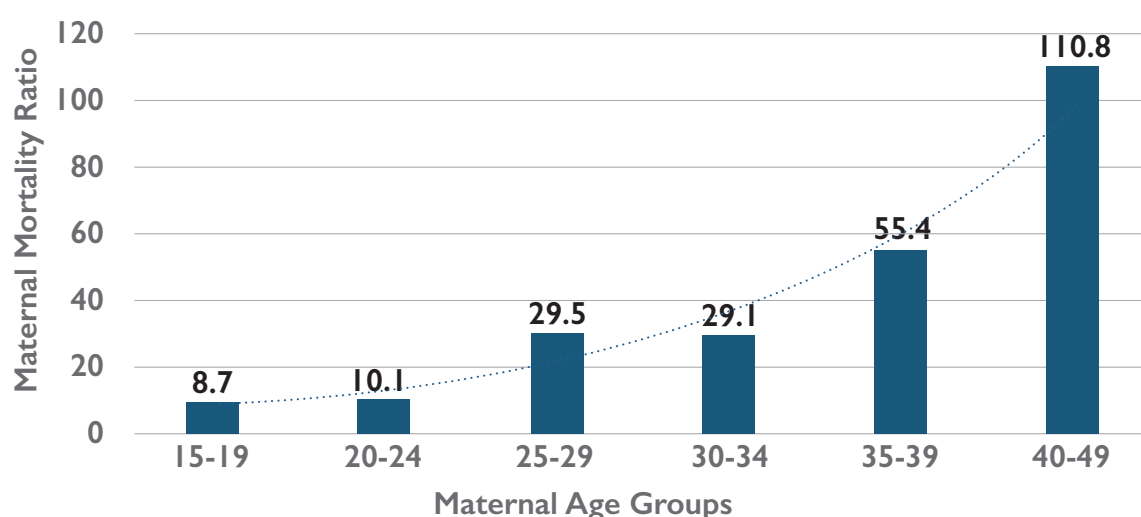


Figure 3: Distribution of Maternal Mortality Ratio by Maternal Age Groups

DEMOGRAPHIC CHARACTERISTICS

Investigating and understanding the demographic characteristics of maternal death cases may assist in explaining the MMR. Moreover, the collected data around demographic characteristics may be used for appropriate planning of services and responses. However, this data should be held with caution due to the small number of maternal death cases.

Table 1.2 in Annex 1 shows maternal deaths by demographic characteristics including age group, nationality, educational level and employment status.

I. MATERNAL DEATHS BY AGE AT DEATH

The percent of maternal deaths was highest in women aged between 25-29 years accounting for (30.6%) of all deaths. The second and third largest proportion of deaths took place in women aged between 35-39 years (24.2%) and 30-34 years (22.6%) respectively. The lowest

percent of deaths (1.6%) took place in age group of 15-19 years. This can be attributed to the fact that the median age at first birth in Jordan is 24.6⁴. The average age of maternal deaths was approximately 32 years, with the highest age being 44 years and the lowest being 19 years. These findings are detailed in Table 1.

Age Group	Number of Maternal Deaths	Percent
15-19	1	1.6
20-24	5	8.1
25-29	19	30.6
30-34	14	22.6
35-39	15	24.2
40-49	8	12.9
Total	62	100

2. MATERNAL DEATHS BY NATIONALITY

Of the 62 maternal deaths, the majority (83.9%) were Jordanian, while the rest were Syrian (9.7%), Palestinian (4.8%) and one case (1.6%) was Pakistani (see Figure 4).

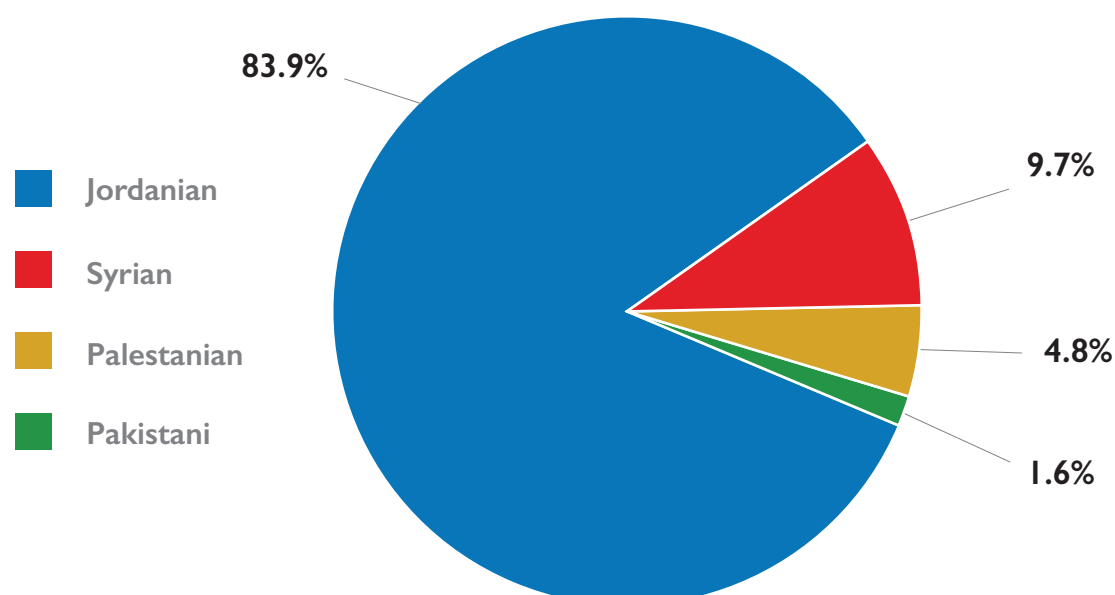


Figure 4: Maternal Deaths by Nationality

3. MATERNAL DEATHS BY EDUCATIONAL LEVEL

Of the 62 maternal deaths, 57 had information on the education level of the deceased (see Figure 5). The results of the Jordan Population and Family Health Survey (2017-18)⁴ for the percent distribution of ever-married women by highest level of schooling attended or completed are somehow close to the level of education reported for the deceased women.

Information on the level of education was difficult to ascertain due to discrepancies between the data collected from the health facility and household reviews. It was decided to rely more on the household information where discrepancies arose.

Upon investigating the possible causes for these discrepancies, it was concluded that the question related to education in the questionnaires could have been unclear and possibly interpreted differently by different people. Therefore, this was amended when the questionnaires were reviewed for the following year.

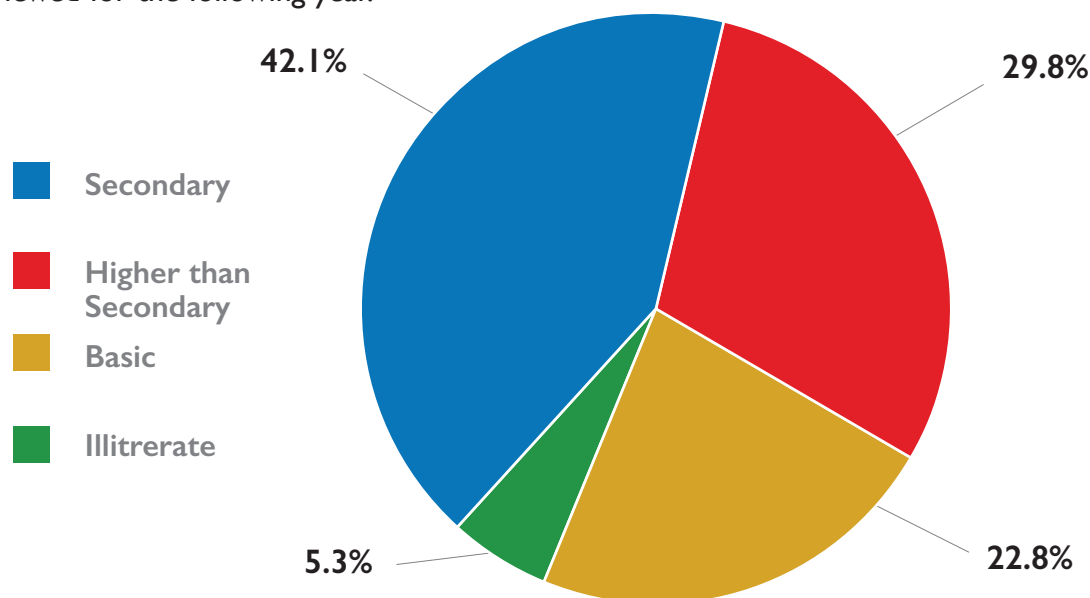


Figure 5: Maternal Deaths by Educational Level

4. MATERNAL DEATHS BY EMPLOYMENT STATUS

Information on employment status was captured for 58 cases, the vast majority (89.7%) of deceased women were unemployed (see Figure 6). The Jordan Population and Family Health Survey (2017-18)⁴ also showed that the majority of ever-married women (86%) have never been employed.

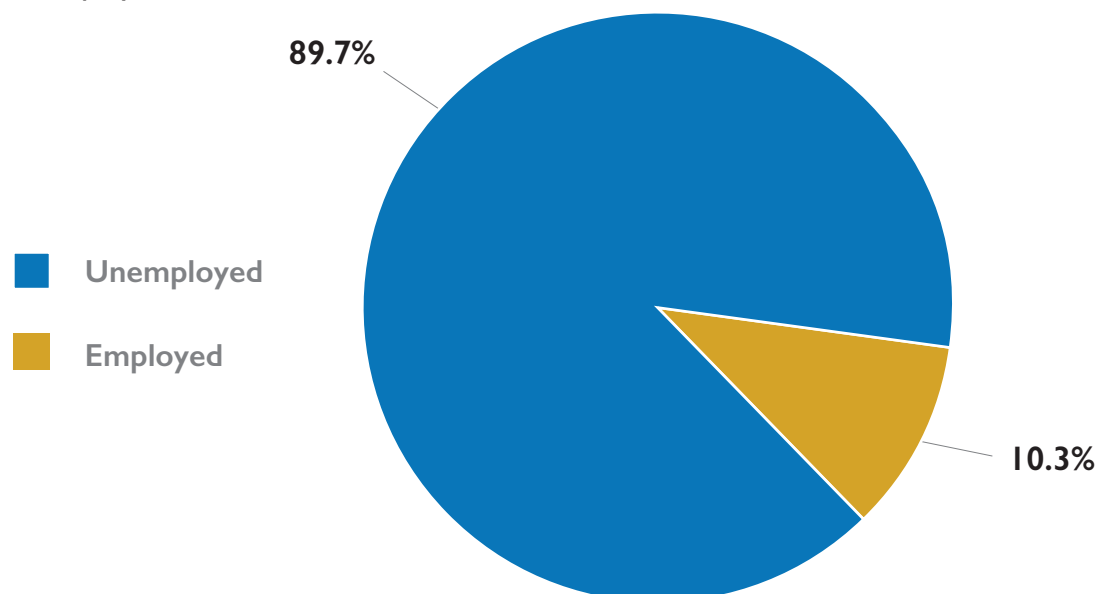


Figure 6: Maternal Deaths by Employment Status

5. MATERNAL DEATHS BY PLACE OF RESIDENCE AND PLACE OF DEATH

Information on the place of residence and death of the deceased women were collected from both the health facility and household Reviews. Table 2 below shows the percent distribution of maternal death cases according to the place of residence and the governorate where the death occurred. While only (21.3%) of deceased women resided in Amman, (41.9%) of maternal deaths took place in the same governorate. Amman governorate has the largest number of referral public and private hospitals leading to influx of referred complicated cases from all over the country.

Table 2: Maternal Deaths by Place of Residence and Place of Death

Governorate	Place of Residence Number (Percent)	Place of Death Number (Percent)
Amman	13 (21.3)	26 (41.9)
Irbid	17 (27.9)	16 (25.8)
Balqa	8 (13.0)	5 (8.1)
Aqaba	4 (6.6)	4 (6.5)
Mafraq	4 (6.6)	4 (6.5)
Karak	4 (6.6)	2 (3.2)
Ajloun	2 (3.3)	1 (1.6)
Jerash	1 (1.6)	1 (1.6)
Ma'an	1 (1.6)	1 (1.6)
Madaba	2 (3.3)	1 (1.6)
Zarqa	5 (8.2)	1 (1.6)
Tafilah	0 (0)	0 (0)
Total	61* (100)	62 (100)

*One woman was visiting Jordan and resided in Palestine.

CLINICAL CHARACTERISTICS

The below sections provide information about the clinical characteristics of the maternal death cases that occurred during the reporting period (refer to summary Table 1.4 in Annex 1).

I. MATERNAL DEATHS BY PARITY

Parity was defined in this report as the number of previous pregnancies carried to a viable gestational age (24 weeks and above) and resulting in live births or stillbirths, including the pregnancy that led to death. Although maternal deaths were observed at all parity levels, the data clearly indicates that the majority (78.7%) of deceased women were multiparous (parity 1-4). Grand and great grand multi-para were reported in almost (18%) of maternal deaths. These findings are detailed in Table 3 below.

Parity	Number of Maternal Deaths	Percent
Nulliparous	2	3.3
Multipara	48	78.7
Grand multipara	8	13.1
Great grand multipara	3	4.9
Total	61*	100

*The parity was missing for one case.

2. MATERNAL DEATHS BY TIMING OF DEATH

The timing of a woman's death in relation to pregnancy was captured from the MDR at the facility and household levels. The majority of maternal deaths took place during the postpartum period (79.0%). The majority of deaths in the postpartum period (68%) took place within the first 24 hours of delivery. Death during pregnancy was reported in (12.9%) of cases and in (8.1%) of post miscarriage cases (see Figure 7). Half of the deaths during pregnancy happened before 24 weeks of gestation.

Due to lack of accurate documentation in health facility records, the actual timing of death in relation to the stage of labor could not be accurately determined. Therefore, in some cases, the NAG could not decide whether a death had occurred in the intrapartum or immediate postpartum period.

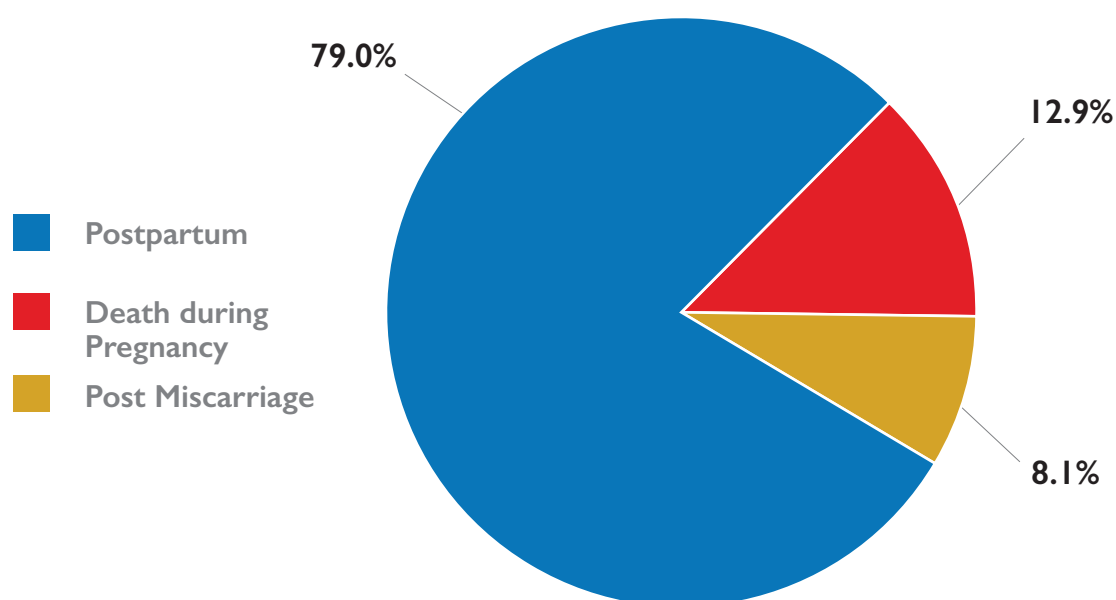


Figure 7: Maternal Deaths by Timing of Death

3. MATERNAL DEATHS BY ANTENATAL CARE

One of the top priority programs for reduction of maternal mortality is the universal access to quality ANC. Access to ANC services will contribute to the reduction of maternal deaths, but the impact on the reduction depends on how well healthcare providers screen for and manage cases of high risk pregnancy. Extreme precaution needs to be taken in interpreting the following results as they do not nullify the need and impact of quality ANC on maternal health outcomes.

The majority of maternal death cases received ANC services during the pregnancy that led to death, either from public or private health sector providers. Of the 62 maternal deaths, the number of ANC visits was recorded for 46 of them. About (24%) had 1 to 3 ANC visits, (39.1%) had 4 to 7 visits and (37.0%) had 8 and above visits. The median of ANC visits was 7.5 with a minimum of one and maximum of 20. About (34%) had received ANC services from private sector facilities, (30.5%) from public hospitals, (8.5%) from public primary health centers and (27.1%) from both public and private facilities. Results show that only a minority (8.5%) of the deceased women had received their ANC services from public primary healthcare facilities. This could be explained by the fact that ANC services for cases of high risk pregnancy are normally provided at the secondary and tertiary levels according to the Jordanian healthcare system.

The above results should not indicate that ANC programs are failing to save the lives of mothers, however, they indicate the need for compliance with the quality of care parameters when providing services, as well as the adherence of women to positive health practices encouraged during their ANC visits. These findings are detailed in Tables 4 and 5.

Table 4: Maternal Deaths by Antenatal Care Visits

Antenatal Care Visits	Number of Maternal Deaths	Percent
1 to 3 Visits	11	23.9
4 to 7 Visits	18	39.1
8 Visits and Above	17	37.0
Total	46*	100

*There were missing values for 16 cases for number of ANC care visits.

Table 5: Maternal Deaths by Place of Antenatal Care

Place of Antenatal Care	Number of Maternal Deaths	Percent
Private Sector	20	33.9
Public Hospital	18	30.5
Public Primary Healthcare Center	5	8.5
Public and Private	16	27.1
Total	59*	100

*There were missing values for three cases for place of ANC.

4. MATERNAL DEATHS BY MODE OF DELIVERY

Of the 62 maternal deaths, 39 cases (62.9%) had a cesarean delivery, 26 (41.1%) cases had an emergency cesarean and 13 (21.0%) cases had an elective cesarean. Eight women (12.9%) had a vaginal delivery and a few women (3.2%) had an assisted vaginal delivery. Eight (12.9%) women died while still pregnant, and 5 women (8.1%) died following miscarriage, two of these were at a gestational age between 20 and 23 weeks and had a surgical procedure to terminate pregnancy (hysterotomy). These findings are detailed in Table 6.

39 of the 62 maternal death cases (62.9%) delivered by a cesarean section, 17 of these were primary cesarean section deliveries (first time). Cesarean section is a major surgical procedure that can save the lives of both the fetus and the mother. However, a medically unnecessary cesarean section is associated with a higher risk of perinatal and maternal mortality compared to a vaginal delivery⁸.

In this report, the proportionately high number of maternal deaths in women who delivered by cesarean section indicates that further evaluation of the circumstances around the cesarean section delivery is indicated. Moreover, attention needs to be given towards unnecessary primary cesarean section delivery, improving pre-operative and intra-operative procedures, and post-operative monitoring for cesarean deliveries. This is significantly important given the situation of the rising trend of cesarean section delivery in Jordan^{9, 10, 11}.

Table 6: Maternal Deaths by Mode of Delivery

Mode of Delivery	Number of Maternal Deaths	Percent
Emergency Cesarean	26	41.9
Elective Cesarean	13	21.0
Vaginal Delivery	8	12.9
Miscarriage	5	8.1
Assisted Vaginal Delivery by Vacuum Extraction	2	3.2
No Delivery	8	12.9
Total	62	100

5. MATERNAL DEATHS BY FETAL OUTCOME

Analysis of maternal death and outcome of delivery among women who delivered before they died was also carried out. Of the 62 maternal deaths, 43 cases (69.3%) had live birth neonates, 6 cases (9.7%) had stillborn neonates, 5 cases (8.1%) had a miscarriage and 8 cases (12.9%) died while pregnant with co-occurring maternal and fetal death (see Figure 8).

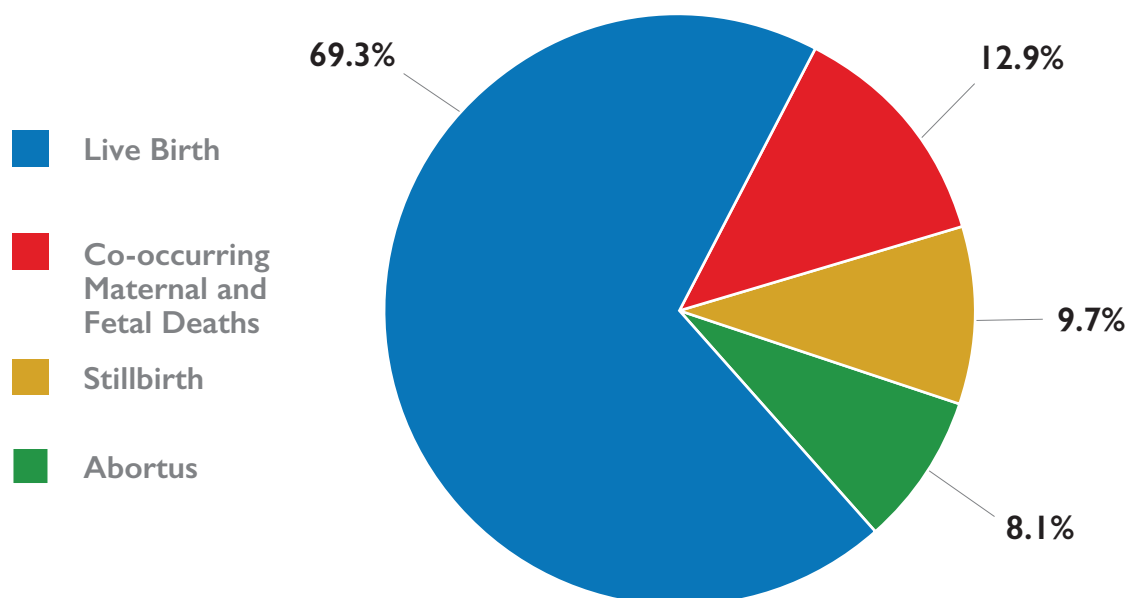


Figure 8: Maternal Deaths by Fetal Outcome

6. MATERNAL DEATHS AND MATERNAL ANEMIA

Of the 62 maternal deaths, hemoglobin values were only recorded for 57 cases, 30 of which were reported to have hemoglobin levels below normal values. The JMMSR system records did not capture the specific hemoglobin value for each of the deceased women which made it difficult to define the severity of anemia in most of the cases upon hospital admission. The NAG advocated and modified the JMMSR system tools to capture the specific hemoglobin values with the beginning of 2019.

The average number of ANC visits for the 57 maternal death cases with low hemoglobin levels was 6.2 visits throughout the course of pregnancy. Ten (58.8%) of the 17 maternal deaths due to obstetric hemorrhage had hemoglobin values below normal.

Anemia in pregnancy is associated with severe maternal morbidity and is an indirect cause of maternal death in both low-income and high-income settings. Studies reaffirm the association of maternal anemia with maternal mortality, emphasizing the need to reduce anemia during pregnancy and the postpartum period¹². Therefore, the WHO global targets call for a 50% reduction in anemia in women of reproductive age by 2025¹³.

CAUSES OF MATERNAL DEATH

Of the 62 maternal death cases, the DAGs and NAG assigned the main cause of death to 56 cases (see Figure 9), while the cause of death could not be specified for the remaining 6 cases. This was due to insufficient information from the health facility and household MDRs to establish the cause of death. Moreover, postmortem autopsies were not performed for these cases.

Findings showed that of the 56 cases, 35 cases (62.5%) died due to direct obstetric causes. Obstetric hemorrhage was the most common direct cause of maternal deaths and the most frequent cause-specific maternal mortality factor in 17 cases (30.5%). On the other hand, 21 cases (37.5%) died due to indirect causes. The most common cause of indirect deaths was cardiac disease in 8 out of the 56 cases (14.3%). Refer to summary Table 1.5 provided in Annex 1. Moreover, postmortem autopsies were performed for (22.6%) of the cases (see Figure 10).

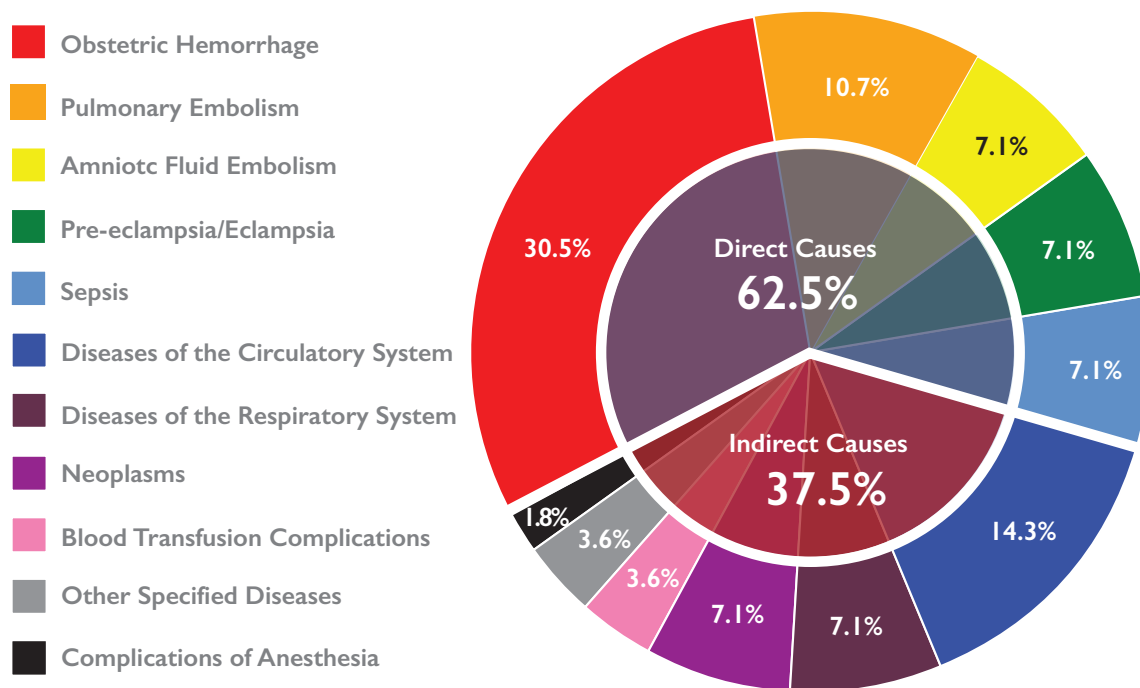


Figure 9 Maternal Deaths by Causes of Death

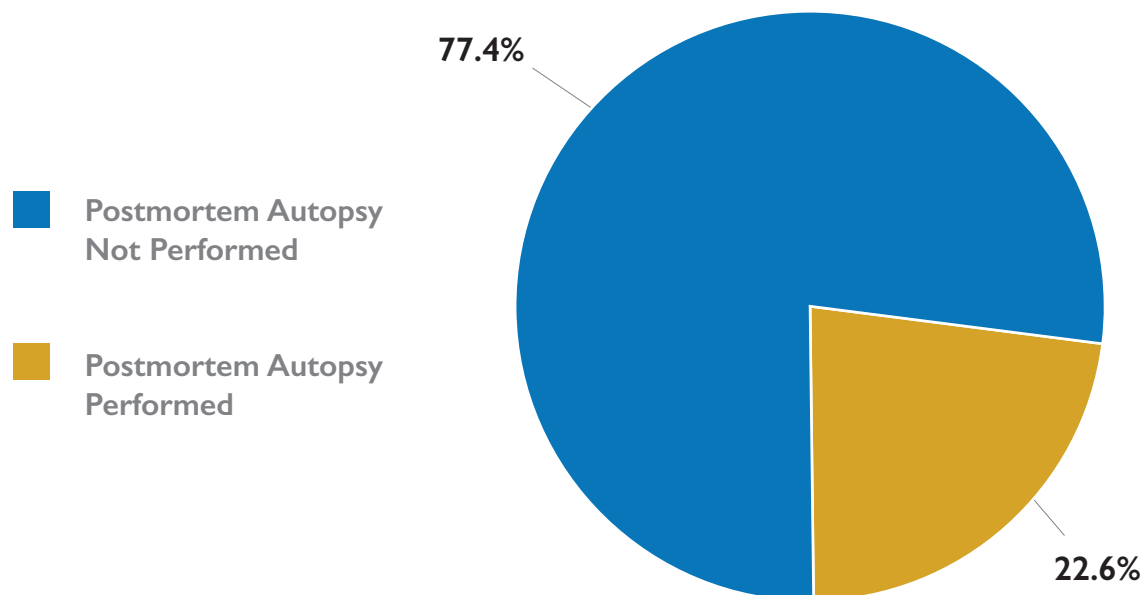


Figure 10: Maternal Deaths by Postmortem Autopsy

I. DIRECT CAUSES

A) OBSTETRIC HEMORRHAGE

Obstetric hemorrhage was the leading cause of maternal death in Jordan during the reporting period. It was associated with (48.6%) of direct obstetric deaths and (30.5%) of maternal deaths for which a cause of death was specified. 12 cases (70.6%) developed hemorrhage postpartum, 3 cases (17.6%) developed hemorrhage intrapartum and 2 cases (11.8%) developed hemorrhage post miscarriage (see Figure 11). These findings are detailed in Table 1.6 in Annex I.

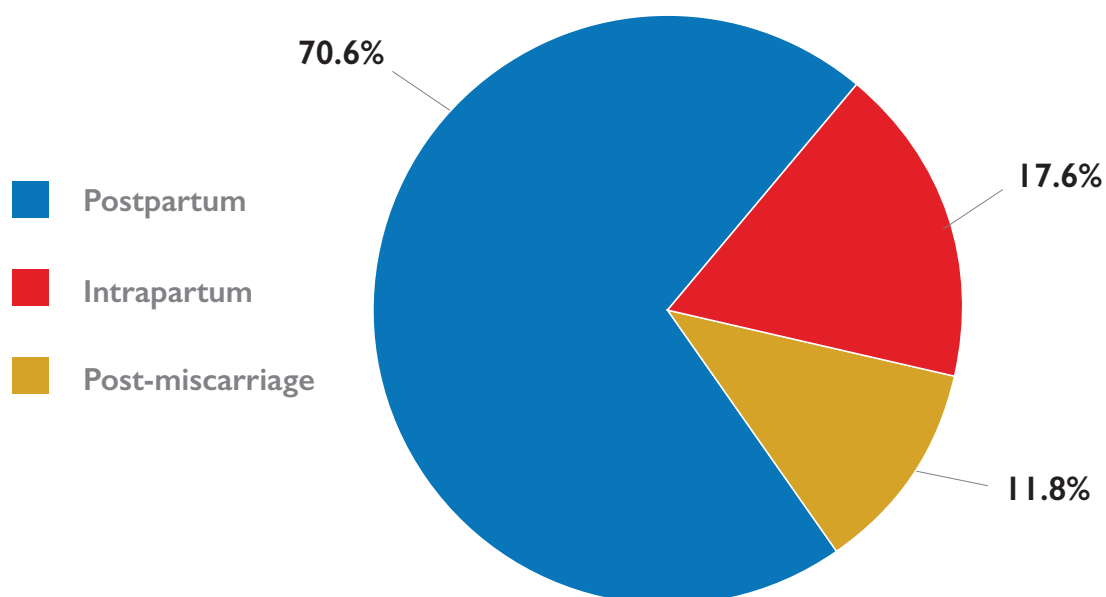


Figure 11: Maternal Deaths by Type of Obstetric Hemorrhage

Postpartum hemorrhage is known to be the leading cause of worldwide maternal death¹⁴. More than two thirds of reported hemorrhage deaths are classified as postpartum hemorrhage¹⁵. A significantly high proportion (72–90%) of the morbidity of obstetric hemorrhage cases are considered to be preventable¹⁶.

Postpartum hemorrhage is correlated to adequate management of the condition, firstly, through early recognition then, through selecting the most appropriate choices of therapy and adequate interventions, particularly in the early stages^{17, 18}.

Postpartum hemorrhage can rapidly develop into an urgent life-threatening emergency that requires an immediate response. Therefore, appropriate care of postpartum hemorrhage consists of a prevention phase and a treatment phase, where various measures need to be taken by a multi-disciplinary team of healthcare professionals in a limited time-frame¹⁹.

Obstetric interventions, such as augmentation and induction of labor, instrumental vaginal delivery and cesarean delivery, are all significantly associated with severe postpartum hemorrhage. Despite improvements in management, early postpartum hemorrhage still remains a significant cause of maternal morbidity and mortality in developing countries²⁰.

One of the ways to prevent postpartum hemorrhage is the “Active Management of Third Stage of Labor”. It is considered to be the “gold standard” to reduce the incidence of postpartum hemorrhage^{21,22,23}. During the last few years with the support of USAID Health Service Delivery, public sector hospitals in Jordan introduced Active Management of Third Stage of Labor to decrease the incidence of cases with atonic postpartum hemorrhage. Efforts should continue to scale-up this practice to all public and private hospitals and also to improve the clinical case management during the fourth stage of labor (first two hours after delivery).

B) PULMONARY EMBOLISM

Of the 56 maternal deaths, 6 (10.7%) cases died from pulmonary embolism. The diagnosis was confirmed in three cases with postmortem autopsies and in one case with a perfusion scan.

Two of them died during pregnancy and four during postpartum. Two of the cases who died postnatally were multipara, one of which had a history of deep vein thrombosis.

Venous thromboembolism is a leading cause of severe maternal morbidity and mortality. Pregnancy and the postpartum are very high-risk periods for thromboembolic events to occur, the most common of which is pulmonary embolism. Pulmonary embolism being the leading cause of direct maternal deaths in developed countries worldwide²⁴.

The incidence of venous thrombosis, pulmonary embolism and maternal death can be significantly reduced by embracing a prophylactic strategy. Being the reported second most common cause of maternal mortality in Jordan, key strategies should be developed and implemented at both the primary healthcare level and hospital level.

C) AMNIOTIC FLUID EMBOLISM

Of the 56 maternal deaths, in four (7.1%) cases the cause of death was reported as amniotic fluid embolism, three of them were multipara. Postmortem autopsies were not performed for any of them and the diagnosis was based on clinical assessment.

Amniotic fluid embolism is a rare complication of pregnancy with a comparatively high mortality²⁵ which is considered to be an unpredictable and unpreventable event with an unknown cause²⁶. It often presents as the sudden onset of cardiovascular collapse, respiratory compromise and disseminated intravascular coagulation. As countries continue to work towards reducing their maternal mortality, conditions such as amniotic fluid embolism are likely to become more prominent, as is the case for Jordan.

D) PRE-ECLAMPSIA/ECLAMPSIA

Pre-eclampsia/eclampsia was a direct cause of maternal death in four cases (7.1%). All of the cases presented with severe features on admission. Most of the cases attended ANC during pregnancy, however, information regarding their blood pressure levels during the antenatal period was difficult to attain. It was noted that 10 cases of the 62 had a history of hypertension.

Hypertensive disorder of pregnancy is one of the most common complications in pregnancy, significantly contributing to maternal mortality. The WHO reported that (14%) of global maternal deaths are attributed to hypertensive disorders of pregnancy¹⁵.

Magnesium sulfate helps prevent eclamptic fits in pregnant women at increased risk. It reduces by half the risk of eclampsia and probably reduces the risk of maternal death²⁷. While the healthcare system in Jordan took the initiative to adopt and implement the administration of magnesium sulfate for pre-eclampsia cases, it is still crucial to make an early diagnosis of mild cases and refer them to the appropriate care level for comprehensive case management in order to decrease the probability of severity and complications.

E) SEPSIS

Four maternal death cases died due to sepsis, contributing to (7.1%) of the 56 maternal deaths and (11.4%) of direct obstetric deaths. Sepsis is a life-threatening condition that arises when the body's response to infection causes injury to its own tissues and organs.

Despite being highly preventable, maternal sepsis continues to be a major cause of death and morbidity for pregnant or recently pregnant women^{15,28}.

The MOH and RMS took the initiative to adopt the prophylactic antibiotics for cesarean section deliveries clinical pathway, a practice that needs to be scaled up in all hospitals in Jordan.

2. INDIRECT CAUSES

A) DISEASES OF THE CIRCULATORY SYSTEM

Cardiovascular diseases of pregnancy were the most frequent indirect cause of maternal death in Jordan during the reporting period. The JMMSR system identified 8 cases with cardiac disease, representing (38.1%) of all indirect obstetric deaths and (14.3%) of the 56 maternal deaths. Among women with cardiac diseases, 5 cases were known to have pre-existing cardiac disease, two of the five cases got pregnant against medical advice.

In Western countries, the main causes of death from cardiac disease are myocardial infarction, cardiomyopathy and congenital heart disease, while in developing countries, rheumatic heart disease and its long-term consequences play a more important role²⁹. The JMMSR system revealed that congenital heart disease was the most common cause of cardiac disease in maternal deaths as shown in Table 7.

Type of Circulatory Disease	Frequency
Congenital Heart Disease (atrial septal defect and ventricular septal defect - myocardial congenital bridging of left coronary artery)	4
Cardiomyopathy-Postpartum	1
Valve Replacement	1
Left Ventricular Impairment and Systemic Lupus Erythematosus	1
Myocardial Infarction	1

B) NEOPLASMS

Four cases died due to neoplasms (one case of intracranial tumor, two cases of leukemia and one case of gastrointestinal cancer); all were diagnosed postpartum. These patients presented with vague symptoms during the antenatal period such as headaches, chronic constipation and fever which were likely misinterpreted and did not lead to further clinical investigations.

Neoplasm related symptoms can mimic those of physiological pregnancy changes which leads to a delay in accurate diagnosis³⁰. This delay can lead to a more advanced stage of the disease, resulting in higher mortality. Neoplasms during pregnancy are relatively rare, but they are considered as a potential threat for both maternal and fetal well-being. Incidence of neoplasms during pregnancy has been estimated to occur in 1 in 1,000 pregnancies; however, the incidence is rising globally due to increasing maternal age and the increasing incidence of risk factors for neoplasms^{31, 32, 33}. This finding should encourage further assessment of the frequencies of neoplasms among women of reproductive age in general and pregnant women in specific.

C) DISEASES OF THE RESPIRATORY SYSTEM

Of the 56 maternal deaths, four cases died due to respiratory system complications. Two of them died of pneumonia, one died of aspiration pneumonia and one of pulmonary edema. Pneumonia that occurs during pregnancy is known to carry an increased risk of adverse outcomes when compared to pneumonia in non-pregnant women. There are major factors predisposing pregnant women to severe pneumonic infections such as alteration in the immune and hormonal status and the decreased ability of pregnant women to clear respiratory secretions due to some anatomical changes which occur in the chest during pregnancy³⁴.

Acute pulmonary edema in pregnant women is an uncommon but life-threatening event. It is characterized by sudden-onset breathlessness with typical chest X-ray features. The most common causes of pulmonary edema are the use of tocolytic agents, underlying cardiac disease, fluid overload and pre-eclampsia³⁵.

Early detection and appropriate management of respiratory problems during pregnancy will be essential to decrease the number of maternal deaths in the future.

D) BLOOD TRANSFUSION COMPLICATIONS

Of the 56 maternal deaths, two cases died during blood transfusions. One of them received blood for severe anemia and the other one for secondary postpartum hemorrhage. A transfusion-related acute lung injury was revealed in one of them.

Blood transfusion is a crucial intervention of emergency obstetric care that significantly reduces maternal mortality, when indicated. Although the majority of blood transfusions are safe, transfusion in obstetric patients carries risks due to changes in maternal physiology, development of antigens against red blood cells, leucocytes and platelets, risk of alloimmunization and infections in the fetus³⁶. Inappropriate transfusion resulting in hemolytic transfusion reactions and transfusion-related acute lung injuries are considered major sources of morbidity and mortality.

In order to avoid the risks of blood transfusions, all measures should be deployed to reduce the incidence of anemia during pregnancy and improve the prophylaxis and management of cases with obstetric hemorrhage.

CONTRIBUTING FACTORS TO MATERNAL DEATH

The NAG identified contributing factors that led to maternal deaths from MDR reports and case summaries. The most common contributing factors identified are presented below using the “Three Delays Model” by Thaddeus and Maine (1994)⁶. It is worth noting that in some cases multiple contributing factors were identified from a combination of delays (see Figure 12). These findings are detailed in Table 1.8 in Annex 1.

1. DELAY I: SEEKING CARE

Failure to recognize or underestimate the severity of danger signs which led to delay in seeking care was the second most important avoidable factor contributing to the death of 14 out of 62 women (22.6%). The case summary below illustrates the presence of delay I as a contributing factor to one of the reviewed maternal death cases.

Case Study

A 29 year-old woman arrived dead at the emergency room of a hospital at a gestational age of 17 weeks after she suddenly collapsed at home. According to her relatives, she had been complaining of chest pains, general fatigue, and was unable to carry out her day-to-day tasks but did not seek any medical care. She was a gravida 5, para 3 with a history of 1 previous abortion. She had attended 3 antenatal care visits at a primary healthcare clinic during the pregnancy that led to her death, where she was seen by a midwife. She had a medical history of heart disease and had undergone a valve replacement surgery 3 years prior to death and was on aspirin, carvedilol, iron and vitamins. No interventions were done at the hospital and a postmortem autopsy was not performed.

2. DELAY II: REACHING CARE

Factors such as geographical isolation, distance to the nearest healthcare facility, travel time, availability and cost of transportation, road conditions and limitations in availability of ambulances, all contribute to delay II. None of the 62 maternal death cases reported this type of delay.

As a middle-income country, Jordan’s healthcare system provides good accessibility for its population, both in the urban as well as the remote rural areas, through even distribution of health facilities across the Kingdom’s governorates.

3. DELAY III: RECEIVING CARE

This delay includes factors affecting the speed with which effective care is provided once a woman reaches a healthcare facility. Examples include shortages of supplies, equipment and trained personnel, as well as competence of available personnel and quality of care. This type of delay contributed to 36 of the maternal death cases (58.1%). In 14 of them, the main cause of death was hemorrhage.

Any delay in the diagnosis, first aid management and specific management of cases with hemorrhage could significantly compromise the patient's outcome and lead to death in a short time. The case summary below illustrates the presence of delay III as a contributing factor to one of the reviewed maternal death cases.

Case Study

A 31 year-old woman was admitted to a hospital at a gestational age of 41 weeks for induction of labor by prostaglandin. She was a gravida 5, para 4 and it was unknown if she had attended any antenatal care visits during the pregnancy that led to her death. She had no history of pre-existing medical conditions and no previous admissions to hospital during the course of the pregnancy that led to her death. On examination, her vital signs were stable and laboratory investigations were normal. On admission, prostaglandin E2 tablet was inserted into the posterior vaginal fornix. Her labor did not progress well, so 5 hours later, a second prostaglandin E2 was inserted. After 4 hours, she was in active labor with a cervical dilation of 5cm and was transferred to the delivery room. Three hours later, she had a vaginal delivery and gave birth to a live newborn. Two hours after delivery, the patient started to complain of vaginal bleeding and was found to have suffered from a left sided cervical tear (3-4cm). A hemostatic suture was done, but bleeding persisted. The patient's condition started to deteriorate: BP 70/50mmHg, pulse 110bpm. Therefore, she was transferred to the operating theatre for an exploratory laparotomy under general anesthesia. Findings revealed a ruptured uterus extending to the left side with a huge left broad ligament hematoma. Repair of the uterus and evacuation of the hematoma was done. During the procedure, she was given a blood transfusion of 4 units. The patient arrested and CPR was done. She was then transferred to the ICU unit, where she died. A postmortem autopsy was performed which confirmed the cause of death as postpartum hemorrhage.

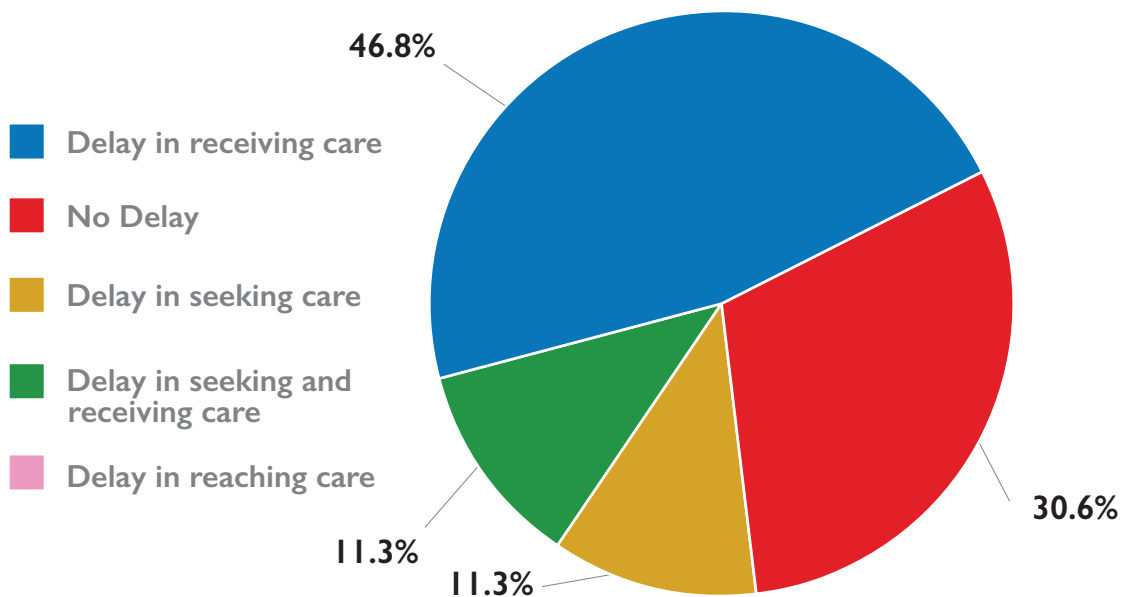


Figure 12: Maternal Deaths by Level of Delay

LATE MATERNAL DEATHS

Late maternal deaths refer to deaths caused by direct or indirect obstetric causes more than 42 days, but less than one year, after the end of pregnancy. The JMMSR IS was not designed to capture cases of late maternal death. However, at the time of running quality checks of the JMMSR IS data against CSPD data, 28 cases were identified from the CSPD data as late maternal deaths.

Maternal death data was not collected through health facility and household questionnaires for the late maternal death cases in the first year of the JMMSR system implementation; however, the NAG recommended to include them in the review process for the next year.

Although the number of late maternal deaths was excluded from the MMR calculation, it provides an opportunity to understand the avoidable factors that may have contributed to or may be associated with a maternal death, as they are not usually reported as sole conditions on death certificates.

DATA LIMITATIONS

As expected, there were some limitations in the first year of the JMMSR system implementation. However, being the first active surveillance system of maternal mortality, all challenges are considered an opportunity for improvement. The lessons learned throughout the first year of implementation can be used to continually improve implementation processes and enhance the system overall.

MDRs relied on the collected information obtained through verbal autopsies, healthcare provider interviews and medical record reviews. The lack of documentation on medical records related to obesity, family planning methods used and the exact timing of death prevented the NAG from defining and analyzing risk factors associated with these variables. The inconsistent documentation on medical records related to ANC, level of education and employment status also constituted a challenge for the NAG to present a complete analysis for these variables.

Although women prior to their deaths were able to access multiple healthcare providers in the public and private sectors, the lack of linkage between these sectors and the inability to exchange patients' information about ANC resulted in inadequate data related to ANC services provided to the deceased women. Moreover, it was difficult for the NAG to comment on the quality of ANC provided.

Of the 62 maternal deaths, there were 10 cases where the cause of death was amniotic fluid embolism and pulmonary embolism. Although the clinical picture and ventilation perfusion scans can clearly identify pulmonary embolism as a main cause of death, yet, postmortem autopsies and histopathology will remain the only available evidence to confirm the diagnosis of amniotic fluid embolism as a cause of death³⁷. Moreover, incomplete postmortem autopsies led to inability to assign the cause of death for six maternal death cases.

In order to address root causes of data limitations identified throughout the first year of the JMMSR system's implementation, the NAG, in collaboration with the MOH NCDD, met and agreed on recommendations to improve data collection and analysis for subsequent years. Moreover, the JMMSR system health facility and household questionnaires were revised to minimize these limitations.

RESPONSE

The NAG convened in the presence of the MOH Secretary General, discussed and agreed on specific responses to address the main causes of maternal deaths and their contributing factors for the reporting period.

Table 8 shows the responses that are to be adopted across the entire health sector in Jordan, according to the respective level of the health system.

Table 8: Responses to Be Adopted by Healthcare System Level		
Response	Actions	Level of Response
1) Adopt strategies for the prevention and management of obstetric hemorrhage.	<ul style="list-style-type: none"> Identify high risk cases and possible referrals to tertiary healthcare. Develop, implement and monitor the Active Management of Third Stage of Labor program. Develop, implement and monitor the management of obstetric hemorrhage program. 	Public and private hospitals nationwide.
2) Adopt strategies to reduce cases of venous thromboembolism.	<ul style="list-style-type: none"> Develop, implement and monitor the prophylaxis and management of venous thromboembolism program. 	Public and private hospitals nationwide.
3) Adopt strategies to enhance the quality of antenatal care services.	<ul style="list-style-type: none"> <u>Provider</u>: develop, implement and monitor a program to increase providers' compliance with evidence-based clinical practices. <u>Client</u>: mobilize clients and their families to adopt healthier lifestyles during pregnancy. <u>Health Facility</u>: improve client flow and equip facilities with the basic essential list of equipment necessary to provide high quality ANC. 	MOH primary healthcare centers, NGO clinics, private doctors' clinics, and the community nationwide.

Table 8: Responses to Be Adopted by Healthcare System Level

Response	Actions	Level of Response
4) Reduce unnecessary primary cesarean section deliveries.	<ul style="list-style-type: none"> • Develop, implement and monitor a program to reduce unnecessary primary cesarean section deliveries. • Develop, implement and monitor a program to standardize the induction and augmentation of labor. 	Public and private hospitals nationwide.
5) Increase the uptake of quality family planning methods.	<ul style="list-style-type: none"> • <u>Provider</u>: develop, implement and monitor a program to increase providers' compliance with evidence-based clinical practices for family planning counselling and service provision. • <u>Client</u>: mobilize clients and their families to address their reproductive needs. • <u>Health Facility</u>: improve client flow and equip facilities with the basic essential list of modern family planning methods and commodities necessary to provide high quality family planning services. 	MOH primary healthcare centers, NGO clinics, private doctors' clinics, and the community nationwide.

CONCLUSION

The JMMSR system played a crucial role in laying the foundation for continuous efforts aimed at reducing maternal mortality in Jordan. It is the first ongoing active surveillance system implemented to quantify maternal deaths, which has demonstrated a successful representation of the positive collaboration between different health sectors at different levels.

Despite the challenges, the JMMSR system enabled Jordan, for the first time, to accurately calculate its national MMR, and identify the leading causes and contributing factors for each maternal death. The figures provided in the National Maternal Mortality Report 2018 will be a good starting point against which future figures will be benchmarked.

The lessons learned throughout the first year of implementation of the JMMSR system will be used to continually improve implementation steps and enhance the overall functions of the system. Emphasis will be placed on strengthening the existing continuum of maternal care and working collaboratively on sustainable improvements for the provision of accessible high quality maternal care.

It is important that all responses summarized in this report are disseminated and integrated in all relevant health plans at the national, health facility and community levels. Future efforts are needed to ensure periodic review and monitoring of responses across all sectors in order to reduce avoidable maternal deaths.

CONTRIBUTORS

CONTRIBUTORS IN THE JMMSR SYSTEM IMPLEMENTATION

The successful implementation of the JMMSR system is led by a national group of senior health care managers from the public and private health sectors in Jordan, they include:

MINISTRY OF HEALTH LEADERSHIP

His Excellency Dr. Hekmat Abu Alfoul
The Secretary General of the Ministry of Health

CENTRAL MINISTRY OF HEALTH

Dr. Adnan Ishaq Mohammad
Assistant to the Secretary General for Primary Health Care

Dr. Nashat Taani
Director of Non-Communicable Diseases Directorate

Ms. Fatima Hammad
Director of E-transformation and Information Technology Directorate

Dr. Kamal Arqoub
Head of the Death Registry and National Advisory Group Committee Rapporteur

Dr. Ayyoub As-Sayaideh
Former Assistant to the Secretary General for Primary Health Care

Dr. Majed Asaad
Former Director of Non-Communicable Diseases Directorate

Dr. Ahmad Bani Hani
Former National Center for Forensic Medicine

ROYAL MEDICAL SERVICES

Brig. Gen Dr. Maher Ma'ayta
Chief of Ob/Gyn Department at the Royal Medical Services

NATIONAL ADVISORY GROUP

Dr. Abdel-Manie' Al Suleimat
Chairman of the JMMSR National Advisory Group and
Chief of Ob/Gyn Specialty at the Ministry of Health

Dr. Malak Al-Ouri

Director of Woman and Child Health Directorate / Ministry of Health

Dr. Adnan Abbas

Director of National Center for Forensic Medicine / Ministry of Health

Dr. Kamal Arqoub

Head of the Death Registry and National Advisory Group Committee Rapporteur /
Ministry of Health

Brig. Gen Dr. Amer Gharaibeh

Technical Director and Chief of Ob/Gyn Department at Al-Hussein Hospital (King Hussein
Medical Center / Royal Medical Services

Dr. Hasan Rawashdeh

Ob/Gyn Specialist / King Abdullah University Hospital

Dr. Mhanna Khattab

Jordan Medical Association Representative / Jordanian Society of Obstetrics and Gynecology

Dr. Shawqi Saleh

Ob/Gyn Specialist / Jordan University Hospital

Dr. Mazen Al Zibdeh

Ob/Gyn Consultant / Gardens Hospital

Dr. Abdel-Malek Abdel-Malek

Ob/Gyn Consultant / Specialty Hospital

CONTRIBUTORS IN THE DEVELOPMENT OF THE NATIONAL MATERNAL MORTALITY REPORT 2018

This national report resulted from the joint contributions of the Ministry of Health and selected National Advisory Group members, with support from USAID Health Service Delivery team and its partner EMPHNET. Contributors include

REPORT DRAFTING

Dr. Abdel-Manie' Al Suleimat

Chairman of the JMMSR National Advisory Group and
Chief of Ob/Gyn Specialty at the Ministry of Health

Dr. Majed Asaad

Former Director of Non-Communicable Diseases Directorate / Ministry of Health

Dr. Kamal Arqoub

Head of the Death Registry and National Advisory Group Committee Rapporteur /
Ministry of Health

Brig. Gen Dr. Amer Gharaibeh

Technical Director and Chief of Ob/Gyn Department at Al-Hussein Hospital (King Hussein
Medical Center / Royal Medical Services

Dr. Shawqi Saleh

Ob/Gyn Specialist / Jordan University Hospital

Dr. Mazen Al Zibdeh

Ob/Gyn Consultant / Gardens Hospital

Dr. Abdel-Malek Abdel-Malek

Ob/Gyn Consultant / Specialty Hospital

REPORT EDITING AND REVIEW

Professor Sabry Hamza

Chief of Party / USAID Health Service Delivery

Dr. Mohannad Al-Nsour

Executive Director / Eastern Mediterranean Public Health Network

Dr. Ali Arbaji

Senior Advisor for Monitoring Evaluation and Learning and Performance Management / USAID
Health Service Delivery

Dr. Raja Khater

Hospital Service Delivery Improvement Lead / USAID Health Service Delivery

Dr. Suhail Abu-Ata

JMMSR Specialist / USAID Health Service Delivery

Ms. Jumana Nabulsi

JMMSR Coordinator / USAID Health Service Delivery

Ms. Lisa Nichols

Principal Associate, RMNCH Market Center Lead / Abt Associates

REPORT DATA VALIDATION

Eng. Bilal Al Nobani

Information Technology Officer / USAID Health Service Delivery

MARKING, BRANDING AND DESIGN

Ms. Sarah Salaytah

Program Manager / USAID Health Service Delivery

Mr. Zaid Shaker

Creative Specialist / USAID Health Service Delivery

OPERATIONAL ASSISTANCE AND FORMATTING

Ms. Julie Malhas

Operations Officer / USAID Health Service Delivery

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ANNEX I: TABLES OF RESULTS

TABLE I.1: DISTRIBUTION OF MATERNAL MORTALITY RATIO BY MATERNAL AGE GROUP

Table 1.1: Distribution of Maternal Mortality Ratio by Maternal Age Group

Age Group	Number of Maternal Deaths	Number of Live Births (%)*	Maternal Mortality Ratio
15-19	1	11,451 (5.5)	8.7
20-24	5	49,581 (23.8)	10.1
25-29	19	64,427 (31)	29.5
30-34	14	48,173 (23.2)	29.1
35-39	15	27,067 (13)	55.4
40-49	8	7,218 (3.5)	110.8
Total	62	207,917 (100)	29.8

*The number of live births was obtained from the Department of Statistics.

TABLE I.2: MATERNAL DEATHS BY DEMOGRAPHIC CHARACTERISTICS

Table 1.2: Maternal Deaths by Demographic Characteristics

Demographic Characteristic	Number of Maternal Deaths	Percent
Age Group		
15-19	1	1.6
20-24	5	8.1
25-29	19	30.6
30-34	14	22.6
35-39	15	24.2
40-49	8	12.9

Table 1.2: Maternal Deaths by Demographic Characteristics		
Demographic Characteristic	Number of Maternal Deaths	Percent
Nationality		
Jordanian	52	83.9
Syrian	6	9.7
Palestinian	3	4.8
Pakistani	1	1.6
Educational Level		
Illiterate	3	5.3
Basic	13	22.8
Secondary	24	42.1
Higher than Secondary	17	29.8
Employment Status		
No	52	89.7
Yes	6	10.3
Total	62*	100

* Educational level was missing for 5 cases, and employment status was missing for 4 cases.

TABLE 1.3: MATERNAL DEATHS BY PLACE OF RESIDENCE AND PLACE OF DEATH

Table 1.3: Maternal Deaths by Place of Residence and Place of Death		
Governorate	Place of Residence Number (Percent)	Place of Death Number (Percent)
Amman	13 (21.3)	26 (41.9)
Irbid	17 (27.9)	16 (25.8)
Balqa	8 (13.0)	5 (8.1)
Aqaba	4 (6.6)	4 (6.5)
Mafraq	4 (6.6)	4 (6.5)
Karak	4 (6.6)	2 (3.2)

Table 1.3: Maternal Deaths by Place of Residence and Place of Death

Governorate	Place of Residence Number (Percent)	Place of Death Number (Percent)
Ajloun	2 (3.3)	1 (1.6)
Jerash	1 (1.6)	1 (1.6)
Ma'an	1 (1.6)	1 (1.6)
Madaba	2 (3.3)	1 (1.6)
Zarqa	5 (8.2)	1 (1.6)
Tafilah	0 (0)	0 (0)
Total	61* (100)	62 (100)

*One woman was visiting Jordan and resided in Palestine.

TABLE 1.4: MATERNAL DEATHS BY REPRODUCTIVE AND CLINICAL CHARACTERISTICS

Table 1.4: Maternal Deaths by Reproductive and Clinical Characteristics

Reproductive and Clinical Characteristics	Number of Maternal Deaths	Percent
Parity		
Nulliparous	2	3.3
Multipara	48	78.7
Grand Multipara	8	13.1
Great Grand Multipara	3	4.9
Timing of Death		
Postpartum	49	79.0
Death during Pregnancy	8	12.9
Post-Miscarriage	5	8.1
Antenatal Care Visits		
1 to 3 Visits	11	23.9
4 to 7 Visits	18	39.1
8 Visits and Above	17	37.0
Place of Antenatal Care		
Private Sector	20	33.9
Public Hospital	18	30.5
Public Primary Healthcare Center	5	8.5
Public and Private	16	27.1

Table 1.4: Maternal Deaths by Reproductive and Clinical Characteristics		
Reproductive and Clinical Characteristics	Number of Maternal Deaths	Percent
Mode of Delivery		
Emergency Cesarean	26	41.9
Elective Cesarean	13	21.0
Vaginal Delivery	8	12.9
Miscarriage	5	8.1
Assisted Vaginal Delivery by Vacuum Extraction	2	3.2
No Delivery	8	12.9
Fetal Outcome		
Live Birth	43	69.3
Stillbirth	6	9.7
Abortus	5	8.1
Co-occurring Maternal and Fetal Deaths	8	12.9
Postmortem Autopsy		
Performed	14	22.6
Not Performed	48	77.4
Total	62*	100

*The missing values were: One case for parity, 16 cases for number of ANC care visits and three cases for place of ANC

TABLE 1.5: MATERNAL DEATHS BY CAUSES OF DEATH

Table 1.5: Maternal Deaths by Causes of Death		
Causes	Number	Percent
Direct Causes		
	35	62.5
Obstetric Hemorrhage	17	30.5
Pulmonary embolism	6	10.7
Amniotic fluid embolism	4	7.1
Pre-eclampsia/Eclampsia	4	7.1
Sepsis	4	7.1

Table 1.5: Maternal Deaths by Causes of Death

Causes	Number	Percent
Indirect Causes	21	37.5
Diseases of the Circulatory System	8	14.3
Diseases of the Respiratory System	4	7.1
Neoplasms	4	7.1
Blood Transfusion Complications	2	3.6
Other Sspecified Diseases	2	3.6
Complications of Anesthesia	1	1.8
Total	56*	100

*The cause of death could not be specified for 6 cases and postmortem autopsies were not performed.

TABLE 1.6: MATERNAL DEATHS BY TYPE OF OBSTETRIC HEMORRHAGE

Table 1.6: Maternal Deaths by Type of Obstetric Hemorrhage

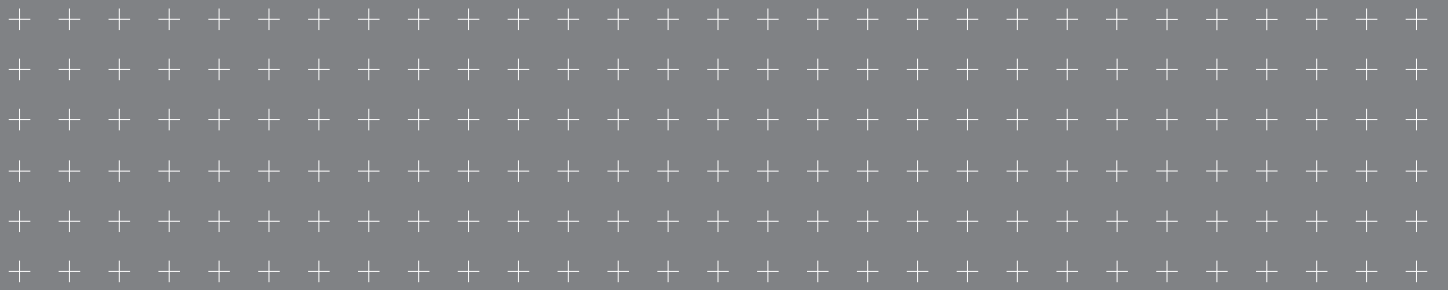
Type of Hemorrhage	Number	Percent
Postpartum	12	70.6
Intrapartum	3	17.6
Post-Miscarriage	2	11.8
Total	17	100

TABLE I.7: MATERNAL DEATHS BY TYPE OF CIRCULATORY DISEASE

<i>Table 1.7: Maternal Deaths by Type of Circulatory Disease</i>	
Type of Circulatory Disease	Frequency
Congenital Heart Disease (atrial septal defect and ventricular septal defect -myocardial congenital bridging of left coronary artery)	4
Cardiomyopathy-Postpartum	1
Valve Replacement	1
Left Ventricular Impairment and Systemic Lupus Erythematosus	1
Myocardial Infarction	1

TABLE I.8: MATERNAL DEATHS BY LEVEL OF DELAY

<i>Table 1.8: Maternal Deaths by Level of Delay</i>		
Level of Delay	Number of Maternal Deaths	Percent
Delay in Seeking Care	7	11.3
Delay in Reaching Care	0	0
Delay in Receiving Care	29	46.8
Delay in Seeking and Receiving Care	7	11.3
No Delay	19	30.6
Total	62	100



The National Maternal Mortality Report 2018

