NATIONAL POPULATION AND HOUSING CENSUS 2021

A REPORT ON MATERNAL MORTALITY

Government of Nepal
Office of the Prime Minister and Council of Ministers
National Statistics Office
Kathmandu, Nepal

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Ministry of Health and Population
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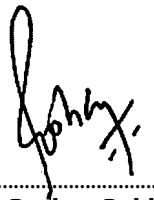
PREFACE

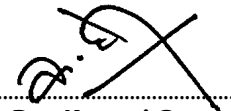
Pregnancy and childbirth are normal physiological processes for women of reproductive age. However, they carry underlying risk factors that can endanger the lives of mothers, such as anaemia, pregnancy-induced hypertension, antepartum and postpartum haemorrhage, sepsis, and other direct and indirect causes of maternal deaths. In 2017, the estimated number of maternal deaths worldwide was 295,000 and the maternal mortality ratio (MMR) was 211 maternal deaths per 100,000 live births. Most maternal deaths are preventable if timely access to appropriate healthcare services are ensured, and yet we continue to struggle to save the lives of these mothers.

Target 3.1 of the Sustainable Development Goals (SDG) calls for the global maternal mortality ratio to be reduced to less than 70 per 100,000 live births by 2030, with no country having MMR greater than 140 per 100,000 live births. Nepal is also committed to achieving this goal and has made maternal health one of its top development priorities. Recently, the Ministry of Health and Population and the National Statistics Office, in collaboration with the Nepal Health Research Council and health development partners (WHO, UNICEF, UNFPA, USAID/SSBH, British Embassy Kathmandu/NHSSP, GIZ), carried out the Nepal Maternal Mortality Study 2021 to determine the current status and causes of maternal deaths in the country. It was conducted following the National Population and Housing Census using the verbal autopsy method in order to obtain an accurate estimate of Nepal's maternal mortality situation. This report presents the latest information on the MMR, pregnancy-related mortality ratio, causes of death, and other related estimates at the federal, provincial, and local levels. We are confident that the results of this study will shed light and provide fresh information that will help us review our current policies on maternal health, formulate new strategies for further improvement, and achieve target 3.1 of the SDG.

We believe that this study report will be a landmark document that will help us better comprehend the maternal mortality situation in the country. We would like to affirm that the Ministry of Health and Population is committed to translating the available evidence into policy actions for the advancement of maternal health in Nepal.



Dr. Roshan Pokhrel
Secretary
Ministry of Health and Population



Ms. Dev Kumari Guragain
Secretary
Ministry of Health and Population

FOREWORD

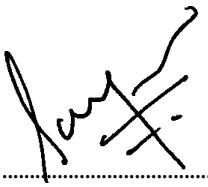
The National Population and Housing Census 2021: A Report on Maternal Mortality is the first ever integrated national effort by the Government of Nepal to estimate the country's maternal mortality ratio (MMR) and its causes. By providing an accurate estimation of the country's MMR, it provides an important step towards meeting target 3.1 of the Sustainable Development Goals (SDG): reducing the global MMR to less than 70 per 100,000 live births by 2030.

Previous studies and surveys have indicated an improvement in Nepal's MMR, but the country lacked a recent and comprehensive study on maternal mortality. This study was, therefore, undertaken with the aim of analyzing the current situation in Nepal and to get insights on the underlying causes of maternal mortality at the federal, provincial, and local levels by using the verbal autopsy method.

It has been my privilege to lead this study's steering committee, which involved members from the Population Management Division of the Ministry of Health and Population, the National Statistics Office, the Nepal Health Research Council, and health development partners, all of whom provided valuable input and support. I acknowledge the efforts taken by former chairpersons of Steering Committee, chairs and members of the technical committee and all those who directly or indirectly contributed to successful accomplishment of the study.

The study involved rigorous survey design, training, fieldwork, data processing, and analysis. Despite the multiple challenges in the field, the study team was able to capture quality data. I am confident that the key findings that it presents are accurate. This report provides a comprehensive look at the levels of and differentials in maternal health parameters and gives a close analysis of the periods, places, and causes of death, and the status of antenatal care. It has also tried to identify the types of delays that occurred during the process of childbirth that led to pregnancy-related mortality.

The information presented in this report will provide crucial data and evidence for the evaluation of the existing national maternal health program, and will help to identify and address implementation gaps. It will guide policymakers as well as organizations at the federal, provincial, and local levels in determining the future strategic directions for identifying and implementing tailored interventions to improve maternal health outcomes and achieve the SDG target.



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Dr. Sangeeta Kaushal Mishra
Additional Health Secretary
Ministry of Health and Population

ACKNOWLEDGEMENT

The Ministry of Health and Population (MoHP) and the National Statistics Office (NSO) are pleased to present the Nepal Maternal Mortality Study (NMMS) 2021, which was conducted following the National Population and Housing Census 2021. Despite the challenges posed by the COVID-19 pandemic, the NSO was successful in completing the census, the first since the country transitioned to a federal system. The Census 2021 provides comprehensive information on the demographic, social, economic, and spatial characteristics of the population.

The National Population and Housing Census has the ability to capture data of all deaths of women of reproductive age across the country. Birth and death information have been the major contents of all such previous censuses. In the National Population and Housing Census 2021, the twelfth in the series, the MoHP, in collaboration with the NSO, made a historical arrangement to verify the deaths of women of reproductive age reported by the Census 2021 enumerators, conduct verbal autopsy to estimate the maternal mortality ratio (MMR) at the federal, provincial, and local levels, and analyse the causes of maternal deaths.

The NMMS 2021 is a special and unique undertaking. It has provided MMR estimates along with causes of death, which will allow the MoHP, development partners, and other stakeholders to review the current health policy and strategies, and design interventions to address the causes of death. We are privileged and honoured to set a cornerstone in Nepal's statistical history. All the institutions and staff who were engaged in the study deserve special thanks and appreciation.

Firstly, the MoHP would like to thank all the respondents of the study and their families for their support. The consent of the families was essential in making this study possible. We also extend our sincere condolences to those who have lost loved ones to issues related to pregnancy and childbirth. Their losses will not be in vain – the information that we have gathered through this study will help us work towards preventing similar tragedies in the future.

Secondly, we would like to thank the members of the NMMS 2021 Steering and Technical Committees for their contribution to the successful completion of the study. Our appreciation goes to Dr. Hem Raj Regmi, Joint Secretary, NSO and Dr. Bibek Kumar Lal, Director of the Family Welfare Division of the Department of Health Services of the MoHP for entrusting the responsibility to the committees. Mr. Kapil Prasad Timalsena, Under-Secretary of the Population Management Division (PMD) of the MoHP and Mr. Dhundi Raj Lamichhane, Director, NSO, deserve praise for their leadership in coordinating and executing the study. In addition, we would like to acknowledge the contributions of Mr. Keshab Kumar Gautam, Director, NSO; Dr. Suresh Mehata, Senior Pubic Health Administrator, Province 1; Mr Binod Paudel, Statistics Officer, PMD, and Dr Meghnath Dhimal, Chief, Research Section, Nepal Health Research Council, and the team; Mr. Dol Narayan Shrestha, Computer Officer, NSO, Mr. Pradeep Poudel, Strategic Advisor, NHSSP and Mr. Paban Kumar Ghimire, NPO, WHO for their tireless efforts – right from the conceptualisation of the study to its successful completion.

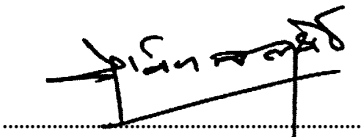
We are extremely grateful to our health development partners –WHO, UNICEF, UNFPA, USAID, British Embassy Kathmandu/NHSSP, and GIZ – for their technical and financial support for the NMMS 2021. We would also like to express our gratitude to ADRA Nepal, Kamana Health Nepal, and Mitra Samaj for their invaluable support in managing various trainings and executing verbal autopsy and data entry. We thank USAID/SSBH for their generous support in the maternal death assignment, in coordination with the MoHP. We would also like to thank national and international reviewers for their valuable comments and suggestions which helped to improve the quality of the report.

This study would be incomplete without the hard work of the health workers across the country – they made tremendous efforts to conduct the verbal autopsy of maternal deaths.

This study will be a key step towards Nepal's endeavor to achieve the Sustainable Development Goal of reducing MMR to 70 maternal deaths per 100,000 live births by 2030.

We believe this report will contribute in improving maternal health by supporting evidence-based policy decisions, planning, and monitoring in Nepal.

Indra Mani Pokharel
Joint Secretary
Ministry of Health and Population



Mr. Nebin Lal Shrestha
Joint Secretary
National Statistics Office

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ACRONYMS AND ABBREVIATIONS

ADRA	Adventist Development & Relief Agency
ANC	Antenatal Care
BEK	British Embassy Kathmandu
COVID-19	Coronavirus Disease of 2019
CSPro	Census and Survey Processing System
DoHS	Department of Health Services
FCHV	Female Community Health Volunteers
FWD	Family Welfare Division
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HA	Health Assistant
HDP	Health Development Partners
HF	Health Facility
HMIS	Health Management Information System
HP	Health Post
ICD-MM	International Classification of Diseases-Maternal Mortality
MMMS	Maternal Mortality and Morbidity Studies
MMR	Maternal Mortality Ratio
MoHP	Ministry of Health and Population
MPDSR	Maternal and Perinatal Death Surveillance and Response
MToT	Master Training of Trainers
NDHS	Nepal Demographic and Health Survey
NGO	Non-Governmental Organisation
NHRC	Nepal Health Research Council
NHSSP	Nepal Health Sector Strategy Support Program
NMMS	Nepal Maternal Mortality Study
NPHC	National Population and Housing Census
NSO	National Statistics Office
PHCC	Primary Health Care Center
PMD	Population Management Division
PNC	Postnatal Care
PRMR	Pregnancy Related Mortality Ratio
RTA	Road Traffic Accident
SDG	Sustainable Development Goal
SOP	Standard Operating Procedure
SSBH	Strengthening Systems for Better Health
ToT	Training of Trainers
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VA	Verbal Autopsy
WHO	World Health Organization
WRA	Women of Reproductive Age

सारांश

दिगो विकास लक्ष्यले कुनै पनि देशमा मातृ मृत्यु अनुपात विश्वव्यापी औसतको दोब्बरभन्दा बढी नहुने गरी प्रतिलाख जीवित जन्ममा ७० भन्दा कममा घटाउने लक्ष्य राखेको छ । विश्वव्यापी लक्ष्य अनुरूप नेपालले पनि सन् २००६ मा प्रतिलाख जीवित जन्ममा २८१ रहेको मातृ मृत्यु अनुपातलाई घटाएर सन् २०२२ सम्ममा ११६, २०२५ सम्ममा ९९ र २०३० सम्ममा ७० पुऱ्याउने प्रतिबद्धता जनाएको छ । यसै सन्दर्भमा, स्वास्थ्य तथा जनसङ्ख्या मन्त्रालय, राष्ट्रिय तथ्याङ्क कार्यालय, नेपाल स्वास्थ्य अनुसन्धान परिषद् र स्वास्थ्य विकास साझेदारहरूको संयुक्त प्रयासमा मातृ मृत्यु अनुपातको अनुमान तथा गर्भवती, प्रसूति र सुत्केरी अवधिमा हुने मातृ मृत्युका कारणहरू पहिचान गर्नका लागि राष्ट्रिय जनगणनासँगै नेपालमा पहिलो पटक मातृ मृत्युसम्बन्धी अध्ययन सम्पन्न भएको छ । यस अध्ययनबाट प्राप्त तथ्य र प्रमाणहरूले राष्ट्रिय तथा प्रादेशिक तहमा तथ्यपरक नीति निर्माण गरी मातृ स्वास्थ्यमा सुधार ल्याउन सहयोग पुऱ्याउने अपेक्षा गरिएको छ ।

स्वास्थ्य तथा जनसङ्ख्या मन्त्रालय र राष्ट्रिय तथ्याङ्क कार्यालयबिच भएको सम्झौताबमोजिम राष्ट्रिय जनगणना, २०७८ का गणकहरूले प्रत्येक घरमा गई विगत १२ महिनामा घरपरिवारमा भएका जीवित जन्म र प्रजनन उमेर समूहका महिलाको मृत्युको तथ्याङ्क सङ्कलन गरेका थिए । अध्ययनको पहिलो चरणमा जनगणनामा खटिएका गणकले १५-४९ वर्ष उमेर समूहका मृत्यु भएका महिलाको मृत्यु सूचना फाराम भरी सुपरिवेक्षकलाई बुझाएका थिए र उक्त मृत्युको सूचना तोकिएका तालिमप्राप्त स्थानीय स्वास्थ्यकर्मीलाई दिएका थिए । अध्ययनको दोस्रो चरणमा तालिमप्राप्त स्थानीय स्वास्थ्यकर्मीले प्रत्येक मृतक महिलाको घरपरिवारमा गई मृत्युको सूचना फाराममा रहेको जानकारीको पुनः प्रमाणीकरण र गर्भावस्थासँग सम्बन्धित मृत्युको पहिचान गरेका थिए । यसरी पहिचान गरिएको प्रत्येक गर्भावस्थासँग सम्बन्धित मृत्युको विस्तृत विवरण स्वास्थ्यकर्मीले भर्बल अटप्सी (मौखिक जाँचबुझ) फाराम मार्फत सङ्कलन गरेका थिए । भरिएका भर्बल अटप्सी फारामको आधारमा विषय विज्ञद्वारा मातृ मृत्युको कारण पत्ता लगाइएको थियो । गर्भावस्थासँग सम्बन्धित मृत्यु र मातृ मृत्यु अनुपात अनुमानका लागि जनगणनाका क्रममा सङ्कलित जीवित जन्मको तथ्याङ्क राष्ट्रिय तथ्याङ्क कार्यालयले स्वास्थ्य तथा जनसङ्ख्या मन्त्रालयलाई उपलब्ध गराएको थियो ।

यस अध्ययनले नेपालमा प्रतिलाख जीवित जन्ममा मातृ मृत्यु १५१ रहेको देखाएको छ । लुम्बिनी र कर्णाली प्रदेशमा उच्च मातृ मृत्यु अनुपात (क्रमशः २०७ र १७२) र बाग्मतीमा न्यून मातृ मृत्यु अनुपात (९८) पाइएको छ । प्रजनन उमेर समूह (१५-४९ वर्ष) मा मृत्यु भएका कुल १२,९७६ महिलामध्ये ६५३ (पाँच प्रतिशत) महिलाको मृत्यु गर्भावस्थासँग सम्बन्धित रहेको देखाएको छ ।

गर्भावस्थासँग सम्बन्धित ६५३ मृत्यु मध्ये ९५ प्रतिशत (६२२) मातृ मृत्यु रहेको छ । प्रजनन उमेरका महिलाको मृत्युमध्ये मातृ मृत्युको समग्र अनुपात ४.८ प्रतिशत रहेको छ । यस अध्ययनले देखाएको कुल ६२२ मातृ मृत्युमध्ये ११ मातृ मृत्युको पर्याप्त सूचना सङ्कलन नभएको हुनाले यस प्रतिवेदनमा ६११ मातृ मृत्युको कारण र अन्य विशेषताहरूको विश्लेषण गरिएको छ ।

मातृ मृत्यु भएका महिलाहरूमध्ये ३३ प्रतिशत महिलाको मृत्यु गर्भावस्थामा, ६ प्रतिशतको प्रसव अवस्थामा र ६१ प्रतिशत महिलाको मृत्यु सुत्केरी अवस्थामा भएको पाइएको छ । मातृ मृत्यु भएका महिलाहरूमध्ये झण्डै आधा (४७ प्रतिशत) महिलाहरूको मृत्यु लुम्बिनी र मधेश प्रदेशमा भएको पाइएको छ । मातृ मृत्यु भएका महिलाहरूमध्ये १० प्रतिशत महिलाहरूको मृत्यु किशोरावस्था (१५-१९ वर्ष) मा भएको छ । अधिकांश (५७ प्रतिशत) महिलाको मृत्यु स्वास्थ्य संस्थामा र २६ प्रतिशत महिलाको मृत्यु घरमा भएको पाइएको छ ।

प्रसव र सुत्केरी अवस्थामा मृत्यु भएका कुल ४१२ मातृ मृत्युमध्ये ५३ प्रतिशत महिलाले सुरक्षित मातृत्व सेवा प्रोटोकलअनुसार चारपटक गर्भ जाँच गराएका

र प्रसूति भएको ७ देखि ४२ दिनको अवधिमा मृत्यु भएका १७३ महिलाहरू मध्ये ४५ प्रतिशत महिलाले प्रोटोकलअनुसार तीन पटक सुत्केरी जाँच गराएको पाईएको छ। त्यस्तै, मातृ मृत्यु भएका ६११ महिलामध्ये ३७ जना (६ प्रतिशत) ले गर्भपतन गराएको वा तिनको गर्भ खेर गएको पाइएको छ ।

प्रसूति र सुत्केरी अवधिमा मृत्यु भएका महिलामध्ये अधिकांश (७६ प्रतिशत) महिलाले स्वास्थ्य संस्थामा प्रसूती गराएका थिए । स्वास्थ्य संस्थामा प्रसूति गराएका महिलाहरूमध्ये ६२ प्रतिशत महिलाले सरकारी स्वास्थ्य संस्थामा र ३८ प्रतिशत महिलाले गैरसरकारी स्वास्थ्य संस्थामा प्रसूति गराएका थिए ।

सुत्केरी अवस्थामा मृत्यु भएका महिलाहरूमध्ये २७ प्रतिशत महिलामा अत्यधिक रक्तस्राव, २३ प्रतिशत महिलामा रिँगटा लाग्ने/बेहोस वा अचेत हुने तथा १२ प्रतिशत महिलामा काम्ने समस्या भएको पाइयो । मृत्यु भएकामध्ये अधिकांश (८३ प्रतिशत) महिला/परिवारले मृत्यु हुनुपूर्व स्वास्थ्य सेवा लिनका लागि कुनै न कुनै स्वास्थ्य संस्थामा उपचार लिन खोजेको पाइयो । उपचार लिन नखोज्नेहरूमध्ये झन्डै आधा (४८ प्रतिशत) ले यसलाई आवश्यक नठानेको पाइयो ।

मातृ मृत्युको प्रमुख कारणहरूमा गैरप्रसूतिजन्य जटिलता (अप्रत्यक्ष कारण) (३२ प्रतिशत), प्रसूतिको बेलामा हुने उच्च रक्तस्राव (२६ प्रतिशत) र उच्च रक्तचापजन्य समस्या (१२ प्रतिशत) रहेको पाइएको छ । पाँच प्रतिशत मृत्यु गर्भपतनका कारणले भएको पाइयो । गर्भावस्थामा मृत्यु भएका महिलाहरूको मृत्युको प्रमुख कारणहरूमा गैरप्रसूतिजन्य जटिलता (४० प्रतिशत), प्रसूतिसँग असम्बन्धित कारण (१७ प्रतिशत) र रक्तचापको समस्या (१४ प्रतिशत) रहेको पाइयो । प्रसवको समयमा मृत्यु भएका महिलाहरूमध्ये तीन चौथाइभन्दा बढी (७८ प्रतिशत) महिलाहरूको मृत्यु प्रसूति रक्तस्रावका कारण भएको पाइयो । सुत्केरी अवस्थामा मृत्यु भएका महिलाहरूमध्ये ३१ प्रतिशत महिलाको मृत्युको कारण प्रसूति अवस्थाको रक्तस्राव र यति नै (३१ प्रतिशत) महिलाको मृत्युको कारण गैरप्रसूति जटिलता रहेको पाइयो ।

गर्भावस्थासँग सम्बन्धित मृत्यु निम्त्याउने "तीन ढिलाइ" लाई हेर्दा उपयुक्त स्वास्थ्य सेवा खोज्नमा ढिलाइ (५७ प्रतिशत), उपयुक्त स्वास्थ्य संस्था पुग्न ढिलाइ (३३ प्रतिशत) र उपयुक्त स्वास्थ्य सेवा प्राप्त गर्न ढिलाइ (४० प्रतिशत) रहेको पाइयो । यी "तीन ढिलाइ" मध्ये अधिकांश मृतक महिला (७४ प्रतिशत) को मृत्युमा कम्तीमा एक प्रकारको ढिलाइ भएको थियो भने १७ प्रतिशत महिलाले तीनवटै ढिलाइ भोगेका थिए ।

निष्कर्षमा, यस अध्ययनले नेपालमा अझै पनि धेरै मातृ मृत्यु गर्भावस्थाको समयमा रक्तस्राव र उच्च रक्तचापजस्ता रोकथाम गर्न सकिने कारणले हुने देखाएको छ भने उल्लेख्य मृत्यु आत्महत्या जस्ता गैरप्रसूतिजन्य जटिलताले पनि भएको देखिन्छ । यसले स्वास्थ्य संस्थामा मातृ स्वास्थ्य सेवाको गुणस्तर र रेफरल संयन्त्रमा सुधार, आपतकालीन यातायात व्यवस्थापन र खतराका सङ्केतहरूको समयमै जाँच गर्ने व्यवस्थालाई बलियो बनाउनु पर्ने देखिन्छ । यस अध्ययनले समुदायमा आधारित मातृ मृत्यु निगरानी र प्रतिकार्य प्रणालीलाई सुदृढ गर्नुपर्ने सन्देश दिनुका अतिरिक्त आगामी राष्ट्रिय जनगणनाहरूमा पनि मातृ मृत्युको अनुपात अनुमान गर्ने र मृत्युका कारणहरूको पहिचान गर्नुपर्ने आवश्यकतालाई औँल्याएको छ ।

EXECUTIVE SUMMARY

The Sustainable Development Goals include the target of reducing the global maternal mortality ratio (MMR) to less than 70 per 100,000 live births, with no country having an MMR that exceeds twice the global average. Nepal has committed to reduce the MMR from 281 per 100,000 live births in 2006 to 116 by 2022, 99 by 2025, and 70 by 2030. This Nepal Maternal Mortality Study 2021 is the first ever joint undertaking of the Ministry of Health and Population (MoHP), the National Statistics Office (NSO), the Nepal Health Research Council, and health development partners for estimating the MMR and identifying the causes of maternal deaths – during pregnancy, delivery, and postpartum periods – in Nepal. By doing so, it intends to inform evidence-based policies and programs at the federal, provincial, and local levels.

The MoHP, in collaboration with the NSO, made an arrangement through a Memorandum of Understanding, where the census enumerators, as a part of their regular work, collected data on live births and deaths of women of reproductive age (WRA) in the enumerated households for the last 12 months preceding the National Population and Housing Census 2021. In the first phase, those Census enumerators then completed the death notification forms to identify pregnancy-related deaths, and submitted them to the census supervisor and notified the deaths to the pre-identified and trained local level health workers. In the second phase of the study, the local level health workers visited the household of each of the deceased women, verified the information and identified the pregnancy related deaths. For each pregnancy-related death identified, a verbal autopsy was conducted by trained health workers using the verbal autopsy form.

The MMR was found to be 151 per 100,000 live births in Nepal, with higher ratios in the Lumbini and Karnali provinces (207 and 172 per 100,000 live births respectively) and a lowest ratio in the Bagmati province (98 per 100,000 live births). Of the 12,976 deaths among women of reproductive age (15-49 years), 653 were pregnancy-related, comprising five percent of the total deaths in this age group.

Of the 653 pregnancy-related deaths, 622 (95 percent) were classified as maternal deaths. The overall proportion of maternal deaths among the deaths of women of reproductive age was 4.8 percent. Only 611 maternal deaths were analysed further for causes and other attributes due to lack of sufficient information for 11 maternal deaths.

The majority of the maternal deaths occurred in the postpartum period (61 percent), while thirty-three percent occurred during pregnancy and six percent during delivery. Nearly half of the deaths (47 percent) were reported in the Lumbini and Madhesh provinces. One in ten maternal deaths was among adolescent mothers. The majority of the deaths (57 percent) occurred in health facilities, whereas 26 percent occurred at home.

Out of 412 women who died during delivery and post-partum period, fifty-three percent had attended all four antenatal care visits; while of the 173 women who died between 7-42 days of delivery 45 percent had attended all three postnatal care visits as per the protocol.

Among the women who had died during delivery and in the postpartum period, over three-fourth (76 percent) had delivered at

health facilities. Among those, 62 percent had delivered at government facilities while 38 percent at non- government health facility.

Twenty-seven percent of women who died during the postpartum period had excessive bleeding, 23 percent had experienced dizziness and fainting, and 12 percent had been afflicted by fits and seizures. Eighty-three percent of the deceased had sought treatment for illness at a health facility or other place before death. Among those who did not seek treatment, nearly half did not consider it necessary (48%).

The largest cause of maternal death was found to be non-obstetric complications (indirect maternal deaths) (32 percent). This was followed by obstetric haemorrhage (26 percent) and hypertensive disorders (12 percent). Five percent of the deaths were attributable to pregnancies with abortive outcomes. The leading causes of death during pregnancy were observed to be non-obstetric complications (40 percent), followed by direct deaths without obstetric codes (17 percent), and hypertensive disorders (14 percent). On the other hand, more than three quarters (78 percent) of deaths during delivery were attributable to obstetric haemorrhage. For deaths during the postpartum period, nearly a third were due to obstetric haemorrhage and non- obstetric complications (31 percent each).

In connection to the "Three Delays" that lead to pregnancy-related mortality, a majority (74 percent) of the deceased women had experienced at least one type of delay, while 17 percent had experienced all three delays. The most common was the delay in seeking appropriate care (57 percent), followed by delay in receiving appropriate care (40 percent), and delay in reaching the healthcare facility for care (33 percent).

In conclusion, the study showed that many maternal deaths in Nepal are due to preventable causes such as haemorrhage and high blood pressure during pregnancy, but a significant number are also caused by non-obstetric complications such as intentional self-harm. It highlighted the importance of improving the quality of maternal health services in health facilities and strengthening referral mechanisms, emergency transportation, and early screening for danger signs. In addition of its potential to strengthen community-based maternal death surveillance and response in the country, the NMMS 2021 also sets a precedent for conducting nationwide censuses of maternal deaths in future censuses to estimate the MMR and identify causes of death.

Pregnancy-Related Death

Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of cause of death.

Maternal Death

Death of a woman while pregnant or within 42 days of termination 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.

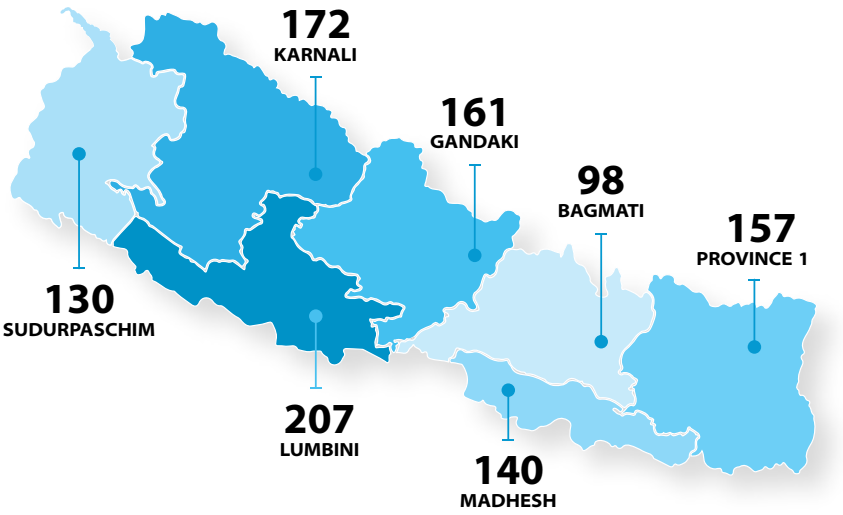
653 PREGNANCY RELATED DEATHS

622 MATERNAL DEATHS

151
100,000 LIVE BIRTHS

MATERNAL MORTALITY RATIO IN NEPAL (MMR)

MATERNAL MORTALITY RATIO BY PROVINCE



MATERNAL MORTALITY RATIO BY ECOLOGICAL BELT	
MOUNTAIN	133
HILL	159
TERAI	147

MATERNAL DEATHS BY ECOLOGICAL BELT	
MOUNTAIN	6%
HILL	39%
TERAI	55%

PREGNANCY - RELATED DEATHS

NON - OBSTETRIC COMPLICATIONS - 31%

OBSTETRIC HAEMORRHAGE - 25%

HYPERTENSIVE DISORDERS - 11%

PREGNANCY-RELATED INFECTION - 7%

OTHERS - 26%

MATERNAL DEATHS BY PERIOD OF DEATH

61%	33%	6%
POSTPARTUM (42 DAYS)	DURING PREGNANCY	DURING DELIVERY

MATERNAL DEATHS BY PLACE OF DEATH

HEALTH FACILITIES	HOME	ON THE WAY TO OR BETWEEN FACILITIES
57%	26%	17%

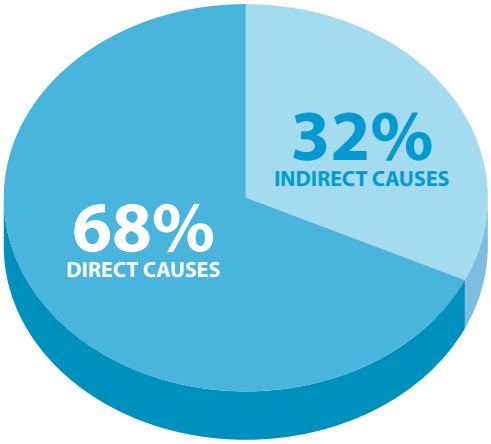
15% MATERNAL DEATHS DUE TO COVID 19

DELAYS AND THEIR FURTHER BREAKDOWN

74% AT LEAST ONE DELAY → 17% ALL THREE DELAYS

26% NO DELAYS

CAUSES OF MATERNAL DEATH



CAUSES OF MATERNAL DEATHS

32% — NON- OBSTETRIC COMPLICATIONS
Almost one third (32%) of Maternal Death were due to Non-Obstetrics Complications.

26% — OBSTETRIC HAEMORRHAGE
92% being Postpartum Haemorrhage and 8% Antepartum Haemorrhage

12% — HYPERTENSIVE DISORDERS
The second leading cause of Direct Maternal Death was Hypertensive Disorders

7% — PREGNANCY-RELATED INFECTION
7% of Maternal Deaths were due to Pregnancy-Related Infection (mostly postpartum)

6% — SELF - HARM
6% of Maternal Deaths were due to intentional Self-Harm, with the majority occurring during pregnancy

5% — PREGNANCY WITH ABORTIVE OUTCOME
5% were due to Pregnancy with Abortive Outcome

1% — COMPLICATIONS OF ANESTHESIA MANAGEMENT
1% were due to unanticipated Complications of Anesthesia Management

11% — OTHERS

CHAPTER

1 INTRODUCTION

1.1. Background

Reducing maternal mortality is one of the priority targets of the Sustainable Development Goals (SDGs). The global target is to reduce the maternal mortality ratio (MMR) to less than 70 maternal deaths per 100,000 live births. This target aims to reduce the MMR of all countries by at least two-thirds from the 2010 baseline, with no country having MMR higher than 140 deaths per 100,000 live births by 2030 (SDG 3.7.1).

Nepal has committed to reducing its MMR from 281 per 100,000 live births in 2006 to 116 by 2022, 99 by 2025, and 70 by 2030[1]. Therefore, it is crucial to monitor maternal deaths, identify their causes and determinants, and implement tailored interventions to achieve the target of SDG 3.7.1. Contextualising the efforts at the federal, provincial, and local levels is necessary to achieve this target.

In Nepal, various methods are employed to estimate the MMR through surveys such as the Demographic and Health Survey and Maternal Mortality and Morbidity Studies, among others. These surveys capture maternal deaths to estimate the MMR. In addition, the Pregnancy-related Mortality Ratio (PRMR) has often been used as a proxy for MMR. However, this year, for the first time, the Nepal Maternal Mortality Study 2021 (NMMS 2021) was conducted to estimate the MMR following the Census 2021. This is a significant milestone in understanding the MMR in the country.

The NMMS 2021 is a joint effort of the Ministry of Health and Population (MoHP), the National Statistics Office (NSO) (former Central Bureau of Statistics), the Nepal Health Research Council (NHRC), and health development partners (HDPs). The MoHP signed a Memorandum of Understanding with the NSO to include this study as part of the Census 2021.

The Census 2021 collected information on several health indicators, particularly demography, fertility, mortality, and disability. Its main questionnaire allows estimation of the PRMR, but does not provide MMR (unless the questions on the cause of death due to accidents or violence are taken into account). Additionally, the census does not offer information on medical causes of death. In Nepal, where Civil Registration and Vital Statistics capacity is limited and exact data on causes of death is difficult to retrieve, this study uses the Verbal Autopsy (VA) method based on the pregnancy-related deaths identified and reported by the Census 2021 enumerators.

Therefore, the NMMS 2021 captured data on all pregnancy-related deaths during the 12 months preceding the Census 2021. It provides federal and provincial level MMR estimates for the first time in Nepal and generates detailed information on causes of death and other morbid conditions of the deceased women.

All levels of government in the country have a shared responsibility for the health of the population, so it is important to estimate MMR at the federal, provincial, and local levels. This allows for the exploration of the causes of death and the formulation of evidence-informed policies and targeted interventions. In addition, this study helps to improve the overall quality of mortality and morbidity data in the census, which can be used to estimate the burden of disease and develop life tables.

1. National Planning Commission, 2021. SDG Progress Assessment Report available at https://www.undp.org/nepal/publications/sdg-progress-assessment-report

1.2 Sources for estimation of MMR and identifying the causes of maternal deaths in Nepal

Table 1 highlights the status of the available sources that provide estimates of MMR and the causes of maternal deaths in Nepal.

Table 1. Sources available for MMR estimation and identifying the causes of maternal deaths in Nepal

Source	Description
Nepal Demographic and Health Survey (NDHS)	Globally, the demographic and health surveys estimate MMR using the direct sisterhood method.[2] The Nepal Demographic and Health Survey (NDHS) generates the estimates of MMR in every alternate round. The NDHS 1996, 2006, and 2016 generated the estimates of PRMR (but referred to as MMR in reports until the NDHS 2016). The NDHS 2016 was the first in its series to give MMR estimates (239 per 100,000 live births) based on the maternal deaths. The NDHS is not designed to provide the causes of maternal deaths. Given the small number of maternal deaths captured in the various NDHSs, its MMR estimates are not available at sub-national levels.
Maternal Mortality and Morbidity Studies (MMMS)	Nepal has so far performed two Maternal Mortality and Morbidity Studies (MMMS) – in 1998 and 2008/09. The MMMS 1998 was carried out in three districts (Okhaldhunga, Rupandehi and Kailali), but it did not collect information on live births and, therefore, did not generate MMR estimates. The MMMS 2008/09 covered eight districts (Okhaldhunga, Sunsari, Baglung, Rupandehi, Banke, Surkhet, Jumla and Kailali), and estimated the MMR to be 229 per 100,000 live births.
Maternal and Perinatal Death Surveillance and Response System (MPDSR)	Under the Maternal and Perinatal Death Surveillance and Response (MPDSR) system, the community-based maternal death surveillance and response system is currently being implemented in 27 districts and the hospital-based maternal and perinatal death surveillance and response system in 94 hospitals across the country. Even though a significant number of maternal deaths are reported from these sites, the data are not representative enough to calculate MMR for the country.
United Nations (UN) estimates	In an effort to measure maternal mortality in countries lacking vital registration, WHO, UNFPA, UNICEF and the United Nations Population Division, as part of the United Nations Maternal Mortality Estimation Inter-Agency Group (MMEIG), provide country-specific MMR estimates based on "modeling" using available national empirical data on maternal deaths in a country and covariates. These initiatives generate the estimates at the national level, but do not deal with the causes of maternal deaths.
National Population and Housing Census (NPHC)	The National Population and Housing Census (NPHC) has been conducted at 10-year intervals since 1911. Its 12th series was carried out in 2021. The NPHC generally collects health-related information on fertility, births, and age standardised mortality in broader categories. The 11th NPHC in 2011, for the first time, had produced the national estimates of PRMR (480 per 100,000 live births) but did not examine the causes of maternal deaths.

1.3 Objectives

The primary objective of this study is to estimate the MMR at the federal, provincial, and local levels and identify programmatically useful information to inform investment and interventions directed towards the improvement of maternal health in Nepal. Its specific purposes are:

- To identify the causes of death during pregnancy, childbirth, and the postpartum period.
- To guide the evidence-based policies, strategies, and implementation plans at the federal, provincial, and local levels to develop targeted interventions that are successful in reducing maternal morbidity and mortality in the local context.

2. An Assessment of DHS Maternal Mortality Data and Estimates, DHS methodological Reports 13 available at https://dhsprogram.com/pubs/pdf/MR13/MR13.pdf

CHAPTER

2 METHODOLOGY

2.1. Study design

The NMMS 2021 was led by the Population Management Division (PMD) of the MoHP in collaboration with the NSO. A steering committee chaired by the Additional Health Secretary of the MoHP and members comprising from the MoHP, NSO, and the HDPs provided oversight to the study. Similarly, a technical working committee chaired by the Chief of the PMD and members comprising from the MoHP, NSO, Family Welfare Division (FWD), NHRC, and the HDPs was formed to provide technical input and ensure quality. Likewise, seven provincial and 77 district-level technical committees were formed for the effective implementation of the study at the respective levels. The composition of these committees is presented in Annex 1.

The NHRC and the HDPs provided guidance in the design and implementation of the study. The NHRC provided technical guidance, while the HDPs—WHO, UNICEF, UNFPA, British Embassy Kathmandu/Nepal Health Sector Support Programme (BEK/NHSSP), USAID, and GIZ—provided technical and financial assistance.

The NMMS 2021 is a retrospective study based on the women of reproductive age (WRA) and pregnancy-related deaths reported by the Census 2021. The data for the census was collected in two phases. The first was completed between 30 Bhadra and 18 Ashoj 2078 (15 September to 4 October 2021) and the second between 25 Kartik and 9 Mangsir 2078 (11 to 25 November 2021). The data collection included the data of all the deaths that were reported to have taken place in the 12 months (defined as a reference period) preceding the Census 2021. This study, thus, also includes all pregnancy-related deaths reported in the census. The VA started from 26 Kartik 2078 (12 November 2021) and was completed by 30 Mangsir 2078 (16 December 2021).

2.2 Study tools

A Standard Operating Procedure (SOP) guided the implementation of the NMMS 2021. It included the tools, procedures, methodology, operational definitions, and work plan for the study. The NMMS 2021 used four tools, which are briefly described in this section and also included in Annex 2.

2.2.1 Census questionnaire

The main questionnaire of the Census 2021 served as the primary tool for the identification of pregnancy-related deaths and live births. It identified households that had experienced deaths of family members (de facto population) in the 12 months preceding the census. In such cases, the census collected detailed information on the deaths, including the full name, sex, and age of the deceased person, and main cause of death as reported by the respondent. Additionally, in the case of WRA deaths, the census collected details on the pregnancy status of the deceased women. The section of the Census 2021 questionnaire on death-related information is presented in Annex 2.1.

The Census 2021 questionnaire collected data on live births in the 12 months preceding the Census 2021. This provided the denominator for the calculation of PRMR and MMR.

2.2.2 WRA death notification form

The Census 2021 questionnaire included questions to categorise the WRA deaths by the pregnancy status of the deceased: during pregnancy, delivery, or postpartum period (within six weeks after childbirth) or beyond (none of these periods/not related to pregnancy). All WRA deaths — irrespective of the period of pregnancy at the time of death — reported under Sub-section 6 of Question 15 (Annex 2.1) of the Census 2021 served as the main source for the identification of pregnancy-related deaths for this study. A notification form was developed to record all the deaths reported under the aforementioned sub-section (Annex 2.2). It included the following information: name of the deceased woman, contact details of the household head, stage of pregnancy at the time of death, i.e., during pregnancy, during delivery, during abortion or death after delivery/abortion up to 42 days, or others (beyond/not related to pregnancy). The Census 2021 supervisors and enumerators were trained on completing the notification form and its reporting channels. This study did not include late maternal deaths – those that occurred after 42 days till one year after delivery.

2.2.3. Mobile application for notifying WRA deaths

A mobile application (for both Android and iOS platforms) was developed to notify pre-identified and trained health workers about WRA deaths. The Census 2021 enumerators notified the health workers in their respective enumeration areas, and were provided with their phone numbers for this purpose. The enumerators and health workers were oriented on the application prior to its use.

After receiving the detailed data as per the death notification forms, the health workers uploaded the information and VA status of the pregnancy-related deaths to the application. Then, the study team at the district, provincial, and federal levels used this data to track VA completions for the identified pregnancy-related deaths.

2.2.4. Verbal autopsy form

The VA tool of the national MPDSR program, managed by the FWD of the Department of Health Services of the MoHP, was customised and used for the NMMS 2021. It aligned with the protocols for pregnancy and postnatal care. The tool was translated into the Nepali language, pretested, and finalised. In addition, a VA manual was prepared and provided to all the trained health workers to ensure uniformity in data collection (Annex 2.3).

2.2.5 Cause of death assignment form

A form was developed to assign causes of death to all pregnancy-related deaths, in accordance with WHO's International Classification of Disease-Maternal Mortality (ICD-MM)[3] codes (Annex 2.4).

2.3 Training/orientation

A cascade of training sessions was organised for implementation of the NMMS 2021.

2.3.1 Orientation to the census 2021 trainers and enumerators

The MoHP, in collaboration with the NSO, oriented the Census 2021 trainers at the federal, provincial, and local levels on identifying and notifying WRA deaths. The trainers and enumerators were familiarised with the overall process of the study and their specific roles at the respective level.

2.3.2 Master training of trainers (MToT) at the federal level

Officials from the MoHP, NHRC, FWD, Provincial Health Ministry/Health Directorate, WHO, UNICEF, UNFPA, NHSSP, GIZ, and independent gynecologists/obstetricians were trained as master trainers for this study. A two-day MToT was organised in Kathmandu on 4 and 5 Ashoj 2078 (20 and 21 September 2021).

3. The WHO Application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD-MM

Table 2: Number of health workers trained to conduct verbal autopsy

Province	Number of districts	Number of health workers		
		Male	Female	Total
Province 1	14	1	151	152
Madhesh	8	2	147	149
Bagmati	13	9	143	152
Gandaki	11	10	79	89
Lumbini	12	0	135	135
Karnali	10	0	81	81
Sudurpaschim	9	1	95	96
TOTAL	**77**	**23**	**831**	**854**

2.3.3 Training of trainers (ToT) at the provincial level

A two-day ToT was organised in each of the seven provinces between 8 and 15 Ashoj 2078 (24 September to 1 October 2021). At least two health officials with nursing background and experience of maternal health from each of the 77 districts were trained as trainers for the VA executors. The ToT participants served as the district coordinators for the NMMS 2021.

2.3.4 Health worker training

A total of 854 health workers were trained to conduct VA at the local levels (Table 2). A two- day training was organised at the district level from 13 Ashoj to 15 Kartik 2078 (29 September to 1 November 2021), in which participants from the MToT and ToT trained the health workers. The number of participants from each local level was determined based on the type of local level and the population. One participant was selected from each rural municipality and municipalities with population of less than 50,000, while two participants were selected from municipalities with more than 50,000 population. There were three participants from each sub-metropolitan city and four from metropolitan cities.

2.3.5 Logistic support to the trainings

UNFPA, UNICEF, NHSSP, and GIZ jointly supported the consortium of ADRA Nepal, Mitra Samaj, and Kamana Health in the management of the MToT and ToT events. Likewise, USAID through Kamana Health supported the management of the VA training events.

USAID, through the Strengthening Systems for Better Health (SSBH) Activity, and UNICEF supported the recruitment of the reviewers for assigning the cause of death.

2.4 Ethical review

Prior to execution of the study, the NMMS 2021 study protocol was reviewed and approved (Reg No. 674/2021P) by the Ethical Review Board (ERB) of the NHRC.

2.5 Pretest of study tools

The Death Notification Form and the VA questionnaire were pre-tested in Thali, Kageswari Manohara Municipality in Kathmandu District in coordination with the District Health Office. The pre-test of the questionnaire was carried out by the core study team members from the MoHP and NHRC. This was done to ensure: the appropriateness of the language, the ability of the respondents to recall the information and

respond properly, the comprehensiveness of the questionnaire, the time taken to complete the interview, and the overall interview technique. The tools were revised based on the findings of the pre-test.

2.6 Field work

The field work comprised of identification of live births, WRA deaths, pregnancy-related deaths, and VA.

2.6.1 Identification of live births

The Census 2021 enumerators identified all live births in the enumerated households in the 12 months preceding the Census 2021. The live birth data was provided by the NSO to the MoHP to estimate the MMR and PRMR.

2.6.2 Identification and verification of WRA and pregnancy-related deaths

The Census 2021 enumerators completed the Death Notification Forms to identify WRA deaths in the enumerated households in the 12 months preceding the Census 2021. Mobile text messages – with the words "Female Death Found" – were sent by the enumerators to the pre-identified trained health workers in their enumeration area, while the Census 2021 supervisors too were informed about the deaths. Then, the health workers communicated with the enumerators for the contact details of the relevant households. Next, the health workers, in consultation with and/or accompanied by local Female Community Health Volunteers (FCHVs), visited the households, identified appropriate respondents, and verified information about the deaths. The health workers used screening questions to determine whether the deaths had occurred during pregnancy, delivery, or postpartum period up to 42 days.

The Death Notification Forms and the list of WRA deaths were handed over to the MoHP by the NSO.

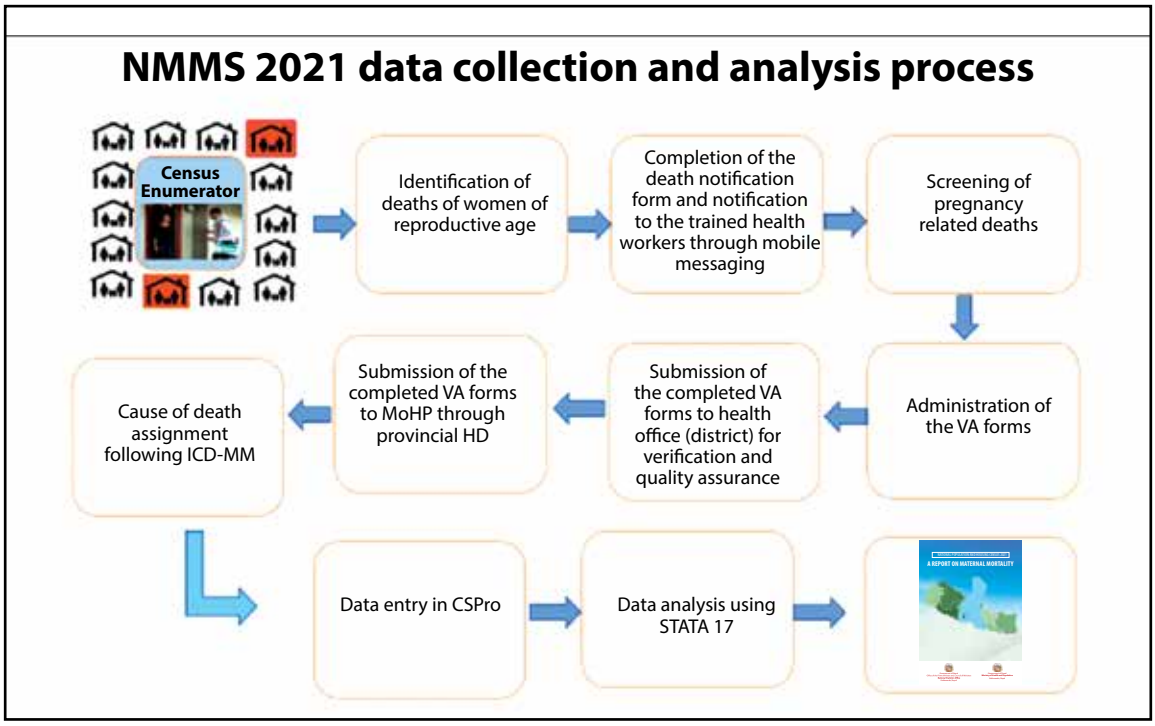
2.6.3 Verbal autopsy (VA)

After each pregnancy-related death was verified, the trained health workers identified appropriate respondents in the household and interviewed them using VA forms. The completed VA forms were collected at the (district) health office, and reviewed by the district coordinators for completeness, consistency, and overall quality. Incomplete VA forms were returned to the health worker who had executed the VA. The VA forms were then sent to the provincial health directorate and finally to the MoHP.

2.7 Cause of death assignment

Each VA form was reviewed independently by two reviewers (gynecologist/obstetrician), who then assigned the cause of death using the ICD-MM guideline. After this, the results were compared. If there were differences, a third reviewer independently reviewed and assigned the cause of death using the ICD-MM code. In such cases, the final cause of death was asserted with majority rule, where the cause assigned by at least two reviewers was considered as the final cause of death. Out of 653 VA forms, 134 cases were decided by the majority rule. In 38 cases where all three reviewers did not agree with a common cause, a panel of experts identified by the NMMS 2021 Technical Working Committee reviewed and assigned the final cause of death. The reviewers also recorded the level of certainty in each assigned cause. They recorded the causal sequence, from the underlying causes to the final cause of death, as recommended by WHO.

The flow chart presents the process and steps of the NMMS 2021. It starts with the identification of live births and WRA deaths, implementation of VA, assignment of cause of death, data analysis, and ends with the finalisation of the report.



2.8 Quality assurance

A mechanism was developed to assure quality at each step of the study. A steering committee at the federal level, and a technical working committee at the federal, provincial, and district levels were formed to steer, coordinate, oversee, and guarantee the quality of the study. An evaluation checklist was prepared for census officers and district coordinators to monitor visits during the collection of census data. The district and provincial coordinators closely supervised the quality of training and data collection, with a special focus on ensuring that no WRA deaths were missed for reporting in the Census 2021.

The completed VA questionnaires were reviewed in each province by the provincial-level coordinators under the direct supervision of the MoHP and NHRC. Prior to data entry, the completed VA forms were analysed by the study coordinators at the MoHP. Incomplete forms were returned to the district coordinators for further clarification, completeness, and consistency. Case verifications were carried out through phone calls and by mobilising local-level health workers and FCHVs.

2.9 Data management and analysis

The completed VA forms and the cause of death assignment forms were entered into a database developed in the Census and Survey Processing System (CSPro) software. A double entry procedure was followed to minimise errors. After the completion of data entry, the data from CSPro was converted into the Stata 17 software for analysis. This involved the use of descriptive analysis and the calculation of frequency distribution and percentage, while data was visualised in figures and diagrams.

The Census 2021 reported a total of 12,976 WRA deaths, of which 653 were identified as pregnancy-related. Verbal autopsy was carried out for each of these cases. However, the information collected in the VA form for 11 of these deaths were incomplete due to the unavailability of appropriate respondent(s). Although information on the background characteristics and conditions surrounding these cases were missing, the study team could gather enough information – such as period of death, cause, and conditions at the time of death – from the respondents contacted (relatives and neighbors of the deceased women) to determine them as maternal deaths.

Table 3: WRA deaths captured in Census 2021, and VA completed in NMMS 2021

Number of WRA deaths reported by the Census	12976
Number of pregnancy related deaths reported by the Census	653
Number of verbal autopsies completed	653
Number of pregnancy-related deaths for estimation of PRMR	653
Number of pregnancy-related deaths for analysis	642
Number of maternal deaths for estimation of MMR	622
Number of maternal deaths for analysis	611
Number of coincidental deaths	31
Number of live births reported by the Census	412935

The NMMS 2021 records a total of 622 maternal deaths for MMR estimation. Nonetheless, due to the limited information, the 11 cases lacked the information for assigning a specific cause of death based on the ICD-MM guideline. Consequently, these 11 deaths have been excluded from the analysis except in MMR estimation (Table 3).

Given that this study used the data generated by the Census 2021, absolute figures have been used for analysis throughout this report.

2.10 Limitations of the study

The primary tool for the NMMS 2021 was verbal autopsy. The causes of death were assigned based on the information collected using the VA form, and not from the clinical reports. Therefore, the general limitations of VA methodology, such as recall bias and social desirability bias, among others, apply to this study as well. The VA executors could not find appropriate respondents to interview for 11 pregnancy-related deaths reported by the Census 2021 enumerators. Some of the cases were reported to have died in India and the deceased women's caretakers were unavailable for interviews at the time of this study. Few respondents also deliberately refused to respond to specific questions, particularly those related to the background characteristics of the deceased women and their causes of death. This was specific to those who died in case of premarital pregnancy.

2.11 Operational definition of the key terms

Verbal autopsy: Verbal autopsy (VA) is a method of ascertaining the clinical causes of death in a defined population by interviewing those closest to the deceased at the time of death (relatives, friends, neighbors) about symptoms, signs, and the circumstances preceding death.

Pregnancy: Period from the first day of last menstrual period before the onset of true labour.

Delivery: Period from the onset of true labour till the expulsion / delivery of the placenta.

Postpartum period: Period up to 42 days of birth of the child.

Abortion: Expulsion or extraction of the product of conception before 24 weeks. Includes self-expulsion as well as use of medicines/instruments to expel the product of conception.

Spontaneous abortion: Termination of pregnancy by expulsion of the product of conception before 24 weeks of gestation, without any intervention.

Induced abortion: Termination of pregnancy by voluntary expulsion/extraction of the product of conception using medicines/ instruments etc.

Live birth: Complete expulsion/extraction from its mother the product of conception showing some signs of life irrespective of the duration of pregnancy, which, after such separation, breathes or shows any other evidence of life.

Pregnancy-related death: Death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of cause of death.

Maternal death: The death of a woman while pregnant or within 42 days of termination 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.

Direct maternal death: Deaths resulting from obstetric complications of the pregnancy state (pregnancy, delivery and postpartum period) from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above.

Indirect maternal death: Deaths resulting from preexisting disease or disease that developed during pregnancy that was not due to direct obstetric causes, but was aggravated by physiologic effects of pregnancy.

Place of usual residence: A person is considered a usual resident of a specified location/place only if s/he "had been living or intends to live there for the last six months." A person who is absent from his/her usual residence for a short period—for the purpose of treatment, pilgrimage, or other similar reasons—is treated as present. Persons away or absent from their birthplace or usual residence for employment, study, or business are considered absent and thus, not counted as part of the present population. However, for this study, the homeless or mobile population were counted at the place where they were traced.

CHAPTER

3 KEY FINDINGS

This chapter presents the findings regarding the status of maternal and pregnancy-related deaths in Nepal. It presents the causes of deaths by background characteristics of the deceased women, morbidities as well as delays in seeking, reaching, and receiving care.

3.1 Pregnancy-related deaths

- A total of 653 pregnancy-related deaths were reported during the reference period. The distribution is presented by province and age group.
- Among the seven provinces, the highest number of deaths were reported from Lumbini (25 percent), followed by Madhesh (22 percent), while the seven percent of deaths were reported from Gandaki (Figure 1).
- Nearly one-third of the deaths were in the age group of 20 to 24 years (30 percent), while 10 percent of the deaths had occurred among adolescents (Figure 2).

Causes of pregnancy-related deaths

- This data includes all deaths that were reported during pregnancy, delivery, and postpartum periods up to 42 days due to any cause. It excludes 11 deaths that could not be assigned causes due to incomplete information.
- Among the pregnancy-related deaths (N= 642), a major contribution was from non-obstetric complications (31 percent), followed by obstetric haemorrhage (25 percent), hypertensive disorders in pregnancy, childbirth, and the puerperium (11 percent), and pregnancy-related infection (seven percent) (Figure 3).
- Five percent of deaths were due to coincidental causes, among which the most common causes were trauma, electrocution, and snake/insect bites (Annex 3.6).

Figure 1: Distribution of pregnancy-related deaths by province (N=653)

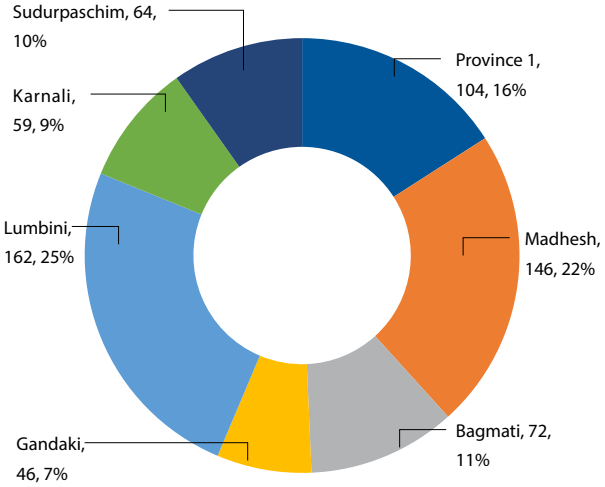


Figure 2: Distribution of pregnancy-related deaths by age group (N=653)

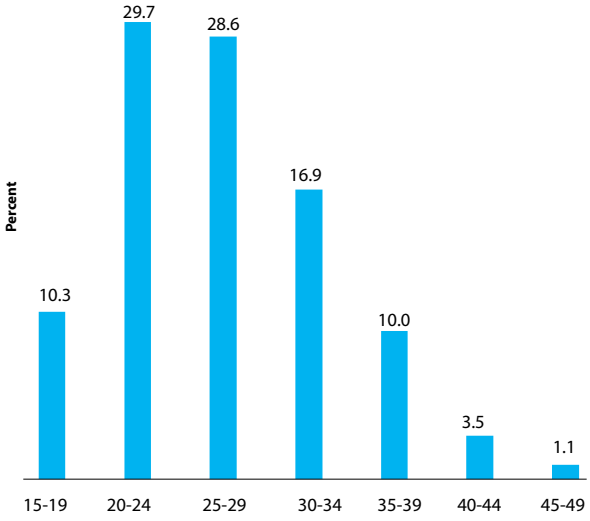
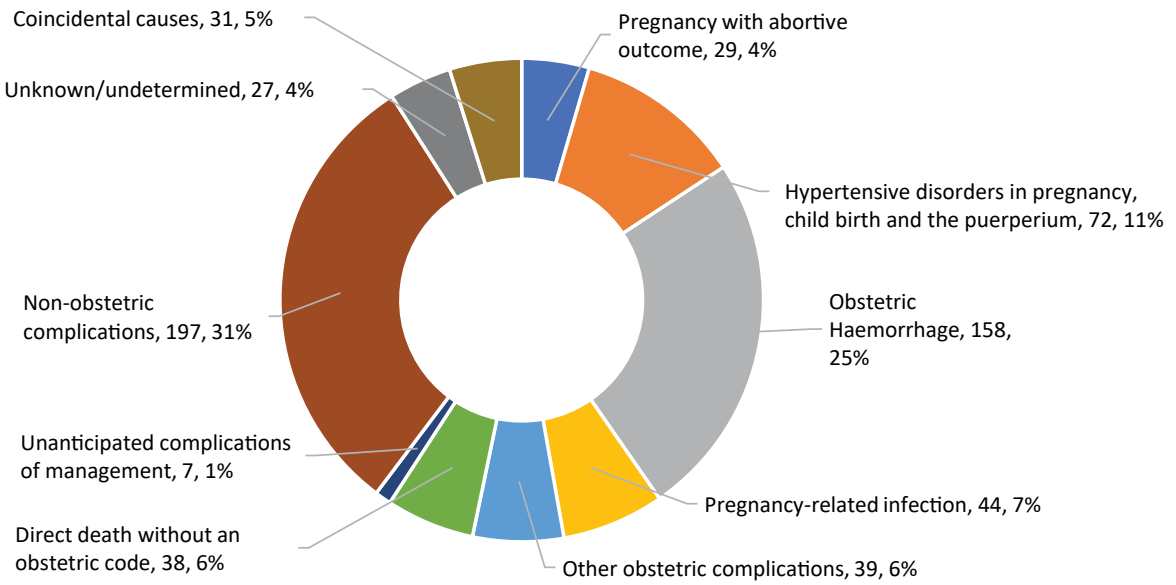


Figure 3: Distribution of pregnancy-related deaths by cause of death (N=642)[4]



3.2 Maternal deaths

- Out of the 653 pregnancy-related deaths, 622 were identified as maternal. This section provides a detailed analysis on 611 maternal deaths (excluding 11 from the 622 maternal deaths), which were categorised in three periods: pregnancy, delivery, and postpartum.
- The majority of maternal deaths (61 percent) were observed in the postpartum period (within 42 days of delivery), while the lowest number of deaths (six percent) occurred during delivery (Table 4).

3.2.1 Background characteristics of the deceased women

- Three-quarters of the deceased women were in the age group of 20-34 years. Ten percent of deaths were among adolescents, with a majority (57 percent) occurring in the postpartum period (Table 4).
- A high proportion of maternal deaths (38 percent) was observed among women who had no formal schooling as compared to women with bachelors and above education (six percent).
- Among the provinces, Lumbini reported the highest number of maternal deaths (25 percent), followed by Madhesh (22 percent). On the other hand, relatively lower number of deaths were reported from Karnali (nine percent) and Gandaki (seven percent) provinces.
- The Terai region, which has a relatively dense population, observed more than half of the maternal deaths (55 percent). This was followed by the hill (39 percent) and mountain (six percent) regions.
- The numbers of deaths were almost similar in the rural municipalities and municipalities.
- The maternal deaths were almost equal during pregnancy in all the ecological belts. However, a higher percentage of deaths during the delivery period (19 percent) was reported in the mountainous region.

4. 11 deaths with incomplete information were excluded

Table 4: Background characteristics of maternal deaths

	Pregnancy		Delivery		Postpartum		Total (%)	Total	
	N	%	N	%	N	%		N	%
Age group									
15-19	25	39.7	2	3.2	36	57.1	100	63	10.3
20-34	144	31.4	31	6.8	283	61.8	100	458	75.0
35-49	30	33.3	3	3.3	57	63.3	100	90	14.7
Education									
Never been schooling/Don't Know	60	26.0	15	6.5	156	67.5	100	231	37.8
1-8 class	47	36.7	11	8.6	70	54.7	100	128	20.9
9-12 class	75	34.7	10	4.6	131	60.6	100	216	35.4
Bachelors and above	17	47.2	0	0.0	19	52.8	100	36	5.9
Marital status									
Currently Married	192	32.1	36	6.0	371	61.9	100	599	98.0
Others	7	58.3	0	0.0	5	41.7	100	12	2.0
Province									
Province1	30	30.3	12	12.1	57	57.6	100	99	16.2
Madhesh	37	27.6	6	4.5	91	67.9	100	134	21.9
Bagmati	24	35.8	1	1.5	42	62.7	100	67	11.0
Gandaki	13	30.2	1	2.3	29	67.4	100	43	7.0
Lumbini	50	32.5	6	3.9	98	63.6	100	154	25.2
Karnali	20	37.0	7	13.0	27	50.0	100	54	8.8
Sudurpashim	25	41.7	3	5.0	32	53.3	100	60	9.8
Ecological belt									
Mountain	14	37.8	7	18.9	16	43.2	100	37	6.1
Hill	73	30.3	18	7.5	150	62.2	100	241	39.4
Terai	112	33.6	11	3.3	210	63.1	100	333	54.5
Place of residence									
Metro and sub-metropolitan cities	24	35.8	1	1.5	42	62.7	100	67	11.0
Municipalities	85	31.8	12	4.5	170	63.7	100	267	43.7
Rural municipalities	90	32.5	23	8.3	164	59.2	100	277	45.3
Total	**199**	**32.6**	**36**	**5.9**	**376**	**61.5**	**100**	**611**	**100.0**

3.2.2 Place of death

- A majority of maternal deaths (57 percent) had occurred in health facilities, followed by private residences (26 percent) (Table 5).
- Around 17 percent of women had died either while travelling from their residences to the health facilities or between the facilities.

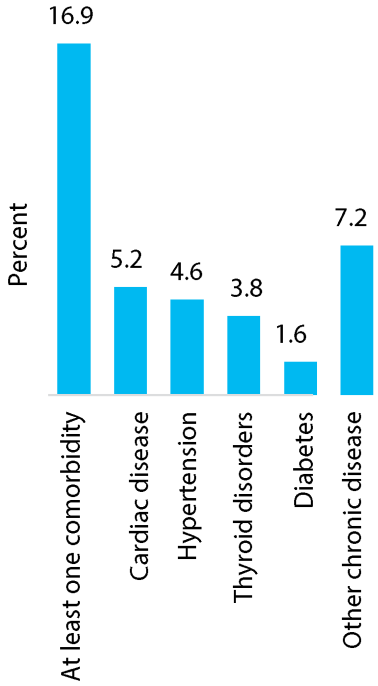
Table 5: Place of death

	Pregnancy		Delivery		Postpartum		Total	
	N	%	N	%	N	%	N	%
Health facilities	94	47.2	13	36.1	239	63.6	346	56.6
Home	71	35.7	13	36.1	78	20.7	162	26.5
On the way from home to health facility	20	10.1	3	8.3	29	7.7	52	8.5
On the way from one health facility to another	14	7.0	7	19.4	28	7.4	49	8.0
Others	0	0.0	0	0.0	1	0.3	1	0.2
Don't know	0	0.0	0	0.0	1	0.3	1	0.2
Total	**199**	**100**	**36**	**100**	**376**	**100**	**611**	**100**

3.2.3 Pre-existing morbidities before the last pregnancy

- Seventeen percent of the deceased women had at least one pre-existing morbidity before the last pregnancy (Figure 4).
- Cardiac disease and hypertension were present among five percent each and thyroid disorder among four percent; seven percent of the deceased women had other chronic diseases.

Figure 4: Pre-existing morbidities (N=611)



3.2.4 Pregnancy-related history and complications

Pregnancy-related history

- The proportion of deceased women were found to be almost equally distributed among primi, second, and third or more gravida with nearly a third of women in each category (Table 6). Among deaths during pregnancy, 40 percent were primigravida cases. Among deaths during delivery, the majority of women were third or more gravida (56 percent).
- Fifteen percent had a history of miscarriage or abortion and around 14 percent had a history of still birth.
- Almost 23 percent had three or more live births whereas 18 percent had never given birth to a live baby.
- One-tenth had a history of Caesarean section for delivery.

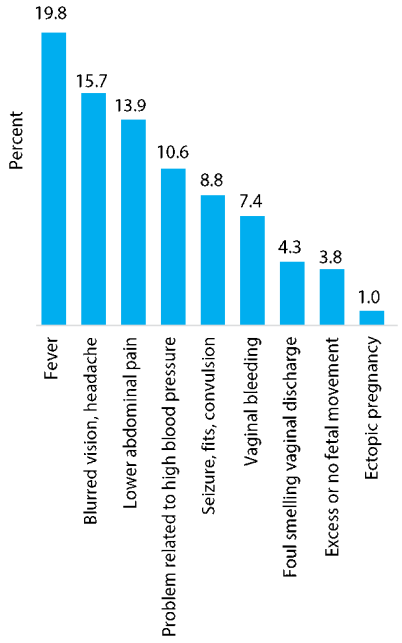
Table 6: Pregnancy-related history

	Pregnancy (N=199)		Delivery (N=36)		Postpartum (N=376)		Total (N=611)	
	N	%	N	%	N	%	N	%
Gravida								
1	79	39.7	6	16.7	116	30.9	201	32.9
2	61	30.7	10	27.8	130	34.6	201	32.9
3+	59	29.6	20	55.6	130	34.6	209	34.2
Ever had miscarriage or abortion before the index pregnancy								
Never	160	80.4	29	80.6	321	85.4	510	83.5
1 time	24	12.1	4	11.1	39	10.4	67	11.0
2-5 times	15	7.5	2	5.6	10	2.7	27	4.4
Don't know	0	0.0	1	2.8	6	1.6	7	1.1
Number of live births before the index pregnancy								
0	88	44.2	2	5.6	22	5.9	112	18.3
1	62	31.2	7	19.4	132	35.1	201	32.9
2	24	12.1	11	30.6	124	33	159	26.0
3+	25	12.6	16	44.4	97	25.8	138	22.6
Don't know	0	0.0	0	0.0	1	0.3	1	0.2
Ever had still birth before the index pregnancy								
0	192	96.5	27	75.0	308	81.9	527	86.3
1	4	2.0	7	19.4	59	15.7	70	11.5
2+	2	1.0	2	5.6	8	2.1	12	2.0
Don't know	1	0.5	0	0.0	1	0.3	2	0.3
History of delivery by Caesarean section before the index pregnancy								
Yes	20	10.1	2	5.6	40	10.6	62	10.1
No	177	88.9	34	94.4	333	88.6	544	89
Don't know	2	1.0	0	0.0	3	0.8	5	0.8

Complications during pregnancy

- The most common complaint during pregnancy was fever (20 percent) (Figure 5).
- The deceased women also had blurred vision and headache (16 percent); high blood pressure (11 percent); and seizure, fits, and convulsions (nine percent).
- Other prevalent complaints included lower abdominal pain (14 percent) and vaginal bleeding (seven percent).

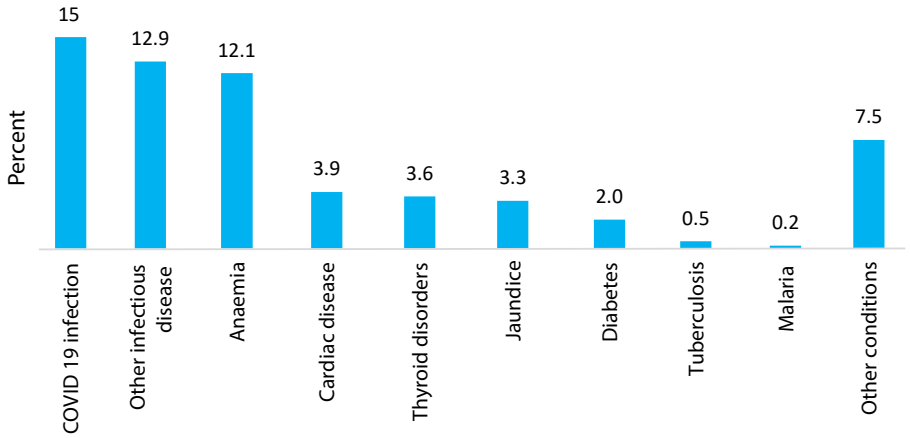
Figure 5: Complications during pregnancy (N=611)



Comorbidities during pregnancy

- Since the study was conducted during the COVID-19 pandemic, it was found that 92 of the 611 deceased women (15 percent) had COVID-19 infections (Figure 6).
- Almost 13 percent of the women had other infectious diseases and 12 percent of the deceased women were anemic.

Figure 6: Comorbidities observed during pregnancy (N=611)

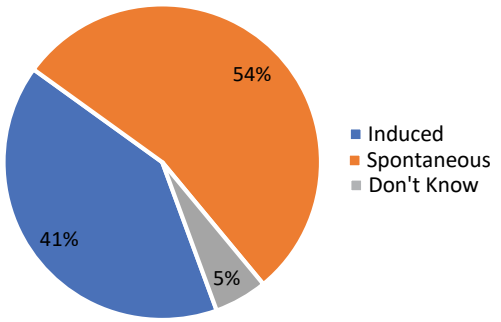


3.2.5 Abortion and complications

Type and time of abortion

- Thirty-seven (six percent) of the 611 maternal death had spontaneous or induced abortion, for the index pregnancy. However, not all those maternal deaths were related to abortive outcomes. Two out of five deceased women who had an abortion, had an induced abortion (Figure 7).

Figure 7: Type of abortion (N=37)



Method and place of induced abortion

- Among the 15 women who had induced abortion, 80 percent reported to have used medical abortion drugs (Figure 8).
- One-third of them had the procedures at private hospitals and an equal number at home (Figure 9).

Figure 8: Method of induced abortion (N=15)

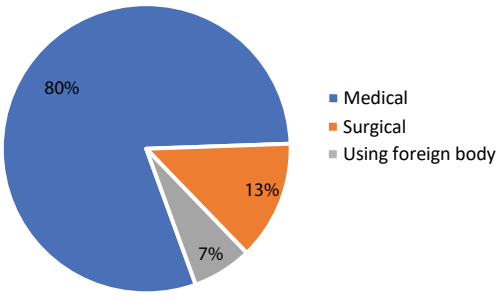
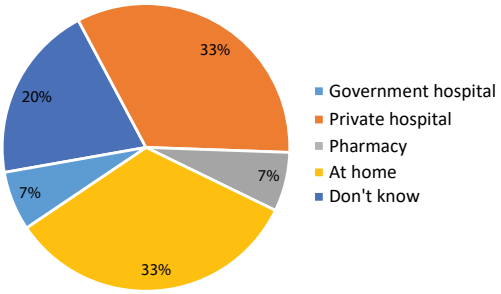


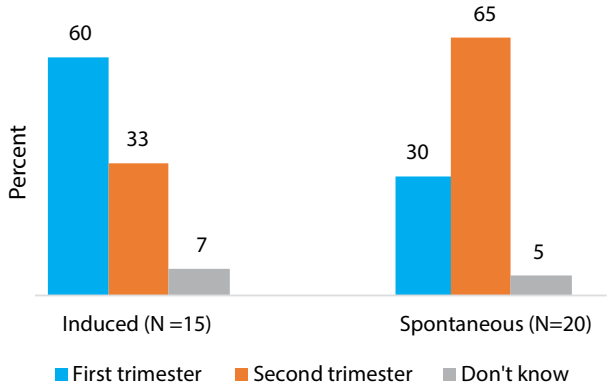
Figure 9: Place of induced abortion (N=15)



Type of abortion by period

- A majority (60 percent) of the deceased women had induced abortion during the first trimester and 33 percent during the second trimester (Figure 10).
- Nearly two-third of the women with spontaneous abortion (65 percent) had it during the second trimester.

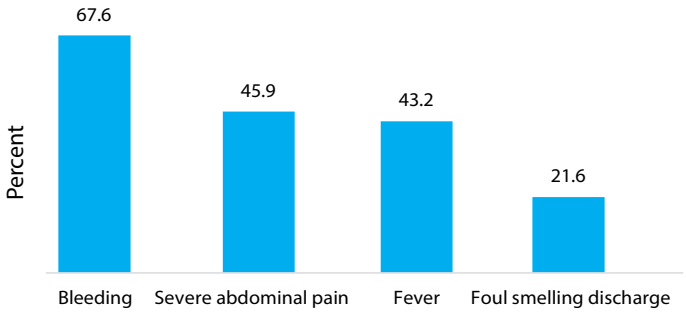
Figure 10: Type of abortion by period of abortion (N=37)



Abortion-related complications

- The most common complications during or after an abortion among the deceased women were: bleeding (68 percent), severe abdominal pain (46 percent), and fever (43 percent)(Figure 11).

Figure 11: Complications during and after abortion (N=37)

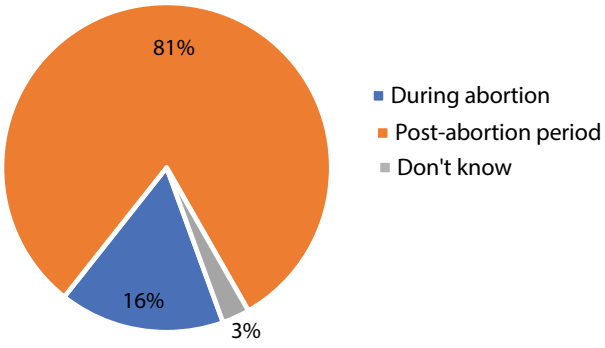


Note: Percentage exceeds 100 due to multiple response items

Time of death

- Among the deaths to abortion-related complications, over 80 percent occurred within 42 days of the post-abortion period, and 16 percent during abortion (Figure 12).

Figure 12: Time of deaths (N=37)



3.2.6 Delivery and complications

Place of delivery

- Among the women who had died during the delivery and in the post-partum period, three out of four women (76 percent) had delivered at health facilities for the index pregnancy. However, nearly one in five had delivered at home and three percent had delivered on the way to the health facility (Table 7).

Table 7: Place of delivery

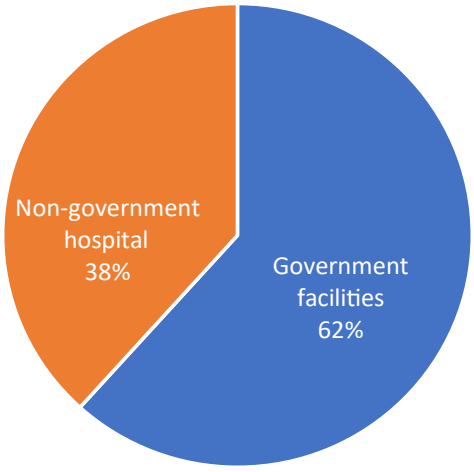
Place of delivery	Delivery (N=36)		Postpartum (N=376)		Total (N=412)	
	N	%	N	%	N	%
Home	16	44.4	62	16.5	78	18.9
On the way	3	8.3	9	2.4	12	2.9
Health facilities	14	38.9	299	79.5	313	76
HP/PHCC/BHCS	*5*	*13.9*	*37*	*9.8*	*42*	*10.2*
Government hospital	*3*	*8.3*	*148*	*39.4*	*151*	*36.7*
*Non-government hospital**	*6*	*16.7*	*114*	*30.3*	*120*	*29.1*
Others/Don't Know	**3**	**8.3**	**6**	**1.6**	**9**	**2.2**

* Non-governmental hospitals include private hospital, NGO/mission hospitals

Type of health facility

Among the deceased women who delivered at a health facility (n=313), 62 percent had delivered at government institutions, including primary, secondary, and tertiary-level facilities, whereas 38 percent had delivered at non-government hospitals (Figure 13).

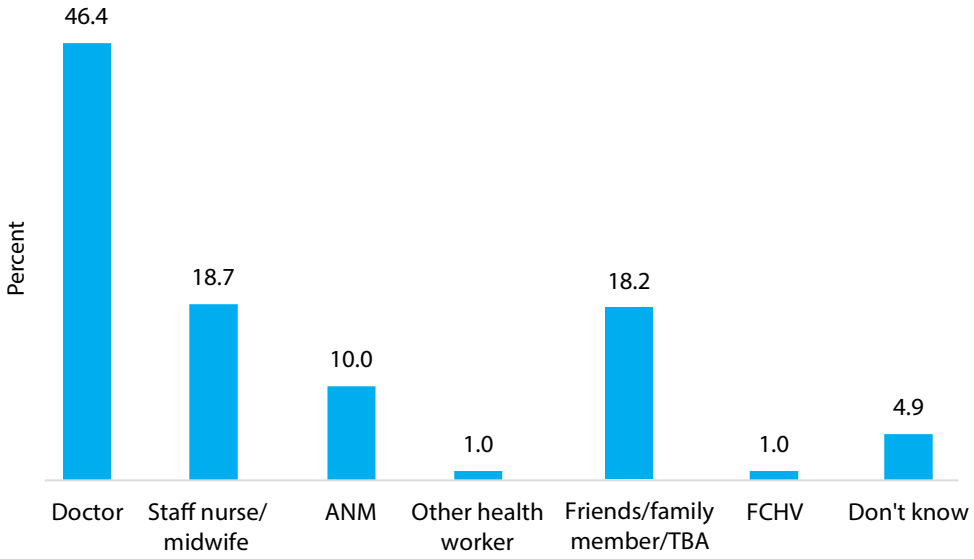
Figure 13: Distribution of deliveries by type of health facility (N=313)



Assistance during delivery

- Forty-six percent of the deliveries among the deceased women were assisted by a doctor and almost one-fifth by staff nurses/midwives (19 percent) (Figure 14).
- Almost one-fifth of deliveries were assisted by non-health personnel (friends, family members, FCHVs, traditional birth attendants).

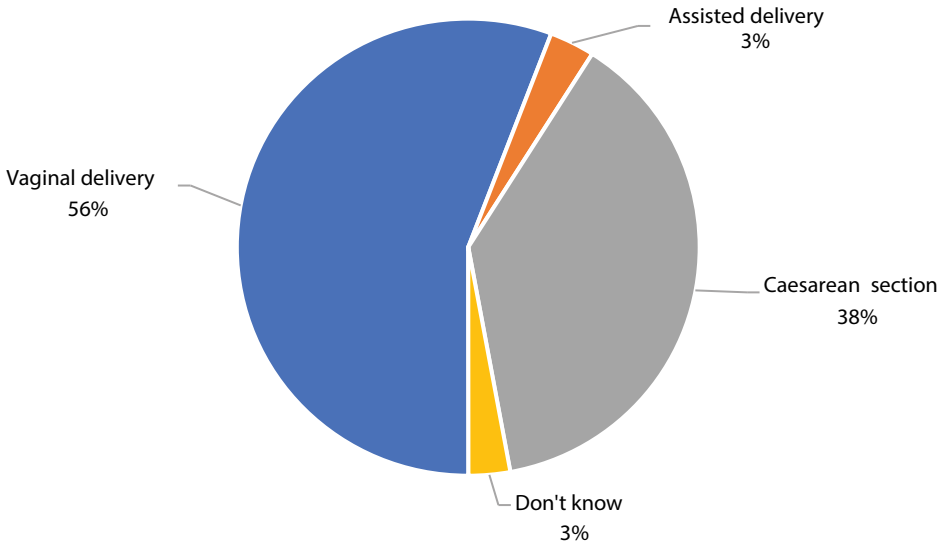
Figure 14: Assistance during delivery (N=412)



Mode of delivery

Fifty-six percent of the deceased women had vaginal delivery and 38 percent had undergone Caesarean section for the index pregnancy (Figure 15).

Figure 15: Mode of delivery (N=412)



Mode of delivery by place

- Sixty six percent of deliveries conducted in non-government hospital had undergone C-Section.

Table 8: Mode of delivery by type of hospital

Type of hospital	Vaginal delivery		Assisted delivery		Caesarean section		Don't know		Total	
	N	%	N	%	N	%	N	%	%	N
Government hospital	67	44.4	6	4	77	51	1	0.7	100	151
Non-government hospital	32	26.7	7	5.8	79	65.8	2	1.7	100	120

Complications during delivery

- A majority of women who had died during delivery and postpartum period had excessive bleeding (28 percent). The other common causes were shock (19 percent); fever (11 percent); fits, seizures, convulsions (10 percent); and retained placenta (8 percent) (Table 9).

Table 9: Complications during labour/delivery

Complications	Total (N=412)	
	N	%
Excessive bleeding	115	27.9
Unconsciousness (shock)	78	18.9
Fever	45	10.9
Fits, seizures, convulsions	42	10.2
Retained placenta	31	7.5
Prolonged labour	28	6.8
Abnormal lie or position	23	5.6
Problem during surgery	19	4.6
Big baby	18	4.4
Foul smelling vaginal discharge	16	3.9
Hand/foot/cord prolapse	11	2.7
Others	32	7.8

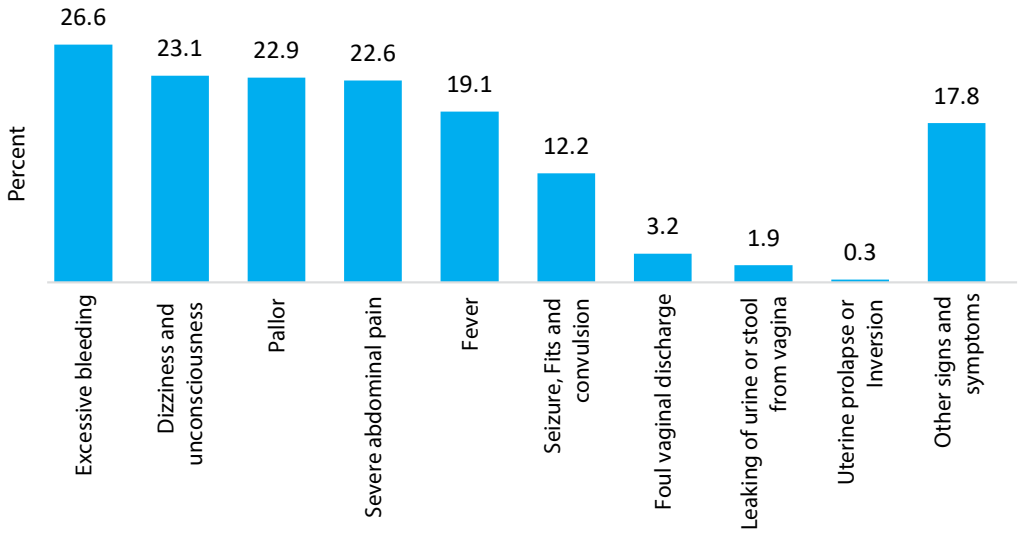
Percentage exceeds 100 due to multiple responses

Complications in the postpartum period

- Among women who had died during the postpartum period, about a quarter each had experienced excessive bleeding (27 percent), and dizziness and unconsciousness, pallor, and severe abdominal pain (23 percent each) (Figure 16).

3.2.7 Postpartum complications

Figure 16: Complications during postpartum period (N=376)



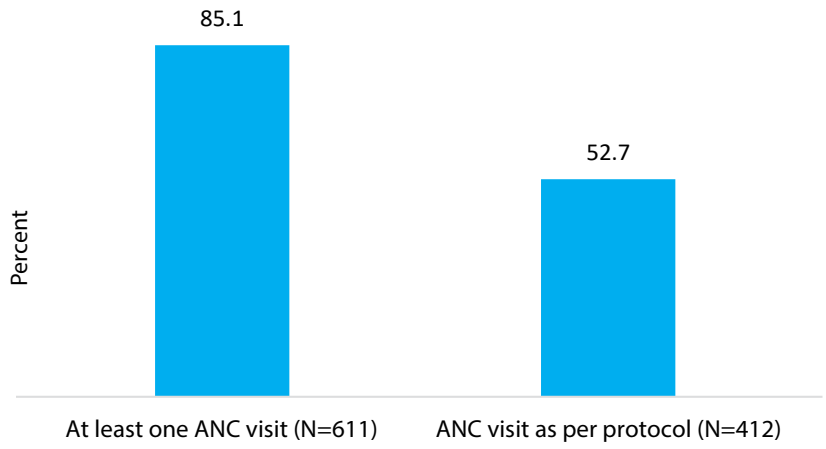
Percentage exceeds 100 due to multiple responses

3.2.8 Health service utilisation

Antenatal care (ANC)

- Among the women who died during pregnancy, delivery or postpartum period (611), 85 percent had at least one ANC visit for the index pregnancy (Figure 17).
- Among the women who died during delivery and postpartum period (412), only 53 percent had attended all four ANC visits, which is recommended by the safe motherhood service protocol. As per the previous protocol, first ANC visit occurred in the 4th month (12-16 weeks of gestation), second in the 6th month (20-24 weeks of gestation), third in the 8th month (28-32 weeks of gestation), and the fourth in the 9th month (36-40 weeks of gestation)*.

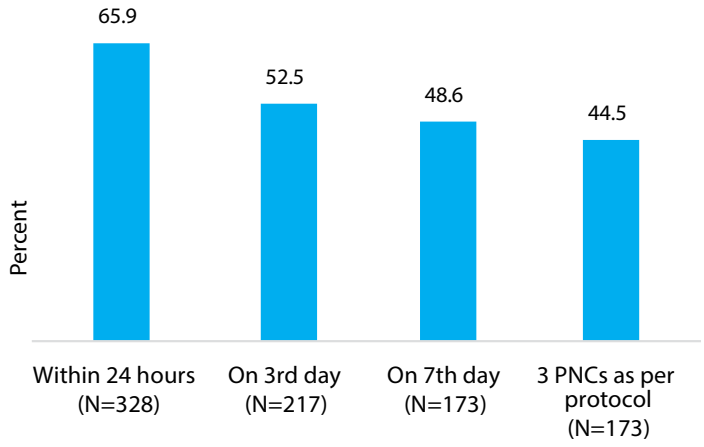
Figure 17: Antenatal visits



Postnatal care (PNC)

- Among the women who died after seven days but within 42 days of delivery, 45 percent had received all three PNC visits as per the protocol (Figure 18). The protocol includes three PNC visits: within 24 hours of birth, on the third day and then on the seventh day as per the previous protocol**.

Figure 18: PNC visits



* The protocols have recently been revised to adapt the WHO recommendations for eight ANC visits.
** Four PNC visits adapted recently.

Health service utilisation

- Eighty-three percent of the deceased women had sought treatment at a health facility or other places for the complications they had experienced before death (Table 10).
- Thirty-six percent had visited private hospitals for treatment before death, followed by government hospitals (35 percent) and basic health service centers (13 percent).
- Approximately 74 percent had received treatment from doctors for their last illness or health problem before death.

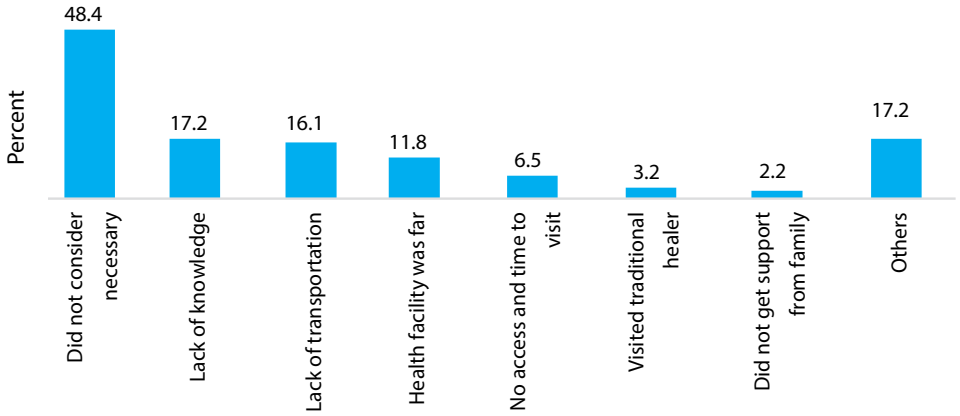
Table 10: Health service utilisation

	Pregnancy		Delivery		Postpartum		Total	
	N	%	N	%	N	%	N	%
Sought treatment at a health facility or other place before death								
Yes	145	72.9	25	69.4	335	89.1	505	82.7
No/Don't know	54	27.1	11	30.6	41	10.9	106	17.3
Total	**199**	**100**	**36**	**100**	**376**	**100**	**611**	**100**
Health facility visited for treatment for the last time before death								
Government hospital	45	31	10	40.0	121	36.1	176	34.9
NGO/Mission hospital	11	7.6	1	4.0	16	4.8	28	5.5
Private hospital	57	39.3	4	16.0	120	35.8	181	35.8
Basic Health Service Center	17	11.8	9	36.0	38	11.4	64	12.7
Traditional healers	6	4.1	0	0.0	5	1.5	11	2.2
Clinic/pharmacy	5	3.5	1	4	27	8.1	33	6.6
COVID-19 isolation center	1	0.7	0	0	0	0	1	0.2
HF/Hospital in India	1	0.7	0	0	2	0.6	3	0.6
Others	0	0	0	0	4	1.2	4	0.8
Don't know	2	1.4	0	0	2	0.6	4	0.8
Total	**145**	**100**	**25**	**100**	**335**	**100**	**505**	**100**
Health service providers who treated the women for the last time before death								
Doctor	110	75.9	12	48	252	75.2	374	74.1
Staff Nurse/Midwife/ANM	14	9.7	8	32	39	11.7	61	12.1
Other Health workers	7	4.8	3	12	28	8.4	38	7.5
Medical shop owner	0	0	0	0	2	0.6	2	0.4
Traditional faith healer/friends	7	4.8	0	0	5	1.5	12	2.4
Don't know	7	4.8	2	8	9	2.7	18	3.6
Total	**145**	**100**	**25**	**100**	**335**	**100**	**505**	**100**

Reasons for not seeking health care

- Seeking health services was considered unnecessary by nearly half of the deceased women.
- Other reasons included: lack of knowledge (17 percent), distance to health facility (12 percent), and lack of transportation (16 percent) (Figure 19).

Figure 19: Reasons for not seeking health care during the last illness before death (N= 93)



Percentage exceeds 100 due to multiple responses

3.2.9 Delays antecedent to death

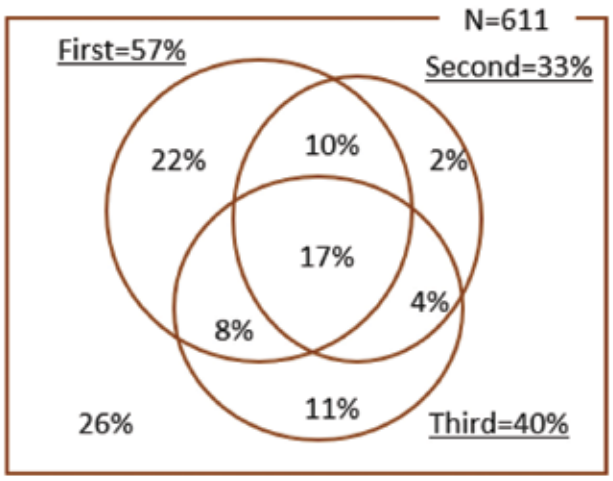
- With regards to the "Three Delays" model, a majority (74 percent) of the deceased women had experienced at least one type of delay, while 17 percent had experienced all three delays. The most common was the delay in seeking care (first delay – 57 percent), followed by delay in receiving care (third delay – 40 percent), and delay in reaching the facility for care (second delay – 33 percent) (Table 11).
- Twenty-six percent of the deceased women did not experience any delay antecedent to their death (Figure 20).

Table 11: Types of delays

Three delays	Pregnancy (N=199)		Delivery (N=36)		Postpartum (N=376)		Total (N=611)	
	N	%	N	%	N	%	N	%
First delay	127	63.8	28	77.8	191	50.8	346	56.6
Second delay	63	31.7	22	61.1	118	31.4	203	33.2
Third delay	56	28.1	19	52.8	167	44.4	242	39.6
Both first and second delays	55	27.6	20	55.6	88	23.4	163	26.7
Both second and third delays	33	16.6	12	33.3	84	22.3	129	21.1
Both first and third delays	46	23.1	12	33.3	95	25.3	153	25
All three delays	31	15.6	10	27.8	63	16.8	104	17

Three delays

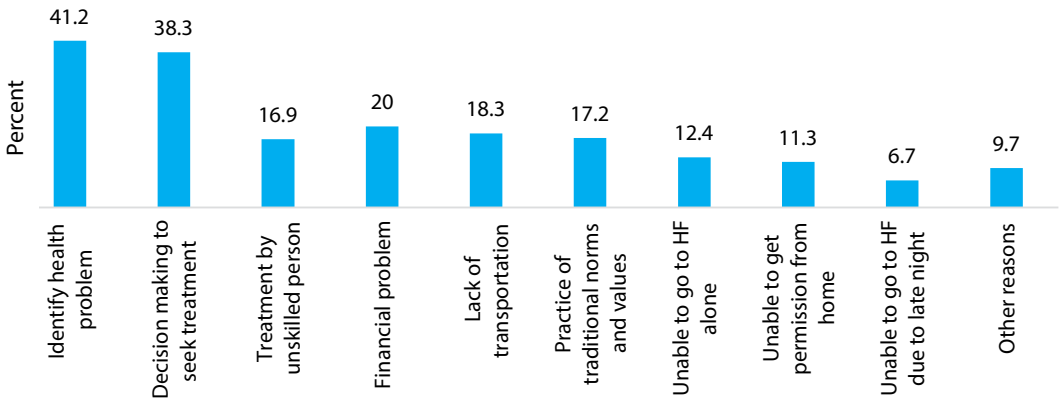
Figure 20: Venn diagram depicting three delays (N=611)



Delays in the community

- The most common causes of the first delay were identifying the health problem (41 percent), decision to seek care (38 percent), practice of traditional norms (17 percent), and treatment by people other than skilled health workers (17 percent) (Figure 21).
- Once the decision was made to seek care, there were delays in reaching the health facilities due to difficulties in arranging finances (20 percent), delays in arranging transportation (18 percent), absence of companions for travelling to the health facilities (12 percent), unable to receive permission from home (11 percent), and inability to travel at night (seven percent).

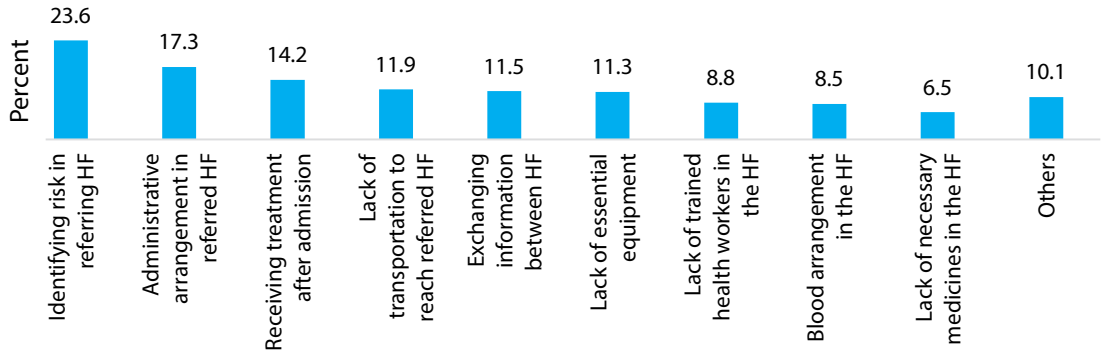
Figure 21: Perception of delays in community (N=611)



Delays in the health facility

- The most common reasons for delays at health facilities were identifying risks for timely referral from the referring facilities (24 percent), administrative delays in the referred facilities (17 percent), arranging transportation from the referring health facilities to reach the referred facilities (12 percent), and inadequate communication between health facilities (11 percent) (Figure 22).
- The respondents also reported delays in receiving treatment after admission (14 percent), lack of essential equipment (11 percent), shortfall of trained health workers (nine percent), delays in blood arranging (nine percent), and shortage of medicines (seven percent).

Figure 22: Perception of delays in health facility (N=611)



3.2.10 Classification of causes of maternal deaths

- Among the causes of deaths assigned to maternal deaths (N=611), 68 percent were direct, and 32 percent were due to non-obstetric complications (indirect maternal deaths) (Table 12).
- The leading direct cause of maternal deaths was obstetric haemorrhage (26 percent). Among the deaths attributed to obstetric haemorrhage, the majority (92 percent) had postpartum haemorrhage and eight percent had antepartum haemorrhage.
- The second leading direct cause of maternal death was hypertensive disorders in pregnancy, childbirth, and the puerperium (12 percent).
- Six percent of the women had died due to other obstetric complications.
- Likewise, six percent of the women were reported to have died due to intentional self-harm, which has been coded as a direct maternal death without an obstetric code. Most of these deaths occurred during pregnancy.
- Seven percent of the women had died due to pregnancy-related infection mostly during the postpartum period, five percent due to pregnancy with abortive outcomes, and one percent due to unanticipated complications related to anesthesia.
- The causes of maternal deaths by province are given in Annex 3.4.

Table 12: Causes of maternal deaths

Causes of maternal deaths	Pregnancy (N=199)		Delivery (N=36)		Postpartum (N=376)		Total (N=611)	
	N	%	N	%	N	%	N	%
Group 1: Pregnancy with abortive outcome	29	14.6	0	0	0	0	29	4.7
Group 2: Hypertensive disorders in pregnancy, childbirth and the puerperium	27	13.6	0	0	45	12	72	11.8
Group 3: Obstetric Haemorrhage	12	6	28	77.8	118	31.4	158	25.9
Group 4 Pregnancy-related infection	2	1	0	0	42	11.2	44	7.2
Group 5.1: Other obstetric complications	2	1	3	8.3	34	9	39	6.4
Group 5.2: Direct death without an obstetric code	34	17.1	0	0	4	1.1	38	6.2
Group 6: Unanticipated complications of management	0	0	3	8.3	4	1.1	7	1.1
Group 7: Non-obstetric complications	79	39.7	2	5.6	116	30.9	197	32.2
Group 8: Unknown/undetermined	14	7	0	0	13	3.5	27	4.4
Total	**199**	**100**	**36**	**100**	**376**	**100**	**611**	**100**

Note: Cause of maternal deaths were assigned using the WHO ICD MM classification following the ICD-10 code.

3.3 Levels of mortality

3.3.1 Levels of pregnancy-related mortality

- Five percent of the deaths of women of reproductive age (15-49 years) were pregnancy-related (Table 13). There were variations in pregnancy-related deaths among provinces, with 3 percent in the Bagmati Province and 9 percent in the Karnali Province.
- The overall ratio of pregnancy-related deaths is 158 per 100,000 live births. This ranged from 102 per 100,000 live births in Bagmati Province to 212 per 100,000 live births in Lumbini Province.

Table 13: Levels of pregnancy-related mortality by province

Province	Number of deaths of women of reproductive age (15-49 years)	Number of live births*	Number of pregnancy-related deaths	% of WRA deaths that are pregnancy related deaths	Ratio of pregnancy-related deaths (per 100000 live births)
Pradesh 1	2619	64190	104	4.0	162
Madhesh	2361	96557	146	6.2	151
Bagmati	2413	70380	72	3.0	102
Gandaki	1083	27940	46	4.2	165
Lumbini	2613	76243	162	6.2	212
Karnali	657	31323	59	9.0	188
Sudurpaschim	1230	46302	64	5.2	138
Nepal	12976	412935	653	5.0	158

* Number of live births was obtained from Census 2021

3.3.2: Levels of maternal mortality

- Maternal deaths accounted for five percent of all the deaths among women of reproductive age (15-49 years) (Table 14). The percentage contribution ranges from 3 percent in Bagmati Province to 8 percent in Karnali Province.
- The maternal mortality ratio is 151 per 100,000 live births in Nepal. This ranges from 98 per 100,000 live births in Bagmati Province to 207 per 100,000 live births in Lumbini Province.

Table 14: Levels of maternal mortality by province

Province	Number of deaths of women of reproductive age (15-49 years)	Number of pregnancy related deaths	Number of maternal deaths	Number of live births*	% of WRA deaths that are pregnancy related deaths	% of WRA deaths that are maternal	% of pregnancy related deaths that are maternal	MMR (per 100,000 live births)
Pradesh 1	2619	104	101	64190	4.0	3.9	97.1	157
Madhesh	2361	146	135	96557	6.2	5.7	92.5	140
Bagmati	2413	72	69	70380	3.0	2.9	95.8	98
Gandaki	1083	46	45	27940	4.2	4.2	97.8	161
Lumbini	2613	162	158	76243	6.2	6.0	97.5	207
Karnali	657	59	54	31323	9.0	8.2	91.5	172
Sudurpaschim	1230	64	60	46302	5.2	4.9	93.8	130
Nepal	12976	653	622	412935	5.0	4.8	95.3	151

* Number of live births was obtained from Census 2021

- The proportion of deaths that are maternal among the deaths of women of reproductive age varied by reproductive age group (Table 15). Maternal deaths comprised a higher proportion of deaths to WRA in their twenties.

Table 15: Proportion of maternal deaths among deaths of women of reproductive age by reproductive age-group

Age group	Number of deaths among women of reproductive age (15-49 yrs)	Number of pregnancy-related deaths	Number of maternal deaths	Percent of maternal deaths
15 - 19	1456	67	63	4.3
20 - 24	1589	193	183	11.5
25 - 29	1528	187	176	11.5
30 - 34	1494	111	109	7.3
35 +	6909	95	91	1.3
Nepal	**12976**	**653**	**622**	**4.8**

CHAPTER

4 CONCLUSION

The Nepal Maternal Mortality Study (NMMS) following the National Population and Housing Census 2021 is a landmark, joint initiative undertaken by the Ministry of Health and Population and the National Statistics Office to estimate maternal mortality ratios (MMR) at the federal and provincial levels and set the ground for the MMR estimation at local levels. More importantly, this study identifies the causes and locations of maternal death in Nepal. This study is notable for its large population coverage, rigorous methodology, and stakeholder collaboration.

The study estimated the MMR of the country at 151 per 100,000 live births. This calculation was done using the Census data on live births and maternal deaths. The study also uncovered inequalities in MMR between different provinces in the country. For example, Lumbini and Karnali provinces had higher MMRs of 207 and 172, respectively, while Bagmati province had the lowest MMR at 98 per 100,000 live births. Similarly, the pregnancy-related mortality ratio was 158 per 100,000 live births.

The study has found that many maternal deaths in Nepal are due to preventable causes such as haemorrhage and hypertensive disorders during pregnancy. However, a significant number of deaths are also caused by non-obstetric complications, such as intentional self-harm.

The NMMS 2021 serves as an initiative to strengthen community-based maternal death surveillance and response in the country. For instance, in this study, local-level health workers were trained in screening for pregnancy-related deaths and conducting verbal autopsies (collecting information about the circumstances of death through interviews with family members and other sources) to determine the cause of death. This approach played a crucial role in identifying and responding to maternal deaths. Moreover, collecting this information and using it to identify trends and risk factors extends opportunities to develop locally tailored targeted interventions to address causes of maternal mortality across the three tiers of government.

The study findings can be used at all levels of government and in communities to design targeted interventions to increase the coverage of quality maternal health services and prevent maternal deaths from preventable causes, paving the way for the country to achieve the Sustainable Development Goals.

The study further highlights the importance of strengthening measures that can improve the quality of maternal health services in health facilities. Similarly, a need is felt to strengthen health systems' capacity to include focused interventions for improving referral mechanisms and emergency transportation, as well as early screening for danger signs and addressing the causes of deaths at all levels of care.

This study sets a precedent for conducting nationwide censuses of maternal deaths in future censuses to estimate the MMR and identify the causes of death periodically. This will provide a strong evidence base to inform investment and interventions to improve maternal health in Nepal.

Overall, the study findings clearly showed the need for continued efforts to address the issue of maternal mortality and improve the quality of care for pregnant and postpartum women in Nepal.

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ANNEXES

Annex 1: Composition of NMMS 2021 steering and technical committees

a. Federal steering and technical working committee

Federal steering committee:	
Dr. Sangeeta Kaushal Mishra, Additional Secretary, MoHP	Chairperson
Mr. Indra Mani Pokharel, Joint Secretary, Population Management Division, MoHP	Member Secretary
Mr. Nebin Lal Shrestha, Senior Joint Secretary, National Statistics Office (NSO)	Member
Dr. Krishna Prasad Paudel, Chief, Policy, Planning and Monitoring Division, MoHP	Member
Dr. Sanjay Kumar Thakur, Chief, Health Coordination Division, MoHP	Member
Dr. Madan Kumar Upadhyay, Chief, Quality Standards and Regulations Division, MoHP	Member
Dr. Bibek Kumar Lal, Chief, Family Welfare Division, DoHS	Member
Dr. Pradip Gyanwali, Member Secretary, NHRC	Member
Mr. Nur Pant, Health Advisor, USAID and Chair, Health Development Partners	Member
Dr. Rajesh Sambhajirao Pandav,WHO Representative, WHO Country Office Nepal	Member
Dr. Budhi Setiwan, Chief Health, UNICEF Nepal	Member
Mr. Nicholas McTurk, Census Coordinator, UNFPA Nepal	Member
Dr. Deepak Kumar Karki, Health Advisor, British Embassy Kathmandu	Member
Mr. Tirtha Sinha, Senior Program Officer, GIZ Nepal	Member

Federal technical working committee	
Mr. Indramani Pokharel, Joint Secretary, Population Management Division, MoHP	Chairperson
Mr. Kapil Prasad Timalsena, Under Secretary, Population Management and Information Section, MoHP	Member Secretary
Ms. Yeshoda Aryal, Chief Public Health Administrator, MoHP	Member
Mr. Dhundi Raj Lamichhane, Director, Population Section, National Statistics Office (NSO)	Member
Dr. Guna Nidhi Sharma, Senior Health Administrator, Policy, Planning and Monitoring Division, MoHP	Member
Dr. Gauri Pradhan Shrestha, Section Chief, Maternal and Newborn Health Section, DoHS	Member
Dr. Meghnath Dhimal, Chief, Research Section, NHRC	Member
Mr. Paban Kumar Ghimire, National Professional Officer-HIS, WHO Country Office Nepal	Member
Dr. Pooja Pradhan, National Professional Officer-FGL, WHO Country Office Nepal	Member
Mr. Nicholas McTurk, Census Coordinator UNFPA Nepal	Member
Ms. Chahana Singh Rana, Health Program Officer, UNICEF Nepal	Member
Ms. Sabita Tuladhar, Strategic Information and Research Advisor, USAID Nepal	Member
Dr. Deepak Kumar Karki, Health Advisor, British Embassy Kathmandu	Member
Mr. Tirtha Sinha, Senior Program Officer, GIZ Nepal	Member
Mr. Pradeep Poudel, Strategic Advisor, NHSSP	Member

b. Provincial steering and district technical working committee

Provincial Technical Working Committee:	
Director, Provincial Health (Service) Directorate	Chairperson
Focal Person, Maternal and Newborn Health, Health Directorate	Member Secretary
Representative (Health), Ministry of Social Development/Health and Population	Member
Subject Specialist, Maternal Health-One Person	Member
Representative, Health Development Partners (If available)	Member

District technical working committee:	
Chief, Health (Service) Office	Chairperson
Focal Person, Maternal and Newborn Health, Health Office	Member Secretary
Representative, District Coordination Committee	Member
Chief, Respective Branch Statistics Office/District Population Office	Member
Subject Specialist, Maternal Health-One Person	Member
Representative, Health Development Partners (If available)	Member

Annex 2: Study tools

Annex 2.1: Mortality related questionnaire in Census 2021

Death related information in the Census 2021					
14. Has anyone in your household died in the past 12 months (365 days)? 1. Yes 2. No (If No, skip to Question No. 16)					
15. Please give details of the deceased person					
SN	Name and surname of the deceased person	Sex M=1 F=2	Age at the time of death (completed years)	What was the main cause of death? (see codes below*)	If the deceased was a woman aged 15 to 49 years, what was her condition when she died? Pregnant = 1 Childbirth = 2 Postnatal (within 6 weeks after childbirth) = 3 Other = 4
(1)	(2)	(3)	(4)	(5)	(6)
1					
2					
3					
*Reason of death: Communicable disease = 1; Non-communicable disease = 2; Vehicle accident = 3; Other accident = 4; Reproductive/childbirth complications = 5; Homicide = 6; Suicide = 7; Natural disaster = 8; Other = 9					

Annex 2.2: Death notification form

Central Bureau of Statistics
National Population Census 2078
(Annex 1 in accordance to S.N. 2 of MOU between MOHP and CBS)

Maternal death notification form

We are saddened to hear about the demise of your family member. Past studies have shown that maternal mortality rate is high in Nepal. Information obtained from the analysis of data based on the number, location, and causes of deaths among women aged 15 to 49 years in the last 365 days will help the Government of Nepal to develop effective programs to prevent maternal deaths by improving safe maternity services.

The Ministry of Health and Population and the Central Bureau of Statistics have planned to conduct further studies in this census using the detailed information received from your family. All information will be kept confidential in accordance with the Statistics Act, 2015 and will only be used for studies on safe maternity service reform. On behalf of the Ministry of Health and Population and the Central Bureau of Statistics, we kindly request you to provide information in this regard and support the study on Safe Maternity Services.

Area of Census	Province	District	Rural Municipality / Municipality	Ward no.	Census Area no.	Village/Tole

S.N.	Full name of Deceased Woman (Only Deceased Woman of Age 15-49 years)	Age at death (Years)	Name of the Head of Family	Census House S.N.	Census Family S.N.	Code for the condition of death as written in Q. n. 15, column 6 of details of death (code 1, 2, 3 or 4)	For consent regarding further study of woman's death		
							Name of Head of Family/ Respondent	Signature/ Finger print	Contact Number

Total Female Death	

Name of Enumerator: _____ Signature: _____ Date: _____ Contact No.: _____

Name of Supervisor: _____ Signature: _____ Date: _____ Contact No.: _____

Annex 2.3: Verbal autopsy form

Government of Nepal
Ministry of Health and Population
Maternal Mortality Study based on National Population Census 2078

Verbal autopsy form

Section 1: Introductory Information

Q. N.	Information of Deceased Woman (Copy from Notification form)	
101	Full name of Deceased Woman	
102	Full name of Deceased's Husband	
103	Full name of Deceased's Head of family	
Usual Place of Residence of Deceased Woman		
104	Province	
105	District	
106	Municipality/ Rural municipality	
107	Ward no.	
108	Village/ Tole	
109	Census House No.	
110	Census Family No.	
111	Census Area No.	
112	Code for the condition of death (**Copy from Notification form**)	
Geographical location (if possible)		
113	Latitude (Degree, Decimal) - North	
114	Longitude (Degree, Decimal) - East	

Note: Obtain information from various people to select appropriate respondent for interview. Select respondent based on following criteria.

- A person who can inform circumstances of death, condition during death and the treatment of a deceased woman.
- A person who was with deceased at the time of death
- A person who has close relation with deceased woman
- A person who is available for the interview

Section 2: Information related to Respondent

Q. N.	Question	Responses
201	Respondent's Full Name	
202	Respondent's Contact number	
203	Contact number of other family member	

S. N.	Question	Responses
204	What is your relationship with deceased female	Husband ..... 1 Father/Mother /In-laws ..... 2 Son/Daughter ..... 3 Family member ..... 4 Health care provider ..... 5 Others (specify)_____96
205	Were you with her (deceased) when she died?	Yes ..... 1 No..... 2
206	*[Note: Make sure that she (deceased) died during pregnancy, childbirth, post natal period or within 42 days of abortion.* If she died during above mentioned condition. ↓	If she died in other than above mentioned condition, clearly mention about the condition of death and end the interview.

Informed consent

Namaste, my name is..... I have come from..... municipality. We are saddened to hear about the demise of your family member. We will get the opportunity to learn from this incident and the suggestions provided by you may prevent such incidents in the future. The information provided by you will help the Government of Nepal to improve safe maternity care and prevent women from premature death. This interview will take around one hour. The information provided will be kept confidential and will only be used to improve maternal health care. There will be no physical or mental harm on participating in this interview. It's your decision whether to participate or to decline to participate in this interview. If you feel uncomfortable or do not want to answer a question, you can refuse and also you are free to end this interview at any time as you wish. However, I request you to answer all the questions correctly and support this work related to health care reform.

206.1 Do you want to ask anything regarding this study?

Yes .....1 (if respondent asks any question, listen to them and answer them appropriately.)

No.....2

206.2 Do you want to enroll in this interview?

Yes 1

No .....2 (End the interview)

Section 3: Detailed information on death of female (case study)

Please tell a short history of what happened prior to death of woman.

[Note: Allow respondent to share the information as his/her wish and write a short summary describing the circumstances at the time of death. It is important to understand the underlying social, economic, and health problems to understand the primary and contributory clinical causes of death. Add an extra sheet if required and attach along this form.]

▪ If she was ill, when and how it was discovered? ▪ What were the symptoms? ▪ What were the health problems from illness to death? ▪ If decision for treatment was made, how much time did it take to make the decision? ▪ If decision for treatment was made, who made the decision and why? ▪ Where was it decided to get the treatment and why? ▪ What preparations were done for treatment? (Eg. transport, money, friends etc.)	▪ What measures were taken at home and who did it? ▪ How much time did it take to reach the health facility? ▪ What happened after reaching health facility? ▪ How long did it take before the health worker treats the patient? ▪ Who treated and what were those treatments? ▪ How much did it cost? ▪ What other problems did you face? ▪ If she was not treated, why?

Section 4: Personal information of deceased woman

Q. N.	Question	Responses		
401	*[Note: Ask respondent at what stage of pregnancy, did the deceased die and encircle the appropriate answer.]* Did she (deceased) die.....?	Yes	No	Don't know
401.1	During pregnancy (Antenatal period)?	1 (Go to 402)	2	98
401.2	During labor (Intranatal period)?	1 (Go to 402)	2	98
401.3	Within 42 days of labor (Postnatal period)?	1 (Go to 402)	2	98
401.4	During spontaneous abortion/induced abortion or within 42 days of induced abortion?	1	2	98
402	When did she (deceased) die?	Date ☐☐ Month ☐☐ Year ☐☐☐☐ Don't know 98		
403	What was the age of deceased when she died? *(completed years)*	☐☐ years		
404	What was the marital status of deceased at the time of her death?	Unmarried .....1 Married .....2 Widow .....3 Divorced .....4 Separated .....5 Living together .....6 Don't know 98		
405	What was the educational qualification of deceased woman? *(Ask completed class)*	Cannot read and write.....1 Can read and write .....2 Completed class _____ Don't know 98		
406	Deceased's permanent residence	District ..... Local level ..... Ward no. ☐☐ Village/tole.....		
407	Employment status of deceased (within 12 months before her death)	Employed .....1 Unemployed .....2 Don't know 98		
408	What was her (deceased) caste/ethnicity? *[Note: mention caste/ethnicity and code based on list of castes/ethnicities given along with this form.]*	Caste/ethnicity: _____ Code ☐☐☐ Others (specify)_____		

S. N.	Question	Responses
409	Where did she (deceased) die? ***[If she (deceased) died in the health facility, specify the name and address of the health facility.]*** _____	Health Post.....1 Primary Health Care Center .....2 Government Hospital .....3 Private Hospital.....4 NGO/ Mission Hospital .....5 Home .....6 While traveling from home to health facility .....7 While traveling from one health facility to another.....8 Others (Specify)_____96 Don't Know 98

Now I am going to ask about the health status of the deceased before pregnancy.

410	***[Note: Ask respondent one by one about following problems of deceased before pregnancy and encircle the appropriate answer.]*** **Before her pregnancy, was she diagnosed with .....**	Yes	No	Don't know	Refused to answer
410.1	Diabetes?	1	2	98	99
410.2	High blood pressure?	1	2	98	99
410.3	Heart disease?	1	2	98	99
410.4	Thyroid disease?	1	2	98	99
410.5	Any other chronic disease? (if yes, mention) _____	1	2	98	99
410.6	Did she (deceased) undergo any surgery (requiring anesthesia) in the past 12 months before death?	1	2	98	99
410.7	If yes, mention type and date of surgery. _____	Date of operation Date ☐☐ Month ☐☐ Year ☐☐☐☐			

411	***[Note: Check Q.N. 401]*** If died during pregnancy (If code 1 is encircled in Q.N. 401.1) → If died in other condition (If code 1 is encircled in Q.N. 401.2 or 401.3 or 401.4 then) → (Go to section 5)	
412	If woman died during pregnancy (antenatal period), what was her duration of pregnancy at the time of death? (mention completed month)	☐☐ Month Don't know 98

Section 5: Information related to pregnancy and complications

Q.N.	Question	Responses			
		Yes	No	Don't know	Refused to answer
501	Was her menstrual cycle regular?	1	2	98	99
502	Gravida at the time of death?			98	99
503	Was this pregnancy planned?	1	2	98	99
504	Did she have a pregnancy test during recent pregnancy?	1	2	98	99
505	Did she ever have a miscarriage or abortion? *(if yes, mention the number of miscarriages/abortions in the given box, if no, write '0' as in the example.)* *e.g.* 0 0	☐☐		98	99
506	How many live births did she (deceased) have? *(if yes, mention the number of live birth in the given box, if no, write '0' as in the example.) e.g.* 0 0	☐☐		98	99
507	How many stillbirths did she (deceased) have? *(if yes, mention the number of stillbirth in the given box, if no, write '0' as in the example.)e.g.* 0 0	☐☐		98	99
508	Did she (deceased) ever give birth through cesarean section?	1	2	98	99
509	In her recent pregnancy, did she (deceased) have her antenatal check-up from doctor, nurse or other health worker?	1	2 (Go to 512)	98	99
510	How many times she (deceased) had her antenatal checkup?	☐☐		98	99
511	*[Note: Ask the following questions one by one to find out if she (deceased) had her antenatal checkup according to ANC protocol and encircle the appropriate answer.]* Did she have her.....				
511.1	Antenatal check up on 4th month?	1	2	98	99
511.2	Antenatal check up on 6th month?	1	2	98	99
511.3	Antenatal check up on 8th month?	1	2	98	99
511.4	Antenatal check up on 9th month?	1	2	98	99

512	*[Note: Ask if the deceased had the following problems one by one during her antenatal period and encircle the appropriate answer. If answer is "yes" mention the number of days for which the problem occurred.]* In antenatal period of her recent pregnancy, did she have.....	Yes	No	Don't know	Refused to answer	Duration (days)		
512.1	Foul vaginal discharge?	1	2	98	99			
512.2	Fever?	1	2	98	99			
512.3	High blood pressure?	1	2	98	99			
512.4	Seizures, fits or convulsion?	1	2	98	99			
512.5	Blurred vision, headache, dizziness and upper epigastric pain?	1	2	98	99			
512.6	Vaginal bleeding?	1	2	98	99			
512.7	Lower abdominal pain?	1	2	98	99			
512.8	Ectopic pregnancy?	1	2	98	99			
512.9	Increased or no fetal movement?	1	2	98	99			
512.10	Jaundice?	1	2	98	99			
512.11	Malaria?	1	2	98	99			
512.12	Tuberculosis?	1	2	98	99			
512.13	Diabetes mellitus/Sugar?	1	2	98	99			
512.14	Cardiac disorders?	1	2	98	99			
512.15	Thyroid disorders?	1	2	98	99			
512.16	Anaemia?	1	2	98	99			
512.17	Infectious epidemic diseases (pandemic diseases)?	1	2	98	99			
512.18	Others (specify) _____	1	2	98	99			

Section 6: Information related to abortion

Q.N.	Question	Responses
	[Note: Check Q.N. 401]	
	If death is due to miscarriage or abortion or within 42 days of abortion (If code 1 is encircled in question 401.4)	If death in other condition (If code 1 is circled in Q.N. 401.1, 401.2, 401.3) → (Go to section 7)
601	If she (deceased) died during an abortion or after having an abortion, where did she (deceased) have her abortion? ***[If treatment sought from the Health facility specify the name and address of the Health facility.]*** _____	Health Post.....1 Primary Health Care Center.....2 Government Hospital.....3 Private Hospital.....4 NGO and Mission Hospital.....5 Clinic.....6 At home.....7 Traditional healers.....8 Pharmacy.....9 Others (Specify).....96 Don't know.....98
602	Method of abortion	Use of Oral medicine.....1 Surgical method (MVA, D &C, Hysterotomy).....2 Use of herbal products.....3 Spontaneous.....4 Others (Specify).....96 Don't know.....98

Q. N.	Question	Yes	No	Don't know	Refused to answer
603	Did she (deceased) die while in the process of spontaneous or induced abortion?	1	2	98	99
604	Did she (deceased) die within 42 days of spontaneous or induced abortion?	1	2	98	99
605	Did she (deceased) have a successful abortion?	1	2	98	99
606	Did she (deceased) have excessive bleeding after abortion?	1	2	98	99
607	Did she (deceased) had fever within 42 days of abortion?	1	2	98	99
608	Did she (deceased) have foul vaginal discharge within 42 days of abortion?	1	2	98	99
609	Did she (deceased) have severe abdominal pain after abortion?	1	2	98	99
610	Did she (deceased) have any injury, perforation or rupture of uterus during the abortion?	1	2	98	99

Section 7: Information related to intrapartum period (labor)

Q. N.	Question	Responses
	[Note: Check Q.N. 401] If death occurred during delivery or within 42 days of delivery (If code 1 is encircled in Q.N. 401.2, 401.3) ↓ If death in other condition (If code 1 is encircled in Q.N. 401.1, 401.4) → (Go to section 9)	
701	How long after the onset of labor pain was the baby delivered?	☐☐ Hours Don't Know 98
702	Where did she (deceased) deliver her baby? ***[If treatments seek from the Health facility, specify the name and address of the Health facility.]*** _____	Health Post ..... 1 Primary Health Care Centre ..... 2 Government Hospital ..... 3 Private Hospital ..... 4 NGO and Mission Hospital ..... 5 At home ..... 6 While traveling from home to health facility ..... 7 While traveling from one health facility to another ..... 8 Others (Specify) ..... 96 Don't Know 98
703	Who conducted the delivery? (Select only one answer)	Doctor ..... 1 Staff Nurse/Midwife ..... 2 ANM ..... 3 Other health workers ..... 4 Female Community Health Volunteers ..... 5 Midwife /Friends ..... 6 Others (Specify) ..... 96 Don't Know 98
704	Mode of delivery	Normal vaginal delivery _____ 1 Assisted vaginal delivery (vacuum, forceps) _____ 2 Caesarean section _____ 3 Others (Specify) _____ 96 Don't know _____ 98

705	*[Note: Ask one by one about the following problems during delivery and select the appropriate answers. If the answer is yes, mention the number of hours for which the problem occurred.]* During the delivery period did she have……..	Yes	No	Don't know	Refused to answer	Duration in Hours	
705.1	Fever?	1	2	98	99		
705.2	Foul vaginal discharge?	1	2	98	99		
705.3	Fits, seizures, convulsions	1	2	98	99		
705.4	Prolonged labor for more than 24 hours	1	2	98	99		
705.5	Retained placenta?	1	2	98	99		
705.6	Excessive bleeding from the vagina?	1	2	98	99		
705.7	Abnormal condition (breech, transverse, oblique etc)?	1	2	98	99		
705.8	Was the baby too big?	1	2	98	99		
705.9	Hand/foot/cord prolapse?	1	2	98	99		
705.10	Unconsciousness?	1	2	98	99		
705.11	During operation, was there any problem associated with anesthesia?	1	2	98	99		
705.12	Others (specify) _____	1	2	98	99		

Section 8: Information related to postpartum period

Q. N.	Question	Responses						
	[Note: Check Q.N. 401] If death occurred within 42 days of delivery (If code 1 is encircled in Q.N. 401.3) ↓ If death in other condition (If code 1 is encircled in Q.N. 401.1, 401.2, 401.4) → (Go to section 9)							
801	How many days after delivery she (deceased) died?	☐☐ Days Don't know ..... 98 Refused to answer..... 99						
802	*[Note: Ask about the following post-delivery problems one by one and select the appropriate answers. If the answer to a problem is "yes", mention the number of days for which the problem occurred.]* Did she (deceased) have the following sign and symptoms after expulsion of placenta……	Yes	No	Don't know	Refused to answer	Duration in Days		
802.1	Excessive Bleeding?	1	2	98	99			
802.2	Foul vaginal discharge?	1	2	98	99			
802.3	Pallor in fingernails, eyelid, and gingiva?	1	2	98	99			
802.4	Severe abdominal pain?	1	2	98	99			
802.5	Dizziness and fainting?	1	2	98	99			
802.6	Seizure, Fits and convulsion?	1	2	98	99			
802.7	Fever?	1	2	98	99			
802.8	Leaking of urine/ stool from vagina?	1	2	98	99			
802.9	Uterine prolapse or Inversion of the uterus?	1	2	98	99			
802.10	Others (Specify) _____	1	2	98	99			

803	*[Note: Ask the following questions one by one regarding whether she has undergone three post natal check-ups (PNC) as per the protocol and encircle the appropriate answers.]* Did she (deceased) have.....	Yes	No	Don't know	Refused to answer
803.1	Post natal check-up within 24 hours?	1	2	98	99
803.2	Post natal check-up on the 3rd day after delivery?	1	2	98	99
803.3	Post natal check-up on the 7th day after delivery?	1	2	98	99

Section 9: Information related to health service utilization

[Note: Check Q.N. 401. Ask this section regardless of death in any condition]

Q. N.	Question	Responses
901	Did she (deceased) seek any treatment at a health facility or other place before death?	Yes .....1 No .....2 (Go to 904) Don't know ..... 98 (Go to Section 10)
902	If she (deceased) had been treated at a health facility or other place before her death, where was she treated? ***[If treatment sought from a Health facility, specify the name and address of the Health facility.]*** _____	Health Post.....1 Primary Health Care Centre. .....2 Government Hospital .....3 Private Hospital .....4 NGO and Mission hospital.....5 Clinic.....6 At home .....7 Traditional healers.....8 Medical shop.....9 Others (Specify) _____ 96 Don't know 98
903	If she (deceased) had been treated at a health facility or other places who treated her?	Doctor .....1 Staff Nurse/ Midwife.....2 ANM.....3 Other Health workers .....4 Midwife/Friends.....5 Female Community Health Volunteers .....6 Others (Specify) _____ 96 Don't know 98
904	If treatment was not seek why did not she (deceased) seek treatment? (Multiple Response)	Didn't consider it necessary.....1 Lack of awareness .....2 Distant health facility.....3 Unable to meet the expenses.....4 Lack of transportation facilities.....5 Others (Specify) _____ 96 Don't know 98

Section 10: Information regarding causes of death

Q.N.	Question	Yes	No	Don't know	Refused to answer
1001	**[Note: Since the three delays may be due to various reasons, ask one by one and encircle the appropriate answer.]** **In your opinion about her (deceased) treatment, was there .....**				
1001.1	Delay in identifying a health problem?	1	2	98	99
1001.2	Delay in decision making to seek treatment?	1	2	98	99
1001.3	Delay due to treatment by other than skilled or trained health workers?	1	2	98	99
1001.4	Delay due to lack of money or its arrangement /financial problems?	1	2	98	99
1001.5	Delay due to lack of transportation or its arrangement?	1	2	98	99
1001.6	Delay due to traditional norms and values?	1	2	98	99
1001.7	Delay as she could not visit the health facility alone?	1	2	98	99
1001.8	Delay to get permission from home for treatment?	1	2	98	99
1001.9	Delay as she could not visit health facility at late night?	1	2	98	99
1001.10	Others (Specify) _____	.....			
1002	**Now I would like to ask some questions related to the health facility regarding the treatment of the patient.** **In your opinion regarding her (deceased) treatment was there.....**				
1002.1	Delay in reaching referred health facility due to lack of transportation?	1	2	98	99
1002.2	Delay in exchanging information between health institutions?	1	2	98	99
1002.3	Delay in receiving treatment after admission in health facility?	1	2	98	99
1002.4	Delay due to incompetence of the previous health facility?	1	2	98	99
1002.5	Delay due to managerial incompetence of the referred health facility?	1	2	98	99
1002.6	Delay due to lack of trained health workers in the health facility?	1	2	98	99
1002.7	Delay in blood arrangement in the health facility?	1	2	98	99
1002.8	Delay due to lack of necessary medicines in the health facility?	1	2	98	99
1002.9	Delay due to lack of essential equipment in the health facility?	1	2	98	99
1002.10	Other (Specify) _____	.....			
1003	**Did she (deceased) die due to any of the following reasons?**				
1003.1	Was she burned by fire or other chemicals?	1	2	98	99
1003.2	Did she commit suicide?	1	2	98	99
1003.3	Was she killed in a road accident?	1	2	98	99
1003.4	Did she die due to a fall injury?	1	2	98	99
1003.5	Did she die due to drowning in water?	1	2	98	99
1003.6	Did she die due to animal or insect bite?	1	2	98	99
1003.7	Was she the victim of any violence or assault?	1	2	98	99
1003.8	If any other type of accident, please specify	.....			
1003.9	At the time of her death, had she (deceased) tested positive for Covid-19?	1	2	98	99
1004	Did the health worker at the health facility inform you about the cause of death?	1	2	98	99
1005	If she died in the hospital, was a death certificate issued?	1	2	98	99
1006	If a death certificate is available, write the cause of death as stated in the certificate.	.....			

Section 11: Health risk behavior

Q.N.	Question	Yes	No	Don't know	Refused to answer
1101	Did she drink alcohol?	1	2	98	99
1102	Did she smoke / consume tobacco products (cigarettes, cigars, pipe, khaini etc.)?	1	2	98	99
1103	Was she a drug-abuser?	1	2	98	99

"Thank you for participating in this study."

Details of the interviewer	
1. Name: _____	
2.Post: _____	
3.Name of Health Institution: _____	
4.Data collection date	Date Month Year
5. Mobile Number	
6.Signature	

Details of the person reviewing the form	
1.Name: _____	
2. Post: _____	
3. Name of health institution: _____	
4. Date of form review	Date Month Year
5.Mobile Number	
6.Signature	

List of Castes/ethnicities

Caste	Code	Caste	Code	Caste	Code	Caste	Code	Caste	Code
Chhetri	1	Brahmin/Terai	27	Jhagad/ dhagar	53	Gaine	79	Ghale	105
Brahmin	2	Kathwaniya	28	baantar/sardar	54	Jirel	80	Khawas	106
Magar	3	Gharti/Bhujel	29	Barai	55	Duri	81	Rajdhowa	107
Tharu	4	Mallaha	30	Kahar	56	Badi	82	Kori	108
Tamang	5	Kalwar	31	Gangai	57	Meche	83	Nachiring	109
Newar	6	Kumal	32	Lodh	58	Lepche	84	Yamphu	110
Musalman	7	Hajam/Thakur	33	Rajbhar	59	Halkor	85	Chamling	111
Kami	8	Kanu	34	Thami	60	Panjabi/Sikh	86	Aathpahariya	112
Yadav	9	Rajwanshi	35	Dhimal	61	Kisan	87	Sarwariya	113
Rai	10	Sunuwar	36	Bhote	62	Raji	88	Bantowa	114
Gurung	11	Sudhi	37	Bin	63	Byasi/Sauka	89	Dolpo	115
Damai/Dhol	12	Lohar	38	Gaderi/Bhediyar	64	Hayu	90	Rimat	116
Limbu	13	Tatmaa/Tatwa	39	Nurang	65	Koche	91	Thulung	117
Thakuri	14	Khatwe	40	Yakkha	66	Dhuniya	92	Mewahang Wala	118
Sarki	15	Dhobi	41	Darai	67	Walung	93	Bahing	119
Teli	16	Majhi	42	Tajpuriya	68	Munda	94	Lhopa	120
Chamar/Harijan/Ram	17	Nuniya	43	Thakali	69	Raute	95	Dev	121
Koiri	18	Kamhar	44	Chidimar	70	Holmo	96	Sangpang	122
Kurmi	19	Danuwar	45	Pahari	71	Pattharkatth/ Kushwadia	97	Khaling	123
Sanyasi/Dasnami	20	Chepang/Praja	46	Maali	72	Kusunda	98	Tapkegola	124
Dhanuk	21	Haluwai	47	Bangali	73	Ihomi	99	Loharung	125
Musahar	22	Rajput	48	Chantyal	74	Kalar	100	Rana Tharu	126
Dusadh/Paswan/Pasi	23	Kayastha	49	Dom	75	Natuwa	101	Bhumihar	127
Sherpa	24	Badhai	50	Kamar	76	Dhandi	102	Foreigner	995
Sonar	25	Marwadi	51	Bhote	77	Dhankar/Dharikar	103	Others	999
Kewat	26	Satar/Santhal	52	Bramha/Baramo	78	Kulung	104		

Annex 2.4: Cause of death assignment form

Government of Nepal
Ministry of Health and Population
Population Management Division
Maternal Mortality Study-2021

Maternal death verbal autopsy cause of death assignment form

A. Case Summary:			
District/Palika		Case Number	
Name of the deceased		Age (in yrs)	
Case narrative: *[Gravida, Parity, ANC/Intra/PNC history, sequence of events, treatment, timeline of events]*			
History of illness prior to death			
Positive symptoms			
• • • •			
Contributing factors (delays)			
First delay	Second delay	Third delay	

B. Cause of death assignment		
Part I		Approximate Interval Between Onset & Death
Disease or condition directly leading to the death*	a. ---------- (due to or as a consequence of)	
Antecedent causes (Morbid conditions, if any, giving rise to the above cause, *stating underlying condition last)*	b. ---------- (due to or as a consequence of)	
	c. ---------- (due to or as a consequence of)	
	d. ---------- (due to or as a consequence of)	
Part II		
Other significant conditions (morbid conditions contributing to death, but not related to the disease or conditions causing it)		
* This does **NOT** mean the mode of dying, e.g., heart failure, respiratory failure; it means the disease, injury or complication that caused death.		

Information about cause of death assignment (please circle in the appropriate number)								
Certainty of Diagnosis	1	[High]	2	[Medium]	3	[Low]	4	[Insufficient to Code]
If circled number 4 (Insufficient information) What other information should have been gathered?								
Reviewer name							Code	
Date of review			Start time		Finish time			

The status of deceased woman was:

(Please tick √ in the appropriate box)

Death during pregnancy	Death during delivery	Death after delivery (within 42 days)	Death during/after abortion (within 42 days)

ICD MM grouping: Please tick any one underlying cause of death

Group	Underlying Cause of Death	Please Tick in the single cell out of 9 cells	Remarks
Group 1	Pregnancy with abortive outcome		
Group 2	Hypertensive disorders in pregnancy, childbirth and the puerperium		
Group 3	Obstetric Haemorrhage		
Group 4	Pregnancy-related infection		
Group 5.1	Other obstetric complications		
Group 5.2	Direct deaths without an Obstetric code		
Group 6	Unanticipated complications of management		
Group 7	Non-obstetric complications		
Group 8	Unknown/undetermined		
Group 9	Coincidental causes		

Annex 3: Status of pregnancy-related deaths and cause of deaths

Annex 3.1: Distribution of pregnancy related deaths by province

Province	Population	Percentage of Population	Population Density	Female Population	% of female population	No. of women of reproductive age (15-49 yrs)	% of female population that are WRA	WRA deaths in reproductive age (15-49 Years)	% of WRA deaths among WRA population	Pregnancy related deaths	Live births	% of deaths to WRA that are pregnancy related	Ratio of pregnancy related deaths (per 100000 live births)
Province 1	4961412	17.0	192	2544084	51	1393488	55	2,619	0.19	104	64,190	4.0	162
Madhesh	6114600	21.0	633	3048849	50	1599321	52	2,361	0.15	146	96,557	6.2	151
Bagmati	6116866	21.0	301	3068182	50	1797206	59	2,413	0.13	72	70,380	3.0	102
Gandaki	2466427	8.5	115	1295594	53	710933	55	1,083	0.15	46	27,940	4.2	165
Lumbini	5122078	17.6	230	2667670	52	1499219	56	2,613	0.17	162	76,243	6.2	212
Karnali	1688412	5.8	60	864651	51	461474	53	657	0.14	59	31,323	9.0	188
Sudurpaschim	2694783	9.2	138	1421997	53	770539	54	1,230	0.16	64	46,302	5.2	138
Nepal	29164578	100.0	198	14,911,027	51	8232180	55	12,976	0.16	653	412,935	5.0	158

Annex 3.2: Levels of maternal mortality ratio by ecological belt

Province	Number of deaths to women of reproductive age (15-49 yrs)	No. of pregnancy related deaths	No. of maternal deaths	No. of live births	% of deaths to WRA that are pregnancy related deaths	% of pregnancy related deaths that are maternal	MMR (per 100000 live births)
Mountain	816	41	37	27878	5.0	90.2	133
Hill	4959	257	249	156342	5.2	96.9	159
Terai	7201	355	336	228715	4.9	94.6	147
Nepal	12976	653	622	412935	5.0	95.3	151

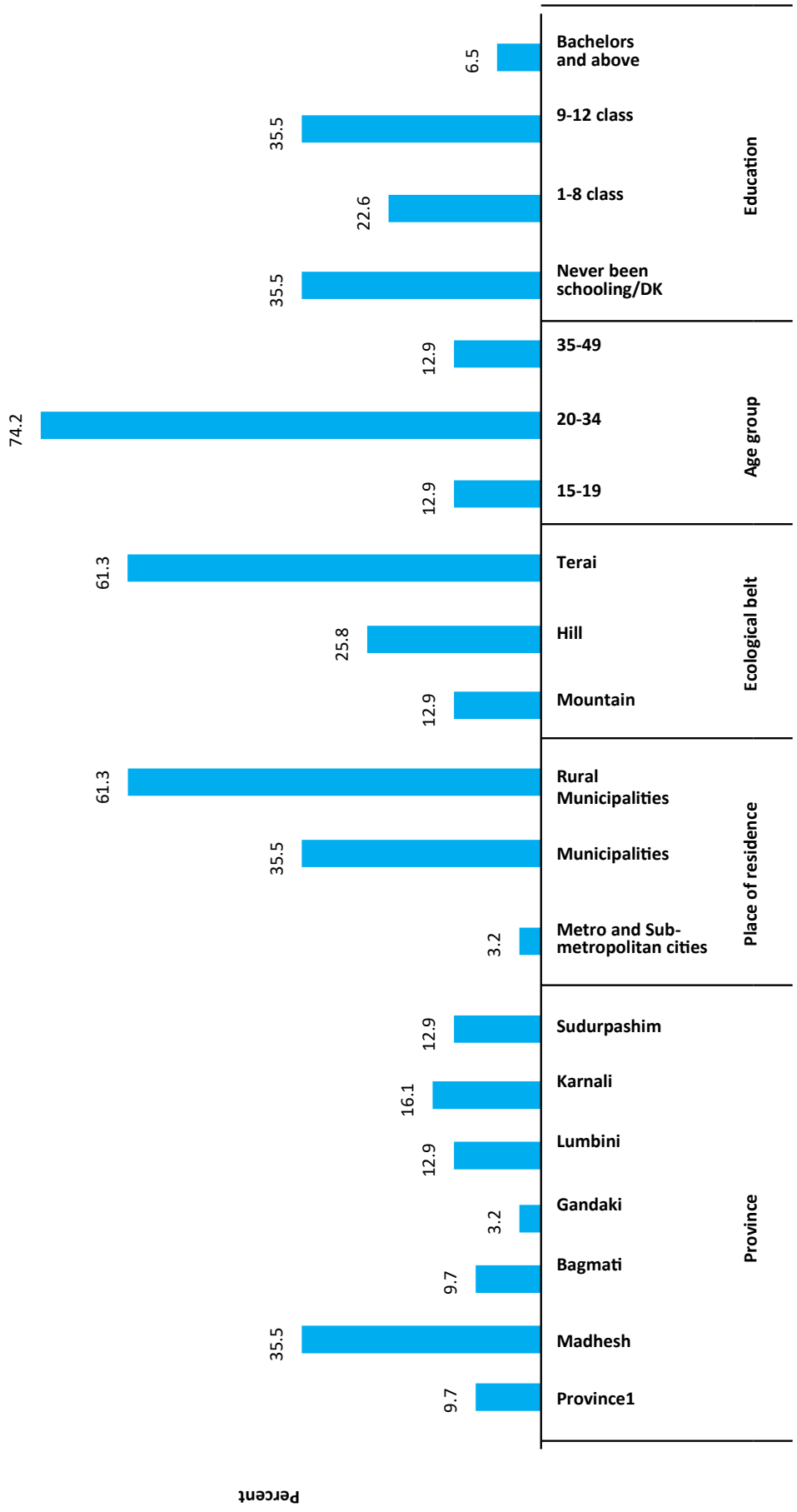
Annex 3.3: Underlying cause of pregnancy-related deaths by province

	Province1		Madhesh		Bagmati		Gandaki		Lumbini		Karnali		Sudurpashim		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Group 1: Pregnancy with abortive outcome	2	2.0	7	4.8	2	2.9	3	6.8	10	6.3	5	8.5	0	0.0	29	4.5
Group 2: Hypertensive disorders in pregnnancy, child birth and the puerperium	13	12.7	16	11.0	4	5.7	4	9.1	18	11.4	9	15.3	8	12.5	72	11.2
Group 3: Obstetric Haemorrhage	26	25.5	41	28.3	9	12.9	14	31.8	37	23.4	14	23.7	17	26.6	158	24.6
Group 4: Pregnancy-related infection	3	2.9	14	9.7	1	1.4	1	2.3	17	10.8	4	6.8	4	6.3	44	6.9
Group 5.1: Other obstetric complications	6	5.9	6	4.1	12	17.1	0	0.0	8	5.1	2	3.4	5	7.8	39	6.1
Group 5.2: Direct death without an obstetric code	1	1.0	9	6.2	3	4.3	4	9.1	8	5.1	8	13.6	5	7.8	38	5.9
Group 6: Unanticipated complications of management	1	1.0	2	1.4	0	0.0	1	2.3	1	0.6	1	1.7	1	1.6	7	1.1
Group 7: Non-obstetric complications	42	41.2	35	24.1	35	50.0	16	36.4	48	30.4	7	11.9	14	21.9	197	30.7
Group 8: Unknown/undetermined	5	4.9	4	2.8	1	1.4	0	0.0	7	4.4	4	6.8	6	9.4	27	4.2
Group 9: Coincidental causes	3	2.9	11	7.6	3	4.3	1	2.3	4	2.5	5	8.5	4	6.3	31	4.8
Total	102	100	145	100	70	100	44	100	158	100	59	100	64	100	642	100

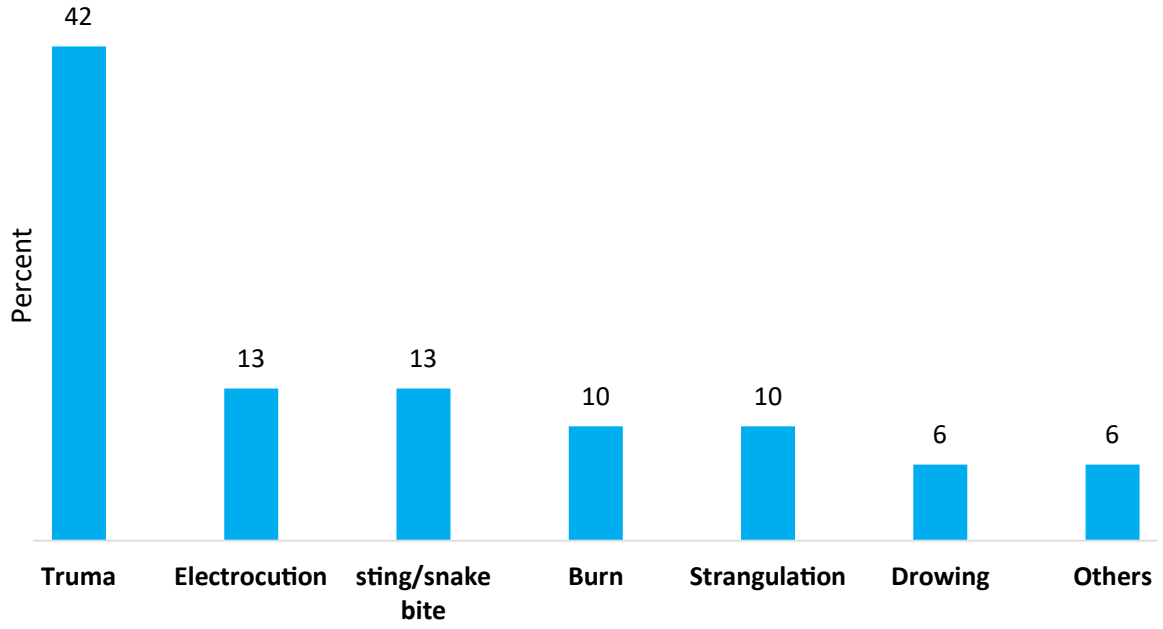
Annex 3.4: Underlying cause of maternal deaths by province

	Province1		Madhesh		Bagmati		Gandaki		Lumbini		Karnali		Sudurpashim		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Group 1: Pregnancy with abortive outcome	2	2.0	7	5.2	2	3.0	3	7.0	10	6.5	5	9.3	0	0.0	29	4.7
Group 2: Hypertensive disorders in pregnnancy, child birth and the puerperium	13	13.1	16	11.9	4	6.0	4	9.3	18	11.7	9	16.7	8	13.3	72	11.8
Group 3: Obstetric Haemorrhage	26	26.3	41	30.6	9	13.4	14	32.6	37	24.0	14	25.9	17	28.3	158	25.9
Group 4: Pregnancy-related infection	3	3.0	14	10.4	1	1.5	1	2.3	17	11.0	4	7.4	4	6.7	44	7.2
Group 5.1: Other obstetric complications	6	6.1	6	4.5	12	17.9	0	0.0	8	5.2	2	3.7	5	8.3	39	6.4
Group 5.2: Direct death without an obstetric code	1	1.0	9	6.7	3	4.5	4	9.3	8	5.2	8	14.8	5	8.3	38	6.2
Group 6: Unanticipated complications of management	1	1.0	2	1.5	0	0.0	1	2.3	1	0.6	1	1.9	1	1.7	7	1.1
Group 7: Non-obstetric complications	42	42.4	35	26.1	35	52.2	16	37.2	48	31.2	7	13.0	14	23.3	197	32.2
Group 8: Unknown/undetermined	5	5.1	4	3.0	1	1.5	0	0.0	7	4.5	4	7.4	6	10.0	27	4.4
Total	99	100	134	100	67	100	43	100	154	100	54	100	60	100	611	100

Annex 3.5: Distribution of coincidental causes by background characteristics (N=31)



Annex 3.6: Distribution of coincidental causes by types of cause (N=31)



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