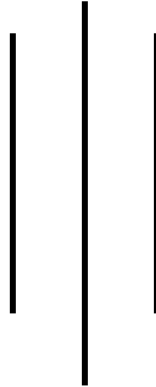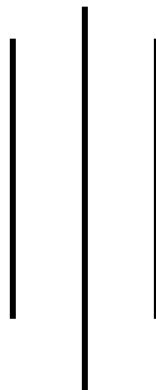**Government of Nepal**

Ministry of Health

Department of Health Services

Family Health Division

Report on Maternal Death Cause Assignment Training From Verbal Autopsy Training

Date: November 23-25, 2016

Hotel Orchid

Tripureshwor, Kathmandu

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1. Introduction

Review of causes of maternal deaths occurring in health facilities has been implemented in Nepal since 1994. By 2015, this program of facility-based maternal and perinatal death review (MPDR) has been implemented routinely in 42 hospitals in Nepal. Following the launching of the Commission on Information and Accountability (CoIA) by the Secretary General of the United Nations as a global strategy to improve the health of women and children, the Family Health Division of Ministry of Health of Nepal developed the Maternal and Perinatal Death Surveillance and Response (MPDSR) guidelines and implementation plan in 2014. The MPDSR initiative to assess causes of death and avoidable factors aims to expand the surveillance system to include maternal deaths occurring the community and to the improve quality of maternal and child health care services. Since 2016, the MPDSR program is implemented in six districts (Solukhumbu, Dhading, Banke, Kaski, Kailali and Baitadi) with the aim of scaling up nationally in few years. The MPDSR has trained community health workers at the District Public Health Office and Health Posts to conduct verbal autopsies (VA) using the WHO 2014 verbal autopsy questionnaire to collect data on maternal deaths occurring in the communities. Following notification by Female Community Health Volunteers and screening by Auxiliary Nurse Midwives, Verbal Autopsies have been conducted for pregnancy related deaths at these districts. The next step is to identify and train a group of physicians in ascertaining causes of maternal deaths from VA in these districts in order to develop and implement a response mechanism to prevent such deaths in the future. Family Health Division (FHD), Directorate of Health Services (DoHS) and WHO Country Office Nepal had jointly organized a training workshop in assigning causes of maternal deaths from VA from October 20-22, 2016 for a group of participants who would be either directly involved in assigning causes death from VAs or trainers. This training was facilitated by International Expert, Dr. Daniel Chandramohan, who has been involved since a long time in verbal autopsy tools development, cause assignments from VA and software for cause assignment from VA. Following the trainer's training, FHD and WHO CO conducted the training on "Maternal Death Cause Assignment from Verbal Autopsy" from November 23-25, 2016 for the medical doctors of the MPDSR implementing districts.

2. Objectives of the training

The objectives of the training were as follows:

1. To re-sensitize participants on MPDSR process including VA in Nepal.
2. To develop experts for assigning cause of maternal death from VA at MPDSR implementing districts.
3. To introduce International Cause of Death 10 for coding of death.
4. To prepare action plan for implementing cause of death assignment in MPDSR districts.

3. Proceedings

The training was facilitated by experts who have been involved in implementing MPDSR in Nepal and participated in the trainers' training facilitated by the International Expert.

Session 1: MPDSR process in Nepal

This session was facilitated by Dr. Meera Upadhyay, WHO. The presentation of the session is attached in Annex 3. The facilitator highlighted that Nepal has shown significant progress in reduction of maternal and perinatal mortality in the past with its commitment towards achieving targets set by periodic plans and global endeavors. Despite its consistent and regular progress in maternal and child health indicators, maternal and child death continues to be a major public health problem. Most of these deaths are preventable if timely intervention had taken place.

The Maternal Mortality Ratio (MMR) in Nepal decreased substantially from 539 per 100,000 live births in 1996 (NFHS) to 258 per 100,000 live births in 2015 (WHO). The Under-five Mortality Rate declined from 139 in 1996 to 54 in 2011. Similarly, Infant Mortality Rate declined from 93 in 1996 to 46 in 2011, Neonatal Mortality Rate declined from 58 in 1996 to 33 in 2011, while the Perinatal Mortality Rate declined from 45 in 2006 to 37 per 1,000 pregnancies in 2011 (NDHS 2011).

Improvement in maternal health services has been the key factor in reducing the country's MMR and has contributed to the improvement in infant and child survival as well. Due to continued government encouragement through free delivery services and financial incentives for transportation, the percentage of births taking place in health facilities has doubled in the past five years (from 18 percent in 2006 to 35 per cent in 2011).

There have been substantial efforts in the past to review the maternal and perinatal deaths since the early 1990s. Maternal Death Review (MDR) was initiated in Paropakar Maternity and Women's Hospital designed by Family Health Division with technical assistance from WHO. The MDR program was expanded in more hospitals. In 2003, Perinatal Death Review (PDR) was integrated in hospitals implementing MDR. The Maternal and Perinatal Death Review (MPDR) was further expanded reaching 42 hospitals in 23 districts till 2013.

Even though Nepal initiated the MDR since early 1990s, the progress for strengthening the program has been slow. There have been gaps in data recording and reporting but review of the program has been conducted. Analysis of MPDR during April 2013 to March 2014 in 42 hospitals revealed that the most common cause of the maternal deaths were hemorrhage.

In 2016, Government of Nepal has redesigned MPDR into MPDSR to capture maternal deaths in the communities. Maternal and Perinatal Death Surveillance and Response (MPDSR) is a form of continuous surveillance process that links health information system and quality improvement processes from local to national levels. It includes routine identification, notification, quantification and determination of causes and avoidable factors of all maternal and perinatal deaths, as well as the use of this information to respond with

actions that will prevent future deaths. The goal of MPDSR is to reduce preventable maternal mortality.

MPDSR takes into consideration key components of the UN Global Strategy for Women's and Children's Health and The Commission 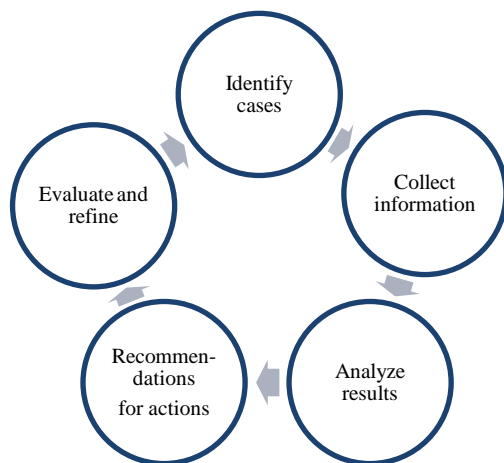on Information and Accountability (CoIA). MPDSR is the basis of any strategy adopted to eliminate preventable deaths. It provides information about avoidable factors that contribute to maternal and perinatal deaths and uses the information to guide actions that must be taken at the community level, within the formal health-care system, and at the inter-sectoral level (i.e. in other governmental and social sectors) that are critical for preventing similar deaths in the future.

Figure 1: MPDSR Cycle

Facility-based MDR systems are qualitative, in-depth investigations of the causes of, and circumstances surrounding, maternal and perinatal deaths that occur in health-facilities. Community- based MDR systems are a method of finding out causes of death and ascertaining the personal, family, or community factors that may have contributed to the death. GoN has rolled out MPDSR in five districts with trainings at different levels of stakeholders. The notification, screening, identification, VA of community maternal deaths in addition to hospital maternal and perinatal deaths have already been started from these districts.

The VA tool has been adopted from the WHO VA tool 2014. The tool is to be filled by the VA team of the respective district after ascertaining that the death identified by the Female Community Health Volunteer is pregnancy related. Apart from the identification details, details of the nterviewee, consent and narrative of the events that occurred before the death of the woman there are nine sections in the tool. Each section gives demographic information, history of ilness, pregnancy related information, history of accidents, risk behavior, utilization of health services, identifications of three delays, death registration and certification and action plan developed after review of the VA and assigned cause.

Session 2: Introduction to ICD

This session was facilitated by Mr. Gunja GC, HMIS Section, Management Division, Directorate of Health Services. The codes related to diseases and deaths, coding process were elaborated during the session. The slide of the session is attached in Annex 4.

Session 3: Verbal Autopsy: Background, tools and procedures

The facilitator, Dr. Shilu Adhikari, Maternal and Child Health Advisor, USAID, gave a presentation on the development process and current status of the WHO standard verbal autopsy tools and procedure (Annex 5). She gave a description of the components of the verbal autopsy tools and different methods available to assign causes of death form VAs. She

highlighted that even though VA has several limitations, this is the only option available in many settings where medical certification of deaths is not available. A review of 125 studies using VA tool found that VAs are used in over 41 countries including many settings in Asia. Currently VA is being rolled out nationally as part of Civil Registration and Vital Statistics (CRVS) in many countries. In order to make VA feasible to be implemented within routine data collection systems such as CRVS, VA tools have been standardized and made amenable to be interpreted by computerized algorithms. As part of this process, a short list of causes of death was agreed upon by the WHO working group on VA. The working group identified the causes of death that were deemed to be feasible to be reached through VA and of public health importance. The list of causes of death resulting from the above process is presented in Annex 5.

Using a minimum set of causes of death facilitates the comparison of cause specific mortality data from VA on an international scale. The short list of cause of death for VA that is recommended by the WHO VA working group is mapped in alignment with the full ICD-10 codes in order to allow comparison of VA derived cause specific mortality data with causes of death ascertained using entire ICD-10 in health facilities.

The WHO short list of cause of death includes the following 9 underlying causes of maternal death: Ectopic Pregnancy, Abortion related death, pregnancy induced hypertension, obstetric haemorrhage, obstructed labour, pregnancy-related sepsis, Anaemia in pregnancy, Ruptured uterus and other & unspecified maternal causes of death. In addition, the list includes several indirect maternal cause of death.

Causes of death can be ascertained from VA questionnaires either by physician review or using a computerized algorithm. Physician review requires a panel of 3 physicians – First two physicians will review the VA questionnaires independently and reach an underlying cause of death. If there is disagreement between the two physicians in the underlying cause of death, a third physician will review the VA and reach a diagnosis by a majority opinion. If all three physicians disagree then the cause of death will be deemed to be undetermined. There are two computerized algorithms (InterVA and SmartVA) that have been used widely and third one (InsilicoVA) is in an advanced stage of development. Although these computerized methods are time efficient and relatively less expensive in the longer term, they need substantial investment and capacity in the Information Technology. Additionally, physician review also identifies delays and avoidable factors related to the death which helps in developing action plan for prevention of such deaths in the future.

Session 4: Causes of death certification guidelines

Dr. Heera Tuladhar, Professor, Obstetrician/Gynecologist, LIST Medical College, gave detailed step by step ICD-10 rules of certifying causes of death. She described a process agreed at a VA workshop supported by the WHO to define criteria for assigning causes of death from VA and the criteria for ascertaining each maternal cause of death included in the short list of causes of death for VA. The slides of this presentation are shown in Annex 6. Dr. Heera described the differences between the medical examination to determine a cause of illness of a patient and the VA to ascertain a cause of death in terms of their respective motive, respondent, interview procedures, recall period, interviewer, instruments and disease

classification. She emphasized the fact that VA is an imperfect tool but this is the only option currently available to obtain information about causes of death in settings where medical certification of causes of death is unavailable. She reminded the participants that VA involves retrospective interview of relatives or any caregivers about the symptoms/signs and contextual factors that were present during the illness that lead to death and that the purpose of VA is to determine the common causes of death at the population level and therefore certain level of uncertainty in the accuracy of causes of death at the individual level can be tolerated. She explained the reasons for having a short list of causes of death instead of using the entire ICD-10 causes of death and reassured that VA has been shown to be reasonably accurate to ascertain the maternal causes of death in settings in Africa.

A death occurs as a result of a single underlying cause or a combination of multiple causes. When there are multiple causes they may be related to each other in a pathological sequence that lead to death or they may be completely unrelated. If there are multiple causes in a sequence of events, it is important to ascertain the underlying cause of death, which is important for estimating the burden of diseases and for taking preventive actions. The underlying cause of death is defined as "the disease or injury that initiated the train of events leading to death" or "the circumstances of the accident or violence that produced the fatal injury". The terminal disease or event that has an ICD code is classified as the immediate cause of death. The diseases or events that lie between the immediate cause and the underlying causes are antecedent causes of death. Diseases that are present but are not linked to the chain of events that lead to the death are classified as contributory causes of death.

The following examples of sequence of events illustrate the underlying, immediate and antecedent causes of death:

Example 1:

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Upper gastro intestinal hemorrhage

Caused by

Bleeding esophageal varices

Caused by

Cirrhosis of liver

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In this case Cirrhosis of liver initiated the chain of events that resulted esophageal varices that cause severe gastro intestinal hemorrhage. Therefore the underlying cause is cirrhosis of liver. Although the cirrhosis of liver could have been initiated by chronic hepatitis B infection or alcoholism it is often difficult to obtain adequate information from VA to diagnose hepatitis B infection or alcoholism. Therefore it is acceptable to diagnose cirrhosis of liver as the underlying cause of death in this case. The immediate cause of death is upper gastro intestinal hemorrhage and the antecedent cause is bleeding esophageal varices.

Example 2:

Antepartum hemorrhage

Caused by

Abruptio Placenta

Caused by

Pre-eclampsia

Also had

Diabetes

In this example the patient died of severe antepartum hemorrhage caused by Abruptio placenta that was caused by Pre-eclampsia. Therefore Pre-eclampia is the underlying cause of death and Abruptio placenta was the antecedent cause and Antepartum hemorrhage was the immediate cause of death. As diabetes is not related to the chain of events that lead to the death Diabetes is contributory cause of death. However it is not uncommon that VA does not obtain sufficient information to reach a diagnosis of pre-eclampsia or abruption placenta. In such circumstances one can assign Antepartum hemorrhage as the immediate & underlying cause of death because antepartum hemorrhage is included in the short list of causes of death for VA.

Note that in standard death certificate the sequence of cause of death appears in the reverse order. The top line (a) disease or condition directly leading to death is the immediate cause of death; lines 2, 3 & 4 (b, c & d) are antecedent causes and/or underlying causes of death depending on the number of antecedent causes between the immediate and underlying cause of death. For example if we use the above mentioned example 2 to complete a standard death certificate it would look as follows:

Disease or condition directly leading to death	(a) Antepartum Hemorrhage (due to or as a consequence of)
Antecedent causes (morbid conditions, if any, giving rise to the above cause, stating underlying condition last)	(b) Abruptio placentae (due to or as a consequence of)
	(c) Pre-eclampsia (due to or as a consequence of)
Other significant conditions (contributory causes)	Diabetes

A list of underlying direct maternal causes of death and a list of common indirect maternal causes of death are given in annex 6. The physicians assessing VA should try to assign one of these causes of death as underlying cause of death. The conditions such as cardio-respiratory arrest or multiple organ failure are not useful and such garbage codes of death should not be recorded as a cause of death in the death certificate.

It is important to assess the presence of any of the delays (delay in seeking care, delay in arriving at facility with appropriate level of care, delay in receiving care at the facility) that contributed to the cause of death. These could be recorded as contributory cause of death. Although these causes do not have an ICD code they are important to be identified in order to plan remedial actions and to prevent maternal deaths.

One of the major limitations of VA diagnosis by physician review is lack of consistency between physicians in ascertaining certain causes of death. One way to improve the consistency between physicians is to have a priori agreed diagnostic criteria for each cause of death included in the list. The process of defining criteria for each cause of death should start with listing all possible signs and symptoms for each cause of death and then classify them as essential, confirmative, supportive, and differential if possible using the following definitions:

Essential: these symptoms/signs should be present but they may not be sufficient on their own to reach a diagnosis. Usually they are present in the given condition but they may also be present in other causes of death but less frequently.

Confirmative: these symptoms/signs if present confirms a given diagnosis on their own or in the presence of other essential or supportive symptoms/signs. These symptoms/sings are usually absent in other conditions.

Supportive: These symptoms/signs if present along with the essential ones help to differentiate a given cause of death from other causes that are likely to be misclassified.

Differential: These symptoms/signs if absent along with the essential ones help to differentiate a given cause of death from other causes that are likely to be misclassified.

Suggested criteria for each cause of death included in the list are shown in Annex 6.

Session 5, 6 and 7: Group work and plenary sessions

As agreed in the trainers' training to adapt group work exercise to train the physicians in the MPDSR districts in ascertaining causes of death using the suggested criteria and causes of death list, the participants were divided into small groups of 3 and each group was asked to review one verbal autopsy questionnaire that was collected recently from one of the MPDSR sites. Each participant was given a copy of the VA interview and were asked to ascertain a cause of death independently using the suggested short list of causes of death and the criteria for diagnosing each causes of death. Then the group of 3 discussed the reasons for reaching a given cause of death and reached the underlying, immediate, antecedent and contributory causes of death by consensus. Each group presented at the plenary the agreed causes of death and the list of symptoms/signs identified to be present to support their diagnosis. All participants discussed the appropriateness of the criteria and the plausibility of the causes of death reached using those criteria. This group work exercise of ascertaining cause of death from VA was repeated with another set of VAs from the MPDSR district. The groups presented the agreed causes of death and the criteria used to reach these diagnoses at the plenary and discussed the appropriateness of the suggested criteria. The participants found

this small group work session interesting and useful to learn the process of ascertaining causes of death from VAs. There were in total three such sessions on second and third day.

Session 8: Review of short list of causes & criteria ascertaining common causes of maternal death

Based on the general consensus and changes made in the trainers' training that the WHO short list of causes of death was appropriate for Nepal, no changes were suggested. The participants discussed the public health importance, feasibility of ascertaining by VA and the relevance to Nepal of each maternal cause of death included or excluded from the WHO short cause of death list for VA.

The participants discussed the proposed criteria for ascertaining each cause of maternal death included in the list. Dr. Heera and Dr. Meera also explained that there is need to think about the pathological progress of the disease while ascertaining the underlying, antecedent and immediate cause of disease.

Session 9: Action plan for implementing VA within MPDSR

In this session, the participants worked in groups to prepare action plans for Cause assignment from VA in their respective districts. The participants were divided into five groups for five districts. The action plans are attached in Annex 7.

4. Conclusion and Recommendation:

The training was closed by Dr. Punya Poudel, Safe Motherhood Focal Person, FHD highlighting that the participants should now work in the respective districts to support the VA team and MPDSR Committee for assigning cause of death and developing action plans to prevent maternal deaths.

Annexure:

Annex 1: Schedule

Maternal Death Cause Assignment Training
Date: November 23-25, 2016
Venue: Hotel Orchid Pvt. Ltd., Tripureshwor

Day One

TIME	ACTIVITIES	FACILITATOR
10:00-10:30	Registration	Ms. Minu Khanal, FHD
10:30-11:00	Opening session Introduction and objectives of the workshop	Ms. Keshu Kafle, FHD
11:00-12:00	MPDSR process in Nepal	Dr. Meera Upadhyay, WHO
12:00-12:15	Tea break	
12:15-01:00	Introduction to ICD	Gunja GC, HMIS, MD
01:00-02:00	Lunch	
02:00-02:45	Cause of Death Assignment procedures	Dr. Shilu Adhikari, USAID
02:45-03:00	Tea break	
03:00-04:00	Assigning causes of maternal deaths by physician review	Dr. Heera Tuladhar, KIST

Day Two

TIME	ACTIVITIES	FACILITATOR
10:00-10:30	Review of previous day	
10:30-11:45	Group work – assigning causes of maternal deaths	Dr. Binamra, GIZ/Dr. Pooja, WHO
11:45-12:00	Tea break	
12:00-12:45	Plenary session – reports from the groups and discussion	Dr. Binamra, GIZ/ Dr. Pooja, WHO
12:45-01:45	Lunch	
01:45-02:45	Group work – more examples of assigning causes of death	Dr. Binamra, GIZ/ Dr. Pooja, WHO
02:45-03:00	Tea break	
03:00-04:00	Plenary session – presentation from the groups and discussion	Dr. Binamra, GIZ/ Dr. Pooja, WHO

Day Three

TIME	ACTIVITIES	FACILITATOR
10:00-10:30	Review of previous day	
10:30-11:30	Group work – more examples of assigning causes of death	Dr. Sharad Sharma, FHD/ Dr. Pooja, WHO
11:30-11:45	Tea break	

TIME	ACTIVITIES	FACILITATOR
11:45-12:30	Plenary session – presentation from the groups and discussion	Dr. Sharad Sharma, FHD/ Dr. Pooja, WHO
12:30-01:30	Lunch Break	
01:30-02:30	List of Cause of maternal death for use in Nepal	Dr. Heera Tuladhar, KIST
02:30-02:45	Tea break	
02:45-03:30	Action plan and further work	Dr. Pooja Pradhan, WHO
03:30-04:00	Closing session	Ms. Keshu Kafle, FHD

Annex 2: List of Participants

SN	Name	Designation	Organization
1.	Dr. Subhash Pandey	Consultant	Nepalgunj Medical College, Banke
2.	Dr. Tara Gurung	Medical Officer	Western Regional Hospital, Kaski
3.	Dr. Kalpana Thapa	Senior Consultant	Bheri Zonal Hospital, Banke
4.	Dr. Dilip Koju	Medical Officer	Phaplu District Hospital, Salokhumbu
5.	Dr. Smita Shrestha Karmacharya	Consultant	Manipal Medical College, Kaski
6.	Dr. Bimlesh Shah	Medical Officer	Salyan PHC, Solukhumbu
7.	Dr. Sudiksha Regmi	Medical Officer	Dhading District Hospital, Dhading
8.	Dr. Shyam Dhodary	Medical Officer	Dhading District Hospital, Dhading
9.	Dr. Sajan K. C.	Consultant	Seti Zonal Hospital, Kailali
10.	Dhana Basnet	Public Health Nurse	Family Health Division