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Maternal Death Surveillance and Response: Developing Implementation Guidelines for Haiti

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Abstract

Maternal Death Surveillance and Response: Developing Implementation Guidelines for Haiti

By: Eve Brecker

Global maternal mortality has fallen worldwide by fifty percent since the 1990s. Haiti, however has made slow progress in this field and, as a result, claims the highest maternal mortality rate in the Western hemisphere. The World Health Organization's Technical Working Group developed general implementation guidelines for their newest tool, the Maternal Death Surveillance and Response system. Literature shows that this is an effective tool for reducing national maternal mortality. However, its effectiveness greatly depends on a country's capacity for local adaption and ownership of this system. The goal of this project is, therefore, to adapt Maternal Death Surveillance and Response implementation guidelines to the Haitian context by examining full- and partial-implementation approaches from Ethiopia, Zambia, Senegal, Morocco and India. These case studies demonstrated the importance of integrating maternal death into notifiable disease systems as well as creating community death reporting systems that feed into facility reporting systems. These lessons combined with available information on barriers to health care access in Haiti inform the most effective way to adapt World Health Organization's Maternal Death Surveillance and Response Technical Guidance for Haiti. The development of these content-specific guidelines will support Haiti in establishing a sustainable maternal mortality surveillance system as well as improving provider adherence to this system which will, in turn, reduce the national maternal mortality rate.

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ACRONYMS

CDC	Centers for Disease Control and Prevention
CHW	Community Health Worker
DHS	Demographic and Health Survey
FC	Facility Coordinator
IDP	Internally Displaced Person
KI	Key Informant
M&E	Monitoring & Evaluation
MDR	Maternal Death Review
MDSR	Maternal Death Surveillance and Response
MDSS	Maternal Death Surveillance System
MeSH	Medical Subject Heading
MMR	Maternal Mortality Rate
MOH	Ministry of Health
OAS	Organization of American States
OB/GYN	Obstetrician/Gynecologist
PAHO	Pan American Health Organization
PHEM	Public Health Emergency Management
PHSRT	Public Health Systems Strengthening and Response Team
RAMOS	Reproductive-Age Mortality Survey
SDG	Sustainable Development Goals
SME	Subject Matter Expert
UN	United Nations
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
USAID	United States Agency for International Development
WHO	World Health Organization
WRA	Woman of Reproductive Age

INTRODUCTION

Maternal death is a preventable global health problem that affects both developed and developing countries alike. It is such a grave concern that the United Nations (UN) renewed its commitment to lowering national maternal mortality rates worldwide to 70 per 100,000 by 2030 (United Nations, 2015). Achieving this goal is particularly challenging though for developing nations which are oftentimes limited by inadequate infrastructural –specifically transportation systems – and medical resources. Both of these factors are necessary to provide appropriate access to services as well as quality care both in general and particularly in terms of antenatal and obstetric care. Haiti became particularly sensitive to these health access challenges after the 2010 earthquake which leveled a majority of the country's health infrastructure. Today, Haiti has the highest maternal mortality rate in the Western hemisphere despite strong political commitment by the national government to reduce the number of maternal deaths. The implementation of a new continuous action surveillance system, Maternal Death Surveillance and Response (MDSR), may help Haiti achieve the UN's goal by providing more comprehensive information on which to base national healthcare decisions.

Problem Statement

Haiti has the highest maternal mortality rate in the Western hemisphere. The World Health Organization (WHO) has developed guidelines for implementing a maternal mortality surveillance system intended to effectively decrease national maternal mortality rates. WHO's technical guidelines serve as an invaluable roadmap for improving the state of a nation's maternal mortality, but this tool has yet to fully be adapted to the local cultures of many countries that wish to use them. Haiti is one of these countries. Haiti needs MDSR guidelines that account for Haitian health system functions and cultural norms.

Purpose Statement

The purpose of this special studies project for the Haitian Ministry of Health (MOH) is to strengthen the capacity of community, facility, district, and national-level staff to properly utilize the MDSR system. The Haiti-specific MDSR implementation guidelines will meet several key objectives: 1) convey to health professionals the importance of a standardized MDSR; 2) improve health professionals' understanding of the MDSR system; and 3) increase adherence to MDSR reporting at all levels. This resource will adapt WHO's MDSR Technical Guidance to Haiti's particular health infrastructure and systems. Overall, it will guide all levels of MOH staff involved with maternal death reporting to do so consistently and comprehensively to ensure the most complete and adequate data.

Target Audience

The target audience for the MDSR implementation guidelines—which aim to improve techniques for the proper identification of maternal mortality cases—includes health care providers and decision makers working at all levels within the Haitian health system. This population is an ideal target audience for the guidelines because of the direct role they play in reporting on the state of maternal mortality in Haiti. Furthermore, this population is within the realm of the Public Health Systems Strengthening and Response Team's (PHSRT) partners and is, therefore, easily accessible for pilot testing. Criteria for those who would benefit the most from using the MDSR guidelines—and were targeted for the pilot test—include individuals who:

- Directly oversee and mitigate cases of maternal mortality in a clinical setting;
- Report cases of maternal mortality to the national civil registration and surveillance departments;

- Manage data collection, analysis and interpretation associated with cases of maternal mortality; or
- Wield decision-making responsibilities over maternal health care at the local, department or national levels.

Common professions for individuals within the target population include: community leaders, civil registration staff, non-governmental organization partners, traditional and skilled birth attendants, midwives, health care providers at all levels, and/or MOH officials at all levels. Prior to guideline implementation, the majority of these individuals had some familiarity with the concept of a national MDSR system, but did not necessarily follow procedures consistent with the proper reporting of maternal mortality. The population is literate and orally proficient in French and/or Haitian Creole.

Conclusion

Prior to presentation of the guidelines, the literature review contextualizes maternal mortality in Haiti, explains how the researcher compiled information for the literature review, explains the MDSR system, and details how MDSR has been applied in other countries. The methods section then outlines the process of creating and implementing a survey intended to tailor the MDSR implementation guidelines to the needs of the Haitian MOH, how the guidelines were developed and the strengths and limitations of both of these processes. The synthesis chapter pulls information from the literature review, case studies, a key survey of MOH officials, and the MDSR implementation guidelines to discuss how this resource should be used. Finally, the Haitian-specific MDSR implementation guidelines are presented.

LITERATURE REVIEW

Introduction

The literature review explains the key background components that justify a need for Haiti-specific MDSR implementation guidelines. An overview of maternal mortality in Haiti and subsequent socio-cultural factors demonstrate the why and how maternal mortality is a major public health concern throughout the country. The proposed MDSR system and comparison case studies describe what MDSR is and how it has been used in other developing nations. The MDSR model is then theoretically applied to Haiti and evidence is provided for how to best tailor lessons learned from past case studies to the Haitian context.

Methods

The literature provides a comprehensive summary of the conditions under which the MDSR implementation guidelines would function in Haiti. This contextual information both supports the synthesis of the most critical components of an MDSR and suggests how the MOH could best incorporate MDSR into the national integrated disease surveillance system given models from other countries and contexts. This literature review of available studies, data, articles and reports explains:

- the implementation of maternal mortality surveillance systems around the world;
- the reporting obstacles that health care providers faced in the event of a maternal death, best practices for incorporating MDSR into the national integrated disease surveillance system; and
- the current guidelines and training materials on implementation of MDSR used in countries with health infrastructure similar to Haiti.

The following were inclusion criteria for resources of the literature review:

- written in English;
- applicable to resource-limited settings; and
- specific to maternal health

Resources that originated in peer-reviewed databases (PubMed, EBSCO, and JSTORE) were primarily found through the input of specific Medical Subject Headings (MeSH) and/or keyword search terms chosen by the researcher as well as those resources that were provided by PHSRT staff. When the researcher was unable to identify specific resources in the peer-reviewed databases using MeSH (due to the non-scientific nature of the information needed), the researcher utilized keyword searches to supplement research efforts using the following terms: maternal, mortality, trends, medical audit, death review, surveillance, response, report, identify, system, guide, guideline, instruction, principles, adult learner, health care, training, manual, materials, curriculum, ministry, staff, Ethiopia, Zambia, Senegal, Morocco, India, challenges. PHSRT staff also shared resources from previous projects and literature reviews to inform the researcher about available information on MDSR. Haiti-specific research focused primarily on resources dated after the January 2010 earthquake as this event greatly changed the landscape of how Haiti's health infrastructure functioned.

Overview of Maternal Mortality in Haiti

Maternal mortality has fallen worldwide by nearly half since 1990 thanks, in part, to collaborative cross-national efforts and global commitments such as the Millennium Development Goals (United Nations, 2015). Haiti, however, has made slow progress in this field. Data show that receiving inadequate care at point of access is the largest contributor to these

maternal deaths throughout the country (Barnes-Josiah, 1998). Maternal deaths are devastating on a personal level for the family experiencing loss; they also have significant effects on the community where the death occurs and can put surviving children at higher risk for poverty, neglect and death (Anderson, 2007). The loss of reproductive-age women from a population can affect productivity of the local labor force and local GDP which, in turn, affects a community's ability to support its residents (Kirigia, 2006). In response to this challenge, the UN has prioritized reducing the global maternal mortality ratio (MMR) to less than 70 per 100,000 live births as part of its Sustainable Development Goals (SDG) 2030 (United Nations, 2015). In contrast, Haiti's MMR was reported to be 350 per 100,000 live births in 2010 (Seraphin et al., 2015). There is much to be done in Haiti to meet this SDG. For these reasons, it is important to monitor not only the number, but also the causes of and trends surrounding maternal death at the community, facility, district, and national level in Haiti.

Globally, hemorrhage and sepsis are the leading causes of maternal mortality accounting for nearly 25% and 15%, respectively, of cases (Gibson et al., 2013). This holds true for Haiti where the top five primary causes of of maternal mortality are hemorrhage, sepsis, eclampsia, obstructed labor, and unsafe abortion (UNFPA, 2015). Hemorrhage oftentimes has a sudden onset and can quickly lead to death if urgent medical care is not provided (Gibson et al., 2013). Despite the fact that this complication can be effectively mitigated with hospital-based interventions, unavailable transportation and inaccessible health centers both contribute to the high number of maternal deaths attributed to hemorrhage in Haiti. Further, key findings from Haiti Demographic and Health Survey (DHS) data suggest that only 36% of Haitian women give birth in a facility (USAID, 2012) leaving the remainder to deliver in homes where conditions

may be unhygienic. Such conditions make women vulnerable to neonatal infections and sepsis increasing their risk of death (Gibson et al, 2013).

While the 2010 MMR is a 43% decrease from the rate in 1990 (Seraphin et al., 2015), non-standardized reporting habits among health care professionals around maternal deaths make it difficult to trust whether or not these data accurately convey the state of maternal mortality in Haiti. Many deaths associated with pregnancy or delivery complications occur outside of a clinical setting and, therefore, may not be captured by typical surveillance procedures. Additionally, for those deaths that occur in a clinical setting, health care professionals may neglect to collect sufficient or correct data on the deaths they do record if inconsistent or inconvenient reporting mechanisms are in place.

There are also a number of systemic factors that contribute to Haiti's high MMR. These include weaknesses in the country's health infrastructure and low access to quality health services (UNFPA, 2015). The country's limited physical capacity to respond to maternal health needs combined with the population's restricted ability to reach adequate care contribute significantly to high maternal mortality.

Health System and Infrastructure. The first contributing factor to Haiti's high MMR is the country's historically fragile health system. The nation's geographic predisposition to infectious diseases combined with a systemic lack of investment in public health services has done little to facilitate the growth of a robust health system (Dowell et al, 2011). The 2010 earthquake also physically damaged national infrastructure—critical to mitigating maternal

health complications—after leveling key buildings such as the MOH offices and primary hospitals in Port-au-Prince (Dowell et al, 2011). The negative effects of this lack of infrastructure were exemplified during the Cholera outbreak which occurred in the months immediately following the earthquake and disproportionately affected women and children (Amibor, 2013).

Access to Quality Health Services. The second factor contributing to high maternal mortality is low access to quality health services. Health service quality can be measured by access to skilled birth attendants and antenatal care services (Babalola, 2014) as well as human resources (Huber, 2015). One study suggests that 64% of women of reproductive age (WRA) live in rural communities where health care is limited (Babalola, 2014). Further, the care that is available to this group is typically ill-equipped to handle obstetric emergencies nor are there the resources to provide effective family planning services (Anderson, 2015). High unmet need for family planning is another consequence of the lack of access to health services (Moszynski, 2011). Even those who live in urban areas such as Port-au-Prince have only limited access to health facilities. The 2010 earthquake demolished dozens of the city's hospitals leaving only eight facilities to support millions of residents (Amibor, 2013). Today, there are about 330 health facilities—intended to serve a population of almost 2.5 million—in the metropolitan Port-au-Prince area (Diagnostic and Development Group S.A., 2015). These access challenges—skilled birth attendants, human resources, and family planning—are best understood when individually explored.

Low access to skilled birth attendants and antenatal care. The WHO recommends that women should have at least four antenatal care visits during their pregnancy and that their

delivery should be monitored by a skilled birth attendant (WHO, 2004a). Antenatal care influences maternal mortality because it educates women about birth preparedness and the importance of delivering in a health facility (Babalola, 2014). A 2012 survey, however, reported that only 67.3% of women in Haiti achieved this standard of care and 35.9% of women delivered their last child in a health facility (Babalola, 2014). Further, the presence of a skilled birth attendant during labor could avert up to 33% of mortality that results from childbirth complications among WRA in the developing world (Seraphin et al., 2015).

Studies have suggested that the presence of a health facility in the community and functional road access are primary determinants of a woman's ability to meet WHO's antenatal care standards (Babalola, 2014). If skilled birth attendants are not available within a reasonable distance, a woman may decline care leaving her in a vulnerable situation for labor and delivery. These physical obstacles are compounded by demographic factors such as education, parity, and birth rank as well as public/community opinion and cultural views on antenatal and delivery care. Even if physical obstacles are minimal, the perception of inadequate or ineffective care can significantly influence a woman's decision to access care (Barnes-Josiah, 1998).

Acknowledging these obstacles, the Haitian government initiated *Soins Obstetricaux Gratuits*—a maternal heath proposal intended to increase obstetric care access free of charge (Amibor, 2013). An evaluation of this program demonstrated a two-fold rise in institutional deliveries between 2007 and 2010 (Amibor, 2013). Despite these gains, Human Rights Watch reports that the government still has been unable to address critical gaps in specific health care services which lend themselves to reducing maternal mortality (Moszynski, 2011).

Human resource shortages. The 2010 earthquake left Haiti's health infrastructure devastated. The MOH lost over 200 staff members in the natural disaster significantly decreasing its long-term operating ability (Amibor, 2013). Further, Haiti's already small constituency of 350 midwives decreased further to 211 midwives in 2013 as a result of deaths as well as skilled labor departing the de-stabilized country for better opportunities abroad (Huber, 2015). Despite the country's remaining 600 obstetricians, this human resource depletion placed an immense burden on those who continued practicing maternal health care for the 2.7 million WRA in Haiti (Huber, 2015). This limited availability of skilled birth attendants can magnify the risk of negative birth outcomes in complicated pregnancies and deliveries due to compromised access to and quality of antenatal care.

High unmet need for family planning. Low access to contraception results in unwanted pregnancies which can increase maternal death rates. This is particularly true when the pregnancy occurs in unsuitable living conditions such as those experienced by the 300,000 displaced girls and women who lived in settlements throughout Haiti in the immediate wake of the earthquake (Moszynski, 2011). A 2011 study suggested that while 97.9% of postpartum women want family planning counseling, only 6% receive this desired counseling and only 23% actually use family planning methods (Lathrop, 2011). Decreased prevalence of contraceptive use among Haitian women increases unwanted pregnancy and, therefore, fosters the risk of maternal mortality.

There are many things that resource-poor countries can do to avoid maternal deaths if they have the proper information on which to base maternal health programming. This requires though that

the government understands not only the national MMR, but also the underlying causes of maternal mortality. Comprehensive maternal death recording and reporting provides data on the number of deaths as well as the specific details that lead to these deaths. The ability to collect such data through an integrated surveillance system provides country-specific indicators that can support the development of practical ways to address and minimize maternal deaths. Logistical challenges and weak health care infrastructure have prevented Haiti from accomplishing a robust maternal death surveillance system up until this point (Diagnostic and Development Group S.A., 2015).

Proposed Maternal Death Surveillance and Response

In response to this global need for strengthening the recording and reporting of maternal death, the WHO MDSR Technical Working Group established a new mechanism in 2013 called the Maternal Death Surveillance and Response system (Hounton, 2013). MDSR is intended to standardize, coordinate, and expand a country's maternal mortality reporting practices to provide a more precise estimate of a country's MMR – a development greatly needed in Haiti (Hounton, 2013). MDSR is an important step to improving the quality of obstetric care and minimizing cases of maternal mortality and morbidity at a national level. Unlike traditional Maternal Death Reviews, MDSR is an ongoing monitoring method of identifying maternal mortality that collects data at both the facility and community levels (WHO, 2013). The innovation in MDSR is its re-purposing of communicable and non-communicable disease surveillance for maternal death surveillance (Hounton, 2013).

MDSR facilitates the ongoing identification of maternal deaths in facilities and communities and subsequent timely notification of these deaths to the nearest civil registry office. Causes of each

maternal death case are investigated and a recommendation for the prevention of deaths from similar circumstances is offered. A review and analysis of maternal deaths then occurs at the district level to inform national-level recommendations. Lastly, recommendations at the community, district, or national level are implemented to prevent future maternal deaths and monitoring mechanisms are established to ensure the consistent and effective execution of the recommendation. These steps then sequentially cycle back to the identification and notification of maternal deaths (WHO, 2013). See Figure 1.

Figure 1: MDSR Continuous Action Cycle

World Health Organization. (2013). *Maternal Death Surveillance and Response Technical Guidelines: Information for action to prevent maternal death*. Geneva, Switzerland: World Health Organization

Socio-cultural challenges of implementing MDSR

The design and strategic planning of an MDSR system is not enough to ensure its successful implementation. There are many factors that can influence the comprehensiveness of a health surveillance system and the reporting habits of those who update the system. Most commonly, knowledge gaps or social and cultural influences can negatively impact reporting habits which then skew data and incorrectly characterize a country's maternal mortality challenges. These factors are considered below.

Misclassification. The definition of maternal mortality itself can affect how maternal deaths are reported. MDSR utilizes WHO's definition of maternal death, which states that a suspected maternal death is one that occurs either while pregnant or within 42 days of the end of a pregnancy (WHO, 2013). However, without proper training, it may be difficult for a health care provider to attribute death directly or indirectly to maternal causes. In these cases, the death might be misclassified and these data would not be recorded in MDSR (WHO et al., 2014). For example, lacking access to health care in Haiti means many women may not know they are pregnant in their first trimester. As such, the deaths of these women in the early stages of pregnancy are often underreported as maternal death cases because these pregnancies are unknown (WHO, 2004b).

Identification. A significant gap in health care access could imply that a large number of pregnancy complications and births occur outside of facilities. Similarly, a large number of deaths attributable to maternal causes may also occur outside of facilities and, therefore, outside of proper maternal mortality surveillance mechanisms (Huber, 2015). Maternal deaths that occur outside of hospitals and clinics are less likely to be captured by MDSR and would thus be excluded from national data collection. Only 36% of births in Haiti occur in a health facility which suggests a large number of maternal deaths could be missed if strong community reporting mechanisms are not in place (Huber, 2015). Further, the true MMR remains unknown in many developing countries because of lacking surveillance activities that exist for displaced girls and women living in camps (Moszinski, 2011). Internally displaced persons (IDP) often function outside the scope of traditional health infrastructure and can oftentimes be overlooked in surveillance activities which may skew national data. In 2011, there were 300,000 IDP women

and girls in Haiti (Moszynski, 2011); a number that has fallen to 64,680 IDPs (men, women, and children) in 2015 (IOM, 2015). There is a high probability that many of their pregnancies and deaths are missed in maternal mortality reporting due to lack of effective monitoring mechanisms within camps (Moszynski, 2011).

Political and Legal Concerns. Managerial ambivalence towards the enforcement of reporting practices or political resistance at the local or district level discourages community health workers and facility staff from abiding by recommended reporting guidelines (Mathai, 2015). Either of these scenarios may also indicate limited training opportunities on maternal death reporting for staff (Mathai, 2015). Fear of conviction for illegal medical procedures, malpractice, or neglect may also negatively influence staff reporting behaviors. For example, abortion is illegal in Haiti under Article 262 of the penal code without exception (Haiti Penal Code, 1985).

Article 262 calls for the punishment of both the woman seeking an abortion and anyone who assists her (Haiti Penal Code, 1985). This restriction may be circumvented in accordance with the legal principle of "necessity" which can excuse criminal liability if an act is performed to save one's own life or the life of another (Boland and Katzive, 2008). In theory, this may be applied to abortion if the woman's life is endangered by the pregnancy. In practice, however, an abortion provider can only invoke this defense if they face criminal charges and it may be hard to prove "necessity" in court. Under such circumstances, deaths associated with complications from an abortion often go unreported or are not recorded as maternal deaths to protect the health care provider from potential legal consequences (Walker et. al, 2004).

Case Studies of Full- and Partial- MDSR Implementation

MDSR has been piloted and/or launched in a number of countries since its inception in 2013. Today, these countries function at various stages of MDSR implementation. Ethiopia, Zambia, and Senegal are three countries where full implementation of MDSR has proven successful and sustainable. For the purposes of this literature review, full implementation is defined as an MDSR system where all infrastructure components outlined by WHO are actively functioning. Partial implementation is defined as an MDSR where only select components outlined by WHO are actively functioning. For example, Morocco and India both manage Maternal Death Reviews—a key component of MDSR—and are categorized as having a partially implemented MDSR system. Frameworks and results of maternal death reporting and recording are compared below to show the potential for MDSR in the Haitian context.

Full MDSR Implementation.

Zambia & Senegal. Zambia and Senegal both piloted the MDSR system with impressive results. Zambia targeted community-based health workers in its training of trainers while Senegal focused on facility-based health workers. In Zambia, the review board identified 68 recommendations to improve quality of maternal care from the case studies that it surveyed (Hadley and Tuba, 2011). Of these recommendations, the review committee reported that it was able to implement 61% of the suggested interventions given resource constraints demonstrating how MDSR behaviors within an MOH can improve quality of care (Hadley and Tuba, 2011). Similar positive results were found in Senegal, where there was evidence from the pilot study of improved clinical outcomes due to implementation of MDSR principles. After reviewing three years of maternal death cases, a national committee set forth recommendations—13 of which

were implemented at a national level—to address the weaknesses found in clinical care protocols (Dumont et al, 2006). Within three years of implementing these recommendations—and monitoring consistent with that required by MDSR—the Senegalese MOH found a 50% decrease in maternal deaths as well as increased antenatal care visits (Dumont et al., 2006).

Ethiopia. Ethiopia has made impressive strides in lowering its MMR—from 1,400 to 420 per 100,000—over the past 25 years (WHO, 2015a). One strategy the Ethiopian MOH has used to continue this successful trend is the launch of MDSR in May 2013 (Ethiopia MOH, 2014). The launch incorporated a sensitization workshop of high-level MOH officials and maternal health experts and was followed up by a number of trainings for regional staff who would directly implement MDSR (Ethiopia MOH, 2014).

Per WHO's recommendation, the MOH strategically decided to implement MDSR via integration into its national disease surveillance system. As a result, this Public Health Emergency Management (PHEM) program now considers maternal death a notifiable disease (WHO, 2015a). The increased detection capability of maternal deaths by PHEM has already proven successful in identifying preventable determinants of maternal death that then allow the MOH to address quality of care issues at both facility and community levels (WHO, 2015a). Other MOH objectives for the integrated surveillance system include improving the ability of district and national review boards to create relevant interventions based on collected data and improving monitoring and evaluation of MDSR activities. The MOH also plans to continue the implementation of training of trainer workshops to expand the regional reach of MDSR in Ethiopia (WHO, 2015a).

Partial MDSR implementation.

Morocco. In response to a considerably high national MMR – around 112 per 100,000 in 2009 – the Moroccan MOH established a Commission on Maternal and Neonatal Mortality Reduction (MOH Morocco and UNFPA, 2011). The Commission's objective is to determine the leading cause(s) of these deaths and how to best respond to them (Abouchadi et al, 2013; Boutayeb 2011). To achieve this goal, the Commission initiated the implementation of a national surveillance system to track maternal deaths (Abouchadi et al, 2013).

The Commission created the Maternal Death Surveillance System (MDSS), which is a three-pronged approach to tracking maternal mortality: aggregate all deaths of WRA, identify pregnancy-related deaths, and identify cause of the pregnancy-related death through confidential inquiry (Abouchadi et al, 2013). The approach is similar to MDSR in that it requires a continuous reporting cycle, but the system itself is not integrated into the national disease surveillance system as recommended by WHO. Instead, data are collected on location, cause, and circumstance of death through a combination of vital statistics registries (i.e. death certificates) and public hospital records (Abouchadi et al, 2013). There is also no review component wherein recommendations are made for improved quality of care.

Additionally, because Morocco's MDSS was developed prior to WHO's publication of MDSR, a review of this system does not speak to the effectiveness of WHO's exact model. MDSS only demonstrates the benefits of Maternal Death Review (MDR) as a component of MDSR. Other limitations of this system include incomplete data due to inadequate medical records; not all home deaths or deaths in private clinics are included. In addition, decentralization of local data

entry and analysis processes make it inconvenient for users to find and enter information (Abouchadi et al, 2013). The system also does not collect data on abortion-related deaths given that abortions are banned in Morocco with the exception of protecting the mother's life and/or preserving physical or mental health (United Nations Department of Economic and Social Affairs Population Division, n.d.). Overall, however, MDSS is a promising tool for understanding maternal mortality in Morocco and could serve as a strong foundation for MDSR implementation. Its limitations resonate with those experienced by the MOH in Haiti and reinforce the importance and effectiveness of implementing MDSR.

India. Similar to Haiti, India had a fragmented system of recording and reporting maternal deaths until 2010 when the Rural Health Mission—a key department of India's MOH—designed and launched a standardized MDR system (Purandare, 2013). This inaugural program introduced new indicators that could potentially identify key causes of maternal death in India – going beyond MMR data collection requirements. The Rural Health Mission declared safe motherhood a national priority and simultaneously sought information on maternal death causes to learn about weaknesses in the quality of national obstetric care. The Rural Health Mission has since used these weaknesses to guide programming decisions that will minimize deaths from these specific maternal death causes (Purandare, 2013). As a result, India's MMR has steadily declined from 212 per 100,000 in 2009 to 178 per 100,000 in 2013 (Office of the Registrar General, 2013).

The government seeks to institutionalize the review system at all levels, but is hindered by its paper-based recording and reporting system. Six different forms are required in varying

combinations for a community versus a facility-based death. Standard reporting procedure for MDR in India begins with the community health worker or hospital staff member reporting the occurrence of death and general demographic information of the deceased within 24 hours (Government of Punjab, 2010). Each health facility maintains its own monthly death registry. Data from these cases are aggregated and reviewed monthly by an MDR committee that provides recommendations that respond to each month's causes of death (Government of Punjab, 2010). A register of all cases and their assigned serial numbers is maintained in each health facility. A district level review is also held to evaluate district-wide causes of maternal mortality and recommendations for action are determined to address these causes. Finally, a state level review takes place every three months, which evaluates deaths from all the districts within each state (Government of Punjab, 2010).

MDR differs from MDSR in India in that the results of this review are not used to feed back into the health care system. In using MDSR, the results of the MDR are aggregated into district and national level recommendations to improve quality of care and minimize maternal death. That said, the Rural Health Mission has achieved one of the most important components of MDSR, which is fostering a confidential and non-shaming environment within which health care staff report and analyze maternal deaths (Ethiopia MOH, 2014). This environment emphasizes the importance of informed consent and confidentiality is respected when findings are shared. These organizational behaviors increase reporting transparency and consistently lead to better data collection.

Lessons Learned. The contrast in reporting progress demonstrated by full- versus partial-MDSR implementation proves the effectiveness of the MDSR model for addressing the underlying determinants of a country's maternal deaths and, subsequently, decreasing national MMR (see Table 1). The case studies of partial implementation in India and Morocco showed an overall trend of incomplete data due to irregular reporting habits and lack of appropriate notification training. Recommendations by the review committee for systemic improvement were then inaccurate because sufficient evidence-based data were not available (Abouchadi et al, 2013). In the case of Morocco, the tight timeframe allowed for data aggregation and recommendations, but did little to facilitate productive and relevant ideas for strengthening the quality of maternal care provision (Abouchadi et al, 2013). By utilizing MDR, India has decreased its MMR by 16% since 2009 (Purandare et al, 2014), while Morocco's MDSS decreased MMR by 5% in the year it was implemented (Abouchadi et al., 2013). In contrast, Ethiopia expects to see a 36% decrease in MMR through full MDSR implementation by the next program evaluation (expected in 2016) (WHO, 2015a). The key takeaway of what worked best in Ethiopia was 1) mandating death notification within 24 hours at the facility level and 48 hours at the community level; 2) integrating MDSR into their existing infectious disease reporting system to facilitate continuous reporting; and 3) organize both district and national maternal death review committees.

In comparing these case studies of full- and partial- MDSR implementation, a number of critical systematic components are revealed. Provisions for notification of maternal deaths must be well defined and enforced. All countries should incorporate maternal deaths in their system of notifiable disease reporting and concrete steps should be taken to ensure timely notification. Data

should be collected on all maternal deaths that occurred in facilities as well as communities. This information should be used to uncover weaknesses in the health-care delivery system from the community through the various levels of referral to the tertiary care facility. Clearly defined data sources and processes for death identification and notification, regardless of the place of death, are emphatically required. Recommendations should be entirely evidence-based. Response activities should be monitored for progress. Monitoring and evaluation mechanisms should be in place to ensure effective implementation of MDSR.

Table 1: Key Challenges – Full versus Partial MDSR Implementation Models

	Full MDSR (Ethiopia)	Partial MDSR (India)	Partial MDSR (Morocco)
Identification and notification on an ongoing basis	• Well-defined, consistently enforced procedures. • Deaths identified in both facilities and communities • Notification occurs within 24 - 48 hours • Procedures integrated into national system for notifiable disease reporting	• Well-defined, consistently enforced procedures • Deaths identified in both facilities and communities • Notification occurs within 24 hours • Procedures NOT integrated into national system for notifiable disease reporting	• Procedures NOT well defined at the community level • Deaths identified in both facilities and communities • Notification occurs to authorities, but no time is specified. • Procedures NOT integrated into national system for notifiable disease reporting
Review of maternal deaths by local maternal death review committees	• Clearly defined data processes • Medical and nonmedical contributing factors examined • Avoidability assessed • Recommendations developed and implemented	• Medical and nonmedical contributing factors examined • Avoidability assessed • Recommendations developed and implemented	• Medical and nonmedical contributing factors examined • Avoidability assessed • Recommendations developed and implemented
Analysis and interpretation of aggregated findings from reviews	• Reviews occur at all administrative levels • Evidence-based recommendations made at each level	• Reviews occur at district level • Evidence-based recommendations made at district level • NO national level review	• Reviews occur at national level • Evidence-based recommendations made at national level • NO district level review committee.
Respond and monitor response	• Evidence-based recommendations implemented at all administrative levels • Monitoring of recommendations occurs regularly	• Evidence-based recommendations implemented at community and district levels ONLY • Monitoring of recommendations occurs regularly	• Evidence-based recommendations implemented at national level ONLY • Monitoring of recommendations occurs regularly
Monitoring and evaluation (M&E)	• M&E of the MDSR system occurs regularly	• No M&E component to this review mechanism	• No M&E component to this review mechanism
Key Challenges		• Separation of MDR from infectious disease notification inhibits timely reporting • Lack of national review committee prevents response to broader country-wide maternal care challenges • Lack of M&E component prevents government from identifying weaknesses in the surveillance system	• Inconsistent case definitions, notification rules, and reporting guidelines lead to incomplete data collection • Separation of MDR from infectious disease notification inhibits timely reporting. • Lack of district review committees prevents response to important district-specific maternal health challenges • Lack of M&E component prevents government from identifying weaknesses in the surveillance system

Maternal Death Reporting in Haiti

Haiti does not have a coordinated system for maternal death recording and reporting. As a result, pertinent information around the country's maternal deaths is either not collected or does not reach MOH decision makers who are best equipped to respond to gaps in health care. In the current system, Haitian law requires that civil registration offices be notified of all deaths in the country at either the facility or the community level within 24 hours of occurrence (Diagnostic and Development Group S.A., 2015). For deaths that occur in a facility, the attending physician must record the death in the facility's internal death registry and then share this information with the nearest civil registry office. The nearest civil registry office than sends the information to the civil registry office located in the jurisdiction of the deceased's last residence. The information is then recorded in this office's death registry book which is maintained by the Ministry of Justice. Only two of the country's 10 departmental hospitals—both based in Port-au-Prince—demonstrated the ability to maintain a proper list of deaths in a 2015 evaluation (Diagnostic and Development Group S.A., 2015).

Standard registry books and death certificates in Haiti collect basic demographic information, but are absent of causation details. Neither asks for information that would allow for the identification of a maternal-related death nor is this information separated out by health facilities (Diagnostic and Development Group S.A., 2015). Once recorded through proper channels, death information should technically be stored in the National Archives Office (Diagnostic and Development Group S.A., 2015). In practice, however, these files are usually stored in the Medical Director's office of the facility where the death occurred which contributes to fragmented nature of Haiti's maternal death recording practices (Diagnostic and Development

Group S.A., 2015). Both the civil registration and central statistics office collect information through a paper-based system that the government is slowly digitizing with help from the Organization of American States (OAS) (OAS, 2008).

In 1999, a situational analysis on health conducted by the Pan American Health Organization (PAHO) (2002) reported that a total of 7,997 death certificates were issued that year in Haiti. These deaths, however, were estimated to represent only 10% of all deaths that occurred in Haiti in 1999 demonstrating the extent to which gaps exist in Haiti's death registration system (PAHO, 2002). This suggested underreporting may be explained by two factors. First, Haiti has 189 civil registry offices assigned to serve 570 communes. Theoretically, each of these communes should have its own civil registry office (Diagnostic and Development Group S.A., 2015). This implies a shortage in civil registry officers relative to the population that each civil registry office serves. Second, as mentioned previously in reference to health care access, only 47% of the national population has access to health care facilities (Diagnostic and Development Group S.A., 2015), which means that a large proportion of deaths are probably occurring outside of a health facilities and, therefore, are most likely not recorded.

Haiti does not have a comprehensive death notification system that is able to identify death occurrences and causes. This makes it difficult to create an accurate picture of the country's maternal mortality status. Without such a system, maternal mortality must be estimated through the triangulation of surveys, census data, and individual death registries which contribute to a Reproductive-Age Mortality Survey (RAMOS) (WHO, 2015b).

RAMOS is the most effective method for estimating maternal mortality in the absence of a nationally standardized MDSR. A RAMOS pilot study was implemented in Haiti in 2015 as the precursor to a formal 2016 RAMOS assessment. The 2016 assessment will be facilitated through a multilateral partnership between the MOH Family Health Department, H4 partners (WHO, UNFPA, UNICEF and The World Bank), and the U.S. Centers for Disease Control and Prevention (CDC). Until this formal assessment is completed though, the most recent validated MMR data available for Haiti was collected by the DHS program between 2005-2006 and analyzed by H4 partners (2014).

MDSR Technical Guidance

WHO's MDSR Technical Guidance is key to supporting the Haitian MOH in establishing a more effective system for estimating its MMR. Currently, WHO's MDSR Technical Guidance Working Group coordinates training workshops for the 75 countries seeking to implement MDSR (Mathai, 2015). Because almost all of these countries requested further technical assistance, WHO published the MDSR Technical Guidance in 2013 (WHO, 2013). However, the slow progress made by the majority of countries who originally expressed interest in MDSR is an indication that these countries need further resources which explicitly address how to implement MDSR with respect to their specific national circumstances (Mathai, 2015).

Further, the MDSR case studies included in this literature review demonstrate that countries seeking to improve their maternal mortality surveillance systems experience different implementation challenges that are oftentimes culturally driven. However, only a few countries (namely Uganda, Iraq, and Ethiopia) have adapted the WHO MDSR Technical Guidelines to

meet their country-specific needs. These countries have published their adapted national guidelines, yet no literature exists to evaluate the effectiveness of their modifications. Additional culturally relevant tools are imperative to translating the WHO MDSR Technical Guidance into practice in Haiti.

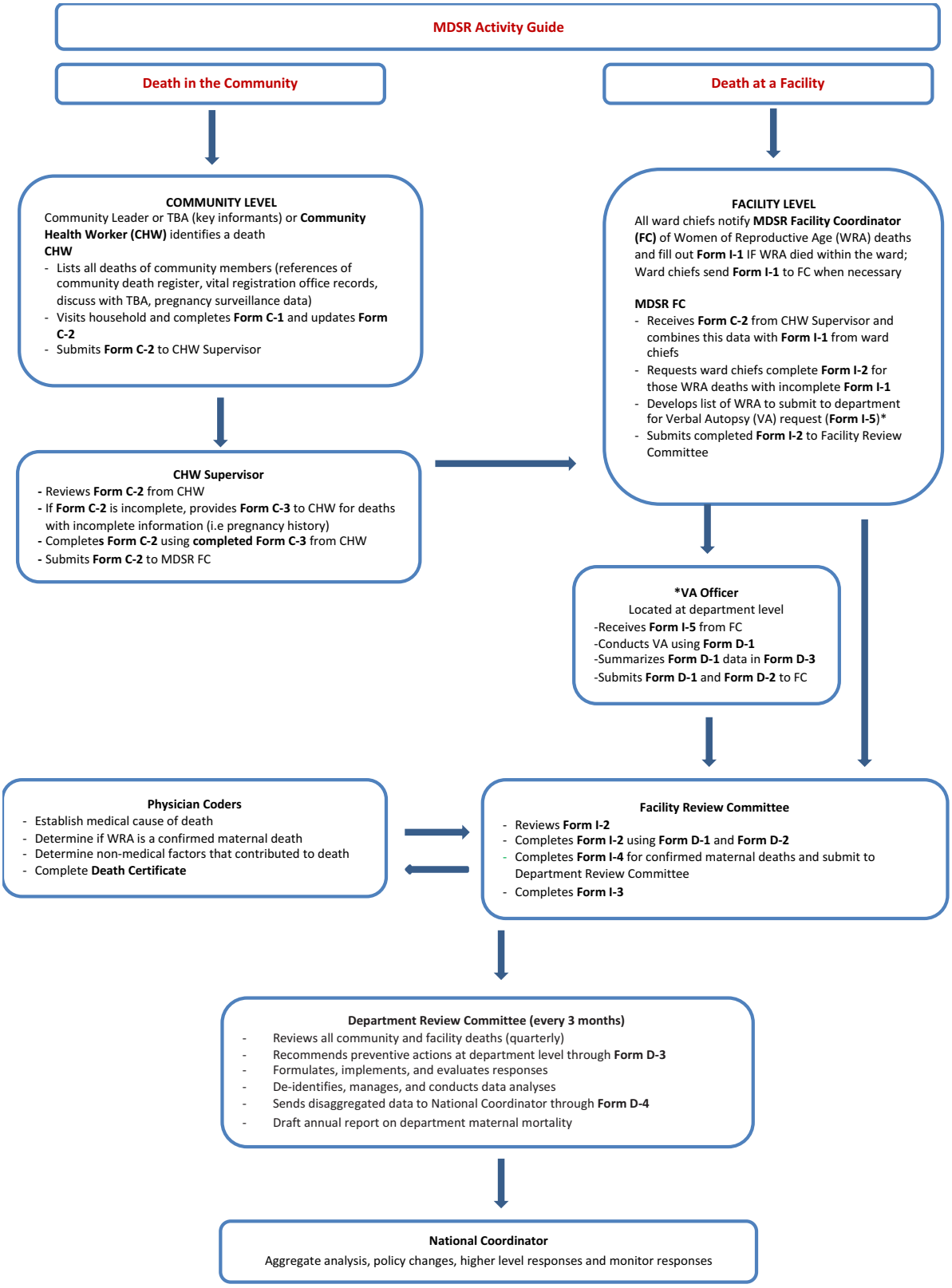
Two of the most important components of MDSR—demonstrated in Ethiopia—include implementation of a national mandate of reporting maternal death and the establishment of a MDSR national oversight committee (Hounton, 2013). Prior to MDSR implementation in Ethiopia, maternal death was not explicitly identified as a cause of death in the national registration system similar to Haiti's current system. Therefore, these data were not collected. Once Ethiopia added "maternal death" and/or "pregnancy-related complications" criterion to their death certificates and registry books, it was possible for MDSR to collect comprehensive information surrounding the country's maternal deaths.

The second important component from case studies in Ethiopia, India, and Morocco is establishing an oversight committee at the administrative level to monitor MDSR; just as an integrated disease surveillance system has a committee to oversee disease epidemic control (Hounton, 2013). Ethiopia and Morocco's MDSR oversight committee—housed at the national level within the MOH—is responsible for strategic planning and implementation of MDSR as well as the integration of MDSR into the national integrated disease surveillance and response system. Ethiopia's full implementation model shows how these oversight committees successfully act as a checks and balances agency at each level; India's partial-implementation model shows how lacking oversight at the national level inhibits large-scale changes; and

Morocco's model shows how lacking oversight at the regional level results in province-specific data being missed.

As mentioned in the MDSR Technical Guidelines (2013), every country's national MDSR implementation plan will differ based on the local context. Both of these functions though should be easily replicable in Haiti given the national government's authority to update the national death registration system as well as its commitment to improving current practices which would drive the organization of oversight committees. A suggested structure for how to implement both of these critical components in Haiti is represented in Figure 2.

Figure 2: MDSR Flow Chart for Haiti



Conclusion

Until recently, Haiti based its maternal mortality data on a decentralized combination of periodic DHS. With the advent of the UN SDG (2015), Haiti has found renewed political support for improving maternal health care. Such national government support puts Haiti in a prime position to transition its outdated reporting practices to an epidemiologically-based surveillance system such as MDSR (Mathai, 2015). This active, cyclical reporting mechanism will link together vital statistics structures with quality assurance practices throughout the national health care system (Mathai, 2015). This will, in turn, inspire interventions that will decrease cases of maternal mortality in Haiti.

To be successful, though, full implementation of MDSR requires political buy-in at all levels as well as appropriate training for health care providers. This requires the Haitian government to take the initial steps of mandating maternal death reporting and organizing MDSR committees as the community, district, and national levels. More resources are also needed to build capacity of local health care providers in Haiti to achieve full implementation of MDSR. Implementation guidelines adapted to Haiti's specific needs is one such resource.

The next chapter concerning methods for this special studies project will outline key steps around development of the implementation guidelines. These steps primarily include the distribution of a survey to MOH staff to narrow the focus of the adaptation process. The guidelines are then developed based on survey responses. Finally, data quality and limitations are evaluated.

METHODS

Introduction

This chapter outlines the steps taken—from the development of an MOH survey to guideline development strategies—to finalize the MDSR implementation guidelines. The preliminary subsections on data collection and analysis explain how the survey instrument was created and implemented. Then, the researcher describes how these data were merged with literature review findings to further refine guideline content and formatting. Finally, the researcher discusses ethical considerations of the project along with the strengths and limitations of the research data quality.

Survey Development

The researcher used information collected from the literature combined with a comparison of MDSR reporting and notification flow charts (created by PHSRT) to identify potential areas of weakness in MDSR implementation. These identified areas were then developed into survey questions in English and then translated to French by a local consultant. All survey participants spoke French so, further translation into Creole was unnecessary for this audience. The survey is included in Appendix 1.

Data Collection. After completing the literature review, the researcher then drafted an operational research survey for community-, facility-, and department-level MOH staff to determine a didactic starting point for tailoring the guidelines' content to the Haitian context. This survey was distributed in hard copy during a regional meeting in Les Cayes, Haiti on

December 10, 2015. Its purpose was to explore perceived barriers to MDSR guideline implementation. Due to the nature of the planned meeting and pre-scheduled PHSRT staff travel, in-person distribution was chosen as the timeliest and most cost-effective method for survey implementation.

Hard copies of the survey were distributed to 44 participants from five departments. PHSRT staff explained the survey in English and, through direct translation, their instructions were translated for participants into French. The on-site translator then read through the English version of the survey and translated each survey question to participants in French. This direct translation method accommodated for the insufficient number of available French hard copies. Participants without the hard copy of the French survey listened to the translated questions and hand wrote their responses on blank paper in French. PHSRT received 21 responses from the survey.

Data Analysis. The researcher entered data from the completed surveys into an excel spreadsheet and drafted summary statistics. The participant group was composed of one maternal and child health specialist and one epidemiologist from each department, two members of the facility review committee, and one member of the community review committee from two hospitals in each department. The researcher then determined potential key findings to share with the project's subject matter experts based on which multiple choice options received the majority of responses and which of these majority responses varied from the response(s) that PHSRT initially expected. The researcher and the experts deliberated on how to apply these findings to MDSR Technical Guidance for adaptation to the Haitian context. The survey questions ultimately assessed the barriers to MDSR implementation for MOH staff and provided MOH and

CDC staff with a better understanding of the strengths and knowledge gaps among community and facility health workers who implement MDSR.

Results. When asked about the greatest challenge in implementing MDSR, 84% (N=21) of respondents indicated that identifying all women of reproductive age (WRA) who died in the community was the largest obstacle among MOH staff. This was closely followed by 62% of respondents citing the department's ability to compile WRA death data from both community and facility levels. When asked about the most common mistakes made at the community and facility level in implementing maternal mortality surveillance activities, 86% of respondents suggested that a failure to fill out all forms in their entirety was the most common. Similarly, 90% reported the most challenging part of MDSR implementation specific to the community health worker's role was the ability to properly identify exact cause of death.

In reference to maternal death review protocol, 62% of respondents indicated that it was most logical to review community deaths at the community level before submitting this data to the facility level.

The topics identified as the most critical to cover in future MDSR trainings at the community and facility level were noted (in order of significance) as the overall importance of MDSR (90%), the overall sequence of MDSR activities (57%), and how to properly complete all reporting and notification forms (52%).

Regarding formatting of the guidelines, 67% of respondents indicated that the most logical structure for MDSR functions and standard operation procedures was by administrative level versus type of activity. A photo-copy friendly pocket-sized guide with a heavy emphasis on images and plain language was selected as the best type of resource for knowledge sharing in the Haitian context.

Guideline Development

The researcher developed the Haitian-specific implementation guidelines to improve the capacity of the target audience to consistently and effectively implement MDSR in Haiti via the national integrated disease surveillance system. The structure and format of these guidelines are loosely based on a Haiti-specific MDSR flowchart created by PHSRT. The content is based on the Technical Guidance document developed by the WHO MDSR Technical Working Group. The literature review established the need for MDSR, determined the key challenges of implementing maternal mortality surveillance systems, and justified the development of guidelines as an effective tool for the successful implementation of this surveillance system. An operational research survey (developed by the researcher with the support of PHSRT) of MOH staff informed the adaptation of both structure/format and content to the Haitian context. Therefore, literature review solidified the platform on which the implementation guidelines should be developed for Haiti; subject matter experts informed the practical application of the literature review findings; and the survey informed the adaptation of the guidelines to the Haitian context.

IRB Exemption

The survey portion of this project included human subjects. However, it was not considered human subject research because of its programmatic nature and, therefore, did not require Emory Institutional Review Board approval. The primary objective of this project was to determine the quality of the MDSR implementation guidelines as a resource, not the effects of the training materials on individual participants.

Quality and Limitations

Using secondary data as the main source of information for the literature review and, subsequently for the guidelines, had both advantages and disadvantages. On one hand, it was easy to access a wide breadth of materials available on the Internet. This was a low-cost research option due to the sheer amount of information that is accessible free of charge online. Resources were also provided by PHSRT which helped to expedite research. Data collected from the operational research survey was convenient and cost-effective in that PHSRT staff were already attending a regional meeting in Haiti and a translator was already present.

The disadvantages of this research approach were the occasional difficulty in evaluating the quality of the information collected and the lack of control the researcher had in finding information on more specialized topics. Further, a select number of documents shared by PHSRT were unpublished and, for confidentiality/security reasons, could not be used or cited in the literature review despite their relevance. The researcher also attempted to restrict resources by date with preference to articles published after 2010. However, this was a fruitless effort given the lack of studies and literature that has been published since that date.

Limitations of the survey were mostly due to small sample size, cultural differences and imprecise estimations of participants' current knowledge of MDSR. Only 21 individuals participated in the survey of which we received varying completed responses to each survey question. In addition, some respondents took the survey in hard copy while others had to write out their responses. These inconsistent methods render much of the data informative for the implementation guidelines, but not generalizable.

Cultural challenges arose in the participants' unwillingness to ask for clarification if they did not understand the questions and PHSRT did not monitor whether or not participants were keeping up with the translator. According to PHSRT staff, the group was reportedly shy and did not want to ask for help when they did not understand questions that asked them to rank their responses. PHSRT staff observed that, in these cases, participants simply skipped the question which resulted in nine participants leaving blank responses to 1-2 questions each. The researcher then had to re-review the questions asked and interpret some responses differently based on the participants' understanding of what was asked i.e. ranked questions were interpreted as "check all that apply" questions.

Participants' minimal current knowledge of MDSR also impacted their responses. For example, one question had to be omitted entirely because the audience had yet to learn about community-based surveillance methods. This knowledge gap rendered the question irrelevant at the time of the survey. These challenges with participant understanding, specifically the margin of error in

translation and interpretation of participants' handwritten responses from French to English, during data input may have altered data to a minor extent.

Conclusion

The literature review provided the platform on which the MDSR implementation guidelines would function in Haiti. This background guided participant selection and structure of the operational research survey which informed the content of the guidelines along with input from project supervisors who, for these purposes, can be considered Haiti "experts". Quantitative data from pre-/post- pilot test surveys confirmed effectiveness of the guidelines while also identifying areas of improvement. While there were a number of research limitations, the information gathered from the literature review and guideline development process was invaluable to the development of the MDSR implementation guidelines in Haiti.

SYNTHESIS

Introduction

The WHO MDSR Technical Guidance was developed in English and translated into French since being published in 2013. Despite two successful pilot studies (in Senegal and Zambia) and one full implementation case study (in Ethiopia), MDSR is underutilized because ministries of health do not have the detailed level of instruction they need to adapt these principles to their respective health systems. The WHO MDSR Technical Guidance is a strong resource for outlining the founding principles of MDSR; it is most effectively used as a conceptual tool for marketing the key principles of MDSR to national-level MOH staff.

This resource, however, does not include instructions or detailed information on the activities required to implement the system, specifically for MOH staff working at the community and regional levels. The literature review, survey, and input from subject matter experts (SME) allowed for the development of these adapted implementation guidelines for the Haitian context. The SMEs supporting this project included a Medical Epidemiologist specializing in maternal and child health issues with expertise in pedagogy and possessing an extensive background in Haiti; an Obstetrician/ Gynecologist (OB/GYN) skilled in maternal health guideline development and a geographic focus on Haiti; and the Director of the Center for Humanitarian Emergencies at Emory University.

Adaptation Process

Literature Review and SME. The Haitian government decided in 2014 to prioritize and begin preparation for the implementation of MDSR across the country starting with a pilot training at the Albert Schwietzer Hospital in 2014 and Milot Hospital in 2015. As the literature suggests, there are many socio-economic factors and legal considerations that may impact how and the extent to which MDSR can be adapted. The literature suggests that any implementation guidelines need to be adapted to account for country-specific health care infrastructure and organizational structure (i.e. national, department, facility, and community administrative levels); laws and policies surrounding reproductive health (i.e. illegality of abortion); current human resources (i.e. a pronounced shortage of OB/GYNs and midwives); financial capacity (i.e. the MOH was allocated only 6% of the national budget in 2013) (USAID, 2014); language (i.e. MDSR implementers at the community level mainly speak Creole); and cultural norms (i.e. women traditionally give birth in the home).

At the highest (national) level, the literature review research suggested that MOH leadership need to fully comprehend the ongoing and cyclical nature of MDSR, how it will contribute to the decrease of maternal mortality in Haiti and how the system will be implemented at the national, departmental, facility, and community levels and the sequence of activities involved at each administrative level. The MDSR: Implementation Guidelines for Haiti walks MOH staff through these systemic components. At the grassroots (community) level, survey results suggested that community health workers (CHWs) and facility staff need to understand how to identify suspected maternal deaths, how to efficiently report and compile these deaths, and how to effectively translate these data into recommendations for action at all administrative levels.

The researcher developed the guidelines' overall objectives based on the above goals. The two-fold objectives for MDSR: Implementation Guidelines for Haiti are:

- To improve understanding of the significance and sequence of MDSR among relevant MOH staff; and
- To strengthen MOH staff capacity to properly implement MDSR, specifically, to improve techniques for the proper identification of maternal mortality cases

To achieve these two objectives, the adapted guidelines include both conceptual and technical chapters alike that will provide key decision makers as well as grassroots staff with the information they need to build a foundation for MDSR in Haiti. Current literature informed the broad chapters that include background information, socio-cultural challenges that will need to be addressed throughout the lifetime of MDSR implementation in Haiti, legislative support for the implementation of such a system, and baseline steps for integrating the system into current disease surveillance programming. Survey findings determined the topics of the technical chapters while SMEs informed their content including concrete descriptions of roles and responsibilities as well as step-by-step instructions on when and how to implement MDSR at each administrative level in MOH; how to formulate recommendations for improving the MDSR cycle; and how to monitor and evaluate MDSR procedures.

Survey Findings. The top three challenges participants selected for implementing MDSR in Haiti were identifying all WRA who die in the community; compiling WRA death data from both the community and the facility; and collecting (or triangulating) maternal death information

from multiple sources. Further, the most common mistakes among staff at all levels when reporting maternal deaths are failing to complete all necessary forms and failing to submit these forms to the appropriate recipient in a timely manner. The most challenging part of the MDSR process for a CHW is determining the cause(s) of a death that takes place in the community. It was also noted that both community and facility staff need further training and/or information on which forms to use/how to complete them, the importance of MDSR, and the general sequence of the system.

For adaptation purposes, the results suggested the need for a strong supervisory presence throughout the guidelines chapters that address reporting and notification processes, specifically to ensure that both of these processes happen at the community level. The MDSR Facility Coordinator (FC) should thus identify key informants (KIs) at the community level where CHWs are not present and ensure that they use and complete the appropriate forms. Supervisors at both the facility and community levels should also ensure KIs and CHWs know *how* to identify deaths and that they both know *when* to report/submit forms to the facility, respectively. These activities have been integrated into the MDSR: Implementation Guidelines for Haiti.

Respondents also suggested that the most convenient way to aggregate information on community deaths is first through individual community-level review committees as opposed to at the facility or department review committees. Logically, this does make the sense. However, SMEs felt it important to establish the largest review committee(s) first and the grassroots committees last. In this way, the basic review infrastructure exists and the process for national decision making can begin. Establishing community review committees is ideal and should be

considered a long-term objective once national, department, and facility review committees have been adequately established. Further validating this decision, the WHO MDSR Technical Guidance (2013) recommends that, when transitioning to an MDSR system, the "…depth [starting point] of the review should provide the most benefit for the least cost" and that "...the simplest and least expensive methodology is a regular, formalized, **facility-based** review" (p. 23). As MDSR in Haiti remains in its nascent stage, the review process in the guidelines begins at the facility level and flows upward from there to the department and national review committees.

Respondents offered that organizing guideline procedures by administrative level (i.e. community, facility, department, national) as opposed to activity level (i.e. identification, notification, analysis, maternal death review, etc.) would be the easiest to read and understand. Thus, the guidelines outline the processes of identification and notification separately at the community and at the facility levels. Activities are then organized up the MOH hierarchy to department and finally to national level responsibilities.

The most effective delivery approach, according to participants, for this resource is a pocket guide with accompanying pictures and images that uses plain (not clinical) language. Due to the request for "plain" language, the translated guidelines were critically reviewed in French and adjusted to ensure simple wording for non-technical implementing actors such as KI. In addition, photocopying was indicated as the most convenient way for KI, CHW, and facility staff to access the necessary forms. Thus, the pocket guide was developed to include all necessary forms as fold-outs that can be easily photocopied by implementing staff.

Strengths. The ability for PHSRT staff to travel to Haiti and work directly with many of the decision makers who will be responsible for the implementation of MDSR was invaluable to the final deliverable. For this same reason, the opportunity to conduct a survey on many of the department and national staff who will potentially be involved in the department and national review committees was also essential to creating a culturally-appropriate product. Input from these sources combined with SMEs ensured that the guidelines were relevant to Haiti and systematically feasible.

The numerous orientation trainings that PHSRT provided the foundation for MDSR in Haiti and successfully achieved the implementation guidelines' first objective to improve MOH staff understanding of the significance and sequence of MDSR. Similarly, a pilot training scheduled to take place in May 2016 will contribute to the achievement of the second objective to strengthen MOH staff capacity to properly implement MDSR. The pilot training will specifically outline techniques to improve staff ability to properly identify maternal mortality cases which, in turn, has the potential to reduce the number of national deaths from maternal causes. The guidelines can improve consistency of surveillance habits and improve patient care so that women facing similar maternal complications to those who have died will receive better care and have a better chance of survival. These guidelines will ultimately ensure a standardized maternal mortality surveillance system that will provide the MOH with detailed, key information on how to improve maternal health outcomes in Haiti.

Limitations. The most glaring gap in the process of developing the implementation guidelines was the lack of Haitian involvement. While SMEs had significant experience working

in Haiti, their repertoire does not compare to Haitian residents who live and work in the context where this deliverable will be used. PHSRT shared outlines and drafts of the final product with MOH counterparts along the way and solicited feedback. However, the primary content was generated by non-Haitians, which sometimes delayed development progress as numerous rounds of edits were necessary to accurately convey correct MDSR processes.

In addition, the survey's small sample size and inconsistent results were not as useful as they could have been. With only 21 participants, it was decided that the results were not generalizable and that they could only be used as a rough guide for determining content. Further, survey participants were unevenly distributed in that they largely only included MOH staff working at the department and national level. While it is important to consider the opinions of this cohort, KIs and CHWs are the key individuals implementing the guidelines and, thus, their input would be directly relevant to the content of the final deliverable. There were also some minor translation and printing issues during distribution of the survey, which with better planning, could have been avoided and produced more robust and accurate responses than what was received.

Finally, only one true case study was used as a model for the development of MDSR implementation tools: Ethiopia. This meant that there was little to base PHSRT's adaptation strategy off of outside of self-directed learning. The lessons learned and data from more case studies may have strengthened the guideline development process or provided a more concrete set of protocols for how to approach this project.

Next Steps and Recommendations

The following recommendations are intended to resolve and improve upon the above limitations. By addressing the issues above, these recommendations will expand the reach of MDSR by solidifying the implementation guidelines development process. The establishment of a concreate protocol for other national governments to follow who seek to adapt WHO's Technical Guidance would significantly expedite the MDSR adaptation process.

Next Steps for Haiti. PHSRT initiated several trainings prior to the start of guideline development to set the stage for effective implementation. During the development process (beginning in October 2015), the team hosted five additional trainings for MOH staff during previously scheduled field visits. Once the content is finalized and approved from both CDC and the MOH, the guidelines will be piloted in a 5-day MOH training scheduled to take place in May 2016. PHSRT staff will provide a brief overview explaining the purpose of the guidelines, how they should be used, and what information they include. Each participant of the pilot group will also take a pre-/-post survey to gauge their knowledge gaps and self-efficacy in recording cases of maternal mortality. The pilot group should take the pre-/post-tests two months apart and PHSRT will then compare the results from both sets of tests to evaluate the effectiveness of the guidelines and the quality of the guidelines training. Feedback from this pilot training should be integrated back into the guidelines and used to better adapt its content to MOH staff needs and current knowledge of the system.

Once content for the guidelines is finalized, PHSRT should format them for printing into 8x11 booklets. PHSRT would then deliver and distribute these booklets to a second pilot test group of

MOH staff. UN and United States government partner agencies (i.e. Jhpiego) should identify the most appropriate participants for the pilot test group. CDC should then collect feedback on the booklet format and style and make adjustments to their booklet model accordingly. The MOH should then work with CDC to develop an implementation plan where the guidelines will be systematically integrated into different levels of Haiti's National Sentinel Site Surveillance System.

Further, while MDSR includes monitoring and evaluation activities at each administrative level, the MOH and CDC should develop a long term, periodic plan for external evaluations. Such evaluations should take place every 3-5 years (or whenever the WHO MDSR Technical Guidance is updated) and would ideally be implemented by CDC, but could also be implemented by other external partners as the MOH sees fit. By gathering key information on MDSR functions from an outside perspective, the implementing partner would identify any missing steps or critical knowledge gaps that may exist within the MOH's MDSR activities – thus evaluating progress on the implementation guidelines' two objectives. The evaluation would also identify weaknesses in maternal health outcomes and/or impact which, in turn, would reveal Haiti's progress in achieving the WHO's original goal of the MDSR technical guidance to eliminate preventable maternal mortality by collecting data on *every* maternal death and using the data to develop evidence driven actions to prevent future death, and monitor the impact of action.

International Replication. Haiti is one of many countries interested in implementing MDSR. However, the guidelines developed for MOH are most effective for Haiti and Haiti

alone. Refining and replicating the adaptation processes taken in this project to apply MDSR in Haiti would be ideal for any other agency interested in assisting a national health department in implementing MDSR. One key lesson learned from this process in Haiti that should be considered in any other adaptation is the inclusion of MOH staff at all levels of the development process. This may seem obvious to many, but in the wake of deadlines and competing work priorities, it may be tempting as an external implementing party to save time on collecting local feedback and pushing forward into the next step of development. This would be a critical flaw in the guideline development process as integrating feedback from MOH staff is imperative to comprehensive adaptation.

Using the guideline development process utilized by Haiti is helpful for other countries seeking to replicate guideline adaption. However, digging deeper into the case study of Ethiopia and/or mobilizing a more comprehensive review of MDSR-implementing countries (i.e. Iraq may have one, but this was unconfirmed for the purposes of the literature review) may be an interesting exercise for learning more about best practices for developing a national MDSR system. Comparing the best practices from all three of these examples and more would allow other nations the develop adapted guidelines as efficiently and effectively as possible.

In evaluating the the best starting point for MOH staff, it would be ideal to plan trainings for MDSR that are separate from other field visits to ensure adequate time is spent explaining the system using quality information tailored to the learning needs and style of the target audience. Once context is provided and facilitators are confident in participants' understanding of the system, it may be appropriate to use a survey to gauge specific ways that the WHO MDSR

Technical Guidance should be adapted to the local context. If it is decided that a survey is the best data collection method, particular attention should be paid to recruiting a large enough sample of the target audience as well as equal availability to and distribution of the survey instrument. Depending on the depth of information collected in the survey, in-depth interviews or focus group discussions among KIs, CHWs, facility staff and MOH employees may provide better context for survey responses making adaptation of the guidelines easier.

Conclusion

Creating implementation guidelines of WHO's Technical Guidance for the Haitian MOH was a challenging honor. While the process was lengthy at times, the enthusiasm that MOH staff demonstrated at our orientation trainings suggest that this resource will effectively strengthen the capacity of MOH officials, facility staff, CHWs and KIs to respond to cases of maternal death; improving Haiti's overall maternal mortality surveillance efforts. By achieving both of the guidelines' objectives to improve understanding of MDSR and to strengthen MOH capacity to properly implement the system, this product contributes to the WHO SDG of to reducing national MMR from 350 maternal deaths to 70 per 100,000 live births by 2030 and, ultimately, WHO's larger goal to eliminate preventable maternal mortality.

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APPENDICES

Appendix 1: Survey

Health Systems Strengthening and Recovery Team
Division of Global Health Security
Center for Global Health
Centers for Disease Control and Prevention
November 2015

Following the National MDSR workshop held in Port au Prince in August 2014, *Le Ministère de la Santé Publique et de la Population* (MSPP) in collaboration with the Centers for Disease Control and Prevention want to continue strengthening Haiti's capacity to implement MDSR. CDC's Health Systems Strengthening and Recovery Team is conducting this online survey to assess the barriers to MDSR implementation and to better understand the strength and knowledge gaps among community and facility health workers who implement MDSR. The results of this online survey will inform the development of a new resource called the MDSR implementation guidelines. Your participation in this survey is voluntary and anonymous. It should take about 10 minutes to complete.

- Do you consent to voluntarily take this survey?
    - YES
    - NO

Please select the answer that most closely matches your belief(s). Where indicated, please select and/or rank all answers that apply.

1. At which level do you work?
    - Community
    - Facility
    - Department
    - National

2. What is your professional title?
    - Maternal and Child Health Officer
    - Surveillance Officer
    - Community Health Worker
    - Community Health Worker Supervisor
    - Nurse/midwife
    - Physician
    - Other (please specify):

3. Please select and then rank the top 3 challenges to implementing MDSR in Haiti? (1 = Most challenging, 3 = Less challenging)

- Identifying all women of reproductive age (WRA) who died in the community
- Identifying all WRA who died at a facility
- Determining whether a death is a maternal death
- Notifying MDSR Coordinator of a maternal death within 24 hours
- Compiling WRA death data from both community and facility levels
- Screening for pregnancy status
- Collecting maternal death information from multiple sources
- Completing the clinical case summary form
- Conducting the review process
- Developing a list of questions for the verbal autopsy interview
- Conducting the verbal autopsy interview
- Developing a summary sheet report of all community and facility deaths
- Developing recommendations for action
- Implementing recommendations for action
- Coordinating meetings between MDSR committees at the community and facility levels

4. How often are reporting mistakes made by community health workers, nurses, and MDSR facility coordinators make when processing occurrence and cause of maternal deaths?
    - Never
    - Almost Never
    - Sometimes
    - Frequently
    - Very Frequently

5. What are the most common mistakes community health workers, nurses, and MDSR facility coordinators make when reporting maternal deaths? (Check all that apply)
    - Reporting a WRA death as a suspected maternal death
    - Reporting a maternal death as a non-maternal death
    - Reporting a non-maternal death as a maternal death
    - Failing to complete all forms to completion
    - Failing to fill out the correct form
    - Failing to submit all forms to the appropriate recipient in a timely manner (24 hours for facility deaths, 48 hours for community deaths)
    - Other (please specify):

6. What is the most challenging part of the MDSR process for a community health worker?
    - Access to community members who report the death
    - Access to the resources (forms) required to report the death
    - Identification of the cause(s) of a death
    - Capture of complete and accurate data
    - Screening of pregnancy status
    - Reporting a death to the supervisor of a community health worker
    - Organizing a review committee
    - Other (please specify):

7. It is important to ensure that deaths occurring within a community are captured as accurately as those that occur within a facility. Which of these options would be the most convenient way to collect this information?
    - Review community deaths together with facility deaths at the facility level
    - Review community deaths together with facility deaths at the district level
    - Review community deaths through a community-level review committee

8. Which topics do community health workers, nurses, and MDSR facility coordinators need further training and/or information on regarding implementation of MDSR?
    - Screening for pregnancy status
    - Completing forms
    - Submitting forms to the appropriate supervisor
    - Timely reporting standards (i.e. reporting a community death within 48 hours, filing forms for facility deaths within 24 hours of the death)
    - Understanding why MDSR is important
    - Understanding the general sequence of MDSR activities
    - Other (please specify):

9. Would MDSR information be best understood in training materials if it were organized by administrative level (i.e. community, facility, department, national) or by the type of activity (i.e. identification, notification, analysis, maternal death review, etc.)?
    - By level
    - By activity

10. What are the three methods or approaches that have been the most successful for knowledge sharing among community health workers, nurses, and MDSR facility coordinators? (Please select up to 3 methods and rank them from most effective to less effective)
    - Pocket guides
    - Reference books
    - Pamphlets or brochures
    - Wall posters
    - Mobile applications
    - Videos
    - Presentations
    - Presentations with handouts

11. Regarding knowledge sharing using written materials, what is the format most easily understood among community health workers, nurses, and MDSR facility? (Please select up to 3 methods and rank them from most effective to less effective)
    - Text
    - Picture/image
    - Checklist
    - Algorithms
    - Decision aids
    - Flow chart
    - Graph

- Clinical language
- Plain language

12. What is the most convenient way for community health workers, nurses, and MDSR facility coordinators to acquire reporting forms?
    - Electronically (for example: email)
    - Print from email attachment or USB
    - Photocopy of a printed document
    - Receive paper copies from a department-level administrator
    - Other (please specify):

Thank you for your time!

Appendix 2: Maternal Death Surveillance and Response: Implementation Guidelines for Haiti – DRAFT 4/11/2016

(Attached in ETD Submission Form as a supplementary document)