# Epidemiological Surveillance of Maternal Mortality (1981-2012)

## COUNTRY: JAMAICA

GTR Grupo de Trabajo Regional para la REDUCCIÓN DE LA MORTALIDAD MATERNA

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# Table of Contents

# ABSTRACT

This case study traces the development of maternal mortality surveillance in Jamaica, a process that began with the awareness that vital data were not producing reliable maternal mortality estimates. The first confidential inquiry (1981–1983) confirmed the under-reporting of these adverse events. In order to integrate the monitoring of maternal deaths into the country's routine surveillance activities, maternal deaths were classified as a Class I notifiable event in 1998. The system relies on both active and passive surveillance to identify incident cases, initiating a full investigation of social determinants, and antenatal and inpatient care. A multi-disciplinary team including obstetricians, public health nurses, epidemiologists, and pathologists reviews each case to identify the medical causes of the death and the social and health system determinants amenable to intervention. Findings have been used to re-orient the delivery of maternal care by expanding access to outpatient, high-risk antenatal care; upgrading and increasing the number of hospitals providing comprehensive emergency obstetric care (CEmOC); improving management of the leading causes of death, such as hypertensive disorders and emerging conditions such as HIV/AIDS and obesity-related conditions (cardiovascular disease, diabetes mellitus). Our 30 years of experience have shown that reducing maternal deaths requires a consistent effort, as successes may be reversed when program efforts are not sustained. Health team members are fully sensitized to the importance of the identification and reporting of maternal deaths; however, achieving the MDG5 goal of 30/100,000 will require better access to tertiary services (e.g., high dependency units at CEmOC hospitals) and retraining staff to ensure continued attention according to established standards.

# GLOSSARY OF TERMS AND ABBREVIATIONS

| | |
|---|---|
| **CAREC** | Caribbean Epidemiology Research Centre |
| **CEmOC** | Comprehensive Emergency Obstetric Care |
| **DOA** | Dead on Arrival |
| **ESMM** | Epidemiological Surveillance of Maternal Mortality |
| **FHU** | Family Health Unit (Ministry of Health) |
| **HDU** | High-dependency unit – intermediate level unit between ward care and intensive care |
| **HIV/AIDS** | Human immunodeficiency virus infection/acquired immune deficiency syndrome |
| **ICD-10** | International Classification of Diseases, 10$^{th}$ revision |
| **ICD-MM** | International Classification of Diseases - Maternal Mortality |
| **ICU** | Intensive Care Unit |
| **MDG5** | Millennium Development Goal 5 (75% reduction in maternal mortality between 1990 and 2015) |
| **MMR** | Maternal mortality ratio |
| **MOH** | Ministry of Health |
| **NSU** | National Surveillance Unit (Ministry of Health) – unit coordinating all surveillance activities at national level |
| **PAHO** | Pan American Health Organization |
| **PMTCT** | Prevention of Mother- to-Child Transmission of HIV |
| **RAMOS** | Reproductive Age Mortality Study |
| **RGD** | Registrar General's Department – agency responsible for registration of births and deaths |
| **RHA** | Regional Health Authority – administrative health unit of 3–4 parish health departments and hospitals |
| **RTD** | Regional Technical Director – leader of the health team at the regional level |
| **WHO** | World Health Organization |

# 1. INTRODUCTION

## 1.1. History of maternal mortality epidemiological surveillance in Jamaica

Vital registration commenced in Jamaica in 1877. The first Registrar General's report documented a maternal mortality ratio (MMR) of 661 per 100,000 live births, and efforts began that same year to train and deploy community midwives to attend home deliveries. In the 1950s, community-based antenatal care was introduced, and improved access to modern contraception began in the 1970s;[1] together, these initiatives contributed to the gradual decline in Jamaica's MMR.[2] Jamaica's independence in 1962, however, brought on an exodus of skilled personnel in vital registration and a decline in the quality of vital data. By the late 1970s, health practitioners were expressing reservations about the accuracy of maternal mortality estimates from vital data, which seemed inconsistent with their clinical experience. These concerns triggered the first confidential inquiry into maternal death figures (1981–1983), which documented a maternal mortality more than double the official estimate;[3] a ratio that was confirmed again five years later.[4]

Efforts by the Ministry of Health (MOH) to institute voluntary reporting of maternal deaths were met with little success. A 1993–1995 hospital-based Reproductive Age Mortality Study (RAMOS) of maternal deaths suggested that this would be a valid strategy to monitor maternal deaths.[5] In order to integrate the identification of maternal deaths into routine surveillance, maternal deaths were classified as a Class

1 notifiable event in 1998, which ushered in Jamaica's continuous maternal mortality surveillance. The process requires that a suspected event be reported to the National Surveillance Unit (NSU) within 24 hours of identification, thus initiating a full investigation. Case finding is supported by the active surveillance of deaths in women 10–50 years old in whom there is evidence of pregnancy within one year of death.

At the time of the 1981–1983 confidential inquiry, 70% of births occurred in hospitals. The observed excess risk of maternal death among adolescent, primiparae, and high-parity mothers (para 0, 5+) led to a policy directive to refer these high-risk women for hospital delivery. Today, hospital delivery is almost universal in the country, with 99% of births occurring in institutions (96% in public hospitals; 3% in private hospitals, and 1% at home].[6]

In the last 10 years fertility has decreased rapidly among women under 30 years of age, but has been stable and has even increased among older women (Figure 1). High-parity births have been trending down, and recently there has been a relative growth of the number of women describing themselves as first-time mothers (Figure 2).

**Figure 1. Number of births, by maternal age group, Jamaica, 2000–2010.**

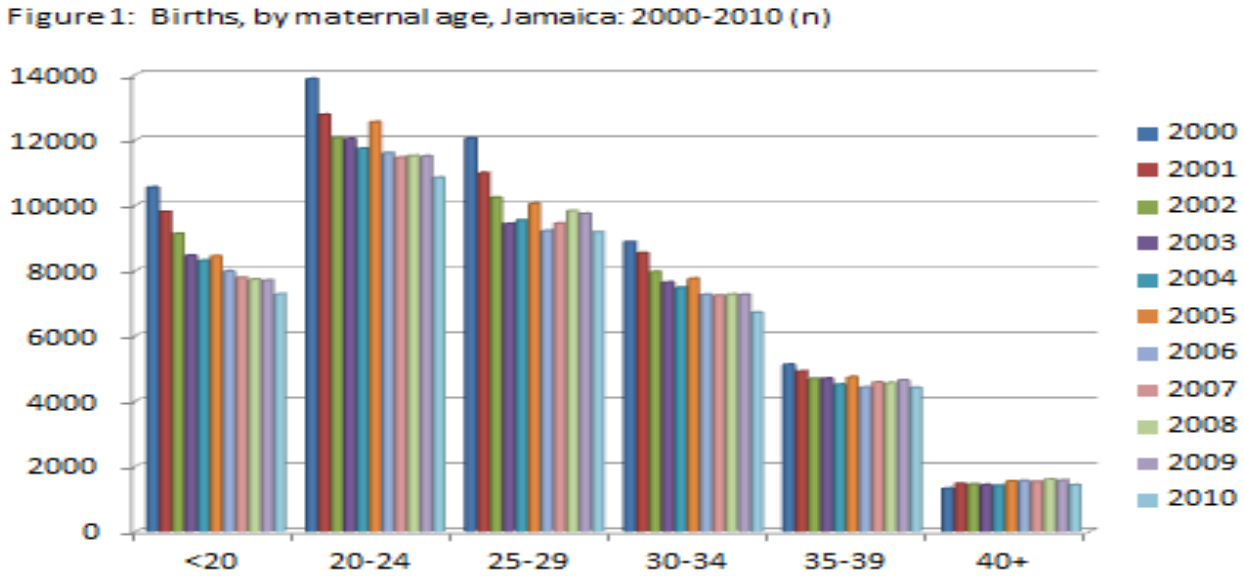
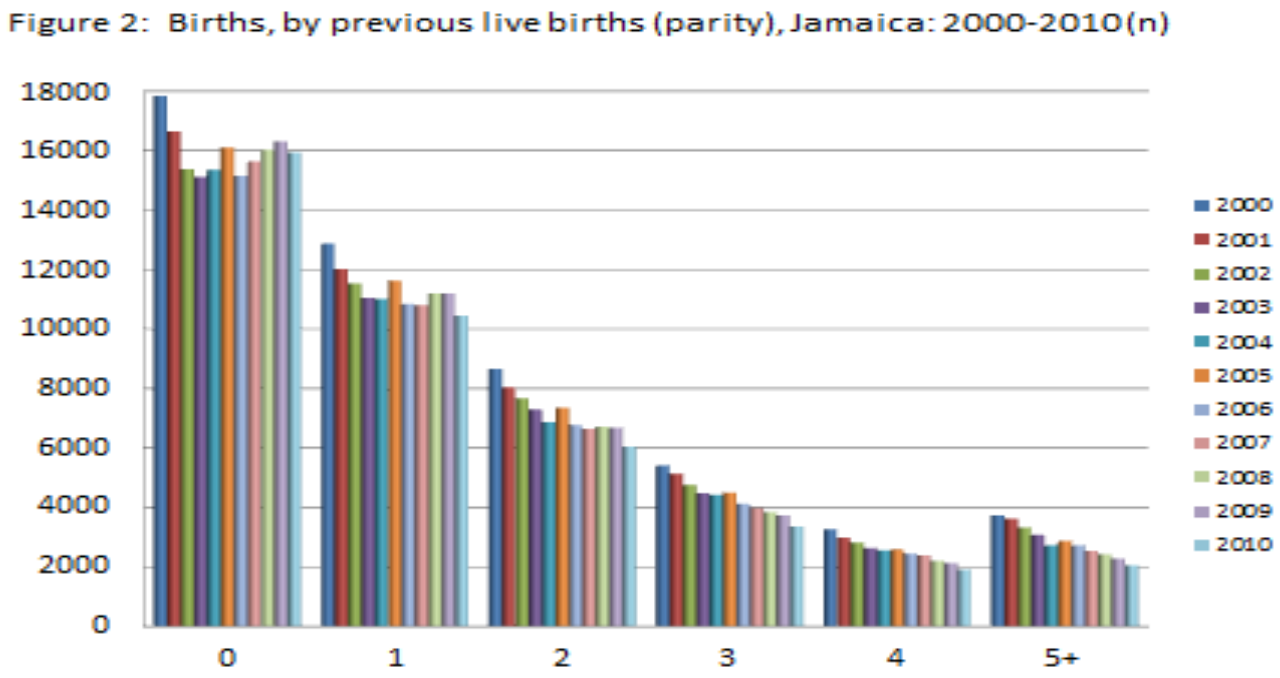


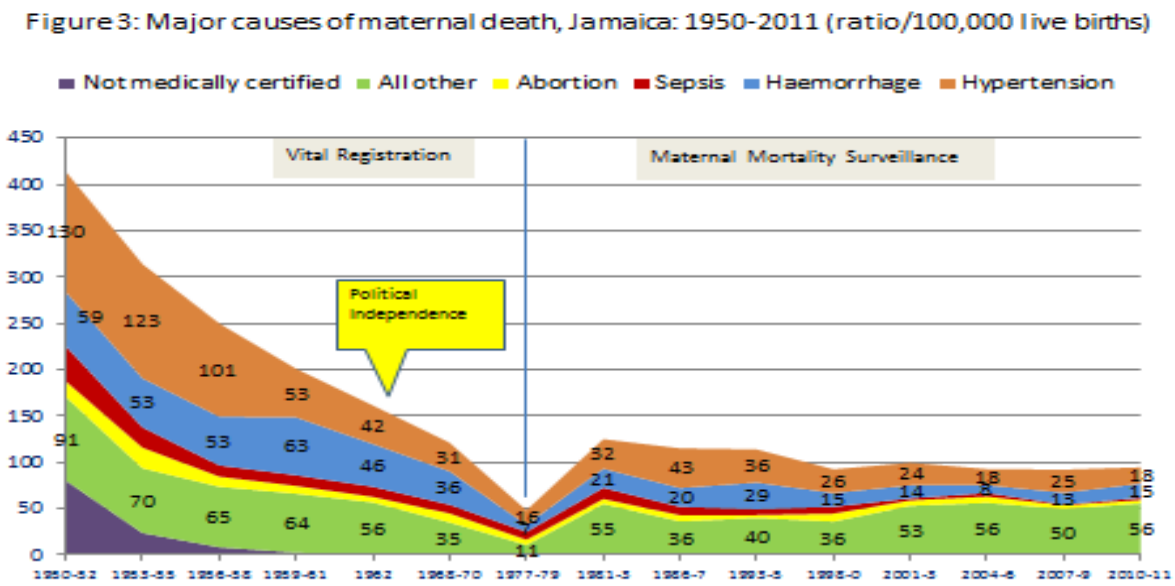
**Figure 2. Number of births, by previous live births (parity), Jamaica, 2000–2010.**




## 1.2. Maternal mortality: causes and trends

Hypertension and hemorrhage have been the leading causes of maternal death in Jamaica for over 50 years. While efforts to control these two conditions have met with some success, the category "all other," which includes mostly indirect deaths, has steadily increased. The major contributors are complications of obesity (cardiovascular disease and diabetes mellitus, among others), sickle cell disease, and the emergence of HIV/AIDS into the antenatal population (Figure 3).

**Figure 3. Major causes of maternal death, Jamaica, 1950–2011.**




## 1.3. Challenges with vital registration as a source of maternal mortality data

The increasing use of vital data to estimate maternal mortality[7,8] led to a 2008 investigation of why only one in five maternal deaths were reported in vital data. Of 51 maternal deaths identified, 29% (15 deaths) had not been registered or were registered too late to be counted in the year they occurred; 8% (4) were missed due to failure of the certifying physician to document the fact of pregnancy on the medical certificate; and 43% (22) were misclassified by coders at the Registrar General's Department (RGD) who failed to assign ICD-10 obstetric codes to these cases, representing the greatest source of data loss, however. Only 19% (10) were correctly coded, yielding a maternal mortality ratio of 24 per 100,000 live births from vital data, instead of the actual ratio of 120 per 100,000 for the universe of cases.[9] These errors were greater among indirect (<7% coded as maternal) than direct (25% coded as maternal) deaths. The MOH's surveillance system missed eight (16%) of the deaths, including five first trimester deaths in the community (four ectopic pregnancies; one abortion) and three direct deaths on non-obstetric hospital wards, including the intensive care unit (hypertension; hemorrhage; other).

# 2. METHODOLOGY AND FINDINGS

This review was conducted based on guidance from Family Care International, which requested that we describe the Jamaican maternal mortality surveillance system, how it came into existence, how it is integrated into the different levels of the health system; the process for identification, notification, and review of cases; and how these findings influence maternal health care. Published evidence on maternal mortality in Jamaica was reviewed, supplemented by primary data from the maternal mortality surveillance database and key informant interviews with persons engaged in the maternal mortality surveillance process (Appendix 1). Data were collected and analyzed between November and December 2012.

## 2.1. Organizational structure of maternal mortality surveillance within the Ministry of Health

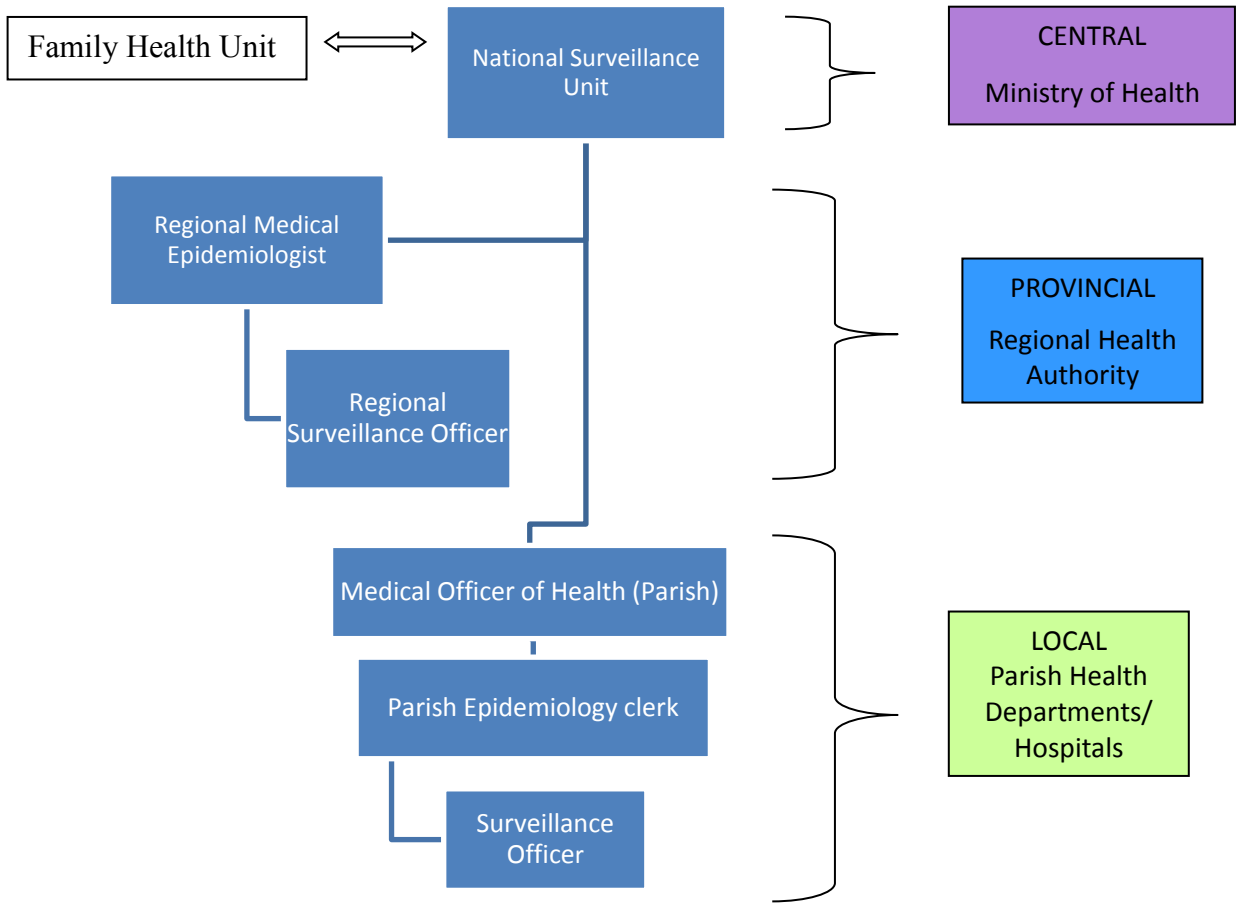
Jamaica's public health system is organized in three levels: local (13 parishes where hospital and primary care services are delivered); regional (the amalgamation of parishes into four administrative areas); and central (MOH). The four regional offices coordinate parish-level activities and report to the central MOH, which is responsible for policy and program directives (Appendix 2).

All surveillance activities, including maternal mortality epidemiological surveillance (MMES), are coordinated by the National Surveillance Unit (NSU) within the Health Promotion and Protection Branch

in the MOH. Local surveillance officers have multiple areas of responsibility for monitoring all Class I notifiable conditions. Suspected cases are reported directly to the MOH (using the Class I reporting form; see Appendix 3) and copied to the Regional Health Authorities (RHAs), which are responsible for coordinating the subsequent investigations. Maternal mortality surveillance has been in place since 1998.

MMES is integrated into routine surveillance activities, so a separate unit or reporting structure does not exist for ESMM (Figure 4). Once the maternal mortality reports reach the MOH, the NSU compiles them and then shares them with the Family Health Unit (FHU), which is ultimately responsible for monitoring, reporting, policy, and programming activities dealing with maternal mortality.

**Figure 4. Organizational structure for surveillance, Jamaica.**



## 2.2. Coverage and legal framework

Jamaica has 35 public and 8 private hospitals that provide institutional health care; in addition, 344 primary care health centers provide ambulatory care, including family planning, antenatal care, and postnatal care. Of the 35 public hospitals, 27 (77%) attend deliveries and are integrated into the MMES process (Table 1). Five of the private hospitals also attend deliveries and report voluntarily.

**Table 1: Facilities attending deliveries, by level of care, in Jamaica, 2012**

| Type of facility/ level of care | Comprehensive emergency obstetric care | Basic emergency obstetric care |
|---|---|---|
| Public hospitals | 9 | 9 |
| Private hospitals | 5* | -- |
| Community hospitals | - | 2 |
| Rural maternity centers | - | 2 |
| Total | **14** | **13** |

*These hospitals may not cover all signal functions, but provide physician-attended births, including C-sections.

The classification of maternal deaths as notifiable events brings them under the Public Health Act (revised in 2004), which provides the legal framework for monitoring all notifiable diseases, their treatment, and prevention. The mandatory reporting process is supported by active surveillance; in practice, the active surveillance of maternal deaths is limited to government facilities and relies on passive reporting from all but one private hospital. Any reported event, however, whether in a public or private facility or in the community, will be investigated. Maternal deaths are rare in private facilities, however, which only attend 3% of births. Complicated cases usually get transferred to, and may subsequently die in, public facilities, as none of the private facilities have tertiary care life support equipment, such as intensive care or high-dependency units.

## 2.3. Physical and human resources

Physical and administrative resources (i.e. materials and communication technology) are generally available for all surveillance activities at the central, regional and local levels. MMES shares resources (physical and human) with all other surveillance programs.

**The national surveillance guidelines[10] describe five levels for the flow of surveillance information:**

- **Level 1** – describes the points of first contact between the client and the health service. For mothers these include health centers, hospitals, private physicians, and other health care facilities. At this level, maternal deaths are identified through active surveillance.

- **Level 2** – includes laboratories and parish health departments, which coordinate case identification and investigation of notified cases. Preliminary data analysis occurs at this level, with reporting to the regional and national levels. Each parish has a medical officer of health (public health physician), a surveillance officer (public health nurse), and a parish epidemiology clerk.

- **Level 3** – is the Regional Surveillance Unit (RSU), which is housed in the RHA. Surveillance activities are coordinated by a regional medical epidemiologist, supported by a regional surveillance officer and, in some instances, by a regional epidemiology clerk and a hospital active surveillance nurse.

- **Level 4** – is the National Surveillance Unit (NSU), which collates notification data from levels 1–3, reviews the data to ensure that case reporting is complete, assists with the investigation of exceptional cases, and transforms the data into information for dissemination. A weekly surveillance bulletin is compiled and disseminated here. Maternal death case files are compiled by a National Surveillance Officer (a trained public health nurse) and shared with the Director of the Family Health Unit (FHU) (a public health physician). The Director of the FHU has primary responsibility for maternal and child health policy and programmatic development and monitoring.

- **Level 5** – addresses policy formulation and information dissemination. Personnel include the Chief Medical Officer, the Director of Health Promotion and Protection, who usually addresses public health issues with the support of the Permanent Secretary, under the aegis of the Minister of Health.

## 2.4. The MMES system: Identification, notification, data collection, and analysis of maternal deaths

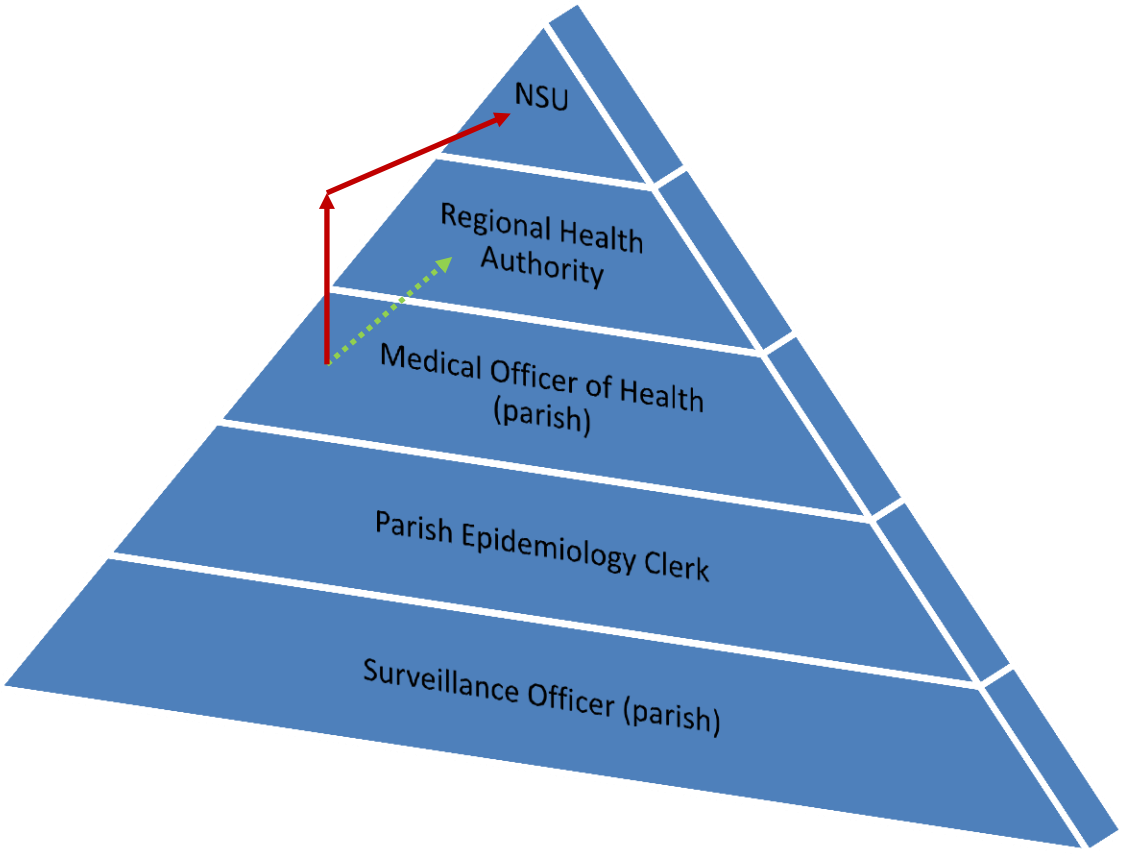
### Data collection

The maternal death surveillance guidelines[11] document the MMES process in Jamaica. Hospital active surveillance is done weekly by parish surveillance officers who review all death registers and ward registers (obstetrics, medicine, surgery, ICU, accident, and emergency) to identify potential cases. Suspected cases are defined as "any death in a woman of reproductive age (10–49 years) where there is evidence of pregnancy within one year of the death."

Figure 5 describes the data-collection and reporting flow and Table 2 details the reporting forms. The initial notice of a possible maternal death originates from the parishes, is submitted directly to the NSU, and is copied (indirect reporting) to the RHA. The region is responsible for conducting the case review, and reports its findings to the NSU at the MOH. There, all elements of the report are assembled (Appendices 3–7), and the fully compiled case report is copied to the Director of the FHU.

Data collection usually begins at the hospital where the death occurred. The surveillance notice (Appendix 3) documents the deceased's demographic details (age, date of death, and place of death) and initiates the case review. The attending physician is expected to complete a clinical summary report (Appendix 4) of the course of care preceding death. A public health nurse or midwife then visits the relatives of the deceased at home to document health-seeking behavior, other social determinants, and signs and symptoms preceding the most recent illness before death; if the deceased woman used public sector antenatal services, this process, too, is documented, and the combined home visit and antenatal report (Appendix 5) is completed. It is recommended that all maternal deaths undergo a post mortem examination. If the family agrees, the report of the findings (Appendix 6) is included. When these three items are available, a regional case review can be held (Table 2).

**Figure 5. Process of notification and reporting of cases.**




**Key:** (Direct report)
(Indirect report – by copy)

**Table 2: Maternal mortality epidemiological surveillance tools, Jamaica.**

| Form | Type of information | Responsible officer |
|---|---|---|
| **Class 1 Reporting form—individual notification (on suspicion) – *Appendix 3*** | Demographic and clinical information for a suspected case of maternal death | Surveillance officer (public health nurse)/medical officer of health (notification within 24 hours of case identification) |
| **Form 1—clinical summary - *Appendix 4*** | Clinical history (hospital) | Obstetrician/resident/consultant/ medical officer of health |
| **Form 2—home visit and antenatal report – *Appendix 5*** | Interview with relatives and antenatal history; a detailed home narrative report may be attached | Registered midwife/surveillance officer (public health nurse) |
| **Form 3—post mortem summary – *Appendix 6*** | Post mortem to identify causes of death | Pathologist /surveillance officer |
| **Form 4—maternal mortality case review summary – *Appendix 7*** | Summary report of case following case review | Review team/ regional medical epidemiologist |
| **Form 5—maternal mortality Registrar General's notification list* -- *Appendix 8*** | Case information for inclusion in vital registration system (quarterly updates) | Regional Surveillance Officer |
| **Form 6—maternal mortality surveillance monitoring report – *Appendix 9*** | Summary report of maternal deaths for region (updated monthly) | Regional medical epidemiologist or regional surveillance officer |

*Has not been implemented due to the non-completion of a data-sharing agreement between the MOH and the RGD.

## Regional and central case reviews

The frequency of regional case reviews depends on the health region and the number of deaths. Reviews may be carried out annually in the smallest region that has five or fewer deaths per year, or semi-annually or quarterly elsewhere. Review meetings conclude with a final determination of the cause of death, whether the death was avoidable, and whether there were any delays.[12] Discussions of changes in clinical care at the local level to prevent the recurrence of similar cases should also occur. A summary report (Appendix 7) is then prepared by the regional medical epidemiologist, the complete case file is sent to the NSU, and a copy is sent to the FHU. Monthly summary updates are provided to the NSU and the FHU (Appendix 9).

The final analysis and classification of maternal deaths is done at the central level by the FHU Director, often with the support of a reproductive health epidemiologist (Professor Affette McCaw-Binns,

University of the West Indies). Data are entered into the maternal mortality database, which is managed by the FHU Director. Any Issues that may have arisen from the regional-level reviews are discussed and addressed, and recommendation to the parish re issued. An annual meeting is held to discuss the national experience, review trends, and discuss issues that need national intervention, such as policy changes, new program development (e.g., in the prevention of mother-to-child transmission of HIV), and training of field staff.

## Case analysis: coverage and quality

The regional maternal mortality reviews are conducted under the supervision of the regional medical epidemiologist, with oversight from the regional technical director (RTD), the most senior medical officer at this level. Cases are analyzed by a multi-disciplinary team that includes a pathologist, an obstetrician, a medical officer of health, a public health nurse, and the consultant or senior resident who managed the case, along with select members of the National Maternal Mortality Surveillance Committee (e.g., an NSU surveillance officer, the FHU Director, and a reproductive health epidemiologist). The aim is to integrate the levels of care—primary and secondary—and to identify gaps and contributing factors to the death. All identified cases (100%) are analyzed.
The maternal mortality reviews seek to determine whether the death was preventable. An analysis of root causes is conducted to identify the underlying and immediate causes of death. Some regional teams have expressed concerns about making these decisions, because they lack experience in this regard. They make a preliminary classification of the deaths as direct, indirect, coincidental, or late. A final determination may be difficult, in that all requisite data for analysis may not be available at the time of review (e.g., post-mortem reports may not be in hand), which restricts the review to the clinical data. Individual institutional reviews (where the death occurred) are also encouraged and are being conducted in some settings.

The delays most frequently identified are delays 2 and 3. Delay 2 involves challenges for the patient in accessing care (e.g., availability and affordability of transportation); delay 3 involves institutional delays in the patient's receiving appropriate care, including such .issues as patients being seen by junior doctors (and sometimes consultants) who fail to recognize clinical symptoms or fail to act swiftly enough. Infrastructure issues, such as a lack of dedicated maternal intensive-care units/high-dependency units (HDUs), are compounded by poor referral systems between secondary and tertiary levels. Additionally, the linkage between tertiary and primary levels to provide adequate follow-up care for high-risk women needs improvement.

The central level conducts a final, detailed analysis of each case. All the reporting forms are analyzed, the case is classified using the World Health Organization's rules for coding maternal deaths,[13,14] and the information is added to the national database.

## Reporting

A weekly surveillance bulletin[15] is prepared by the NSU, which incorporates all surveillance reporting, including MMES. The bulletin provides a running tally of the number of suspected maternal deaths, the status of the investigations, and a comparison of the returns of the previous year to date. Medical officers of health (at the parish level) are responsible for submitting data for this report to the NSU.

These data are then forwarded to the Caribbean Epidemiology Centre (CAREC), the agency which compiles Caribbean-wide health information to be further reported to PAHO and WHO.

Monthly (Appendix 9) and quarterly reports are also produced. The timely submission of reports may be delayed by late autopsy reports, especially when deaths occur outside the women's residence region or if there is no pathologist in the region where the death occurred and cases are sent outside that region for autopsy. An additional challenge occurs in accessing information on community deaths, as these autopsies are the responsibility of the forensic pathologists (Ministry of Justice), rather than of hospital pathologists (Ministry of Health), and information sharing across ministries remains a challenge.
Reports move upward from the local medical officer of health to the RTD, and then on to the NSU. At the central level, the FHU Director prepares an annual family health report that is circulated to Ministry of Health senior directors, parish medical officers of health, regional medical epidemiologists, and RTDs; the report provides a national overview.

## 2.5. Decision-making for MMES

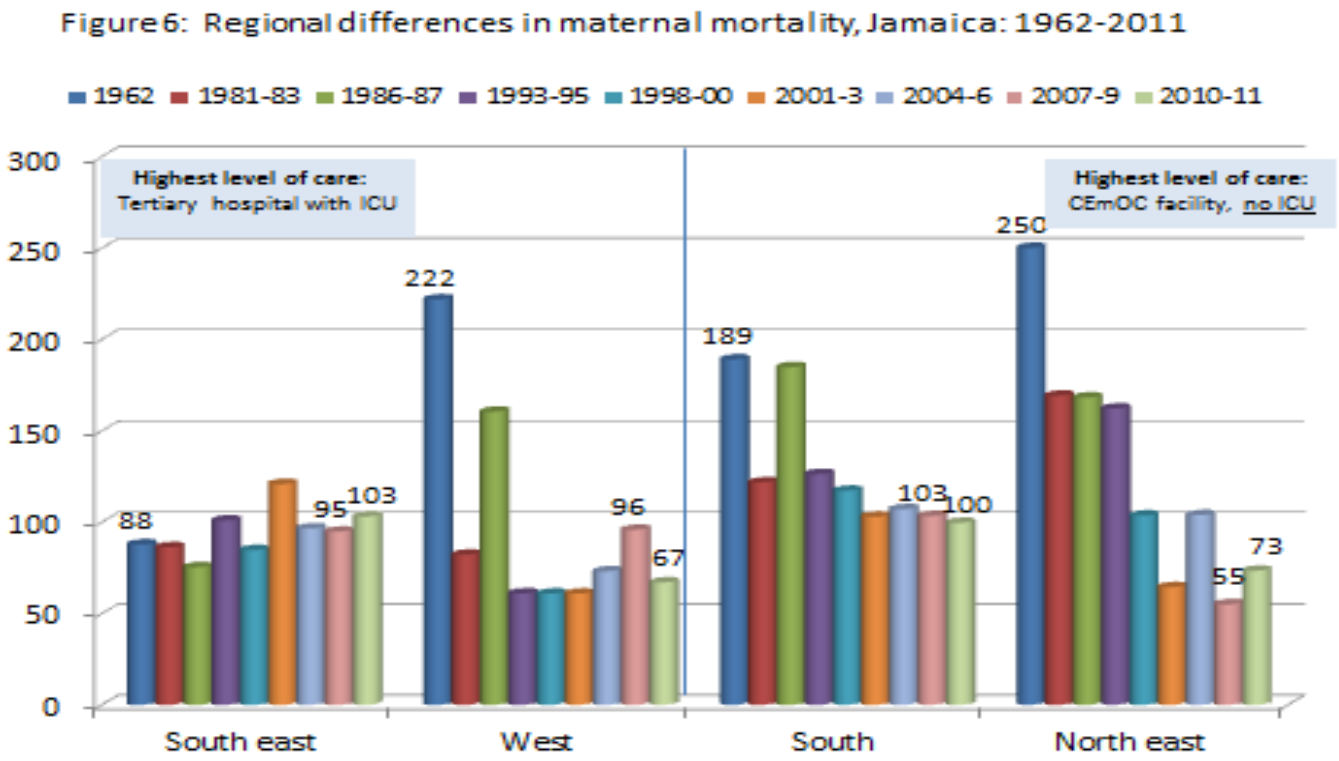
As a rule, the regional medical epidemiologists strive to provide a supportive environment and a non-judgmental atmosphere to facilitate open discussion and contributions from all team members. In the Western region, for example, a confidential evaluation of the meeting allows each team member to submit a written summary of the evaluation at the end of the meeting, which is then reviewed by the regional medical epidemiologist and serves to guide future reviews.

The FHU participates in the regional maternal mortality reviews, and actions that may be required at the central level are discussed and supported. The FHU also feeds information to the National Maternal Mortality Committee, which is responsible for policy direction. However, at present the committee is inactive, with no sessions held in the last year.

## 2.6. Outcomes of maternal mortality reviews: recommendations and advocacy action

The RTD is responsible for noting actions to be taken and for follow-up. Advocacy for the implementation of recommendations is channeled to the FHU through the RTD. Findings from the maternal mortality review are first used by the Regional Health Authority (RHA) to identify possible structural weaknesses in the quality of care and identify areas for local intervention.

**Figure 6. Differences in maternal mortality, by health region, Jamaica, 1962–2011.**




In the North East Region—the region with the smallest population, but which historically has had the highest maternal mortality ratio—the data were first used to expand access to skilled care, with the first obstetrician assigned to that region in 1986. Since then, a second of the four hospitals was upgraded to CEmOC status in 2004. The primary referral hospital recently acquired a high-dependency unit through local community effort. Figure 6 shows that for the last five years, this region's maternal mortality ratio has ranged from 50–75 per 100,000 live births, down from a high of 250 in 1962 and around 150 thereafter; the ratio was 56 per 100,000 in 2011 (Table 3).

**Table 3: Maternal deaths and births, by place of birth and region of occurrence, Jamaica, 2011.**

| Region | Maternal deaths | | Births, by place of occurrence | | | MM ratio |
|---|---|---|---|---|---|---|
| | Public facilities | Private hospitals | Public facilities | At home | Private hospitals | |
| **South East** | 16 | 0 | 15,944 | 66 | 902 | 94.6 |
| **North East** | 3 | 0 | 5,294 | 30 | 0 | 56.3 |
| **Western** | 8 | 0 | 7,542 | 58 | 195 | 102.6 |
| **Southern** | 10 | 0 | 8,289 | 273 | 85 | 115.6 |
| **COUNTRY TOTAL** | 37 | 0 | 37,069 | 427 | 1,182 | 95.7 |

This experience, supported by the observation that residents of the South East and Western regions, who have access to Jamaica's only ICUs, have experienced much lower maternal mortality ratios than residents of the Southern and North East regions, who do not, led the Ministry of Health to seek European Union support to install HDUs at all CEmOC hospitals. To date, women needing such care must be transferred to either Kingston or Montego Bay, with their transfer depending on the availability of these very scarce beds. Table 4 outlines some of the other recommendations which have been implemented as a result of the maternal mortality reviews and some areas where action is still needed.

**Table 4: Selected recommendations implemented and advocacy action from maternal mortality reviews, Jamaica.**

| Sector | Recommendations implemented | Advocacy action |
|---|---|---|
| **Infrastructure** | • Expansion of obstetric wards at three regional referral hospitals (Spanish Town, Mandeville, St. Ann's Bay)<br>• Upgrading of two hospitals to provide specialist obstetric care (Annotto Bay, May Pen) | • Proposal has been prepared to construct five high-dependency units across the regions, which will be funded by the European Union<br>• Advocacy for infrastructural development – e.g. ultrasound units and ICUs |
| **Quality management** | • Development of maternal death surveillance guidelines (central)<br>• Refresher courses for midwives, Public Health Nurses, Medical Records staff, Clinicians, staff in non-maternity wards to improve case identification (North East)<br>• Development of Antenatal Care curriculum | • Proposal to audit complications of the hypertensive disorders of pregnancy to determine why mortality has increased |
| **Skills training** | • Regional surveillance systems training conducted by the FHU<br>• Continuing medical education for managing shock (in Western) | • Proposal to retrain staff to use the antenatal care guidelines, especially for the identification, referral, and follow-up of high-risk women in the community |
| **Service delivery** | • Increase in outreach and high-risk clinics in community to improve access and reduce burden on secondary care (South East)<br>• Increased health promotion efforts targeting high-risk women – chronic diseases, sickle cell | |
| **Strengthening institutional linkages** | • Improving referral system between primary and secondary care (Southern); reducing unnecessary referrals also reduced by increased involvement of the consultant in reviewing and recommending cases for transfer (Western) | • Implement data sharing agreements between the Ministry of Health and:<br>- The Ministry of Justice (to share post-mortem reports on community deaths)<br>- The RGD (two-way sharing of mortality data for case validation – implementation of Form 5, Appendix 6) |

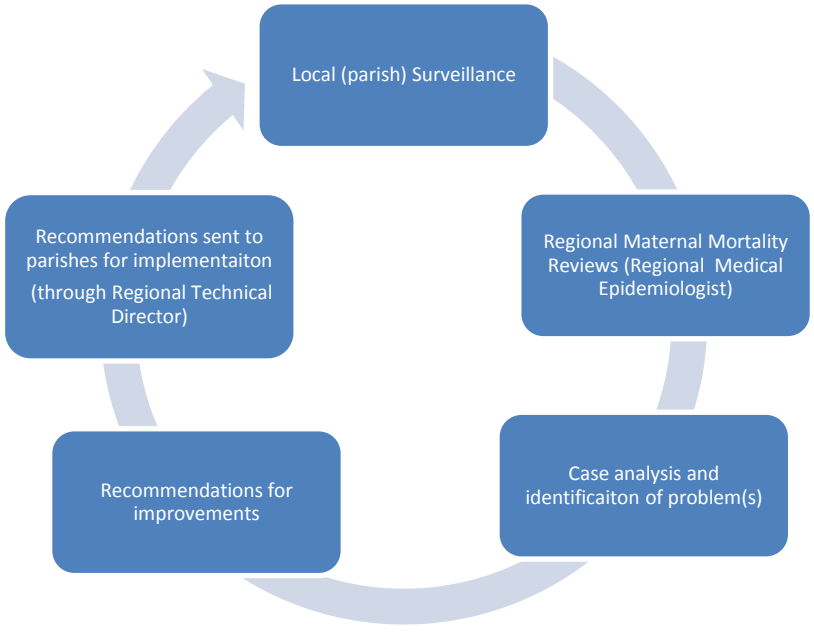
## 2.7. Monitoring and accountability

Data quality-control mechanisms monitor the surveillance system's accountability. The basic procedure involves the parish epidemiology clerk checking for errors; when these are identified, the information is sent back to the field for verification. Similarly, if the region identifies an error, a request is made for verification at the parish level.

Central efforts to improve quality control include (a) periodic evaluations of the RAMOS surveillance system, (b) updating the maternal death surveillance guidelines, and (c) providing training in surveillance systems. For example, an MMES training session was conducted in October 2012 to advise health teams on the new ICD-MM guidelines.[14] In some regions (e.g., South East), periodic validations are also done. Two national validation studies reviewed the early implementation of the surveillance system, one from 1998 to 2003,[16] and another focusing on 2008.[9] Recommendations from the first evaluation expanded maternal mortality surveillance from a hospital-based system to one that included community deaths and widened the case definition to include late maternal deaths and coincidental deaths. As case identification gaps were noted outside the obstetric block, efforts were instituted to monitor non-obstetric areas in hospitals, including accident and emergency departments, medical and surgical wards for puerperal re-admissions, and intensive care units.

The 2008 review identified that non-hospital deaths remained a problem, with five of eight missed deaths occurring in the community. These could, however, be identified through liaison with the forensic pathologists, as all women had received a forensic post mortem examination. Cases were still being missed in non-obstetric areas of public hospitals (three for the year), but less frequently than in the past. The maternal mortality reviews drive the feedback mechanisms for MMES, as information and decisions emanating from these reviews are taken back to the parishes for implementation (Figure 7).

**Figure 7: Feedback mechanism in support of MMES decision making and implementation, Jamaica.**



## 2.8. The Jamaican MMES experience: best practices

The best practices developed by Jamaica include the legal framework for maternal deaths; the maternal mortality review process itself, especially the home visit; and skills training in MMES. The greatest challenge remains the strengthening of institutional linkages. Details are highlighted in Table 5.

**Table 5: Best Practices in MMES, Jamaica**

| Sector | Best Practice |
|---|---|
| **Legal framework** | - Making maternal deaths a Class 1 notifiable event ensures that their occurrence and reporting are treated with urgency |
| **Maternal mortality review process** | - Feedback mechanism—all recommendations from maternal mortality reviews are sent back to the parish; members of the maternal mortality review team can make oral or written recommendations to the meeting<br>- Involvement of the Regional Technical Director (RTD) as a major authority figure supports the importance of MMES; the RTD can engage a wide cross-section of players in the health care system and get a positive response<br>- The regional medical epidemiologist provides an independent review of the cases (independent opinion) and a supportive environment to assist the health care team to identify challenges and reduce deaths (e.g. Southern)<br>- The home visit allows the health team to understand the challenges women and their families face in accessing care and understanding illness |
| **Staffing** | - Stability of experienced and senior staff in some regions (e.g. South East) makes it possible to have continuity of care |
| **Skills training** | - Provision of technical assistance (particularly in death classification) by the central level via reproductive health epidemiologist (AMB) |
| **Strengthening institutional linkages** | - Ongoing efforts to strengthen institutional linkages between primary and secondary care to improve patient care (e.g. Southern)<br>- Participation of staff at the primary and secondary care level in the maternal mortality reviews helps to improve coordination of referrals and cooperation among health team members |

## 2.9. The Jamaican MMES experience: challenges

### Resources

The efficient implementation of MMES is hindered by inadequate resources (both human resources and equipment). At the central level, maintenance of the maternal mortality database is the direct responsibility of the FHU Director. Because no data entry clerks are assigned to this task, data entry does not occur on a timely basis, due to the FHU Director's expansive portfolio. Currently, regions use a paper-based system, which is inefficient; if it were to be replaced by an electronic surveillance system, the timely availability of the data would improve. Fiscal constraints have required some officers to carry

multiple responsibilities (e.g., the secretary of the medical officer of health (at the parish level) doubles as the parish epidemiology clerk).

## Technical skills

At the regional level, staff expressed discomfiture with their technical competence to accurately classify maternal deaths, particularly in selecting the single underlying cause of death, and noted the importance of the support given from the central level [via the reproductive health epidemiologist].

## Institutional linkages

Poor institutional linkages impair the robustness of the MMES (e.g., lengthy delays in receiving post mortem reports; delays in obtaining records from the police for women declared dead on arrival at hospital; late notifications of deaths occurring on non-maternity wards of hospitals; difficulty validating community deaths with the RGD due to poor communication and feedback).


# 3. DISSCUSION

## 3.1. Lessons learned

The MMES experience has provided valuable lessons across Jamaica. MMES provides reliable data, despite an acknowledged under-reporting of first trimester events. RGD coders have demonstrated their failure to correctly code, especially indirect maternal deaths, the prevalence of which has been increasing. Improving the reliability of RGD data will require that their quality control officers and coders receive training to recognize maternal deaths and then to correctly code them. With only 4 of 51 deaths misclassified due to certification failures, doctors were mostly documenting the fact of pregnancy on the medical certificates. Vital registration, however, was a good source for identifying first trimester and other community deaths. The value of triangulating data from the various stakeholders (MOH, forensic pathologists, RGD) will be critical to the entire system's capacity to consistently identify and account for all maternal deaths in Jamaica. RGD case identification could improve if their staff could link their birth (live births, fetal deaths) and mortality databases. This process would need an algorithm that employs probabilistic matching, however, as the records do not include unique identifiers.

But identification of the deaths is only the first step. The more important next step is how this information informs and transforms clinical practice and develops a health service that is more responsive to the needs of mothers. The data have been used with good effect to improve the distribution of skilled providers and upgrade facilities in regions of highest need (e.g., North East and Southern regions). Providers have also demonstrated their willingness to innovate how they deliver care. Thus, in the most populous South East Region, where more obstetricians are available but where the main referral clinic can become extremely busy, obstetricians have been holding outreach high-risk

clinics in selected community health centers. Previous experience[17] has shown that when services are closer to where women live, women are more likely to use them. This has contributed to reversing the upward mortality trend in the South East Region (Figure 6).

The reality, however, is that after the MMR decreased in response to the expanded access to skilled obstetric care in the late 1990s (upgrading of referral hospital obstetric units; implementation of high-risk referral antenatal clinics; introduction of ART for HIV positive mothers), it since has stagnated. Further improvements will require a significant expansion in the technical capabilities of referral hospitals to manage complicated cases. The growing prevalence of obesity and the aging of the antenatal population (Figure 1) have introduced an added burden to the care of women with pregnancy related complications coupled with chronic health problems. The improved survival of women with sickle cell disease in adulthood has increased the number of these women wishing to have children.[18] To care for this growing, high-risk population will require a different approach to antenatal care. We are experimenting with a new model of high-risk care, where consultant obstetricians and physicians attend these clinics and simultaneously cater to both the obstetric and the medical needs of these women, as in the past, it has been a challenge to move women between medical and obstetric care providers. Integration across levels (i.e. primary, secondary, and tertiary care) is a work in progress. Regions have identified the need to improve communication between the levels of care, especially when women need to be referred for more sophisticated care than is available at the first point of contact.

Jamaica is exploring the possibility of securing European Union support to establish dedicated obstetric HDUs at all regional referral hospitals. The acute-care needs of mothers for ventilator support (e.g, post-partum hemorrhage; stroke following eclampsia; or sickle cell disease cases with acute respiratory conditions) cannot always be met by the three ICUs restricted to Montego Bay and Kingston at either end of the island. Mothers, whose mostly short-term need for ventilator support can mean their survival, now must compete for these scarce beds with cardiovascular, accident, and violence victims, whose needs may be more long-term and may require more specialized care than do these women.

## 3.2. Case identification

The system's capacity to detect maternal deaths is well developed and has improved over time. Significant effort has been invested in addressing case identification gaps by training medical, nursing, and medical-records staff to ensure that deaths that occur outside of maternity wards are identified. Late notification of these deaths does occur, however, especially when women are declared dead on arrival (DOA) at hospitals, in that the investigation (autopsy) of these cases rests with the justice system, rather than with the health system. Better communication is needed with the police, with whom the forensic pathologists share the post mortem findings on DOA cases. While not mandated by law to report, maternal deaths occurring in private hospitals are monitored by the regional health authorities, but more often this process relies on passive, rather than active, surveillance, as these deaths are very rare in these settings.

While the above challenges affect the timeliness of data availability for selected cases, as a Class 1 notifiable event, reporting is generally efficient, with data captured through weekly hospital active surveillance, complemented by passive reporting from a highly sensitized health team.

The FHU Director is responsible for the final classification of maternal deaths and the maintenance of the maternal mortality database. This portfolio is quite broad (reproductive health, child welfare, primary care), limiting her availability to conduct these activities on a timely basis with the little clerical support she has. Thus, a key weakness of the surveillance system at the national level is the absence of an officer with clear responsibility for MMES. While one may say that 50 or fewer deaths per year may not warrant the assignment of a specific officer, achieving MDG5 is not only about counting and classifying maternal deaths, but also about developing effective policies and programs in light of the information that will achieve the target maternal mortality ratio of 30 per 100,000 or less for the country. These problems notwithstanding, Jamaica's MMES system has continued to adapt to new requirements, and the Family Health Unit has guided these developments and the implementation of quality management initiatives.

While surveillance is accepted as a necessary public health activity, there are some challenges with maintaining symbiotic relationships among the system's levels, especially at the local level. Some clinicians who are asked to carry out surveillance activities but without the requisite public health focus may not always appreciate the value of completing case reviews and of submitting these reviews in a timely fashion. Accountability of all officers, including senior officers such as consultants who are involved in surveillance, might be improved by including surveillance as a specific measure on performance appraisals.

The surveillance system and related processes are simple. Since its introduction in 1981 and its expansion to a continuous process in 1998, RAMOS surveillance has consistently provided the best available evidence on the maternal mortality experience in Jamaica. The primary concerns are resource constraints, which disallow the timely maintenance of the database and the capacity to effectively respond to changing trends in maternal mortality, especially to manage system failure in the quality of care.

## 3.3. Recommendations

### Institutional linkages

Institutional linkages (internal linkages between primary and secondary health care and external linkages with the RGD, the police, and the forensic pathologists) are necessary to ensure the robustness of the MMES to identify all maternal deaths. Establishing and strengthening these linkages may require formal data sharing agreements with respect to suspected maternal deaths.

### Infrastructure and human resources

Resources needed to improve MMES include the development and implementation of an electronic surveillance system at the parish and regional levels, which would be integrated into the central level. In addition to upgrading the infrastructure to securely transfer information on identified cases, skilled human resources are needed to manage the system. The related training this would entail would improve the confidence of regional teams to classify and code deaths, and also would reduce the burden at the central level to maintain the database. An officer needs to be assigned in the FHU to assist the

Director of Family Health services with case evaluation, maintenance of the database, compiling annual reports to monitor trends, conducting national review meetings, and identifying and implementing training programs to support regional and parish teams.

To facilitate improvements in service delivery, it would be advisable to involve junior doctors in the maternal mortality reviews to sensitize them to the Delay 3 challenges mothers face and their consequences. This direct exposure would provide a learning forum regarding the contributing factors at the institutional level, and could help to reduce maternal deaths. Rotating residents and consultants with a minimum annual attendance requirement at maternal mortality reviews would increase the exposure of the clinical team to issues of appropriate care and management.

### Service delivery

An audit of all cases of severe preeclampsia and eclampsia is urgently needed to understand why mortality from these conditions has increased over the past five years. This evidence would inform the retraining primary and secondary staff to improve the survival of women with these conditions. Critical services such as blood supplies could be enhanced by increasing the number of peripheral blood collection centers (and accessibility for blood donors), ultimately improving maternal care.

### Quality control

Quality control mechanisms can be strengthened with more stringent accountability for MMES and surveillance generally at the local level. Achievements and performance specific to surveillance activities should be included in the staff appraisal system.

Regions have noted the need to maintain dialogue on case definitions, given the infrequency of cases in some regions (e.g. North East). A greater focus on “near miss” surveillance is recommended as a preventive strategy to address institutional barriers at an earlier stage, and will be useful in regions such as the North East, where incidence of maternal deaths is low but interest needs to be sustained.

Maternal mortality reviews are largely quantitative in nature; an increased focus on qualitative analysis at the local level should help to better identify underlying institutional delays (i.e. inefficiencies and complicated processes) that need to be addressed.

Action is needed to reactivate the National Maternal Mortality Committee and have it play its role in directing policy initiatives at the central level. The nomination of an intermediary officer in the FHU may help to revitalize this activity, as its advocacy function is critical to heighten the political will needed to support the required allocation of resources for maternal care. Dialogue on the importance of the country’s lack of progress on MDG 5 requires greater focus at the policy level.

## 3.4. Summary and Conclusions

MMES has been well established, and effectively informs maternal health service delivery in Jamaica. Surveillance for maternal deaths has been integrated into routine surveillance activities, and all identified maternal deaths are reviewed by multidisciplinary teams based in the regional health authorities across the country. The epidemiology of maternal deaths has been found to be dynamic and, therefore, vigilance is needed to ensure that health services remain responsive to the changing needs of

reproductive-age women. Table 6 summarizes the indicators of the structure and the functioning of MMES in Jamaica.

**Table 6. Summary of the MMES, Jamaica.**

| Indicator | Definition | Local context |
|---|---|---|
| ***Of the organization*** | | |
| Organization of the Ministry of Health | Organization chart of the Ministry of Health | Appendix 2 includes the organization chart |
| Organization of the MMES system | Organizational insertion of the MMES system within the ministerial structure | Surveillance of all notifiable conditions covered; MMES is fully integrated into the general surveillance process |
| Normative legal framework | Existence of law, regulation, or resolution that incorporates the MMES system | Maternal deaths are covered under the Public Health Act (rev, 2004) based on their status as a notifiable condition for mandatory reporting. |
| Coverage | Proportion according to type of establishment and subsector that attend births that are integrated in the MMES system | All facilities attending births are integrated into the MMES system; some private facilities are active surveillance sites and are routinely monitored, others report voluntarily. The private sector only attends 3% of births, and maternal deaths in these facilities are rare |
| ***Of physical resources*** | | |
| Physical space | Availability of physical space assigned to MMES | No dedicated space for MMES; space generally available for surveillance activities at all levels of the health system |
| Supplies for managing data | Availability of supplies (PCs, forms, stationery) | Materials are procured for all surveillance activities at the central and local levels |
| Supplies for communication | Availability of telephone, fax, internet connection | Communication technology resources available for surveillance activities at the central and local levels |
| ***Of human resources*** | | |
| Personnel assigned to MMES system | Existing professionals, number, qualification, training | Central level:<br>• National Surveillance Officer – 1 (shared with other surveillance activities)<br>• FHU Director – 1<br>• National Maternal Mortality Committee established but currently inactive<br>Regional level:<br>• Epidemiologists – 1 or more per region<br>Local level (parish):<br>• Surveillance officers (usually 1 per parish)<br>• Surveillance clerk (1 per parish) |
| Existence of different levels of MMES system | Systems at state, municipal, and institutional levels | Systems are well defined at the parish (local), regional, and national levels |
| Classification of the surveillance strategy | Notification/reporting of cases, case analysis, reports from the different administrative levels, verbal autopsies | • Suspected cases are reported immediately by the parish medical officer of health to the NSU (and copied to the FHU Director and RHA); investigation proceeds in the field.<br>• Investigation reports are sent to NSU and the FHU by the Regional Health Authority |
| Type of information collected | Clinical care, quality of care, signs and symptoms; socio- | 1. Class 1 Reporting Form<br>2. MM home visit and antenatal report |

| | | |
|---|---|---|
| | environmental demographic data about the woman; immediate and underlying cause of death | 3. MM post -mortem summary<br>4. MM case review summary<br>5. MM clinical summary<br>6. MM surveillance monitoring report |
| Provider of information | Those responsible for remitting information | • Hospital active surveillance officer: records and reports case to parish health department<br>• Hospital doctors: case review summary<br>• Parish medical officer of health: reports to NSU/RHA/FHU.<br>• Case review summary: regional epidemiologist<br>• FHU Director: reports to senior managers; CAREC |
| Sources of information | Death certificate, clinical history, perinatal history, socio-environmental reports, hospital committee reports | Clinical history; socio-environmental history (including family and home); antenatal care; pathology report; case review summary, which also identifies delays experienced and whether the death was deemed to be avoidable |
| Timeliness of the collection | Frequency of the collection of cases | Hospital active surveillance – weekly reporting |
| Responsible for analysis | Team or individuals responsible | • Regional level – multidisciplinary maternal mortality review team: obstetrician, medical officer of health, epidemiologist, pathologist, midwife, public health nurse, parish surveillance officer<br>• Central level – FHU Director, national surveillance officer |
| Methodology for analysis | Analysis of the case, analysis of root cause, etc. | Root-cause analysis conducted at the regional level (underlying cause; immediate and intermediate; social determinants; three delays)<br>Central level – Final WHO classification: direct, indirect, coincidental, and late; ICD-10 coding |
| Timeliness of analysis | Frequency of analysis of cases | Regional maternal mortality reviews held quarterly (i.e., South East, Western, and Southern). When maternal mortality cases are few, meetings may be semi-annual or annual |
| Flow of information | Circuit of flow of information | See Figure 5 |
| Proportion of cases analyzed | Determination of cases to be analyzed, % of total number of maternal deaths analyzed, institutional barriers to analyzing maternal deaths | • 100% of identified cases reviewed; frequency dependent on case load<br>• The robustness of the MMES system is challenged by a lack of resources (human and infrastructural) at all levels; inadequacy of technical skills to classify maternal deaths at the regional level; poor institutional linkages between forensic pathologists and review process |
| Description of the problems detected in the analysis | Source and classification of the problems, delays identified, recurrence | • Incomplete case reporting – e.g., post mortem findings<br>• Patient problems include Delay 2, accessing care and Delay 3, receiving appropriate care.<br>• Delay 3 issues include need to improve management of chronic diseases – e.g. hypertensive and cardiovascular disorders; resource constraints (i.e. limited ICU & High Dependency Unit beds for maternal cases)<br>• Responsiveness of receiving facilities to accept referrals |
| Return and dissemination of | Reports, who is report submitted to, dissemination, | • Surveillance forms completed weekly and submitted to the NSU, which produces a weekly surveillance bulletin. |

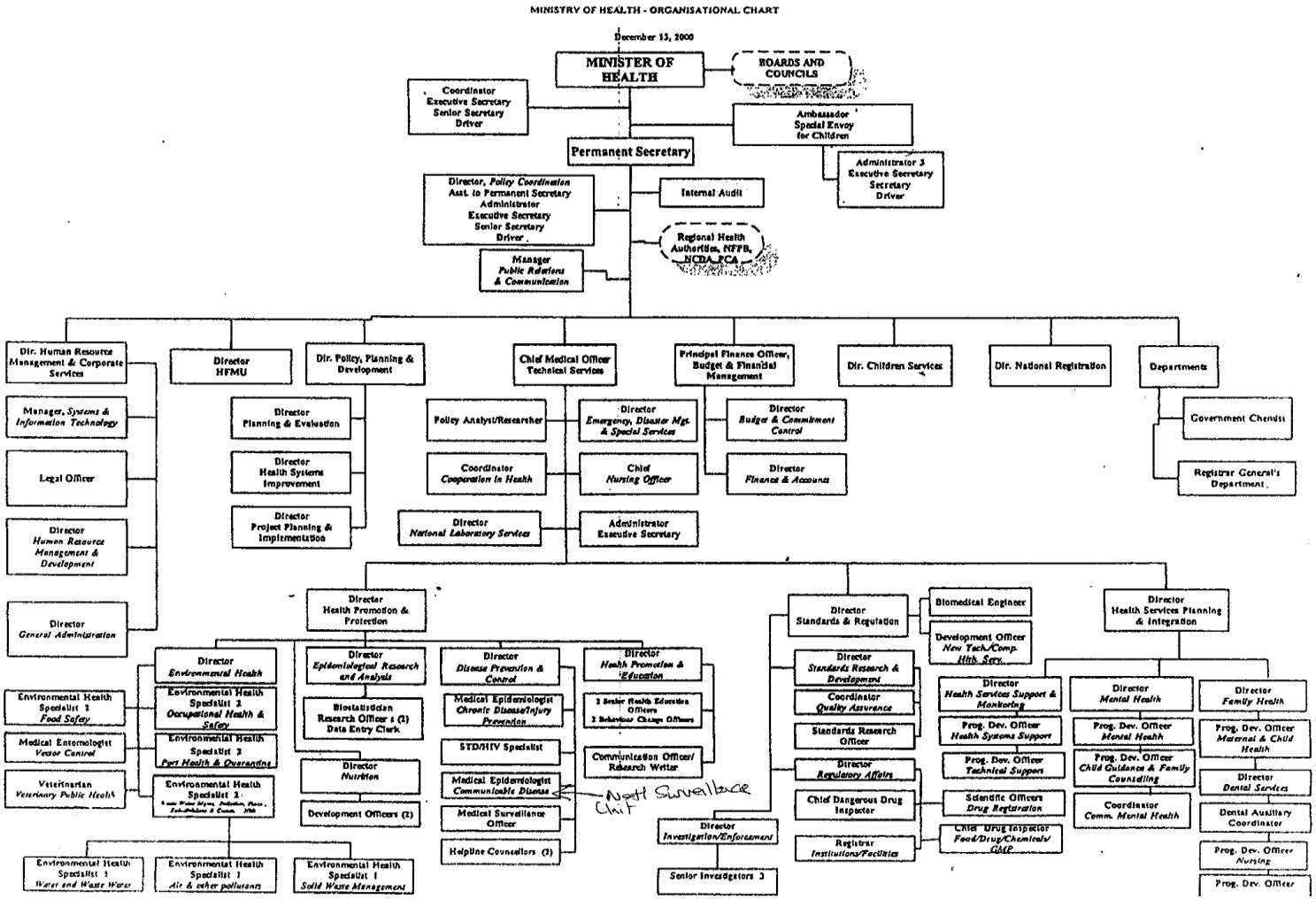
| | | |
|---|---|---|
| findings | regularity, quality inspection | • Weekly surveillance bulletin submitted to CAREC.<br>• An annual family health report (includes maternal deaths) is produced by the FHU Director. This report is shared with senior directors in the Ministry of Health, regions, and parishes.<br>Quality control:<br>• Surveillance guided by the maternal death surveillance guidelines: Family Health Services (revised 2012)<br>• Periodic validation of surveillance system (via RAMOS studies)<br>• MMES training conducted at the national and regional levels |
| Actions proposed | Classification of actions, implementation | Policy and program decisions have been implemented, including:<br>• Revision of surveillance guidelines<br>• Training in surveillance procedures<br>• Plans to establish five high-dependency units (European Union funding procured) |
| Intra-sectorial coordination | Existence of coordination to improve reporting, analysis, recommendations, and decision-making | Within the health sector, coordination is activated through the regional maternal mortality reviews. Problems are identified (at the local and central levels) and addressed through decisions or recommendations; continuous feedback among the levels. Central-level personnel participate in regional reviews.<br>Challenges exist, however, with inter-sectorial coordination, especially with information-sharing with the police and forensic pathologists |

# 4. Appendices

## Appendix 1: Key informants interviewed, Jamaica.

| **Interviewees: title and name** | **Date** |
|---|---|
| Director, Family Health Unit – Dr. Karen Lewis-Bell | November 20, 2012 |
| Regional Medical Epidemiologist (Southern) – Dr. Vittilus Holder | November 23, 2012 |
| Regional Medical Epidemiologist (Western) – Dr. Maung Aung | November 27, 2012 |
| Regional Surveillance Medical Officer (North East) – Dr. Carla Hoo | November 27, 2012 |
| Regional Medical Epidemiologist (South East) – Dr. O'Neil Watson | November 27, 2012 |
| Regional Epidemiologist (South East) – Mrs. Kelly-Ann Gordon-Johnson | November 27, 2012 |
| Regional Surveillance Officer (South East) – Mrs. Sabrina Beeput | November 27, 2012 |
| National Surveillance Officer (NSU) – Mrs. Venita Fyffe-Wright | December 3, 2012 |

## Appendix 2: Organization of the Ministry of Health, Jamaica, 2000



## Appendix 3: Class 1 Reporting Form – Individual Notification (on suspicion)

**Appendix DD:**

**CLASS I REPORTING FORM - INDIVIDUAL NOTIFICATION (ON SUSPICION)**

Date of Report: _____ / _____ /_____ (DD/MM/YY) NEW CASE / PREVIOUSLY REPORTED CASE (Circle One)

Diagnosis: _____ _____

**Case Demographic Information**

Name (including pet name): _____ Sex: _____ Age:_____ D.O.B ____ / ____ / _____(dd/mm/yy)

Address: Lot #:_____ Street:_____ Street Type: _____

Include landmark) (Name) (Drive, Road, Close etc)

Community: _____ Neighbouring Community/District: _____ Parish:_____

Workplace/School: _____ Occupation: _____

(H) Phone #.: _____ (Wk) Phone #: _____ History of overseas travel in past 4-6 weeks? Y / N

Specify area/country: _____

Name of NOK/Parent: _____ Relationship to case: _____

Address of NOK/Parent: _____ Phone No.: _____

**Clinical Information:**

Symptoms: _____ Hosp./Facility Name: _____

_____ Medical Record # _____

Date of onset: ___ / ___ / _____ d/mm/yy) Date seen: ___ / ___ / _____ (dd/mm/yy) Case admitted to Hosp?: Y / N (Circle one)

Specimen Taken Y / N Type: _____ Date of Admission: _____ / _____ / _____ (dd/mm/yy)

Specimen Date: ___ / ___ / _____ (dd/mm/yy) Laboratory:_____ Ward: _____

Result(s): _____ If dead, Date of Death: _____ / _____ / _____ (dd/mm/yy)

**Notifier Information**

Name of notifier: _____ Phone #:_____ Received by MO(H) _____/ _____ / _____ (dd/mm/yy)

Address: _____ Email: _____ Parish MO(H) Signature _____

Comments : _____ Forwarded to R.S.O. _____ / _____ / _____ (dd/mm/yy)

_____ Forwarded to Surveillance Unit _____ / _____ / _____ (dd/mm/yy)

# Appendix 4: Maternal Mortality Clinical Summary (Form 1)



**FORM 1** **MINISTRY OF HEALTH**
**JAMAICA**
**MATERNAL MORTALITY CLINICAL SUMMARY**

**Data will be collected on all deaths that occur during pregnancy or within one year after termination of pregnancy**

**DEMOGRAPHIC INFORMATION**

HOME/HOSPITAL_____ DOCKET NO._____

1. PATIENT'S INITIALS_____ 2. RESIDENCE _____
DISTRICT / PARISH

DATE OF DEATH ____/____/____ AGE AT DEATH _____ DATE OF DELIVERY ____/____/____
day mon yr day mon yr

TIME OF DEATH_____ am/pm

PLACE OF DELIVERY (_ **ONLY ONE**)

Type A public hospital [1] Type B public hospital [2] Type C hospital [3]
Cottage hospital [4] Public maternity centre [5] Private maternity centre [6]
Private hospital [7] Home [8] other [9] (specify) _____

AUTOPSY REQUESTED : Yes [1] No [2] Unknown [9]
AUTOPSY REPORT AVAILABLE: YES [1] NO [2] DATE AUTOPSY PERFORMED:___/___/____
WHERE AUTOPSY PERFORMED: _____

DATE OF ADMISSION (1) _____ Reason: [1] delivery [2] other specifiy_____
DATE OF DISCHARGE (1)_____ DISCHARGE DIAGNOSIS_____
DATE OF ADMISSION (2) _____ Reason: [1] delivery [2] other specifiy_____
DATE OF DISCHARGE (2)_____ DISCHARGE DIAGNOSIS_____
DATE OF ADMISSION (3) _____ Reason: [1] delivery [2] other specifiy_____
DATE OF DISCHARGE (3)_____ DISCHARGE DIAGNOSIS_____
DATE OF ADMISSION (4) _____ Reason: [1] delivery [2] other specifiy_____
DATE OF DISCHARGE (4)_____ DISCHARGE DIAGNOSIS_____
COMPLICATION/RISK FACTOR 1_____
COMPLICATION/RISK FACTOR 2_____
COMPLICATION/RISK FACTOR 3_____
WAS PATIENT TRANSFERRED [1] NO [2] YES, SPECIFY FROM WHERE _____
DATE TRANSFERRED _____ TIME OF ARRIVAL _____
PLACE OF DEATH: [1] ICU [2]TYPE A HOSPITAL [3]TYPE B HOSPITAL [4]TYPE C HOSPITAL
[5] PRIVATE FACILITY [6] HOME [7] OTHER, SPECIFY_____

PREGNANCY HISTORY (enter number of events; if none, enter zero "0")
Number of **previous** pregnancies (**excluding** current pregnancy) ____
Outcomes 1. full term live births ____ 2. premature live births (<2500g) ____ 3. stillbirths ____
4. spontaneous abortions ____ 5. induced abortions ____ 6. ectopic pregnancies ____
7. trophoblastic diseases ____
PREVIOUS COMPLICATIONS OF PREGNANCY_____

15

**DELIVERY INFORMATION**

DATE ADMITTED FOR DELIVERY ____/____/____ DATE THIS PREGNANCY TERMINATED ____/____/____

ATTENDANT AT DELIVERY (_ **ONLY ONE** Or the Most Highly Trained Attendant IF MORE THAN ONE)
nana/self [1] district midwife[2] registered nurse/midwife [3] obstetrician [4]
other med. pract. [5](specify)_____ other trained personnel [6] (specify)_____

31. METHOD OF DELIVERY (_ **ONLY ONE**)
Vaginal-spontaneous [1] Vaginal-induced [2] Caesarean-emergency [3] Caesarean-elective [4] Undelivered [5]

32. PRESENTATION: Cephalic [1] Breech [2] Other [3](specify)_____ Not Known [9]

33. BIRTHWEIGHT: _____LBS/KG 34. SEX: Male[1] Female [2] Not Known [9]

35. WAS ANAESTHETIC USED: No [0] Yes, local [1] Yes, general [2]

36. IF YES, WHO ADMINISTERED IT: Nurse anaesthetist [1] Resident [2] Specialist [3]
25. GESTATION AT PREGNANCY TERMINATION/MATERNAL DEATH:_____ Weeks from LMP [99] not known

26. OUTCOME OF THIS PREGNANCY (_ **ONLY ONE**)
died undelivered [0] full term live birth [1] premature live birth [2] stillbirth [3]
spontaneous abortion [4] induced abortion [5] ectopic pregnancy [6] trophoblastic disease [7]
multiple gestation (specify all outcomes using code numbers from above ) [8] twin 1 _____ [9] twin 2 _____

27. If liveborn, did infant survive: Yes [1] No [2] 28. If no, date of death_____

CLINICAL SUMMARY

SIGNED_____ NAME:_____POSITION _____

Reviewed by:_____
(Medical Officer of Health)

Date received by Ministry of Health: _____/_____/_____
day mon year

# Appendix 5: Maternal Mortality Home Visit and Antenatal Report (Form 2)



**FORM 2** **MINISTRY OF HEALTH**
**JAMAICA**
**MATERNAL MORTALITY HOME VISIT AND ANTENATAL REPORT**

INSTRUCTIONS: To be completed by a PHN, community midwife covering the decedent's community of residence or hospital midwife' by visiting with next of kin of the deceased to determine what occurred prior to the patient's death.

**Offer your condolences and explain to the relatives that in an effort to prevent maternal deaths we visit the relatives of all women who died during pregnancy and childbirth to better understand what problems the patient had and how the health services can better provide for these needs so that these problems can be avoided in the future.**

**DEMOGRAPHIC INFORMATION**

PATIENTS NAME_____ RESIDENCE_____
DISTRICT / PARISH

DATE OF DEATH ___/___/___ AGE AT DEATH _____ DATE OF DELIVERY _____/_____/_____
day mon yr day mon yr

MARITAL STATUS (_ **ONLY ONE**)
[1] Married [2] Common-law [3]Visiting [4] Other, specify _____ [9] Unknown

PLACE OF DEATH _____/_____ HOME [ ]
District/parish

**NEXT OF KIN INTERVIEWED**:(CHECK ALL THAT APPLY)
[1] spouse/consort [2] mother [3] father [4] sibling [5] other relative, specify _____
[6] other non relative, specify_____ [8] relationship not stated

**Respondents knowledge:**

a. Were you present when the patient died? [1] Yes [2] No
b. If no, How long before death did you see her? _____
c. Who told you about her death?[1] spouse/consort [2] relative [3] doctor [4] nurse [5] other_____
d. Was this person with her when she died? [1] Yes [2] No
e. How long after her death did you hear about it? _____
f. Before (name) was pregnant for the last time, was she generally well? [1] Yes [2] No [9] Not known

If no, what problems was she having_____

**Antenatal care:**

1. Did (name) attend antenatal clinic [1] Yes [2] No [9] Not Known
2a. If no, do you know why she did not go? no [1] not known [9] yes [2](specify)_____

2b. If yes, where did she attend, specify name of :
a)_____ health centre b)_____ hospital c)_____ private doctor
3. How many visits did she make _____ 4. Date of last visit _____
5. Did (name) have a maternal record card: [1] Yes [2] No [9] Not Known
6. Had (name) been referred elsewhere to see a doctor: [1] Yes [2] No [9] Not Known
7. If yes, where was she referred _____
8. Did she go [1] Yes [2] No [9] Not Known
9. Was she seen by a doctor when she went [1] Yes [2] No [9] Not Known
10. Was she advised to enter hospital [1] Yes [2] No [9] Not Known
11. Was she admitted to hospital [1] Yes [2] No [9] Not Known
12. If Yes, where admitted _____
13. Was she told tat she had high blood pressure [1] Yes [2] No [9] Not Known

Prior to going into hospital (if died in hospital) or prior to the most recent illness, did the patient complain of any of the following symptoms:

**before going into labour or before delivery (antepartum)**(_ ALL THAT APPLY)

[01] severe headaches [02] visual disturbance (seeing spots, seeing double, blindness)
[03] epigastric pain (stomach aches) [04] fits (seizures) [05] severe abdominal pain
[06] swelling of face or hands [07] high fever [08] extremely short of breath
[09] yellow skin or eyes [10] vaginal bleeding [11] severe chest pain
[12] long labour (more than 12 hours) [13] coughing up blood [14] severe pain in calves or legs

**if died after delivery, ask about** (_ ALL THAT APPLY)

[15] severe bleeding [16] bad smelling discharge [17] if c-section, reopened wound

[18] red, swollen wound [19] severe abdominal pain

**INFORMATION FROM THE ANTENATAL CARE PROVIDER(S) IDENTIFIED BY THE RELATIVES**

[1] HEALTH CENTRE: date 1ST visit __/__/__ date last visit__/__/__ gestat 1st visit ____ no. visits ____

Blood Pressure (Last on Record)_____/_____ Oedema: [1] Yes [2] No [9] Not known

Albuminuria (Highest Level) _____

Other complications:_____

Was patient referred for additional care: [1] Yes [2] No [9] Not known If yes, date referred ____/___/___

Reason for referral_____

Was patient followed up to ensure attendance: [1] Yes [2] No [9] Not known

[2] PRIVATE MD: date 1ST visit __/__/__ date last visit__/__/__ gestat 1st visit ____ no. visits ____

Blood Pressure (Last on Record)_____/_____ Oedema: [1] Yes [2] No [9] Not known

Albuminuria (Highest Level) _____

Other complications:_____

Was patient referred for additional care: [1] Yes [2] No [9] Not known If yes, date referred ____/___/___

Reason for referral_____

Was patient followed up to ensure attendance: [1] Yes [2] No [9] Not known

[3] HOSPITAL/high risk ANC: date 1ST visit __/__/__ date last visit__/__/__ gestat 1st visit ____ no. visits ____

Blood Pressure (Last on Record)_____/_____ Oedema: [1] Yes [2] No [9] Not known

Albuminuria (Highest Level) _____

COMPLICATIONS AND OTHER MEDICAL PROBLEMS (IF ANY):

_____

_____

**SCREENING TEST RESULTS**

HB: _____ [9] not known/not done

HIV test result: [1] positive [2] negative [9] not k known/not done

VDRL test result: [1] positive [2] negative [9] not known/not done

SIGNED (PHC RM) _____ POSITION _____DATE___/___/___

SIGNED (Hosp RM)[1]_____ POSITION _____DATE___/___/___

Reviewed by:_____
(Medical Officer of Health)

Date received by Ministry of Health: ____/____/_____
day mon year

# Appendix 6: Maternal Mortality Post Mortem Summary (Form 3)

Maternal Death Surveillance Guidelines

FORM 3

**MINISTRY OF HEALTH**
**JAMAICA**
**MATERNAL MORTALITY POST MORTEM SUMMARY**

**INSTRUCTIONS: To be completed by pathologist or regional surveillance officer from the post mortem findings on any death investigated of a female 10-50 years of age whose death is suspected as being pregnancy related.**

**DEMOGRAPHIC INFORMATION**

PLACE OF DEATH_____ DOCKET NO._____

PATIENT'S INITIALS_____ DATE OF DEATH ___/___/___ AGE AT DEATH _____

**CLINICAL INFORMATION**

Complications

_____

_____

_____

Other Medical Problems/Risk Factors present

_____

_____

_____

**CAUSE OF DEATH**

IMMEDIATE CAUSE_____

INTERMEDIATE CAUSE_____

INTERMEDIATE CAUSE_____

UNDERLYING CAUSE_____

Other significant conditions

_____

_____

**AUTOPSY DONE BY:**

[1] DM PATHOLOGIST – MINISTRY OF HEALTH/UHWI [2] DM PATHOLOGIST – MINISTRY OF JUSTICE

[3] DMO [4] OTHER MEDICAL OFFICER DATE OF AUTOPSY ___/___/___

**REPORT COMPLETED BY:**

[1] INVESTIGATING OFFICER [2] SURVEILLANCE OFFICER [3] OTHER, SPECIFY _____

SIGNATURE _____ DATE COMPLETED ___/___/_____

Date received by Ministry of Health: _____/_____/_____
day mon year

# Appendix 7: Maternal Mortality Case Review Summary (Form 4)



FORM 4

**MINISTRY OF HEALTH**
**JAMAICA**
**MATERNAL MORTALITY CASE REVIEW SUMMARY**

**INSTRUCTIONS: To be completed on all deaths during pregnancy or within one year after termination of pregnancy once case review has been completed. The summary, with supporting documents are then shared with (1) institution in which the death occurred (2) parish of residence of the mother (3) the Ministry of Health.**

**DEMOGRAPHIC DATA**

PATIENT'S INITIALS_____ AGE AT DEATH ____ TOTAL PREGNANCIES, INCL THIS ONE _____

DATE OF DEATH ___/___/___ DATE OF DELIVERY ___/___/_____ DAYS DELIVERY-DEATH _____
day mon yr day mon yr

PARISH OF RESIDENCE_____ PLACE OF DEATH _____/_____
HOME [ ] DISTRICT / PARISH

**ANTENATAL INFORMATION**

SOURCE OF ANTENATAL CARE: [1] HEALTH CENTRE [2] HOSPITAL [3] PRIVATE DOCTOR [9] NOT KNOWN
TOTAL NUMBER OF ANTENATAL VISITS, ALL SITES _____ (ENTER ZERO IF NO ANTENATAL CARE)
Was patient referred to high risk clinic? [1] yes [2] no NUMBER OF VISITS TO HIGH RISK CLINIC_____
REASON FOR REFERRAL _____

**CLINICAL INFORMATION**

PLACE OF DELIVERY (CHECK **ONLY ONE**)
[1] Type A public hospital [2] Type B public hospital [3 ]Type C hospital
[4] Cottage hospital [5] Public maternity centre [6] Private maternity centre
[7] Private hospital [8] Home [9] Other (specify) _____

METHOD OF DELIVERY (CHECK **ONLY ONE**)
[1] Vaginal-spontaneous [2] Vaginal-induced [3] Caesarean-emergency [4] Caesarean-elective [5] Undelivered

WAS ANAESTHETIC USED: [0] No [1] Yes, local [2] Yes, general

OUTCOME OF THIS PREGNANCY (CHECK **ONLY ONE**)
[0] died undelivered [1] full term live birth [2] premature live birth [3] stillbirth
[4] spontaneous abortion [5] induced abortion [6] ectopic pregnancy [7] trophoblastic disease
[8] multiple gestation (specify all outcomes using code numbers from above ) [8] twin 1 _____ [9] twin 2 _____
If liveborn, did infant survive: [1] Yes [2] No If no, date of death_____

WAS PATIENT ADMITTED BEFORE GOING INTO LABOUR: : [1] Yes [2] No
REASON FOR ANTEPARTUM ADMISSION _____
DATE OF MOST RECENT ADMISSION (1) _____
Reason: [1] delivery [2] other specify_____
DISCHARGE DIAGNOSIS_____
COMPLICATION/RISK FACTOR 1_____
COMPLICATION/RISK FACTOR 2_____
COMPLICATION/RISK FACTOR 3_____
WAS PATIENT TRANSFERRED [1] NO [2] YES, SPECIFY FROM WHERE _____
DATE TRANSFERRED _____ TIME OR ARRIVAL _____
PLACE OF DEATH: [1] ICU [2]TYPE A HOSPITAL [3]TYPE B HOSPITAL [4]TYPE C HOSPITAL
[5] PRIVATE FACILITY [6] HOME [7] OTHER, SPECIFY_____

**CAUSE OF DEATH**

TIME OF DEATH [1] MATERNAL (pregnant – 42 days post partum) [2] LATE MATERNAL DEATH (43-364 days)
SOURCE OF INFORMATION (_ALL THAT APPLY) Death Certificate [1] Autopsy Report [2] Clinical Diagnosis [3]
UNDERLYING
CAUSE_____
INTERMEDIATE CAUSE_____
IMMEDIATE CAUSE_____
CLASSIFICATION OF DEATH [1] DIRECT [2] INDIRECT [3] CO-INCIDENTAL [9] not classified

**QUICK CODES – DIRECT DEATHS**

[11] GESTATIONAL HYPERTENSION [12] HEMORRHAGE [13] EMBOLISM [14] ABORTION [15] INFECTION [16] OTHER DIRECT

**QUICK CODES – INDIRECT DEATHS**

[21] CARDIAC DISORDER [22] SICKLE CELL DISEASE [24] DIABETES MELLITUS [25] HIV/AIDS [26] RESPIRATORY DISORDER [27] SUICIDE [28] OTHER INDIRECT

**QUICK CODES – CO INCIDENTAL DEATHS**

[31] HOMICIDE [32] MVA [33] OTHER CO-INCIDENTAL including non pregnancy related medical complications

**EVALUATION OF THE ASSESMENT TEAM**

AVOIDABLE FACTORS PRESENT: [1] NO [2] YES , IF YES, SPECIFY ALL THAT APPLY

[1] DELAY 1 (PATIENT DID NOT RECOGNIZE PROBLEM)

_____

[2] DELAY 2 (PATIENT DELAY SEEKING CARE)

_____

[3] DELAY 3 (DELAYED ACCESS TO CARE – COST, TRANSPORTATION, OTHER COMMUNITY ISSUES)

_____

[4] DELAY 4 (DELAY RECEIVING APPROPRIATE CARE ONCE IN THE INSTITUTION)

_____

DETAIL SOURCES BELOW IF DELAY 4

[41] providers of care at time of death (training, quality, availability)

_____

[42] decision making process (recognition of serious problem, correct diagnosis, consultation process)

_____

[43] actions taken (e.g. referral, emergency obstetric care, appropriate treatment)

_____

[44] delays in referral (e.g. transport, money, permission, physical environment)

_____

[45] facilities (e.g. quality, blood, anaesthesia, supplies, drugs)

_____

**REVIEW TEAM** DATE OF REVIEW ___/___/___

Obstetrician _____ [1] Midwife _____ [2]

Epidemiologist _____ [3] MO(H) _____ [4]

MO(H) _____ [5] Other _____ [6]

Other _____ [7] Other _____ [8]

DATE SUMMARY SENT TO MO(H) PARISH OF RESIDENCE___/___/___

DATE SUMMARY SENT TO HOSPITAL OF DEATH___/___/___

DATE SUMMARY SENT TO MINISTRY OF HEALTH___/___/___

Date received by Ministry of Health: _____/_____/_____

day mon year

# Appendix 8: Maternal Mortality RGD Notification List (Form 5)

Maternal Death Surveillance Guidelines

FORM 5

**JAMAICA**

**MATERNAL MORTALITY RGD NOTIFICATION LIST**

**INSTRUCTIONS: To be completed by regional surveillance officer from the CASE REVIEW SUMMARY and forwarded to the CEO, REGISTRAR GENERAL'S DEPARTMENT on a quarterly basis**

**[1] FIRST QUARTER [2] SECOND QUARTER [3] THIRD QUARTER [4] FOURTH QUARTER**

| **REGION REPORTING** | **[1]SE [2] NE [3] W [4]S** | | **DATE REPORT** |
|---|---|---|---|
| NAME OF DECEDENT | DATE OF DEATH | PLACE OF DEATH | CAUSE OF DEATH<br>Immediate<br>Intermediate<br>Underlying |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

22

# Appendix 9: Maternal Mortality Surveillance Monitoring Report (Form 6)

Maternal Death Surveillance Guidelines

**FORM 6**

**MATERNAL MORTALITY SURVEILLANCE MONITORING REPORT, JAMAICA**

Instructions: Record to be maintained for each hospital in the region; report updated monthly to reflect revised status of cases from preceding month(s).

Name of Hospital: _____ Date: _____

Monthly report for: _____ Year:_____

Compiled by: _____

Reviewed by: _____

| Month | Deaths identified in women 10-50 years | Records retrieved and inspected | Evidence of pregnancy in preceding 12 months | Records of pregnancy related deaths reviewed | Reports completed | | | Case review meeting held | Final summary report sent to Ministry of Health |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Hospital summary (form 1) | Home visit/ANC (form2) | Post mortem report (form 3) | | |
| January | | | | | | | | | |
| February | | | | | | | | | |
| March | | | | | | | | | |
| April | | | | | | | | | |
| May | | | | | | | | | |
| June | | | | | | | | | |
| July | | | | | | | | | |
| August | | | | | | | | | |
| September | | | | | | | | | |
| October | | | | | | | | | |
| November | | | | | | | | | |
| December | | | | | | | | | |
| **Total (current YTD)** | | | | | | | | | |
| **Total (previous YTD)** | | | | | | | | | |

_____

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