Monitoring and Evaluation of Maternal and Newborn Health and Services at the District Level

Technical Consultation Meeting Report
5–8 December 2006

World Health Organization
Department of Making Pregnancy Safer
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1. Introduction

1.1 Overview

It is estimated that each year over 4 million babies die in the first four weeks of life, 3.3 million more are stillborn and more than half a million women still die each year from pregnancy-related causes. Almost all of these deaths occur in developing countries. In 2005, the World Health Organization established the Department of Making Pregnancy Safer (MPS) with the mission to reduce maternal and newborn morbidity and mortality by strengthening universal coverage and accelerating country support to scale up access to essential interventions. Special emphasis is placed in countries with high maternal and perinatal mortality in order to contribute to achieving the Millennium Development Goals (MDG). MPS identified monitoring and evaluation (M&E) as a critical area for development and support at the country level and, in collaboration with other countries and partners, MPS aims to strengthen M&E for better decision-making by policy-makers and planners. Areas that require more intensive action are those to improve knowledge on the magnitude and burden of leading causes of maternal and newborn morbidities and mortality; advance M&E approaches, methods and tools; and identify priority gaps.

This Technical Consultation aimed to provide guidance to strengthen M&E of maternal and newborn health and services at the district level. Monitoring progress to our goals and evaluating the impact of our interventions and actions are essential to improving performance and achieving results. It gives us feedback as to whether activities have been implemented as planned, ensures accountability and enables timely feedback for support and improving strategic planning. Empowering districts to understand progress – or lack of progress – and to be self-sufficient actors in managing decisions and advocating for change are also critical. In an era of decentralization, district health managers can use M&E principles to advance health systems, thereby strengthening through improved coverage, equity, access, acceptability and continuation of care, as well as the quality of care.

A framework for monitoring and evaluating maternal and newborn health and services at the district level is crucial in strengthening M&E systems. This framework should take into account the considerable variation in the degree of development and capacity of districts and health systems, as well as the need for both facility-based and community-based monitoring and evaluation. The strengthening process should also address all possible sources of information and the most effective ways to collect it; how the information will be used, in what context, at which time and by whom; the importance of full coordination with other programmes; and the need for integration in the national health information system (HIS) whenever possible. Most importantly, the targeted outcome of the M&E and HIS strengthening process is improved use of information for evidence-based decision-making aimed at reducing maternal and newborn morbidity and mortality.

Opening plenary remarks by Joy Phumaphi, Assistant Director General, Family and Community Health, World Health
Organization, and Dr Monir Islam, Director of the Department of Making Pregnancy Safer, further described critical aims for advancing M&E at the district level.

Mrs Phumaphi emphasized the value of motherhood and its influence on life, individuals, and communities. She recognized the tremendous advancements to protect maternal and newborn health, noting it is unjustifiable to say that we cannot effectively measure outcomes. Desired results of the meeting include recommendations focusing on accountability. This includes accountability through effectively monitoring and evaluating performance, improving efficiency and demonstrating economic use and management of resources to donors and partners. Accountability is also dependent upon the global community for the production of products for scale and evaluating performance for planning. Mrs Phumaphi stressed the need to share experiences and methodologies to improve information.

Dr Monir Islam’s opening remarks highlighted three major issues aimed at improving maternal and newborn health, morbidity, and mortality. First, in order to understand the magnitude and burden of disease, there is a need to move beyond global estimates to counting every pregnant woman, mother, and newborn. This requires solid M&E systems capable of generating evidence for action. Second, he noted that this was not a meeting on developing indicators; rather, the focus is to set the grounds to improve district-level capacity for data collection, analysis, and use. Lastly, it is important to understand how to better design integrated HIS at the district level with linkages to the local, national, and global levels for timely response.

1.2 Meeting objectives

Recognizing the need for dialogue, technical agreement and guidance in the processes involved in effective M&E of maternal and newborn health at the district level and its adequate structure and management, the Department of Making Pregnancy Safer convened a technical consultation, the first in a proposed series, with the following objectives:

- **Share experiences** from routine systems, projects with innovative approaches and research projects in developing countries to monitor and improve maternal and newborn health and services at the district level.
- **Analyse requirements** for effective monitoring and evaluation of maternal and newborn health services at the district level.
- **Discuss an integrated approach** for maternal and newborn health information systems at the district level, including information and resource needs, data collection, data analysis, data interpretation and information use.
  - Analyse and discuss health information systems requirements, both in terms of production of quality data and use of information for district management.
  - Analyse and discuss how to better integrate various health information systems (non-routine and routine) for effective monitoring and evaluation of maternal and newborn health and services.
• **Recommend a process** to moving towards developing future guidance for monitoring and evaluating at district level in a context of national monitoring for Millennium Development Goal achievements. If necessary, to form a Task Force to rapidly advance this area.

### 1.3 Technical advisory group members

Fifty-eight individuals were invited to the consultation. These included 23 country participants, 8 participants from United Nations agencies or other partners, 2 observers, 10 WHO nominated staff and 15 Secretariat members. Individuals represented themselves in an advisory role to the Director General.

Chair: Dr Theo Lippeveld  
Rapporteur: Dr Anuraj Shankar  
List of participants: See Annex A  
Agenda: See Annex B
2. Proceedings

2.1 Central issues in monitoring and evaluation of maternal and newborn health and services at the district level

A priority objective of district level M&E of MNH is to use information to improve management functions – including those in sectors other than health – that will directly lead to an improvement of the acceptability and implementation of district health services and their impact. It is recognized that the M&E process is not merely a technocratic exercise, but rather a system-wide intervention closely linked to the national health information system, and yet, acting on its own for local decision-making. It should also act within the context of a management cycle, concerned with day-to-day operations, and capable of generating accurate information for timely response.

Central issues identified by participants included:

- M&E is a quality improvement tool aimed at assuring systems operations and impact. If M&E is effectively implemented, the system will improve accountability and performance over time. M&E is also an advocacy tool that generates information to be used to mobilize community stakeholders and inform policy.

- Data collection efforts defined by a minimum of qualitative and quantitative data need to be integrated in HIS that can routinely guide management, planning and implementation of maternal and newborn health and services.

- Availability of information does not guarantee its utilization for evidence-based decisions. Poor data quality and underutilization are core concerns, and use of data needs to move beyond unilateral reporting and toward institutional change through feedback and quality assurance principles.

- It is critical to establish linkages with programmes for which pregnancy can be an entry point in the system so as to decrease missed opportunities for case identification and tracking and avoid duplication of monitoring efforts through more integrated operations and systems.

- A district health system refers to a more or less self-contained segment of a national health system. For purposes of definition, district-level M&E should include the public and private sectors, as well as community and facility levels.

- Increasingly, health functions are transitioning from Ministries of Health to the private sector and other public organizations, thereby, limiting government access to population-based data.

- There are only limited human resources available to support and sustain district-level M&E operations, and therefore local staff is unable to routinely use the information for decision-making.

- Legislation and policies, or the lack thereof, may affect resource mobilization,
privacy, confidentiality and security issues such that data gathering, access and use are hindered.

2.2 Monitoring and evaluation conceptual frameworks, methods, and tools

M&E principles, processes and tools vary across organizations and programmes, and this may be based on need, capacity and evolution of M&E understanding and its application. It is important to build upon international, national and district initiatives so that district-level MNH M&E systems aim towards integration and avoid development in isolation. The rapid advances in information and communication technology (ICT) facilitate timely access to relevant MNH-related information within the context of evidence-based standards, programmatic guidelines and M&E approaches, methods and tools. Evaluating existing resources is essential to understanding their effectiveness for public health practice, research and learning.

Other points identified by participants included:

- A conceptual framework describes the processes used to outline possible courses of action or to present a preferred approach to systems development. The framework should be a simple tool capable of illustrating a quality improvement cycle of planning, implementation, evaluation and information use. Underpinning the whole M&E cycle is the surveillance of maternal and newborn mortality and morbidity indicators.

- Advancing district-level MNH M&E systems, and achieving MDGs, may require behavioural, organizational and contextual changes guided by reciprocal and collective involvement of stakeholders; systematic investment in M&E; assuring standards of evidence, accountability and performance; engendering learning organizations; and recognizing the value of M&E for guiding local quality improvement, management and advocacy so as to assure operations, sound decision-making and policy.

- It is important to understand how communities should, and could, be involved in the process of M&E. Events occur in the community and these should be part of the reporting and feedback of the MNH system. Also, in trying to change health and services, it is critical that the process make information available at the household level.

- Donors look for a sector-wide approach so that the links between district, province and national monitoring are not lost. There is a need to create linkages with programmes (e.g. HIV, TB, malaria, immunization) and public and private partnerships at the international, national, district level and below.

- There are varying methods (e.g. clinical audit, operations research) associated with M&E and terminologies need to be clarified to better understand purposes, strengths and differences between them. Borrowing from existing definitions and practices could be significant to this end.

- Given the broad availability of existing M&E approaches, methods and tools, knowledge management strategies need
to be identified that promote information for translation, implementation and reporting of lessons learnt and scientific understanding.

2.3 Health Information Systems

The relevant information for M&E of MNH interventions and outcomes is produced by the Health Information System (HIS). An information system can be defined as a system that provides specific information support to the decision-making process at each level of an organization. The ultimate objective of an HIS is therefore not to "gain information" but to "improve action". This definition can be applied to all sources of health information including population-based sources (census, vital statistics and household/population-based surveys and surveillance), as well as health services-based sources, often called "health management information systems" or "HMIS" (e.g. disease surveillance, health-facility records, administrative records and health-facility surveys).

All these health information sub-systems and data sources potentially produce data relevant for M&E of MNH interventions and outcomes. In practice, the routine HMIS is perhaps the most critical information system at the district level. HMIS is an integral part of the local service delivery system. It documents and supports ongoing health care provision, administration and financing, morbidity, births and deaths, and, increasingly, community-level public health actions. HMIS works in tandem with special studies and surveys to complement or corroborate results of different data sources, provide a comprehensive picture of district level health actions and provide information on those individuals in the population who do not use the health services.

Unfortunately, HMIS in most developing countries are poorly functioning due to a series of issues, such as irrelevance and poor quality data collected; centralization of information without feedback to lower levels; poor and inadequately used health information system infrastructure; and fragmentation into programme-oriented information systems resulting in duplication and missed opportunities.

There is an urgent need for strengthening HMIS performance and integration. HMIS performance is defined not only on the basis of the quality and relevance of data produced but most importantly on evidence of the continued use of these data for improving health system operations and health status. Thus, improving the performance of HMIS often requires interventions that address a broad range of possible determinants of performance which contribute or detract from data quality and data use.

As for integration, a comprehensive district HMIS that includes MNH as well as other programme data helps to integrate care at the service delivery point and guides managers and workers towards holistic and community-oriented rather than vertical program-based actions. Sound integrated and community-based routine information systems have been effective (at least on a small scale) in identifying pockets of underserved populations and in helping to target district resources to those in greatest need. The latest ICT
innovations can improve integration and harmonization of various data sources, bringing together survey results, vital events information and service statistics in one district-based “data warehouse”. In recent years, the Health Metrics Network and other international bodies encourage harmonized and standardized information system development, as well as better integration between various data sources such as surveys, disease surveillance, HMIS and health impact assessment.

Strengthening M&E for MNH interventions should seriously consider the central role of HIS and sound information management in ensuring programme effectiveness. HIS investment should tackle four equally important areas:

• First, it is critical to promote local discussion in defining essential health information needs. Data collectors and managers must feel a sense of responsibility (i.e. ownership) for the information they collect and use.

• Second, investment in information systems must focus on the organizational and behavioural aspects of HIS operations, as well as technical elements of HIS development, taking into account costs, new technology and better understanding of HIS performance measurement.

• Third, particular focus should be given to the development of a “culture of information” in health systems and health organizations involved in MNH programmes. Incentives and rewards should be introduced that demonstrate the value of using evidence to manage resources, services and impact.

• Lastly, MNH information system strengthening efforts should, where possible, build on existing district information systems, looking for opportunities for integrated district health action, data management efficiency and community involvement.

2.4 Country experiences

Participants from nine countries (Afghanistan, Bangladesh, China, India, Slovenia, Solomon Islands, South Africa, Thailand, Zambia) presented operational practices and improvements associated with data collection, analysis and use. Brief summaries of the experiences are presented below. Selected stories are depicted in boxes throughout the document.

Afghanistan

The Afghan example draws upon the principle that “If every mother and child count, then we should account for every mother and child at the facility and district level.” The WHO Collaborating Center in Atlanta assisted the Ministry of Health to implement a monitoring system for maternal and newborn health centred on defining local relevant indicators on the basis of two pieces of information: the birth weight and the newborn time of death. These local indicators defined the “gaps” at the district level and are seen as an opportunity to close the local “gap”. The implementation of the quality assurance process reaches full importance at the district level where local staff is empowered. Key issues guiding this methodology include linkage of process to outcome indicators to reduce disparities; emphasis in participatory training methodologies;
and development of a local process for the HIS that provides the most information with the least amount of data.

**Bangladesh**

In Bangladesh, community health workers, responsible for delivering essential service packages, are also in charge of monitoring and surveillance. They visit the households in their assigned catchment areas and collect data on maternal and infant deaths, pregnancies, births and incidence and prevalence of certain communicable diseases. The M&E experience in Bangladesh brings up major challenges encountered in this area: unidirectional data flows; poor supervision and management, analysis and feedback, resulting in low quality of routine MIS data. Other weaknesses include insufficient training, infrastructure and lack of vital registration systems. More importantly, monitoring data are rarely used for planning and other purposes. There is a need to strengthen the M&E system especially for MNH to impact on maternal and newborn mortality (see also Case study 1, p15).

**China**

The China National Maternal and Child Health Surveillance System provides information on maternal and child mortality and on the prevalence of birth defects in a sample of 336 sites nationwide. Begun in 1986, critical to the functioning of this system has been the establishment of clear rules, regulations and responsibilities, as well as strong emphasis on quality control at local level. These factors make the system very demanding in terms of human resources. Computerization and electronic systems is one of the important challenges in China, as well as qualified trained staff, especially in rural areas (See also Case study 2, p17).

**India – Tamil Nadu**

In the state of Tamil Nadu in India basic registers of maternal and neonatal consultations are maintained in health centres. These assess institutional performance and are sent to the district office weekly. Emergency obstetric care centres also report by telephone key MNH performance indicators to the district office. Maternal deaths audits have improved the accountability of the service providers and revealed factors associated with maternal deaths that led to evidence-based corrective actions. Moreover, local civil societies are actively involved in the district planning with full autonomy to plan, implement and monitor all health programmes. This has led to strengthening the concept of data for decision-making. Shaped by data, the planning activities for health have been decentralized to the primary health care centres (See also Case study 3, p18).

**Slovenia**

The National Institute of Public Health in Slovenia is responsible for M&E of health and care. Health-care providers are responsible for data collection. The Ministry of Health and the National Institute together define priorities on the basis of main public concerns and demands for international data reporting. Given the satisfactory data, reproductive health is not a priority in Slovenia. However, several systems are involved in monitoring maternal and newborn health. All hospitals report data to different national health information systems. The computerized Perinatal Information System is a national database that gathers data on live births.
and stillbirths from all hospitals in Slovenia. The data are presented yearly in the Health Statistical yearbook. Regarding maternal mortality, Slovenia has established a process to systematically investigate all deaths in women in reproductive age. Findings and recommendations are published every three years (See also Case study 4, p20).

**Solomon Islands**
The Solomon Islands implemented a reproductive health surveillance system in 2001. With no large resources or technology development, a very pragmatic approach was adopted. Based on an existing maternal and child health system, it was decided not to collect new data. Four simple actions made the data already being collected more useful: coding, easy data entry, unique identification number and linkage of records. A user-friendly and simple computer system made it possible to overcome the lack of computer application experience. Similarly, automatic generation of 26 tables of information on maternal and child health status and a report template made it possible to overcome the lack of analysis and reporting experience. Training, assistance and supervision are critical, and political commitment is necessary (See also Case study 5, p22).

**South Africa**
In South Africa, the National Department of Health has created a confidential enquiry into maternal deaths, a national perinatal mortality audit and a national survey to analyse child deaths in institutions. All three present results through a published report every three years including recommendations. These systems are based on the same process, namely the ICA Solution Audit System (I – Identification of deaths, C – Causes of deaths, A – Avoidable or modifiable factors, Solution – analysis of the data and discussion of the problems identified to suggest solutions). These reports have triggered the development of other styles of audit systems, training programmes and guidelines (See also Case study 6, p25).

**Thailand**
It is estimated that 540 000 persons in Thailand in 2006 were HIV-positive. A major concern is to assure quality of services for antiretroviral treatment. HIVQUAL-T was initiated in 2003 to build capacity for performance measurement, quality improvement and infrastructure in Thai ambulatory clinics. A user-friendly software program allows collection of data on key ambulatory care indicators. Data can be aggregated at provincial and national level but facility-specific reports can be generated immediately after data entry. Quality improvement projects are undertaken in areas found in need and results discussed in regional workshops. Critical to the success of this programme have been the leadership commitment, hospital-level ownership, integration with the HIV M&E national and accreditation programme, and the capacity building provided by the Ministry of Health.

**Zambia**
In 2003, the Zambian Ministry of Health first discussed the potential benefits of adding “smart card”-based, portable electronic medical records to the system of care in Zambia for the primary purpose of aiding the provision of continuity of care for each patient regardless of mobility issues (the card is carried by each patient). However, there was an express
intention that this would, with the same effort, significantly improve the Zambian HMIS. In 2005, with local CDC technical support, a multiservice electronic medical record (EMR) system was deployed and, presently, over 73,000 patients are in the "SmartCare" system, which is being used by increasing numbers of partners. Although the majority of enrollees is still in Lusaka, the SmartCare system has now been deployed in 10 different districts and about 40 health centres. In 2006 it was identified as the national standard EMR system. A touch-screen interface permits virtually any literate person to use it since no typing or even "mouse" skills are required. Among others, the benefits of the system include immediate access to patient's clinical condition, prior visits, medication, etc., immediate provision of local statistics at each service level, graphs and tables, provision of warning and reminders, and use of a single data capture effort to serve both patient care and public health management.

Case Study 1: Bangladesh

Bangladesh is an impoverished and densely populated country in the southern Asian region where 36% of the country’s 140 million population live below the absolute income poverty line (US$ 1/per day).

The Management Information Systems (MIS) is under the Ministry of Health and Family Planning and is divided into four components: the service MIS, the financial MIS, the personnel MIS and the logistic MIS. The M&E management cycle is poor in Bangladesh and there is a need to strengthen MIS of MNH to impact on maternal and newborn mortality. The major weaknesses of the MIS are:

- data flow is unidirectional, i.e. data always moves upwards and no system of giving feedback to the reporting sites
- analysis of data is poor and MIS data are rarely used for planning and action
- programme managers are not information minded
- there are insufficient data management infrastructure
- quality of data in terms of completeness, timeliness and accuracy is poor
- monitoring MNH services is not priority
- non-existent vital registration systems.

Under the Ministry of Health, there is an extensive network of fieldworkers at community level to impart different essential service packages (ESP). For every 4000 population there is a Health Assistant (HA) and a Family Planning Assistant (FWA). In addition to ESP provision, these community level workers are also involved in monitoring and surveillance. The HAs visit all households in their catchment areas once a month while the FWAs do so once in every two months. They collect data on maternal and infant deaths, new pregnancies, births and prevalence and incidence of certain communicable diseases through epidemiological information sheets. They also conduct a yearly census to determine targets and coverage status for health and family planning. There are also systems for annual health-census of the population. However, the management and supervision for these are poor resulting in poor quality of data, which is, therefore, never used for evaluation and planning. The main lesson from Matlab field site of ICDDR,B is that an extensive community-based monitoring and surveillance is possible to implement with the help of modern computer devices. The problem is that it requires huge resources and without continuous donor support it is difficult to implement by national governments of the developing world.
3. Technical Advisory Group (TAG) recommendations for countries

3.1 Recommendations on a conceptual framework for monitoring and evaluation of maternal and newborn health and services at the district level

The consultation group advised that further work is needed on the development of a monitoring and evaluation framework at the district level. The framework should consider the following guiding principles and system characteristics:

3.1.1 Guiding principles

- M&E systems for MNH should be driven by the use of information for improvement of service delivery performance and assessment of impact.
- M&E systems for MNH should involve community and facility partners and be guided by participatory decision-making to ensure local ownership and benefits.
- M&E for MNH should be supported by national policy.
- Only those data should be collected on a routine basis that can be used at local levels for their own management purposes.
- Users of M&E systems at district level and below should be empowered to make decisions.
- Data generation for MNH should be integrated within the broader HIS wherever possible.
- Districts with functional health information systems should align operations according to the conceptual framework and integrate strategies. For districts lacking functional HIS, vertically implement the conceptual framework for MNH services and aim towards a systems approach over time.

3.1.2 System characteristics

- M&E for MNH should be structured and functioned in such a way that it can account for every mother and newborn.
- M&E of MNH should ensure a systematic approach and should allow for a certain level of independence and adaptation for data collection, management, use and planning.
- There should be a clear linkage between M&E of MNH and the quality improvement of services. Quality improvement should enable the identification of ongoing problems, understanding needed response, monitoring and evaluation, and determining effectiveness and impact.
- Its management structure should be appropriate to the country context and build upon existing procedures.
- Linkage between process and outcome indicators should be made at the district level. Linking these will assist in understanding which changes in services improve outcomes.
- Data should be accessible and disseminated through various methods to the community, stakeholders and especially people who are users of the system (including the private and public partnerships).
Case Study 2: China

The China National Maternal and Child Health (MCH) Surveillance System is a network for the systematic collection, analysis, interpretation and dissemination of information on maternal and child mortality, providing estimates for maternal and under-five deaths and for the prevalence of birth defects at different levels of disaggregation. Data collection process follows from village to township to county to provincial MCH centers to national MCH surveillance office. Dissemination of information flows in the opposite direction. The Department of Maternal and Children Health and Community Health at the Ministry of Health also disseminates results through press conferences, newsletters and newspapers and publications with major indicators.

In 2006, the surveillance system in China covered 336 sites nationwide, including urban and rural areas. For maternal mortality, the target population includes all pregnant women or up to 42 days after delivery who are registered in the site as a permanent resident. There is an official maternal death registration card and a questionnaire of maternal death reason that needs to be completed for further investigation.

Supporting the system includes clear rules and regulations that establish responsibilities, and record checking and evaluation of quality at each level. Regarding human resources, the system requires at each provincial or city MCH Institute, 3–4 staff for data collection, data quality control, analysis and reporting. At each county MCH Institute, 2–3 specialized staff responsible for collecting the township and village surveillance data through monthly regular meetings. Transportation used includes bicycles, donkey/horse, car and bus. While two thirds of the surveillance counties have computers, there is a lack of them in rural areas, particularly in remote rural areas. From 2005, the Government provides special funds to the 336 surveillance sites.

Quality control is performed at county, township and village levels once a year in selected sites. As the number of maternal deaths is small, all deaths are investigated in the three selected townships. For children under-five, three villages are further selected in each township. Quality control starts at the MCH hospital and general hospitals in the central district, where hospital death registries are reviewed and medical histories are retrieved and checked. In a second step, records from the hospitals in the townships are also reviewed. Finally, villages are visited and the health worker (called village doctor), the family planning worker and other relevant staff are asked about deaths that might have occurred in the previous year. As a final step, people encountered in the streets are also asked about their knowledge of possible recent deaths of women and children in the village, and households previously identified as having been the place of either a birth or a maternal or under-5 death over the past year are visited for confirmation of the information.

Challenges encountered by this surveillance system in China include:

- difficulty in setting up an electronic system for data collection and transmission due to financial constrains that results in delays of the surveillance process
- lack of qualified MCH staff in rural areas; more training is needed
- inadequate utilization of the data resulting from the surveillance system
- insufficient dissemination of results to relevant agencies.
Case Study 3: Tamil Nadu, India

Tamil Nadu is the southern-most state of India. The MMR is 90; 98% of women obtain at least 3 prenatal care visits and 96% deliver in a facility with a trained birth attendant. Maternal and newborn health (MNH) has steadily improved since 1990 when the MMR was 400 and monitoring and evaluation (M&E) for MNH was virtually non-existent. Improvements in M&E have been central to improved MNH in Tamil Nadu.

In 1994, implementation of a maternal death notification protocol began. Maternal death audits were subsequently carried out by District Data Collectors who interviewed relatives of the deceased as well as service providers. Review of these data led to improve the accountability of the service providers and revealed factors associated with maternal deaths. Evidence-based corrective actions could then be taken. For example, to overcome the shortage of specialists, institutions were permitted to hire private anesthetists when needed.

Data collection starts at the grass-roots level where health staff from Primary Health Centers (PHC) and Health Sub Centers (HSC) maintain basic registers of maternal and neonatal consultations (e.g. antenatal registrations, deliveries conducted, immunizations performed). A maternal and child health report is prepared that reflects the institutional performance weekly. These are electronically forwarded to the District every month where the data are further analysed and sent to the state level for additional analysis and feedback to Districts.

Furthermore, each District maintains 2 to 3 emergency obstetric care (EmOC) centres that report daily through a convenient telephone-based reporting system. This has led to regular reporting of key MNH performance indicators such as the number of complicated maternity admissions, number of specialists available, number of caesareans performed during the day and night, blood group availability, and blood transfusions performed. The District and State Headquarters analyse the data and post results on the web daily. In addition, monthly EmOC reports are sent to the districts and state level.

District offices are equipped with qualified statistical personnel and computers. Video conference facilities have been established in all District Headquarters. PHCs are being equipped with computers in a phased manner so that over the next few years PHCs will be able to upload their data via the Internet. Periodic surveys at all levels compliment and validate the routine data collection. This has led to strengthening of the concept of data for decision-making. Shaped by data, the planning activities for health have been decentralized to the PHC. Moreover, elected members and local civil societies are actively involved in the preparation of plans through the creation of a District Health Society (DHS) which has full autonomy to plan, implement and monitor all health programmes. Indeed, the entire budget for the district is placed at the disposal of the DHS.

The State of Tamil Nadu is currently in the process of establishing Patient Welfare Societies (PWS) for each PHC and hospital which would be given annual cash grants for the maintenance of the health facility and M&E of PHCs. The PWSs would monitor performance of the hospitals to improve accountability of institutions. The PWS would also be able to mobilize funds from philanthropists for health facility improvement based on results from M&E activities.

In summary, appropriate technologies such as optical readers, telephone-based reporting of data, computers and enhancement of human resources have been at the roots of successful and reliable M&E practices in Tamil Nadu, used to guide policy and practice, to improve accountability and quality of services.
3.2 Recommendations on information systems in support of monitoring and evaluation of maternal newborn health at the district level

The consultation group formulated recommendations related to the following topics:

• general recommendations on the development of MNH information systems
• specific recommendations on the design and implementation of MNH information systems
• recommendations on cross-cutting issues related to MNH information systems.

3.2.1 General recommendations on the development of MNH information systems

• There should be strong leadership and political will at the national and district levels to ensure smooth functioning of M&E for MNH.
• In support of M&E of MNH, each district should have a well functioning HIS capable of producing information for evidence-based decision-making.
• A national and district legal framework and policy should be established to ensure the availability of comprehensive information for M&E of MNH. This policy should include incentives and measures for licensing or certification of providers and accreditation of institutions to ensure involvement of the private sector and of other public sectors besides health.
• A system of regular meetings by the district health team should be established to stimulate use of information. During these meetings MNH information is reviewed, best practices are shared, problems identified and solutions proposed for improvement of MNH services.

3.2.2 Specific recommendations on the design and implementation of MNH information systems

3.2.2.1 Information needs

• In addition to a standard set of quantitative indicators, qualitative data should be collected to better understand issues regarding service delivery, utilization and impact.
• Denominators for indicators (population-based parameters) should be accurately determined by different methodologies available, including community-level data on the true number of women of reproductive age, number of pregnancies and live births.
• At each level (community, facility and district levels), minimum sets of indicators need to be defined to keep the data collected within a manageable quantity.
• Maternal and perinatal deaths should be made legally notifiable.
• Needs assessment should be conducted at regular intervals using existing tools to assess MNH service provision and to
Case Study 4: Slovenia

Slovenia is a European country with only 2 million inhabitants divided into 9 health regions. In 2005, the infant mortality rate was 4.1 per 1000 live births, the perinatal mortality rate 5.2 per 1000 births (≥1000 g.), and 8.6 per 1000 births, regardless the birth weight. Maternal mortality rate for the period 2000–2002 was 15.1 per 100 000 live births. In Slovenia, more than 99.8% deliveries occur in the maternities.

The National Institute of Public Health (NIPH) is responsible for M&E of health and care including data collection, processing, analysis and reporting to international organizations. Data are collected uniformly for the whole country through the national HIS. Regional public health institutes are also involved, especially for analysis of regional data and preparation of regional reports.

Health-care providers are paid for data collection. Decision of what data are needed is based on main public health concerns and international data reporting obligations. Several information systems are involved in M&E of MNH. Generally, reproductive health and health of the pregnant women can be monitored using the National Outpatient Information System where data are reported annually. Information on serious complications in pregnancy can be monitored and analysed through the National Health Information System of Hospital Treatment. All hospitals report data semi-annually in the form of individual episode records, which contain, among others, personal identification and demographic variables, variables about diagnoses and therapeutic procedures, intensive care and type and length of hospital treatment.

The Perinatal Information System of the Republic of Slovenia was set up in 1987. It started as a project at the University hospital and two years later became the national information system. Its main purpose is monitoring, evaluating and planning for health care and services in perinatology. All live births and stillbirths are included. Information is gathered by all maternity hospitals in Slovenia. Data are collected in two forms, which serve also as medical documentation in delivery rooms: Birth record (by midwives and obstetricians) and Newborn (by paediatricians) and sent, computerized, to the NIPH. Analysis and results from this national database are regularly shown in the Health Statistical Yearbook. Special publications are also accessible through the Internet and particular analyses are prepared for presentations in expert meetings. Furthermore, Slovenian obstetricians use it for research and quality improvement of health care.

Maternal mortality data are available in Slovenia for the last 50 years. Emphasis is placed in improving reliability for cause of death and a multidisciplinary working group was established for this purpose. Determination of death and cause of death are the responsibility of the physicians who issue a death certificate and complete a section on cause of death. This document is sent to the NIPH and entered in the mortality database. This database is used to identify all deaths of women in reproductive age (15–49), which are then investigated with the aim of reducing misclassification of maternal deaths, including late maternal deaths. Investigation includes gathering medical documentation from all health-care providers of deceased woman. The working group analyses the circumstances of every maternal death, the cause of death is assigned and preventability assessed. Based on the findings, a report is prepared every three years including recommendations. The report is sent to the Ministry of Health and presented to the Board of Obstetrics and Gynaecology. The most important findings are also presented at expert meetings. Recently, computer data linkage between the mortality database and the PIS and Informational system on fetal deaths is being introduced.
Triangulate with the existing HMIS.

- Clinical audits and maternal death reviews should be carried out periodically and verbal autopsies should be carried out at the community level.

### 3.2.2.2 Data collection

- Standardized data collection protocols, guidelines, tools and instruments should be developed, if not existing, and made available and correctly utilized. Facility-based health information systems should be created to support consultation-based, patient-level tracking and avoidance of record duplication.
- Wherever practical, electronic data collection should be attempted to ensure timely availability and accessibility of data and reduce problems associated with storage of paper-based records.
- Protocols and/or standards (e.g. on data security) should be established and training enforced to ensure confidentiality of collected data.
- Data should be anonymized and/or access limited to specific levels and/or data locked through password protection.

### 3.2.2.3 Data flow, analysis and management

- To ensure data completeness, a routine reporting system should be in place with defined levels of participation and standardized schedules. A well-planned data flow system for the district should be prepared to ensure appropriate flow and utilization of data.
- Standardized protocols, guidelines and training materials for data analysis should be developed, if not existing, made available and correctly utilized.
- There should be a focus on the analysis of disparities to give special attention to the poor, the marginalized and the underserved.
- Wherever practical, implement computer-based data analysis systems.
- When feasible, correct procedures for coding, processing and analysis of data should be implemented by dedicated staff.
- Local internal demand for data and policy change should be made at higher levels to ensure the flow of data from the upper levels to the district and local levels.

### 3.2.2.4 Data quality

- Local and international standards, including data element definitions, electronic standards and case definitions, should be established and systematically incorporated into data dictionaries.
- Quality control and strong feedback mechanisms for data collection, processing and analysis should be created including cross-checking for accuracy, logical and internal consistencies to assess reliability, and wherever possible, additional validation methods should be used (e.g. random sample forms).
- Enhancing data quality relies on routine use by data collectors, analysts, managers and stakeholders. Efforts should be made to foster a no-blame, no-shame environment to minimize misreporting or falsification of data.
- Instructional manuals, guidelines and protocols for data collection, processing, analysis, training and quality assurance should be developed if not existing, and made available and correctly utilized.
- Ongoing coaching and training procedures for data collectors should be established to ensure continual improvements in quality.
Case Study 5: Solomon Islands

Solomon Islands has a total population of 450 000 in 6 main islands and more than 120 small islands and atolls. In 2000, MNH data were already collected through different systems, including antenatal care card, risk factor record, delivery record, postpartum visit record, immunization record, family health record, mother's health book and children's health book. However, computers were not used, not all islands had telephone service and some islands used two-way radio for communication. There was a monthly routine health statistic report system established.

In 2001 a pilot study on establishing a reproductive health surveillance system (RHSS) in Solomon Islands was conducted. Pragmatic solutions were found to challenges encountered as follows:

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Solution proposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>How to start the pilot study?</td>
<td>It was based upon the existing MCH system and no modifications were made to MCH delivery system and service programmes; no new data were collected. The pilot study started in a simple, easy and small way (SES).</td>
</tr>
<tr>
<td>How to make existing data useful?</td>
<td>Developing two coding sheets – perinatal health care and children health care to code core data from existing data collection tools; the coding sheets were designed as a pre-code form, and they were easy for data entry. Unique ID number was created for each mother and each child, and a linkage between mother and child's form was created.</td>
</tr>
<tr>
<td>Lack of computer application experience</td>
<td>A user-friendly computer program was developed for RHSS with four components: data entry, reporting, back-up and maintenance systems.</td>
</tr>
<tr>
<td>Lack of data analysis experience</td>
<td>The RHSS program generates automatically 26 tables of information on maternal and child health status, MCH health care services, priority health problems identification, developing health care strategies and evaluating MCH program.</td>
</tr>
<tr>
<td>Lack of information reporting experience</td>
<td>An annual report template was developed, which includes background, main results (such as characteristics of women and children, adverse outcomes, characteristics of health care, main health problems), operation plan for next year-national, provincial, district levels. MOH RH supervisors and provincial supervisors can use this template to develop national and provincial annual reports easily.</td>
</tr>
<tr>
<td>Lack of personnel with computer experience</td>
<td>MOH hired a person for computer operation and data process. This person was trained, is supervised and obtains continuous training. She can now provide technical assistance to provinces.</td>
</tr>
<tr>
<td>RH staff lack of experience</td>
<td>Training and assistance to national and provincial level supervisors on computer operation, RHSS program, data entry, management tool, report writing, presentation was provided.</td>
</tr>
</tbody>
</table>

In 2005, the first annual report of reproductive health surveillance was submitted to MOH and presented on the national conference. In 2006, all provinces have been trained and began to establish the RHSS. It is expected that an annual report for the whole country will be developed in 2007.
3.2.5 Information use

- Information should be used to establish priorities, to identify problems and to guide improvement of MNH interventions.
- Organizational and behavioural interventions need to be developed (and resources assured) to strengthen information culture, leading to better use of information for service improvement: self-assessment of information by districts and health facilities, institutionalization of problem solving techniques, etc.
- Information should be disseminated to the community, to health facility staff, to district and provincial officers, to relevant national authorities and to partner NGOs and donors.
- Internal and external evaluations should be implemented to assess achievement and progress based on pre-defined targets.
- A formal report should be prepared and disseminated to all personnel involved in data collection processing and analysis.
- Community-based advocacy groups should be created to lobby for resources.
- Measurable actions/recommendations should be developed and evaluated over time to assess impact.
- Whenever possible, data should be compared to other districts.
- District authorities should identify appropriate tools and channels that can be used to implement changes identified through M&E for MNH.
- Data should be presented to community and health-care providers and they should be consulted to develop annual strategic plans.
- Laws should be in place to promote sharing of data without crossing the lines of confidentiality.

3.2.6 Ethics

- Ethical boards should be strengthened and/or established to assure systematic policy inclusive of individuals, facilities and communities as related to data ownership and safeguards for confidentiality.
- Careful consideration needs to be given as to how, and to what degree, ethical boards should be involved in collection and use of information/data in the context of M&E for MNH.
- At minimum, ethical boards should be informed about collection and use of information/data and can check that data are kept secure and patient confidentiality is maintained.
- Further work is needed to clarify the difference and overlap between general collection and use of information/data and specifically M&E, research and audit.
- A recommended process for review (given the increased workload for ethical boards or committees) is to

Case Study 5: Solomon Islands (Continued)

Lessons learnt and recommendations:

- Make the system simple; use available data as much as possible.
- Choose a right site for piloting.
- Identify personnel to be trained to drive and maintain the system, and supervise.
- Consider local problems and issues when training; local managers’ capacity building takes time, and continue training.
- GIS system is very well received.
- Make information available at national level and at provincial level.
- Continue to support, monitor and supervise during implementation.
- Continue to advocate for the system.
- Produce a report for Minister, Undersecretary, provincial directors and NGOs.
- Assure political and financial support from Minister, Undersecretary and provincial directors.
- Identity priority issues on annual RH managers conference and compare with each other.
- Present recommendations to national and provincial health conference to obtain support from policy-makers and donors.
- Develop strategies and implementation plan – national, provincial and district plan.
- Integrate RHSS into HIS central data centre for sharing.

Monitoring and Evaluation of Maternal and Newborn Health and Services at the District Level
consider having a human subject, non-research determination committee or an information governance committee to act as an expedited screening/preview committee of any collection and use of information/data (including M&E and audit) to determine if it needs full ethical board approval.

3.2.3 Recommendations on cross-cutting issues related to MNH information systems

3.2.3.1 Stakeholder involvement
- To ensure effective M&E for MNH partnerships should be established with different stakeholders, including the communities as well as other non-health sectors.
- The community should participate in data collection and use for decision-making and advocacy (e.g. verbal autopsies).
- Involvement of district stakeholders should be increased for the development of appropriate hardware and software, so that specific needs can be taken into account (districts with more than one health system, conflicts about choices and software designed for pre-established indicators).
- Partnerships should be promoted for personnel/human resources development between the public health system, NGOs and academic institutions in order to harness human resources and to develop capacity for M&E for MNH.

3.2.3.2 Human resources and training
- Policies and practices should be implemented to ensure staff motivation, retention and recognition, such as performance review and certification.
- Professional development specific to M&E for MNH should be made available.
- Human resources for the use and processing of MNH information should be increased through investment, training on the use and interpretation of data, coaching, computer assisted aids, existing tools and through nurturing environment and feedback mechanism.
- Establish and utilize competency-based human resources practices to create a culture of information, accountability and excellence.
- Procedures should be created and promoted to ensure adequate and ongoing coaching and supervision. (e.g. performance assessment checklist).
- Competency-based certification systems should be utilized to enhance data quality and to motivate health professionals to use information.
- Training should be provided to improve data interpretation and problem solving.

3.2.3.3 Financial resources
- There should be long-term investment and a specific budget line item for district level M&E of MNH.
- Partnerships should be sought to harness available resources.
- Districts’ authority should notify appropriate national authorities on needs to appropriately carry out M&E for MNH.
- Advocacy and information sharing with local
donors should be undertaken to ensure interest and possible financial support for M&E for MNH, as appropriate.

• Existing resources should be reallocated for IT infrastructure development by leveraging with other programmatic areas (e.g., HIV/AIDS) and systems (e.g. web-based systems), wherever possible.
• An incentive system should be created to encourage career progression, and lessen salary discrepancies between public and private sectors.

3.2.3.4 Infrastructure

• Hardware infrastructure (e.g. including computers, printers, calculators, fax, telephones lines and electricity), should be available for multi-use with no lockdown and with appropriate security measures.
• Appropriate amounts and location of space should be allocated commensurate with the critical role of M&E.
• Adequate field support (e.g. transportation, communication) and reporting of data should be provided.
• Quality assurance must be institutionalized.

Case Study 6: South Africa

The HIS for maternal and child health functions poorly in South Africa. Data from the various facilities relating to MNH is not feedback to the clinicians and there is considerable doubt as to its accuracy. Attempts are being made to correct this.

Clinicians therefore started developing their own systems to obtain information related to MNH. The systems developed by the clinicians were all audits based on critical incidents. In 1997, the National Department of Health (NDOH) created a confidential enquiry into maternal deaths and making maternal deaths notifiable facilitated this. A national committee produces a triennial report on the results of the analysis of the maternal deaths including recommendations: Saving Mothers: Report on the Confidential Enquiry into Maternal Deaths in South Africa. The third report dealing with the years 2002–2004 has been already published.

A national perinatal mortality audit system evolved from a programme designed for use in district hospitals to improve the quality of care. The programme (Perinatal Problem Identification Programme – PPiP) is now being used by about 200 institutions throughout South Africa and 164 send their data electronically to a national database based in the MRC Maternal and Infant Health Care Strategies Research Unit. The unit amalgamated the data and produces a national report. Provinces produce their own reports and district hospitals also can produce their own reports. The national report, Saving Babies: Perinatal Care Survey of South Africa, originally produced annually, is now being produced triennially and includes recommendations.

Another national survey has been developed that analyses child deaths in institutions. This programme (Child Health Care Problem Identification Programme – ChPiP) now has about 50 sites from throughout the country and also produces a report, Saving Children: A survey of child health care in South Africa. Data are also sent to the MRC Maternal and Infant Health Care Research Unit for amalgamation. These reports are currently being brought out annually but will ultimately be produced triennially and be in sequence with the other reports (Saving Mothers and Saving Babies).

All these systems are based on the same process, namely the ICA Solution Audit System (I – Identification of deaths, C – Causes of deaths, A – Avoidable or modifiable factors, Solution – analysis of the data and discussion of the problems identified to suggest solutions). These reports have initiated other styles of audits systems; for example, process audits into the functioning of antenatal care and intrapartum care. Four training programmes have been developed to improve MNH care, the basic antenatal care (BANC) programme, basic intrapartum care (BIC) programme, an implementation of kangaroo mother care programme and a paediatric care programme to compliment IMCI and aimed at district and sub-district hospitals. Guidelines for managing common conditions causing maternal deaths have also been produced and have been adopted as national management guidelines.
4. Recommendations on next steps for the Department of Making Pregnancy Safer

During the final plenary session, the consultation group members produced recommendations for the Department of Making Pregnancy Safer. Members emphasized the need to assure the recommendations are executable for practical action.

1) The consultation group advised further work on coordination mechanisms with other partners to strengthen M&E of MNH at global, national and district levels:
   - partnership MNCH
   - programmatic partners (Maternal Newborn Health, Child Health, Reproductive Health, Malaria, TB, HIV/AIDS, Immunization, etc.)
   - HIS partners (Health Metrics Network, United Nations Stat, RHINO, MEASURE Evaluation, INCLEN, Indepth, BUCEN, Centers for Disease Control, IMMPACT)
   - research partners and academic institutions
   - other United Nations and Development Banks (UNAIDS, UNICEF, UNFPA, World Bank, etc.)
   - other donor agencies
   - other non-governmental organizations.

2) The MPS Secretariat should assure that meeting recommendations, relevant to WHO partners, are operationalized into practical action.

3) The MPS Secretariat should further advocate for increased involvement and funding to M&E for MNH.

4) Further work is needed on more specific guidance on HIS management for MNH at various levels of the health system (e.g. decision space, roles and responsibilities, linkages, essential data sets).

5) There is a need for knowledge management tools for district level MNH M&E including:
   - inventory and/or annotated bibliography on available tools, methods, ongoing experience and research on M&E and HIS for MNH
   - library of best practices
   - a consultants’ database.

6) Development of operation research agenda on M&E of MNH (e.g. attribution of the effect of strengthening M&E processes on MNH outcomes).

7) Development of ethical guidelines concerning data access and use through:
   - consultation with WHO ethics committees
   - creation of a working group with the following mandate:
     - to clarify the differences between the types of data collected and the various uses of such information (e.g. between M&E, operational research, targeted evaluations, public health evaluations, audit and biomedical research).
     - to differentiate between human subjects research and non-research activities for the protection of adults, infants and children
     - to develop guidelines for stakeholders (there are four distinct stakeholders):
       - patients and respondents
       - persons collecting, holding, using the data
       - persons responsible for health care practice and policy
       - ethical review boards.
5. Technical consultation next steps

- MPS will distribute the Technical Consultation Report for public access.
- MPS will create virtual communication in the next six months on further areas of work.
- MPS will plan for a future consultation to follow up on further work identified.
- MPS will engage the TAG to ensure ongoing technical support on M&E of MNH.
Annex A:

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Annex B:
Meeting Agenda

Day 1  Tuesday, 5 December 2006

Registration, Introduction  
Welcome and Opening Remarks  
Presentation of the Department of Making Pregnancy Safer (MPS)  
MPS Monitoring and Evaluation. Objectives of the meeting  
Central Issues in Monitoring & Evaluation Maternal & Newborn Health  

Monir Islam  
Joy Phumaphi  
Monir Islam  
Ana P Betrán  
Rikk Guidotti

Tea / Coffee Break

Review of M&E conceptual frameworks, methods and tools  
Engineering a Framework to Guide M&E MNH at the District Level  

Denise Giles  
Mark Shields

Lunch

Case study: China  
Case study: India  
WHO Global Survey on Maternal & Perinatal Health: platform for monitoring MNH  

Wang Bin  
P Padmanabhan  
Archana Shah & Kidza Mugerwa

Tea / Coffee Break

Service Availability Mapping (SAM)  
Community-based M&E and Health information Systems: Case study: Bangladesh  
Working groups: guiding principles of a Conceptual Framework at district level  

Shanthi Noriega  
Igbal Anwar

Reception (Restaurant)
Day 2  Wednesday, 6 December 2006

Reporting of Day 1: Working Groups Discussion  
Case study: Zambia  
Rapporteurs  
Mark Shields

Tea / Coffee Break

Case study: Afghanistan  
M&E MNH within the Health Information System at the district level  
Rapporteurs  
Brian McCarthy  
Theo Lippeveld

Working groups:  
A – Information needs and data collection  
B – Data Analysis  
C – Information use

Lunch

Discussion in working groups (continued)  
Reporting of working groups  
Rapporteurs

Tea / Coffee Break

Plenary discussion on the four areas of work (Information needs, data collection, data analysis and information use)  
Case study: Western Pacific Regional Office Surveillance Database  
Rapporteurs  
Li Zhu

Case study: Slovenia  
Barbara Mihevc-Ponikvar
Day 3 Thursday, 7 December 2006

Summary of previous day
Quality improvement in PMTCT and Pediatric HIV Care: Thailand Experience Facilitator Rangsima Lolekha
Case study: South Africa
Experiences and lessons learnt: Improving RH care within the context of district health services: A hands-on manual for planners and managers Facilitator Bruce Campbell
Discussion in plenary
Working groups: MPS Intervention list Facilitator
A – Information needs and data collection
B – Data Analysis
C – Information use

Tea / Coffee Break

Discussion in working groups

Lunch

Reporting of working groups and discussion Rapporteurs
Quality Assurance in MNH at district level Facilitator Brian McCarthy

Tea / Coffee Break

Working groups: Recommendations Rapporteurs
Reporting of working groups and plenary discussion Rapporteurs

Day 4 Friday, 8 December 2006

Summary of previous day Facilitator
Plenary discussion: Future needs – Research, implementation, plans

Tea / Coffee Break

Recommendations from the expert group Facilitator
Summary, conclusions, agreements, the way forward
Closure Monir Islam