Towards Improving Monitoring and Evaluation in Maternal and Perinatal Health

Proceedings from a Workshop on the Use of Birth Registers as a Data Source for Maternal and Perinatal Health Care

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Table of Contents

Executive Summary

Documenting births and other obstetric events in a delivery room logbook or birth register is commonplace in all health facilities throughout the world. Traditionally in the developing world, data from these registers, with their varying levels of completeness and accuracy, have been passed up the administrative chain for reporting at the district and/or national levels. Occasionally, these data are used within the facility for resource planning or other administrative purposes. Given the increased attention to facility-based data by the proponents of the Safe Motherhood Initiative, MEASURE Evaluation organized a workshop to explore and expand current uses of birth register data for monitoring and evaluation of maternal and perinatal health care. Forty-eight participants from 15 countries attended the workshop.

The objectives of the workshop encompassed describing the range of data currently collected in registers and exploring current reporting practices based on these data. The meeting also sought to examine issues affecting birth register data use, such as data quality, computerization and the importance of standardization of data collection forms. Ultimately, the meeting sought to establish a series of next steps for the MEASURE Evaluation project and others involved in similar activities.

Examination of the sample of facility-based registers collected for this workshop showed substantial variation in the format and content of registers. There was consensus among participants that referring to a birth register implied a much more limited scope of data than is available on many of these registers. Obstetric register was felt to more accurately reflect the data in question. It was also evident that obstetric data may be collected in a series of registers. For example, presenters described turning to the following registers for data related to monitoring and evaluation: admission, delivery, discharge, surgical, referral and supply or drug registers. In contrast, some monitoring systems relied directly on a computerized patient medical record and did not use registers for this purpose.

Experiences in monitoring and evaluation using facility-based data were reported from Senegal, Ghana, Morocco, Guatemala and 18 Latin American and 19 Caribbean countries which collaborate with the Latin American Center for Perinatology. In every example presented during the workshop, the existing register required modification in order to obtain the required data. These modifications most frequently involved adding information on maternal complications. It was agreed that instituting a modified obstetric register should realistically be seen as an intervention. Throughout the meeting participants repeatedly emphasized the role of women as health care consumers in the monitoring and evaluation of maternal and perinatal health. To date, however, no one had experience in soliciting or disseminating facility-based data to women.

Data collection represents only one step in the monitoring and evaluation process. Tabulation, analysis, presentation of results and, ultimately, decision making and data use follow. Clearly, each step in the process becomes increasingly more difficult, and therefore, less frequently seen in practice. Few examples of putting data to use were described. In most cases, true data use implies behavior change at the individual and/or facility-level. A frequent shortcoming of monitoring systems is that the exact purpose of the overall system and of the individual indicators are not explicitly stated. Data needed for decision making within facilities are not necessarily the same as data intended for aggregation at the district, national or international level. The common practice of referring to "monitoring and evaluation systems" as though they are designed to have one singular and common "effect" hinders our ability to provide guidance on improving these systems.

Register-based data appear to be more appropriate for the monitoring of service utilization than for reporting on quality of care. In most cases, assessment of quality of care will require more detailed information than is available in a register. Theoretically, the register could serve as a sampling frame for in-depth case review or audit. However, to date, this has not been done in the examples discussed. A multi-country study in Africa that institutes near-miss enquiries as a means of improving quality of obstetric care is currently underway. Results from these studies will provide important information on the capacity of health facilities to put these enquiries to use.

To complement the developing country experiences, trials in developed countries designed to assess the effectiveness of statistical feedback at improving health care outcomes and provider practice were reviewed. The evidence suggests that feedback alone was not sufficient to alter health care outcomes or provider practices. In only two trials, which relied upon feedback in conjunction with the involvement and education of local opinion leaders, was there strong evidence of a clinically important effect of feedback. To date, no similar trials have been conducted in a developing country.

Based on discussions during the workshop, the following activities were cited for possible follow-up by the MEASURE Evaluation project. Prioritization of these activities will be decided in discussions with the United States Agency for International Development (USAID).

1. Strengthen the use of obstetric register data by conducting a number of pilot studies looking at issues regarding core data items and their use, as well as various approaches to provision of feedback. Possible collaborators in this effort include the Centers for Disease Control and Prevention and the Maternal and Neonatal Health project at Johns Hopkins Program for International Education in Reproductive Health (JHPIEGO).

2. Collaborate with the Latin American Center for Perinatology (CLAP) staff to develop and pursue secondary analysis plans using CLAP data.
3. Pursue collaboration with concerned parties, in particular, the London School of Hygiene and WHO, to conduct a meeting on maternal and perinatal death audits.
4. Compile a series of case studies on national level reporting and obstetric register data use.
5. Maintain this working group. Several means of maintaining this group were discussed, including, (a) development of a list-serve through which experiences could be shared, (b) compilation and development of materials and results from obstetric registers accessible via the MEASURE Evaluation web site, (c) an electronic conference next year, and (d) a follow-up meeting in one to two years depending upon the newly available material and results.

1. Birth Registers and Their Current Uses

1.1 Background Information and Workshop Objectives

Any health facility in which women deliver maintains a written record of the deliveries which occur there. This is true for developing country rural health centers and for referral hospitals in industrialized nations. The written record generally consists of a large logbook kept in the delivery room, which is often referred to as the birth register. Traditionally in the developing world, routine data from these registers have been passed up the administrative chain for use at the district and or national levels. Less frequently, these data have been used within the facility to monitor the volume of births for resource planning and other administrative purposes. It is fair to state, however, that little use has been made of these data.

In recent years increased attention has been directed to the use of health facility data. This has occurred in response to the constraints involved in collecting population-based data on maternal mortality and morbidity and also to the recognition of the critical role of essential obstetric care in reducing maternal mortality. Many of the indicators recommended by various international donor agencies for monitoring and evaluation of maternal health programs rely on facility-based data.

As a means of expanding the options for putting birth register data to use for monitoring and evaluation purposes, the MEASURE Evaluation project organized a workshop on the use of this routine data source for maternal and perinatal health care. The workshop was held from March 2-4 in Arlington, Virginia. Forty-eight participants attended from 15 countries. Participants included obstetricians and other physicians, researchers, program planners, health information systems experts, representatives from donor agencies and a representative from a consortium of private voluntary organizations. The workshop agenda, list of participants and workshop evaluation are included in Appendix A.

The objectives of the workshop were as follows:

1. To define the range of data items currently recorded in birth registers
2. To describe current reporting practices for birth register data by level of care (facility, district, national)
3. To frame issues regarding data quality, computerization and standardization of data collection forms and their effects on data use
4. To identify appropriate and practical actions to increase and improve the use of birth register data for monitoring and evaluation of maternal and perinatal health care
5. To develop next steps for the working group

As is reflected in the objectives, the workshop was designed to have three components. The first component involves a description of the current state and use of birth register data. The second component seeks to shed light upon the issues involved in the collection and use of birth register data. The third component proposes solutions for the problems identified and means through which this routine data source could be used to greater advantage for the purposes of monitoring and evaluation. The presentations and subsequent discussions are summarized below.

1.2 Current State of Birth Registers

In preparation for the workshop, MEASURE Evaluation solicited examples of birth registers from as many sites as possible. Registers from 16 sites in nine countries were received. Clearly, these do not reflect a representative sample of registers. This is particularly true since some of the registers are from sites with donor-funded activities which have relied on modified registers to serve project needs. A review of all registers received suggests substantial variation in the data collected in the registers. (See Table 1 in Appendix B.) This variation is most likely due to differences in the organization of services regarding admission, labor and the postpartum period, the volume of women served, the reporting needs of each health information system and historical precedence. However, in at least 80% of the sites, nine variables were consistently recorded: number (order on register), mother's name, mother's age, medical record number, delivery attendant, delivery method, newborn outcome, sex of baby and birth weight. Register content is summarized in Table 2 in Appendix B.

The most effective use of these commonly collected variables was discussed. Two lines of thought predominated. There was disagreement in the group regarding the advisability of having this group develop a minimal set of indicators for use by facilities. The hesitation was based on the fact that professional obstetric organizations have been struggling with this issue for many years, without success. Moreover, this workshop was planned to build upon, but not replicate, the work undertaken last year at the MotherCare sponsored workshop focusing specifically on indicators.

A second line of thought involved the identification of the current and potential use of the data. It is assumed that birth register data have been used traditionally as a management tool for individual facilities. Clearly, at the international level our interest is more focused on monitoring access to care across different geographical areas. Facility-based data may also be used for the management of patient care and as indicators of quality of care. However, in most cases, registers are insufficient alone for this purpose and must be complemented by a woman's medical record. Additionally, it was acknowledged that the sophistication of the use of the data depends greatly on the local context; that is, overall level of development of the country or site, legal environment affecting registration of certain variables, user-friendliness of the register and educational level of staff responsible for completing the register.

It was also evident that frequently there is more than one register with information regarding a woman, her treatment and outcomes within a facility. For example, in Bolivia data are recorded in 11 different logbooks. In another example from Ghana, at least five different logbooks are maintained. Common registers include admission, discharge, delivery, surgical and supply registers. There was general consensus that the title of the workshop did not adequately reflect the breadth of the data under discussion. Birth register implies a focus restricted to the baby. Obstetric or delivery register was felt to better represent the scope of data recorded in most logbooks. It was also noted that nurse-midwives complete a register covering home-based deliveries in countries such as Indonesia which have made strides toward providing professional delivery care to the community. These registers should not be overlooked.

Although emphasis was placed on use of data in facility-based registers *as they currently exist*, the group agreed that a woman's complete address was not particularly helpful. Instead, participants suggested that municipality or another indicator of geographic location, including urban/rural residence would be most useful.

1.3 Country Experiences with Monitoring and Evaluation Using Facility-based Data

In theory, the advantage of using obstetric register data for monitoring and evaluation is that a minimal set of data which has been abstracted from the medical record or other data sources is in readily available format and recorded in one place. Where more in-depth information is required, the register may serve as a sampling frame which permits easy identification of specific types of cases; for example, all Caesarian sections or all complicated cases. Once identified, the medical record and case notes may be reviewed to gain more complete information. The experiences summarized during this workshop showed that in reality this is not necessarily a common approach. As previously mentioned, some facilities have multiple registers in place, and in some cases, facilities rely directly on the computerized medical records for data for monitoring and evaluation purposes.

Five speakers representing Senegal, Ghana, Guatemala, Morocco and a group of approximately 18 Latin American and 19 Caribbean countries which collaborate with the Latin American Center for Perinatology (CLAP) presented summaries of their experiences in monitoring and evaluation based on facility-based data. The examples shown for Morocco, Ghana and Guatemala relied on information collected in one or more registers. In all three cases, these efforts were part of a larger project that involved technical assistance and/or funding from a donor agency. In Senegal and the CLAP-affiliated countries, the data came from a woman's computerized medical record. In both cases, the medical records were designed to bring all pertinent information together regarding antenatal, intrapartum and postpartum care received by a woman.

Senegal

The experiences reported from Senegal come from a government-sponsored health center in the outskirts of Dakar. This center was recently constructed with funding from the Belgian government and includes an operating theater. Over a very short period of time, the volume of births doubled from 3,000 to 6,000 births annually, with no change in resource or personnel allocation. A woman's record was introduced which includes demographic data, a previous pregnancy history and data relating to the antenatal, intrapartum (including a partograph) and postpartum care received by the woman. There is also a page dedicated to newborn health, although, this is rarely completed. This record was designed for the purposes of monitoring and evaluation, as well as the traditional uses of a medical record. It was also designed to be computerized. A traditional delivery room register is kept in this facility, but is not used for monitoring of services offered at the facility.

One of the objectives of this system of data collection and feedback is to assess quality of care. This is accomplished via case review, reporting of case fatality rates and the comparison of the care given relative to established protocols. Regular meetings are held at the facility to discuss results. Interestingly, meetings are also held with staff from surrounding facilities to discuss morbidity and mortality due to avoidable factors regarding referral practices. The representative from Senegal felt strongly that data quality and quality of care are strongly linked. When the data are good, the quality of care received is good, as well. This is based on the idea that complete information is recorded, reviewed and considered when making decisions about the next steps regarding health care.

Ghana

The Ghana experience represents the current practices at facilities involved in the Prevention of Maternal Mortality (PMM) program in this country. The original project received technical assistance from Columbia University with funding from the Carnegie Foundation. The project began in 1987 and drew to a close in 1997. Since completion of the original project, PMM has become a non-governmental agency within Ghana. The general objective for PMM is to extend the PMM approach to all districts in Ghana in collaboration with the Ministry of Health. The PMM approach emphasizes the importance of including concerned staff in all stages of program design, implementation and evaluation. This reporting system relies primarily upon register-based data for monitoring and evaluation needs. Several registers exist, such as the Maternity Ward Admission Register, Discharge Register, Labor Ward Delivery Register, Nominal Roll of Maternity Patients, Antenatal Clinic Register and the Referral Register. Core data items from these registers are considered to be name, place of residence, age, parity, duration of pregnancy, complications of pregnancy, treatments provided and referral status.

These data are used for two different purposes. They provide the data required for administrative and budgetary purposes at higher levels and are also used for monitoring the services and medical interventions provided at the facility-level. Examples of indicators which are routinely reported include the number of obstetric admissions per month, the number of deliveries per month, the number of obstetric complications recorded per month, the number of maternal deaths per month, the causes of maternal deaths, the proportion of beds allocated for obstetric care and the proportion of total deliveries done by C-section. Data recording, tabulation and analysis are handled differently depending upon the size of the facility, available technology and the training of the medical information clerk. In general, the data are recorded on the registers by the ward nurse/midwives and then passed to the medical records office for compilation. The data are computerized at the regional and national hospitals. However, at lower level facilities clerks have been successful tabulating the data with the use of hand calculators.

At the beginning of the project certain deficiencies in record keeping were recognized and improved. For example, in most cases, obstetric complications were not recorded in the registers. It was also recognized that case notes were not designed to ensure recording of these conditions nor their associated treatments. Standardization of data collection to address these issues became an important priority early in the project.

Guatemala

The report from Guatemala was based on work undertaken during the MotherCare project in four hospitals in four departments of the country between 1994 and the present. Technical support was provided by MotherCare via funding from United States Agency for International Development (USAID). There were two principal objectives for these activities: (1) to evaluate MotherCare activities based on predetermined indicators, and (2) to provide each hospital with its own data in tabular format to monitor survival rates after the intervention. Monitoring of this information was designed to identify activities for future interventions and improved organization of services. It was stressed, however, that in these Guatemala departments only about 15 percent of all births take place in health facilities. Thus, reliance on data for facility-based pregnancies and births in this setting is not at all representative of care during pregnancy and at birth for the area as a whole.

The register that was needed to respond to these objectives was developed in conjunction with facility staff. There was only minor controversy over the content of the maternal/perinatal register. Differences generally pertained to questions regarding family planning. The finalized register included space for 12 women's names per page and asked 39 questions of each woman. In all four hospitals, staff chose to complete this register in addition to the registers in place at that time. During the initial phase of the project there were numerous data-related problems due to insufficient training and staff turnover. Rectifying the situation provided an exercise in consensus building regarding the recording and tabulation of data. A consultant was hired by MotherCare who worked with physicians in the facilities to aid in data cleaning, to design dummy tables for the data considered most important to them, and to produce results in a format preferred by them. Additionally, supervision and quality control were introduced via monthly visits to each of the hospitals by the MotherCare advisor.

Physicians, nurses and nurse-auxiliaries share responsibility for completing the register. In most cases a physician chose to take responsibility for data entry. Once the practical problems of data preparation were resolved, other issues which concern all programs using register-based data emerged. These include determining the unit of analysis (woman or pregnancy-related visit), and deciding on the appropriate classification of women by type of visit (obstetric, gynecologic, abortion, undetermined). This latter issue is particularly problematic in facilities in which gynecologic and obstetric patients are treated in the same ward.

Morocco

The experience reported from Morocco reflects one component of a broad project that addresses health system reform in maternal health services in this country. The Safe Motherhood Initiative for 1996-99 is ongoing and encompasses such interventions as in-service training for facility staff; upgrading of facilities; an information, education and communication program focused on emergency obstetric care; and a monitoring and evaluation component. Technical assistance for the monitoring and evaluation component is being provided by John Snow International, with funding from USAID. The program objective is to increase access for pregnant women to both basic and comprehensive essential obstetric care by increasing met need for obstetric care from 32 to 60 percent by 1999.

Currently, work is ongoing in two regions of Morocco. These regions were selected based on a 1992 study that showed an overall deficit in the number of major obstetrical interventions provided to women compared to international norms and notably high deficits compared to other regions in Morocco. The primary indicator selected for evaluating the program objective is met need for obstetric complications. The numerator for the met need indicator requires the number of major obstetric interventions performed (within a facility or aggregated across facilities). The denominator requires population-based estimates of the expected number of pregnancies. Other monitoring indicators reported monthly at both the facility and district level include the Caesarian section rate and the case-fatality rate.

As noted by other presenters, the required information on complications was not readily available at the outset of this project. This required the development of a new obstetric register designed specifically to monitor maternal health care and a standardized reporting form for monthly review. In some cases, it even required a re-organization of patient flow within facilities. This was required so that women with obstetric complications were seen at a place in the hospital where the obstetric register was kept, assuring data collection on all types of patients (gynecologic, abortion, delivery-related, postpartum).

Latin American Center for Perinatology

The Latin American Center for Perinatology (CLAP) developed a data collection form that would allow for standardized and integrated maternal and neonatal information from health centers and hospitals. This is referred to as the Perinatal Information System (PIS). The activity began in Argentina in 1974 and has now been adopted by 19 Latin American countries and 18 Caribbean countries. The extent to which these individual countries have accepted the use of the CLAP form is described in Table 3 in Appendix C. In some countries, only a small percentage of government facilities have accepted the form. In contrast, in Uruguay all government, social security and even private facilities have accepted the form.

The form was designed to serve as an epidemiological tool for hospitals and also as support for the monitoring of established guidelines for care. The form is completed during the actual visit, whether antenatal or intrapartum. For the case of antenatal visits, the same information is also recorded on a card which the woman carries with her to each visit. Data items which reflect high risk are highlighted in yellow on the card. Once completed, data are computerized for local use and are forwarded to CLAP headquarters in Monte Video, Uruguay. CLAP receives support from the Pan-American Health Organization (PAHO). CLAP has provided EPI-INFO programs to assist facility staff in tabulating and analyzing the data at the local level. Analysis plans for the large data set archived in Monte Video is currently under discussion.

A recognized weakness of the PIS is the data on neonatal survival, and to a lesser degree, maternal survival. This is due to the fact that women are discharged from the facility well before the 28-day cut-off for neonatal mortality and the 42-day cut-off for maternal mortality. The rate of institutional deliveries in the population varies tremendously among participating countries. For example, in Cuba and Chile 100 percent of births occur in facilities, whereas in Paraguay, Guatemala and Bolivia less than 40 percent of deliveries take place in a health facility.

1.4 Issues Regarding Data Quality, Standardization of Data-collection Forms and Computerization

Three issues must be addressed when using birth register data. These are the overall quality of the data found in these registers, the value of standardizing data collection forms across facilities to allow for data aggregation and the advantages and disadvantages of computerizing the record keeping system. Presentations on these various issues reflect experiences from the following countries: Morocco, Bolivia, Indonesia, and Guatemala, as well as a number of Latin American countries (CLAP) and several countries in West Africa (the PMM Network).

Data Quality: Morocco

Improving data quality was discussed in the context of a nation-wide retrospective survey conducted in Morocco in 1990. In this survey, data were collected from the routine information system in all hospital wards (public, private and parapublic) to capture all pregnant women who underwent an obstetrical intervention in 1989 and/or who died in a hospital during the delivery or the puerperium. The goal of the study was to compare rates of major obstetrical interventions between rural and urban areas and to identify specific geographic areas showing deficits in obstetric care. The following five sources of error were recognized and discussed:

- ***Over-reporting of complications*** if a woman is counted more than once. This can be reduced by using computer programs which identify duplicate entries.

- ***Under-reporting of interventions*** by both private and public sectors. Tax evasion in private facilities could not be excluded.

- ***Misinterpretation of the indications for interventions***, even after attempts to standardize the selection criteria. An expert committee was formed to review the data and to reconcile cases in which the intervention was not appropriate for the recorded indication or when the indication was misclassified. To minimize these problems, data collectors with some obstetrical experience were used.

- ***Estimating the number of births*** in order to determine the denominator for the calculation of rates. The number of births was extrapolated from census data with various hypotheses regarding population growth, fertility, mortality, and migration. If these hypotheses are incorrect, the resulting rates will be over- or under-estimated for that area.

- ***Lack of congruence*** between those included in the numerator and the denominator. This becomes a problem when women move outside their area of residence to seek care. For example, women frequently shift from a rural to urban area for delivery.

Although the quality of routine data may be poor, it is possible to improve it by involving the staff in data collection, in understanding the problem under study, and by framing the results in a way which they will find useful.

Data Quality: Bolivia

A data quality monitoring system was instituted in Bolivia as a first step in the process to help facility-based providers and district level managers to better understand and use data. The original source of data in the health information system is series of patient records (prenatal care card, obstetrical history form and a CLAP form) and 11 facility-based registers. Monthly reports are sent from each facility to the district and from the district to the national level. Little if any feedback is provided to the facility. The staff responsible for data collection and reporting also changes, as each January new medical and nursing school graduates are posted for one year of service to a health center.

In order to assess the reliability of the national health information system (referred to as SNIS) data, the number of deliveries as reported in medical records, in facility registers, and in the monthly SNIS report were compared for each facility. Variations were observed over an 18-month period with SNIS reporting more deliveries than reported by medical records or by the registers. One possible explanation for the greater number of deliveries in the SNIS may be that they are used as a basis for reimbursement for each delivery conducted in the facility. This reimbursement covers all costs to run the facility, including salaries. Hence, there is an economic incentive to inflate the number of deliveries reported to the district or national level. The solution to improve the reliability of data remains illusive. In Bolivia, however, they have instituted regular meetings at the facility and district level to discuss the results from these various reporting systems.

Data Quality: Indonesia

The data quality of delivery room register data from three districts in South Kalimantan Indonesia was reviewed. A standardized register was in place in the delivery rooms for antepartum, intrapartum and postpartum admissions. These government registers were completed using data collected in a non-standardized handwritten register found in each facility. To address the specific evaluation needs of the donor-funded MotherCare project, a new register was developed to standardize these handwritten registers and to add district of residence and maternal complications. In retrospect, the purposes of the register were not explicitly stated from the beginning and these purposes differed for each player (Ministry of Health, MotherCare project, USAID).

Overall, the data were quite complete with more than 95% of the data items completed. It was noted, however, that emergencies had less complete data than regular admissions. Additionally, it was also often unclear whether a vaginal delivery had been normal or whether the complication data were simply missing. At the facility level, complications were of interest to determine cause of death, to calculate the case fatality rate, to define indications for interventions (e.g. Caesarian section), to identify cases for audit and to determine resource allocation. At the district or province level, complication data are needed for the indicators that proposed to measure access to both general and emergency care. The reliability and validity of the data recorded on complications are unknown.

Nonetheless, the data quality from this system was considered to be very good. Factors that influence the quality included a strong tradition of this type of data collection in hospitals in Indonesia and the concomitant project activities to improve the quality of care through training and supervision. In this setting, the need for a standardized register is not clear. Although the purpose of the register was not made explicit at the outset of the project, the good quality of the data raises the question: Was there potential for data manipulation once people deduced the purpose of the register?

Standardization of Forms: Indonesia

The process of standardization of the delivery registers and the experiences in implementing the MotherCare register in South Kalimantan Indonesia was further described. The initial steps included meetings with the hospital director, director of OB/GYN departments and obstetrical staff at each of the seven hospitals to arrive at consensus on the information to be collected in the register and to develop standard perceptions of the complications and diagnoses to be reported. In some cases, the directors delegated a nurse or midwife to attend. The 'new' register was pre-tested for 6 weeks at two hospitals. Following the pretests, half of the staff from each hospital attended a half-day training to practice completing the register using case studies. Facilities were monitored in the first and third month and then every trimester following the training.

Observations from the implementation phase include

- Completing the new register adds a burden to the workload of the staff. This is because staff is still required to fill out the standard government register. Approval of the register to replace the current standard government register would reduce this problem.
- Approximately one half of the staff did not receive the training. These members of the staff were less likely to complete the register and did not consider it one of their duties.

- The quality of the register data is better in facilities with low volume and in facilities in which a designated person is responsible for completing the register.
- Certain data items remained problematic. Data entry personnel need technical oversight to assist with data cleaning.
- The hospital directors and directors of OB/GYN departments need to be involved from the beginning. Delegation to a lower staff level reduced ownership needed at the higher level.
- Private hospitals were not included in this system because it was felt that women from the three districts of interest were not likely to use them for care. Implicit in the acceptance of the register by private facilities is the acceptance of monitoring activities at these facilities.

Standardization of Forms: CLAP

The perinatal information system developed by CLAP was intended to provide a system of standardized data collection, data cleaning, and data analysis for perinatal health services in the PAHO region. A one page standard medical record was developed so that health care personnel can record information about the care provided to an individual. The information selected for inclusion on the medical record reflects the established guidelines for care and can be used at all facility levels. Training for the use of the card has been standardized. A manual is now available in Spanish, Portuguese, English and Dutch. Data are entered into a computer at individual facilities so each facility has the ability to clean and analyze the data. Software programs have been developed and are readily available to assist with data cleaning and analysis. Currently, the software is being revised to produce a more user-friendly list of variables and indicators that are evidence-based, and which nests the indicators within the new EPI-INFO 2000.

Computerization: PMM

Experience from the more than ten years of work by the PMM Network in West Africa was described. This team found that a handheld calculator was all that was necessary to calculate the key indicators suggested by UNICEF, UNFPA and WHO at both the facility and district level. Computerization becomes necessary when more complex analyses are needed or when data from more than 10 facilities are aggregated.

The downside of computerization was also recognized. Computer systems tend to be exclusive, rather than inclusive because of the need for access to a computer, and the knowledge to use it and the associated software. Experience has shown that the learning curve is slow and the resulting frustration can limit both the understanding and use of the data. At the end of the PMM project an internal evaluation, which included a self-assessment of computer skills, found that skill level was still low, especially among the medical personnel. However, it should be kept in mind that this was the situation in West Africa between 1987 and 1997, and that this situation may not be representative of other parts of the world.

Computerization: Guatemala

An EPI-INFO software program to assist providers with the analysis of facility-level birth register data in Guatemala was described. This software package was developed in conjunction with the MotherCare/Guatemala project. The design of the software evolved through a series of steps as the needs of the providers were more completely recognized.

Initially, EPI-INFO was introduced in a training workshop for the providers with the expectation that they would be able to use this tool to analyze their data. Several months later, it became obvious that the providers were not using it and were rapidly losing their newly acquired computer skills. The program was revamped and made much more user-friendly. Tabulation plans were developed in consultation with providers. A menu of icons was created which allows providers to simply select the desired task (data cleaning, merging data, data back-ups, tabulation, etc.). The program was also designed to provide the specific data or tables needed for reports requested by the Ministry of Health, as well as for the MotherCare project and tables of interest to the local providers. The intention was to create a program that would generate results in a format designed to facilitate the actual use of the data. Overall, the software has been well accepted in the facilities. Bugs in the program and user mistakes still cause occasional computer crashes; thus, the software is still being refined.

1.5 Discussion

Putting birth or obstetric register data *to use* requires (1) data collection, (2) tabulation and analysis plans, (3) effective means for dissemination of results, and (4) decision making which leads to specific actions. The information presented at this meeting clearly shows that each step along this pathway becomes increasingly more difficult, and therefore, less frequently seen in practice.

Although some type of obstetric register is common in health facilities, in every example presented here, it was necessary to modify the existing data collection forms in order to institute the desired monitoring and evaluation system. In most cases, these modifications were due to a lack of data on obstetric complications, among other variables. Common obstacles included training requirements to maintain the system given frequent staff turnover, reliability of data between registers, and representivity of the data for the local population. For the case of projects with complex data systems and newly introduced computerization, sustainability was also cited as a serious concern.

The design of the monitoring and evaluation systems described here vary according to program objectives. The Senegal, Guatemala and Ghana examples were very much oriented toward facility-level decision making, whereas the CLAP and Morocco examples aimed at both facility-level data and indicators which were appropriate for aggregation at higher levels of the system. A number of participants stressed the importance of disseminating results produced by these systems to the community. There were, however, no examples of community involvement reported at the workshop.

A decision was made by group consensus to focus this meeting on issues related to facility-level or district-level monitoring and evaluation. In all cases, participants were aware that data were passed to the national level. None of the participants, however, could provide examples of country-level reports, or were any aware of which variables were used and for what reasons at the national level.

The group concluded that concern over the issue of data quality is justified. However, experience has shown that use of the data may improve its quality over time. Moreover, some of the indicators of interest do not require perfect data in order to be useful to facility clinicians and managers. Those involved in monitoring and evaluation are encouraged to use the data, and in the process, explore means of improving them.

The discussion also focused on the complexity of the systems described and the necessary balance between the development of record keeping systems designed to capture the data necessary for the desired indicators and development of user-friendly systems for providers. The inclusion of data items needed specifically for project evaluation complicates the issue, but it does not explain the lack of use of the data by providers for their own monitoring and evaluation purposes. It was pointed out that birth registers are an institution in most facilities. They are widely accepted as the norm by most providers and it is important to capitalize on this fact. Standardization of registers is not needed in the management of individual cases, but is obviously necessary to aggregate data for monitoring of activities across facilities.

Regarding computerization, the discussion centered around the recognition that computers do not constitute a monitoring and evaluation system. They represent a tool that assists in the process of monitoring and evaluation and can frequently be used as the “hook” to motivate people. The availability and use of computers varies considerably among countries. In situations where there is little familiarity with computers and computer skills are low, introducing computers will require substantial support and ongoing supervision. Disregarding this reality will come at a high cost to the program and staff morale. The PMM experience with handheld calculators is inspiring and should be replicated elsewhere.

2. Use of Obstetric Register Data for Aggregate Purposes and for Audits

Obstetric register data can potentially serve several purposes. As shown in the country examples, indicators derived from register data may be used for resource planning, to monitor utilization of services and, to a lesser degree, to monitor quality of care. It is generally agreed, however, that quality of care nearly always involves seeking information from the woman's medical record. In cases in which the medical record is computerized, this does not pose a difficult problem. A second use of register data treats the register as a sampling frame to identify cases of interest for further study. This is generally the approach used in maternal and perinatal death audits. A primary objective, however, of both monitoring systems and of audits is to obtain information which can be used to facilitate and orient decision making aimed at improving health and health care outcomes.

2.1 Aggregate Data for Monitoring Use

A review of the literature regarding the effectiveness of monitoring systems to improve health care outcomes or provider practice was presented including a Cochrane Database review of more than 30 randomized or quasi-randomized studies. The studies covered by the Cochrane review investigate (a) the effectiveness of audit and feedback, and (b) the effectiveness of audit and feedback compared to other interventions or compared to variations in feedback dissemination. The majority of these studies were carried out in the United States or Canada; no trials have been conducted in a developing country.

Study design and outcomes varied substantially across the studies. A particularly relevant trial in Finland investigated the effect of providing hospitals with regular feedback on Caesarian section rates (Hemminki et al., 1992). In this study, selected hospitals were provided with information packages including ready-made transparencies to be shared with staff. Although the technical quality of the data improved over the course of the study, there was no evidence that the feedback led the hospitals to change their practices regarding Caesarian section. Likewise, an observational study in 17 Maternity Units in Belgium found no effect of regular feedback on Caesarian section rates, use of forceps or vacuum extraction over a four-year period (Buekens et al., 1993).

In only two trials was there strong evidence of a clinically important effect of feedback. In both cases, the intervention relied not only upon statistical feedback, but also on the involvement and education of local opinion leaders (Lomas et al., 1991; Soumerai et al., 1998). In the majority of trials, however, there were no significant changes in provider practices such as use of drugs, vaccinations, diagnostic tests, counseling and use of Caesarian section or other clinical procedures. The general conclusion from the review regarding the effectiveness of feedback is that “at the present time, the selection of specific components of audit and feedback cannot be based upon evidence from randomized trials” (Thomson et al., 1999). The underlying assumption in these studies is that “practitioners are active consumers of information and that they are willing to make changes in the way they provide health care when they encounter information that suggests alternative practices” (Thomson et al. 1999).

2.2 Near-Miss Enquiries To Improve The Quality Of Obstetric Care

A five-country study to develop near-miss enquiries as a means of improving the quality of obstetric care was also described. Study sites include four to five hospitals in each of the following countries: Ghana, Benin, Ivory Coast, Morocco and Mali. A network including physicians from each of these countries along with collaborators at the London School of Hygiene and Tropical Medicine, the Prince Leopold Institute of Tropical Medicine in Belgium and the Instituto per l’Infanzie in Italy has been formed. Funding is provided by the European Union, Department for International Development for the United Kingdom and the Belgian Agence pour la Cooperation au Developpement. This exercise is being referred to as an enquiry versus an audit due to the common misunderstandings associated with the word audit. The objective of the study is to use the enquiries as a tool for initiating action within facilities and for enhancing political commitment to quality of care.

This study will focus on near-misses versus deaths which have been the traditional target of audits. The advantages of pursuing near-misses over maternal or perinatal deaths include

- near-misses are positive events (the women survive) which are less threatening to the provider
- the number of near-miss events is many times larger than deaths and therefore offers greater statistical power
- the near-miss approach relies on both quantitative and qualitative data, relying on use of the medical record as well as home-based interviews with the women

Previous studies have developed three definitions for a “near-miss.” These are (1) potentially life-threatening episodes of morbidity for the mother (Stones, 1991), (2) severe life-threatening complication necessitating an urgent medical intervention in order to prevent the likely death of the mother (Filippi, 1996), and (3) a very ill woman who would have died had it not been that luck or good care was on her side (Mantel, 1998). Three different approaches have also been used for operationalizing the definitions: (1) a definition using severity criteria based on clinical signs for each direct and indirect complication, (2) a definition using severity criteria based on type of treatment, i.e., admission to intensive care unit, and (3) a definition based on organ failure. Representatives from the various countries agreed upon the definition as proposed by Mantel et al. for a near-miss event. The implementing teams in each country will determine the operational definitions used at their respective sites. Although precise definitions may not be required for the enquiry per se, precise definitions are required for the development of treatment guidelines. The treatment guidelines are the standard against which future practices will be judged.

2.3 Discussion

In discussing monitoring and evaluation systems using facility-based data, the need to explicitly articulate *what one seeks to identify with a specific indicator*, and most importantly, *what behaviors one seeks to change* became very evident. For example, participants cited the importance of differentiating between desired changes in behavior regarding more or less routine practices and behaviors associated with emergency life-saving responses. It was also remarked that routine practices in an area with adequate infrastructure may well be among the life-saving practices in a less developed setting. The need to differentiate between data with life-saving implications at the facility level versus indicators needed by national-level policy makers and international donors was also noted. Clearly, the common practice of discussing monitoring and evaluation systems as though they are designed to have one singular and common, though unstated, effect hinders our ability to provide guidance on improving these systems.

During the discussion participants concentrated on the appropriateness of conducting randomized trials on feedback in a developing country setting. Some participants felt that systems were not mature enough to institutionalize the definition of cases, the establishment of corresponding standards of care and the desired accompanying changes in behavior based on feedback systems. Others proposed that now is the time to begin experimenting with simple interventions, such as forms and data presentation.

Regarding near-miss enquiries, several participants remarked that the scope of the study should be broadened to include community issues related to the first and second delays in seeking health care. Although, this is possible much later, the current focus is restricted to improvements within facilities.

2.4 Small Group Discussions

The following four subject areas were identified for small group discussion:

- A research agenda for effective use of register data in developing country settings
- Best practices regarding the encouragement of physicians to be "active consumers of information"
- Best practices regarding effective design and presentation of data for decision making at the facility and district levels
- Identification of mechanisms for data quality improvement via the implementation of death/near-miss audits

The results of this small group work are briefly summarized below.

Research Agenda

Three areas of research were prioritized. The first item proposed by the group was secondary analysis of CLAP data. Proposed analysis topics included investigation of the relationship between maternal complications and perinatal death, documentation of intervention rates and case fatality rates, and experimentation with documentation of referral rates.

Interest was also expressed in compiling national-level case studies of facility-based data use. It was hoped that this exercise could be initiated during this workshop. However, no national-level reports were located by workshop participants. In order to compile and effectively present data for monitoring and evaluation purposes, it is important to first understand who are the current consumers of register data and what are the current uses of these data.

Randomized trials to test effective feedback mechanisms at the individual facility level were recommended by the group. It was pointed out that further work is required in the area of quality of care indicators derived from register data.

Physicians as Active Consumers of Information

A number of barriers were identified which prevent or discourage clinicians' receptiveness to information on their practice. These barriers include the medical culture, which requires the collection and reporting of data for exclusive use by the system, versus individual clinicians. A result of this environment is that clinicians do not see themselves as decision-makers within the system. They practice medicine, but do not see a role for their involvement in how the system works. Possible solutions include operations research designed to involve clinicians in ways which will illustrate the power they do have to change practice within their own facilities. The system must also be designed in a very user-friendly way which is manageable given their workloads.

There was substantial discussion, but no consensus on whether or not the system should be judgmental. Some felt that accountability must be incorporated into the system. Others felt that change must come from within. It was also remarked that much could be learned from studying the private sector and information use within in developing countries, given that most of the discussion was oriented toward the civil service. The incentives for quality of care within the private sector are not known. Still others felt strongly that change can be effected externally by health care consumers.

Design and Presentation of Data

The establishment of a monitoring system which regularly reports on a short list of indicators is recommended. This system must also include reporting forms for the presentation of these indicators. The indicators should be reviewed together by staff before data are passed on to the next level. The approach to the review of the data should be comparative in nature. That is, the data should be treated as secular and comparisons should be made with previous performance. Comparisons across facilities of similar type may also be beneficial. The group recommended the use of pilot studies relying on data currently collected in registers, such as method of delivery or birth weight. Training is an integral component of this activity and should be spread across multiple provider types, such as nurses, midwives, physicians, etc.

Data Quality and Near-Miss/Death Enquiries

A clinical audit begins by identifying a critical event. Traditionally, this has been a death, though near-misses are now being investigated, also. The purpose of the audit is to evaluate the performance of the health system as compared to a standard of care that has been established for the particular event. The standards of care for each event of interest will obviously determine the data requirements for the audit. Data must be available that will allow one to judge compliance with the standard. In some cases, data from outside of the facility are used as well. For instance, interviews with members of the family or community are often used.

As mentioned earlier, ideally, birth registers can serve as a sampling frame to identify these key events. Certainly, for the case of maternal deaths, a register should be able to function as such. Other events that are most likely identifiable via a birth register include Caesarian sections, eclampsia and perinatal deaths. Ultimately, local priorities will determine the scope of the events of interest. It may be necessary to refer to additional registers, such as the surgical register, admissions and discharge register, delivery and supply logs and the patient record.

3. Next Steps

Based on the small group recommendations and the discussions during the workshop, the following activities were cited for possible follow-up by the MEASURE Evaluation project. Prioritization of these activities will be decided in discussions with USAID.

1. Strengthen the use of obstetric register data by conducting a number of pilot studies looking at issues regarding core data items and their use, as well as various approaches to provision of feedback. Possible collaborators in this effort include the Centers for Disease Control and Prevention and the Maternal and Neonatal Health project at JHPIEGO.
2. Collaborate with CLAP staff to develop and pursue secondary analysis plans using CLAP data.
3. Pursue collaboration with concerned parties, in particular, the London School of Hygiene and WHO, to conduct a meeting on maternal and perinatal death audits.
4. Compile a series of case studies on national level reporting and obstetric register data use.
5. Maintain this working group. Several means of maintaining this group were discussed. For example, (a) development of a list serve through which experiences could be shared, (b) compilation and development of materials and results from obstetric registers accessible via the MEASURE Evaluation web site, (c) an electronic conference next year, and (d) a follow up meeting in one to two years depending upon the newly available material and results.

REFERENCES

Buekens, P., Boutsen, M., Kittel, F., Vandenbussche, P., Dramaix, M. 1993. *Does Awareness of Rates of Obstetric Interventions Change Practice?* British Medical Journal, 306:623.

Mantel GD, Buchman E, Rees H, Pattinson RC. 1998. *Severe acute maternal morbidity: a pilot study for a definition of near-miss*. Br J Obstet Gynaecol 1998,105:985-90.

Filippi, V., Alihonou, E., Mukantaganda, S., Graham, W., Ronsmans, C. 1998. *Near misses: Maternal Morbidity and Mortality*. The Lancet. Vol. 351, no. 9096.

Hemminki, E., Teperi, J., Tuominen, K. 1992. *Need for and Influence of Feedback From the Finnish Birth Register to Data Providers. Quality Assurance in Health Care*. Vol. 4, No. 2, pp. 133-139.

Lomas, J., Enkin, M., Anderson, G., Hannah, W., Vayda, E., Singer, J. 1991. *Opinion Leaders vs Audit and Feedback to Implement Practice Guidelines. Journal of the American Medical Association*. Vol. 265, No. 17. pp. 2202-2207.

Soumerai, S., McLaughlin, T., Gurwitz, J., Guadagnoli, E., Hauptman, P., Borbas, C., Morris, N., McLaughlin, B., Gao, X., Willison, D., Asinger, R., Gobel, F. 1998. *Effect of Local Medical Opinion Leaders on Quality of Care for Acute Myocardial Infarction: A Randomized Controlled Trial. Journal of the American Medical Association.* Vol. 279, No. 17. pp. 1358-1363.

Stones, R., Lim, Y., Al-Azzawi, F., et al. 1991. *An Investigation Of Maternal Morbidity with Identification of Life-threatening "Near-miss" Episodes*. Health Trends. 23:13-5.

Thomson, M.A., Oxman, A.D., Davis, D.A., Haynes, R.B., Freemantle, N., and Harvey, E.L. 1999. *Audit and Feedback to Improve Health Professional Practice and Health Care Outcomes (Part II)* (Cochrane Review). In: The Cochrane Library, Issue 1, 1999. Oxford: Update Software.

APPENDIX A

Workshop Objectives and Agenda

List of Participants

Workshop Evaluation

Objectives of the Workshop

- To define the range of data items currently recorded on birth registers
- To describe current reporting practices for birth register data by level of care (facility, district, national)
- To frame issues regarding data quality, computerization and standardization of data collection forms and their effects on data use
- To identify appropriate and practical actions to increase and improve the use of birth register data for monitoring and evaluation of maternal and perinatal health care
- To develop next steps for the working group

Workshop Agenda

Day 1

8:30 - 9:00am	Continental Breakfast and Registration
9:00 - 9:45	Welcome Address: Elizabeth Holt, USAID (5 min.) Introductions and Review of workshop objectives, schedule, administrative details: Cindy Stanton, Measure Evaluation. (35 min.) Birth Registers and the importance of their use: the WHO perspective Carla AbouZahr, WHO (5 min.)
9:45 - 10:30	Moderator: Linda Bartlett, CDC (1-2 min.) Current State of Data Collection: Presentation of sample birth registers Presenter: Jeanne McDermott, American College of Nurse Midwives (20 min.) Discussion (25 min.)
10:30 - 10:45	BREAK
10:45 - 12:15	Experiences in Monitoring and Evaluation using Birth Register Data: Panel #1 on Country Experiences Moderator: Anibal Faundes, Univ. Estadual de Campinas (5 min.) 1st Presenter: Luc de Bernis, King Baudouin Health Center, Dakar, Senegal, Cooperation Francaise (15 min.) Use of Birth Register Data within a Health Center and Effects on other Local Facilities 2nd Presenter: J.B. Danquah, Prevention of Maternal Mortality Network Accra, Ghana (15 min.) Record-keeping and Use of Records in the PMM Project Facilities

3rd Presenter: Patsy Bailey, Family Health International (15 min.)
Realities of Implementing Changes in a Birth Register and Preparing the Data for Use; Mothercare/Guatemala

Discussion (40 min.)

12:15 - 1:30pm LUNCH - on 14th floor at J.W. Steakhouse

1:30 - 2:30 Moderator: Erin Eckert, Tulane University

4th Presenter: Theo Lippeveld, John Snow International
Rabat, Morocco (15 min.)
Birth Register Data and Its Use as a Regional Management Tool in Morocco

5th Presenter: Jose Belizan, Latin American Center for Perinatology (CLAP) (15 min.)
Montevideo, Uruguay: The CLAP Experience with Facility Data Collection and Use across Latin America

Discussion (30 min.)

2:30 - 3:45 Experiences in Monitoring and Evaluation Using Birth Register Data: Panel #2 on Data Quality

Moderator: Cynthia Berg, CDC (5 min.)

1st Presenter : Vincent de Brouwere, Prince Leopold Institute of Tropical Medicine (15 min.)
Data Quality Issues involved in Collecting Complication and Intervention Data; Morocco

2nd Presenter: Stanley Blanco, MotherCare, Bolivia (15 min.)
The Reliability of Birth Register Data; The Experience in Bolivia

3rd Presenter: Carine Ronsmans, London School of Hygiene and Tropical Medicine (15 min.)
Complexities of Collecting Maternal and Newborn Complication Data using Birth Registers; The Experience from Indonesia

Discussion (25 min.)

3:45 - 4:00 BREAK

4:00 - 5:30 Standardization of Data Collection Forms: Is Comparability Worth the Effort?

Moderator: Patricia Stephenson, USAID (5 min.)

1st Presenter: Gunawan Supratiko, MotherCare/Indonesia (15 min.)
The Advantages and Disadvantages of Standardizing Birth Registers across Public and Private Health Facilities in South Kalimantan, Indonesia

2nd Presenter: Fernando Barros, CLAP (15 min.)
Standardized Data Collection: The CLAP Experience

Discussion (40 min.)

7:00 - 9:00pm Reception - View Ballroom, 14th floor

Day 2

8:30 - 9:00 am Continental Breakfast

9:00 - 9:15 Presenter: Marge Koblinsky, John Snow International
Summary of Day 1 (15 min.)

9:15 - 10:30 Computerization, Is It Necessary?

Moderator: Nancy Yinger, PATH (5 min.)

1st Presenter: Therese McGinn, Columbia School of Public Health (15 min.)
Advantages and Disadvantages of Computerizing Birth Register Data

2nd Presenter: Jorge Matute, MotherCare/Guatemala (15 min.)
Introducing computers in a Facility for Data Entry and Analysis of Birth Register Data;

Computer Demonstration: Data Analysis Plan Designed By Providers (15 min.)

Discussion (25 min.)

10:30 - 10:45	BREAK
10:45 - 12:30	Moderator: Jeanne McDermott (5 min.) Putting Birth Register Data to Use for Aggregate Purposes and for Audits 1st Presenter: Carine Ronsmans, London School of Hygiene and Tropical Medicine (15 min.) Issues regarding Birth Register Data to Identify Near-miss Deaths for Use in Audits Discussion (15 min.) 2nd Presenter: Pierre Buekens, University of North Carolina (15 min.) Does Awareness of Rates of Obstetric Interventions Change Practice? Discussion: How applicable are the factors and assumptions identified in studies from developed country settings for less developed countries? (40 min.) Summary: Jeanne McDermott (15 min.) Participants sign up for a Working Group
12:30 - 1:30pm	LUNCH
1:30 - 3:15	Moderator: Cindy Stanton (10 min.) Break out into 4 groups to determine: 1) Research agenda for effective use of birth register data in less developed country settings 2) Best practices re: Effective design and presentation of data for decision-making at the facility and district levels 3) Best practices re: Encouragement of clinicians to be “active consumers of information” 4) Define mechanisms for data quality improvement via the implementation of death/near-miss audits
3:15 - 3:30	BREAK
3:30 - 5:15	Moderator: Pierre Buekens, University of North Carolina

	Presentations of small group work (15 - 20 min.)
	Discussion (as needed) Summary: Pierre Buekens, University of North Carolina (10 min.)

Day 3

8:30 - 9:00 am	Continental Breakfast
9:00 - 10:00	The Role of Implementers in Addressing Best Practices Identified on Day 2
	Moderator: Pius Okong, St. Francis Hospital, Kampala, Uganda (5 min.)
	Panel 1: Representative from CLAP, Jose Belizan (10 min.) Representative from FIGO/Save the Mothers project/Mozambique Anibal Faundes (10 min.) Representative from JHPIEGO/MNH, S. Brechin* (10 min.) Representative from MEASURE Evaluation, A. Tsui (10 min.)
	Discussion (15 min.)
10:00 - 10:25	Moderator: Pius Okong The Role of International Agencies
	Panel 2: Representative from USAID, Holly Dempsey (10 min.) Representative from WHO, Carla AbouZahr (10 min.)
10:45 - 11:00	BREAK
11:00 - 11:30	Next Steps: Cindy Stanton, MEASURE Evaluation (10 min) Discussion
11:30 - 11:45	Closing Remarks Cindy Stanton, MEASURE Evaluation (5 min.) Krista Stewart, USAID (5 min.)
11:45 - 12:00	Completion of Workshop Evaluation Forms

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Workshop Evaluation

At the close of the workshop participants were asked to evaluate the meeting by completing a brief questionnaire. The workshop organizers were particularly interested in learning which sessions participants found most useful to their work and what could have been done to improve the substantive and logistical aspects of the workshop.

Participants were asked to score the usefulness of the content of each of the sessions below. Usefulness was measured on a scale of 1 (not at all useful) to 4 (very useful). The average score for every session was "3" (Somewhat useful) or higher. No one scored a session as "not at all useful".

Session Content	Usefulness Average Score (Range: 1-4) (n = 22)
Current State of Registers	3.5
Country Experiences in M&E using Facility Data	3.5
Standardization of Forms	3.3
Data Quality Issues	3.7
Computerization Issues	3.3
Putting Register Data to Use	3.6

Several participants mentioned in written comments that organizers should have done more to collect a broader sample of birth registers. Others mentioned frustration that there were so few examples of how people are actually using register data and that more emphasis should have been directed to that task. Below is a sample of other relevant comments regarding the substantive issues discussed at the workshop:

- This just got the dialogue going. Important to keep the momentum going.
- Will be important to have progress reports from all of us to keep this from being a one-shot deal.
- An attempt to clarify all of the purposes of birth register data from the beginning would have been helpful.

- There is the perennial problem with small working groups. The discussion in the group itself is good, useful, interesting. The report-backs are not as useful. A difficult, but common problem.
- Could have used more time for the small working groups.
- Enjoyed seeing the computer demonstration with EPI-INFO.
- [The meeting] brought together an extraordinary group of people with useful experiences to share.
- More participants from developing countries would have assisted in finding out more about the current problems in other developing countries.
- Written and verbal feedback suggested that all participants found the logistical arrangements for the meeting satisfactory to excellent.

APPENDIX B

Table 1: Register content for all examples received

Table 2: Summary of common variables recorded on registers

Table 1: Register Content for all examples received

Country	Indonesia			Guatemala	Honduras
Locale/facility	MOH*	MC Hosp	MC BDD	MC	
Number	X	X			X
Med Rec Number	X	X		X	X? (Historia Clinica)
Maternal Name	X	X	X	X	X
Address	X	X			
District		X		X/Munic	
Occupation					
Husb's occup		X			
Civil status (?Marital status)					
Method of pay	X	X			
Religion	X	X			
Age	X	X		X	X
Gravidity	X	X			
Parity	X	X			
Abortion	X	X			
Ethnic group				Indig/Lad	
Maternal educational level				X-List	
Years since last delivery				X	
Prev del in hosp				Y/N	
Prev FP use				Y/N	

Country	Indonesia			Guatemala	Honduras
Locale/facility	MOH*	MC Hosp	MC BDD	MC	
Prenatal care					
Where last PNC/ANC				X-List	
Pap smear				Y/N	
Single or Multiple Pregnancy	X				
Admission Date	X	X		X	X
Admission Hour	X	X		X	X
Adm Diagnosis or complication		X			X
Gestational Age	X	X		X	
Referral	X	X		X-Who	
Accompanied OR allowed with woman			X	X-by TBA	
Delivery date	X	X	X		X
Delivery hour	X	X			X
Delivery method	X	X		X	X?
Delivery attendant	X	X	X	X	X DOC/N
Delivery place			X		
Presentation					
Rupture of membrane					
Amniotic fluid					
Length of labor					
Episiotomy					X

Country	Indonesia			Guatemala	Honduras
Locale/facility	MOH*	MC Hosp	MC BDD	MC	
Estimated blood loss					
Placenta & cord characteristics					
Baby gender	X	X			X
Birth weight/length	X/X	X/O	X-CAT/O		X/O
Neonatal complications	X	X	X	X-List	
Apgar - 1min	X			X	
Apgar- 5 min	X+10'		X -CAT	X	
Newborn outcome	X cause		X	X-List	X
All maternal complications	X (ab)	X	X	X-List	
Intervention OR management for complication	X (only baby)			X-List	
Date of management				X	
Hour of management				X	
Medications given				X-list	
Pediatrician					
Maternal death	X	X	X	Y/N	
Maternal death date		X			
Maternal death hour		X			

Country	Indonesia			Guatemala	Honduras
Locale/facility	MOH*	MC Hosp	MC BDD	MC	
Maternal death cause	X	X			
Maternal condition					X
Desire for preg within 2 yrs				Y/N	
Desire for FP method on disch				Y/N	
FP method on discharge			X @ 6WKS	X-List	
Duration of stay					
Date of discharge				X	
Discharge diagnosis			X		
Postpartum care			X 4 visits		
Comments or Observations	X	X			X

Country	Bolivia*	Peru				Ghana
Locale /facility	MOH	#1	#2	Minsa	Sapasoa	Kumasi Hosp PMM*
Number	X	X	X	X	X	X
Med Rec Number	X (Historia Clinica)	X (Historia Clinica)	X (Historia Clinica)	X (Historia Clinica)	X (Historia Clinica)	X
Maternal Name		X	X	X	X	X
Address						X

Country	Bolivia*	Peru				Ghana
Locale /facility	MOH	#1	#2	Minsa	Sapasoa	Kumasi Hosp PMM*
District	X				X?	
Occupation						X
Husb's occup						
Civil status (?Marital status)		X			X	
Method of pay						
Religion						
Age	X -CAT	X	X		X	X
Gravidity		X		X		
Parity		X		X		X
Abortion		X				
Ethnic group						
Maternal educational level						
Years since last delivery						
Prev del in hosp						
Prev FP use						
Prenatal care		X				
Where last PNC/ANC						
Pap smear						

Country	Bolivia*	Peru				Ghana
Locale /facility	MOH	#1	#2	Minsa	Sapasoa	Kumasi Hosp PMM*
Single or Multiple Pregnancy						X
Admission Date		X	X		X	X
Admission Hour		X				X
Adm Diagnosis or complication			X			
Gestational Age	X		X	X	X	X
Accompanied OR allowed with woman						
Delivery date		X	X	X	X	
Delivery hour		X	X			
Delivery method	X- cat	?X	X	X		X
Delivery attendant	X-by place	X		X	X	
Delivery place	X				X	
Presentation		X				
Rupture of membrane		X				
Amniotic fluid		X				
Length of labor		X		X		
Episiotomy				Y/N		
Estimated blood loss		X		X		

Country	Bolivia*	Peru				Ghana
Locale /facility	MOH	#1	#2	Minsa	Sapasoa	Kumasi Hosp PMM*
Placenta & cord characteristics		X				
Baby gender	X	X	X	X	X	X
Birth weight/length	X? (CAT)	X/X		X	X	X
Neonatal complications		X				?
Apgar - 1min		X		X		
Apgar- 5 min		X		X		
Newborn outcome	X	x	X			X
All maternal complications	X					X
Intervention OR management for complication	X?					X
Date of management						X
Hour of management						X
Medications given		X				
Pediatrician						
Maternal death	X					X
Maternal death date						X

Country	Bolivia*	Peru				Ghana
Locale /facility	MOH	#1	#2	Minsa	Sapasoa	Kumasi Hosp PMM*
Maternal death hour						
Maternal death cause	X					
Maternal condition						X
Desire for preg within 2 yrs						
Desire for FP method on disch						
FP method on discharge						
Duration of stay	X					X
Date of discharge	X		X			X
Discharge diagnosis	X		X			X
Postpartum care						X
Comments or Obsesva-tions	X	X	X			

Country	Uganda		Columbia	Morocco	
Locale/facility	HC1 Kiboga	Hospital Ginga	Cali	Hospital	Hospital?
Number		X	X	X	X
Med Rec Number	X	X	X (Historia Clinica)	X?	
Maternal Name	X		X	X	X
Address	X Village	Village		X	X
District					
Occupation					
Husb's occup					
Civil status (?Marital status)					
Method of pay					
Religion					
Age	X	X	X		X
Gravidity					
Parity	X		X		X
Abortion					
Ethnic group					
Maternal educational level					
Years since last delivery					

Country	Uganda		Columbia	Morocco	
Locale/facility	HC1 Kiboga	Hospital Ginga	Cali	Hospital	Hospital?
Prev del in hosp					
Prev FP use					
Prenatal care					
Where last PNC/ANC					
Pap smear					
Single or Multiple Pregnancy					X
Admission Date	X	X			X
Admission Hour					x
Adm diagnosis or complication	X	X	X?		X
Gestational Age			X		X
Referral	X	X		X	X
Accompanied OR allowed with woman					
Delivery date	X		X?	X?	
Delivery hour			X?		
Delivery method	X	X	X?	X?	X
Delivery attendant	X		DOC NAME	X	
Delivery place					
Presentation					

Country	Uganda		Columbia	Morocco	
Locale/facility	HC1 Kiboga	Hospital Ginga	Cali	Hospital	Hospital?
Rupture of membrane					
Amniotic fluid					
Length of labor					
Episiotomy					
Estimated blood loss					
Placenta & cord characteristics					
Baby gender	X	X	X	X	X
Birth weight/length			X/X	?X-cat	X
Neonatal complications					X
Apgar - 1min			X		
Apgar- 5 min			X		
Newborn outcome	X	X	X	X	X
All maternal complications				?	X

Country	Uganda		Columbia	Morocco	
Locale/facility	HC1 Kiboga	Hospital Ginga	Cali	Hospital	Hospital?
Intervention OR management for complication			X		
Date of management					
Hour of management					
Medications given					
Pediatrician			X		
Maternal death	X			X	
Maternal death date				X	
Maternal death hour					
Maternal death cause					
Maternal condition	X				
Desire for preg within 2 yrs					
Desire for FP method on disch					
FP method on discharge					

Country	Uganda		Columbia	Morocco	
Locale/facility	HC1 Kiboga	Hospital Ginga	Cali	Hospital	Hospital?
Duration of stay					
Date of discharge		X			
Discharge diagnosis		X			
Postpartum care					
Comments or Observations	X				X

Data Items Recorded in Registers

14 (88 %)	**Mother's name** **Baby gender**	**Delivery method (type)** **Medical record number (7 Historia clinica)**
13 (81 %)	**Number (order)** **Mother's age**	**Newborn (delivery) outcome**
12 (75 %)	**Birth weight**	**Delivery attendant (may include name)**
11 (69 %)	**Admission date**	**Delivery date**
10 (63 %)	**Address/District**	**Gestational age**
9 (56 %)	**Referral**	
8 (50 %)	**Parity** **Maternal death**	**Maternal complications** **Comments/observations**
7 (44 %)	**Admission hour**	**Admission diagnosis or complication**

- **Wide variety in items reported; some consistency with 9 reported in at least 75% of registers**
- **Caution: difficult to determine when column title broad**

APPENDIX C

Table 3: Countries using the Perinatal Information System (CLAP)

Perinatal Information System

Country	National standard	Substantial use	Occasional use
ARGENTINA	X		
BOLIVIA	X		
BRASIL			X
CARIBBEAN (19 COUNTRIES)	X		
CHILE	X		
COLUMBIA		X	
COSTA RICA	X		
CUBA			X
ECUADOR	X		
EL SALVADOR	X		
HONDURAS	X		
MEXICO			X
NICARAGUA	X		
PANAMA	X		
PARAGUAY	X		
PERU	X		
REP. DOMINICANA	X		
URUGUAY	X		
VENEZUELA		X	