A MEDICAL BIRTH REGISTRY AT KILIMANJARO CHRISTIAN MEDICAL CENTRE

Per Bergsjø¹, Joseph Mlay², Rolv T Lie¹, E Lie-Nielsen³ and John F. Shao⁵

Abstract

Objective: To establish a medical birth registry intended to serve clinical, administrative and research purposes.

Methods: Starting in July 2000, every birth at Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania has been recorded in a separate database. The information is obtained through personal interviews with each mother, conducted by specially trained midwives, and supplied with data from the medical records. A secretary enters the data into an electronic file. Data are collected about the mother and father: education, occupation and living conditions, mother’s health before and during present pregnancy, expected date of delivery, smoking and drinking (alcohol) habits, use of drugs, plus HIV and syphilis status (if known). This is followed by particulars on the delivery: spontaneous or induced, and complications; the child or children: weight, height and Apgar score, malformations and other diagnoses. Mode of birth: spontaneous or operative intervention. If perinatal death: when? Transfer to intensive neonatal unit? The mother’s reproductive history (births, miscarriages, ectopic pregnancies) is also recorded, with outcomes.

Results: We describe the process based on more than six years’ experience, including obstacles and how they were overcome. The registry serves as a monitoring tool, with a set of key activities and events being issued monthly, indicating changes and trends in, e.g., bleeding complications, caesarean section rates and perinatal mortality, as early warning signs. Monthly reports on key issues are presented. Confidentiality and data protection are key issues. Day-to-day recording of births is vulnerable to personnel shortage, whether from disease or holidays.

Conclusions: Validation and quality checks leave the overall impression that the database is largely accurate and credible. There are plenty of opportunities for research. Clinicians and epidemiologists will profit from using the database to test hypotheses and clarify problem issues, to the ultimate benefit of labouring women and their children.

Key Words: Birth registry; pregnancy complications; birth complications; perinatal mortality; caesarean section

Introduction

Statistical figures on maternal death and maternal health give a frightening display of the gap between rich and poor countries. We need instruments for regular monitoring and research, to serve as tools in our endeavours to rectify the disproportion. A medical birth registry will go some way to cover the need.

In Norway, a medical birth registry was established in 1970 to ensure quick recognition of changes in the pattern of diseases, injuries and malformations (1). This would in turn disclose causes or risk factors, as a prerequisite for targeted preventive action. In addition, a number of other functions have been incorporated. The practical and scientific value of the registry’s database is unquestionable, not least documented through a series of research publications of high international quality.

The present annual estimate for maternal death worldwide is 530 000, according to the World Health Organization; more than 90 % occur in developing countries (2). Local electronic databases with demographic, social and medical information on every event such as caesarean sections and maternal and perinatal deaths, besides being databases for analytic research by medical students and candidates for Master’s and Doctoral degrees.

Based on experience from some of these projects and prompted by local demand for a reliable recording system, we started medical registration of birth at Kilimanjaro Christian Medical Centre (KCMC) in Northeast Tanzania in July 2000, following several years of planning and pilot testing. The Norwegian Programme for Development, Research and Education (NUFU) supports the KCMC Birth Registry financially, through the Centre for International Health at the University of Bergen. The project was reviewed by the National committee for biomedical research ethics in Norway. Permission for the conduct of the study was granted by the National Institute for Medical Research, Ministry of Health in Tanzania and by the ethics committee at KCMC Hospital.

A major goal is to contribute to competence building in the Tanzanian research community. Another prospect is to obtain experience in medical birth registration before this service can be recommended for general use in other birth institutions in Tanzania and elsewhere.

Anonymised data from this Birth Registry database are available to any scientist interested in reproductive health in developing countries.

Material and methods

Kilimanjaro Christian Medical Centre (KCMC) (Fig. 1) is a zonal, consultative, University teaching hospital serving the local community and referred cases from six regions in Northern Tanzania, namely Arusha, Kilimanjaro, Manyara, Tanga, Dodoma and Singida, with 15 million inhabitants. Pregnant high-risk women from the regions are referred for observation and delivery, in addition to women in the local community who come to deliver of their own accord. Information in the registry about domicile and referral makes a distinction between the two groups possible.
A four-page form is filled out for every delivery in the hospital. Specially trained nurse-midwives put the following structured information on record:

1. Mother and father: demography, education, occupation, living conditions.
2. Mother’s health before and during present pregnancy, expected date of delivery, smoking and drinking (alcohol) habits, use of drugs, plus HIV and syphilis status (if known).
3. The delivery: Spontaneous or induced, and complications.
4. The child, with separate information on each in case of multiple births: weight, height and Apgar score. Mode of birth: spontaneous or operative intervention (specified). If perinatal death: when? Specify malformations and other diagnoses. Transfer to intensive neonatal unit?
5. The mother’s reproductive history (births, miscarriages, ectopic pregnancies) in chronological order, with outcomes

Other questions concern female genital cutting, and prior use of family planning, and which methods, if any. We soon realised that key information about newborns that had been transferred to neonatal intensive care, would add to data quality. This was done in 2004, with a separate form constructed in collaboration with the Department of Paediatrics at KCMC.

The nurse-midwives collect data on the day after the delivery in normal cases, or on the second or third day in case of caesarean section or other complications (Fig. 2). Information is voluntary, following information, and is based on case records and personal interview. A mother is discharged 12 to 24 hours after a normal delivery, which requires registration every day, weekends and holidays included. The next step is for a secretary to transfer the data to an electronic file. The guiding principle was to establish a simple and robust computer system. The nurse-midwives have also been taught to enter data by computer, but have been unable to do it because the interviews and supplementary data collection are too time-consuming. With increasing experience through regular meetings and feedback from the secretary, improvement of the system is an ongoing feature.

Fig. 2. The Reproductive Health office at KCMC

Results

Experience and validation

After more than six years of registration and around 20,000 deliveries the system functions satisfactorily. Problems have arisen along the way. In the summer of 2001 transfer of data was delayed. The backlog was added through intensive effort in the course of six months. The demand for uninterrupted work by a small staff makes the system vulnerable in cases of illness and other vacancies. One project midwife tragically passed away after a period of sick leave and was replaced by another, recruited from the obstetrical department. The secretary, who enters data into the electronic file, shared a small office with personnel from other health care projects. Researchers on temporary visits demanded office space and access to a computer. This caused congestion and overcrowding; something had to be done. Budgeted money for improvement of the infrastructure was used to build a separate office building on the hospital campus. Construction was completed in November 2004, and the building presently has sufficient office space for Birth Registry activities and related maternal and child health projects (Fig. 2).

Validation and quality checks of the database were done by one medical doctor and two medical students from Norway, during study sojourns at KCMC. The overall impression is that the database information is largely accurate and credible. However, diagnoses of self-reported illnesses and conditions, such as tuberculosis, often lack written verification. Most of the women know their year, but not the date of birth. Recollection and recording of personal reproductive history seem to be accurate. Information about female genital mutilation (or “cutting”) is sensitive, but presumably correct, due to good interview communication with the nurse-midwives and as a rule verifiable through the medical birth record.

Initially, the project midwives received instruction orally. A manual with definitions and detailed procedural instructions was written and printed in 2005 (7). In any case, use of birth registry data requires caution with regard to possible equivocal pieces of information.
The Registry as a research tool; recruiting candidates for competence development

The database must have a certain volume to become a research tool. It is now possible to study conditions and events that are not too rare. The basic idea is that use of the database will enhance competence among candidates from Tanzania and other African countries without excluding researchers from the outside world. On the contrary: international collaboration will enrich all parties involved. Some projects are ongoing, but there are numerous opportunities for those curious to learn and disseminate information about birth and reproduction in a developing country. Proposed projects must be approved by the Scientific Advisory Committee of the Birth Registry and may need ethical clearance from official authorities in Tanzania and other involved countries or institutions. The present authors will provide interested researchers with further information.

Here is an arbitrary list of issues for possible research:

- Use of drugs before and during pregnancy
- Infections before and during pregnancy
- Mother’s pre-pregnancy weight, and weight increase during pregnancy
- HIV status, related to birth outcome
- Modes of delivery (spontaneous, forceps or ventouse, caesarean section)
- Twins and higher multiple pregnancies
- Frequency of congenital malformations
- Birth weight
- Women’s reproductive histories

Some of the themes will require scrutiny of original forms for additional coding of diagnoses and drugs, others supplementary information from other hospitals and health stations in the region. Comparing obstetrical statistics from KCMC to that from the Medical Birth Registry in Norway will widen the perspective. An ongoing project on depression in pregnancy with comparison between Bergen, Norway and Moshi, Tanzania, is a relevant example.

At a workshop in Momella Wildlife Lodge in Arusha in November 2004, researchers and research candidates from Tanzania, Norway and USA put data from the birth registry to the first test, with preliminary analyses on referrals, birth weight and maternal deaths. Invited representatives from the Ministry of Health in Tanzania and the World Health Organization office in Dar es Salaam were actively engaged and expressed satisfaction with the work performed and encouraged the Birth Registry personnel to continue.

Prospective research candidates not studying or working at KCMC or its affiliated Tumaini University College should spend a period of time at the premises to get acquainted with local conditions and get to know the local counterparts.

**The registry as monitoring tool**

One of the authors (EL-N) has designed a program for monthly reporting of important indicators for activities, maternal diseases and other complications, plus vital statistics for the newborns, and twinning rates in the Obstetrical Department (Tables 1 and 2). The report is used to quickly recognize marked changes which may require investigation and, if necessary, corrective action. It also serves as a basis for discussion at departmental staff meetings. Table 2 shows that the caesarean section rate is regularly above 30%. In the obstetrical department at the nearby regional hospital various constraints limit the number of caesarean sections there; instead, emergency cases are transferred to KCMC for operative delivery. Induction rates are comparatively high, in the order of 25%, whereas vaginal operative deliveries with forceps are hardly ever done. The above mentioned validation report indicates that the incidence of post partum haemorrhage, defined as 500 ml or more, may be too low because of inadequate routines for collection and estimation of blood loss after birth. This calls for checking of routines and reinforcement if they are found inadequate.

Registry data on mortality may (Table 1) help to identify high-risk pregnancies and become a surveillance tool for preventive strategies in the future. The perinatal mortality rate recorded by the registry for the period 2000 to 2004 was 5.3 per cent, almost 10 times higher than figures from Norway.

**Table 1. KCMC Birth Registry: Annual reports July 2000 – April 2006, including monthly reports January to April 2006. Numbers of confinements (births) and percentages. To obtain numbers of children born, the number of twins plus twice the number of triplets should be added to the number of births.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>No. of births</th>
<th>Twins</th>
<th>Triplets</th>
<th>Still birth</th>
<th>Neonatal death</th>
<th>LBW</th>
<th>Apg&lt;7</th>
<th>Transferred</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td></td>
<td>1646</td>
<td>74(4.50)</td>
<td>0(0.00)</td>
<td>66(4.01)</td>
<td>33(2.00)</td>
<td>175(10.63)</td>
<td>128(7.78)</td>
<td>204(12.39)</td>
</tr>
<tr>
<td>2001</td>
<td></td>
<td>3470</td>
<td>192(5.53)</td>
<td>6(0.17)</td>
<td>140(4.03)</td>
<td>83(2.39)</td>
<td>482(13.89)</td>
<td>313(9.02)</td>
<td>475(13.69)</td>
</tr>
<tr>
<td>2002</td>
<td></td>
<td>3086</td>
<td>177(5.74)</td>
<td>10(0.32)</td>
<td>109(3.53)</td>
<td>54(1.75)</td>
<td>391(12.67)</td>
<td>253(8.20)</td>
<td>430(13.93)</td>
</tr>
<tr>
<td>2003</td>
<td></td>
<td>2775</td>
<td>179(6.45)</td>
<td>6(0.22)</td>
<td>117(4.22)</td>
<td>44(1.59)</td>
<td>380(13.69)</td>
<td>38(8.58)</td>
<td>450(16.22)</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td>2891</td>
<td>175(6.05)</td>
<td>3(0.10)</td>
<td>114(3.94)</td>
<td>40(1.38)</td>
<td>390(13.49)</td>
<td>264(9.13)</td>
<td>444(15.36)</td>
</tr>
<tr>
<td>2005</td>
<td></td>
<td>2797</td>
<td>129(4.61)</td>
<td>4(0.14)</td>
<td>118(4.22)</td>
<td>37(1.32)</td>
<td>364(13.01)</td>
<td>279(7.58)</td>
<td>388(13.87)</td>
</tr>
<tr>
<td>2006</td>
<td>Jan-April</td>
<td>971</td>
<td>33(3.40)</td>
<td>0(0.00)</td>
<td>32(3.30)</td>
<td>9(0.93)</td>
<td>120(12.36)</td>
<td>80(8.24)</td>
<td>118(12.15)</td>
</tr>
<tr>
<td>2006</td>
<td>Jan</td>
<td>249</td>
<td>12(4.82)</td>
<td>0(0.00)</td>
<td>10(4.02)</td>
<td>4 (1.61)</td>
<td>35(14.05)</td>
<td>27(10.84)</td>
<td>35(14.06)</td>
</tr>
<tr>
<td>2006</td>
<td>Feb.</td>
<td>214</td>
<td>9(4.21)</td>
<td>0(0.00)</td>
<td>12(5.61)</td>
<td>2 (0.93)</td>
<td>25(11.68)</td>
<td>20(9.35)</td>
<td>22(10.28)</td>
</tr>
<tr>
<td>2006</td>
<td>Mar.</td>
<td>277</td>
<td>6(2.17)</td>
<td>0(0.00)</td>
<td>6(2.17)</td>
<td>3 (1.08)</td>
<td>32(11.55)</td>
<td>21(7.58)</td>
<td>39(14.08)</td>
</tr>
<tr>
<td>2006</td>
<td>April</td>
<td>229</td>
<td>6(2.62)</td>
<td>0(0.00)</td>
<td>4(1.75)</td>
<td>0 (0.00)</td>
<td>28(12.23)</td>
<td>12(5.24)</td>
<td>22(9.61)</td>
</tr>
</tbody>
</table>

**Notes:**
- LBW: Birth weight < 2500 grams
- Neonatal Apg.: Apgar score at 1 minute
- Transferred: Transferred to Paediatric Department

**Legend:**
- Jan: January
- Feb: February
- Mar: March
- Apr: April
Table 2. KCMC Birth Registry: Annual Reports, part 2: Selected complications, and interventions.

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>No. of births</th>
<th>Ante part bleeding</th>
<th>Post part Bleeding</th>
<th>C-section</th>
<th>Induction</th>
<th>Forceps in pregn.</th>
<th>Malaria</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>Jan - April</td>
<td>1646</td>
<td>58 (3.52)</td>
<td>9 (0.55)</td>
<td>457 (27.76)</td>
<td>412 (25.03)</td>
<td>1 (0.06)</td>
<td>421 (25.58)</td>
</tr>
<tr>
<td>2001</td>
<td>Jan</td>
<td>2975</td>
<td>27 (0.97)</td>
<td>10 (0.36)</td>
<td>930 (33.51)</td>
<td>747 (26.92)</td>
<td>0 (0.00)</td>
<td>538 (19.39)</td>
</tr>
<tr>
<td>2002</td>
<td>March</td>
<td>2981</td>
<td>16 (0.55)</td>
<td>9 (0.31)</td>
<td>1030 (35.63)</td>
<td>752 (26.01)</td>
<td>1 (0.03)</td>
<td>513 (17.74)</td>
</tr>
<tr>
<td>2003</td>
<td>April</td>
<td>2797</td>
<td>18 (0.64)</td>
<td>3 (0.11)</td>
<td>954 (34.11)</td>
<td>932 (33.32)</td>
<td>4 (0.14)</td>
<td>540 (19.31)</td>
</tr>
<tr>
<td>2004</td>
<td>Jan</td>
<td>969</td>
<td>4 (0.41)</td>
<td>0 (0.00)</td>
<td>(26.94)</td>
<td>300 (30.96)</td>
<td>0 (0.00)</td>
<td>180 (18.58)</td>
</tr>
<tr>
<td>2005</td>
<td>Feb</td>
<td>249</td>
<td>2 (0.80)</td>
<td>0 (0.00)</td>
<td>(31.73)</td>
<td>70 (28.11)</td>
<td>0 (0.00)</td>
<td>43 (17.27)</td>
</tr>
<tr>
<td>2006</td>
<td>March</td>
<td>214</td>
<td>1 (0.47)</td>
<td>0 (0.00)</td>
<td>(25.70)</td>
<td>79 (36.92)</td>
<td>0 (0.00)</td>
<td>44 (20.56)</td>
</tr>
<tr>
<td>2007</td>
<td>April</td>
<td>277</td>
<td>0 (0.47)</td>
<td>0 (0.00)</td>
<td>84 (30.32)</td>
<td>80 (28.88)</td>
<td>0 (0.00)</td>
<td>48 (17.33)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>229</td>
<td>1 (0.44)</td>
<td>0 (0.00)</td>
<td>43 (18.78)</td>
<td>71 (31.00)</td>
<td>0 (0.00)</td>
<td>45 (19.63)</td>
</tr>
</tbody>
</table>

Discussion and conclusion

The KCMC Birth Registry is hospital based. Referred cases can be separated from parturient women coming of their own accord. A geographically based registry presupposes information about every delivery in the chosen area, both those taking place in institutions and those at home or elsewhere. This will be resource demanding and is not feasible in its present format. The logistics will be complex, especially for births taking place outside of public institutions. In the Kilimanjaro region most of the births take place in hospitals or at health clinics; institutional registration will cover the large majority. The Maasai community is an exception; many Maasai women deliver at home (8). Countrywide medical birth registration is not advisable, since 50 -60% of births in Tanzania still take place at home.

The KCMC Birth Registry contains extensive epidemiological and clinical information. Given the present model, which has been continually refined, a simplified system could be locally adapted for other institutions in the region and gradually expanded to a larger area. This may serve as a monitoring tool for health authorities to enact interventions for the health benefit of mothers and offspring, to lessen the gap of death and disease between rich and poor countries. The foundation has been laid; enthusiasm is awakening. With some support from donor agencies and some from national resources a viable system is within reach.

To conclude, validation and quality checks leave the overall impression that the database is largely accurate and credible. There are plenty of opportunities for research. Clinicians and epidemiologists will profit from using the database to test hypotheses and clarify problem issues, to the ultimate benefit of labouring women and their children.

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References


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