Establishment of Maternal and Perinatal Database for Quality, Equity and Dignity (MPD-4-QED) programme: Processes, challenges, lessons and prospects

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COMMENTARY

Establishment of Maternal and Perinatal Database for Quality, Equity and Dignity (MPD-4-QED) programme: Processes, challenges, lessons and prospects

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1 | INTRODUCTION

Many low- and middle-income countries (LMICs) with high maternal mortality rates lack reliable routinely collected data on the quality of care provided to women giving birth in facilities nationwide and information when a death occurs. Although global efforts have been made to address the high numbers of maternal and perinatal deaths (e.g. by increasing the number of women who access health facilities for pregnancy care and delivery), this has not translated into reducing mortality.[1,2]

Despite reaching health facilities, many women and their babies still die because of delays in receiving quality care.[3,4] Health information systems designed to assess quality of care and outcomes for women and their babies can play a crucial role in facilitating timely interventions, as part of a continuing quality improvement process to enhance maternal and newborn care. Nigeria is one of the highest contributors to maternal and perinatal mortality worldwide, with approximately 67 000 annual maternal deaths and stillbirth rates of 43 per 1000 total births.[5,6] However, as a tool for improving maternity care, the collation of actionable routine healthcare data is hindered by the lack of harmonised data and by the poor quality of data available in Nigeria. This limitation impedes the ability of researchers to pinpoint and address gaps in the quality of care at regional and national levels.

Recognising this limitation, the World Health Organization (WHO) in partnership with the Nigerian Federal Ministry of Health (FMOH) established a nationally representative electronic database, the Maternal and Perinatal Database for Quality, Equity and Dignity

(MPD-4-QED), in referral-level hospitals across Nigeria, with the aim of monitoring the quality of maternal and early newborn care and outcomes for women and their babies. In this article, we present the process for setting up the database, challenges encountered in its implementation, lessons learned and prospects of the programme to assist other countries that share similar health system characteristics in establishing nationally representative facility-based data collection systems.

2 | PROCESSES

2.1 | Country entry and project organisation

In the planning stages, the WHO engaged with the Nigerian FMOH, including the Minister of Health, to establish the MPD-4-QED programme. This successful engagement led to a partnership with the FMOH for the programme and facilitated the participation of referral-level public health facilities under the jurisdiction of the FMOH. In addition, the WHO met with key in-country stakeholders in maternal and child health, including professional medical associations, to gain their support for the programme and enable the participation of health facilities run by the State Ministry of Health as well as health facilities that are privately owned. Consequently, the MPD-4-QED programme was established in 54 consenting referral-level hospitals (48 publicly funded and six privately funded) in Nigeria. These hospitals receive patient referrals from lower levels of care and manage both high-risk and low-risk pregnancies. The hospitals were spread across 36 states of the country (Appendix 1).

Each hospital had a dedicated team for the MPD-4-QED programme, consisting of two medical record officers (MROs) conducting data entry and two hospital coordinators (an obstetrician and a neonatologist) overseeing the data collection. The hospitals in each of the six geopolitical regions of Nigeria were supervised by a regional coordinator, and a national coordinating unit for the programme was set up, comprising a national coordinator, a data manager and an administrative team.

2.2 | Population and data collection

The study population comprised all women and their babies who were admitted for delivery or for complications within 42 days of delivery or termination of pregnancy. Babies who were delivered outside the participating hospitals but were admitted to the hospitals within the first week of life were also included.

Data collection was designed in line with the WHO Quality, Equity and Dignity (WHO QED) strategic objectives for improving maternal, newborn and child health.[1] The WHO QED strategy utilises a set of common indicators, the 'QED indicators', to monitor the key aspects of quality of care (Appendix 2). We developed an individual-level data collection template using a participatory approach with the Nigerian FMOH and in-country stakeholders, including obstetricians and neonatologists. The wording of the questions and the selection of variables reflected standard case definitions and context-specific practices regarding clinical documentation in Nigeria. The information included biodemographic data, antenatal and past medical history, clinical conditions during pregnancy and at admission for delivery, labour interventions and complications (if any), time-related events in clinical management (such as labour augmentation and decision-to-delivery interval), mode of delivery, immediate postpartum condition, and maternal and newborn outcomes (Appendix 3).

These data were collected through an electronic platform developed by customising the open-source District Health Information Software (DHIS-2).[7] Routine data entry was primarily performed by trained MROs using internet-enabled tablet devices and synchronised in real time to a secured central cloud-based server. Data entry was initiated at the time of admission and updated until discharge or death (whichever occurred earlier). For newborns, information was collected up to 7 days after birth, at discharge or upon death (whichever happened first). In the event of maternal or perinatal death, the local mortality audit team (led by an obstetrician and neonatologist) analysed and documented the primary cause of death (using the International Classification of Diseases for Maternal Mortality, ICD-MM, and the International Classification of Diseases for Perinatal Mortality, ICD-PM) and the avoidable contributing factors.

A unique identifier was used to link the data between a woman and her newborn. In instances of poor internet connectivity, it was possible to enter data offline and then automatically synchronise once internet connectivity was restored. Furthermore, facility-level audits were conducted quarterly to evaluate personnel, conditions of the facility, quality management, basic hygiene and sanitation, equipment and the commodity inventory. The model of the MPD-4-QED electronic platform is shown in Figure 1.

2.3 | Data quality assurance procedure

To minimise heterogeneity in data collection, a standard operating procedure (SOP) manual detailing how cases should be defined and how electronic data collection should be completed was developed. The SOP manual was used to train the project team members from all participating facilities at the regional level. The electronic platform had built-in validation rules, reflecting demographic, biological and medical plausibility, which were applied to minimise data entry errors and ensure data completeness and internal consistency. Before deployment, the electronic platform was pretested for 4 weeks and the problems identified were fixed iteratively. The data entry error was less than 1% in all facilities before the formal launch of the platform on 1 September 2019. The programme continues to collect data to date.

To ensure that all eligible data were captured, a hospital coordinator compared weekly entries with admission registers

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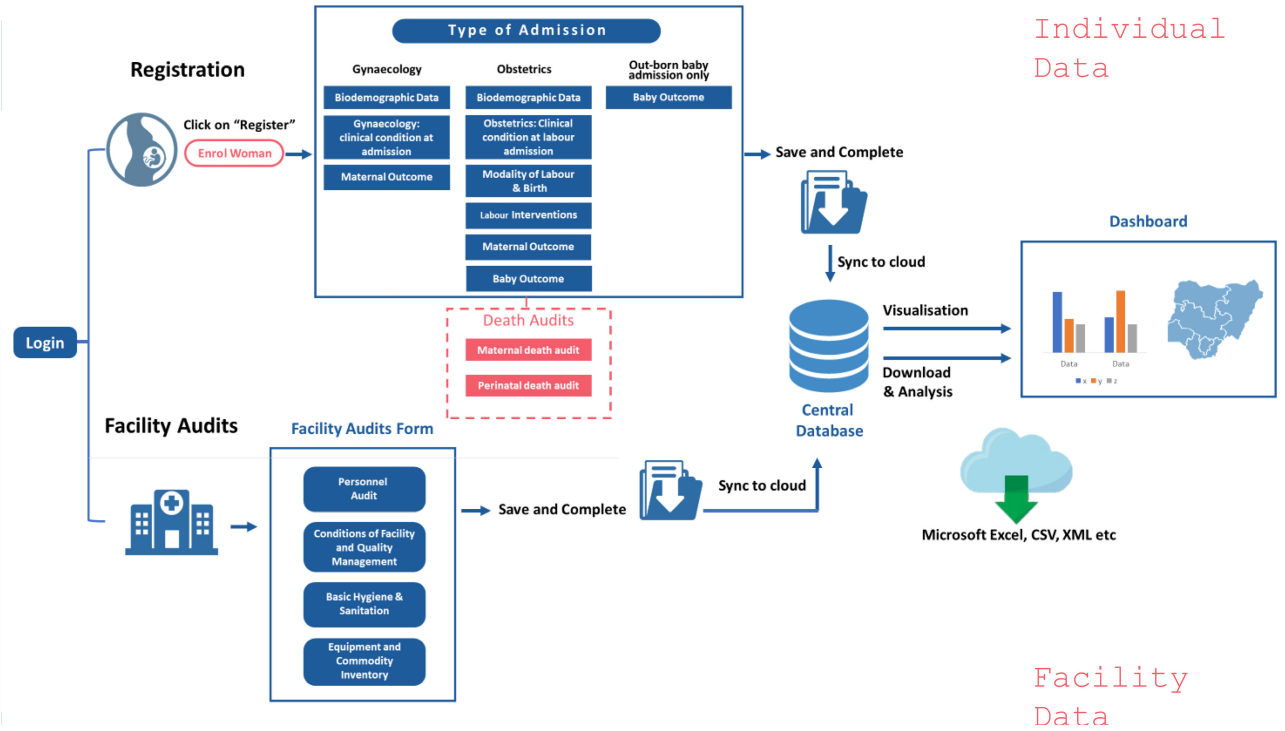

FIGURE 1 The MPD-4-QED platform conceptual model.

and randomly sampled 5% of cases to review for accuracy. Any observed missing cases or errors in the data entries were resolved before closure of the data record for each participant. At 6-monthly intervals, regional coordinators paid unscheduled visits to participating institutions for independent external data monitoring for completeness and internal consistency. The national coordinating unit conducted periodic analyses of available data at the facility, regional and national levels, and shared the results monthly with collaborating institutions and the FMOH. Each hospital coordinator had access to data visualisation specific to their respective hospital, whereas regional coordinators were provided with data visualisation for their designated regions.

3 | CHALLENGES

There were several external challenges in implementing the MPD-4-QED programme. The high turnover of hospital staff who were involved in the programme as hospital coordinators or MROs posed a significant challenge.

The need to continually train new personnel in the programme arose at different intervals and across diverse hospitals and regions. To navigate this challenge, a trainer model was implemented. This approach empowered regional coordinators to conduct regular training sessions for new hospital coordinators and, in turn, enabled hospital coordinators to provide training for new MROs as required.

Second, the additional workload for hospital coordinators and MROs was an issue initially, but over time became more seamlessly integrated into routine practice. Motivation increased when the first results became available, and the data could be visualised regularly and used in local quality improvement meetings and for research purposes.

Another challenge was the variability in the strength of internet networks among providers across different regions. Consequently, multiple network providers were needed to ensure unlimited strong internet access for the data-capturing tablets. However, the system also enabled offline data entry and synchronisation when an internet connection was available.

4 | LESSONS LEARNED

In general, it is feasible to establish a routine electronic health database in a low -to middle-income country such as Nigeria. The past decade has witnessed a rapid surge in mobile and internet penetration in sub-Saharan Africa, enhancing the prospects for digital health interventions.[8] Although the likelihood of poor internet services remains, designing the electronic platform to capture data offline and synchronise when the internet network is available was successful in minimising disruptions.

The success of the programme was driven by the meaningful engagement of in-country stakeholders, including the FMOH, hospital authorities and healthcare staff. The motivation of staff played a pivotal role in achieving the project's goals. Regularly disseminated newsletters and infographics, illustrating care performance, areas requiring improvement, and advancements in maternal and perinatal care, proved effective in sharing outcomes with

the team and contributed to sustaining motivation. The availability of the SOP manual and the standardisation and uniformity of the data collection template resulted in high-quality data that could be aggregated at regional and national levels to monitor care performance and improve quality. The close monitoring and maintenance of an effective two-way communication system for raising and addressing issues also contributed to the quality of the data collected. We collected high-quality data on maternal and perinatal death audits and found that timely death audits, conducted within 3 days, were important. Our experience was that it was very difficult to conduct retrospective death audits after a prolonged period.

On the whole, the MPD-4-QED programme shows the future potential for monitoring key maternal, newborn and child health indices in Nigeria (and by extension in other LMICs), rather than solely depending on estimates.

5 | FUTURE PROSPECTS

The success of the MPD-4-QED programme demonstrated the feasibility of implementing a harmonised and unified routine data collection system for maternal and perinatal outcomes, as well as the quality of care, in Nigeria.

The rich data collected could be used to identify gaps in the quality of care and improve clinical practice at individual hospitals. To enhance the translation of recommendations resulting from the analyses of the database into actionable steps, the establishment of a national technical working group is required. To avoid drops in data quality, continual training and retraining in clinical documentation and data capture will be necessary, as well as the continuous monitoring and evaluation of the data collection processes. The MPD-4-QED database yielded high-quality data, proving valuable for assessing the quality of maternal and perinatal care. The successful development of this database suggests its potential for scalability to other LMICs and demonstrates that it can be implemented elsewhere.

AUTHOR CONTRIBUTIONS

The idea for the commentary was conceived by AA, TL, JT and OTO. AA wrote the first draft, with substantial input from TL, JT and OTO. All authors (AA, JT, TL, BE, IA, PA, OA, CC, SE, HG, JI and OTO) revised the article for intellectual content and approved the article for publication. The article represents the views of the named authors only.

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CONFLICT OF INTEREST STATEMENT

All authors declare that they have no competing interests associated with this work.

DATA AVAILABILITY STATEMENT

This is a commentary article with no data to share.

ETHICS APPROVAL

The scientific content of the programme was approved by the WHO HRP Research Project Review Panel (A65930, 6 May 2018). The WHO Ethics Review Committee (A65930, 5 June 2018) and the Nigerian National Health Research and Ethics Committee (NHREC/01/01/2007, 5 September 2018) approved the study. Authorities of all participating hospitals granted written institutional approval to participate in data collection, periodic analyses and reporting.

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APPENDIX 1

LIST OF PARTICIPATING HOSPITALS

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APPENDIX 1 (Continued)

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APPENDIX 2

WORLD HEALTH ORGANIZATION QUALITY, EQUITY AND DIGNITY INDICATORS, AND DEFINITIONS

Indicator	Operational definition	Method of data collection in current study
Pre-discharge maternal mortality ratio	Number of deaths to women who delivered in the hospital per 100 000 hospital live births	The number of maternal deaths recorded by facilities among women who gave birth in the facility. Number of live births in the facility
Institutional stillbirth rate (disaggregated by antenatal and intrapartum stillbirth)	Percentage of babies born in a health facility with no signs of life at birth, expressed as stillbirths per 1000 facility births	The number of stillbirths (deaths ≥28 weeks of gestation) recorded by facilities among babies (≥28 weeks of gestation) who were born in the facility
Pre-discharge neonatal mortality rate	Percentage of babies born alive in facility who died before discharge, expressed as deaths per 1000 facility live births	The number of babies (≥28 weeks of gestation) who died recorded by facilities among babies born alive in the facility
Pre-discharge family planning counselling for mother and baby	Proportion of women who received pre-discharge family planning counselling for the mother and the baby in a given period	Number of women (obstetric admissions) discharged with a live infant who received pre-discharge family planning counselling, as recorded in postnatal ward note. In the case report forms, three responses were available: yes (postnatal ward note reported that the woman had received pre-discharge family planning); no (postnatal ward note reported that the woman did not receive pre-discharge family planning); information not available (it could not be ascertained from postnatal ward note whether the woman received family planning counselling or not)
Companion of choice	Proportion of women who had a companion supporting them during labour and childbirth in the health facility	Number of women (obstetric admissions) who had a companion present, as recorded in medical records. In the case report forms, three responses were available: yes (medical record reported that the woman had a companion during labour); no (medical record reported that the woman did not have a companion during labour); unknown (medical record did not report whether the woman had a companion in labour or not). If this information was left blank in the case report form, it was considered missing data For women who had a companion in labour, the type of companion was also recorded (spouse, family member or another person)
Newborns breastfed within 1 h of birth	Percentage of babies born alive in a facility who are breastfed within 1 h of birth	Number of babies born alive and breastfed within 1 h of birth, as recorded in the medical record. In the case report forms, three responses were available: yes (medical record reported that baby was breastfed within 1 h of birth); no (medical record reported that baby was not breastfed within 1 h of birth); information not available (it could not be ascertained from the medical record whether the baby was breastfed within 1 h of birth)
Immediate postpartum uterotonic use for postpartum haemorrhage (PPH) prevention	Percentage of women who gave birth in a facility who received a prophylactic uterotonic immediately after birth (ideally within 1 min) for the prevention of PPH	Number of women (obstetric admissions) who received a uterotonic for PPH prevention, as recorded in the medical record. In the case report forms, three responses were available: yes (medical record reported that the woman received a uterotonic); no (medical record reported that the woman did not receive a uterotonic); unknown (medical record did not report whether the woman received a uterotonic or not). If this information was left blank in the case report form, it was considered missing data

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APPENDIX 2 (Continued)

Indicator	Operational definition	Method of data collection in current study
Newborns with birthweight documented	Percentage of babies born in a facility in a given period with documented birthweight before discharge	Number of babies born in facility with birthweight recorded in the medical record. In the case report form, if the birthweight (grams) was entered this was counted as a newborn who had a documented birthweight. In case report forms where the birthweight was left blank, this was counted as a newborn who did not have birthweight documented
Basic hygiene provision	Proportion of facilities in which delivery rooms have at least one functional handwashing station with water and soap available	Number of facilities reporting at least one functional handwashing station with water and soap available in the most recent quarterly facility audit
Basic sanitation available to women and families	Proportion of facilities with basic sanitation available for women during and after labour and childbirth	Number of facilities reporting having basic sanitation available during and after labour and childbirth in the most recent quarterly facility audit

APPENDIX 3

MPD-4-QED DATA DICTIONARY

Enrolment record[a]

Name	Description	Mapping
Enrolment ID	Enrolment ID	Unique enrolment ID
Type_Adm	Type of admission	Look up: Type of admission
Type_Obstetrics	If obstetrics, where childbirth took place	Look up: Location of birth
Del_Place	If location of birth was outside this hospital, the time interval between the delivery and admission	Look up: Outside admissions
Woman_ID	Woman's hospital number	For admin processing only
Child_ID	Child's hospital number	For admin processing only
TOHA	Time of hospital admission	

[a] Look-up files are provided with data access.

Biodata

Name	Description	Mapping
Age	Age at last birthday (years)	
Marital	Marital status	Look up: Marital status
Gravidity	Gravidity	
Parity	Parity	
Miscarriage	Number of previous miscarriages or abortions (terminations of pregnancy)	
Child alive	Number of children alive	
Caesarean section	Number of previous caesarean sections	
Wo_Edu	Educational level completed	Look up: Level of education
Wo_Occup	Woman's occupation	Look up: Occupations
Husb_Occup	Husband's occupation	Look up: Occupations
Tribe	Tribe	Look up: Tribes
Religion	Religion	Look up: Religion
Booking	Booking status	Look up: Booking status
GA_booking_weeks	Best estimated gestational age at booking in weeks	
GA_booking_days	+Days (gestational age)	
GA_booking_unknown	Check if booking gestational age is unknown	

(Continues)

APPENDIX 3 (Continued)

Name	Description	Mapping
ANC_visit	If antenatal care (ANC) at the same health facility, how many ANC visits did she attend?	
Height	Maternal height (cm)	
Weight	Last ANC maternal weight (kg)	
MedB4preg	Chronic medical condition before pregnancy	Look up: No/Yes
If yes:		
B4_HTN	Hypertension	Look up: No/Yes
B4_DM	Diabetes	Look up: No/Yes
B4_Asthma	Asthma	Look up: No/Yes
B4_SCD	Sickle cell anaemia	Look up: No/Yes
B4_TB	Tuberculosis	Look up: No/Yes
B4_HIV	HIV/AIDS	Look up: No/Yes
B4_Hepatitis	Hepatitis	Look up: No/Yes
B4_Cardiac	Cardiac disease	Look up: No/Yes
B4_Renal	Renal disease	Look up: No/Yes
B4_Thyroid	Thyroid Disease	Look up: No/Yes
B4_Epilepsy	Epilepsy	Look up: No/Yes
B4_Other	Other	Look up: No/Yes
PregCompl	Medical or obstetrics complications recorded during pregnancy	Look up: No/Yes
Preg_PIH	Pregnancy-induced hypertension	Look up: No/Yes
Preg_Preeclampsia	Pre-eclampsia	Look up: No/Yes
Preg_Eclampsia	Eclampsia	Look up: No/Yes
Preg_GDM	Gestational diabetes	Look up: No/Yes
Preg_Praevia	Placenta praevia	Look up: No/Yes
Preg_Abruptio	Abruptio placenta	Look up: No/Yes
Preterm	Preterm labour	Look up: No/Yes
PROM	Prelabour rupture of membranes	Look up: No/Yes
Anaemia	Anaemia in pregnancy	Look up: No/Yes
Malaria	Malaria	Look up: No/Yes
UTI	Urinary tract infection	Look up: No/Yes
TB	Tuberculosis	Look up: No/Yes
HIV	HIV/AIDS	Look up: No/Yes
Hepatitis	Hepatitis	Look up: No/Yes
Cardiac	Cardiac disease	Look up: No/Yes
Renal	Renal disease	Look up: No/Yes
Preg_Other	Other	Look up: No/Yes
Lassa Fever[a]	Lassa fever infection during pregnancy?	Look up: No/Yes
COVID-19[a]	COVID-19 infection diagnosed during pregnancy?	Look up: No/Yes
covid_no_symptom	No symptoms[a]	Look up: No/Yes
covid_cough	Cough[a]	Look up: No/Yes
covid_fever	Fever[a]	Look up: No/Yes
covid_sorethroat	Sore throat[a]	Look up: No/Yes
covid_breath	Difficulty breathing[a]	Look up: No/Yes
covid_musclepain	Muscle pain[a]	Look up: No/Yes
covid_smell_loss	Loss of sense of smell[a]	Look up: No/Yes
covid_taste_loss	Loss of sense of taste[a]	Look up: No/Yes

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APPENDIX 3 (Continued)

Name	Description	Mapping
Referral	Was the woman referred to the hospital?	Look up: No/Yes
Referral_Source	If referred, source of referral?	Look up: Referral source
Level	If referred from public hospital, what level of care?	Look up: Level of care

[a] These data were collected following the onset of the COVID-19 pandemic.

Obstetrics – clinical condition at labour admission

Name	Description	Mapping
Hosp_Birth	Did birth occur in this hospital?	Look up: No/Yes
Birth_occur	If no, where did the birth occur?	Look up: Location of birth
GA_weeks_adm	Best estimate of gestational age (in weeks) at admission in labour or into the theatre	
GA_days_adm	+Days (gestational age)	
GA_unknown	Check whether gestational age is unknown	
DODD	Date of labour diagnosis/decision for surgical delivery	
TODD	Time of labour diagnosis/decision for surgical delivery	
Pulse_Obs	Pulse rate at admission in labour/theatre (beats per minute)	
Systolic_Obs	Blood pressure at admission in labour/theatre: systolic	
Diastolic_Obs	Blood pressure at admission in labour/theatre: diastolic	
SFH	Symphysiofundal height at admission in labour/theatre (cm)	
Lie	Lie of the baby	Look up: Baby lie
Presentation	Presentation of the baby	Look up: Baby presentation
FetalHrt	Fetal heart sound on labour ward/obstetrics theatre admission	
FHR	Fetal heart rate on labour ward/obstetrics theatre admission (beats per minute)	
Cervix	Cervical dilatation on labour ward/obstetrics theatre admission (cm)	
Membranes	Status of fetal membranes on labour ward/obstetrics theatre admission	Look up: Membrane status
ROM_Duration	Duration of rupture prior to labour ward/obstetrics theatre admission (in hours)	
Spont_Labour	Was the onset of labour spontaneous?	Look up: No/Yes
Induction	Did the woman have induction of labour?	Look up: No/Yes
If the woman had induction of labour, what was the method of the induction?		
Ind_Misoprostol	Misoprostol	Look up: No/Yes
Ind_Foleys	Intracervical (Foley's) catheter	Look up: No/Yes
Ind_Sweeping	Membrane sweeping	Look up: No/Yes
Ind_Oxytocin	Oxytocin	Look up: No/Yes
Ind_PG	Other prostaglandins (e.g. Prostin E2)	Look up: No/Yes
Ind_ARM	Amniotomy/artificial rupture of membranes	Look up: No/Yes
Ind_Other	Other	Look up: No/Yes
If the woman had induction of labour, what was the indication of the induction?		
Postdate	Post-date pregnancy	Look up: No/Yes
Postterm	Post-term (prolonged) pregnancy	Look up: No/Yes
Ind_HTN	Hypertension	Look up: No/Yes
Ind_Preeclampsia	Pre-eclampsia	Look up: No/Yes
Ind_Eclampsia	Eclampsia	Look up: No/Yes
Ind_GDM	Diabetes during pregnancy	Look up: No/Yes
IUGR	Intrauterine growth restriction	Look up: No/Yes
IUFD	Intrauterine fetal death	Look up: No/Yes
Mat_Request	Maternal request	Look up: No/Yes

APPENDIX 3 (Continued)

Name	Description	Mapping
PPROM	Preterm premature rupture of the membranes	Look up: No/Yes
Ind_Anomaly	Congenital anomaly of the fetus	Look up: No/Yes
Other_Ind_Indication	Other	Look up: No/Yes
Partograph	Was the labour monitored with a partograph?	Look up: No/Yes
SVD	Was delivery spontaneous vaginal birth?	Look up: No/Yes
ELCS	Was elective caesarean section performed?	
If elective caesarean section was performed, what was the indication?		
PreviousCS	Previous caesarean section	Look up: No/Yes
EL_Praevia	Placenta praevia	Look up: No/Yes
EL_Preeclampsia	Pre-eclampsia	Look up: No/Yes
EL_Breech	Breech presentation	Look up: No/Yes
EL_Mat_Request	Maternal request	Look up: No/Yes
EL_Twin	Multiple pregnancy	Look up: No/Yes
Big_baby	Macrosomia (large baby)	Look up: No/Yes
EL_Small_Pelvis	Contracted/inadequate pelvis	Look up: No/Yes
EL_IUGR	IUGR	Look up: No/Yes
EL_Lie	Transverse/oblique (abnormal) lie	Look up: No/Yes
EL_Myomectomy	Previous myomectomy	Look up: No/Yes
EL_Infertility	Infertility	Look up: No/Yes
EL_IVF	Assisted reproductive technology (ART)/in vitro fertilisation (IVF) baby	Look up: No/Yes
EL_Primigravida	Elderly primigravida	Look up: No/Yes
EL_Pelvic_Surgery	Previous pelvic surgery	Look up: No/Yes
EL_HIV	HIV/AIDS	Look up: No/Yes
EL_Other	Other	Look up: No/Yes
ARM	Was artificial rupture of fetal membranes (ARM) performed?	Look up: No/Yes
Liquor	What was the state of the liquor?	Look up: State of liquor
Augmentation	Was the labour augmented with oxytocin?	Look up: No/Yes
Episiotomy	Was episiotomy performed?	Look up: No/Yes
AsstVD	Did the woman have assisted vaginal birth (delivered vaginally with the aid of instruments)?	Look up: No/Yes
Type_AsstVD	Which method?	Look up: Assisted vaginal delivery
If assisted vaginal delivery was performed, what was the indication?		
AsstVD_FDistress	Fetal distress	Look up: No/Yes
Mat_Exhaustion	Maternal exhaustion	Look up: No/Yes
Delayed_2ndStage	Delayed second stage	Look up: No/Yes
AsstVD_Cardiac	Cardiac disease	Look up: No/Yes
AsstVD_PIH	Pregnancy-induced hypertension	Look up: No/Yes
AsstVD_Preeclampsia	Pre-eclampsia	Look up: No/Yes
AsstVD_Eclampsia	Eclampsia	Look up: No/Yes
AsstVD_SCD	Sickle cell disease	Look up: No/Yes
AsstVD_Asthma	Asthma	Look up: No/Yes
AsstVD_Mat_Request	Maternal request	Look up: No/Yes
AsstVD_Other	Other	Look up: No/Yes
EMCS	Was emergency caesarean section performed for the woman?	Look up: No/Yes

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APPENDIX 3 (Continued)

Name	Description	Mapping
If emergency caesarean section was performed, what was the indication?		
EM_CPD	Cephalopelvic disproportion	Look up: No/Yes
EM_Obstr_labour	Obstructed labour	Look up: No/Yes
EM_Abruptio	Abruptio placenta	Look up: No/Yes
EM_Praevia	Placenta praevia	Look up: No/Yes
EM_PIH	Pregnancy-induced hypertension	Look up: No/Yes
EM_Preeclampsia	Severe pre-eclampsia	Look up: No/Yes
EM_Eclampsia	Eclampsia	Look up: No/Yes
EM_Fetal_distress	Fetal distress	Look up: No/Yes
EM_Failed_Induction	Failed induction of labour	Look up: No/Yes
EM_Failed_AsstVD	Failed assisted vaginal delivery	Look up: No/Yes
EM_Failed_VBAC	Failed vaginal birth after caesarean section (VBAC)	Look up: No/Yes
EM_Failed_labour	Failure of labour to progress	Look up: No/Yes
EM_Cervix_dystocia	Cervical dystocia	Look up: No/Yes
EM_Prolonged_labour	Prolonged labour	Look up: No/Yes
EM_Prolapse	Cord prolapse	Look up: No/Yes
EM_Hydramnios	Oligohydramnios/anhydramnios	Look up: No/Yes
EM_Mat_Request	Maternal request	Look up: No/Yes
EM_Other	Other	Look up: No/Yes
EM_Interval	If emergency caesarean section was performed, what was the time interval from when the decision was taken to the time the baby was delivered in minutes?	
Uterotonic	Was medication to contract the uterus (uterotonic) given immediately after the birth of baby?	Look up: No/Yes
Medication	Which medication was given?	Look up: Uterotonic
Cadre	Cadre of health professional that conducted the delivery	Look up: Cadre of professional
Date_Del	Date of delivery	
Time_Del	Time of delivery	
Time_Del_when	AM/PM	
GA@del_weeks	Best estimate of gestational age at delivery (weeks)	
GA@del_days	+Days (gestational age)	
GA@del_unknown	Check if booking gestational age is unknown	
Companion	Was a companion present throughout childbirth?	Look up: No/Yes
Companion_present	If yes, who was present	Look up: Companion present

Maternal outcome and postnatal conditions

Name	Description	Mapping
EBL	Estimated blood loss after birth (mL):	
Tear	Did the woman develop a perineal tear?	Look up: No/Yes
Tear_degree	If yes, which degree of tear?	Look up: Perineal tear
PN_Compli	Did the woman develop any complication between delivery and hospital discharge?	Look up: No/Yes
If yes, did any of these conditions develop?		
PN_RupUterus	Ruptured uterus	Look up: No/Yes
PN_Preeclampsia	Pre-eclampsia	Look up: No/Yes
PN_Eclampsia	Eclampsia	Look up: No/Yes
PN_PPH	Postpartum haemorrhage	Look up: No/Yes

APPENDIX 3 (Continued)

Name	Description	Mapping
Retained_Placenta	Retained placenta	Look up: No/Yes
PN_Sepsis	Puerperal sepsis	Look up: No/Yes
Wound_Infection	Wound infection	Look up: No/Yes
PN_Thrombo	Thromboembolic disease	Look up: No/Yes
PN_Anaemia	Anaemia	Look up: No/Yes
PN_ARF	Acute renal failure	Look up: No/Yes
PN_DIC	Disseminated intravascular coagulopathy	Look up: No/Yes
PN_Stroke	Stroke	Look up: No/Yes
PN_Anaesthetic	Anaesthetic complication	Look up: No/Yes
PN_Pulmonary	Pulmonary oedema	Look up: No/Yes
PN_Cardiac	Cardiac arrest	Look up: No/Yes
PN_Hepatic	Hepatic failure	Look up: No/Yes
PN_Other	Other	Look up: No/Yes
ICU_Admit	Was the woman admitted to the intensive care unit (ICU)?	Look up: No/Yes
If yes, what was the indication for ICU admission?		
ICU_RupUterus	Ruptured uterus	Look up: No/Yes
ICU_Preeclampsia	Pre-eclampsia	Look up: No/Yes
ICU_Eclampsia	Eclampsia	Look up: No/Yes
ICU_PPH	Postpartum haemorrhage	Look up: No/Yes
ICU_Placenta	Retained placenta	Look up: No/Yes
ICU_Sepsis	Puerperal sepsis	Look up: No/Yes
ICU_Wound_Infxn	Wound infection	Look up: No/Yes
ICU_Thrombo	Thromboembolic disease	Look up: No/Yes
ICU_Anaemia	Anaemia	Look up: No/Yes
ICU_ARF	Acute renal failure	Look up: No/Yes
ICU_DIC	Disseminated intravascular coagulopathy	Look up: No/Yes
ICU_Stroke	Stroke	Look up: No/Yes
ICU_Anaes	Anaesthetic complication	Look up: No/Yes
ICU_Pulm	Pulmonary oedema	Look up: No/Yes
ICU_Cardiac	Cardiac arrest	Look up: No/Yes
ICU_Hepatic	Hepatic failure	Look up: No/Yes
ICU_Other	Other	Look up: No/Yes
Mat_Outcome	Final maternal outcome at discharge or 42 days after delivery (whichever was earlier)	Look up: Maternal outcome
BF_Counsel	Did the woman receive a pre-discharge counselling on breastfeeding and care of the baby?	Look up: Breastfeeding counselling
FP_Counsel	Did the woman receive a pre-discharge counselling on postpartum family planning?	Look up: FP counsel
Date_Discharge	Date of hospital discharge	
Time_Discharge	Time of hospital discharge	
Time_Discharge_when	AM/PM	

Baby – outcome and clinical conditions[a]

Name	Description	Mapping
Num_Babies	Number of babies born	
Date_Babybirth	Date of baby's birth	
Baby_Wt	Baby's weight (kg)	

APPENDIX 3 (Continued)

Name	Description	Mapping
Baby_Alive	Was baby alive at birth?	Look up: No/Yes
Type_stillbirth	Type of stillbirth	Look up: Type of stillbirth
Apgar1	Baby's Apgar score at 1 min	
Apgar5	Baby's Apgar score at 5 min	
Baby_Sex	Baby's assigned sex at birth	Look up: Sex at birth
BC_Compl	Any complications identified in the baby at birth?	Look up: No/Yes
If yes, were any of these identified?		
BC_Asphyxia	Birth asphyxia	Look up: No/Yes
BC_Trauma	Birth trauma	Look up: No/Yes
BC_Jaundice	Jaundice	Look up: No/Yes
BC_Anomaly	Congenital anomaly	Look up: No/Yes
BC_Premature	Prematurity	Look up: No/Yes
BC_Sepsis	Presumed neonatal sepsis	Look up: No/Yes
BC_HIE	Hypoxic ischaemic encephalopathy (HIE)	Look up: No/Yes
BC_Other	Other	Look up: No/Yes
Breastfed	Was baby breastfed within 1 h of delivery?	Look up: Breastfeeding (1 h)
Skin_to_Skin	Was baby allowed to have skin-to-skin mother care within 1 h after delivery?	Look up: Skin-to-skin care
SCBU	Was baby admitted to the Special Care Baby Unit (SCBU)?	Look up: SCBU
If baby was admitted to the SBCU, what was the indication?		
SCBU_Asphyxia	Birth asphyxia	Look up: No/Yes
SCBU_Trauma	Birth trauma	Look up: No/Yes
SCBU_Jaundice	Jaundice	Look up: No/Yes
SCBU_LBW	Low birthweight	Look up: No/Yes
SCBU_Anomaly	Congenital anomaly	Look up: No/Yes
SCBU_Premature	Prematurity	Look up: No/Yes
SCBU_Sepsis	Neonatal sepsis	Look up: No/Yes
SCBU_Rdistress	Respiratory distress	Look up: No/Yes
SCBU_Seizure	Seizure	Look up: No/Yes
SCBU_Other	Other	Look up: No/Yes
Baby@Discharge	Baby's condition at hospital discharge or on day 7 of life (whichever was earlier)	
Date_Perinataldeath	Date of perinatal death	

[a] Same data elements were collected for twins and other multiple births.

Gynaecology – clinical conditions during admission

Name	Description	Mapping
Gynae_Adm	Indication for gynaecological admission	Look up: Gynaecological admission indication
Abortion_method	If woman had termination of pregnancy, what was the method used?	Look up: Abortion methods
Pulse_Gynae	Pulse rate at gynaecological admission (beats per minute)	
Systolic_Gynae	Blood pressure at gynaecological admission: systolic	
Diastolic_Gynae	Blood pressure at gynaecological admission: siastolic	
Gynae_compl	Did the woman develop any complication?	Look up: No/Yes
If yes, which complications?		
Gynae_Blood	Haemorrhage	Look up: No/Yes
Gynae_Shock	Shock	Look up: No/Yes

APPENDIX 3 (Continued)

Name	Description	Mapping
Gynae_ARF	Acute renal failure	Look up: No/Yes
Gynae_Sepsis	Sepsis	Look up: No/Yes
Gynae_Thromb	Thromboembolic disease	Look up: No/Yes
Gynae_Anaemia	Severe anaemia	Look up: No/Yes
Gynae_Injury	Organ perforation/injury	Look up: No/Yes
Gynae_Peritonitis	Peritonitis	Look up: No/Yes
Gynae_abscess	Pelvic abscess	Look up: No/Yes
Gynae_DIC	Disseminated intravascular coagulopathy	Look up: No/Yes
Gynae_Other	Other	Look up: No/Yes
Gynae_Rx	How was her clinical diagnosis managed?	Look up: Gynae treatment
Did she receive any of the following interventions?		
Gynae_AntiB	Antibiotics	Look up: No/Yes
Gynae_Blood	Blood transfusion	Look up: No/Yes
Gynae_ICU	ICU admission	Look up: No/Yes

Maternal death audit[a]

Name	Description	Mapping
Time_MatDeath	Time of maternal death	
Time_MatDeath_when	AM/PM	
Preg_Outcome	Outcome of index pregnancy	Look up: Index pregnancy outcome
Mat_PryDeath	Primary underlying cause of death	Look up: ICD-10 code MM
Mat_PryDeath_other	Other causes of death	Look up: ICD-10 code MM
Mat_FinalDeath	Final cause of death	Look up: ICD-10 code MM
Mat_FinalDeath_other	Other final cause of death	Look up: ICD-10 code MM
Were any of the following modifiable factors identified as contributing to the maternal death?		
Seeking_help	Delay in woman seeking help	Look up: No/Yes
Transport	Lack/delay of transport from home to healthcare facility	Look up: No/Yes
Delay_Referral	Delay in appropriate referral	Look up: No/Yes
Refuse_Rx	Patient's refusal of treatment or admission	Look up: No/Yes
Delay_medicare	Delay in receiving care from medical staff	Look up: No/Yes
Lack_facilities	Lack of facilities, equipment or consumables	Look up: No/Yes
Lack_expertise	Lack of medical expertise, training or education	Look up: No/Yes
Lack_HR	Lack of human resources	Look up: No/Yes
Comm_Brkdown	Health services and communication breakdown	Look up: No/Yes

[a] Data collected only in instances of maternal death.

Perinatal death audit[a]

Name	Description	Mapping
Date_BabyDeath	Date of baby's death	
Time_BabyDeath	Time of baby's death	
Time_BabyDeath_when	AM/PM	
Type_PND	Type of perinatal death	Look up: Type perinatal death
Period_babydeath	Period of baby's death	
Main_disease	Main disease or condition in the fetus/baby	Look up: ICD-10 code PM

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APPENDIX 3 (Continued)

Name	Description	Mapping
Main_disease_other	Specify other causes of perinatal death	Look up: ICD-10 code PM
Mat_con	Main maternal disease or condition contributing to fetal/baby's death	Look up: ICD-10 code PM
HW_factor	Health worker factors	Look up: health worker factors
Admin_factor	Administrative factors	Look up: admin factors
Family_factor	Patient/family factors	Look up: patient factors
Community_factor	Community factors	Look up: community factors

[a] Data elements were collected for multiple births, as appropriate.