N I A O

Northern Ireland Audit Office

Safer Births: Using Information to Improve Quality

REPORT BY THE COMPTROLLER AND AUDITOR GENERAL
29 April 2014

N I A O

Northern Ireland Audit Office

Safer Births: Using Information to Improve Quality

Published 29 April 2014

This report has been prepared under Article 8 of the Audit (Northern Ireland) Order 1987 for presentation to the Northern Ireland Assembly in accordance with Article 11 of that Order.

K J Donnelly

Comptroller and Auditor General

Northern Ireland Audit Office

29 April 2014

The Comptroller and Auditor General is the head of the Northern Ireland Audit Office employing some 145 staff. He, and the Northern Ireland Audit Office are totally independent of Government. He certifies the accounts of all Government Departments and a wide range of other public sector bodies; and he has statutory authority to report to the Assembly on the economy, efficiency and effectiveness with which departments and other bodies have used their resources.

For further information about the Northern Ireland Audit Office please contact:

Northern Ireland Audit Office
106 University Street
BELFAST
BT7 1EU

Tel: 028 9025 1100
email: info@niauditoffice.gov.uk
website: **www.niauditoffice.gov.uk**

© Northern Ireland Audit Office 2014

Contents

Contents

Abbreviations

Department	The Department of Health, Social Services and Public Safety
HSC	Health and Social Care
MLU	Midwifery-led Unit
NI	Northern Ireland
NICE	National Institute for Health and Care Excellence
NIMAT system	Northern Ireland Maternity System
PHA	Public Health Agency
ROI	Republic of Ireland
Strategy	The Department of Health, Social Services and Public Safety Maternity Strategy 2012
TGCS	Ten Group Classification System
UK	United Kingdom
WHO	World Health Organization

Glossary of Terms

Antenatal	Occurring or existing before birth.
Antenatal care	Health care that a pregnant woman receives. Services needed include dietary and lifestyle advice, weighing to ensure appropriate weight gain, and examination for pregnancy problems.
Breech birth	Where a baby is born bottom (rather than a head) first.
Caesarean Section	A caesarean section is the birth of a baby through a surgical incision in the mother's abdomen and uterus carried out under either regional analgesia (epidural or spinal) or general anaesthetic. An elective (or planned) caesarean is one which is scheduled to take place before labour. An emergency caesarean is unplanned and is performed prior to or during labour to address potentially dangerous complications. Caesarean sections occur for a variety of reasons. In labour they may be necessary because of dystocia (failure to progress) or suspected foetal distress or in cases where the foetus is lying in a breech position. They may also be performed due to complications with the placenta or because of the mother's condition (for example, in cases where the mother has high blood pressure, suffers from diabetes, etc).
Cephalic presentation	Where a baby presents for birth positioned head down in the uterus.
Consultant-led maternity unit	A consultant-led maternity unit is located within a general hospital and is staffed by obstetricians and midwives. The woman's care will be provided by both midwives and doctors under the direction of a consultant obstetrician. If complications arise, the consultant obstetrician will become more involved. Interventions such as epidurals and caesarean sections are available within the unit.
Forceps	Instruments used during labour to assist with the delivery of the baby.
Gestation	The length of a pregnancy taken from the first day of the last menstrual period.
Intrapartum	The time of childbirth (includes labour and birth).
Intervention	Medical staff assistance in the form of: • inducing labour; administering an epidural or spinal anaesthetic, • using instruments to assist with the birth; or • performing a caesarean section.

Labour	From the onset of regular rhythmical contractions to the birth of the baby, placenta and membranes.
Maternal	1. Pertaining to the mother as, for example, the maternal mortality rate. 2. Related through the mother as, for example, the maternal grandparents. 3. Inherited from the mother as, for example, the maternal "X" chromosome.
Midwife	A healthcare professional who, as an independent practitioner, is both responsible and accountable for the care they provide, working in partnership with women to give the necessary support, care and advice during pregnancy, labour and the postnatal period. Midwives are experts in dealing with straightforward, 'normal' pregnancies and therefore can be the lead professional in straightforward pregnancies and births. They also provide care to the mother and newborn baby in the first hours and days after the birth.
Midwifery-led unit	A midwifery-led unit (MLU) offers care to women with a straightforward pregnancy. Midwives (rather than consultants) are the lead professionals. Midwifery-led units do not offer obstetric, neonatal or anaesthetic care. Women attending midwifery units who require these services are transferred to a consultant-led maternity unit. MLUs can stand alongside a consultant-led maternity unit or can be free-standing (i.e. existing on a hospital site with no consultant-led maternity unit).
Miscarriage	Loss of a pregnancy before the foetus is viable.
Multipara	A woman who is having a baby other than her first.
Nullipara	A woman who is having her first baby.
Obstetrics	Medical specialty which cares for the woman from pregnancy, through labour and birth and the time immediately following the birth.
Obstetrician	An obstetrician is a specialist doctor who provides care to pregnant women from the outset of their pregnancy to the postnatal period. Obstetricians are experts and the lead professionals in more complex, high risk, 'abnormal' pregnancies. They may also undertake some gynaecology work and may have specialist training in areas such as foetal medicine, diabetes in pregnancy, etc.
Perinatal	Relating to the period around the birth.

Glossary of Terms

Pregnancy	The time from conception to birth.
Quality	Quality obstetric/midwifery care is defined as effective, safe and responsive to the needs and preferences of women.
Risk factors in Pregnancy	Something that increases a woman's chances of needing an intervention in childbirth, for example, smoking or obesity.
Ventouse	A ventouse (vacuum extractor) is an instrument that is attached to the baby's head by suction. During a contraction, the obstetrician or midwife gently pulls to help with the birth.

Executive Summary

Executive Summary

1. Each year in Northern Ireland (NI) there are around 25,000 registered births. The majority of women give birth in either a consultant-led unit (around 22,000) or in a midwifery-led unit alongside a consultant-led unit (around 3,000). A small percentage of women give birth in one of three freestanding midwife-led units. Very few women in NI choose to give birth at home.

2. Maternity care should be appropriate to clinical need, which in the majority of cases can be met by midwives. While many women give birth without any intervention, in any case where a normal birth is unlikely to achieve a safe and positive birthing outcome, intervention should be provided. Intervention rates in NI are higher than in the Republic of Ireland and among the highest in the UK. Interventions of all types, although necessary in many cases, can pose health risks for both the mother and the baby.

3. In 2012 the Department of Health, Social Services and Public Safety (the Department) launched a new Maternity Strategy (the Strategy). The Strategy acknowledges that interventions can, and do, save lives but identifies that there may be scope for reducing variations in the provision of interventions across NI. It highlights a need to promote a culture of "normalisation" of pregnancy and birth. The Strategy recommends that Health and Social Care (HSC) Trusts measure intervention rates and compare these with rates in the UK and the Republic of Ireland. This would ensure that HSC Trusts are well placed to assess the standard of maternity care provided and make best possible use of resources.

4. This report uses data routinely collected by HSC Trusts on one type of intervention, caesarean section, to illustrate how the level of variation between hospital maternity units can be measured. Highlighting variation in this way provides clinical managers with the basis for investigating the reasons for divergent caesarean section rates. Primarily, reducing unnecessary interventions is important for ensuring that healthcare provided is appropriate and patient-focused. In addition, reducing unnecessary interventions can result in improved health outcomes and increased control over healthcare costs.

5. While we limited our review to caesarean sections, a common major hospital surgical procedure, the principles and methodology set out in this report can be applied to a wide range of other interventions and birthing outcomes (see Appendix 3).

6. Since the 1970s, caesarean section rates have risen around the world. The average caesarean section rate globally stands at around 16 per cent but there are enormous regional differences, even among western countries. While the reasons for the global increase are not

entirely clear, it is likely that changing demographic characteristics such as rising levels of maternal obesity and increasing maternal age in childbirth, have influenced rates of caesarean section births.

7. In 2011-12, around 27 per cent of babies born in the United Kingdom were delivered by caesarean section. In Northern Ireland, caesarean section birth rates (at just over 28 per cent) were broadly in line with the national average. Rates varied significantly across NI consultant-led units from 24 per cent in the Mater Infirmorum Hospital to almost 35 per cent in Daisy Hill Hospital. It is important to note that the volume and complexity of case mix contributes to variations across units.

8. Many systems for comparing birthing interventions and outcomes exist. For our analysis, we selected the Ten Group Classification System (TGCS), developed by Dr Michael Robson, from the National Maternity Hospital, Dublin. It permits standardised auditing within, and between, maternity units by limiting comparisons to clinically relevant groupings. It is unique in that it only compares the outcomes of women with similar obstetric characteristics. It is relatively easy to use and difficult to misinterpret. It has been applied in several countries across the world and therefore international comparisons are possible.

9. We used the HSC Trusts' Northern Ireland Maternity System (the NIMAT system) to source obstetric information on women who gave birth between 2010 and 2012. The NIMAT system is a web-based database used by HSC Trusts to record details of a woman's current pregnancy together with information on her past medical, social and obstetric history.

10. The system was not designed to facilitate comparison of birthing interventions or outcomes. However, the Department, HSC Board, Public Health Agency and the HSC Trusts are putting considerable effort into improving the NIMAT system. The Department told us that work has already been done to ensure that women can be classified using the TGCS.

11. The published caesarean section rates show that:

- caesarean rates at the Mater Infirmorum Hospital were the lowest of all NI consultant-led units in both years;
- in 2012-13, the caesarean section rate at the Mater Infirmorum Hospital was just under 23 per cent while the rate at the Royal Jubilee Maternity Hospital that year was just over 32 per cent; at Craigavon Area Hospital was 33 per cent; and at Daisy Hill Hospital it was just under 36 per cent; and

Executive Summary

- the overall caesarean section rate in NI remained fairly consistent in both years at around 28-30 per cent.

A caesarean section rate whether high or low, is not a marker of quality care on its own. However, analysing variations in caesarean section rates between maternity units in conjunction with contextual information on individual patient characteristics and clinical practices will help to provide assurance that the use of the procedure consistently provides the optimum outcomes for mothers and babies. For instance, the Mater Infirmorum Hospital, although categorised as a consultant-led unit, primarily delivers low-risk women because of limited on-site resources. Where a woman presents at the Mater Infirmorum Hospital and is not assessed as low risk, she is immediately transferred to the nearby Royal Jubilee Maternity Hospital. The caesarean section rate at the Mater Infirmorum Hospital would therefore be expected to be low, relative to other maternity units.

12. Using information we extracted from the NIMAT system, we categorised women who gave birth over the period 2010 -12, across the TGCS (Appendix 2). While recognising the limitations of the information we extracted, we used it to illustrate how the TGCS facilitates comparisons across units and over time. High level observations included:

- women who had a caesarean birth in a previous pregnancy make the most significant contribution to the overall caesarean section rate in any given year; and

- mothers having their first baby who are induced make the second largest contribution to the caesarean section rate.

13. Producing data that informs clinicians will be a major driving force in ensuring that maternity care can be of the highest quality. We have demonstrated that the use of a classification system like TGCS can be used to compare childbirth interventions/outcomes both clinically and economically. We recommend that HSC Trusts implement

such a classification system and that it is regularly used to compare the activity and costs of similar obstetric populations across local maternity units and with other internationally available data, so that the widest possible range of good practice can be identified and adopted.

14. We acknowledge and welcome the efforts being made within HSC Trusts to examine and reduce caesarean section rates. The HSC Safety Forum is supporting a Maternity Quality Improvement Collaborative on "Normalising Birth" across all five HSC Trusts. Dr Robson (creator of the TGCS) has been consulted and has contributed to the initiative. The Department informed us that a decision has been taken to adopt the TGCS as a means of comparing birthing interventions and outcomes.

Part One:
Introduction and Background

Part One:
Introduction and Background

Responsibility for delivery of maternity services falls to a range of HSC sector bodies

1.1 Childbirth is one of the most important events in life. As with all healthcare provision, women should receive the best care possible during their pregnancy and the birth. Women expect that their maternity package delivers quality care tailored to meet their specific clinical, social and emotional needs. The challenge for healthcare professionals is to provide quality maternity services in a safe and supportive environment within existing financial resources.

1.2 In 2012-13 in Northern Ireland, maternity services cost around £109 million. Almost £97 million of this related to expenditure on hospital services – the remaining £12 million related to expenditure on community midwives. Overall, maternity services represent around 2.5 per cent of annual health and social care expenditure[1].

1.3 Maternity services in Northern Ireland are commissioned by the Health and Social Care Board (HSC Board) on behalf of the Department of Health, Social Services and Public Safety (the Department) in conjunction with five Local Commissioning Groups. Responsibility for the management and delivery of maternity services falls to the five non regional Health and Social Care Trusts (HSC Trusts). General Practitioners, community midwives, health visitors and allied health professionals, in providing preconception, antenatal and postnatal care to their pregnant patients, also have an important role in providing maternity care. HSC Trusts currently provide in-patient, outpatient and community-based midwifery services across eight consultant-led units, four stand alongside midwifery-led units (MLUs) and three freestanding, midwife-led units (one in the Belfast HSC Trust and two in the South Eastern HSC Trust)[2].

Each year around 25,000 babies are born in Northern Ireland, largely in consultant-led maternity units

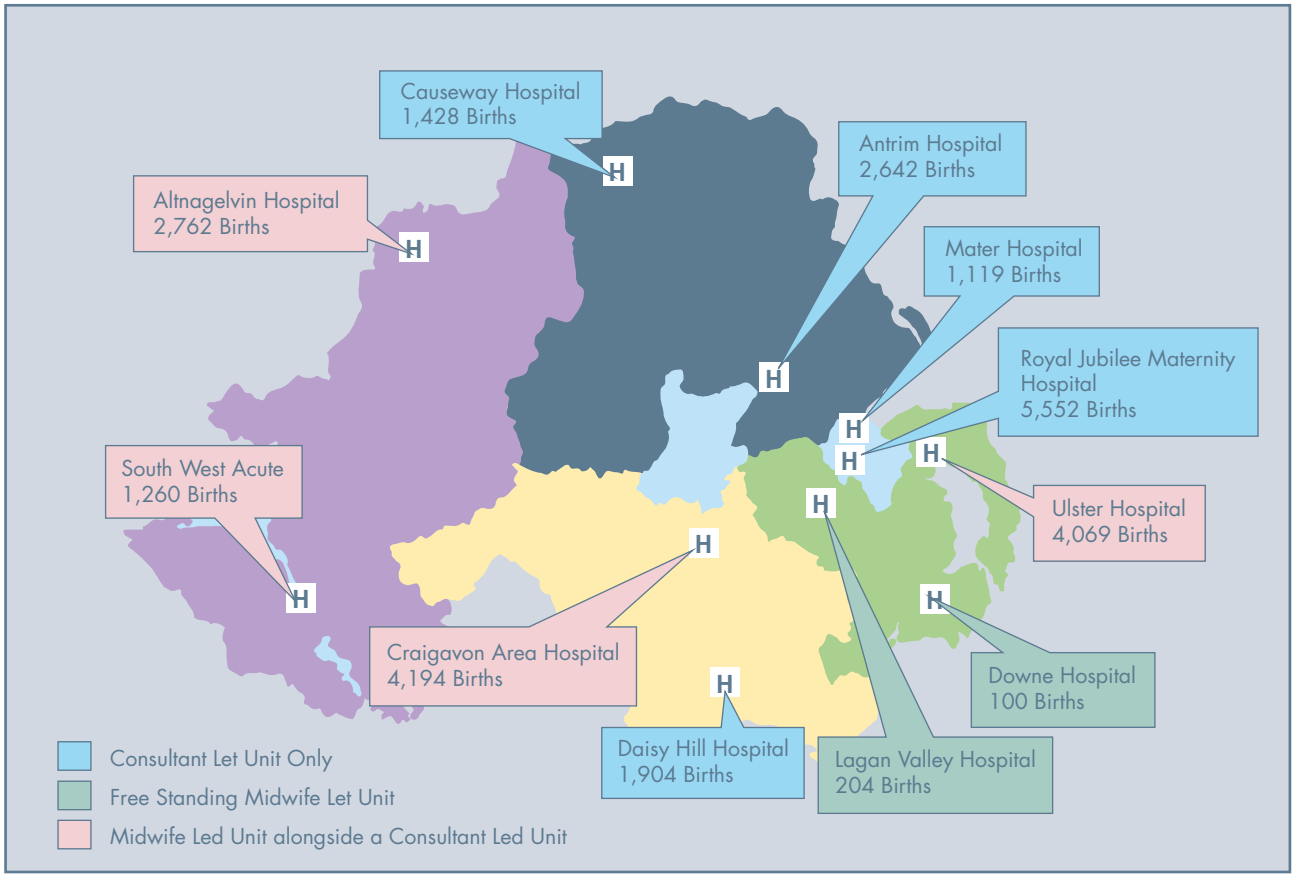
1.4 In 2012, there were around 25,000 registered births[3] in Northern Ireland. Almost all babies were born in consultant-led units (around 22,000) or stand alongside MLUs (around 3,000). Around 300 babies were born in free standing MLUs. Freestanding MLUs were first developed in 2010 to care for women with straightforward pregnancies. Figure 1 shows the number of babies born at individual units across NI in 2012-13.

1 These costs do not include the cost of settling obstetric clinical negligence cases which can be substantial.

2 By the end of April 2013, the status of the Mater Infirmorum Hospital had changed from a consultant-led unit to a free-standing midwifery-led unit (MLU). Freestanding MLUs were first developed in 2010 to care for women with straightforward pregnancies during labour and birth. Midwives take primary professional responsibility for care.

3 Information on births is collated and published by the NI Statistics and Research Agency (NISRA) and the Department's Hospital Information Branch (HIB). Both sources are used during this report. There are variations in the number quoted due to differences in timescales and definitions. For example, the NISRA total births figure refers to the number of babies registered in each calendar year. The figure excludes the number of still-births. Conversely, HIB's figure for total births refers to all births (live and still-births) in a financial year.

Figure 1: Births in Northern Ireland during 2012-13

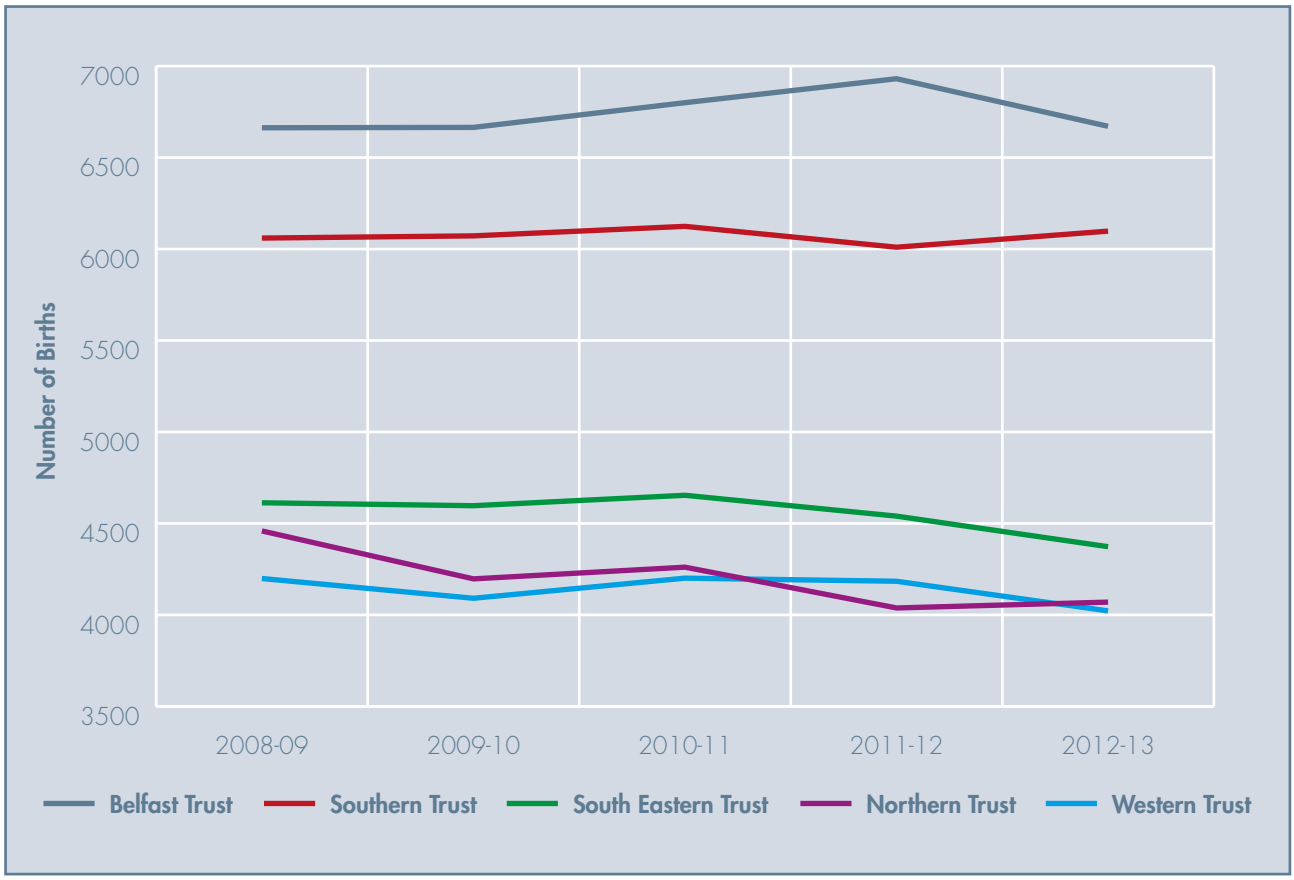


Source: The Department

Part One:
Introduction and Background

1.5 Each year most births occur within the Belfast HSC Trust. In 2012-13, fewest births were recorded within the Western HSC Trust. Figure 2 below shows the number of births within each HSC Trust over the five year period to 31 March 2013.

Figure 2: Births in Northern Ireland HSC Trusts over the period 2008-09 to 2012-13



Source: Northern Ireland Hospital Statistics: Inpatient and Day Case Activity (2008-09 to 2012-13)

The Department's 2012 Maternity Strategy highlighted the need to promote a culture of "normalisation" of pregnancy and birth and to reduce inappropriate variation in intervention rates

1.6 In launching a new Maternity Strategy in 2012[4], the Department identified a need to promote a culture of "normalisation" of pregnancy and birth and reported that:

> *"Northern Ireland has a higher prevalence of interventions, including caesarean sections, when compared to elsewhere in the UK and…*[the Republic of] *Ireland. We need to know why this is the case. The recently launched Maternity Strategy proposes that Trusts benchmark such interventions against comparable maternity units across the UK and …*[the Republic of] *Ireland in order to address the cause of this disparity. Maternity care – regardless of whether it is public or private care, should be of a high standard and make the best possible use of resources …."*[5]

1.7 There is no formal definition of a "normal" birth in Northern Ireland. However, for the purposes of this report, normal pregnancy and birth refers to a vaginal birth performed in the absence of any medical procedure which would require hospital-based care. Hospital-based medical procedures (or interventions) include, among other things:

- inducing labour;
- administering an epidural or spinal anaesthetic;
- using instruments to assist with the birth; or
- performing a caesarean section.

For the purposes of this study, we selected one form of intervention – caesarean section

1.8 Caesarean section is one of a number of interventions which can be used when complications arise during childbirth. While caesarean sections undoubtedly save lives in certain circumstances, there is some concern that, on occasion, caesarean sections are performed in cases where there is no clinical need. Various research studies show that caesarean section rates above a certain limit do not show any additional benefit for the mother or the baby[6]. Conversely, a number of studies have shown an association between low rates of caesarean section and maternal and infant mortality in low income countries[7] where large sectors of the population lack access to basic obstetric care[8].

4 The Department's Maternity Strategy is available at: http://www.dhsspsni.gov.uk/index/maternity-strategy.htm

5 Oral Answer provided to NI Assembly on 11 October 2011 to Oral Question AQO 523/11-15.

6 The Global Numbers and Costs of Additionally Needed and Necessary Caesarean Sections performed per year: Overuse as a Barrier to Universal Coverage, Luz Gibbons, Jose M Belizan, Jeremy A Lauer, Ana P Betrán, Mario Merialdi and Fernando Althabe, World Health Report (2010), Background Paper 30

7 WHO Rates of caesarean section: analysis of global, regional and national estimates Ana P. Betrán, Mario Merialdi, Jeremy A. Lauer, Wang Bing-shun, Jane Thomas, Paul Van Look, Marsden Wagner

8 F. Althabe et al, Caesarean section rates and Maternal and Neonatal Mortality on Low, Medium and High Income Countries, Birth, 2006, 33(4):270-7;C.Ronsman et al, Socioeconomic Differential in Caesarean Rates in Developing Countries, Lancet, 2007, 18 (4);485-6

Part One:
Introduction and Background

1.9 Our review focused on one form of intervention, caesarean section, because it is the most common and significant event and, therefore will always be at the centre of any discussion on labour and delivery. However, the principles and methodology can be applied to identify opportunities for rationalising the use of other interventions.

There is no definitive direction on the optimum rate for caesarean sections

1.10 In 1985, the World Health Organization (WHO) issued a consensus statement suggesting there were unlikely to be any additional health benefits associated with caesarean section rates above 10 to 15 per cent[9]. However, in 2009, WHO moved away from this position and stated that there was no empirical evidence for an optimum percentage and that the best possible rate for caesarean sections is unknown[10]. In 2012, a joint paper by the UK Royal College of Obstetricians and Gynaecologists, the Royal College of Midwives and the National Childbirth Trust pointed out that the NHS Institute concluded that a caesarean section rate of 20 per cent is achievable and sustainable[11]. We note that the Welsh Government expects that caesarean section rates within its Health Boards should be close to 20 per cent. Further, where Health Boards have a caesarean section rate of 25 per cent and above, it expects them to explain their planned actions to reduce the rate through improved practices[12].

9 World Health Organisation (WHO) "Appropriate Technology for Birth" Lancet 1985.

10 World Health Organisation (WHO), 'Monitoring Emergency Obstetric Care: A Handbook' 2009

11 RCOG's "Making sense of commissioning maternity services in England", produced in collaboration with the Royal College of Midwives (RCM) and the National Childbirth Trust, 2012

12 The National Assembly for Wales, Public Accounts Committee, "Maternity Services in Wales" February 2013

1.11 In 2011, the National Institute for Health and Care Excellence (NICE) issued revised guidance on caesarean sections[13]. The new guideline advocates support for women who have fears about giving birth normally. It recommends that, in such cases, women should be provided with full information about the risks and benefits of all birthing methods and offered the opportunity to discuss their concerns with members of the obstetric team or other medical professionals. If their anxiety is not allayed by this support, then they should be offered a planned caesarean section. The actual wording from the NICE guidance is as follows:

NICE Guidance on Maternal request for Caesarean Section

When a woman requests a caesarean section, explore, discuss and record the specific reasons for the request.

If a woman requests a caesarean section when there is no other indication, discuss the overall risks and benefits of caesarean section compared with vaginal birth and record that this discussion has taken place… . Include a discussion with other members of the obstetric team (including the obstetrician, midwife and anaesthetist) if necessary to explore the reasons for the request, and ensure the woman has accurate information.

When a woman requests a caesarean section because she has anxiety about childbirth, offer referral to a healthcare professional with expertise in providing perinatal mental health support to help her address her anxiety in a supportive manner.

Ensure the healthcare professional providing perinatal mental health support has access to the planned place of birth during the antenatal period in order to provide care.

For women requesting a caesarean section, if after discussion and offer of support (including perinatal mental health support for women with anxiety about childbirth), a vaginal birth is still not an acceptable option, offer a planned caesarean section.

An obstetrician unwilling to perform a caesarean section should refer the woman to an obstetrician who will carry out the caesarean section.

1.12 Investigating variations in caesarean section rates within and between HSC Trusts is important from a quality and safety perspective. Such analysis would allow comparison of the extent to which care provided is mother-focused and appropriate. Reducing unnecessary interventions may improve outcomes for the mother and baby and improve efficiency in the face of increasing health care costs.

13 Caesarean Section (Update) Clinical Guidelines, CG132 issued by NICE (The National Institute for Health and Care Excellence) November 2011 (amended August 2012).

Part One:
Introduction and Background

The increase in caesarean section rates worldwide is likely to be linked to changing demographic characteristics and increasing maternal age in childbirth

1.13 The reasons for the global increase in caesarean sections are not entirely clear. Evidence that large numbers of women request caesarean sections in the absence of clinical indications is weak[14]. Research[15] suggests that the four most common clinical reasons for performing a caesarean section have remained relatively unchanged in the past 10 - 15 years. It is likely that changing demographic characteristics, such as rising levels of maternal obesity and increasing maternal age in childbirth, have influenced rates of caesarean section births[16].

1.14 The rise in caesarean sections is sometimes attributed to clinicians' fear of litigation. As our report on *Safety of Service*[17] published in 2012 noted, around 25 per cent of clinical negligence claims are related to obstetrics and gynaecology. Individual clinicians are not financially liable, however, if clinical negligence is proved this could lead to disciplinary action and considerable stress for all individuals involved. A recent report by the Westminster Committee of Public Accounts[18] highlighted the need to address the main causes of maternity clinical negligence claims in order to stop so many claims coming forward.

The Northern Ireland caesarean section rate in 2011-12 was higher than the rate in any other region of the United Kingdom or the Republic of Ireland

1.15 Figure 3 below compares birth rates and caesarean section rates in Northern Ireland in 2011-12 with those elsewhere in the UK. The level of caesarean sections in Northern Ireland (at just over 28 per cent) was higher than any other region in the UK and the Republic of Ireland. The Department told us that analysis by the Public Health Agency and HSC Board has shown that the higher caesarean section rates in NI (compared with other countries, and across units) are largely due to higher elective caesarean section rates.

14 "Caesarean rates still too high" Article by Deirdre Munro, World of Irish Nursing, April 2010. It is important to note that the lack of evidence on the number of maternal requests for interventions may be due to inconsistencies in information recording.

15 The four major clinical determinants of caesarean sections are foetal compromise, failure to progress labour, presence of a caesarean section scar and breech presentation – noted by NICE 2004 Guidance on Caesarean Sections.

16 The National Sentinel Caesarean Section Audit, London Royal College of Obstetrics and Gynaecologists (RCOG) Press 2001

17 The Safety of Services provided by HSC Trusts, NIAO, 23 October 2012

18 House of Commons Committee of Public Accounts "Maternity Services in England" HC776 January 2014

Figure 3: Birth and Caesarean Section Rates in the UK and the Republic of Ireland (2011-12)

Country	Number of Births	Caesarean Section %
England	668,936	25.0
Scotland	57,911	27.8
Wales	32,102	25.7
Northern Ireland	25,703	28.4
UK Average	–	26.7
Republic of Ireland	74,377	28.0

Sources: England – HES Online, Health and Social Care Information Centre;
Scotland – SMRO2, ISD Scotland;
Wales – Statistics Wales, Welsh Government;
Republic of Ireland – Health Research Information Division, ESRI;
Northern Ireland – Hospital Information Branch, DHSSPS

Notes:

1. *Figures shown for Wales refer to live births by method of birth*
2. *There may be differences in data-recording practices in other parts of the UK and the ROI and therefore care is required in comparing NI figures.*
3. *Information relates to 2011-12 because 2012-13 figures from Scotland and Wales were not available at the time of drafting this report.*

Part One:
Introduction and Background

The purpose of this study is to illustrate how measuring and comparing events, using a suitable classification system, can identify variations in service delivery and highlight potential opportunities for improvement

1.16 At a time when there are considerable constraints on healthcare costs, healthcare managers must assess and manage the implications of clinical decisions. In relation to childbirth, the decision on whether to intervene must solely be based on clinical need. Research suggests that the extent of intervention has risen to levels beyond those known to be of medical value to women[19].

1.17 The Northern Ireland Maternity System (the NIMAT system) was designed by clinicians and built in the late 1980s to record individual patient data on all maternity activity. The data was intended to be used to provide information at individual unit level.

1.18 We used the NIMAT system to obtain data on births over the three year period to 2012. We then selected a classification system (the Robson Ten Group Classification System (TGCS)(see paragraph 1.22 below)) and used it to identify trends in caesarean section rates across NI maternity units (see paragraph 2.19). Internationally, the TGCS is being increasingly used by labour and delivery units to report their caesarean section rates and other maternity outcomes. The results are being published either in medical journals or form part of clinical reports[20].

1.19 While the NIMAT system was not originally designed to facilitate comparison of birthing interventions, it has the capacity (if developed) to produce the information required by the TGCS. As it stands, the data and intelligence collected on the NIMAT system is not currently used to its full potential. Better use of data held would enable HSC Trusts and the Department to measure progress against aspirational aims (such as the desire to normalise pregnancy and birth).

19 Betrán AP, Merialdi M, Lauer JA, Bing-Shun W, Thomas J, Van Look P, Wagner M. Rates of caesarean section: analysis of global, regional and national estimates. Paediatr Perinat Epidemiol. 2007; 21 (2):98-113; Althabe F, Sosa C, Belizán JM, Gibbons L, Jacquerioz F, Bergel E. Cesarean section rates and maternal and neonatal mortality in low-, medium-and high income countries: an ecological study. Birth. 2006; 33 (4): 270-7; Belizán JM, Althabe F, Cafferata ML. Health Consequences of the Increasing Caesarean Section Rates. Epidemiology. 2007; 18 (4): 485-6; Villar J, Valladares E, Wojdyla D, Zavaleta N, Shah A, Campodónico L, et al. Caesarean delivery rates and pregnancy outcomes: the 2005 WHO global survey on maternal and perinatal health in Latin America. Lancet 2006; 367 (9525): 1819–29; 7) Barros FC, Victora CG, Barros AJ, Santos IS, Albernaz E, Matijasevich A, et al. The challenge of reducing neonatal mortality in middle income countries: findings from three Brazilian birth cohorts in 1982, 1993, and 2004. Lancet 2005; 365 (9462): 847–54; 8) Hall MH, Bewley S. Maternal mortality and mode of delivery. Lancet, 1999;354 (9180): 776.

20 Kelly S, Sprague A, Fell DB, et al. Examining caesarean section rates in Canada using the Robson classification system. J Obstet Gynaecol Can. 2013;35:206–14; Goonewardene M, Manawadu MH, Priyaranjana DV. Audit: the strategy to reduce the rising cesarean section rates. JSAFOG. 2012;4:5–9; Stavrou EP, Ford JB, Shand AW, et al. Epidemiology and trends for caesarean section births in New South Wales, Australia: a population-based study. BMC Preg Childbirth. 2011;11:8; Scarella A, Chamy V, Sepúlveda M, et al. Medical audit using the Ten Group Classification System and its impact on the cesarean section rate. Eur J Obstet Gynecol Reprod Biol. 2011;154:136–40; Breadahl RO, Pedersen BL, Wilken-Jensen C, et al. Stratified rates of cesarean sections and spontaneous vaginal deliveries. Acta Obstetricia et Gynecologica Scandinavica. 2000;79:227–31; Robson M. National Maternity Hospital Clinical Report; 2010:105–29.

1.20 Our analysis provides an illustration of how a classification system can be used to identify variations in service delivery. On its own, a caesarean section rate is not an indicator of the relative quality of care. Rather, the rate has to be considered in relation to other factors and outcomes associated with it, in order to make valid comparisons: for example, age, height, body mass index, relevant medical conditions, ethnicity, gestational age and condition of the foetus and other case-mix variables. It will be for clinicians and managers within the maternity services and the wider healthcare sector to examine the variations in more detail to determine the reasons for variations where they occur and identify areas that require improvement. HSC Trusts are also likely to find it useful to undertake similar analysis for other interventions, such as the incidence of epidurals or the use of forceps. Appendix 1 sets out various other birthing events and outcomes which could be analysed using the TGCS.

1.21 Regularly identifying and investigating variances in maternity care will highlight the extent to which provision across Northern Ireland is safe, equitable, efficient and effective. We acknowledge that quality is at the centre of birthing care and that the views and concerns of women are integral to the clinical decision-making process. From a value for money perspective, examining the effectiveness of provision will also involve comparing the economic cost of various clinical decisions and childbirth delivery modes to ensure that the most cost effective care is being delivered.

1.22 The classification system we selected was developed by Dr Michael Robson, Consultant Obstetrician and Gynaecologist at the National Maternity Hospital, Dublin, Republic of Ireland. His Ten Group Classification System (TGCS) compares the birthing outcomes of women with similar obstetric characteristics. It is relatively easy to use and difficult to misinterpret. It has been applied in many countries across the world and has been endorsed by the World Health Organisation[21]. Dr Robson assisted us with the interpretation of the results. More detail on the TGCS and our decision to recommend its use in NI is provided at paragraphs 2.7 to 2.11.

21 WHO Global Survey on Maternal and Perinatal Health in Latin America: classifying caesarean sections on the level of caesarean sections in Latin America; World Health Organisation, Classifications for Caesarean Section: A systematic Review, January 2011

Part Two:
Identifying and Applying a Model for Comparing Events

Part Two:
Identifying and Applying a Model for Comparing Events

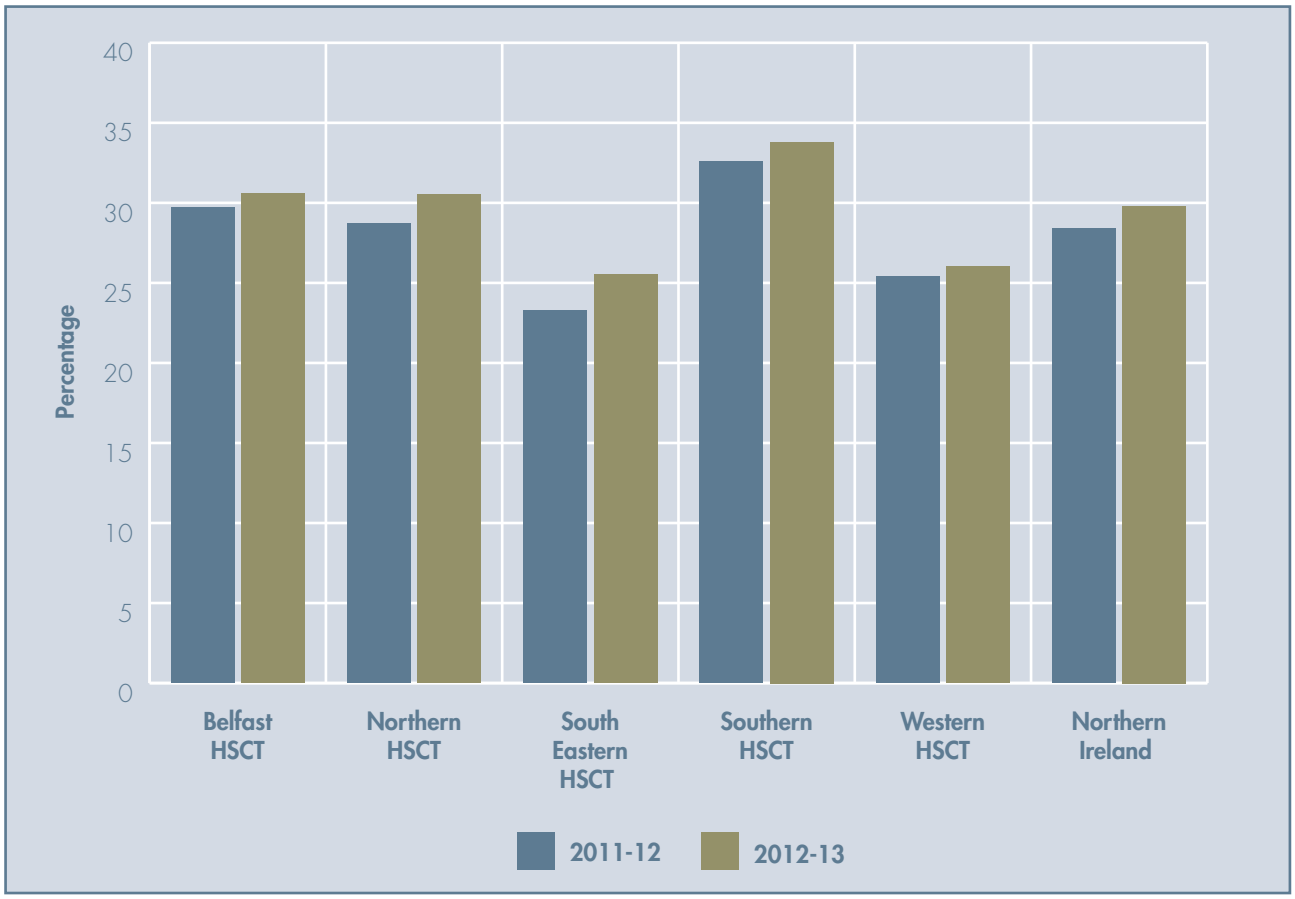
2.1 Information on the total number of births and mode of delivery is collected, validated and published by each of the four UK regions (see Figure 3). In NI, since 2011-12, more detailed information at HSC Trust and maternity unit level is also publicly available. Figure 4 below shows the total number of births in each NI maternity unit within each HSC Trust and shows the percentage of babies delivered by caesarean section in 2012-13.

Figure 4: Incidence of Caesarean Births in 2012-13

	Total Number of Births	Number born by Caesarean Section	Percentage born by Caesarean Section %
Mater Infirmorum	1,119	256	22.9
Royal Jubilee Maternity	5,552	1,788	32.2
Belfast HSC Trust	**6,671**	**2,044**	**30.6**
Antrim Area	2,642	778	29.4
Causeway	1,428	463	32.4
Northern HSC Trust	**4,070**	**1,241**	**30.5**
Downe MLU	100	0	0
Lagan Valley MLU	204	0	0
Ulster Hospital, Belfast	4,069	1,117	27.5
South Eastern HSC Trust	**4,373**	**1,117**	**25.5**
Craigavon Area	4,194	1,382	33.0
Daisy Hill	1,904	682	35.8
Southern HSC Trust	**6,098**	**2,064**	**33.8**
Altnagelvin	2,762	713	25.8
South West Acute	1,260	333	26.4
Western HSC Trust	**4,022**	**1,046**	**26.0**
Total	**25,234**	**7,512**	**29.8**

Source: Hospital Information Branch

Figure 5: Caesarean rates within HSC Trusts in 2011-12 and 2012-13



Note: Information prior to 2011-12 was not collated in a similar format.

Source: The Department

2.2 Figure 5 shows caesarean section rates within each NI HSC Trust in 2011-12 and 2012-13.

2.3 These figures demonstrate that:

- caesarean section rates at the Mater Infirmorum Hospital were the lowest of all hospitals;
- the caesarean section rate at the Mater Infirmorum Hospital was nearly 23 per cent while the rate at the Royal Jubilee Maternity Hospital that year was just over 32 per cent and the rate at Daisy Hill Hospital was almost 36 per cent;

Part Two:
Identifying and Applying a Model for Comparing Events

- 2012-13 caesarean section rates in the Southern HSC Trust were higher than in any other HSC Trust; and

- caesarean section rates were higher in 2012-13 in all HSC Trusts than those in 2011-12.

2.4 These initial observations focus only on the more obvious findings. On their own, the variations revealed in these figures are not an indicator of the quality of care. To gain further insight, clinical managers need to examine the comparative rates in relation to information on other factors such as age, height, body mass index, relevant medical conditions, ethnicity, gestational age and condition of the foetus and other case-mix variables.

2.5 In addition, analysis of these published figures takes no account of the suite of services available at individual sites. For example, the Mater Infirmorum Hospital consultant-led unit only delivers low-risk women because of limited on-site resources. Where a woman presents at the Mater Infirmorum Hospital and is not assessed as low risk, she is immediately transferred to the nearby Royal Jubilee Maternity Hospital. The caesarean section rate at the Mater Infirmorum Hospital would therefore be expected to be low, relative to other NI units.

2.6 The Department's 2012 Maternity Strategy[22] drew attention to higher than average intervention rates in Northern Ireland maternity units compared with the rest of the UK and the Republic of Ireland and to significant unexplained variation in practice between units within Northern Ireland. Identifying and investigating trends and drivers in intervention rates (including caesarean section rates) allows service providers to evaluate and compare the quality of the maternity care they provide.

In 2011, following a review of a range of classification systems, the WHO recommended that, women-based classifications in general, and the TGCS in particular, would be in the best position to fulfil international and local needs in comparing caesarean section rates

2.7 The Robson Ten Group Classification System (TGCS) is one of several caesarean section classification systems. In selecting an appropriate classification system, we considered the results of research undertaken in 2011 by the World Health Organisation (WHO)[23] which identified and compared the advantages and disadvantages of a range of caesarean section classification systems. The review was undertaken by an international panel of experts and examined a total of 27 classification systems as follows:

- 12 "indication-based" systems,

- five systems which focused on the "degree of urgency",

22 Maternity Strategy 2012-18 Objective Number 20.

23 World Health Organisation, Classifications for Caesarean Section: A systematic Review, January 2011

- four systems which were based on the characteristics of women (including the TGCS); and

- six other systems.

2.8 The TGCS was the only classification system to be awarded a maximum score (of 14) by the panel. The panel concluded that the TGCS was easy to understand, clear, mutually exclusive, totally inclusive, reproducible, adaptable and allows prospective (as well as retrospective) identification of categories. Overall the research suggested that, among all the classification systems considered, women-based classifications in general, and the TGCS in particular, would be in the best position to fulfil international and local needs.

2.9 Our decision to recommend use of the TGCS was also supported by our knowledge that the methodology has been used in many countries across the world and, therefore, international comparisons are possible[24]. Our analysis of NI births, using the TGCS, is provided at Appendix 2.

The Robson Ten Group Classification System provides a means of comparing caesarean section rates in various locations

2.10 The TGCS (Figure 6) allocates women (rather than births) to one of 10 all-inclusive, mutually-exclusive groups, according to the characteristics of her pregnancy and labour. Allocation to an individual group is based on:

- a woman's obstetric history (that is, whether or not she is expecting her first baby);

- the category of her pregnancy (that is, whether her pregnancy is single, multiple, cephalic or breech);

- the presence of a uterine scar (that is, whether she gave birth by caesarean section in the past);

- the course of labour (whether, in this pregnancy, she spontaneously went into labour or had a caesarean section before labour); and

- the gestational age (the week of the pregnancy).

2.11 Figure 6 provides more detail on each of the 10 groups. The detail is replicated at Appendix 3 in the form of a pull-out sheet. Guidance on interpreting the results of the TGCS, prepared by Dr Robson on the basis of his extensive obstetric experience, is provided at Appendix 4.

24 See FP McCarty et al, A new way of looking at Caesarean section births, Aust NZ J Obstet Gynaecol, 2007, 47: 316-320; CE Denk et al, Surveillance of caesarean section deliveries New Jersey, 1999-2004, Birth, 2006, 33: 203-209; S.Howell et al, Trends and determinants of Caesarean sections births in Queensland 1997-2006, Aust NZ J Obstet Gynaecol, 2009, 49 (6): 606-611; DJ Brennan et al, Comparative analysis of international Caesarean delivery rates using 10 Group-Classification identifies significant variation in spontaneous labor, Int J Gynaecol Obstet, 2006, 301-308; M Florica et al, Indications associated with increased Caesarean sections in a Swedish hospital, Int J Gynaecol Obstet, 2006, 92; 181-185; t Kolas et al, Indications for Caesarean deliveries in Norway, Am J Obstet Gynaecol 2003, 188: 864-870.

Part Two:
Identifying and Applying a Model for Comparing Events

Figure 6: TGCS Group Definitions

Group	TGCS Group Descriptor	Definition
1	Nulliparous, single cephalic, 37 or more weeks, in spontaneous labour	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • go into labour unassisted.
2		
2a	Nulliparous, single cephalic, 37 or more weeks, induced	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • are assisted into labour.
2b	Nulliparous, single cephalic, 37 or more weeks, not in labour	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • receive a caesarean without going into labour.
3	Multiparous (excluding previous caesarean), single cephalic, 37 or more weeks, in spontaneous labour	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • go into labour unassisted.

Group	TGCS Group Descriptor	Definition
4		
4a	Multiparous (excluding previous caesarean), single cephalic, 37 or more weeks, induced	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • are assisted into labour.
4b	Multiparous (excluding previous caesarean), single cephalic, 37 or more weeks, caesarean before labour	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • receive a caesarean without going into labour.
5	Previous caesarean, single vertex, 37 or more weeks	All women who: • have previously had a caesarean; • are expecting 1 baby; and • have reached full-term in pregnancy.
6	All nulliparous breech	All women who: • have not previously given birth; and • have a baby lying in the breech position.
7	All multiparous breech (including previous caesarean)	All women who: • have previously given birth (including those who have had a caesarean); and • have a baby lying in the breech position.
8	All multiple pregnancies (including previous caesarean)	All women who are expecting more than 1 baby.
9	All abnormal lies (including previous caesarean)	All women who have a baby lying in the transverse or oblique birthing position
10	All single cephalic, less than or equal to 36 weeks (including previous caesarean)	All women who: • are expecting 1 baby; and • give birth before reaching full-term.

Part Two:
Identifying and Applying a Model for Comparing Events

We applied the TGCS methodology to the obstetric population in Northern Ireland

2.12 We used the NIMAT system to source obstetric information on those women who gave birth in the 2010 to 2012 calendar years[25]. The NIMAT system is a database which is used by HSC Trusts to record details of a woman's current pregnancy together with information on her past medical, social and obstetric history. The system was not originally designed to facilitate comparison of birthing interventions or outcomes and we therefore had difficulty extracting relevant information.

The NIMAT system is not currently operating at an optimal level but steps are being taken to address this

2.13 The Maternity Strategy for Northern Ireland highlighted the need to improve the NIMAT system. The Department told us that, since the Strategy was launched, the NIMAT system:

- is available in all maternity units and in many community settings where midwives provide clinics;
- has been converted to a web-based service which allows more detail to be recorded; and
- is easier to use to input data and create reports.

2.14 When we attempted to use the information held on the NIMAT system to allocate women across the TGCS, we encountered a number of difficulties. For example:

- we were unable to identify those women who had a normal birth but had a caesarean section in a previous pregnancy (Vaginal Birth After Caesarean (VBAC)). As a result, we could not accurately populate Group 5 of the TGCS. The women included in our Group 5, all delivered by caesarean section for at least the second time. Women who delivered normally after having a previous caesarean section, could not be identified; and
- we were unable to accurately populate Group 9. While HSC Trusts currently record all instances where the baby is not lying in a conventional birthing position, the exact lie is not specified. The TGCS distinguishes between babies lying in the breech position (Groups 6 and 7) and those with a transverse or oblique lie (Group 9).

The NIMAT system is capable of generating information to inform decision making but steps must be taken to ensure that the information held is complete and accurate

2.15 The Department, HSC Board, Public Health Agency and the HSC Trusts are

25 In line with other countries, we have extracted data on a calendar (rather than financial) year basis. This makes international comparison more straightforward.

putting considerable effort into improving the NIMAT system. The intention is to simplify and standardise input to the system, improve the accuracy of the information held and enhance the report-generating facilities so that the data held is capable of informing decision-making. The Department told us that work has already been done to the NIMAT system to ensure that women can be classified using the TGCS.

2.16 We recognise the work currently being undertaken to improve the NIMAT system. It is important that the current exercise is completed as soon as possible. The improvement exercise should include a validation programme to provide assurance on the integrity of the data held. The Department has assured us that investment in the NIMAT system is a priority.

2.17 If decision making in future years is to be supported by information generated from the NIMAT system, it is essential that the system is capable of producing accurate, comprehensive and relevant information in a format which is compatible with a classification system like TGCS. For example, if further comparisons are to be undertaken using the TGCS then the NIMAT system will need to be programmed to produce the following:

A. Comprehensive previous obstetric history – the system should be capable of identifying those women who deliver normally but have a caesarean section scar from a previous pregnancy. Where a woman has had more than one caesarean section, the NIMAT system should hold information on the total number of caesareans performed. In cases where a woman has suffered a miscarriage in a previous pregnancy, the week in which the miscarriage occurred should be recorded.

B. Category of pregnancy – for each pregnancy, the NIMAT system should hold details on the position of the baby. Presentations should be identified as either:

   a. single cephalic (head facing downwards in traditional birthing position);
   b. single breech;
   c. multiple pregnancy; or
   d. single transverse or oblique lie.

   The NIMAT system should continue to provide information on the course of labour. For each birth, the NIMAT system currently records whether the woman went into labour spontaneously, whether her labour was induced or whether she had a pre-labour caesarean section.

Part Two:
Identifying and Applying a Model for Comparing Events

Applying the TGCS to information generated from the NIMAT system reveals several trends over the past three years

2.18 Despite the current limitations with the NIMAT system, we consider that our disaggregation of the available information provides a sound basis for an initial exploratory analysis of the patterns of interventions within and across Trust maternity units/centres. Paragraph 1.9 and paragraph 1.19 explains that, while this report examines the incidence of one intervention, caesarean section, Trusts will wish to use the methodology to compare other birthing interventions and outcomes. A list of birthing events which could be analysed in greater detail using the TGCS is provided at Appendix 1.

2.19 We allocated all women who gave birth in 2012 (around 25,000 women) to one, and only one, of the 10 TGCS groups based on their obstetric characteristics. Figure 7 shows the size of the individual group as a percentage of the obstetric population. Presenting the data in this way is useful for verifying the accuracy of the information since Dr Robson has set out expected group sizes based on his extensive obstetric experience (see Appendix 4). For example:

- around 35-40 per cent of women who give birth each year are expected to be allocated to Group 1 or 2. Figure 7 shows the overall size of these two groups as 34 per cent. The proportion of women allocated to Group 1 and 2 is consistently close to the expected level in all NI units. This provides some assurances over the accuracy of the allocations to these groups;

- Dr Robson expects that the total number of women in Group 9 should be between 0.2 per cent and 0.6 per cent of the total. Figure 7 shows that in all NI units the size of Group 9 is greater than expected. While this confirms that there are problems with the allocation of women to specific groups, it is important to note that this group is small in terms of the overall population; and

- Dr Robson expects that Groups 3 and 4 should contain 30-40 per cent of all women. Our figures show a higher proportion of women in these groups. This reflects the fact that we were unable to identify women who gave birth normally after having a caesarean section during a previous pregnancy. As a result, we know that the proportion of women in Group 3 and/or 4 has been overstated while the proportion of women in Group 5 has been understated.

Figure 7: Percentage of women in each of the TGCS groups within individual hospitals in 2012

TGCS Group	NI %	Royal Jubilee %	Mater Infirmorum %	Craigavon Area %	Daisy Hill %	Antrim Area %	Causeway %	Ulster %	Altnagelvin %	SWAH %
1	**19**	18	22	18	19	19	19	22	18	18
2	**15**	17	13	15	11	16	15	19	15	13
2a	**13**	15	12	13	10	14	13	16	14	11
2b	**2**	2	1	2	1	1	2	2	1	2
3	**28**	24	38	27	33	28	30	26	29	33
4	**16**	18	13	14	14	17	17	16	17	17
4a	**14**	14	12	13	12	15	15	14	15	15
4b	**2**	4	1	2	2	2	3	2	2	2
5	**9**	10	7	10	11	8	9	7	10	8
6	**2**	2	1	2	2	2	2	2	2	2
7	**2**	2	1	2	1	2	2	1	2	2
8	**2**	2	1	2	2	1	1	1	2	2
9	**2**	1	1	4	2	2	2	2	1	1
10	**5**	6	3	6	5	5	3	4	4	4
	100	100	100	100	100	100	100	100	100	100

Source: NIMATS, Appendix 2

Part Two:
Identifying and Applying a Model for Comparing Events

2.20 For each of the ten groups we then calculated the caesarean section rate for each maternity unit (Figure 8) and the relative contribution of each group to the total caesarean section rate (Figure 9). Our analysis showed that caesarean section rates varied considerably among maternity units overall and within the risk-based groups. Figure 8 sets out the caesarean section rate in each TGCS group. Dr Robson has set out expected rates based on his extensive obstetric experience (see Appendix 4). Our analysis identified:

- the caesarean section rate in Group 1 is expected to be under 10 per cent. Figure 8 shows that while many NI hospitals are achieving around this rate, two hospitals have significantly higher rates. The data indicates that Group 1 women are more likely to have a caesarean section if they are admitted to Daisy Hill Hospital and Causeway Hospital;

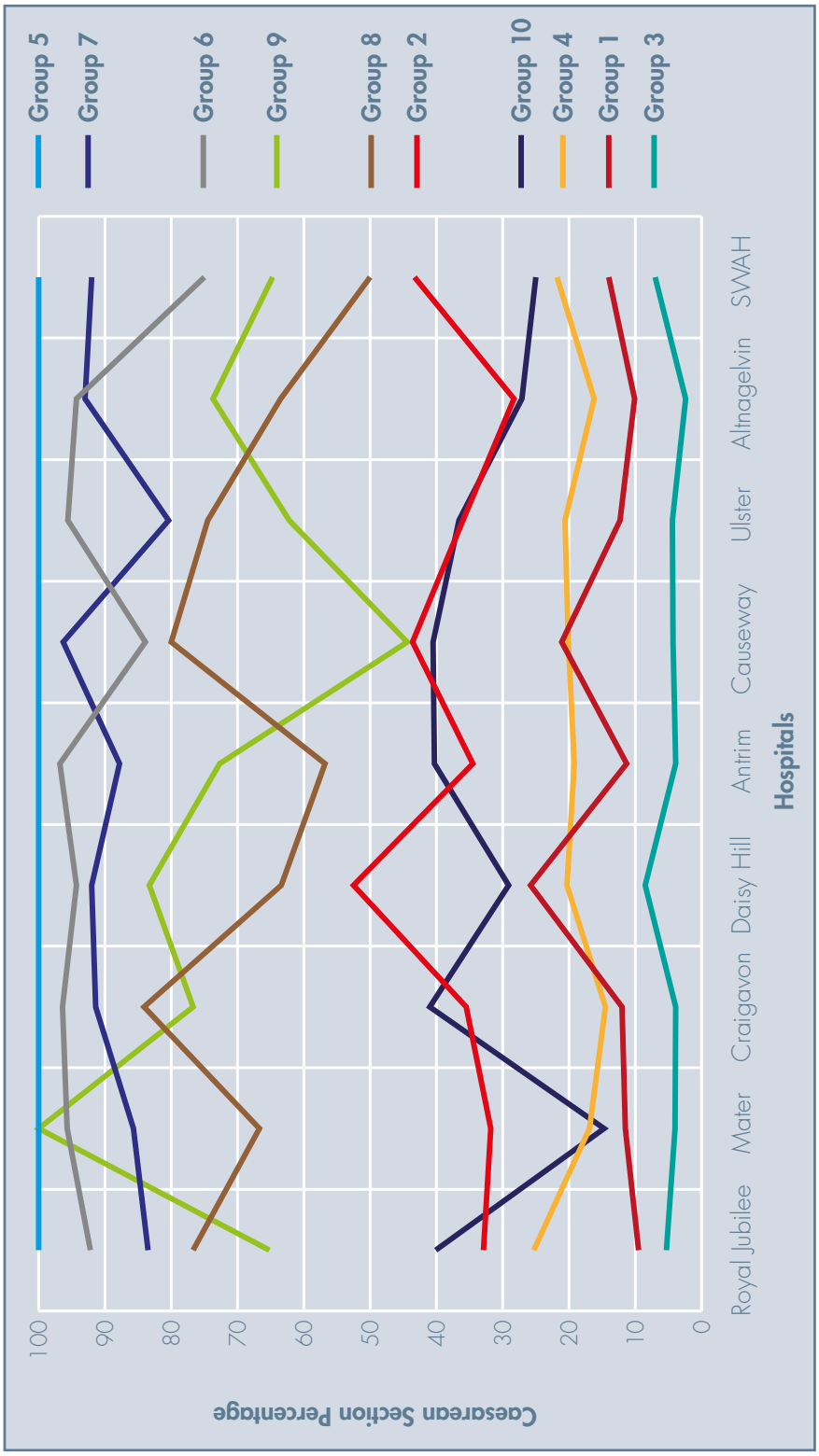
- the caesarean section rate in Group 2 is expected to be between 25 to 30 per cent. The rate should not exceed 35 per cent. Again Figure 8 (and Appendix 2) shows that rates in many units in NI are within these limits. However, Group 2 women are more likely to have a caesarean section if they are admitted to Daisy Hill Hospital, Causeway Hospital or the South West Acute Hospital;

- the caesarean section rate in Group 4 should be less than 20 per cent. Dr Robson considers that a rate in excess of 20 per cent indicates a high pre-labour caesarean section rate. Figure 8 shows that the Royal Jubilee Maternity Hospital and South West Acute Hospital both had caesarean section rates in excess of 20 per cent in Group 4;

- Dr Robson has concluded that a caesarean section rate in Group 10 of 15-20 per cent indicates a high pre-term labour rate. Also a rate in excess of 40 per cent indicates a high pre-labour caesarean section rate. Figure 8 shows that the rate in a number of NI units in 2012 exceeds 40 per cent but it is important to note that the number of women in this group is small; and

- if the data is accurate, the caesarean section rate in Group 9 will always be 100 per cent. Figure 8 shows that in NI, no unit (other than the Mater Infirmorum), had a caesarean section rate of 100 per cent in 2012. This confirms that a number of women are incorrectly included in Group 9.

Figure 8: Caesarean section rate within each TGCS Group at each hospital during 2012



Source: NIMATS, Appendix 2

Part Two:
Identifying and Applying a Model for Comparing Events

2.21 Figure 9 shows the absolute contribution of each of the ten groups to the overall caesarean section rate in each unit in NI during 2012. Dr Robson anticipates that this information is useful in identifying the significance of each obstetric group to the overall caesarean section rate (Appendix 4). For example:

- Group 5 made the largest contribution to the overall caesarean section rate, at around 9 per cent of all deliveries. Group 5 contains women who previously delivered by caesarean section. Over time, the population of Group 5 can be reduced by decreasing the number of caesarean sections performed on women in Groups 1 and 2; and
- In 2012, in the Ulster Hospital, women who had previously given birth by caesarean section (Group 5) make a lower contribution to the overall caesarean section rate than in other units. This may indicate that the caesarean section rates for first-time mothers in that unit was lower than in other units in previous years or it may highlight that this unit has more normal births in women who previously delivered by caesarean section.

Figure 9: Absolute contribution of individual groups to overall caesarean section rate during 2012

TGCS Group	NI %	Royal Jubilee %	Mater Infirmorum %	Craigavon Area %	Daisy Hill %	Antrim Area %	Causeway %	Ulster %	Altnagelvin %	SWAH %
1	**2.5**	1.7	2.5	2.2	4.9	2.1	4.0	2.7	1.8	2.5
2	**5.5**	5.5	4.1	5.2	5.9	5.4	6.7	6.7	4.2	5.4
2a	**3.8**	3.7	3.3	3.2	4.5	4.1	4.5	4.5	3.2	3.8
2b	**1.7**	1.8	0.8	2.1	1.4	1.3	2.2	2.2	1.0	1.7
3	**1.3**	1.3	1.5	1.0	2.8	1.1	1.3	1.2	0.7	2.3
4	**3.2**	4.5	2.2	2.1	2.8	3.3	3.5	3.3	2.8	3.7
4a	**0.8**	0.7	1.0	0.4	0.9	1.0	0.9	1.0	0.9	1.4
4b	**2.4**	3.8	1.2	1.7	1.8	2.3	2.6	2.3	1.8	2.3
5	**9.2**	10.1	6.9	10.5	11.0	8.6	9.2	6.8	10.1	7.6
6	**1.8**	1.7	1.9	1.9	1.7	2.3	1.8	1.6	1.8	1.3
7	**1.6**	1.9	1.0	1.8	1.2	1.6	1.8	1.1	1.4	1.9
8	**1.1**	1.4	0.3	1.4	1.4	0.8	0.6	0.9	1.2	1.0
9	**1.3**	0.5	0.7	2.7	2.1	1.2	0.9	1.4	1.0	0.9
10	**1.8**	2.4	0.4	2.5	1.3	2.1	1.2	1.6	1.1	1.1
	29.3	31.1	21.6	31.4	35.0	28.5	30.9	27.1	26.1	27.7

Source: NIMATS, Appendix 2

Part Two:
Identifying and Applying a Model for Comparing Events

2.22 Regularly analysing obstetric information using the TGCS and investigating variations will be useful to HSC Trusts not only for verifying the accuracy of the data they hold and establishing the health characteristics of the obstetric population but, more importantly, for highlighting variations in clinical practice. Producing data that informs clinicians in this way can be a major driving force in reducing variation through the identification of best evidence-based practices which should also take account of birth outcomes.

According to Departmental cost data, caesarean section deliveries typically cost more than those births undertaken without intervention

2.23 Research studies undertaken in the United Kingdom and internationally show that the cost of caesarean sections to the healthcare system is typically greater than the cost of normal deliveries and that reducing caesarean section rates (by promoting normal birth) is achievable without any adverse health outcomes[26]. The Department provided us with the following information on the 2011-12 comparative cost of deliveries in local maternity units:

Normal Birth:	£1,933
Assisted Birth:	£2,780
Caesarean Birth:	£3,724

2.24 As with the difficulties identified in drawing conclusions about quality purely on the basis of variations in caesarean section rates, we acknowledge that it is equally challenging to compare the costs of different modes of child birth delivery. However, in the current financial climate, it is also essential that clinical managers in the HSC Trusts understand and manage the comparative cost implications of different modes of delivery in order to ensure that resources are being used as equitably and cost effectively as possible. Possession of such information would allow HSC Trusts to verify that allocated resources are based on clinical decisions. The TGCS has been structured so that it can also provide an assessment of the overall cost structure of the entire process of childbirth (antenatal care, delivery and post natal care) for all modes of delivery. The use of an activity-based childbirth classification system like TGCS to cost resources used in the maternity sector would ensure that childbirth can be compared both clinically and economically using detailed information on the resources used by individual women.

2.25 Many systems exist for comparing birthing interventions and outcomes using detailed obstetric information. We have demonstrated that one of these systems, the TGCS, can be used to compare childbirth outcomes both clinically and economically, using detailed information on the resources used by individual women. In order to assist in the more effective management of interventions/ outcomes, we recommend that HSC Trusts implement such a classification system and that it is regularly used to compare the activity and costs of similar obstetric populations across local maternity units and with other internationally available data so that the widest possible range of good practice can be identified and adopted.

2.26 The Department informed us that a decision has been taken to adopt the TGCS and that it is now being used by HSC Trusts to compare birthing interventions and outcomes.

Appendices:

Appendix 1: (see paragraph 1.20 and 2.18)

Other birthing events (recorded on the NIMAT system) which could be analysed in greater detail using the Ten Group Classification System (TGCS)

1. Artificial Rupturing of Membranes – ARM – an intervention in which the amniotic sac of water surrounding the baby is punctured by midwives and doctors to release the fluid inside. It is performed either to accelerate or induce labour.

2. Prostaglandin – vaginal pessaries or a gel inserted to replicate the naturally-occurring hormone prostaglandin E2 which induces labour.

3. Oxytocin – a synthetic version of the naturally-occurring oxytocin hormone administered where labour has not started naturally or where the labour is considered too weak for the baby to be pushed out.

4. Epidural – an anaesthetic administered by injection to the lower back used to relieve pain.

5. Electronic Foetal Monitoring – an ultrasound device that records the baby's heart beat and the relative strength of a contraction.

6. Duration of Labour – the length of the physiological process during which the baby, membranes, umbilical cord and placenta leave the uterus.

7. Foetal Blood Sample – a sample of blood is taken from the baby's scalp to identify any foetal distress. From the results clinicians can identify whether the baby is suffering distress.

8. Vaginal Operative Birth – the use of forceps or a vacuum device to assist the mother with the birth.

9. APGAR <7 at 5 minutes – a comparative index used to establish the health of a newborn baby immediately after birth. In healthy babies, the score should exceed 7 within 5 minutes.

10. Cord pH<7.0 – a sample of blood is collected from the umbilical cord and tested after the baby is born.

11. Caesarean section at full dilation.

12. Admitted to Neonatal Unit – incidence of babies requiring assistance in a special unit.

13. Episiotomy – a surgical incision made in the area between the vagina and anus to expand the opening of the vagina to prevent tearing during the birth.

14. Third/Fourth Degree Tear – an extensive tear extending from the vaginal wall and perineum to the anal sphincter, anal canal and rectum.

15. Blood Transfusion (post - partum haemorrhage) – cases where the mother suffers significant blood loss.

16. Perinatal Mortality Rate (intrapartum/still birth/neonatal) – death of a foetus or baby.

17. Hysterectomy - a surgical procedure which removes a woman's womb (uterus).

Appendix 2

(See Paragraph 2.9)

NI 2012 includes Western Trust				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	608/4,710	19.0	12.9	2.5
2	1,373/3,849	15.5	35.7	5.5
2a	*948/3,424*	*13.8*	*27.7*	*3.8*
2b	*425/425*	*1.7*	*100.0*	*1.7*
3	328/6,971	28.1	4.7	1.3
4	800/3,996	16.1	20.0	3.2
4a	*208/3,404*	*13.7*	*6.1*	*0.8*
4b	*592/592*	*2.4*	*100.0*	*2.4*
5	2,278/2,278	9.2	100.0	9.2
6	446/478	1.9	93.3	1.8
7	392/447	1.8	87.7	1.6
8	276/389	1.6	71.0	1.1
9	329/464	1.9	70.9	1.3
10	446/1,224	4.9	36.4	1.8
Total	**7,276/24,806**	**100.0**		**29.3**

Source: NIMAT system

Appendix 2 continued

NI 2011 excludes Western Trust				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	555/4,210	20.4	13.2	2.7
2	1,134/3,187	15.4	35.6	5.5
2a	*777/2,830*	*13.7*	*27.5*	*3.8*
2b	*357/357*	*1.7*	*100.0*	*1.7*
3	247/5,832	28.2	4.2	1.2
4	567/3,014	14.6	18.8	2.7
4a	*152/2,599*	*12.6*	*5.8*	*0.7*
4b	*415/415*	*2.0*	*100.0*	*2.0*
5	1,944/1,944	9.4	100.0	9.4
6	324/349	1.7	92.8	1.6
7	324/349	1.7	92.8	1.6
8	244/342	1.7	71.3	1.2
9	277/379	1.8	73.1	1.3
10	401/1,049	5.1	38.2	1.9
Total	**6,017/20,655**	**100.0**		**29.1**

Source: NIMAT system

Appendix 2 continued

NI 2010 excludes Western Trust				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	619/4,182	20.6	14.8	3.1
2	1,199/3,050	15.0	39.3	5.9
2a	*801/2,652*	*13.1*	*30.2*	*3.9*
2b	*398/398*	*2.0*	*100.0*	*2.0*
3	268/5,818	28.7	4.6	1.3
4	563/2,954	14.6	19.1	2.8
4a	*168/2,559*	*12.6*	*6.6*	*0.8*
4b	*395/395*	*1.9*	*100.0*	*1.9*
5	1,886/1,886	9.3	100.0	9.3
6	352/374	1.8	94.1	1.7
7	303/325	1.6	93.2	1.5
8	234/318	1.6	73.6	1.2
9	266/360	1.8	73.9	1.3
10	444/1,020	5.0	43.5	2.2
Total	**6,134/20,287**	**100.0**		**30.2**

Source: NIMAT system

Appendix 2A

Royal Jubilee Hospital 2012				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	94/989	18.0	9.5	1.7
2	304/923	16.8	32.9	5.5
2a	*204/823*	*15.0*	*24.8*	*3.7*
2b	*100/100*	*1.8*	*100.0*	*1.8*
3	72/1,348	24.6	5.3	1.3
4	245/967	17.6	25.3	4.5
4a	*38/760*	*13.9*	*5.0*	*0.7*
4b	*207/207*	*3.8*	*100.0*	*3.8*
5	552/552	10.1	100.0	10.1
6	94/102	1.9	92.2	1.7
7	106/127	2.3	83.5	1.9
8	79/103	1.9	76.7	1.4
9	30/46	0.8	65.2	0.5
10	130/324	5.9	40.1	2.4
Total	**1,706/5,481**	**100.0**		**31.1**

Source: NIMAT system

Appendix 2A continued

Royal Jubilee Hospital 2011				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	133/1,038	19.0	12.8	2.4
2	346/968	17.8	35.7	6.3
2a	*223/845*	*15.5*	*26.4*	*4.1*
2b	*123/123*	*2.3*	*100.0*	*2.3*
3	46/1,343	24.6	3.4	0.8
4	165/823	15.1	20.0	3.0
4a	*40/698*	*12.8*	*5.7*	*0.7*
4b	*125/125*	*2.3*	*100.0*	*2.3*
5	561/561	10.3	100.0	10.3
6	97/107	2.0	90.7	1.8
7	80/87	1.6	91.7	1.5
8	86/122	2.2	70.5	1.6
9	46/61	1.1	75.4	0.8
10	141/340	6.2	41.5	2.6
Total	**1,701/5,450**	**100.0**		**31.2**

Source: NIMAT system

Appendix 2A continued

Royal Jubilee Hospital 2010				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	183/1,085	20.0	16.9	3.4
2	379/916	16.9	41.4	7.0
2a	*250/787*	*14.5*	*31.8*	*4.6*
2b	*129/129*	*2.4*	*100.0*	*2.4*
3	53/1,315	24.3	4.0	1.0
4	159/787	14.5	20.2	2.9
4a	*49/677*	*12.5*	*7.2*	*0.9*
4b	*110/110*	*2.0*	*100.0*	*2.0*
5	623/623	11.5	100.0	11.5
6	101/110	2.0	91.8	1.9
7	83/89	1.6	93.3	1.5
8	87/109	2.0	79.8	1.6
9	43/60	1.1	71.7	0.8
10	170/326	6.0	52.1	3.1
Total	**1,881/5,420**	**100.0**		**34.7**

Source: NIMAT system

Appendix 2B

Mater 2012				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	30/260	22.0	11.5	2.5
2	49/154	13.0	31.8	4.1
2a	*39/144*	*12.2*	*27.1*	*3.3*
2b	*10/10*	*0.8*	*100.0*	*0.8*
3	18/448	37.9	4.0	1.5
4	26/154	13.0	16.9	2.2
4a	*12/140*	*11.8*	*8.6*	*1.0*
4b	*14/14*	*1.2*	*100.0*	*1.2*
5	81/81	6.9	100.0	6.9
6	22/23	1.9	95.7	1.9
7	12/14	1.2	85.7	1.0
8	4/6	0.5	66.7	0.3
9	8/8	0.7	100.0	0.7
10	5/34	2.9	14.7	0.4
Total	**255/1,182**	**100.0**		**21.6**

Source: NIMAT system

Appendix 2B continued

Mater 2011				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	30/288	23.9	10.4	2.5
2	54/177	14.7	30.5	4.5
2a	*48/171*	*14.2*	*28.1*	*4.0*
2b	*6/6*	*0.5*	*100.0*	*0.5*
3	13/360	29.9	3.6	1.1
4	24/177	14.7	13.6	2.0
4a	*8/161*	*13.4*	*5.0*	*0.7*
4b	*16/16*	*1.3*	*100.0*	*1.3*
5	101/101	8.4	100.0	8.4
6	13/14	1.2	92.9	1.1
7	19/23	1.9	82.6	1.6
8	7/13	1.1	53.8	0.6
9	12/15	1.2	80.0	1.0
10	6/37	3.1	16.2	0.5
Total	**279/1,205**	**100.0**		**23.2**

Source: NIMAT system

Appendix 2B continued

Mater 2010				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	35/280	23.4	12.5	2.9
2	66/196	16.3	33.7	5.5
2a	*54/184*	*15.3*	*29.3*	*4.5*
2b	*12/12*	*1.0*	*100.0*	*1.0*
3	23/398	33.2	5.8	1.9
4	25/168	14.0	14.9	2.1
4a	*11/154*	*12.8*	*7.1*	*0.9*
4b	*14/14*	*1.2*	*100.0*	*1.2*
5	82/82	6.8	100.0	6.8
6	20/20	1.7	100.0	1.7
7	15/17	1.4	88.2	1.3
8	2/4	0.3	50.0	0.2
9	5/9	0.8	55.6	0.4
10	5/25	2.1	20.0	0.4
Total	**278/1,199**	**100.0**		**23.2**

Source: NIMAT system

Appendix 2C

Craigavon Hospital 2012				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	89/740	18.0	12.0	2.2
2	215/606	14.7	35.5	5.2
2a	*130/521*	*12.7*	*25.0*	*3.2*
2b	*85/85*	*2.1*	*100.0*	*2.1*
3	43/1,115	27.1	3.9	1.0
4	86/594	14.4	14.5	2.1
4a	*18/526*	*12.8*	*3.4*	*0.4*
4b	*68/68*	*1.7*	*100.0*	*1.7*
5	432/432	10.5	100.0	10.5
6	80/83	2.0	96.4	1.9
7	74/81	2.0	91.4	1.8
8	58/69	1.7	84.1	1.4
9	112/146	3.5	76.7	2.7
10	103/251	6.1	41.0	2.5
Total	**1,292/4,117**	**100.0**		**31.4**

Source: NIMAT system

Appendix 2C continued

Craigavon Hospital 2011				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	90/770	19.6	11.7	2.3
2	217/566	14.4	38.3	5.5
2a	*145/494*	*12.6*	*29.4*	*3.7*
2b	*72/72*	*1.8*	*100.0*	*1.8*
3	44/1,105	28.1	4.0	1.1
4	108/544	13.8	19.9	2.7
4a	*21/457*	*11.6*	*4.6*	*0.5*
4b	*87/87*	*2.2*	*100.0*	*2.2*
5	413/413	10.5	100.0	10.5
6	66/71	1.8	93.0	1.7
7	64/71	1.8	90.1	1.6
8	52/66	1.7	78.8	1.3
9	85/96	2.4	88.5	2.2
10	104/229	5.8	45.4	2.6
Total	**1,243/3,931**	**100.0**		**31.6**

Source: NIMAT system

Appendix 2C continued

Craigavon Hospital 2010				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	87/729	18.7	11.9	2.2
2	225/566	14.5	39.8	5.8
2a	*135/476*	*12.2*	*28.4*	*3.5*
2b	*90/90*	*2.3*	*100.0*	*2.3*
3	45/1,110	28.5	4.1	1.2
4	138/563	14.4	24.5	3.5
4a	*33/458*	*11.8*	*7.2*	*0.8*
4b	*105/105*	*2.7*	*100.0*	*2.7*
5	395/395	10.1	100.0	10.1
6	68/72	1.8	94.4	1.7
7	55/57	1.5	96.5	1.4
8	43/61	1.6	70.5	1.1
9	85/106	2.7	80.2	2.2
10	126/238	6.1	52.9	3.2
Total	**1,267/3,897**	**100.0**		**32.5**

Source: NIMAT system

Appendix 2D

Daisy Hill 2012				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	95/368	19.1	25.8	4.9
2	114/217	11.3	52.5	5.9
2a	*87/190*	*9.9*	*45.8*	*4.5*
2b	*27/27*	*1.4*	*100.0*	*1.4*
3	54/632	32.8	8.5	2.8
4	53/261	13.6	20.3	2.8
4a	*18/226*	*11.7*	*8.0*	*0.9*
4b	*35/35*	*1.8*	*100.0*	*1.8*
5	211/211	11.0	100.0	11.0
6	33/35	1.8	94.3	1.7
7	23/25	1.3	92.0	1.2
8	26/41	2.1	63.4	1.4
9	40/48	2.5	83.3	2.1
10	25/86	4.5	29.1	1.3
Total	**674/1,924**	**100.0**		**35.0**

Source: NIMAT system

Appendix 2D continued

Daisy Hill 2011				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group %**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	95/385	19.6	24.7	4.8
2	112/224	11.4	50.0	5.7
2a	*83/195*	*9.9*	*42.6*	*4.2*
2b	*29/29*	*1.5*	*100.0*	*1.5*
3	54/708	36.0	7.6	2.7
4	51/242	12.3	21.1	2.6
4a	*22/213*	*10.8*	*10.3*	*1.1*
4b	*29/29*	*1.5*	*100.0*	*1.5*
5	227/227	11.6	100.0	11.6
6	25/25	1.3	100.0	1.3
7	33/34	1.7	97.1	1.7
8	24/32	1.6	75.0	1.2
9	15/20	1.0	75.0	0.8
10	28/68	3.5	41.2	1.4
Total	**664/1,965**	**100.0**		**33.8**

Source: NIMAT system

Appendix 2D continued

Daisy Hill 2010				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	91/450	22.0	20.2	4.5
2	98/220	10.8	44.5	4.8
2a	*69/191*	*9.3*	*36.1*	*3.4*
2b	*29/29*	*1.4*	*100.0*	*1.4*
3	48/706	34.6	6.8	2.3
4	47/260	12.7	18.1	2.3
4a	*16/229*	*11.2*	*7.0*	*0.8*
4b	*31/31*	*1.5*	*100.0*	*1.5*
5	208/208	10.2	100.0	10.2
6	24/26	1.3	92.9	1.2
7	33/37	1.8	89.2	1.6
8	18/27	1.3	66.7	0.9
9	24/31	1.5	77.4	1.2
10	25/78	3.8	32.1	1.2
Total	**616/2,043**	**100.0**		**30.2**

Source: NIMAT system

Appendix 2E

Antrim 2012				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	55/488	18.6	11.3	2.1
2	141/409	15.6	34.5	5.4
2a	*108/376*	*14.3*	*28.7*	*4.1*
2b	*33/33*	*1.3*	*100.0*	*1.3*
3	28/724	27.6	3.9	1.1
4	87/453	17.2	19.2	3.3
4a	*26/392*	*14.9*	*6.6*	*1.0*
4b	*61/61*	*2.3*	*100.0*	*2.3*
5	226/226	8.6	100.0	8.6
6	61/63	2.4	96.8	2.3
7	43/49	1.9	87.8	1.6
8	21/37	1.4	56.8	0.8
9	32/44	1.7	72.7	1.2
10	54/134	5.1	40.3	2.1
Total	**748/2,627**	**100.0**		**28.5**

Source: NIMAT system

Appendix 2E continued

Antrim 2011				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	79/523	20.0	15.1	3.0
2	139/399	15.3	34.8	5.3
2a	97/357	13.6	27.2	3.7
2b	42/42	1.6	100.0	1.6
3	37/717	27.4	5.2	1.4
4	74/403	15.4	18.4	2.8
4a	20/349	13.3	5.7	0.8
4b	54/54	2.1	100.0	2.1
5	258/258	9.9	100.0	9.9
6	32/34	1.3	94.1	1.2
7	55/56	2.1	98.2	2.1
8	21/37	1.4	56.8	0.8
9	33/48	1.8	38.8	1.3
10	58/141	5.4	41.1	2.2
Total	**786/2,616**	**100.0**		**30.0**

Source: NIMAT system

Appendix 2E continued

Antrim 2010				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	96/515	18.6	18.6	3.5
2	153/378	16.6	40.5	5.5
2a	*110/335*	*12.1*	*32.8*	*4.0*
2b	*43/43*	*1.6*	*100.0*	*1.6*
3	42/831	30.0	5.1	1.5
4	75/462	16.7	16.2	2.7
4a	*23/410*	*14.8*	*5.6*	*0.8*
4b	*52/52*	*1.9*	*100.0*	*1.9*
5	259/259	9.3	100.0	9.3
6	47/49	1.8	95.9	1.7
7	43/45	1.6	95.6	1.6
8	28/40	1.4	70.0	1.0
9	32/47	1.7	68.1	1.2
10	54/145	5.2	37.2	1.9
Total	**829/2,771**	**100.0**		**29.9**

Source: NIMAT system

Appendix 2F

Causeway 2012				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	56/265	18.8	21.1	4.0
2	95/218	15.5	43.6	6.7
2a	*64/187*	*13.3*	*34.2*	*4.5*
2b	*31/31*	*2.2*	*100.0*	*2.2*
3	18/416	29.5	4.3	1.3
4	49/244	17.3	20.1	3.5
4a	*12/207*	*14.7*	*5.8*	*0.9*
4b	*37/37*	*2.6*	*100.0*	*2.6*
5	129/129	9.2	100.0	9.2
6	26/31	2.2	83.9	1.8
7	26/27	1.9	96.3	1.8
8	8/10	0.7	80.0	0.6
9	12/27	1.9	44.4	0.9
10	17/42	3.0	40.5	1.2
Total	**436/1,409**	**100.0**		**30.9**

Source: NIMAT system

Appendix 2F continued

Causeway 2011				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	29/283	20.1	10.2	2.1
2	72/204	14.5	35.3	5.1
2a	*49/181*	*12.9*	*27.1*	*3.5*
2b	*23/23*	*1.6*	*100.0*	*1.6*
3	12/421	29.9	2.9	0.9
4	36/234	16.6	15.4	2.6
4a	*8/206*	*14.6*	*3.9*	*0.6*
4b	*28/28*	*2.0*	*100.0*	*2.0*
5	134/134	9.5	100.0	9.5
6	27/29	2.1	93.1	1.9
7	25/27	1.9	92.6	1.8
8	10/13	0.9	76.9	0.7
9	7/18	1.3	38.9	0.5
10	16/44	3.1	36.4	1.1
Total	**368/1,407**	**100.0**		**26.2**

Source: NIMAT system

Appendix 2F continued

Causeway 2010				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	34/315	22.2	10.8	2.4
2	86/236	16.7	36.4	6.1
2a	*48/198*	*14.0*	*24.2*	*3.4*
2b	*38/38*	*2.7*	*100.0*	*2.7*
3	17/414	29.2	4.1	1.2
4	31/227	16.0	13.7	2.2
4a	*10/206*	*14.5*	*4.9*	*0.7*
4b	*21/21*	*1.5*	*100.0*	*1.5*
5	103/103	7.3	100.0	7.3
6	25/26	1.8	96.2	1.8
7	24/24	1.7	100.0	1.7
8	13/16	1.1	81.3	0.9
9	9/14	1.0	64.3	0.6
10	16/42	3.0	38.1	1.1
Total	**358/1,417**	**100.0**		**25.3**

Source: NIMAT system

Appendix 2G

Ulster Hospital 2012				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	108/879	21.6	12.3	2.7
2	273/759	18.6	36.0	6.7
2a	*182/668*	*16.4*	*27.2*	*4.5*
2b	*91/91*	*2.2*	*100.0*	*2.2*
3	47/1,069	26.3	4.4	1.2
4	133/646	15.9	20.6	3.3
4a	*41/554*	*13.6*	*7.4*	*1.0*
4b	*92/92*	*2.3*	*100.0*	*2.3*
5	275/275	6.8	100.0	6.8
6	65/68	1.7	95.6	1.6
7	45/56	1.4	80.4	1.1
8	35/47	1.2	74.5	0.9
9	56/90	2.2	62.2	1.4
10	68/183	4.5	36.6	1.6
Total	**1,104/4,072**	**100.0**		**27.1**

Source: NIMAT system

Appendix 2G continued

Ulster Hospital 2011				
1	**2**	**3**	**4**	**5**
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	99/923	22.6	10.7	2.4
2	194/649	15.9	29.9	4.8
2a	*132/587*	*14.4*	*22.5*	*3.2*
2b	*62/62*	*1.5*	*100.0*	*1.5*
3	41/1178	28.9	3.5	1.0
4	109/591	14.5	18.4	2.7
4a	*33/515*	*12.6*	*6.4*	*0.8*
4b	*76/76*	*1.9*	*100.0*	*1.9*
5	250/250	6.1	100.0	6.1
6	64/69	1.7	92.8	1.6
7	48/51	1.2	94.1	1.2
8	44/59	1.4	74.6	1.1
9	79/121	3.0	65.3	1.9
10	48/190	4.7	25.3	1.2
Total	**976/4,081**	**100.0**		**23.9**

Source: NIMAT system

Safer Births: Using Information to Improve Quality 75

Appendix 2G continued

Ulster Hospital 2010				
1	2	3	4	5
TGCS Group	Caesareans/ number of women in each Group	Contribution of Group to the overall hospital population %	CS rate in each Group %	Contribution of each Group to the overall CS rate %
1	93/808	22.8	11.5	2.6
2	192/538	15.2	35.7	5.4
2a	*135/481*	*13.6*	*28.1*	*3.8*
2b	*57/57*	*1.6*	*100.0*	*1.6*
3	40/1044	29.5	3.8	1.1
4	88/487	13.8	18.1	2.5
4a	*26/425*	*12.0*	*6.1*	*0.7*
4b	*62/62*	*1.8*	*100.0*	*1.8*
5	216/216	6.1	100.0	6.1
6	67/71	2.0	94.4	1.9
7	50/56	1.6	89.3	1.4
8	43/61	1.7	70.5	1.2
9	68/93	2.6	73.1	1.9
10	48/166	4.7	28.9	1.4
Total	**905/3,540**	**100.0**		**25.6**

Source: NIMAT system

Appendix 2H

Altnagelvin 2012				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	51/506	18.1	10.1	1.8
2	117/413	14.8	28.3	4.2
2a	*89/385*	*13.8*	*23.1*	*3.2*
2b	*28/28*	*1.0*	*100.0*	*1.0*
3	20/817	29.2	2.4	0.7
4	77/475	17.0	16.2	2.8
4a	*26/424*	*15.2*	*6.1*	*0.9*
4b	*51/51*	*1.8*	*100.0*	*1.8*
5	281/281	10.1	100.0	10.1
6	50/53	1.9	94.3	1.8
7	40/43	1.5	93.0	1.4
8	33/52	1.9	63.5	1.2
9	28/38	1.4	73.7	1.0
10	32/118	4.2	27.1	1.1
Total	**729/2,796**	**100.0**		**26.1**

Source: NIMAT system

Note: NIMATS DATA FOR WESTERN TRUST WAS INCOMPLETE FOR 2011 AND NOT AVAILABLE IN 2010

Appendix 2H continued

SWAH 2012				
1	2	3	4	5
TGCS Group	**Caesareans/ number of women in each Group**	**Contribution of Group to the overall hospital population %**	**CS rate in each Group %**	**Contribution of each Group to the overall CS rate %**
1	30/215	17.9	14.0	2.5
2	65/150	12.5	43.3	5.4
2a	*45/130*	*10.9*	*34.6*	*3.8*
2b	*20/20*	*1.7*	*100.0*	*1.7*
3	28/402	33.6	7.0	2.3
4	44/202	16.9	21.8	3.7
4a	*17/175*	*14.6*	*9.7*	*1.4*
4b	*27/27*	*2.3*	*100.0*	*2.3*
5	91/91	7.6	100.0	7.6
6	15/20	1.7	75.0	1.3
7	23/25	2.1	92.0	1.9
8	12/24	2.0	50.0	1.0
9	11/17	1.4	64.7	0.9
10	13/52	4.3	25.0	1.1
Total	**332/1,198**	**100.0**		**27.7**

Source: NIMAT system

Note: NIMATS DATA FOR WESTERN TRUST WAS INCOMPLETE FOR 2011 AND NOT AVAILABLE IN 2010

Appendix 3

(Figure 6 and Paragraph 2.11)

Group	TGCS Group Descriptor	Definition
1	Nulliparous, single cephalic, 37 or more weeks, in spontaneous labour	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • go into labour unassisted.
2		
2a	Nulliparous, single cephalic, 37 or more weeks, induced	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • are assisted into labour.
2b	Nulliparous, single cephalic, 37 or more weeks, not in labour	All women who: • have not previously given birth; • are expecting 1 baby; • reach full-term in pregnancy; and • receive a caesarean without going into labour.
3	Multiparous (excluding previous caesarean), single cephalic, 37 or more weeks, in spontaneous labour	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • go into labour unassisted.
4		
4a	Multiparous (excluding previous caesarean), single cephalic,37 or more weeks, induced	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • are assisted into labour.
4b	Multiparous (excluding previous caesarean), single cephalic, 37 or more weeks, caesarean before labour	All women who: • have previously given birth; • have not previously had a caesarean; • are expecting 1 baby; • reach full-term in pregnancy; and • receive a caesarean without going into labour.
5	Previous caesarean, single vertex, 37 or more weeks	All women who: • have previously had a caesarean; • are expecting 1 baby; and • have reached full-term in pregnancy.
6	All nulliparous breech	All women who: • have not previously given birth; and • have a baby lying in the breech position.
7	All multiparous breech (including previous caesarean)	All women who: • have previously given birth (including those who have had a caesarean); and • have a baby lying in the breech position.
8	All multiple pregnancies (including previous caesarean)	All women who are expecting more than 1 baby.
9	All abnormal lies (including previous caesarean)	All women who have a baby lying in the transverse or oblique birthing position
10	All single cephalic, less than or equal to 36 weeks (including previous caesarean)	All women who: • are expecting 1 baby; and • give birth before reaching full-term.

Please fold out
for
Appendix 3

Appendix 4: (see paragraph 2.11 and 2.19)

Guidance on Interpreting the results of the TGCS

Notes:

1. Appendix 2 categorises the obstetric population over the TGCS groups for the period 2010-12. For simplicity, the appendix uses five columns which are referred to below.

2. These steps have been developed by Dr M Robson based on his experience applying the TGCS.

	Expected Result	Interpretation
1.	To confirm that the groups include all women who gave birth in the selected period.	If the totals in column 2 match the total number of women who gave birth and the total number of caesareans, then data is complete.
2.	The total number of women in Group 9 (column 3) should account for between 0.2 per cent to 0.6 per cent of the total women who gave birth.	If the number of women included in Group 9 is not within the expected limits, there may be issues with the quality of the data.
3.	All babies lying in the transverse/oblique birthing position are delivered by caesarean and therefore the rate in Group 9 (column 4) should be 100 per cent.	If the caesarean section rate within Group 9 is not 100 per cent, it is likely that some women are incorrectly allocated to that group.
4.	Usually around 35-40 per cent of women admitted each year belong to groups 1 and 2 (column 3).	If the rate exceeds 45 per cent, this may indicate inaccuracies in the data.
5.	The number of women in Group 1 should exceed the number in Group 2. The ratio in column 3 should be no less than 2:1 (column 3).	A ratio of less than 2:1 indicates a high induction and pre-labour caesarean section rate.
6.	Caesarean section rate in Group 2 (column 4) should be between 25-30 per cent and no more than 35 per cent.	Figures in excess of 35 per cent indicate a high pre-labour caesarean section rate.

Appendix 4 continued

	Expected Result	Interpretation
7.	Groups 3 and 4 (column 3) combined usually account for about 30-40 per cent of all women.	If the size exceeds 40 per cent, this may indicate inaccuracies in the data.
8.	Group 3 to Group 4 ratio should be greater than the Group 1 to Group 2 ratio.	A Group 3 to Group 4 ratio of less than the Group 1 to Group 2 ratio may indicate problems with the validity of the data.
9.	The caesarean section rate in Group 4 (column 4) should be less than 20 per cent.	A rate in excess of 20 per cent suggests a high pre-labour caesarean section rate.
10.	Group 5 includes all women who have previously had a caesarean section. The contribution of Group 5 (column 5) to the overall caesarean section provides some indication of the caesarean sections rates in Group 1 and 2 in previous years.	If Group 5 contributes over 10 per cent of the overall caesarean rate, this indicates that, in previous years, caesarean section rates in Groups 1 and 2 have been high.
11.	Group 6 and 7 cover all breech births. Group 6 and 7 (column 3) should account for 3-4 per cent of women. Sometimes the rate may be as high as 5 per cent.	A rate in excess of 4 per cent may indicate a high premature birth rate. Step 13 below will confirm whether this is the case.
12.	The Group 6 to Group 7 ratio should be 2:1 since the incidence of breech is higher in women who have not previously given birth.	Where the ratio is less than 2:1, this may indicate problems with the accuracy of the information.
13.	Group 10 (column 3) includes women who deliver single, cephalic, pre-term and should account for around 4-5 per cent of women.	If Group 5 accounts for in excess of 5 per cent of women then the suspected high premature birth rate (at step 12 above) is confirmed. This may indicate that the unit is a tertiary referral unit or runs a fertilisation programme.
14.	Women expecting multiple births (Group 8 (column 3)) should account for 1.5-2.0 per cent of the total population.	A higher percentage may indicate that the unit is a tertiary referral unit or runs a fertilisation programme.

Appendix 4 continued

	Expected Result	Interpretation
15.	The caesarean section rate in Group 10 (column 4) relates to pre-term women.	A rate of 15-20 per cent indicates a high pre-term labour rate. A rate in excess of 40 per cent indicates a high pre-labour caesarean rate.
16.	A caesarean section rate in Group 1 (column 4) of under 10 per cent is satisfactory.	-
17.	The caesarean section rate in Group 3 (column 4) should be less than 3 per cent.	If the rate exceeds 3 per cent, it is likely that the group incorrectly includes Group 5, 6 or 7 women.
18.	The caesarean section rate in Group 5 (column 4) should be between 50-60 per cent (subject to satisfactory perinatal outcomes).	-
19.	The caesarean section rate in Group 8 (column 4) is generally around 60 per cent.	-
20.	The total caesarean section rate in Groups 1,2 and 5 (column 4) rate should account for 2/3 of the overall caesarean section rate.	-

NIAO Reports 2013-14

Title	Date Published
2013	
Department for Regional Development: Review of an Investigation of a Whistleblower Complaint	12 February 2013
Improving Literacy and Numeracy Achievement in Schools	19 February 2013
General Report on the Health and Social Care Sector by the Comptroller and Auditor General for Northern Ireland	5 March 2013
Northern Ireland Water's Response to a Suspected Fraud	12 March 2013
Department of Culture, Arts and Leisure: Management of Major Capital Projects	22 March 2013
Sickness Absence in the Northern Ireland Public Sector	23 April 2013
Review of Continuous Improvement Arrangements in Policing	3 September 2013
The Agri-Food and Biosciences Institute (AFBI)	12 September 2013
Tackling Social Housing Tenancy Fraud in Northern Ireland	24 September 2013
Account NI: Review of a Public Sector Financial Shared Service Centre	1 October 2013
DOE Planning: Review of Counter Fraud Arrangements	15 October 2013
Financial Auditing & Reporting 2013	5 November 2013
The exercise by local government auditors of their functions in the year to 31 March 2013	19 November 2013
Department for Regional Development: Archaeological Claims Settlement	3 December 2013
Sport NI's Project Management and Oversight of the St Colman's Project	10 December 2013
2014	
The Future Impact of Borrowing and Private Finance Initiative Commitments	14 January 2014
Improving Pupil Attendance: Follow-Up Report	25 February 2014
Belfast Metropolitan College's Titanic Quarter PPP Project	25 March 2014

Published and printed by CDS

CDS 112318

ISBN 978-1-910219-15-7