Irish Maternity Indicator System

National Report 2018

National Women and Infants Health Programme
Clinical Programme for Obstetrics and Gynaecology

June 2019

HSE

National Women & Infants Health Programme

OBSTETRICS AND GYNAECOLOGY

Contents

Introduction

This Irish Maternity Indicator System (IMIS) Interim Report shows data from 19 maternity hospitals/units from January through December 2018. It encompasses 33 multidisciplinary metrics across a range of domains, including demographics, deliveries, serious obstetric complications and risks, neonatal care, and laboratory metrics. Clear implementation guidelines underpin the IMIS data collection, definitions, and reporting procedures. There are also guidelines for escalation in the event of potential problems presenting (Appendix 2).

The IMIS is a management instrument that serves several functions. It provides within-hospital tracking of monthly and annual data. It also provides national comparisons across all maternity units, allowing hospitals to benchmark themselves against national rates and over time. To our knowledge, Ireland is the only country with a national standardised data-driven management system for maternity services that is based on data collected directly by hospitals, rather than relying on national minimum datasets.

Since the IMIS was introduced in 2014, there is evidence of resultant improvements in the quality of data collection and reporting at hospitals. Moreover, there is evidence that the information provided has led to improvements in maternity settings and the quality of care delivered. These developments are part of the envisaged outcomes of national recommendations for maternity services (Appendix 4).

IMIS reports are prepared by the Office of the National Women and Infants Health Programme (NWIHP) and the National Clinical Programme for Obstetrics and Gynaecology.

The data presented in IMIS reports are provided by the 19 maternity hospitals and are entirely the hospitals' own. They are correct at the time of submission, but some figures may be subject to change subsequently as new information comes to light. The implementation of the IMIS is attributable to individual staff members at maternity hospitals (Appendix 1). They continually work to improving their data systems while concurrently performing full-time midwifery and other roles in their hospitals and, in many cases, without modern electronic data systems.

The NWIHP strives to achieve consistent delivery of high quality care in Ireland's maternity services. A fundamental aspect of this work is measurement and analysis for quality improvement and safety at national, network and service level. The IMIS is a key element in this process, providing timely data for hospital management and oversight. Under the National Maternity Strategy Implementation Plan (2017), the NWIHP is committed to continued development of the IMIS in collaboration with staff at the maternity hospitals and networks.

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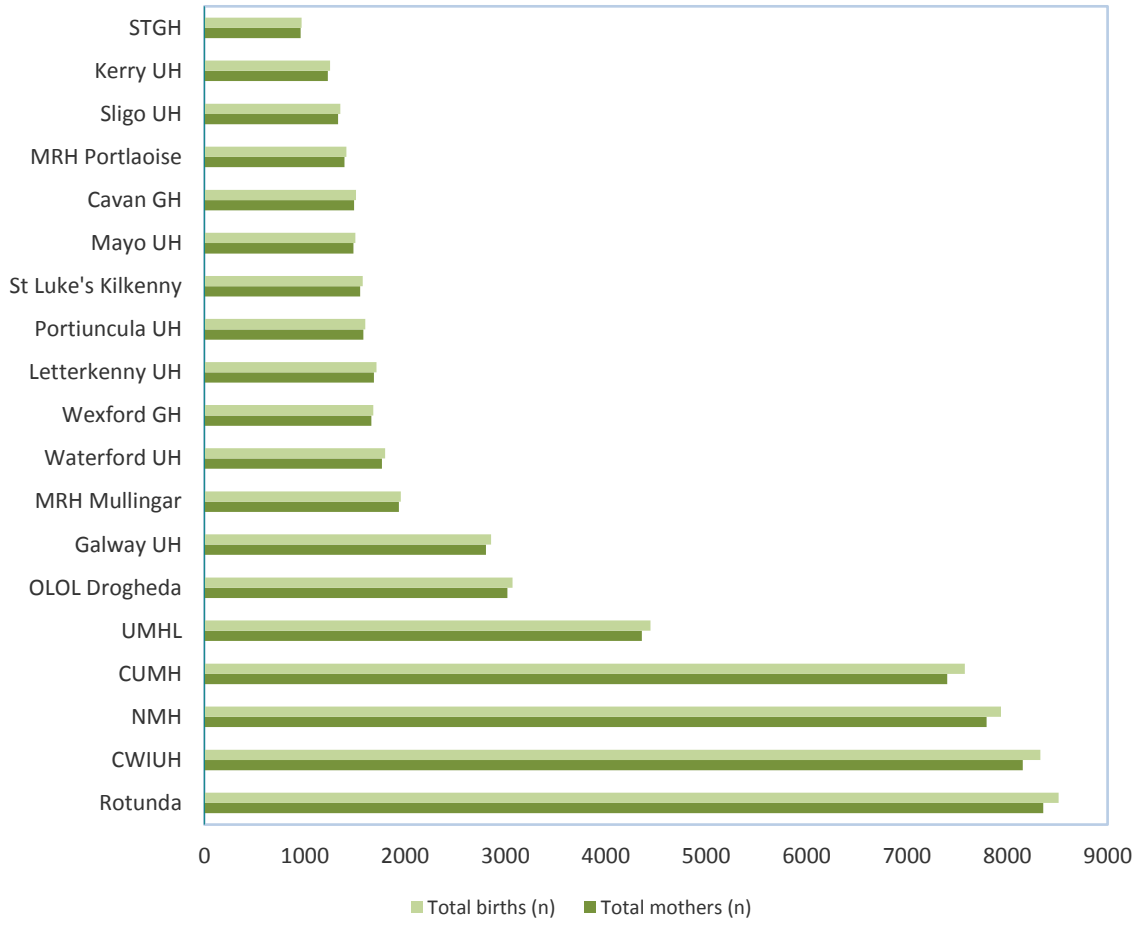
Hospital Management Activities

Indicators #1 and #2: Total births and total mothers delivered

Definitions

Total births: Number of live births and stillbirths weighing ≥ 500g.

Total mothers delivered: Number of women delivering a baby weighing ≥ 500g.



	Total births		Total mothers	
	2017	2018	2017	2018
National (n)	61,902	61,084	60,744	59,981
Mean (S.D.)	3,258 (2,713)	3,215 (2,709)	3,197 (2,647)	3,157 (2,651)
Range	982 - 8,619	969 - 8,513	979 - 8,433	959-8,358

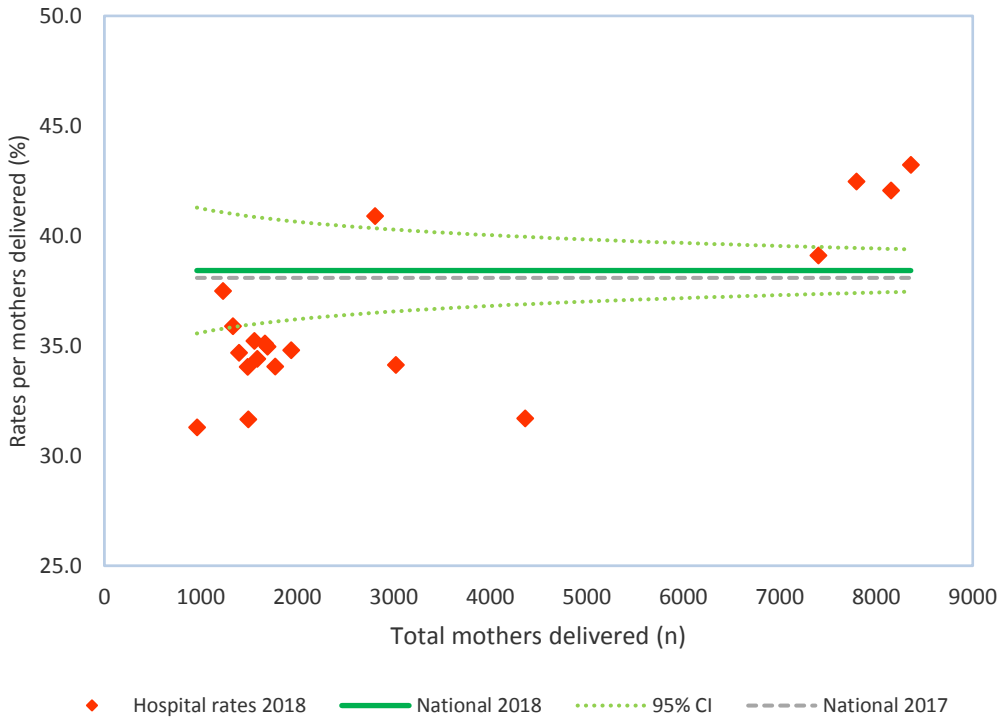
Notes:

Higher rates of multiple deliveries at the tertiary hospitals have serious implications for service provision at these sites.

Total births have fallen by 9.2% since the IMIS began in 2014 (p=0.36); the rate has declined by 19.2% over the past decade, since 2008 (p=0.23) (see longitudinal trends, Appendix 11).

Indicator #3: Nulliparas

Definition Number of deliveries (≥500g) to women who have never had a previous pregnancy resulting in a live birth or stillbirth.



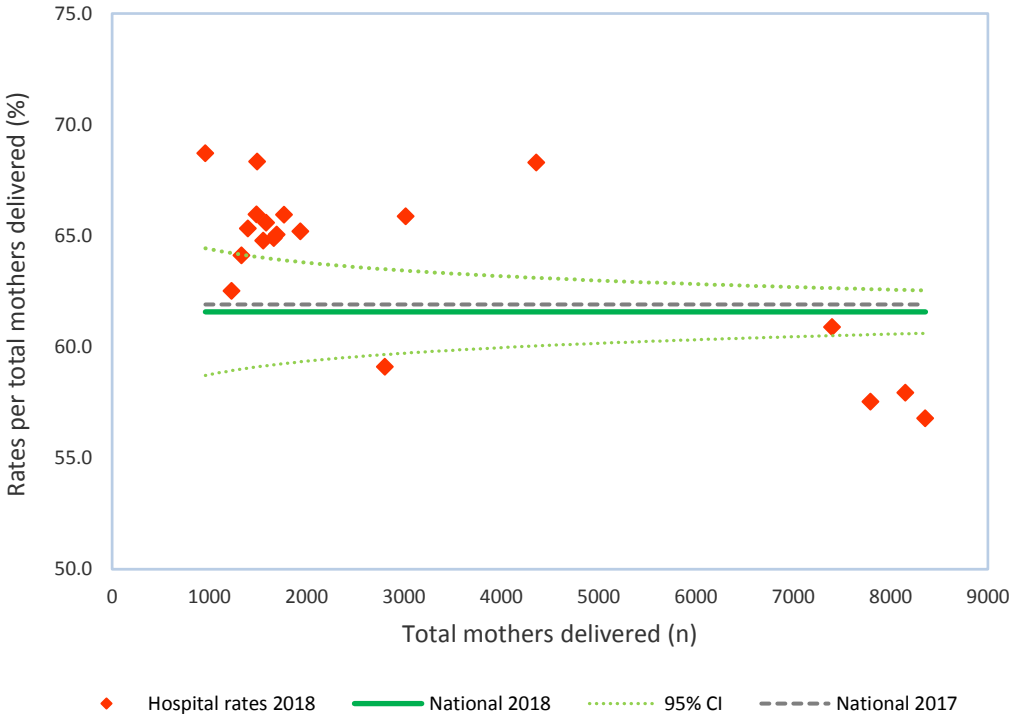
	2017	2018
Rate *(% total mothers)*	38.1%	38.4%
95% CI	37.7-38.5	38.0-38.8
Total nulliparas (n)	23,137	23,047
Total mothers (n)	60,744	59,981

Note:

The rate of nulliparas increased in 2018 by 0.9% (p=0.34), with more nulliparas attending the large tertiary hospitals. This is an important metric for hospital future planning in healthcare provision and beyond.

Indicator #4: Multiparas

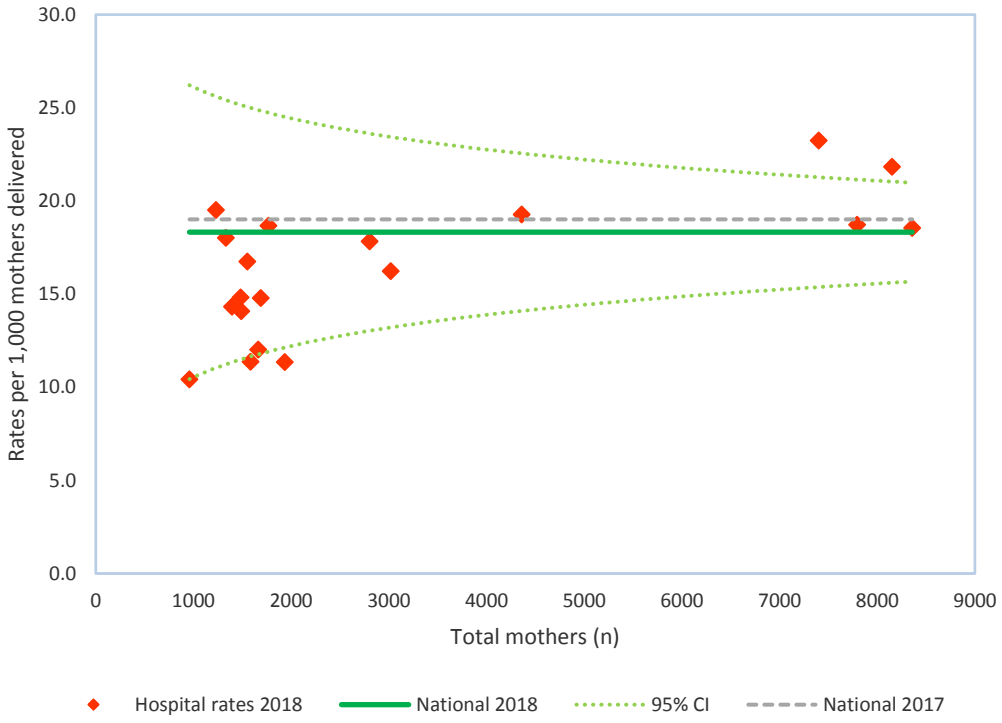
Definition Number of deliveries (≥500g) to women who have had at least one previous pregnancy resulting in a live birth or stillbirth.



	2017	2018
Rate *(% total mothers)*	61.9%	61.6%
95% CI	61.5-62.3	61.2-62.0
Total multiparas (n)	37,607	36,934
Total mothers (n)	60,744	59,981

Indicator #5: Multiple births

Definition Number of multiple births, based on the number of women with multiple births (not the number of babies born) occurring during the current month. A multiple birth results when more than one baby is born from a single pregnancy.



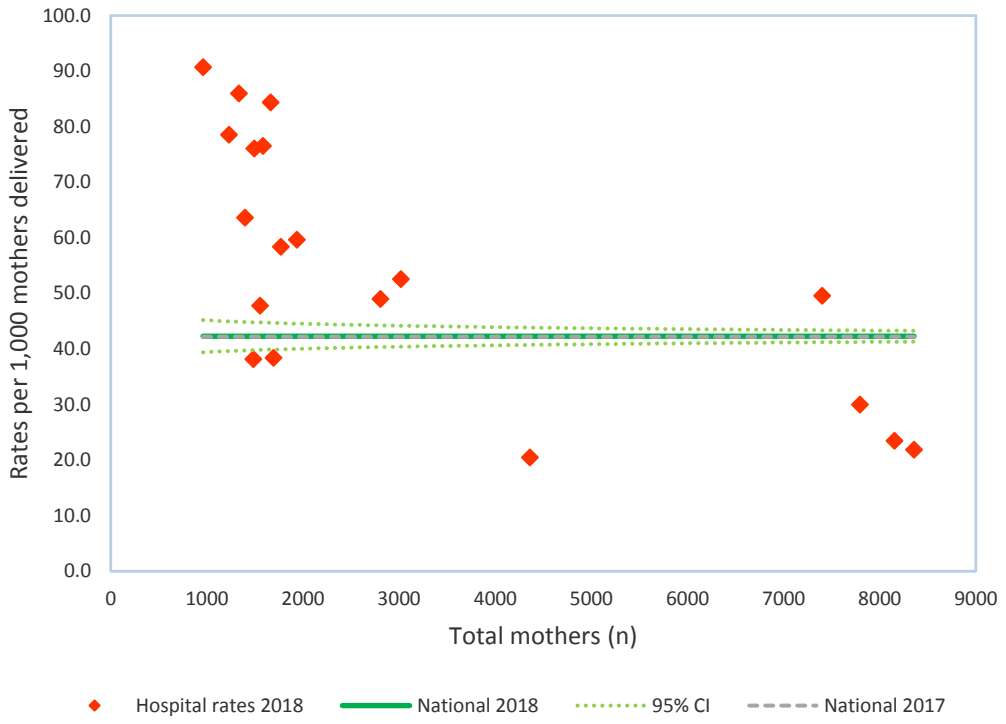
	2017	2018
Rate *(per 1,000 mothers)*	19.0	18.3
95% CI	17.9-20.1	17.3-19.4
Total multiple births (n)	1,155	1,099
Total mothers (n)	60,744	59,981

Note:

The rate of multiple births has fallen by 3.8% since the IMIS began in 2014 (p=0.40).

Indicator #6: EPAU first visits

Definition Number of first visits to the Early Pregnancy Assessment Unit (EPAU) occurring during the current month (do not count the combined number of first and return visits).



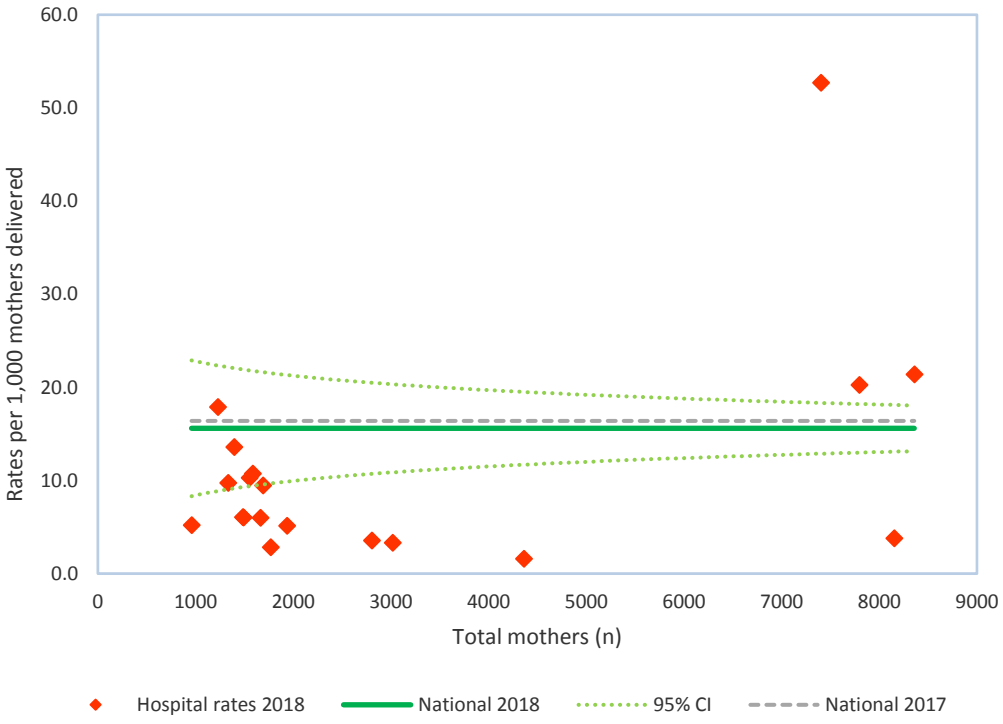
	2017	2018
Rate *(% of total mothers)*	42.2%	42.3%
95% CI	41.8-42.6	41.9-42.7
Total EPAU first visits (n)	25,633	25,365
Total mothers (n)	60,744	59,981

Note:

There is extreme variation, or 'over-dispersion', in the measurement of EPAU first visits (i.e., nearly all maternity units lie beyond the 95% thresholds), which implies the indicator may not be measuring the same type of activity at all maternity units. Thus, it is more informative for maternity hospitals to compare their activities in EPAU over time, rather than make comparisons with other units.

Indicator #7: Maternal transfers

Definition Number of women transferred for critical care to Level 2 care and/or Level 3 care (e.g., Critical Care Unit, Intensive Care Unit, High Dependency Unit) either within the hospital or to another hospital/unit. Serious obstetric events that require women to be transferred should be reported by the hospital where she gave birth and not the hospital to which she was transferred and where she received treatment for the problem. There is no gestation parameter on this metric, i.e. it may include transfers from early pregnancy through post-natal readmissions.



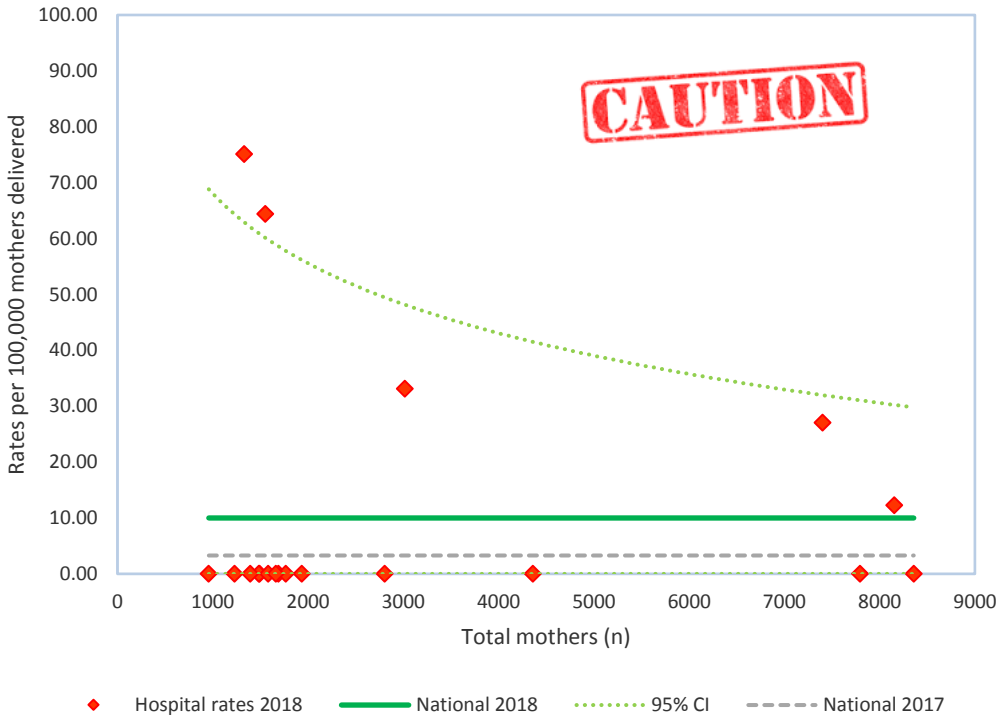
	2017	2018
Rate *(per 1,000 mothers)*	16.4	15.6
95% CI	15.4-17.4	14.6-16.6
Total maternal transfers (n)	996	936
Total mothers (n)	60,744	59,981

Note:

This metric may be useful for staff at maternity hospitals comparing their levels of maternal transfer activity over time, rather than making comparisons with other units. For example, the outlying tertiary hospital admits women who require additional monitoring to their HDU, whereas other units may monitor such women in a separate observation room or station on their antenatal or postnatal wards.

Indicator #8: Maternal deaths

Definition Number of deaths of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its mangement but not from accidental or incidental causes occurring during the current month.



	2017	2018
Rate *(per 100,000 mothers)*	3.29	10.00
95% CI	0.00-7.86	0.00-18.01
Total maternal deaths (n)	2	6
Total mothers (n)	60,744	59,981

Note:

The rate of maternal deaths in 2018 was noticeably higher than recent years. The Maternal Death Enquiry Ireland reported the total maternal death rate was 6.5 per 100,000 over the three-year period 2013-15 (MDE Ireland, 2017).[1] The Confidential Maternal Death Enquiry Report 2018 reported 9.8 women per 100,000 died during pregnancy or up to six weeks after childbirth or the end of pregnancy over the three-year period 2014-16 (MBRRACE-UK 2018).[2]

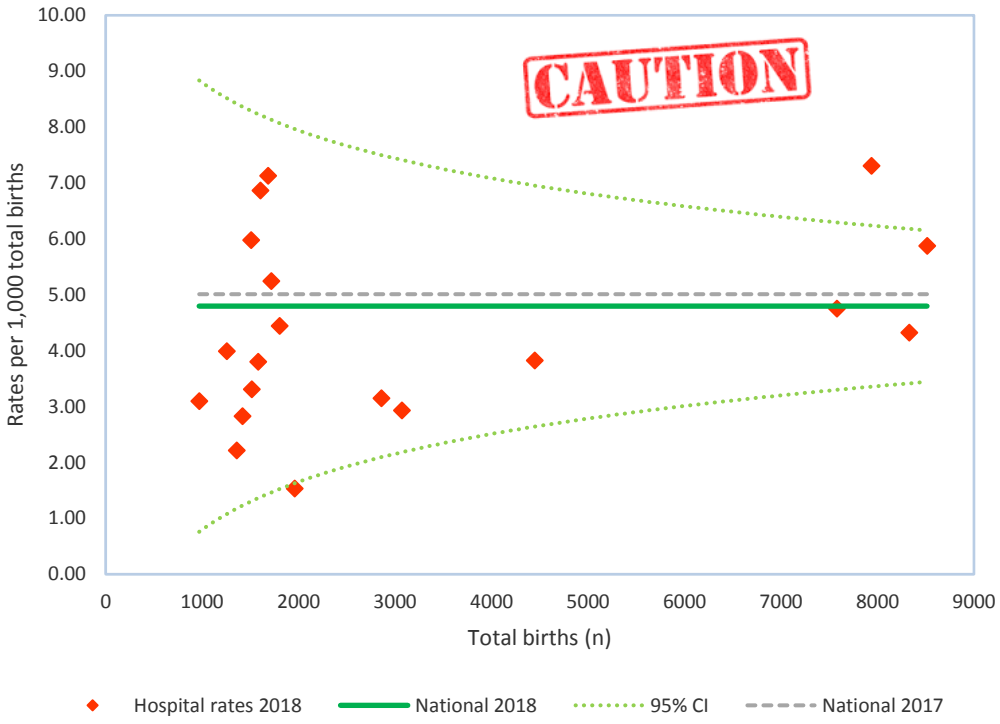
While maternal death in a single year is not considered a robust indicator of quality of clinical care in a maternity setting, lessons can be learned from the management of individual cases.

1 O'Hare MF, Manning E, Corcoran P, Greene RA on behalf of MDE Ireland. Confidential Maternal Death Enquiry in Ireland, Report for 2013 - 2015. Cork: MDE Ireland, December 2017.

2 MBRRACE-UK: Saving Lives, Improving Mothers' Care report for 2018.

Indicator #9: Perinatal deaths (total)

Definition Number of deaths, including stillbirths and early neonatal deaths from delivery to six completed days occurring during the current month. A stillbirth in this report refers to the death of a fetus weighing ≥500g, irrespective of duration of pregnancy; an early neonatal death refers to the death of a live born infant during the first seven days of life. This metric is not adjusted to exclude congenital anomalies.



	2017	2018
Rate *(per 1,000 total births)*	5.0	4.8
95% CI	4.4-5.6	4.3-5.3
Total perinatal deaths (n)	309*	293
Total births (n)	61,902	61,084

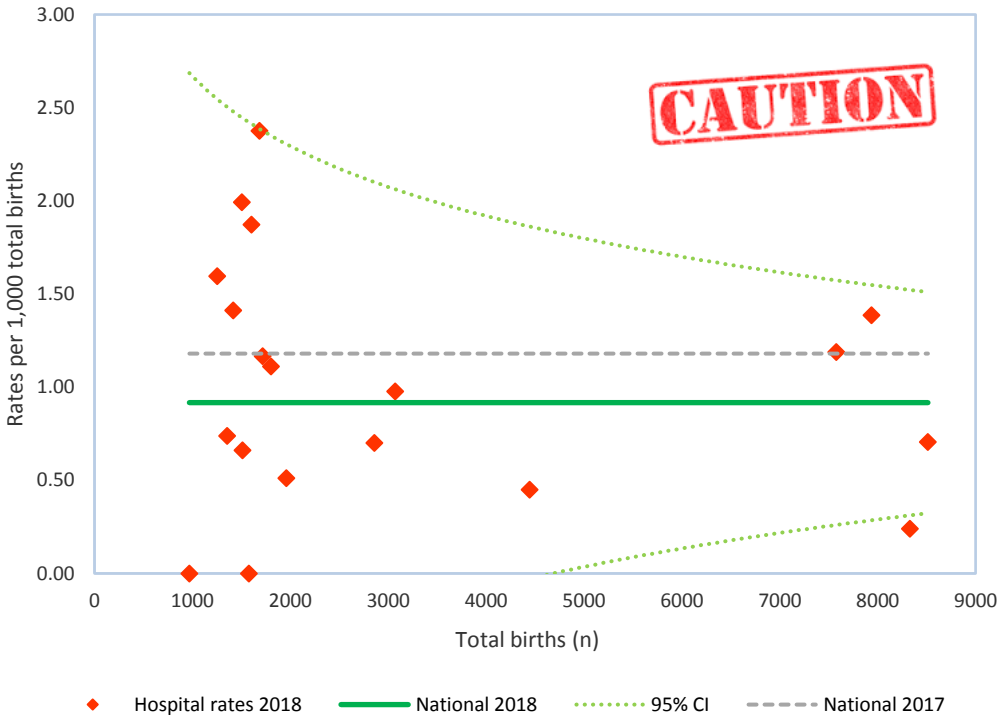
**Data for 2017 were amended during 2018, reducing the total number of perinatal deaths by n=1. The national rate was unaffected by the change.*

Note:

The rate of total perinatal deaths has fallen by 20.7% ($p<0.001$) since the IMIS began in 2014. It has fallen by 30.5% ($p<0.001$) since 2008 (see Appendix 11). This metric should be interpreted with caution.

Indicator #10: Perinatal deaths ≥2.5kg without a congenital anomaly

Definition Number of perinatal deaths (stillbirths and early neonatal deaths) weighing 2.5kg or more without physiological or structural abnormalities that develop at or before birth and are present at the time of birth.



	2017	2018
Rate *(per 1,000 total births)*	1.2	0.9
95% CI	0.9-1.5	0.7-1.2
Total perinatal deaths ≥2.5kg without a congenital anomaly (n)	73	56
Total births (n)	61,902	61,084

Note:

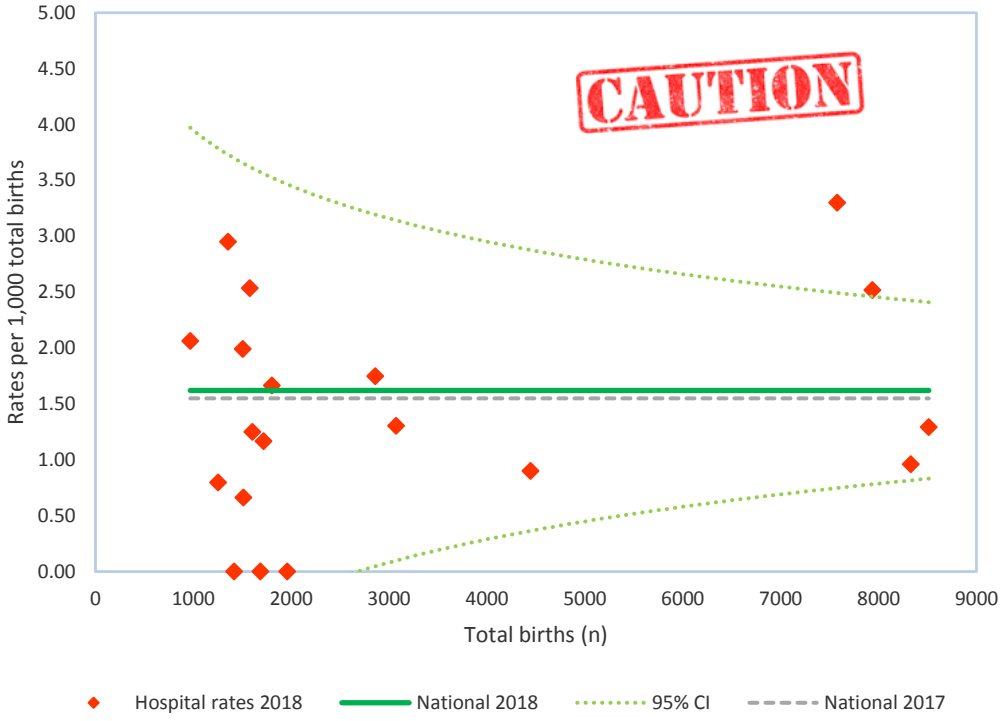
Since the IMIS began in 2014, the rate of total perinatal deaths without a congenital anomaly has fallen by 33.6% (p=0.08).

As with all indicators with small values, this should be interpreted with caution.

Neonatal Metrics

Indicator #11: Neonatal encephalopathy (NE)

Definition All infants with ≥35 weeks' gestation who, during the first week of life, have either seizures alone and/or signs of neonatal encephalopathy, which are defined as clinical findings in three or more of the following domains: Level of consciousness, spontaneous activity when awake or aroused, posture, tone, primitive reflexes, and automonic system. Note, Hypoxic Ischaemic Encephalopathy (HIE) is a subset of NE and is the most common cause of NE; not all encephalopathies have a HIE.



	2017	2018
Rate *(per 1,000 total births)*	1.6	1.6
95% CI	1.2-1.9	1.3-1.9
Total NE (n)	96	99
Total births (n)	61,902	61,084

Note:

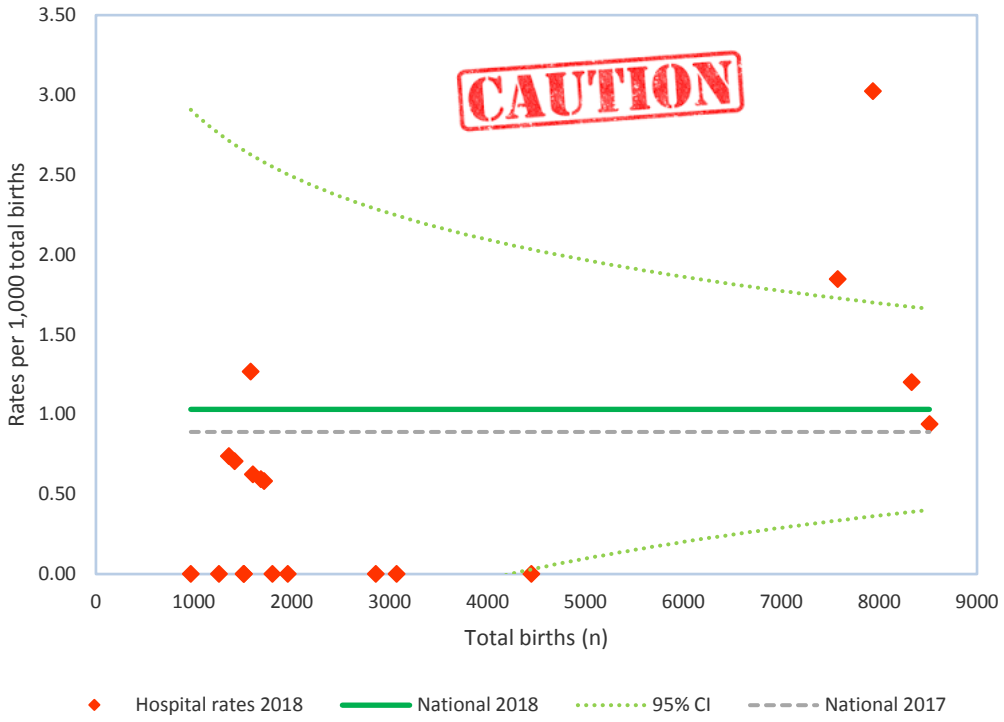
The Neonatal Therapeutic Hypothermia in Ireland report 2016-17 estimated the incidence of NE was 3.0 per 1,000 live births.[3]

Caution is advised when dealing with small values.

3 Meaney S, McGinley J, Horkan S, Corcoran P, Greene RA, Murphy J, on behalf of Neonatal Therapeutic Hypothermia Working Group. Neonatal Therapeutic Hypothermia in Ireland Annual Report 2016-2017. Cork: National Perinatal Epidemiology Centre, 2018.

Indicator #12: Brachial plexus palsy

Definition Number of neonatal brachial plexus palsies (BPP) diagnosed during the current birth episode. Obstetric BPP refers to loss of movement or weakness of the arm resulting from damage to the brachial plexus nerve network, which may occur from mechanical injury involving shoulder dystocia during difficult childbirth. May include Erb's Palsy, Klumpke's Palsy, and total plexus injury.



	2017	2018
Rate *(per 1,000 total births)*	0.9	1.0
95% CI	0.7-1.1	0.8-1.3
Total BPP (n)	55	63
Total births (n)	61,902	61,084

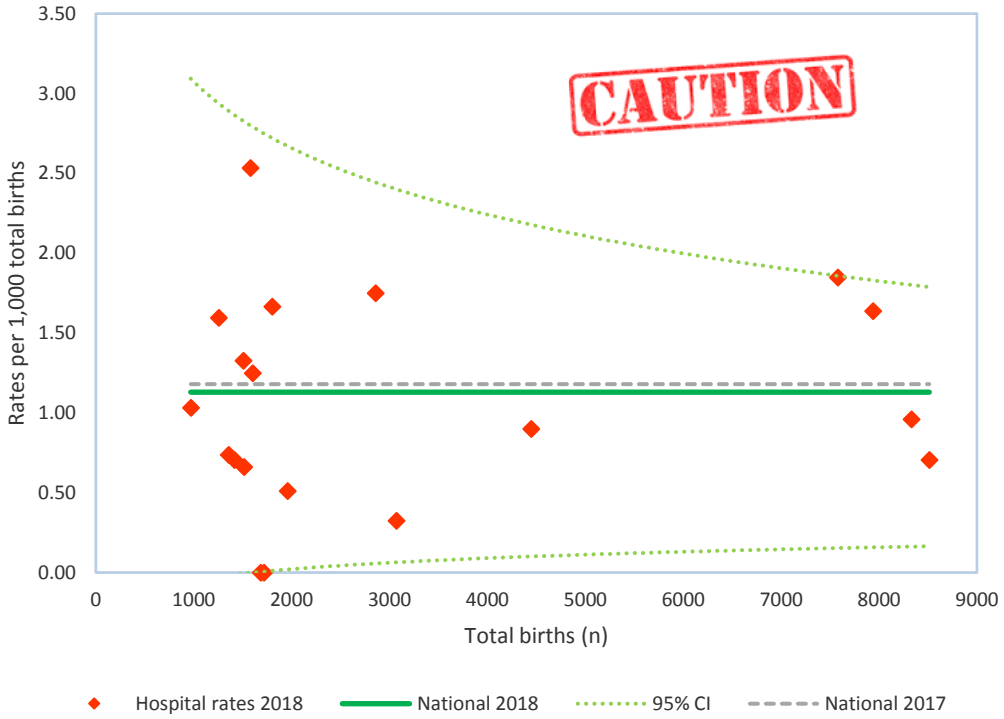
Note:
International research finds the rate of neonatal brachial plexus palsy is around 1.3 per 1,000 total births.[4]

The rate at the outlying maternity hospital is based on confirmed inpatient and outpatient Erbs Palsy diagnosis by a Physiotherapist, while other hospitals tend to report diagnoses by neonatologists or paediatric doctors. This metric should be interpreted with caution.

4 Chauhan SP, Blackwell SB, Ananth CV. Neonatal brachial plexus palsy: incidence, prevalence, and temporal trends. Semin Perinatol 2014 Jun;38(4):210-18.

Indicator #13: Whole body neonatal cooling (WBNC)

Definition WBNC refers to therapeutic 'active' (not passive) cooling administered during the current birth episode as a treatment for Hypoxic Ischemic Encephalopathy (HIE). WBNC is conducted at the four large tertiary hospitals in Dublin and Cork. Babies may be transferred from smaller maternity units around the country via the National Neonatal Transport Programme, which operates 24 hours a day, seven days a week.



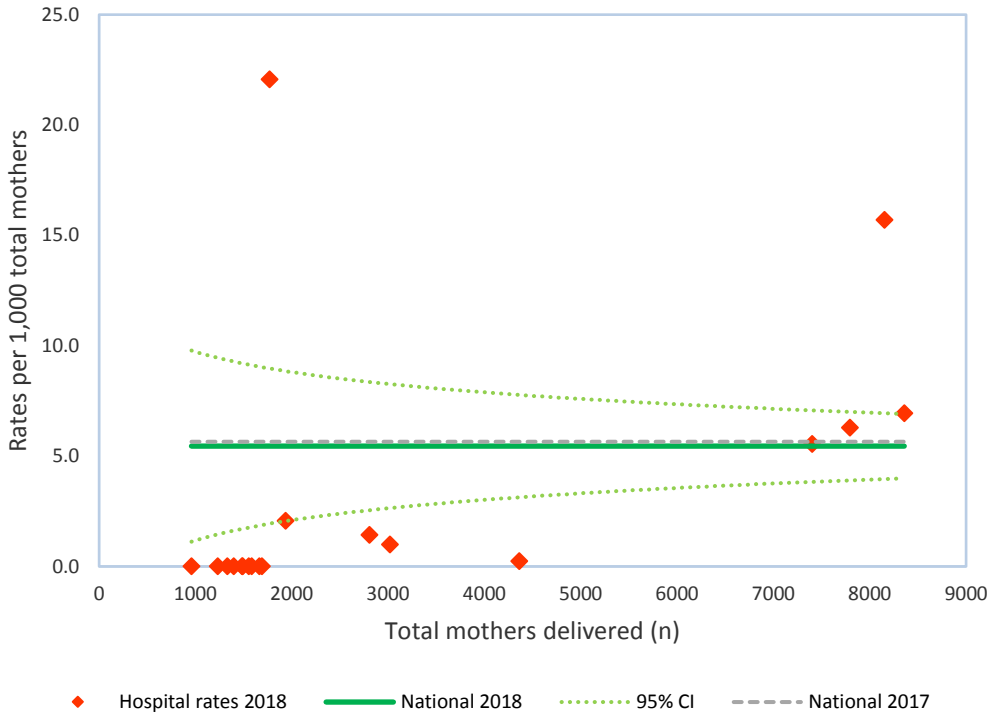
	2017	2018
Rate *(per 1,000 total births)*	1.2	1.1
95% CI	0.9-1.5	0.9-1.4
Total WBNC (n)	74	69
Total births (n)	61,902	61,084

Note:
The chart shows all babies that were cooled based on the hospital where they were born. Babies born at the four tertiary hospitals comprise 59.4% of all babies cooled and babies transferred from smaller units comprise 40.6%. The National Therapeutic Hypothermia in Ireland Report found 140 infants underwent neonatal therapeutic hypothermia treatment in the two-year period 2016-17, 60.0% of whom were born in a tertiary unit and 40.0% were transferred from smaller units.[5]

5 Meaney S, McGinley J, Horkan S, Corcoran P,Greene RA, Murphy J on behalf of Neonatal Therapeutic Hypothermia Working Group. Neonatal Therapeutic Hypothermia in Ireland, Annual Report 2016-2017. Cork: National Perinatal Epidemiology Centre, 2018.

Indicator #14: In-utero transfers admitted

Definition Number of women with a fetus in-utero admitted into the hospital after being transferred from another hospital *in the fetal interest*, during the current birth episode.



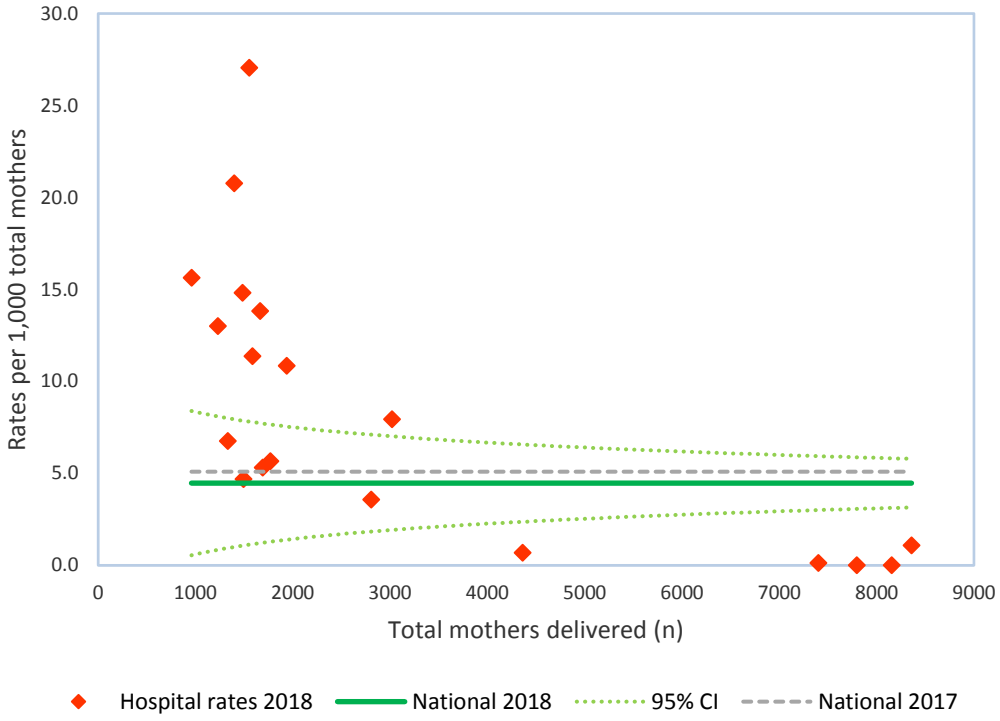
	2017	2018
Rate *(per 1,000 mothers)*	5.7	5.5
95% CI	5.1-6.2	4.9-6.0
In-utero transfers admitted (n)	343	327
Total mothers (n)	60,744	59,981

Note:

The metrics for in-utero transfers (admitted and sent out) may be useful for hospital staff assessing their in-utero transfer activities over time, rather than comparing their activities with other hospitals. For example, on the chart, the two outlying hospitals have specific patient transfer arrangements with other maternity hospitals/units in their maternity networks. This metric should be read in conjunction with in-utero transfers sent out (see following page).

Indicator #15: In-utero transfers sent out

Definition Number of women with a fetus in-utero transferred out of the hospital to another hospital *in the fetal interest*, during the current birth episode (refers to transfers of inpatients only, not outpatients.)

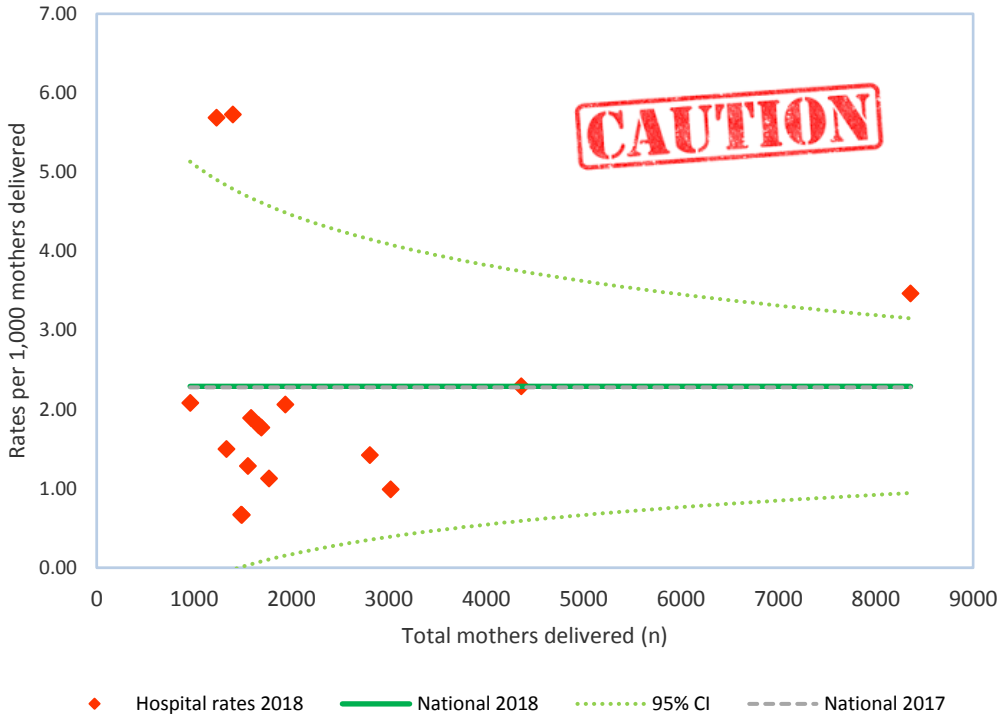


	2017	2018
Rate *(per 1,000 mothers)*	5.1	4.5
95% CI	4.5-5.7	3.9-5.0
In-utero transfers sent out (n)	309	268
Total mothers (n)	60,744	59,981

Laboratory Metrics

Indicator #16: Maternal bacteraemia

Definition Diagnosis of bacteraemia is based on laboratory definition only and does not include clinical indications. Diagnosis of bacteraemia is based on ONE positive blood culture for a recognised bacterial pathogen (e.g. *Staphylococcus aureus, Escherichia coli*). Cases of blood culture contamination (e.g. skin contaminants) should be excluded (ECDC 2012: 47). Cases should be defined as 'maternal' if the positive blood culture is taken at any time during pregnancy or within 42 days of the end of pregnancy.

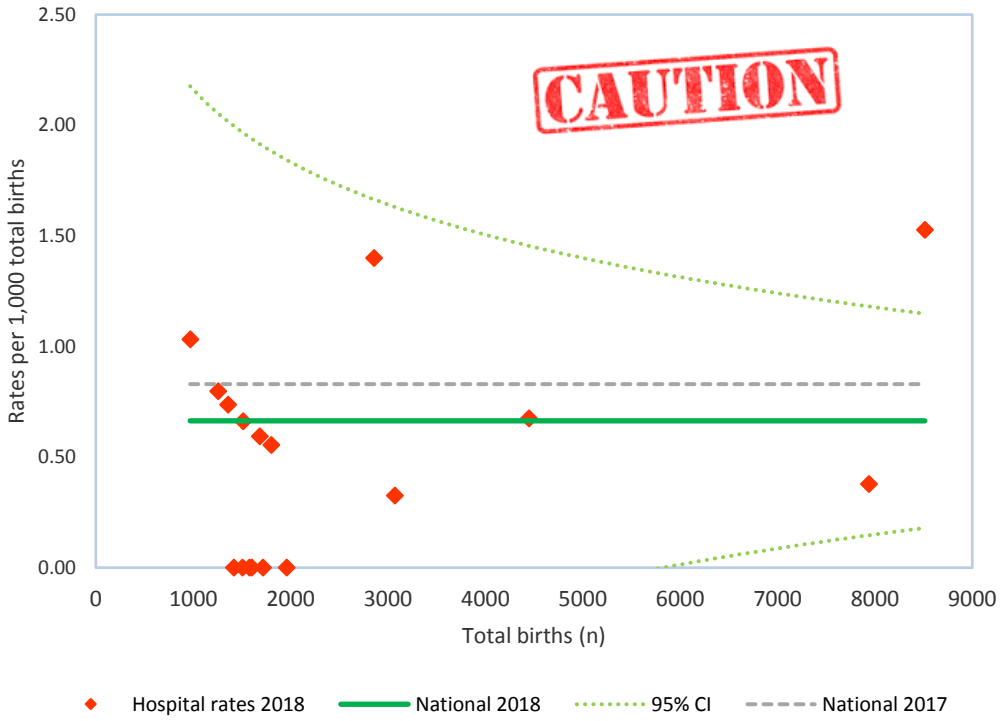


	2017*	2018**
Rate *(per 1,000 mothers)*	2.3	2.3
95% CI	1.8-2.8	1.8-2.8
Total maternal bacteraemia (n)	81	84
Total mothers (n)	35,535	36,631

**Based on data from 15 maternity hospitals/units. **Based on data from 16 maternity hospitals/units.*

Indicator #17: Neonatal bacteraemia (early-onset)

Definition Diagnosis of neonatal bacteraemia refers to early-onset clinically significant bacteraemia in neonates (<72 hours of age) based on a laboratory definition of bacteraemia and does not include clinical indications. Diagnosis of bacteraemia is based on ONE positive blood culture for a recognised bacterial pathogen (e.g. *Staphylococcus aureus, Escherichia coli*). Cases of blood culture contamination (e.g. skin contaminants) should be excluded (ECDC 2012: 47).

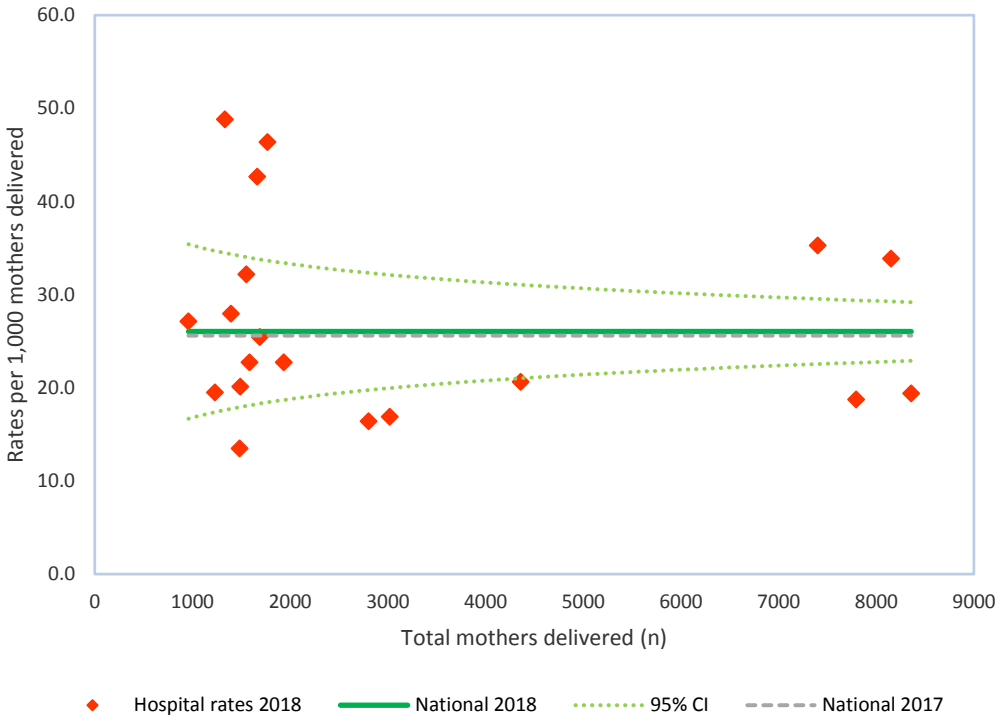


	2017*	2018**
Rate *(per 1,000 total births)*	0.8	0.7
95% CI	0.5-1.1	0.4-0.9
Total neonatal bacteraemia (n)	30	30
Total births (n)	36,138	45,177

**Based on data from 15 maternity hospitals/units. **Based on data from 17 maternity hospitals/units.*

Indicator #18: Obstetric blood transfusions

Definition Number of obstetric patients who receive one or more units of blood components/products (including red cells, plasma, platelets, etc.), not including clotting factors or recombinant products. Report obstetric patients only, exclude gynaecology patients. Obstetric is defined as from the time of diagnosis of pregnancy (based on a positive pregnancy test).



	2017	2018
Rate *(per 1,000 mothers)*	25.6	26.0
95% CI	24.3-26.9	24.8-27.3
Total OBTs (n)	1,555	1,562
Total mothers (n)	60,744	59,981

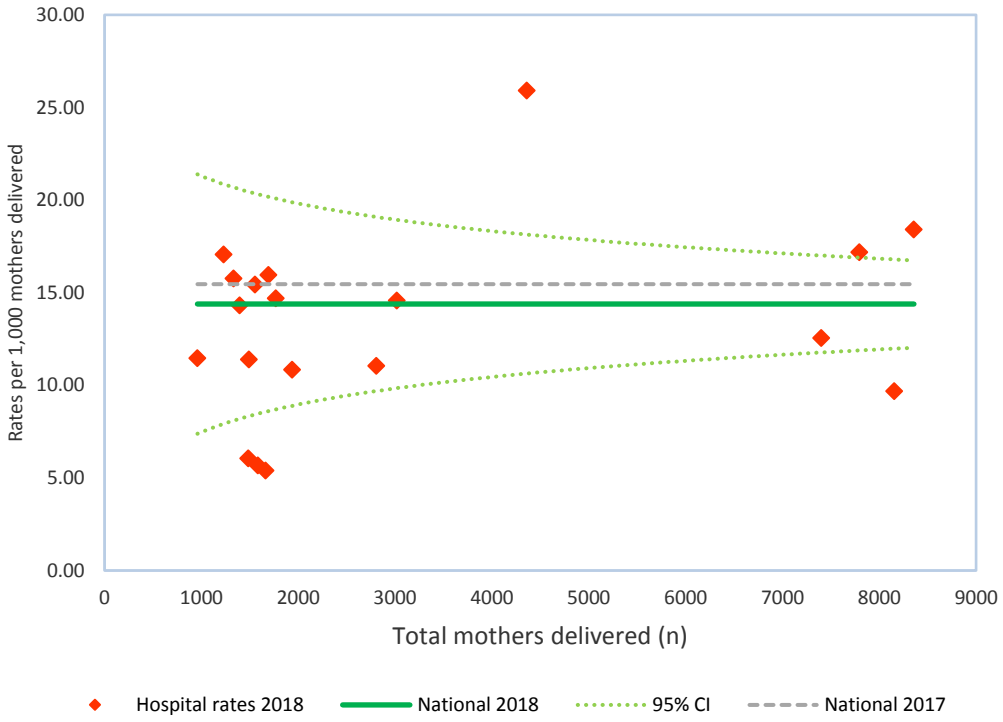
Note:

There is considerable variation across hospitals on this metric, from 13.5 to 48.8 per 1,000 mothers delivered having blood transfusions. This metric should be viewed in conjunction with Metric #28, Primary postpartum haemorrhage (see page 31).

Serious Obstetric Events

Indicator #19: Ectopic pregnancy

Definition Number of women diagnosed during the current month with an ectopic pregnancy, including abdominal pregnancy, tubal pregnancy, ovarian pregnancy, and other/unspecified pregnancy. Do not source data on ectopic pregnancies from the HIPE.

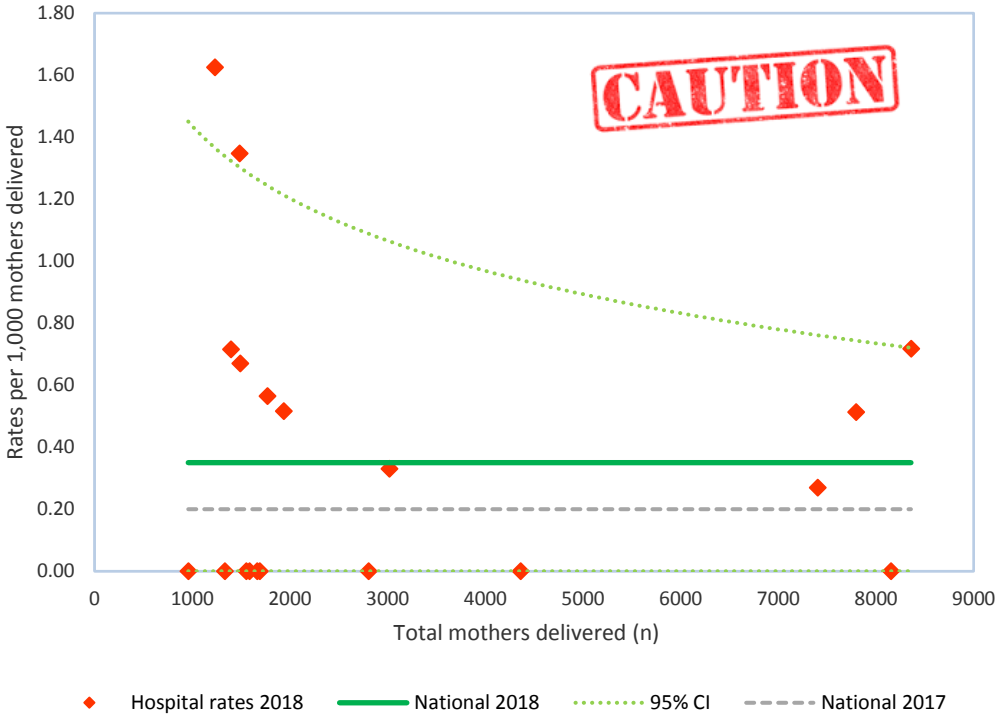


	2017	2018
Rate *(per 1,000 mothers)**	15.5	14.4
95% CI	14.5-16.4	13.4-15.3
Total ectopic pregnancies (n)	939	863
Total mothers (n)	60,744	59,981

**Rates are calculated using total mothers as a proxy denominator, since total number of pregnant women is unavailable.*

Indicator #20: Eclampsia

Definition Number of women diagnosed during the current month with eclampsia during any antenatal hospital event or at delivery, including eclampsia in pregnancy, in labour, in the puerperium, and eclampsia unspecified as to time period. Does not include severe pre-eclampsia.



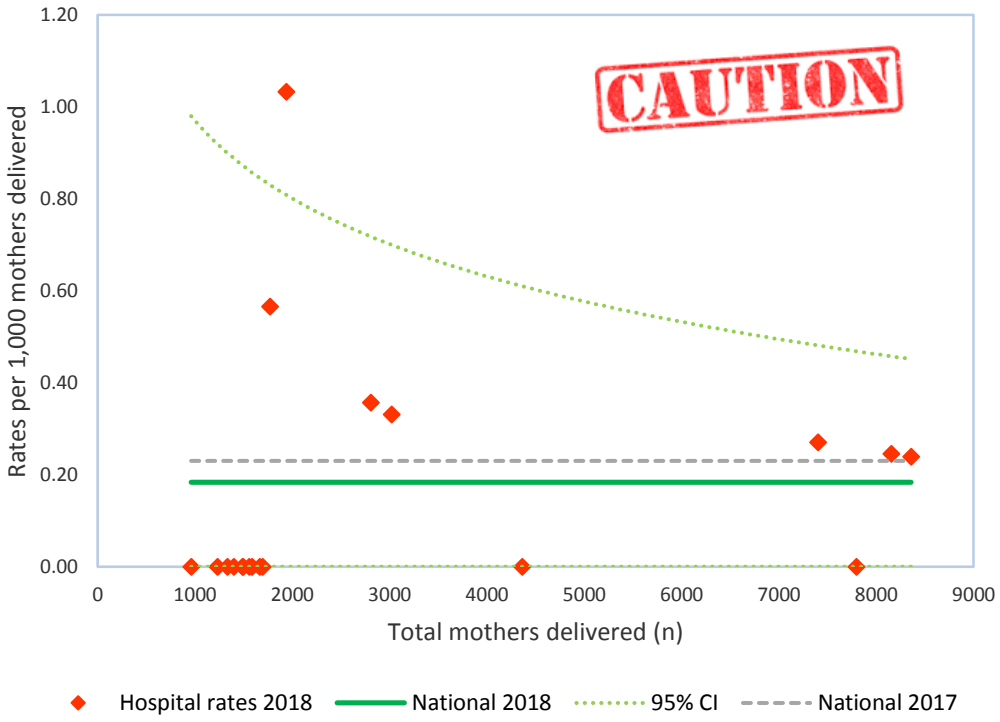
	2017	2018
Rates *(per 1,000 mothers)*	0.20	0.35
95% CI	0.09-0.31	0.20-0.50
Total eclampsia (n)	12	21
Total mothers (n)	60,744	59,981

Note:

The outlying units both had two cases of eclampsia. Caution is advised when dealing with small numbers of cases.

Indicator #21: Uterine rupture

Definition Number of women diagnosed during the current month with rupture of uterus before onset of labour or during labour, including cases that may not be diagnosed until after delivery. The IMIS definition of uterine rupture refers to complete rupture.



	2017	2018
Rates *(per 1,000 mothers)*	0.23	0.18
95% CI	0.11-0.35	0.08-0.29
Total uterine ruptures (n)	14	11
Total mothers (n)	60,744	59,981

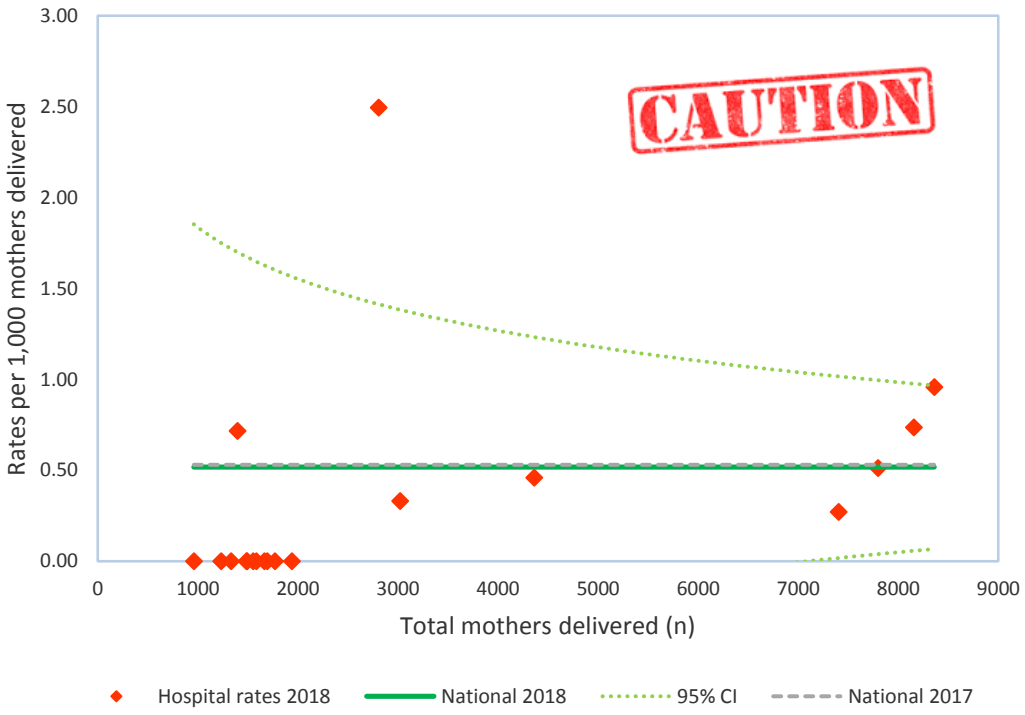
Note:

The risk of uterine rupture tends to be higher after trial of labour among women with previous Caesarean sections (CS), compared with repeat elective CS. Induction of labour (using prostaglandins) is also associated with high risk of uterine rupture.

The outlying maternity unit had two cases of uterine rupture. Caution is advised when dealing with small numbers.

Indicator #22: Peripartum hysterectomy

Definition Number of hysterectomy procedures completed during the current month, usually following a caesarean section, including hysterectomies performed during pregnancy and/or procedures within seven completed days after delivery.



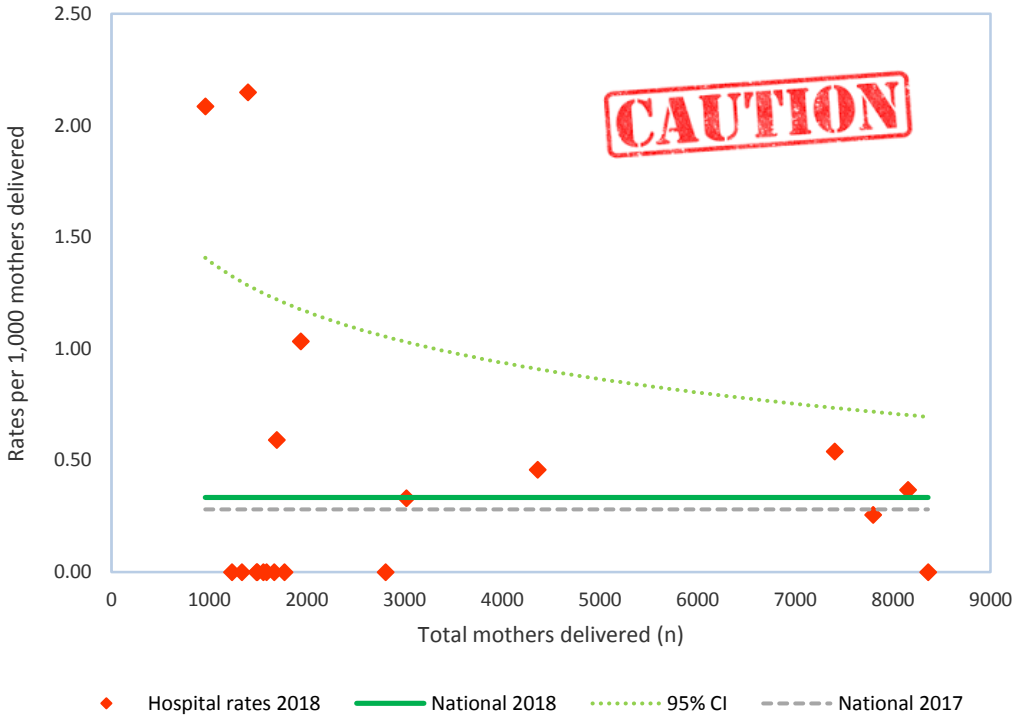
	2017	2018
Rates *(per 1,000 mothers)*	0.53	0.52
95% CI	0.34-0.71	0.33-0.70
Total peripartum hysterectomies (n)	32	31
Total mothers (n)	60,744	59,981

Note:
Peripartum hysterectomy is rare in modern obstetrics. It can cause significant morbidity and mortality and is usually only performed in emergency situations. It may be associated with maternal age, Caesarean sections, and placenta praevia/accreta (Huque et al 2018).[6] Caution is advised when dealing with small numbers of cases.

6 Huque S, Roberts I, Fawole B, et al. Risk factors for peripartum hysterectomy among women with postpartum haemorrhage: analysis of data from the WOMAN trial. BMC Pregnancy Childbirth 2018; 18:186.

Indicator #23: Pulmonary embolism

Definition Number of women diagnosed during the current month with obstetric pulmonary emboli in pregnancy and/or the puerperium and excludes embolism complicating abortion or ectopic or molar pregnancy.



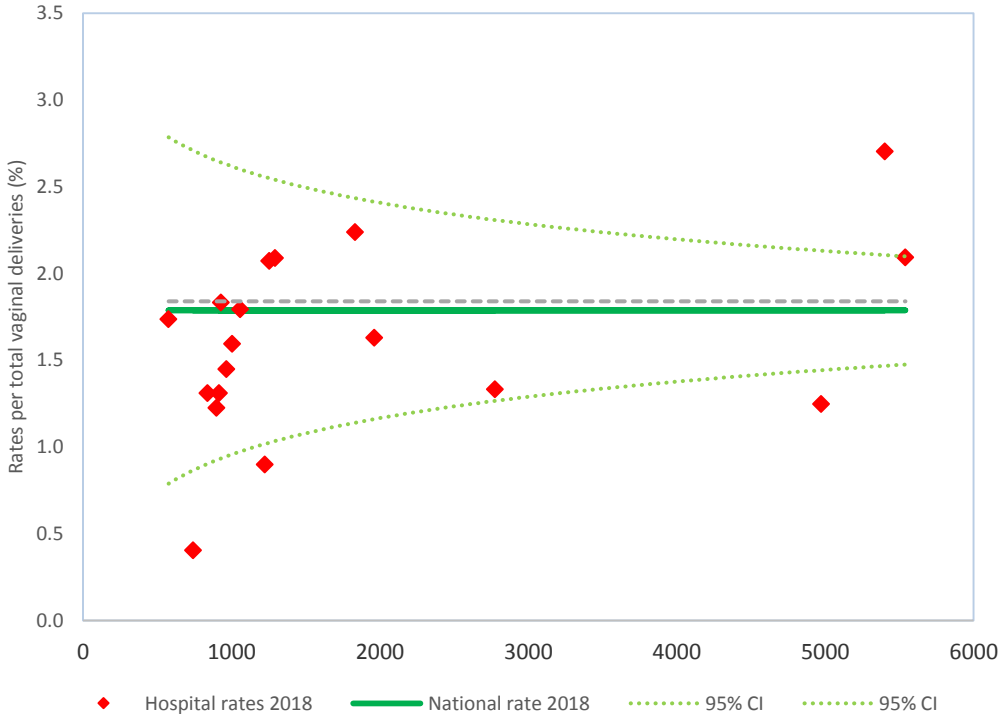
	2017	2018
Rates *(per 1,000 mothers)*	0.30	0.33
95% CI	0.16-0.43	0.19-0.48
Total pulmonary embolism (n)	18	20
Total mothers (n)	60,744	59,981

Note:

Pulmonary embolism is a leading cause of maternity mortality in developed countries. The national rate has fallen by 15.4% since the IMIS began in 2014. It is hoped that the declining rate is a response to hospitals' implementation of the National Clinical Guideline, *Venous Thromboprophylaxis in Pregnancy* (2013). Caution is advised when dealing with small numbers.

Indicator #24: Perineal tears

Definition Number of third-degree and/or fourth-degree perineal lacerations diagnosed during the current month, including tears in the vaginal tissue, perineal skin, and perineal muscles that extend into the anal sphincter and/or go through the anal sphincter and the tissue underneath it.



	2017	2018*
Rates *(% total vaginal deliveries)*	1.8%	1.8%
95% CI	1.7-2.0	1.7-1.9
Total perineal tears (n)	757	611
Total vaginal deliveries (n)	41,218	34,184

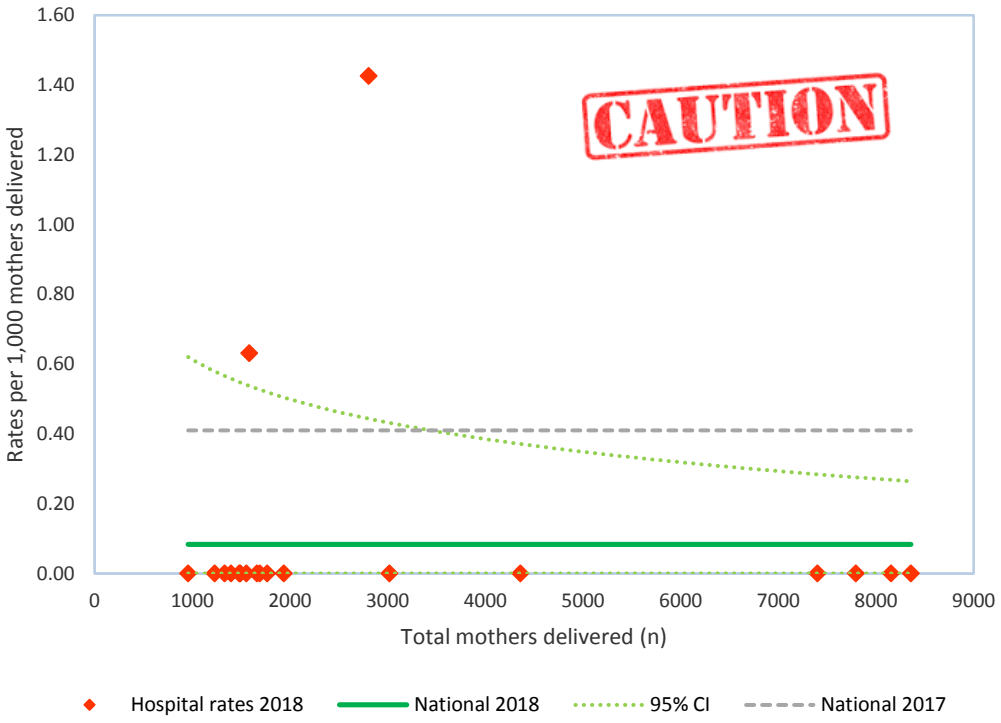
**Based on data from 18 maternity hospitals/units (data unavailable from one tertiary hospital due to an ongoing data quality improvement project).*

Note:
The rate of severe perineal tears among women with vaginal deliveries has declined by 5.9% since the IMIS began in 2014 (see Appendix 11). The rate varies from 0.4% to 2.7%. Similar variation exists across European countries, for example, from 0.1% in Romania to 4.9% in Iceland.[7]

7 Blondel B, Alexander S, Bjarnadóttir RI, et al. Variations in rates of severe perineal tears and episiotomies in 20 European countries: a study based on routine national data in Euro-Peristat Project. Acta Obstet Gynecol Scand. 2016 Jul; 95(7):746-54.

Indicator #25: Postpartum neuropathy

Definition Number of women diagnosed during the current month with persistent (24-48 hours) partial lower limb or body weakness or numbness causing patient distress or loss of function. Related terms include postpartum palsy or lesion of femoral nerve.



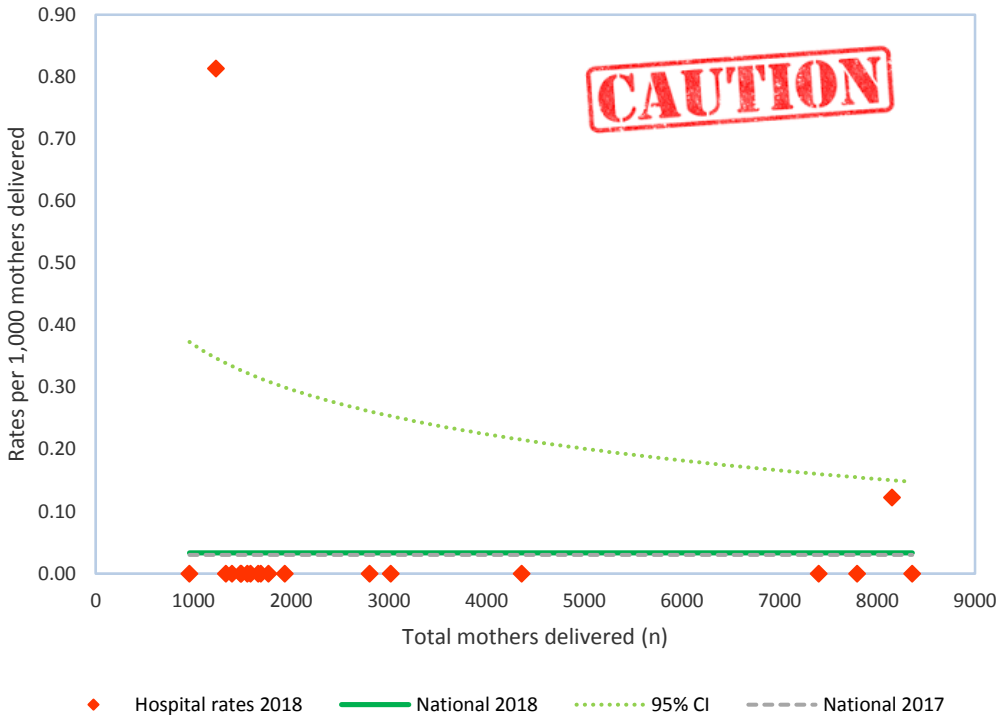
	2017	2018
Rates *(per 1,000 mothers)*	0.41	0.08
95% CI	0.25-0.57	0.01-0.16
Total postpartum neuropathy (n)	25	5
Total mothers (n)	60,744	59,981

Note:

Following a review of this metric, it was agreed to remove it from the IMIS at the end of 2018.

Indicator #26: Miscarriage misdiagnosis

Definition Number of women diagnosed during the current month with a spontaneous miscarriage when a subsequent ultrasound confirms an ongoing pregnancy.



	2017	2018
Rates *(per 1,000 mothers)*	0.03	0.03
95% CI	0.00-0.08	0.00-0.08
Total miscarriage misdiagnoses (n)	2	2
Total mothers (n)	60,744	59,981

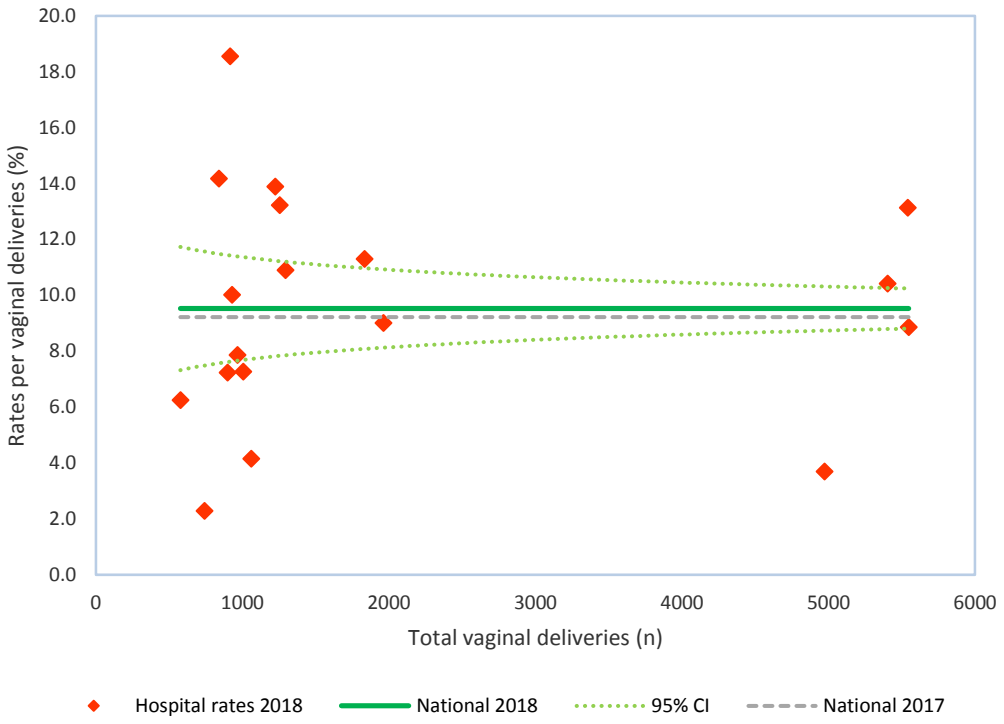
Note:

Two cases of miscarriage misdiagnosis were reported in 2018, following two cases in 2017. This is disappointing, given improvements in Early Pregnancy Assessment Units after 2011 (Ledger and Turner, 2016) and the development of a national training program and the national clinical guideline, *Management of Early Pregnancy Miscarriage (2012)*. While miscarriage is common, estimated as affecting one in five pregnancies, incorrect diagnosis of miscarriage may result in some pregnancies being terminated unnecessarily.

Caution is advised when dealing with small numbers.

Indicator #27: Primary postpartum haemorrhage

Definition Number of women during the current month with one episode of blood loss of ≥500ml following a vaginal delivery and prior to discharge from the labour ward to the postnatal ward. Count both minor postpartum haemorrhage (i.e., 500-1,000ml) and major/severe PPH (>1,000ml). Do not count secondary PPH. Do not count cases of haemorrhage following Caesarean section.



	2017*	2018*
Rates *(% total vaginal deliveries)*	9.2%	9.5%
95% CI	8.9-9.5	9.2-9.8
Total PPH (n)	3,539	3,521
Total vaginal deliveries (n)	38,394	36,957

**Based on data from 18 maternity hospitals/units.*

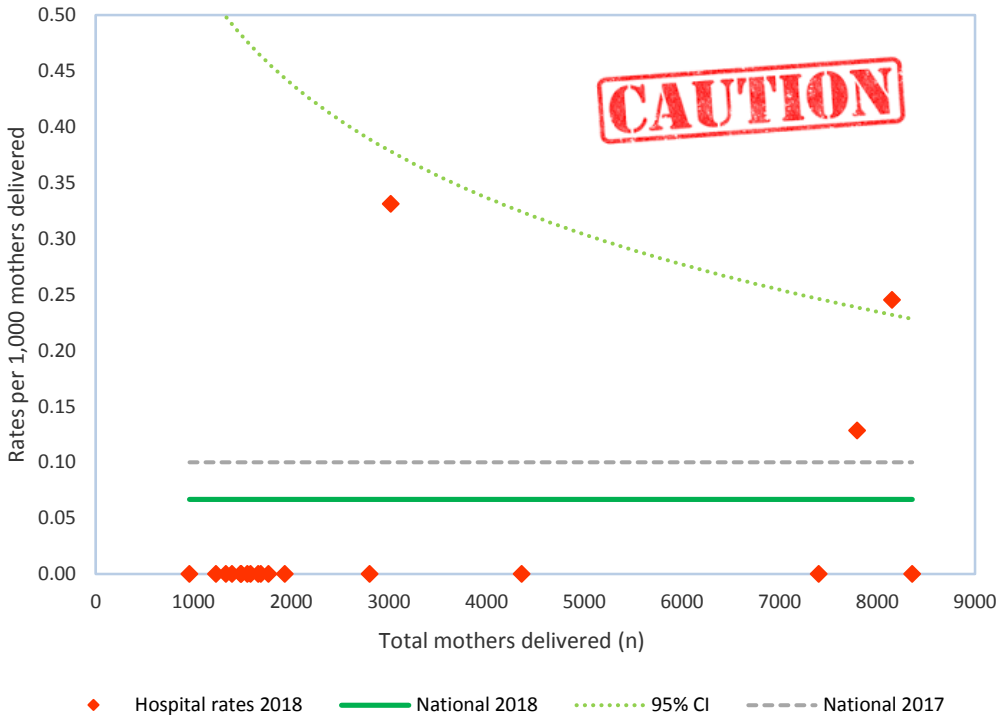
Note:

Nationally, the rate of PPH remained fairly consistent on the previous year. There is a high level of variation in 2018, from 2.3% at one hospital to 18.6% in another. A review of this metric conducted during 2018 indicated the variation may be attributed to confusion around the definition and difficulties measuring minor blood loss of 500-1,000ml. It was agreed to change the definition from 1st January 2019 to measure major/severe PPH (>1,000ml).

Caution is advised when dealing with small numbers.

Indicator #28: Retained swabs

Definition Number of women during the current month who have a swab retained unintentionally in the vagina after a vaginal delivery.

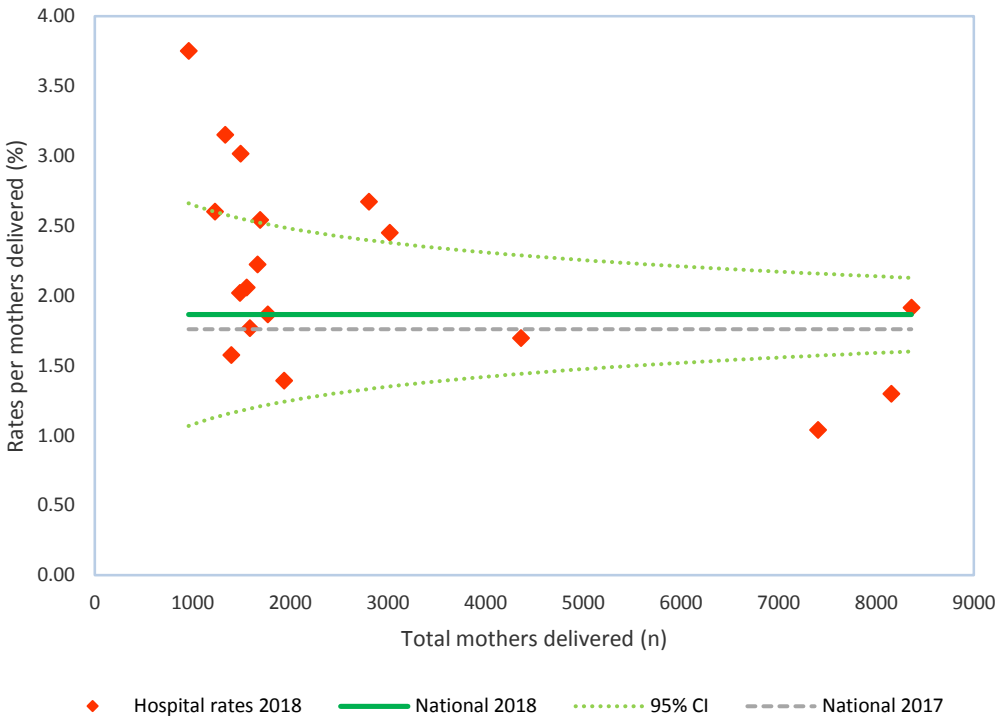


	2017	2018
Rates *(per 1,000 mothers)*	0.10	0.07
95% CI	0.02-0.18	0.00-0.13
Total retained swabs (n)	6	4
Total mothers (n)	60,744	59,981

Delivery Metrics

Indicator #29: General anaesthetic for Caesarean sections

Definition Number of women during the current month who underwent a Caesarean section and were administered a general anaesthetic (GA), including primary GA and also conversion to GA from regional anaesthetic (epidural or spinal).



	2017	2018*
Rates *(% total mothers)*	1.8%	1.9%
95% CI	1.7-1.9	1.8-2.0
Total GA for CS (n)	1,067	973
Total mothers (n)	60,744	52,186

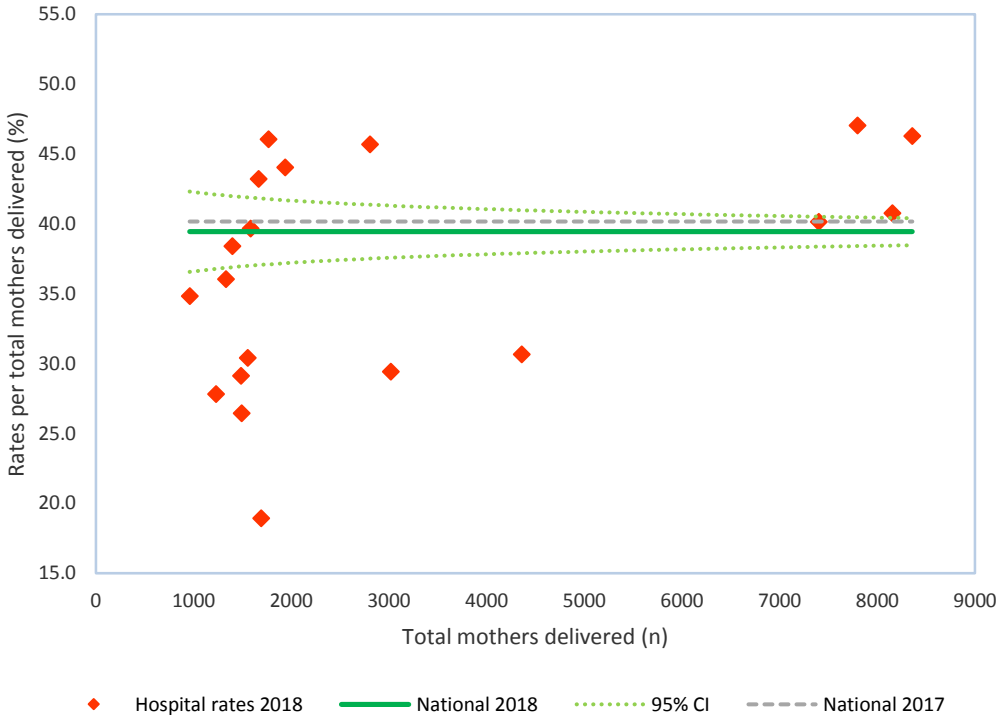
**Based on data from 18 maternity hospitals/units.*

Note:

The rate of GA for Caesarean sections per total Caesarean sections was 4.8% (4.5-5.1). This compares with 5.5% (5.2-5.8) in 2017.

Indicator #30: Labour epidurals

Definition Number of women for whom labour epidurals were administered during the current month, including neuraxial block during labour and neuraxial block during labour and delivery procedure.



	2017	2018
Rates *(% total mothers)**	40.2%	39.4%
95% CI	39.8-40.6	39.1-39.8
Total labour epidurals (n)	24,400	23,657
Total mothers (n)	60,744	59,981

** The base 'per total mothers delivered' is a proxy denominator for total women in labour.*

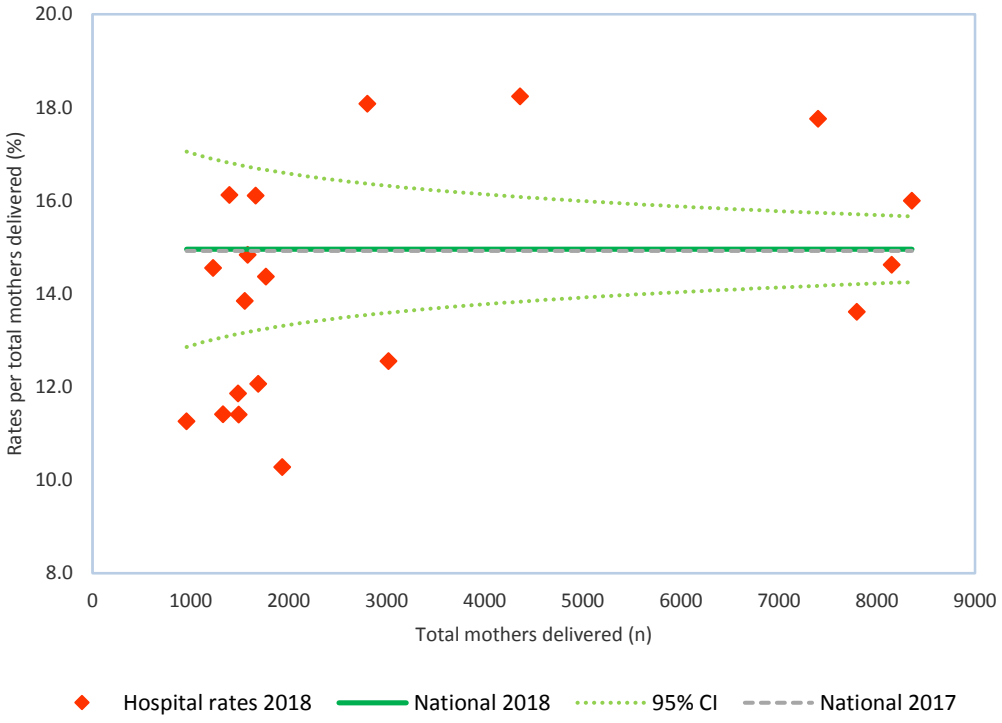
Note:

There is over-dispersion in the funnel chart (i.e., most of the maternity units lie beyond the 95% thresholds), with rates ranging from 18.9% at one hospital to 47.0% at another.

When viewing this metric along with the rate of GA for CS, eight of the ten maternity units below the national rate for labour epidurals lie above the national rate for GA for CS, which may be an indication of anaesthetic staffing at these units.

Indicator #31: Operative vaginal delivery (OVD) (total)

Definition Number of women undergoing operative vaginal delivery (OVD), or instrumental delivery, including forceps delivery and vacuum extraction, assisted breech delivery with forceps to after-coming head and breech extraction with forceps to after-coming head. Excludes failed forceps and failed vacuum extraction.



	2017	2018
Rates *(% total mothers)*	14.9%	15.0%
95% CI	14.6-15.2	14.7-15.2
Range *(% total mothers)*	9.1%-18.7%	10.3%-18.2%
Total OVD (n)	9,066	8,970
Total mothers (n)	60,744	59,981

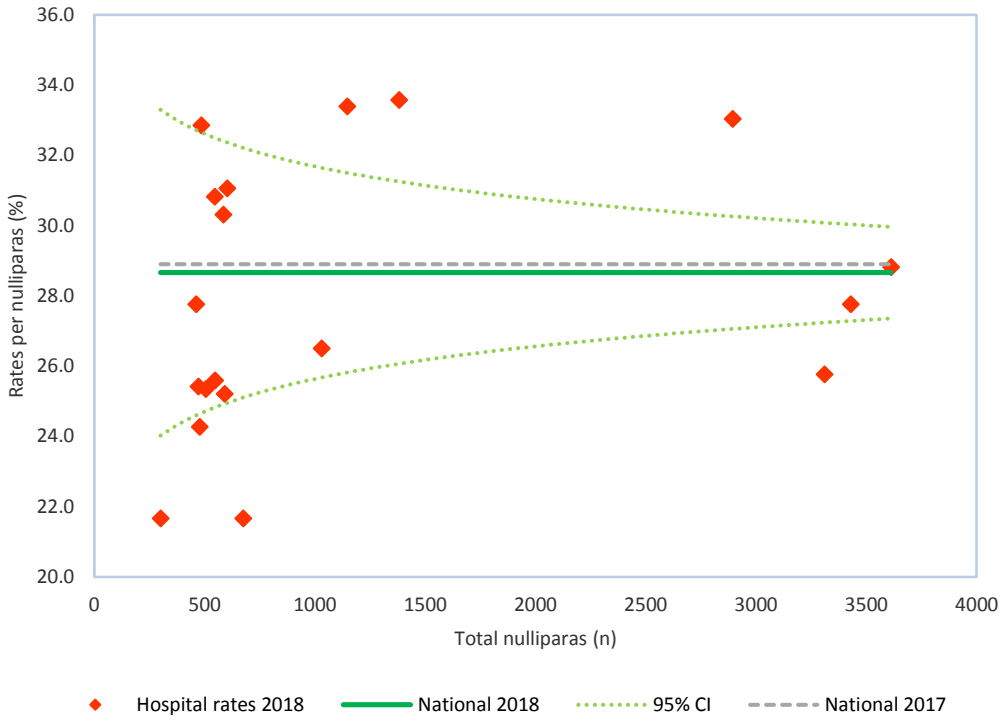
Notes:

The rate of OVD has fallen by 3.5% (p=0.05) since the IMIS began in 2014. The trends in variations across hospitals and declining rates (see Appendix 11) are reflected in international research.[8] Declining and diverse usage of OVD procedures, as well as variations in the instruments of choice by obstetricians, have serious implications for obstetric training.

8 Merriam AA, Ananth CV, Wright JD, et al. Trends in operative vaginal delivery, 2005-2013: a population-based study. BJOG 2017;124(9): 1365. Hubena Z, Workneh A, Siraneh Y. Prevalence and outcome of operative vaginal delivery among mothers who gave birth at Jimma University Medical Centre, Southwest Ethiopia. Journal of Pregnancy, 2018, Article 7423475.

Indicator #31a: OVD among nulliparas

Definitions as before



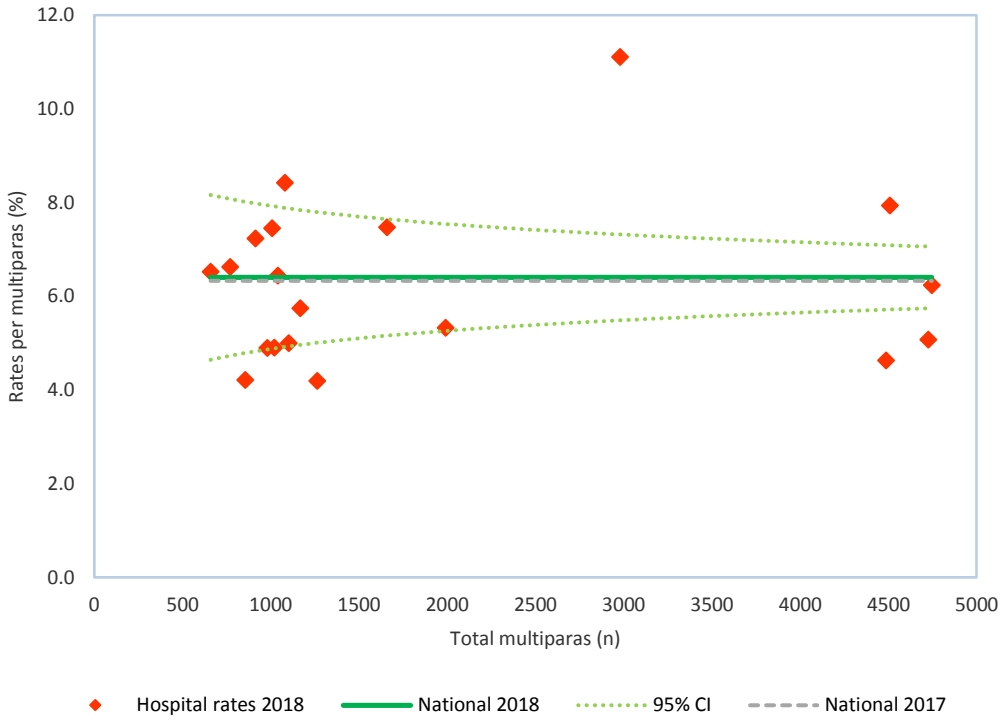
	2017	2018
Rates *(% nulliparas)*	28.9%	28.7%
95% CI	28.3-29.5	28.1%-29.2%
Range *(% nulliparas)*	21.5%-36.8%	21.7%-33.6%
OVD among nulliparas (n)	6,686	6,605
Total nulliparas (n)	23,137	23,047

Note:

The variation in OVD rates is particularly acute among nulliparas, ranging from approximately 22% in one hospital to 34% in another.

Indicator #31a: OVD among multiparas

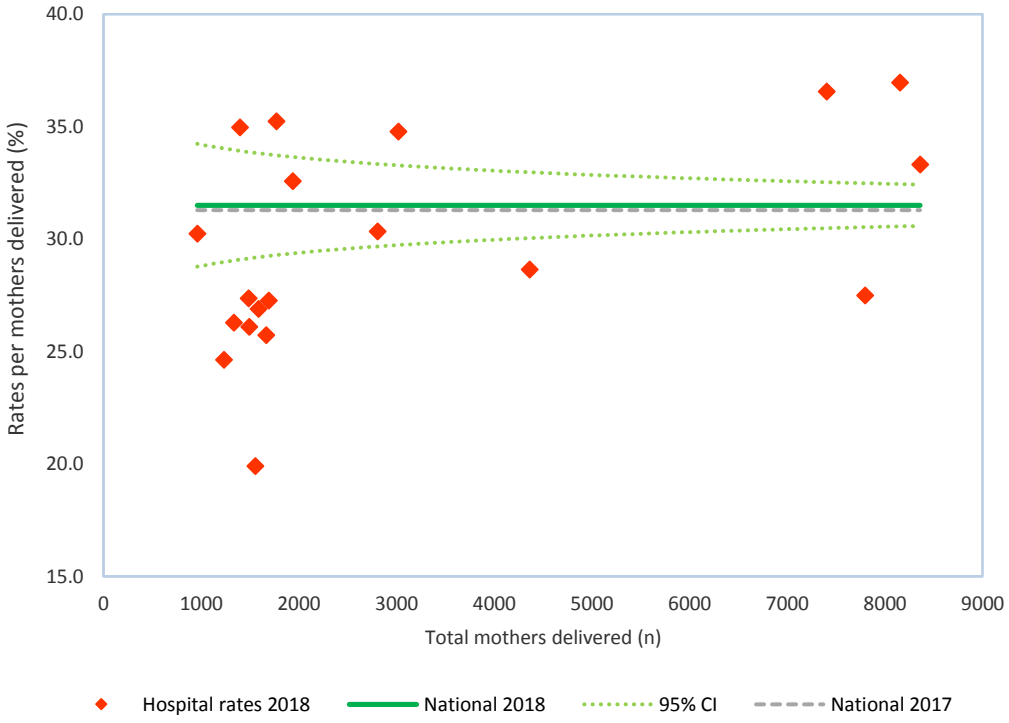
Definitions as before



	2017	2018
Rates *(% multiparas)*	6.3%	6.4%
95% CI	6.1-6.6	6.2%-6.7%
Range *(% multiparas)*	3.2%-10.5%	4.2%-11.1%
OVD among multiparas (n)	2,380	2,365
Total multiparas (n)	37,607	36,934

Indicator #32: Inductions of labour (IoL) (total)

Definition Number of women during the current month undergoing inductions of labour, including medical and/or surgical inductions of labour. Include use of oxytocin, prostaglandin, or other. Include artificial rupture of membranes or other surgical means. Include synchronous medical and surgical IoL.



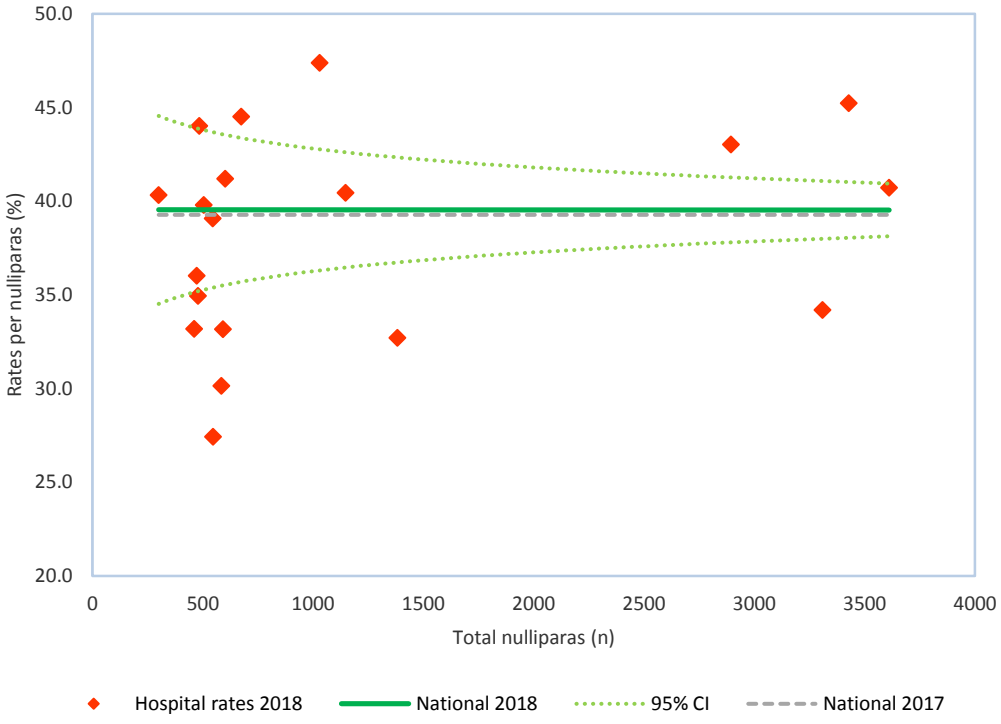
	2017	2018
Rates *(per total mothers, %)*	31.3%	31.5%
95% CI	30.9-31.7	31.1%-31.9%
Range *(% mothers)*	19.7%-35.8%	19.9%-37.0%
Inductions of labour (total) (n)	19,004	18,900
Total mothers (n)	60,744	59,981

Note:
The rate of IoL has increased by 6.5% (p=0.25) since the IMIS began in 2014. There is wide variation in IoL rates across hospitals, from approximately 20% to 37%. Similar variation is reflected in research (Sinnott et al., 2016)[9]. The IMIS does not explore reasons for variations, but explanations probably include clinical factors, sociodemographic trends, and organisational behaviour and practices. There is no known optimum rate of induction of labour.

9 Sinnott SJ, Layte R, Brick A, Turner MJ. (2016). Variation in induction of labour rates across Irish hospitals: A cross-sectional study. *European Journal of Public Health, 2016, June 5*.

Indicator #32a: IoL among nulliparas

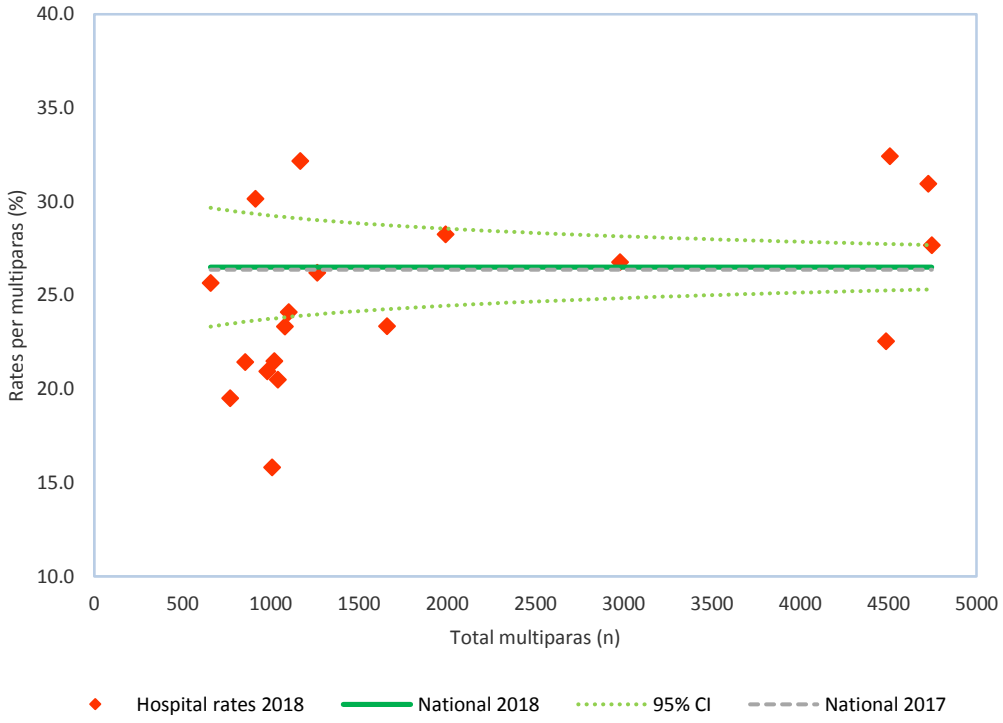
Definitions as before



	2017	2018
Rate *(% total nulliparas)*	39.3%	39.5%
95% CI	38.6-39.9	38.9%-40.2%
Range *(% nulliparas)*	25.4%-45.2%	27.4%-47.4%
IoL among nulliparas (n)	9,086	9,111
Total nulliparas (n)	23,137	23,047

Indicator #32b: IoL among multiparas

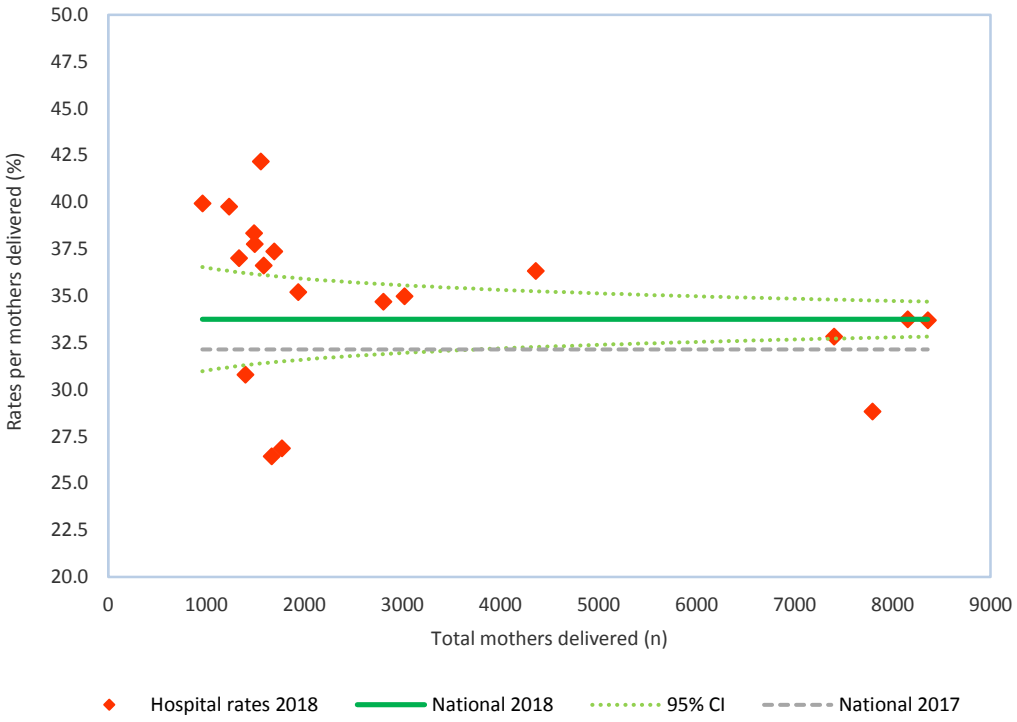
Definitions as before



	2017	2018
Rate *(per total multiparas, %)*	26.4%	26.5%
95% CI	25.9-26.8	26.1%-27.0%
Range *(% multiparas)*	16.8%-31.6%	15.8%-32.4%
IoL among multiparas (n)	9,918	9,789
Total multiparas (n)	37,607	36,934

Indicator #33: Caesarean sections (total)

Definition Number of women during the current month giving birth by Caesarean section (CS), including elective classical Caesarean section, emergency classical Caesarean section, elective lower segment Caesarean section, and emergency lower segment Caesarean section.



	2017	2018
Rate *(per total mothers, %)*	32.1%	33.8%
95% CI	31.8-32.5	33.4%-34.1%
Range *(% mothers)*	26.2%-38.7%	26.4%-42.2%
Total Caesarean sections (n)	19,526	20,249
Total mothers (n)	60,744	59,981

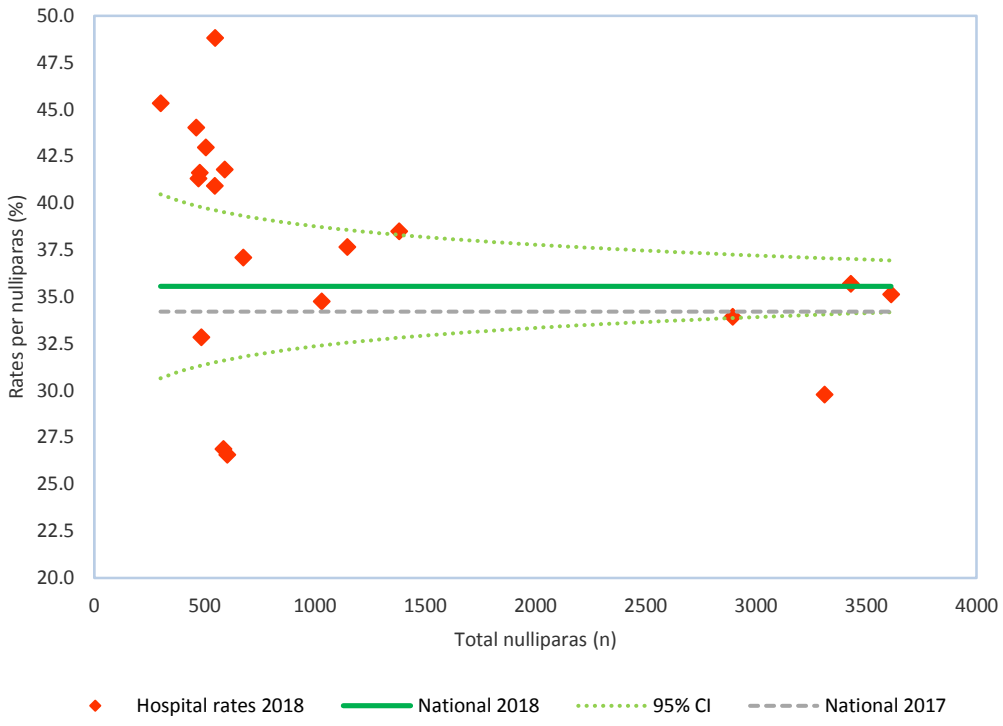
Note:

Since the IMIS began in 2014, the CS rate has risen by 13.9% (p=0.00) (see Appendix 11). There is considerable variation in CS rates across maternity units, ranging from approximately 26% to 42%. In terms of the increasing rates and variation across hospitals, research indicates Ireland is largely similar to other jurisdictions.[10]

10 Betrán AP, Ye J, Moller AB, et al. 2016. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. PlosOne https://doi.org/10.1371/journal.pone.0148343

Indicator #33a: CS among nulliparas

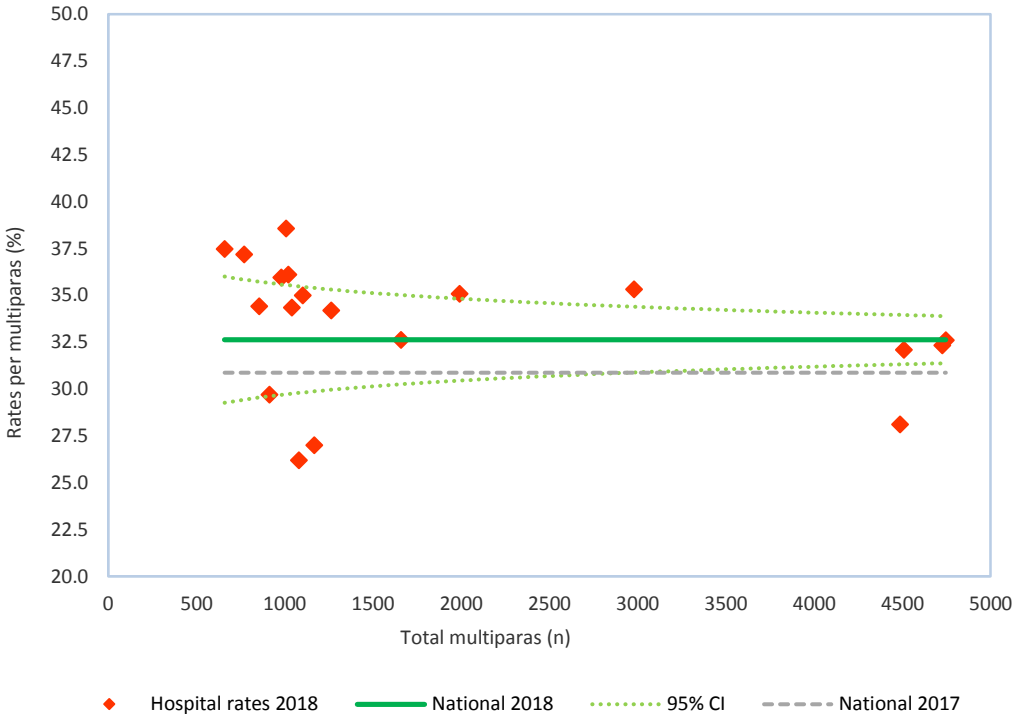
Definitions as before



	2017	2018
Rate *(per total nulliparas, %)*	34.2%	35.6%
95% CI	33.6-34.8	35.0%-36.2%
Range *(% nulliparas)*	29.5%-44.5%	26.6%-48.8%
CS among nulliparas (n)	7,916	8,196
Total nulliparas (n)	23,137	23,047

Indicator #33b: CS among multiparas

Definitions as before



	2017	2018
Rate *(per total multiparas, %)*	30.9%	32.6%
95% CI	30.4-31.3	32.2%-33.1%
Range *(% multiparas)*	24.8%-37. 0%	26.2%-38.6%
CS among multiparas (n)	11,610	12,053
Total multiparas (n)	37,607	36,934

Appendices

Appendix 1: Acknowledgements

IMIS Officers/Teams in maternity units:

Karen Malocca, Ann Arnott, Margaret Mulvany, Cavan General Hospital
Claire Everard, Cork University Maternity Hospital
Julie Sloane, Emma McNamee, Coombe Women & Infants University Hospital
Claire Shannon, Our Lady of Lourdes Hospital, Drogheda
Anne-Marie Grealish, Claire Greaney, Galway University Hospital
Mary Stack-Courtney, University Hospital Kerry
Connie McDonagh, Fiona Dalton, Paula Power, St Luke's Hospital, Kilkenny
Shane Neary, Evelyn Smith, Eileen Egan, Marion Doogan, Letterkenny UH
Stephen Culligan, Mary O'Brien, University Maternity Hospital Limerick
Andrea McGrail, Síle Gill, Mayo General Hospital, Castlebar
Marie Corbett, Midland Regional Hospital, Mullingar
Fionnuala Byrne, National Maternity Hospital, Dublin
Priscilla Neilan, Marie-Christine de Tavernier, Portiuncula University Hospital
Ita Kinsella, Midland Regional Hospital, Portlaoise
Kathy Conway, Rotunda Hospital, Dublin
Madeleine Munnelly, Juliana Henry, Sligo University Hospital
Sinéad Heaney, Mary O'Donnell, South Tipperary General Hospital
Paula Curtin, University Hospital Waterford
Helen McLoughlin, Wexford General Hospital

Advisory Subgroup:

Ms June Boulger, HSE
Mr Alan Cahill, Department of Health (from 2014)
Ms Deirdre Carey, HSE (until 2017)
Ms Anne Gallen, HSE Nursing & Midwifery Planning and Development Unit
Dr Howard Johnson, HSE Health Intelligence Unit
Ms Aoife Lawton, HSE
Dr John Loughrey, Consultant Anaesthetist, Rotunda Hospital
Dr Bob McDonnell, HSE Health Intelligence Unit (until 2017)
Dr Hugh Magee, Department of Health (2013-14)
Dr Jennifer Martin, HSE (until 2015)

Appendix 2: IMIS Data Collection Form, 2018

		Previous year		Current year	
		Month	YTD	Month	YTD
HOSPITAL ACTIVITIES					
1.	Mothers delivered ≥ 500g (n)				
2.	Multiple births (n)				
3.	Total nulliparas (n)				
4.	Total multiparas (n)				
5.	EPAU first visits (n)				
6.	Maternal transfers (n)				
7.	Maternal deaths (n)				
8.	Total births ≥ 500g (n)				
9.	Perinatal deaths (total) (n)				
10.	Perinatal deaths ≥ 2.5kg without a congenital anomaly (n)				
NEONATAL METRICS					
11.	Neonatal encephalopathy (n)				
12.	Brachial plexus palsy (n)				
13.	Whole body neonatal cooling (n)				
14.	In-utero transfers admitted (n)				
15.	In-utero transfers sent out (n)				
LABORATORY METRICS					
16.	Maternal bacteraemia (n)				
17.	Early-onset neonatal bacteraemia (n)				
18.	Obstetric blood transfusions (n)				
SERIOUS OBSTETRIC METRICS					
19.	Ectopic pregnancy (n)				
20.	Eclampsia (n)				
21.	Uterine rupture (n)				
22.	Peripartum hysterectomy (n)				
23.	Pulmonary embolism (n)				
24.	Perineal tears (3^{rd} / 4^{th} degree) (n)				
25.	Postpartum neuropathy (n)				
26.	Miscarriage misdiagnosis (n)				
27.	Primary postpartum haemorrhage (labour ward) (n)				
28.	Retained swabs (n)				
ANAESTHESIA METRICS					
29.	General anaesthetic for Caesarean sections (n)				
30.	Labour epidurals (n)				
DELIVERY METRICS					
31.	Operative vaginal deliveries (OVD) (total) (n)				
	31a. OVD among nulliparas (n)				
	31b. OVD among multiparas (n)				
32.	Induction of labour (IoL) (total) (n)				
	32a. IoL among nulliparas (n)				
	32b. IoL among multiparas (n)				
33.	Caesarean sections (CS) (total) (n)				
	33a. CS among nulliparas (n)				
	33b. CS among multiparas (n)				

Appendix 3: IMIS Implementation Guidelines

1. The IMIS is designed to capture and measure clinicial activities in the maternity unit. It is intended for within-hospital use: the data will be collected by hospital staff within the maternity hospital/unit and reviewed by senior hospital managers.
2. The IMIS should be based entirely on data sourced directly from maternity units.
3. Monthly completion of the IMIS is mandatory for the 19 maternity units.
4. The IMIS is approved by the National Implementation Group HSE/HIQA Maternity Services Investigations and is aligned with national recommendations in the Investigation Report of the HSE National Incident Management Team (2012); HIQA Investigation Report (2012); Report of Chief Medical Officer on Perinatal Deaths 2006-date (February 2014), Safety Incident Management Policy (June 2014), Review by Dr Peter Boylan (June 2015), the National Maternity Strategy 2016-2026, and the HSE Maternity Clinical Complaints Review (May 2016).
5. The Quality Assurance (QA) Officers in all 19 maternity units were nominated to work part-time on implementing the IMIS; the QA Officer should have access to maternity hospital/unit data files and should be accustomed to dealing with data within the hospital/unit.

IMIS Monthly data collection and reporting

6. The reporting period is the calendar month (i.e., from first to last day of the month).
7. The monthly report should be completed by the 20th day of the following month.
8. The QA Officer should send a monthly IMIS report to senior managers in the hospital/unit:
   - Chief Executive Officer or Master
   - Clinical Director(s), as appropriate
   - Director of Midwifery/Nursing
9. The senior managers should review the monthly IMIS. If they have concerns arising from the IMIS, these should be discussed with the clinical staff and, if appropriate, reported to the Hospital Board or equivalent. In the event of concerns with national implications arising, these should be reported to the head of HSE Acute Hospitals Division via NWIHP.

IMIS Annual reporting

10. The annual IMIS data should be completed by **end of February** of the following year.
11. The QA Officer should send the annual IMIS data to the following people:
    a) Senior managers of the hospital (as above)
    b) NWIHP Programme Director
    c) IMIS Project Manager
12. Staff at the NWIHP will check and verify annual data in collaboration with staff at maternity hospitals/units.
13. The NWIHP will prepare IMIS reports and disseminate to maternity hospitals/units and relevant organisations.
14. If senior managers of the hospitals have concerns arising from the annual IMIS data, these should be discussed and escalated as above.
15. Reviews of the IMIS format will be conducted by the NWIHP and changes introduced on an annual basis.

Appendix 4: National recommendations

There follows an outline of the relevant national recommendations and initiatives produced since June 2013, which align with and support the IMIS as a management instrument for quality improvement in maternity services.

1. **HSE NIMT Recommendations, Incidental factor 1 (June 2013)**

   'The review team recommends consideration of a National Quality Assurance Programme of Obstetrics and Gynaecology as an initial step to maintain confidence amongst patients/services users, staff, the public administrators and regulators and to put into place safety systems and interventions before a catastrophe happens. Monthly workloads, clinical outcomes, and adverse incidents should be monitored by using a dashboard to include green, amber and red signals to warn of the possibilities of impending problems.' (HSE, June 2013).

2. **HIQA National Recommendations (October 2013)**

   In October 2013, the HIQA produced national statutory recommendations, two of which refer directly to quality assurance in the maternity services.

   'The HSE and key stakeholders should agree and implement effective arrangements for consistent, comprehensive national data collection for maternity services in order to provide assurance about the quality and safety of maternity services. This should include the development of an agreed and defined dataset and standardised data definitions to support performance monitoring, evaluation and management of key patient outcome and experience indicators.' (National Recommendation N16)

   'The arrangements for collecting, reviewing and reporting maternal morbidity and mortality should be reviewed by the HSE to facilitate national and international benchmarking for improved learning and safety in the provision of maternity services. This should include a formal process for the implementation of recommendations of the Confidential Maternal Death Enquiries.' (National Recommendation N17)

3. **HSE Midland Regional Hospital, Portlaoise, Report of Chief Medical Officer on Perinatal Deaths 2006-date (2014):**

   In February 2014, Dr Tony Holohan, Chief Medical Officer, reported to the Minister for Health Dr James Reilly TD, about perinatal deaths in Portlaoise. The report contained a list of recommendations, several of which are relevant to quality and safety (and measurement) in the maternity services and which led to the development (by the HSE Acute Hospitals Division, the Clinical Programme in Obstetrics and Gynaecology, the HSE Quality Assurance and Verification Division, and the HSE Quality Improvement Division) in May 2015 of the Maternity Patient Safety Statement (MPSS). The MPSS is intended to be a monthly statement on the quality of care in maternity units. It is based on the design of the IMIS and uses 16 IMIS indicators.

Theme IV recommendations:

- The HSE should issue a directive to all providers to require them to notify the director of quality and patient safety and HIQA of all 'never events' (R.21)
- The HSE should ensure that every maternity service (and later every health service provider) should be required to complete a Patient Safety Statement which is published and updated monthly (R.22) (O.R.10)

Overall recommendations:

- Every maternity service (and later every health service provider) be required to complete a Patient Safety Statement which is published and updated monthly (O.R.10)
- The Patient Safety Statement should be a requirement of hospital licensing (R.23) (O.R.10)
- A National Patient Safety Surveillance system should be established by HIQA (O.R.11)

4. Safety Incident Management Policy (June 2014)

In June 2014, the HSE National Incident Management Team drafted the Safety Incident Management Policy, which was approved by Dr Philip Crowley, National Director Quality and Patient Safety, HSE. The purpose of the document is to set out the HSE policy for managing safety incidents across a range of areas, including surgical events, product or device events, patient protection events, care management events, environmental events, and criminal events. Several of the Serious Reportable Events (SRE) are relevant to maternity services.

5. Report of the investigation into the safety, quality and standards of services provided by the Health Service Executive to patients in the Midland Regional Hospital, Portlaoise (May 2015)

Recommendation 6c: 'The Health Service Executive (HSE), along with the chief executive officers of each hospital group, must ensure that the new hospital groups prioritise the development of strong clinical networks underpinned by regular evaluation and audit of the quality and safety of services provided.'

6. Report, Dr Peter Boylan, 'A Review of 28 Maternity Case Notes' (June 2015)

Recommendation: 'Each hospital in the State should implement a formal system of audit of pregnancy outcome classified according to the Ten Groups Classification as recently endorsed by the WHO. This audit should take place on a monthly basis and involve all relevant clinicians. Each hospital needs to supply relevant administrative support.' […] 'Using data from individual maternity units, an annual audit of Irish maternity services should be implemented without delay.' […] 'Ongoing audit in this manner will allow a pattern of adverse outcomes to be identified in a timely fashion so that appropriate action can be taken.'

7. 'Creating a better future together', National Maternity Strategy 2016-2026 (2017)

Action: Measurement and analysis for quality improvement and safety will occur at national, network and service level, based on an agreed minimum dataset (Action 4.14.5).

8. HSE Maternity Clinical Complaints Review (May 2017)

The final report of the Maternity Clinical Complaints Review concluded a review process commissioned by the HSE in 2014. The report reviewed complaints received from patients and their families and outlined recommendations for all maternity services nationally.

Recommendation: 'External oversight should be provided in order to assure the public of the quality of maternal services. The National Women and Infants Health Programme (NWIHP) should develop a model to ensure external oversight is applied across each hospital group. The Irish Maternity Indicator System (IMIS) currently provides information for local scrutiny of clinical maternity activity. The NWIHP will expand the role of IMIS to provide for Group and National level oversight, as well as local.'

9. HSE National Maternity Strategy Implementation Plan (October 2017)

Developed by the National Women and Infants Health Programme (NWIHP) in 2017, the Implementation Plan stipulates that the IMIS will be the agreed measurement instrument for quality improvement and safety at national, network and service level and the IMIS will form part of the standing agenda for monthly meetings with the maternity networks.

Appendix 5: IMIS data and methods

Data

The IMIS data for 2018 were provided by nominated QA Officers at the maternity hospitals/units and checked and verified by the NWIHP and NCPOG in collaboration with the QA Officers. Comparative national data for the national longitudinal trends were drawn from the National Perinatal Reporting System (NPRS),[11] obtained from the HSE, and the Hospital In-Patient Enquiry system (HIPE).[12]

Methods

The IMIS data were analysed using MS Excel. National rates were calculated for all maternity units and hospital-level rates were calculated for each unit individually. Confidence intervals at 95% levels were calculated and customised funnel charts were designed for the IMIS indicators.

Funnel charts

Funnel plots are a form of scatter plot in which observed area rates are plotted against area populations. Control limits are then overlaid on the scatter plot. The control limits represent the expected variation in rates assuming that the only source of variation is stochastic (i.e., including a random variable). The control limits are computed in a fashion very similar to confidence limits and exhibit the distinctive funnel shape as a result of smaller expected variability in larger populations.

Funnel plots are useful where observations for different hospitals are based on varying sample sizes. The funnel-shaped confidence limits indicate that, as sample sizes decrease, an observation must be further from the national rate to be considered significantly different. The purpose of the charts is to enable each maternity unit to observe their position relative to the national benchmark and the upper and lower control limits.

Caution is advised where small values are concerned.

Maternity hospitals/units lying beyond the confidence limits on the funnel plots may be considered in a 'warning' sector. However, since no statistical analysis has been conducted to take formal account of the multiple characteristics that are not shown in the funnel plot, in this report crossing a threshold does not indicate high or low 'quality'. We recommend senior managers at maternity units should investigate the reasons for the variation at the hospital level before action is taken.

Several funnel plots in this report show evidence of a phenomenon known as overdispersion (Spiegelhalter 2005).[13] This overdispersion is not an unusual phenomenon in health data and, in fact, can be useful in model specification (Birkmeyer 2001).[14] Overdispersion occurs when a greater level of variability is demonstrated than can be explained by chance and the existence of a small number of outlying maternity hospitals/units.

Potential explanations for overdispersion are differences in data quality, lack/limitations of risk adjustment, and clinical uncertainty. Given that no risk adjustment has been executed in the analysis presented in this report, it is likely that these are the underlying reasons for much of the

11 The NPRS provides national statistics on perinatal events based on approximately 70,000 birth records each year from 19 maternity units and all practicing self-employed community midwives.

12 The HIPE provides demographic, administrative, and clinical data on inpatient and day-case discharges from publicly-funded acute hospitals in Ireland.

13 Spiegelhalter DJ. (2005). Handling over-dispersion of performance indicators. *Qual Saf Health care 14*: 347–51.

14 Birkmeyer JD. (2001). Primer on geographic variation in health care. *Effective Clinical Practice 4*(5): 232-33.

systematic variation between units. Consequently, it would be premature to draw conclusions from the charts alone about whether differences in the patterns of maternity care provision reflect differences in quality.

To compensate for the absence of statistical risk adjustment, notes are provided after the funnel charts. These notes contain crucial details that inform or explain the results. They are based on clinical expertise and hospital management experiences. The notes contribute explanations of the annual hospital rates where they lie above or below the national rates and, particularly, where they lie beyond the confidence limits**.**

Interpreting a funnel plot:

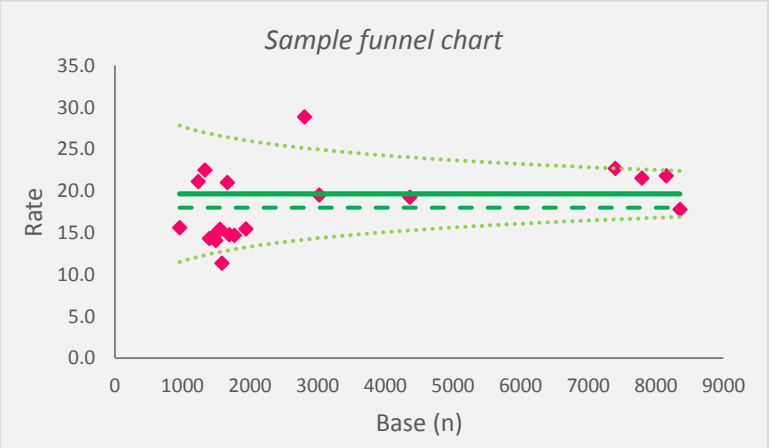
Diamond-shaped markers represent the 19 maternity hospitals/units.

The horizontal axis represents the base number (in most charts, the base is the number of total births or total maternities). The diamonds further to the right are maternity units with more births/maternities.

The vertical axis measures the frequency of the outcome, usually expressed as a percentage rate or rate per 1,000 mothers delivered or births. The diamonds placed higher up on the chart represent maternity units with higher rates of an outcome.

The solid horizontal green line shows the national rate in the current year. The horizontal dotted line shows the national rate in the previous year.

The dotted curved green lines constitute the statistical reference range or 95% confidence limits for the current year. The reference range defines what is regarded as the 'normal', or typical, range. Anything beyond the range is regarded as abnormal or non-standard. The reference range allows us to say that if the true value of the parameter lies beyond the 95% confidence limits, then an event has occurred which had a probability of 5% (or less) of happening by chance alone.



Appendix 7: Maternity hospitals/units in Republic of Ireland (n=19)

Appendix 8: HSE Maternity Networks

Ireland East	National Maternity Hospital, Dublin Midland Regional Hospital Mullingar St Luke's General Hospital, Kilkenny Wexford General Hospital
RCSI	Rotunda Hospital, Dublin Cavan General Hospital Our Lady of Lourdes Hospital, Drogheda
Dublin Midlands	Coombe Women and Infants University Hospital, Dublin Midland Regional Hospital Portlaoise
University Limerick	University Maternity Hospital Limerick
South/South West	Cork University Maternity Hospital South Tipperary General Hospital University Hospital Kerry University Hospital Waterford
Saolta	University Hospital Galway Letterkenny University Hospital Mayo University Hospital Portiuncula University Hospital Sligo University Hospital

Appendix 9: Relevant data sources/agencies

The following offices collect and provide health- and hospital-related data, including data on maternity and perinatal activities, in ROI:

BNF01 Birth Notification Form
Four-part form completed by staff at maternity hospitals/units for each live birth and stillbirth and returned to the HPO for distribution to CSO, GRO, and NPRS.

CSO Central Statistics Office
Ireland's national statistical office provides vital statistics, including births, stillbirths, and deaths.

GRO General Register Office
Central civil repository for records including births, stillbirths, and deaths in Ireland.

HIPE Hospital In-Patient Enquiry system
A health information system designed to collect demographic, clinical, and administrative data on hospital day cases and in-patients as well as deaths from acute hospitals nationally. The HIPE is the only source of morbidity statistics available nationally for acute hospital services. All acute public hospitals participate in HIPE, reporting on over 1.5 million records annually.

IMIS Irish Maternity Indicator System
The IMIS is a standardised data-based management tool for individual maternity hospitals/units and national analysis. Data are collected and reviewed monthly. National reports are published annually.

MPSS Maternity Patient Safety Statement
Initiated by the Department of Health, the MPSS is published for all maternity hospitals/units on a monthly basis and is intended to provide assurance that maternity services are delivered in an environment that promotes open disclosure.

NPEC National Perinatal Epidemiology Centre, University College Cork
The NPEC collaborates with maternity services and publishes annual data on perinatal mortality and severe maternal morbidity using a range of research methodologies and drawing on the HIPE data.

NPRS National Perinatal Reporting System
Based on data derived from the BNF01, the NPRS provides national statistics on perinatal events, in particular data on pregnancy outcomes, perinatal mortality, and important aspects of perinatal care.

NWIHP National Women and Infants Health Programme
Established in 2017, the NWIHP leads the management, organisation, and delivery of maternity, gynaecology and neonatal services in line with the National Maternity Strategy. The NWIHP is overseeing development of maternity networks and has responsibility for allocating development funding for maternity services.

Appendix 10: Glossary and Abbreviations

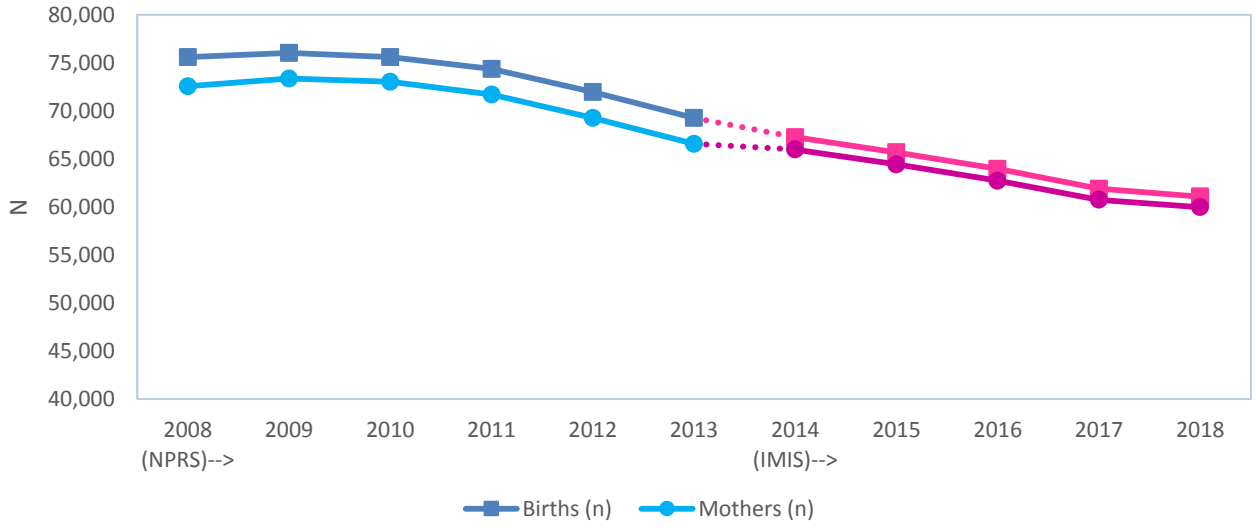
ACHI	Australian Classification of Health Interventions
BPP	Brachial plexus palsy
CA	Congenital anomaly
CS	Caesarean section
ECDC	European Centre for Disease Prevention and Control
EPAU	Early Pregnancy Assessment Units
GA	General anaesthetic
HIE	Hypoxic ischaemic encephalopathy
HIQA	Health Information and Quality Authority
HSE	Health Services Executive
ICD	International Classification of Diseases
IMIS	Irish Maternity Indicator System
IoL	Induction of labour
NE	Neonatal encephalopathy
HIPE	Hospital In-Patient Enquiry system
HPO	Healthcare Pricing Office
NCG	National Clinical Guideline
NCPOG	National Clinical Programme for Obstetrics and Gynaecology
NPEC	National Perinatal Epidemiology Centre
NPRS	National Perinatal Reporting System
NWIHP	National Women and Infants Health Programme
OVD	Operative vaginal delivery
PPH	Postpartum haemorrhage
QA	Quality Assurance
WBNC	Whole body neonatal cooling
WHO	World Health Organisation

Appendix 11: National longitudinal trends, 2008-2018

1. Total births and total mothers

Total births: Number of live births and stillbirths weighing greater than or equal to 500 grams (in accordance with WHO guidelines), occurring during the current month.

Total mothers: Number of women delivering a baby weighing 500g or more.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Births (n)	75587	76023	75600	74377	71986	69267	67263	65680	63964	61902	61084
Mothers (n)	72574	73373	73032	71705	69263	66574	65987	64435	62736	60744	59981

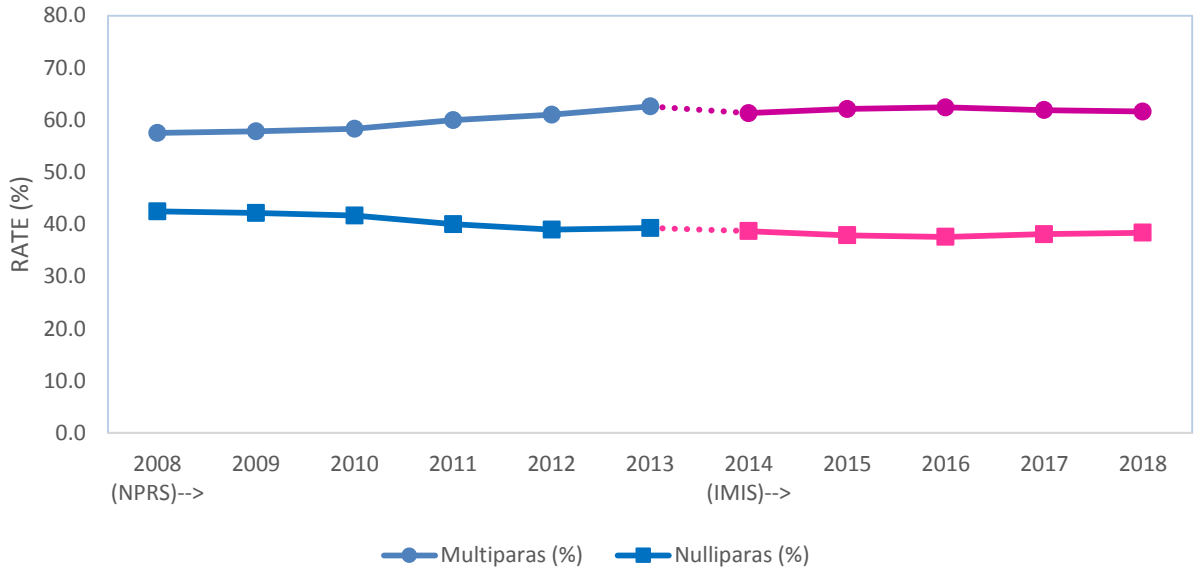
Sources: NPRS Annual Report 2013, IMIS 2014-2018

% changes	Total births	Total mothers
2008-18 (NPRS/IMIS)	-19.2% *(p=0.23)*	-17.4% *(p=0.23)*
2014-18 (IMIS)	-9.2% *(p=0.36)*	-9.1% *(p=0.36)*
2017-18 (IMIS)	-1.3% *(p=0.48)*	-1.3% *(p=0.48)*

2. Total nulliparas and Total multiparas

Nulliparas: Number of women delivering a baby ≥500g who have never had a previous pregnancy resulting in a live birth or stillbirth.

Multiparas: Number of women delivering a baby ≥500g who have had at least one previous pregnancy resulting in a live birth or stillbirth.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Multiparas (%)	57.5	57.8	58.3	60.0	61.0	62.6	61.3	62.1	62.4	61.9	61.6
Nulliparas (%)	42.5	42.2	41.7	40.0	39.0	39.3	38.7	37.9	37.6	38.1	38.4

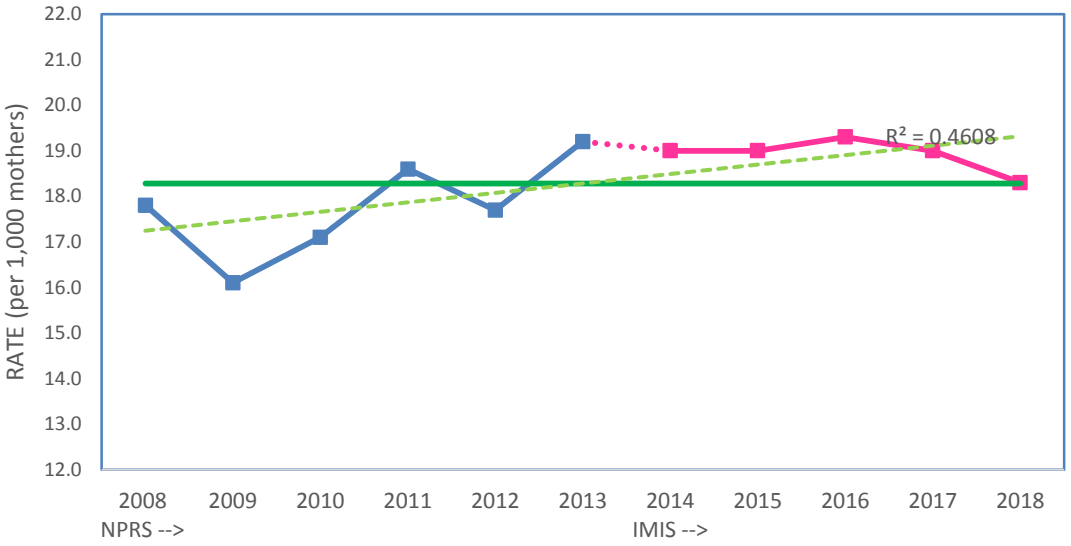
Sources: NPRS Annual Report 2013, IMIS 2014-2018

% changes	Multiparas	Nulliparas
2008-18 (NPRS/IMIS)	7.1% *(p=0.00)*	-9.6% *(p=0.00)*
2014-18 (IMIS)	0.4% *(p=0.21)*	-0.7% *(p=0.21)*
2017-18 (IMIS)	-0.5% *(p=0.34)*	*0.9% (p=0.34)*

3. Total multiple deliveries

Definition:

Number of multiple deliveries, based on the number of women with multiple births (not the number of babies delivered by mothers with multiple pregnancies) occurring during the current month. A multiple birth results when more than one baby is born from a single pregnancy.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Multiple deliveries*	17.8	16.1	17.1	18.6	17.7	19.2	19.3	19.0	19.3	19.0	18.3

**Rates per 1,000 mothers delivered*

Sources: NPRS Annual Report 2013, IMIS 2014-2018

% changes

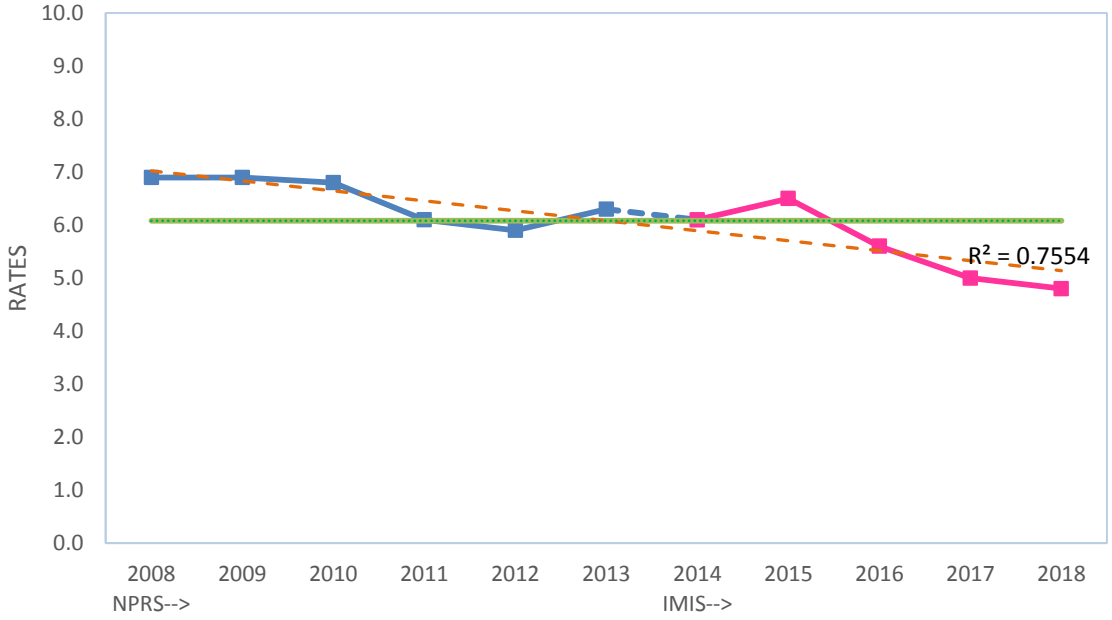
2008-18 (NPRS/IMIS)	2.9% *(p=0.44)*
2014-18 (IMIS)	-3.8% *(p=0.40)*
2017-18 (IMIS)	-3.8% *(p=0.33)*

4. Total perinatal death rate (IMIS) and Perinatal mortality rate (NPRS)

Definitions

IMIS: Number of deaths, including stillbirths and early neonatal deaths from delivery to six completed days occurring during the current month. A stillbirth in this report refers to the death of a fetus weighing ≥500g, irrespective of duration of pregnancy; an early neonatal death refers to the death of a live born infant during the first seven days of life. This metric is not adjusted to exclude congenital anomalies.

NPRS: Perinatal deaths include stillbirths and early neonatal deaths. Fetal death is defined as death prior to the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy. An early neonatal death refers to the death of a live born infant during the first week of life.



	NPRS						IMIS				
Rate calculations:	(Number of Stillbirths + Early Neonatal Deaths/ Total Live Births and Stillbirths) x 1,000.						(Number of stillbirths + early neonatal deaths/Total births) x 1000.				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
PMR (NPRS)/ Perinatal death rate (IMIS)	6.9	6.9	6.8	6.1	5.9	6.3	6.1	6.5	5.6	5.0	4.8

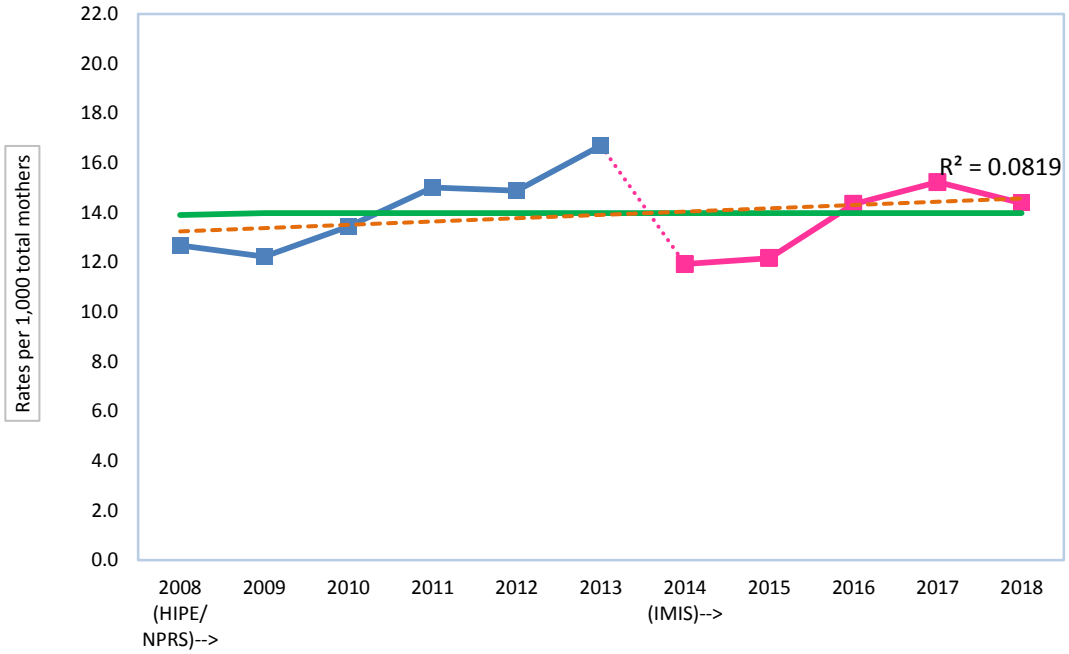
Sources: NPRS Annual Report 2013, IMIS 2014-2018

% changes:

2008-18 (NPRS/IMIS)	-30.5% *(p=0.00)*
2014-18 (IMIS)	-20.7% *(p=0.01)*
2017-18:	-4.2% *(p=0.34)*

5. Ectopic pregnancy

Definition: Number of women diagnosed during the current month with an ectopic pregnancy, including abdominal pregnancy, tubal pregnancy, ovarian pregnancy, and other/unspecified pregnancy. Do not source data on ectopic pregnancies from the HIPE.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	12.7	12.2	13.5	15.0	14.9	16.7	11.9	12.2	14.3	15.2	14.4

**Per 1,000 mothers delivered*

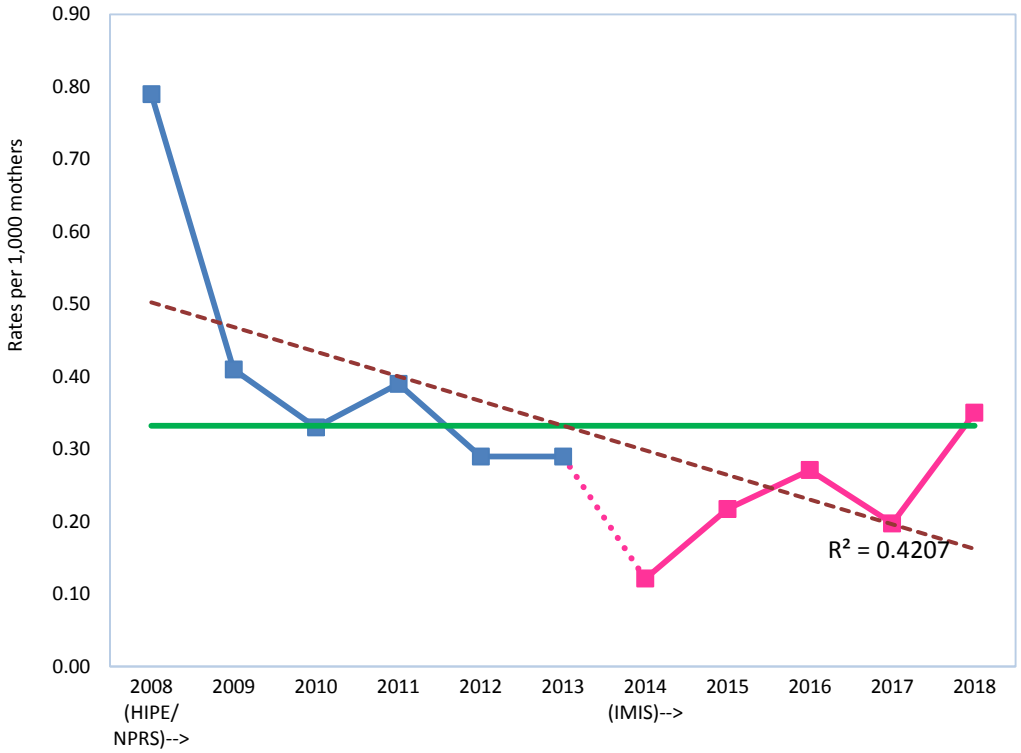
Sources: HIPE (closed national files for 2008-2013); NPRS 2008-2013; IMIS 2014-2018

% changes

2008-18 (HIPE/NPRS, IMIS): 13.5%; 2014-18 (IMIS): 17.1%; 2017-18 (IMIS): -5.5%

6. Eclampsia

Definition Number of women diagnosed during the current month with eclampsia during any antenatal hospital event or at delivery, including eclampsia in pregnancy, in labour, in the puerperium, and eclampsia unspecified as to time period. Does not include severe pre-eclampsia.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	0.79	0.41	0.33	0.39	0.29	0.29	0.12	0.22	0.27	0.20	0.35

**Per 1,000 mothers delivered*

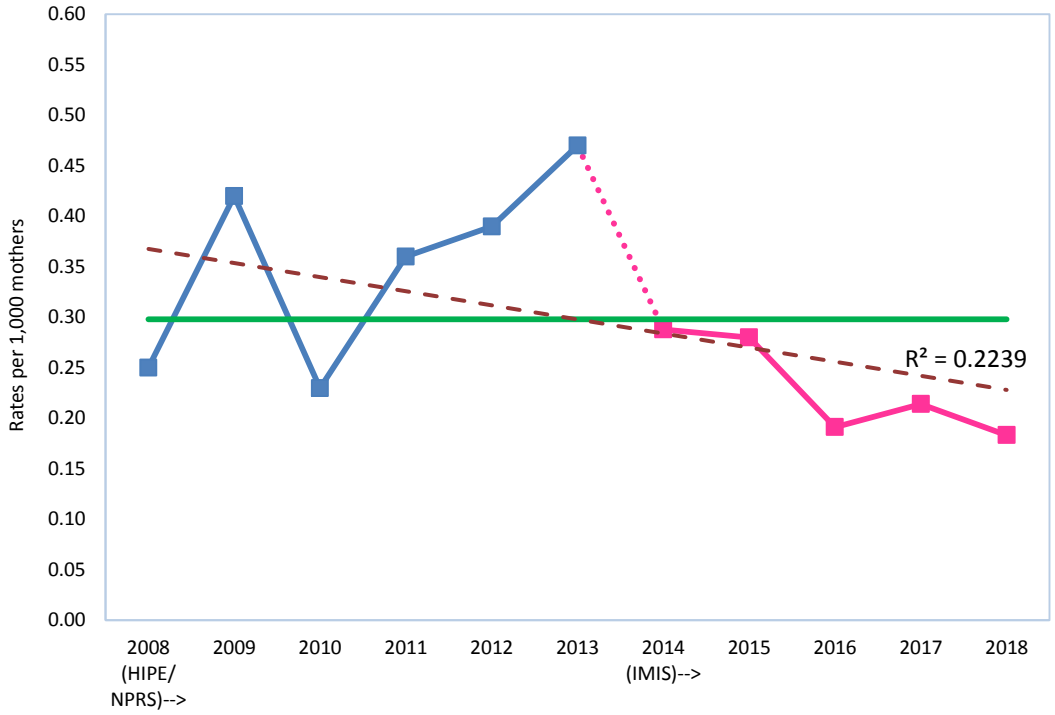
Sources: HIPE (closed national files for 2008-2013); IMIS 2014-2018

% changes:

2008-18 (HIPE/NPRS, IMIS): -77.2%; 2014-18 (IMIS): 188.7%; 2017-18 (IMIS): 77.2%

7. Uterine rupture

Definition Number of women diagnosed during the current month with rupture of uterus before onset of labour or during labour, including cases that may not be diagnosed until after delivery. The IMIS definition of uterine rupture refers to complete rupture.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	0.25	0.42	0.23	0.36	0.39	0.47	0.29	0.28	0.19	0.21	0.18

**Per 1,000 mothers delivered*

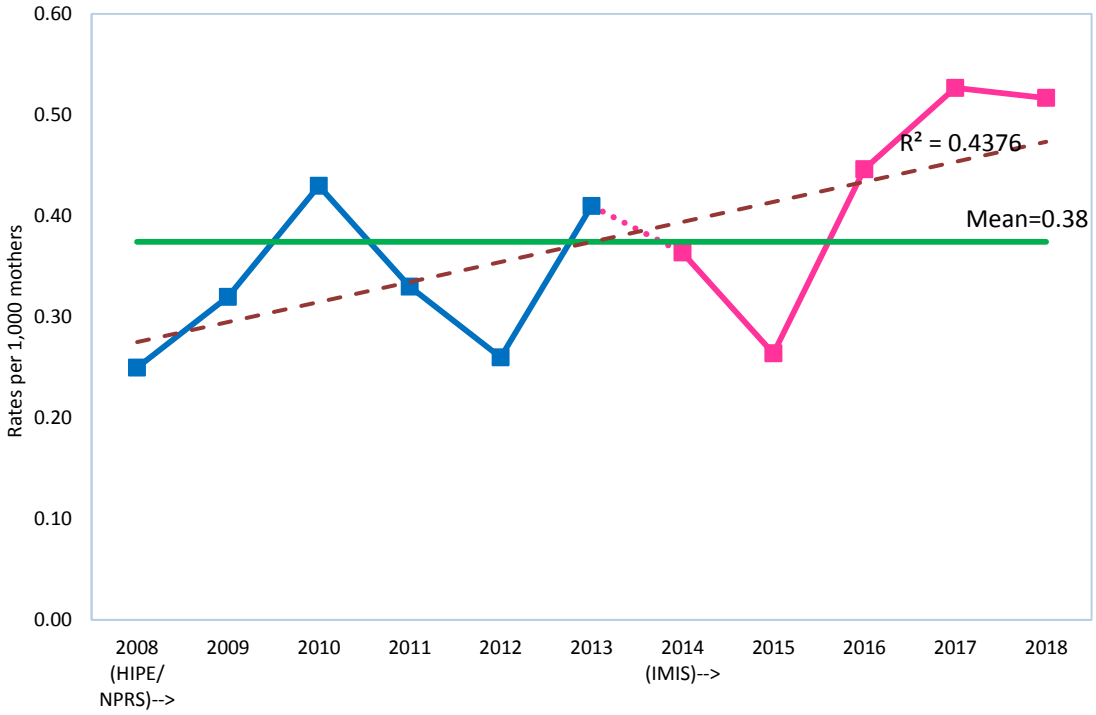
Sources: HIPE (closed national files for 2008-2013); IMIS 2014-2018

% changes:

2008-18 (HIPE/NPRS, IMIS): -26.6%; 2014-18 (IMIS): -36.3%; 2017-18 (IMIS): -14.3%

8. Peripartum hysterectomy

Definition Number of hysterectomy procedures completed during the current month, usually following a caesarean section, including hysterectomies performed during pregnancy and/or procedures within seven completed days after delivery.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	0.25	0.32	0.43	0.33	0.26	0.41	0.36	0.26	0.45	0.53	0.52

**Per 1,000 mothers delivered*

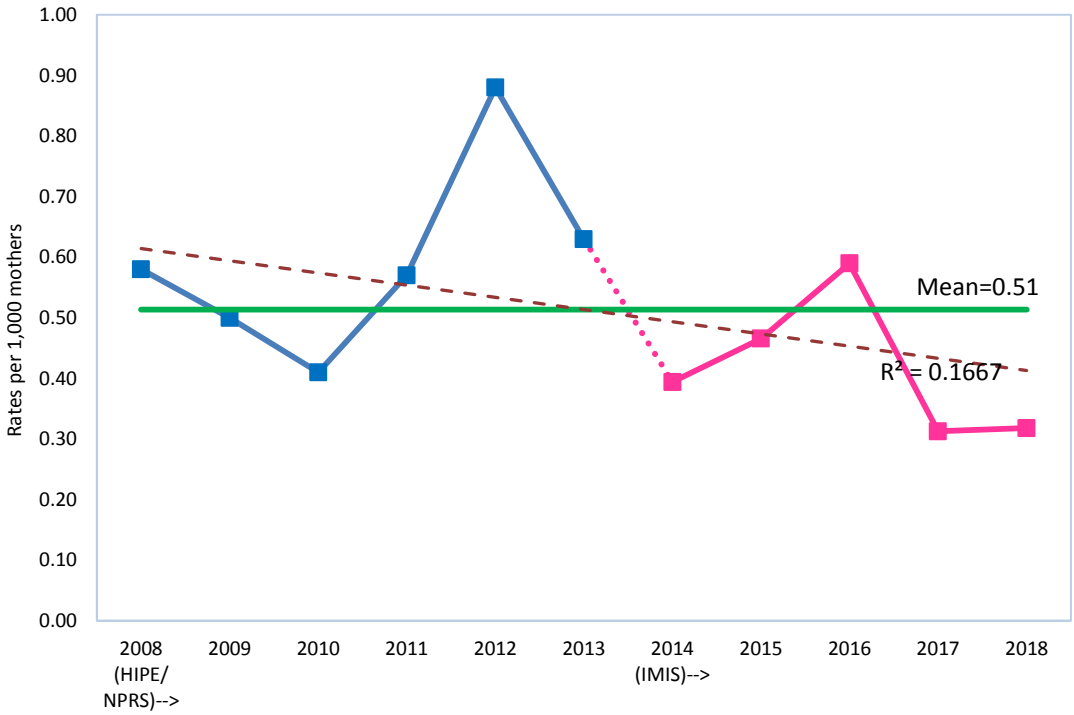
Sources: HIPE (closed national files for 2008-2013); IMIS 2014-2018

% changes:

2008-18 (HIPE/NPRS, IMIS): 106.7%; 2014-18 (IMIS): -42.1%; 2017-18 (IMIS): -1.9%

9. Pulmonary embolism

Definition Number of women diagnosed during the current month with obstetric pulmonary emboli in pregnancy and/or the puerperium and excludes embolism complicating abortion or ectopic or molar pregnancy.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	0.58	0.50	0.41	0.57	0.88	0.63	0.39	0.47	0.59	0.31	0.33

**Per 1,000 mothers delivered*

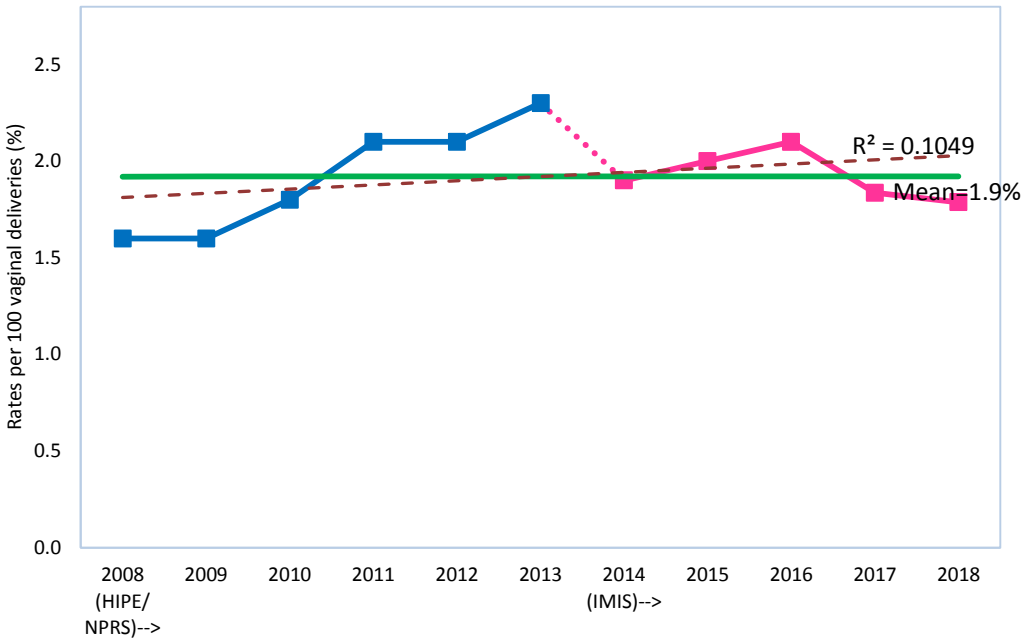
Sources: HIPE (closed national files for 2008-2013); IMIS 2014-2018

% changes:

2008-18 (HIPE/NPRS, IMIS): -45.2%; 2014-18 (IMIS): -15.4%; 2017-18 (IMIS): 6.6%

10. Perineal tears (third-degree and/or fourth-degree tears)

Definition Number of third-degree and/or fourth-degree perineal lacerations diagnosed during the current month, including tears in the vaginal tissue, perineal skin, and perineal muscles that extend into the anal sphincter and/or go through the anal sphincter and the tissue underneath it.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	1.6%	1.6%	1.8%	2.1%	2.1%	2.3%	1.9%	2.0%	2.1%	1.8%	1.8%

**Per 100 vaginal deliveries (%)*

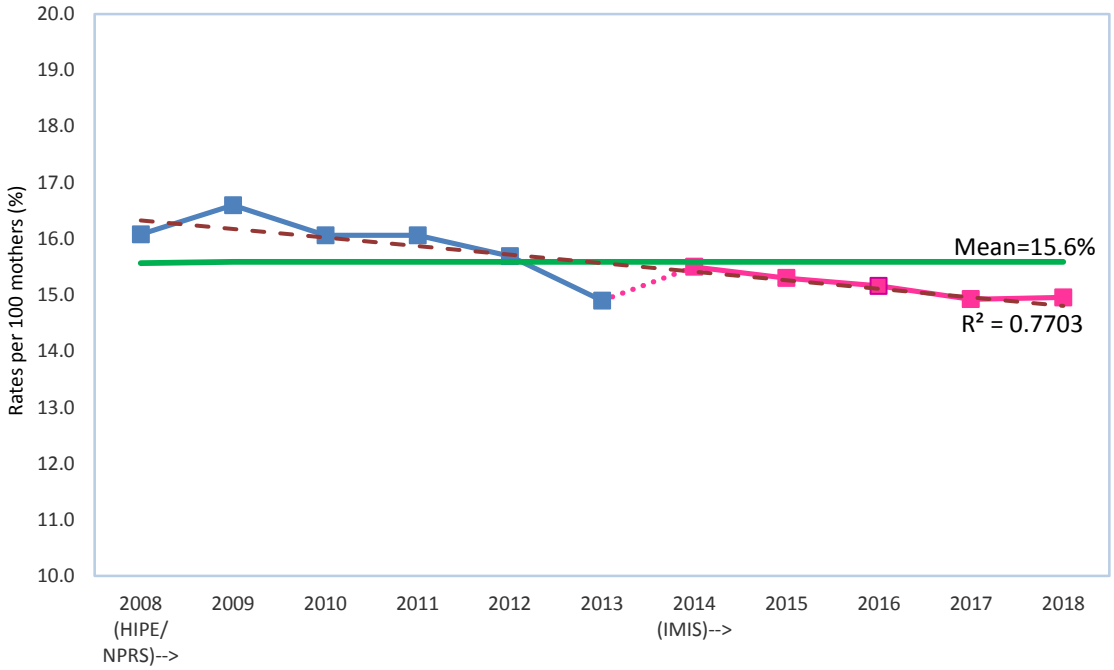
Sources: HIPE (closed national files for 2008-2013); NPRS 2008-2013; IMIS 2014-2018

% changes (figures subject to rounding):

2008-18: (HIPE/NPRS, IMIS): 11.7%; 2014-18 (IMIS): -5.9%; 2017-18 (IMIS): -2.7%

11. Operative vaginal deliveries (total)

Definition — Number of women undergoing operative vaginal elivery, or instrumental delivery, including forceps delivery and vacuum extraction, assisted breech delivery with forceps to after-coming head and breech extraction with forceps to after-coming head. Excludes failed forceps and failed vacuum extraction.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	16.1%	16.6%	16.1%	15.7%	15.7%	14.9%	15.5%	15.3%	15.2%	14.9%	15.0%

**Per 100 mothers delivered (%)*

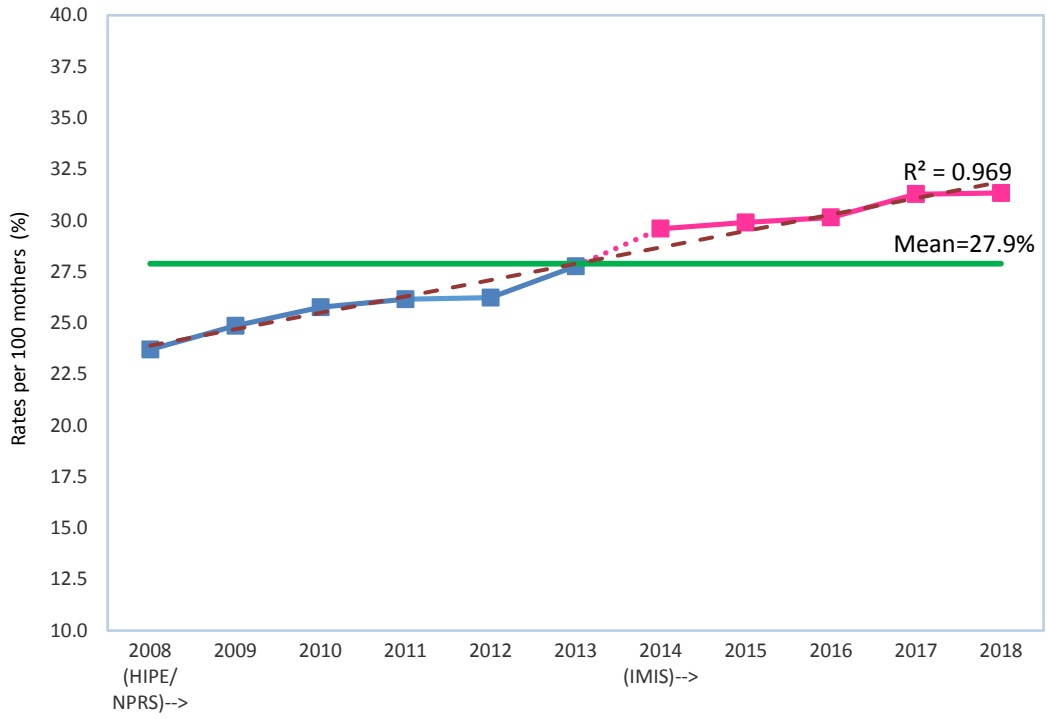
Sources: HIPE (closed national files for 2008-2013); NPRS 2008-2013; IMIS 2014-2018

% changes (figures subject to rounding):

2008-18 (HIPE/NPRS, IMIS): -7.0%; 2014-18 (IMIS): -3.5% (p=0.05); 2017-18 (IMIS): 0.2% (p=0.45)

12. Inductions of labour (IoL) (total)

Definition Number of women during the current month undergoing induction of labour, including medical induction of labour, oxytocin; medical induction of labour, prostaglandin; other medical induction of labour. Include surgical induction of labour by artificial rupture of membranes; other surgical induction of labour; and synchronous medical and surgical induction of labour.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	23.7%	24.9%	25.8%	26.2%	26.2%	27.8%	29.6%	29.9%	30.1%	31.3%	31.5%

**Per 100 mothers delivered (%)*

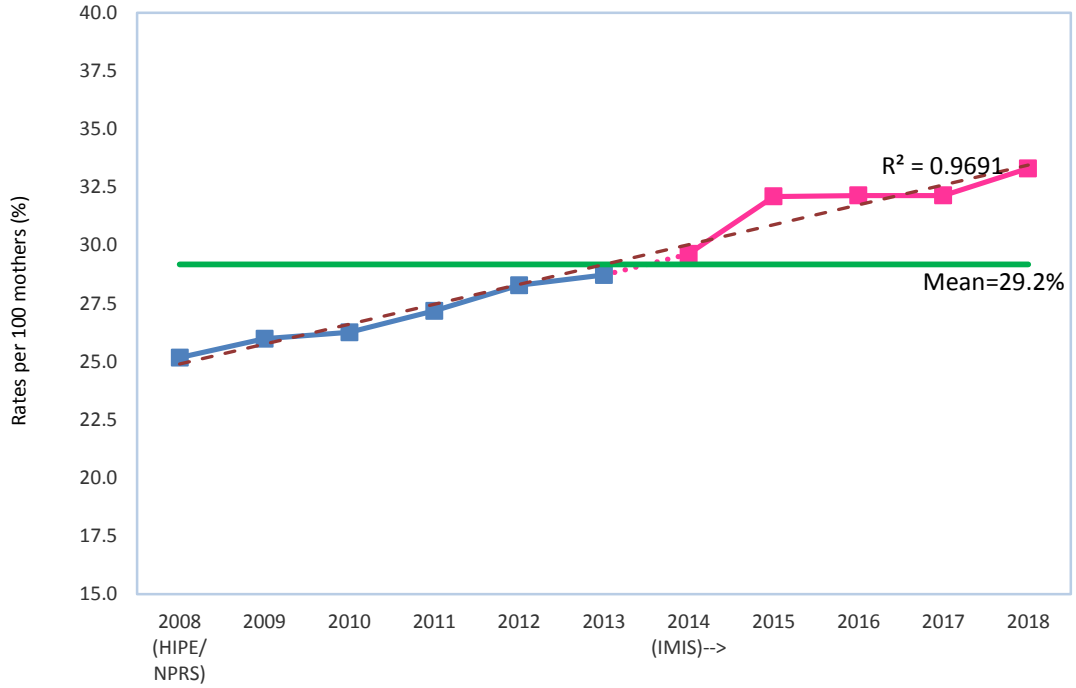
Sources: HIPE (closed national files for 2008-2013); NPRS 2008-2013; IMIS 2014-2018

% changes (figures subject to rounding):

2008-18 (HIPE/NPRS, IMIS): 32.9%; 2014-18 (IMIS): 6.5% (p=0.25); 2017-18 (IMIS): 0.7% (p=0.40)

13. Caesarean sections (total)

Definition Number of women during the current month giving birth by Caesarean section, including elective classical Caesarean section, emergency classical Caesarean section, elective lower segment Caesarean section, and emergency lower segment Caesarean section.



	NPRS						IMIS				
	2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Rates*	25.2%	26.0%	26.3%	27.2%	28.3%	28.7%	29.6%	30.9%	32.1%	32.1%	33.8%

**Per 100 mothers delivered (%)*

Sources: HIPE (closed national files for 2008-2013); NPRS 2008-2013; IMIS 2014-2018

% changes (figures subject to rounding):

2008-18 (HIPE/NPRS, IMIS): 34.1%; 2014-18 (IMIS): 13.9% (p=0.00); 2017-18 (IMIS): 5.0% (p=0.05)

Irish Maternity Indicator System (IMIS)

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OBSTETRICS AND GYNAECOLOGY