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Original Research Article

Analysis of caesarean section rates in Malta using the Robson ten-group classification system

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ABSTRACT

Background: Caesarean section (CS) rates continue to rise globally. In Malta, the rate of caesarean deliveries has increased by eight percentage points over the past two decades. The World Health Organization recommends the use of the Robson classification as a global standard for monitoring and auditing CS. This study aimed to examine CS rates in the Maltese Islands across two time periods using the Robson classification.
Methods: A retrospective, registry-based study was conducted covering all deliveries between 2009-2013 and 2019-2023. Women undergoing childbirth in Malta and Gozo were allocated to one of the 10 Robson groups. Changes in overall CS rates and contributions by Robson group between the two periods were analysed using significance tests. Indications for CS were analysed for 2019-2023.
Results: A total of 42,585 deliveries were analysed across both periods. Despite more advanced maternal age and a higher proportion of non-Maltese mothers over the time periods, the CS rate remained stable (31.9% in 2009-2013; 32.6% in 2019-2023). Contributions to the overall CS rate of Robson groups 5 (previous CS), 6 and 7 (breech) increased significantly, whilst contributions of groups 1 (nullipara, spontaneous labour), 2 (nullipara, induction/pre-labour CS), 8 (multiple pregnancies), and 10 (preterm) decreased significantly between study periods. The top contributors remained Robson groups 5 and 2, followed by 1.
Conclusions: The Robson classification allows identification of the obstetric populations driving CS use. Our study findings provide a starting point for auditing of obstetric practices with a view to reducing CS rates.

Keywords: Caesarean section, Childbirth, Malta, Robson classification

INTRODUCTION

Caesarean section (CS) is an obstetric surgical intervention performed to deliver a fetus in situations where vaginal delivery may pose a risk to the mother and/or the baby. Indications for CS include prolonged or obstructed labour, fetal distress, maternal pathology, abnormal fetal lie/presentation, and multiple pregnancies, amongst others. When performed under the correct indications, CS has the potential to reduce both maternal and newborn morbidity and mortality. Conversely, unnecessary procedures may pose serious risks to maternal and newborn health.[1]

The percentage of births by CS has been defined as an indicator of access to and utilisation of emergency healthcare during childbirth.[2] The steadily increasing use of CS worldwide, particularly caesareans without medical justification, presents a global public health concern, with rates projected to continue rising. The global CS rate is estimated at 21.1% (95% CI: 18.8-23.3), having increased by 19 percentage points over the past three decades.[3] In Europe, CS rates vary widely, ranging from 16.9% in the Northern region to 43.6% in Southern Europe.[4]

In Malta, CS rates have seen a steady rise over the past two decades, from 27.3% of all maternal deliveries in 2004 to 35.1% in 2023.[5] When compared with other European countries, Malta had one of the higher percentages of births delivered by CS in 2019, with a rate of 31.9% of

total births. This exceeded the median CS rate of 26.0% (IQR: 20.7-32.1) seen across Europe.[6]

In 2025, the European Board and College of Obstetrics and Gynaecology (EBCOG) together with Euro-Peristat, a European research network for the surveillance and evaluation of maternal and newborn health in Europe, published a joint statement highlighting the wide variation in CS rates across Europe and the lack of data to explain these differences. This document underscores the necessity of more standardised data collection on CS to enable development of comprehensive comparative statistics at an international level, whilst generating evidence to improve clinical practices and promote evidence-based care.[7]

The Robson classification of deliveries is increasingly being used internationally to classify and audit CS.[8] Originally proposed by Dr Michael Robson in 2001, this classification is a simple, reproducible system comprising 10 mutually exclusive, totally inclusive, and clinically relevant groups of women. All women admitted for childbirth are categorised into one of the groups based on a number of obstetric parameters determined at the time of delivery. This classification allows for detailed analysis and comparison of CS rates within and across groups, providing an initial overview of the CS rate and showing where differences lie, whilst allowing for meaningful comparisons between institutions and timepoints.[9] The World Health Organization (WHO) endorsed its use as a global standard tool for assessing, monitoring, and comparing CS rates in 2015.[10]

No in-depth analysis of CS rates has been carried out at a local level in recent years and the Robson classification has not been implemented into practice. The main motivation behind this study was a recognition of the need to examine the rising CS rates in more detail to identify priority areas for improvement. This study aimed to analyse and compare all deliveries occurring in Malta and Gozo over two time periods, five years apart, using the Robson classification, with a focus on caesarean deliveries.

METHODS

A retrospective, observational, registry-based study was conducted, including all deliveries in Malta and Gozo over a 10-year period. The study period comprised two time periods of five years each, with the first period (T1) covering 2009 to 2013 and the second period (T2) covering 2019 to 2023.

Anonymised, record-level data were extracted from the National Obstetric Information System (NOIS) which is maintained by the Directorate for Health Information and Research. NOIS is a national register containing detailed information on all deliveries and births taking place in the Maltese Islands, both to residents and non-residents. Information for NOIS is obtained from the medical records of all parturient women delivering at the three maternity hospitals in Malta and Gozo.[11] All infants/fetuses delivered at 22 weeks' gestation and over are registered, irrespective of their birth weight.

The study population consisted of all women delivering a livebirth or stillbirth during the study period. The variables collected included maternal parity, history of previous CS, pregnancy multiplicity, fetal lie/presentation, gestational age, onset of labour, type of delivery, and reason for CS. In the NOIS, indication for CS is collected as free text and later coded using the International Classification of Diseases, tenth revision (ICD-10) classification system. Demographic data were collected to describe the study population. For multiple pregnancies, data were included only once for each mother.

All variables required for the analysis were available from NOIS. Each mother was then classified into one of the Robson groups based on the registry data. The 10-group classification system is presented in Table 1. The WHO Implementation manual for the Robson classification was utilised as the main guide for the analysis and interpretation of data.[12]

Table 1: Robson's 10-group classification system, including subgroups.

Group	Obstetric population
1	Nulliparous women with a single cephalic pregnancy, ≥37 weeks' gestation, in spontaneous labour
2	Nulliparous women with a single cephalic pregnancy, ≥37 weeks' gestation, who either had labour induced (2a) or CS before labour (2b)
3	Multiparous women without previous CS, with a single cephalic pregnancy, ≥37 weeks' gestation, in spontaneous labour
4	Multiparous women without previous CS, with a single cephalic pregnancy, ≥37 weeks' gestation, who either had labour induced (4a) or CS before labour (4b)
5	All multiparous women with a previous CS, with a single cephalic pregnancy, ≥37 weeks' gestation
6	All nulliparous women with a single breech pregnancy
7	All multiparous women with a single breech pregnancy (including women with previous CS)
8	All women with multiple pregnancies (including women with previous CS)
9	All women with a single pregnancy with a transverse or oblique lie (including women with previous CS)
10	All women with a single cephalic pregnancy, <37 weeks' gestation (including women with previous CS)

Statistical analysis

Analysis of data was carried out using Microsoft Excel and the statistical software package IBM SPSS Statistics version 28.

A descriptive analysis of the study population by demographic characteristics and obstetric variables was conducted. Each mother was categorised into one of the 10 Robson groups based on the results of six core variables: parity (nullipara or multipara), history of previous CS, onset of labour (spontaneous, induced, or pre-labour CS), number of fetuses (singleton or multiple pregnancy), gestational age (preterm or term), and fetal lie/presentation (cephalic, breech, or transverse/oblique). The overall CS rate, the size and CS rate of each Robson group, and the absolute and relative contributions of each Robson group to the overall CS rate were calculated for each 5-year period under study. The absolute group contribution to the overall CS rate referred to the number of CS in each group as a proportion of the total number of women who delivered, while the relative contribution of each group referred to the number of CS in each group as a percentage of the total number of CS carried out.

Demographic and obstetric characteristics of all women in the two periods were compared. Changes in the overall CS rate and in the contribution by Robson groups between study periods were then analysed. Statistical significance was determined using the Chi-square test, with a post-hoc column proportions test (z-test) undertaken to compare the contributions of each Robson group. A p value <0.05 was considered statistically significant.

Mothers with incomplete information on any obstetric variable that did not allow categorisation into the Robson groups were excluded from the analysis. The size of this "unclassifiable" group was calculated as this represents an indicator of data quality.[12]

Indication for CS was analysed solely for the period 2019-2023, as this variable was not collected by NOIS before 2018.

RESULTS

A total of 43,321 births were recorded from 42,585 women in the two time periods under study. 20,538 deliveries were recorded in 2009-2013 (T1), while 22,047 deliveries were registered between 2019-2023 (T2). The maternal age ranged from 13 to 55 years in T1, with a mean age of 29.1 years (95% CI: 29.04-29.18). In T2, maternal age ranged from 14 to 55 years, and the mean age was 31.0 years (95% CI: 30.91-31.05). The demographics of the study population and obstetric variables are presented in Table 2.

Table 2: Demographic and obstetric characteristics of the study population.

Characteristics		T1	T2
Deliveries, N (% of total)		20538 (100)	22047 (100)
Maternal age, N (% of mothers)	<15 years*	18 (0.1)	3 (0.0)
	15-19 years**	1107 (5.4)	595 (2.7)
	20-24 years**	2866 (14.0)	2013 (9.1)
	25-29 years**	6458 (31.4)	5333 (24.2)
	30-34 years**	6799 (33.1)	8480 (38.5)
	35-39 years**	2854 (13.9)	4635 (21.0)
	40+ years**	435 (2.1)	987 (4.5)
	Not specified	1 (0.0)	1 (0.0)
Maternal nationality, N (% of mothers)	Maltese**	18201 (88.6)	15221 (69.0)
	EU (including UK)**	781 (3.8)	2389 (10.8)
	Non-EU**	1504 (7.3)	4429 (20.1)
	Not specified	52 (0.3)	8 (0.0)
Assisted fertilisation (ART), N (% of mothers)	None**	20225 (98.5)	20958 (95.1)
	In vitro fertilisation (IVF)/Intracytoplasmic sperm injection (ICSI)**	51 (0.2)	542 (2.5)
	Other ART incl. induced ovulation and artificial insemination*	261 (1.3)	233 (1.1)
	Not specified	1 (0.0)	314 (1.4)
Parity, N (% of mothers)	Nulliparous	10684 (52.0)	11376 (51.6)
	Multiparous, no previous CS	7151 (34.8)	7756 (35.2)
	Multiparous, previous CS	2702 (13.2)	2912 (13.2)
	Not specified	1 (0.0)	3 (0.0)
Presentation, N (% of deliveries)	Cephalic**	19888 (96.8)	21033 (95.4)
	Breech**	606 (3.0)	908 (4.1)
	Transverse or oblique (incl. unstable lie)	44 (0.2)	69 (0.3)

Continued.

Characteristics		T1	T2
	Not specified	0 (0.0)	37 (0.2)
Number of fetuses/multiplicity, N (% of deliveries)	Single*	20166 (98.2)	21718 (98.5)
	Multiple*	372 (1.8)	329 (1.5)
Gestational age, N (% of deliveries)	<37 weeks (preterm)	1346 (6.6)	1437 (6.5)
	37 weeks and beyond (term)	19192 (93.4)	20610 (93.5)
Onset of labour, N (% of deliveries)	Induced	5881 (28.6)	6377 (28.9)
	Spontaneous**	11441 (55.7)	11841 (53.7)
	CS (elective/emergency)**	3216 (15.7)	3826 (17.4)
	Not specified	0 (0.0)	3 (0.0)
Mode of delivery, N (% of deliveries)	Unassisted vaginal*	13071 (63.6)	13759 (62.4)
	Vaginal (with instrument)*	907 (4.4)	1103 (5.0)
	Pre-labour CS*	3373 (16.4)	3831 (17.4)
	CS during labour	3187 (15.5)	3354 (15.2)
Births, N (% of total)		20934 (100)	22387 (100)
Infant outcome, N (% of births)	Livebirth	20819 (99.5)	22290 (99.6)
	Stillbirth	115 (0.5)	97 (0.4)

*Indicates a significant difference between time periods at p<0.05; ** p<0.001

Table 3: CS rates (% of deliveries) for each studied year and for the two study periods.

Year	Number of deliveries	Number of CS	CS rate (%)
2009	4112	1194	29.04
2010	3952	1252	31.68
2011	4226	1435	33.96
2012	4175	1409	33.75
2013	4073	1270	31.18
Total (T1)	20538	6560	31.94
2019	4379	1352	30.87
2020	4481	1396	31.15
2021	4420	1462	33.08
2022	4304	1410	32.76
2023	4463	1565	35.07
Total (T2)	22047	7185	32.59

Table 4: The Robson classification report table for the two time periods under study.

Setting: National (three maternity hospitals in Malta and Gozo)			Period: January 2009 to December 2013 (T1) and January 2019 to December 2023 (T2)									
Group	**Number of CS in group**		**Number of women in group**		**Group size (%)**		**Group CS rate (%)**		**Absolute group contribution to overall CS rate (%)**		**Relative group contribution to overall CS rate (%)**	
	T1	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**	**T1**	**T2**
1	972	945	5404	5604	26.31	25.47	17.99	16.86	4.73	4.29	14.82	13.21
2	1706	1731	4142	4419	20.17	20.08	41.19	39.17	8.31	7.87	26.01	24.21
3	186	182	4150	4472	20.21	20.32	4.48	4.07	0.91	0.83	2.84	2.55
4	432	484	2413	2664	11.75	12.11	17.90	18.17	2.10	2.20	6.59	6.77
5	1827	2192	2398	2555	11.68	11.61	76.19	85.79	8.90	9.96	27.85	30.65
6	327	501	334	520	1.63	2.36	97.90	96.35	1.59	2.28	4.98	7.01
7	197	299	209	313	1.02	1.42	94.26	95.53	0.96	1.36	3.00	4.18
8	355	317	372	329	1.81	1.50	95.43	96.35	1.73	1.44	5.41	4.43
9	43	67	43	67	0.21	0.30	100.00	100.00	0.21	0.30	0.66	0.94
10	515	433	1072	1061	5.22	4.82	48.04	40.81	2.51	1.97	7.85	6.06
Total	6560	7151	20537	22004	100.00	100.00	31.94	32.50	31.94	32.50	100.00	100.00

Unclassifiable: T1 = 1 case (0.005%); T2 = 43 cases (0.20%)

The annual CS rate varied between 29.0% of deliveries in 2009 and 35.1% in 2023 (Table 3). There was no statistically significant difference in the average CS rate between the two study periods, with an overall rate of 31.94% (95% CI: 31.30-32.58) in T1 and 32.59% (95% CI: 31.97-33.21) in T2 (p=0.15).

Table 4 shows data disaggregated by Robson group, demonstrating the number of women and number of CS in each group, group size, CS rates for each group, and their absolute and relative contributions to the overall CS rate. For the period 2009-2013, one case had missing data on obstetric history (0.005% of women who delivered), while 43 cases had missing data, particularly fetal lie/presentation, in 2019-2023 (0.20% of women). These unclassifiable cases were excluded from further analysis.

The data show that nulliparous women with a single, cephalic, term pregnancy in spontaneous labour (group 1) and those who had labour induced or delivered by pre-labour CS (group 2) represented almost half of the study population (46.5% in T1 and 45.6% in T2). Multiparous women with no history of CS, with a single, cephalic, term pregnancy in spontaneous labour (group 3) contributed a further 20%. The proportion of women in group 3 was almost double that of group 4 (multiparous women with no history of CS who had labour induced or underwent pre-labour CS). Within groups 2 and 4, most women had labour induced (subgroups 2a and 4a) as opposed to pre-labour CS (subgroups 2b and 4b). Women with a singleton in transverse or oblique lie (group 9) were least prevalent overall, making up less than 1% of deliveries.

Despite being the least prevalent, group 9 recorded the highest CS rate, whereby all deliveries occurred by CS in both periods. Women with a single breech pregnancy (groups 6 and 7) and those with multiple pregnancies (group 8) also had very high CS rates exceeding 90%.

Robson groups 1 and 2 include almost all nulliparous women. Most had spontaneous initiation of labour (56.6% in T1 and 55.9% in T2), followed by induction (35.2% in T1 and 37.3% in T2). The rest underwent pre-labour CS (8.2% in T1 and 6.8% in T2). Overall, there was a higher proportion of nulliparous women who had labour induced (subgroup 2a) than multiparous women (subgroup 4a) (16.4% versus 10.2% in T1; 17.0% versus 10.6% in T2). Additionally, CS rates in group 2a were significantly higher than in group 4a (T1: 27.5% (95% CI: 26.0-29.0) versus 5.7% (95% CI: 4.8-6.8), respectively; T2: 28.1% (95% CI: 26.6-29.5) versus 6.3% (95% CI: 5.3-7.3), respectively).

Figure 1 demonstrates the relative contribution of the individual Robson groups to the overall CS rate for the two study periods. The greatest contributors to the overall CS rate in both periods were multiparous women with a single, cephalic, term pregnancy who had a history of at least one previous CS (group 5) and nulliparous women with a single, cephalic, term pregnancy who underwent labour induction or pre-labour CS (group 2). This was followed by group 1, representing nulliparous women with a single, cephalic, term pregnancy with spontaneous initiation of labour.

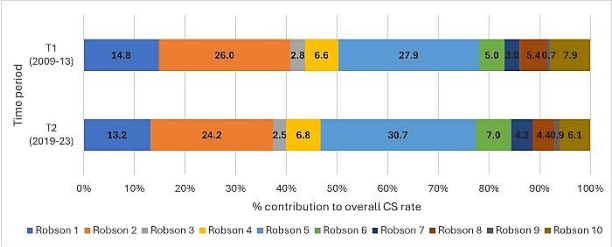

Figure 1: Relative contributions of the 10 Robson groups to the total CS rate (%), by study period.

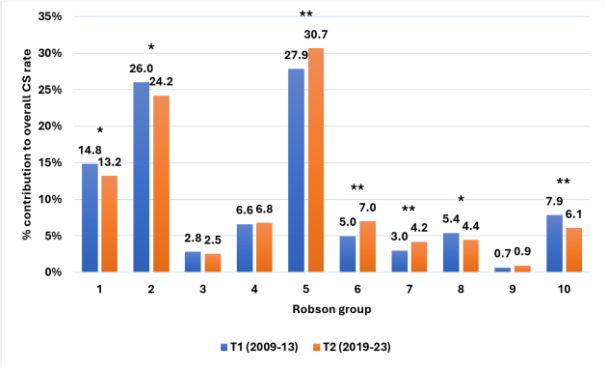

Figure 2: Comparison of the contributions of each Robson group to overall CS rates between study periods.

* p<0.05; ** p<0.001.

Figure 2 demonstrates a comparison of the relative contributions of each Robson group to the overall CS rate between the two study periods. The contributions of group 5 (women with previous CS) and groups 6 and 7 (breech pregnancies) showed a statistically significant increase (p <0.001), whilst the contributions of groups 1 and 2 (nulliparous women, singleton, cephalic, term pregnancy) decreased significantly between T1 and T2 (p<0.05).

When comparing both periods, the ranking of Robson groups by their contribution to the overall CS rate remained unchanged, except for group 10 (preterm delivery) which had a lower contribution in T2 due to a decreased frequency of CS, and group 6 (nullipara, breech) which had a higher contribution in T2 caused by an increase in group size.

Table 5: Main indications for caesarean delivery in 2019-2023.

Reason for caesarean section	ICD-10 codes	Count	% of CS
Maternal care for known or suspected abnormality of pelvic organs (including uterine scar from previous surgery)	O34	2026	28.33
Labour and delivery complicated by fetal stress and umbilical cord complications	O68-O69	1632	22.82
Maternal care for known or suspected malpresentation of fetus	O32	875	12.24
Long labour	O63	681	9.52
Caesarean section for maternal request	O82	333	4.66
Maternal care for known or suspected fetal abnormality and fetal problems	O35-O36	324	4.53

In terms of indications for CS, most caesarean deliveries in 2019-2023 (T2) were performed due to the presence of a uterine scar from previous CS (28.0% of all CS). Table 5 demonstrates the main indications for performing a CS in T2 by ICD-10 codes. Other reasons for CS included multiple gestation, placental disorders, hypertensive disorders, failed induction of labour, obstructed labour, and antepartum haemorrhage, amongst others.

The reported primary reason for CS in women categorised into Robson group 5 (previous CS) was uterine scar (84.0%), and the onset of labour was predominantly by elective/planned CS (75.0% of caesarean deliveries in this group). For group 2 (nulliparous women, singleton, cephalic, term with induction of labour/pre-labour CS), the main indication was fetal distress (37.4% of CS in this group), followed by prolonged labour (16.7%). In group 1 (nulliparous women in spontaneous labour), most CS (53.8%) were due to fetal distress.

DISCUSSION

CS rates continue to increase globally. This shift in the childbearing scenario is related to a multitude of factors, including changing demographics, medical practices, patient preferences, and healthcare policies, amongst others.[3] In Europe, wide variations in CS rates and trends exist. A Euro-Peristat study comparing CS in 2015 and 2019 showed evidence of increasing rates in some European countries alongside decreasing or stabilising rates in others, with reported CS rates ranging from 16.0% (Norway) to 52.2% (Cyprus) in 2019.[13] The highest rates are observed in the Southern European region.[4]

Historically, the international healthcare community considered CS rates between 10-15% to be within an acceptable threshold. However, the frequency of CS has since continued to rise, together with advancements in research and clinical care, and it remains a challenge to identify the optimal population-level CS rate.[10] Malta recorded CS rates averaging 32% for the past 20 years.[5] This compares well to 2019 rates from other Southern European countries as reported by Euro-Peristat (2022) (Cyprus: 53.1%; Italy: 33.0%; Spain: 25.7%).[6]

In our study, analysis by Robson groups revealed a high proportion of nulliparous women with a single, cephalic, term pregnancy (groups 1 and 2) in both periods. These groups are important contributors to the overall CS rate due to their size, such that small changes in the frequency of CS would impact the overall rate.[9] International literature shows that the distribution of the obstetric population by Robson groups varies across Europe. In most countries, nulliparous women with a single, cephalic, term pregnancy who go into labour spontaneously (group 1) are more prevalent than those with labour induction or pre-labour CS (group 2), with rates being double or almost double.[14] This contrasts with our study findings, whereby Robson group 1 was only slightly larger than group 2 (ratio of 1.3:1 in T1 and T2). A ratio of less than 2:1 between the sizes of these two groups suggests a high incidence of labour induction and/or pre-labour CS among nulliparous women, which may reflect a high-risk nulliparous population and/or a tendency towards medicalisation of childbirth.[15]

In terms of CS rates, Robson group 5 (women with previous CS) tends to be the greatest contributor to the total CS rates across Europe.[14] The high CS rates seen in group 5 in our study are consistent with those from the rest of Southern Europe, whereby almost all women with a prior CS give birth via a repeat CS, albeit with slightly lower rates found in our data. These findings contrast with data from Nordic Europe, whereby only half of these women deliver by CS, indicating a tendency for vaginal birth after caesarean in these countries.[4] In our study, the contribution of group 5 to the overall rate increased significantly between T1 and T2, along with an increase in the frequency of caesarean deliveries. This may reflect a shift in practices towards delivery by planned CS, as opposed to a trial of labour, among these women over time.

Robson group 2 (nulliparous women, singleton, cephalic, term with labour induction/pre-labour CS) was the second major contributor to the overall CS rates in our study, in line with findings from most European countries.[14] Given that most women underwent induction (subgroup 2a) as opposed to pre-labour CS, high rates of CS in this group may indicate poor success rates for induction or poor selection of women for induction.[12] There is a growing body of evidence demonstrating higher caesarean delivery

rates among women who undergo labour induction, with the risk being higher for nulliparous than multiparous women with a previous vaginal delivery. The association between induction and unplanned caesarean delivery in nulliparous women is primarily explained by lower cervical dilatation at admission as well as higher rates of intrapartum complications.[16] Establishing protocols for management of labour induction may limit inductions with no medical indication and improve CS rates in nulliparous women.[17]

Groups 1, 2, and 5 (nulliparous women and multiparous women with a previous CS, with singleton, cephalic, term pregnancies) were found to contribute to two thirds of all CS in our study. This is not an unusual finding, with the WHO recommending that hospitals focus on these three groups if the aim is to lower the total CS rates.[12] Our study findings raise concerns on the domino effect of primary CS and highlight the need for implementing strategies to reduce primary caesarean deliveries in an effort to safely reduce overall CS rates.[4] Limiting CS in nulliparous women would subsequently limit the proportion of women with uterine scars. This, combined with an approach of promoting a trial of labour following caesarean delivery, would consequently result in a reduction in overall CS rates.[17]

In about 3-4% of pregnancies, the fetus is in breech presentation at term.[18] Our findings demonstrated high rates of caesarean delivery among women with a single breech pregnancy (Robson groups 6 and 7). High rates of CS (exceeding 80%) in these populations have also been observed across Europe, which may reflect the shift towards delivery by CS for breech-presenting fetuses at term following publication of the Term Breech Trial in 2000.[4] The latter was a randomised multi-centre trial comparing delivery by planned CS versus vaginal delivery in breech presentation, whereby the authors recommended CS as the safer mode of delivery.[18] Since then, the trial's findings have been subject to debate and criticism. Carbillon et al argued in favour of an individualised management plan, with consideration of external cephalic version and subsequent vaginal delivery.[19] Although the contributions of group 6 and 7 to the overall CS rate increased significantly from T1 to T2 in our study, this resulted from an increase in group size rather than increased frequency of CS, particularly for group 6 (nullipara, breech). Several predisposing factors for breech presentation have been identified, including advanced maternal age, uterine and placental abnormalities, nulliparity, and assisted reproductive technology (ART), amongst others.[20] Whilst examining predictors of breech presentation was beyond the scope of this study, the reason for the increased proportion of women with breech could potentially be attributed to changing demographics, including more advanced maternal age, and the significantly higher use of ART in T2, together with possible changes in reporting practices over time.

Robson group 9 (singletons in transverse/oblique lie) was found to be the lowest contributor to the overall CS rate in both study periods, despite having a 100% CS rate. Fetal malpresentation is indeed one of the common indications for caesarean delivery.[21] Although the highest CS rates were seen in Robson groups 6 to 9 (breech, multiple pregnancies, and abnormal lie), these groups represent the least prevalent obstetric populations, hence their low contribution to the overall CS rates.

This was the first in-depth analysis carried out locally to examine and compare CS rates using the Robson 10-group classification system over two 5-year periods, combined with an analysis of indications for CS. Amyx et al observed a positive association between implementation of this classification and declining caesarean deliveries, indicating that it may positively be used to provide the evidence base to trigger an improvement in CS rates.[13] The Robson classification represents an objective starting point for auditing CS. It may be utilised by healthcare institutions to identify the obstetric populations contributing most to their CS rates and by health professionals to identify the parturient women who are more likely to deliver by CS. However, as Robson pointed out, an analysis of CS would not be complete without consideration of maternal and perinatal morbidity and mortality indicators.[9] It is recommended that future research assesses additional outcome variables such as maternal and infant outcomes.

Strengths of this study are: the national coverage of the NOIS and the extensive number of data variables collected enabled classification of most women undergoing childbirth in the Maltese Islands into the 10 Robson groups and an analysis of CS over time. Only 0.005% of deliveries (one case) could not be classified in T1 and 0.2% of deliveries (43 cases) in T2, due to missing data. The WHO Robson classification implementation manual sets out several steps to further assess the quality of the data, such as the size of group 9 being less than 1% and its CS rate 100% by convention.[12] Our results satisfied both these criteria, signifying good data quality.

One limitation of this study was its retrospective nature covering a long period, hence potentially subject to changes in reporting practices, even though this is mitigated as much as possible by the standard operating procedures of NOIS. Furthermore, given the small numbers of deliveries and births in Malta and Gozo and the low number of women in some Robson groups, changes observed may have arisen due to chance. As discussed by Zeitlin et al, countries may differ in their reporting and classifications for delivery onset, fetal presentation, and prior CS, resulting in heterogeneity across countries.[14] Notwithstanding this, our study's findings were broadly consistent with the rest of Europe.

CONCLUSION

Overall CS rates remained stable between the two study periods. Analysis by Robson provides a means of identifying the major contributors to overall caesarean rates. The primary drivers of CS in our study were identified as Robson groups 5, 2, and 1, respectively. These findings mirror those of other European countries. Parturient women with previous CS (group 5) and those with breech pregnancy (groups 6 and 7) showed a significant increase in contribution to the overall CS rate between study periods. Conversely, the contributions of nulliparous women in spontaneous labour (group 1) and labour induction/pre-labour CS (group 2) decreased significantly. Auditing of practices surrounding the use of CS and labour induction within these obstetric populations is key to optimising local CS rates in the long term.

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REFERENCES

1. Angolile CM, Max BL, Mushemba J, Mashauri HL. Global increased cesarean section rates and public health implications: a call to action. Health Sci Rep. 2023;6(5):e1274.
2. World Health Organization. The Global Health Observatory: Births by caesarean section (%). Available at: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/68. Accessed on 25 June 2025.
3. Betran AP, Ye J, Moller AB, Souza JP, Zhang J. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Health. 2021;6(6):e005671.
4. El Radaf V, Campos LN, Savona-Ventura C, Mahmood T, Zaigham M. Robson ten group classification system for caesarean sections across Europe: a systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2025;305:178-98.
5. Gatt M, Borg LW. National Obstetric Information System Annual Report 2023, 2024. Available at: https://dhir.gov.mt/wp-content/uploads/2025/01/NOIS_2023-Annual-Report-final-v1.1z.pdf. Accessed on 25 June 2025.
6. Euro-Peristat. European Perinatal Health Report: Core indicators of the health and care of pregnant women and babies in Europe from 2015 to 2019, 2022. Available at: https://www.europeristat.com/publications/european-perinatal-health-report-2015-2019/. Accessed on 25 June 2025.
7. Velebil P, Durox M, Zeitlin J, Mahmood T; Euro-Peristat Research Group. A call for better data for surveillance and evaluation of caesarean sections in Europe- a joint statement by Euro-Peristat and European Board and College of Obstetrics and Gynaecology (EBCOG). Eur J Obstet Gynecol Reprod Biol. 2025;309:168-74.
8. Betrán AP, Vindevoghel N, Souza JP, Gülmezoglu AM, Torloni MR. A systematic review of the Robson classification for caesarean section: what works, doesn't work and how to improve it. PLoS One. 2014;9(6):e97769.
9. Robson MS. Classification of caesarean sections. Fet Matern Med Rev. 2001;12(1):23-39.
10. World Health Organization. WHO statement on caesarean section rates, 2015. Available at: https://www.who.int/publications/i/item/WHO-RHR-15.02. Accessed on 26 June 2025.
11. Directorate for Health Information and Research. National Obstetrics Information System (NOIS). Available at: https://dhir.gov.mt/en/registries/births/. Accessed on 28 June 2025.
12. World Health Organization. Robson Classification: Implementation Manual, 2017. Available at: https://www.who.int/publications/i/item/9789241513197. Accessed on 28 June 2025.
13. Amyx M, Philibert M, Farr A, Donati S, Smárason AK, Tica V, et al. Trends in caesarean section rates in Europe from 2015 to 2019 using Robson's ten group classification system: a Euro-Peristat study. BJOG. 2024;131(4):444-54.
14. Zeitlin J, Durox M, Macfarlane A, Alexander S, Heller G, Loghi M, et al. Using Robson's Ten-Group Classification System for comparing caesarean section rates in Europe: an analysis of routine data from the Euro-Peristat study. BJOG. 2021;128(9):1444-53.
15. Robson M, Murphy M, Byrne F. Quality assurance: The 10-group classification system (Robson classification), induction of labor, and cesarean delivery. Int J Gynaecol Obstet. 2015;131(1):S23-7.
16. Kjerulff KH, Attanasio LB, Edmonds JK, Kozhimannil KB, Repke JT. Labor induction and cesarean delivery: A prospective cohort study of first births in Pennsylvania, USA. Birth. 2017;44(3):252-61.
17. Le Ray C, Blondel B, Prunet C, Khireddine I, Deneux-Tharaux C, Goffinet F. Stabilising the caesarean rate: which target population? BJOG. 2015;122(5):690-9.
18. Hannah ME, Hannah WJ, Hewson SA, Hodnett ED, Saigal S, Willan AR. Planned caesarean section versus planned vaginal birth for breech presentation at term: a randomised multicentre trial. Lancet. 2000;356(9239):1375-83.
19. Carbillon L, Benbara A, Tigaizin A, Murtada R, Fermaut M, Belmaghni F, et al. Revisiting the management of term breech presentation: a proposal

for overcoming some of the controversies. BMC Pregnancy Childbirth. 2020;20(1):263.
20. Stavridis K, Pisimisi M, Triantafyllidou O, Kalampokas T, Vlahos N, Kastora SL. The association of assisted reproductive technology with fetal malpresentation: a systematic review and meta-analysis. J Matern Fet Neonat Med. 2024;37(1):2313143.
21. Sung S, Mikes BA, Martingano DJ, Mahdy H. Cesarean Delivery. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024.

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