

Short Report

A comparison of trends in caesarean section rates in former communist (transition) countries and other European countries

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Caesarean section rates are rising across Europe, and concerns exist that increases are not clinically indicated. Societal, cultural and health system factors have been identified as influential. Former communist (transition) countries have experienced radical changes in these potential determinants, and we, therefore, hypothesized they may exhibit differing trends to non-transition countries. By analysing data from the WHO Europe Health for All Database, we find transition countries had a relatively low caesarean section rate in 2000 but have since experienced more rapid increases than other countries (average annual percentage change 7.9 vs. 2.4).

Introduction

Caesarean section rates are high and increasing in many European countries and although life-saving in many situations, they pose additional risks of harm when conducted unnecessarily. Risks not only operate over the delivery period (including blood loss, anaesthetic complications and deep venous thrombosis) but also physical and psychological issues may extend to future pregnancies, with, for example, an elevated chance of multiple placental abnormalities.¹ High caesarean section rates may also divert health system resources from other areas. The World Health Organization, therefore, proposed a maximum rate of 10–15% in 1985.² However, this threshold has been criticized for neglecting the potential for higher rates arising appropriately because of changing circumstances rather than increases in inappropriate intervention.³

Reasons for increasing caesarean section rates are complex. Research has focused largely on individual-level explanations, including increasing maternal age, technological innovation, patient choice and clinical risk factors (such as obesity and previous caesarean section delivery). However, these explanations do not account for the majority of variation observed.⁴ In contrast, recent research identified population-level determinants, such as social, cultural and health system factors, as being associated with caesarean section trends.⁵

After the collapse of communism within Europe, many central and eastern European countries have undergone radical societal change.⁶ These countries are often referred to as ‘transition’ countries, being characterized by the change from central planning to democracy and a market economy. Transition countries have frequently experienced health care reforms, including a reduction in the size of the hospital sector, increasing private sector provision, decentralization and changes in payment methods.

Given the potential for population-level factors to influence caesarean section rates markedly, we hypothesized trends in

former-communist countries (hereafter ‘transition’ countries) would differ from other (non-transition) countries in Europe. This article compares trends to test this hypothesis.

Methods

The WHO Health For All database provides information on a range of health variables for the 53 countries within the WHO European region.⁷ Data were retrieved (in May 2012) on caesarean section rates per 1000 live births, absolute number of caesarean sections, absolute number of live births, percentage of mothers aged <20 years and percentage of mothers aged ≥35 years. Data were available from the year 2000 at earliest up to 2010 at latest. No data on caesarean section rates were available for 5 of 53 countries (Andorra, Belgium, Greece, Monaco, San Marino). Three additional countries (Russia, Turkey, Turkmenistan) did not have age-related variables available and were excluded from the main analysis (but their inclusion in a sensitivity analysis led to similar results). Transition countries were defined on the basis of World Bank definitions.⁸ Germany was excluded because of its history of transition and non-transition status. The classification of the 44 included countries is available in the Supplementary Data.

Trends comparing transition and non-transition countries were initially inspected graphically. To test the *a priori* hypothesis that trends differed between groups, multilevel negative binomial regression models were fitted to the number of caesarean sections (yearly observations nested within countries). Transition status was defined using a dummy variable. A random-slope model (with the time coefficient varying between counties) was used to calculate the annual average percentage change (AAPC) in caesarean section rate for each country. Random-intercept models were used to calculate trends over time, initially calculated for all years (unadjusted and adjusted for age covariates) and then stratified for transition country status. Models using an interaction between transition status and time were fitted. A significant interaction between age 35+ years

Table 1 Results of multilevel models investigating trends in caesarean section rates over time in transition and non-transition countries

	All countries IRR (95% CI)	Non-transition countries IRR (95% CI)	Transition countries IRR (95% CI)
Models for all countries and stratifying by transition country status			
Model 1			
Time	1.059 (1.055–1.064)	1.024 (1.021–1.028)	1.079 (1.074–1.085)
Variance*	0.297	0.097	0.320
Model 2			
Time	1.076 (1.069–1.082)	1.015 (1.009–1.021)	1.107 (1.100–1.113)
<20 years	1.014 (1.001–1.026)	1.024 (0.998–1.051)	1.046 (1.035–1.057)
>35 years	0.971 (0.962–0.981)	1.020 (1.012–1.028)	0.965 (0.956–0.975)
Variance*	0.464	0.097	0.418
	Model 3 IRR (95% CI)	Model 4 IRR (95% CI)	Model 5 IRR (95% CI)
Models with an Interaction Term for Transition Country Status			
Time	1.024 (1.019–1.030)	1.038 (1.031–1.044)	1.016 (1.008–1.025)
Transition	0.454 (0.339–0.607)	0.293 (0.211–0.407)	0.622 (0.421–0.918)
Trans*Time	1.054 (1.047–1.061)	1.060 (1.053–1.067)	1.088 (1.078–1.099)
<20 years		1.047 (1.037–1.057)	1.045 (1.035–1.054)
>35 years		0.984 (0.977–0.991)	1.020 (1.008–1.033)
Trans*Over 35 years			0.946 (0.932–0.960)
Variance*	0.229	0.271	0.285

Model 1 = adjustment for time only; Model 2 = adjustment for time and age covariates; Model 3 = adjustment for time and an interaction between transition country status and time (Trans*Time); Model 4 = as model 3 with age covariates added; Model 5 = as Model 3 with an interaction term between age 35+ years and transition country status (Trans*Over 35).

Variance*, indicates between country variance; IRR, incidence rate ratio derived from random-intercept negative binomial regression models.

and time was found; hence, an additional interaction term was fitted in the final model. All analyses were carried out using MLwiN v2.25.

Results

Caesarean section rates increased across nearly all European countries (excluding Iceland and Finland, which had relatively low rates throughout). Transition countries started with lower rates than non-transition countries (3 of 24 transition vs. 14 of 17 non-transition countries had rates >150 per 1000 in 2000) (see Supplementary Data).

Random slope regression analysis (see Supplementary Data) showed transition countries experienced faster increases in caesarean sections (7.88% AAPC in transition vs. 2.36% in non-transition countries). The fastest relative increases were seen in Azerbaijan, Georgia, Serbia, Uzbekistan and Tajikistan—all countries with a low starting rate (of <100 caesarean sections per 1000 live births). There was also evidence to suggest that transition countries continued to experience faster increases even after attaining high absolute rates. For example, by 2009, the AAPC in the seven non-transition countries with a rate of >250 per 1000 varied between 1.8 and 5.2%. In contrast, the AAPC ranged from 4.8 to 13.3% for the six transition countries with a rate above the same threshold.

Random intercept models confirmed these differing trends were unlikely to arise from chance. Model 1 (see table 1) shows a crude incidence rate ratio per year (IRR) of 1.059 [equivalent to a 5.9% annual increase, 95% confidence interval (CI) 1.055–1.064] across all European countries and when stratified, 1.024 (95% CI 1.021–1.028) in non-transition compared with 1.079 (95% CI 1.074–1.085) in transition countries. When adjusted for age covariates, the trend was attenuated in non-transition but increased in transition countries (Model 2). Formal testing of the model with an interaction term confirms the trend differs significantly between transition countries (IRR 1.088 for the difference between trends, 95% CI 1.078–1.099) and could not be accounted for by differences in age covariates (Models 3–5).

Discussion

Post-communist countries in Europe display markedly differing trends in caesarean section rates over time. Although most European countries experienced increases during the previous decade, these seem to be much larger in transition countries. Importantly, higher rates seem to be sustained when comparing transition countries with high absolute levels of caesarean sections to non-transition countries with similar absolute rates. Our study has a number of important limitations. First, this analysis is descriptive, and we are unable to make any causal inference between undergoing transition and increasing caesarean section rates. Further work making use of historical data before transition is necessary. In addition, we had limited covariates to investigate the relationship between transition and maternal care. These data limitations include an inability to age-standardize and instead relying on adjustment for age at the country level. We, therefore, acknowledge the potential for residual confounding.

Despite these limitations, this study highlights important differences in caesarean section rates in Europe. But what are the explanations? It is possible that these divergent trends are spurious if, for example, changes in data sources or caesarean section coding systematically improved in transition countries over time. Alternative explanations include increasing maternal choice, an increase in clinically indicated caesarean sections that were previously not carried out, changes in clinical risk (e.g. increased obesity) or increases in 'inappropriate' caesarean section. Here, the definition of 'inappropriate' is important, as clinical guidelines and practice may differ, and thus what clinicians consider appropriate can vary between countries.⁹ This may be reflected in different clinical norms becoming established in response to differing needs in different countries or regions.

Differentiating between these potential explanations is important. Marked inequalities in life expectancy and other health indicators remain between transition and non-transition countries.¹⁰ This study raises important questions about whether potentially unnecessary maternity care is diverting scarce national health care resources away from areas of unmet need and whether this problem will increase in the future.

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Conflicts of interest: None declared.

Key points

- Former communist (transition) countries in Europe had substantially lower caesarean section rates than other European countries in 2000.
- Between 2000 and 2010, transition countries have experienced far greater increases (in both absolute and relative terms) in caesarean section rates.
- These findings have important implications for health care planning, including raising the possibility that resources are not being used efficiently within newly reformed health systems. Further comparative research is needed to determine the causes of the growth in caesarean section.

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Short Report

Effects of the 2010 World Cup football tournament on emergency department assault attendances in England

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We explore the impact of the 2010 World Cup, held in South Africa, on levels of assault attendances to 15 emergency departments in England. The majority (70.1%) of assault attendees during the 2010 World Cup was male and aged 18–34 years (52.5%). Assault attendances increased by 37.5% on the days that England played ($P < 0.01$). Preparation for major sporting events in non-host countries should include violence prevention activity. Emergency department data can be used to identify violence associated with such events and thus inform both the targeting of prevention efforts and assessments of their effectiveness.

Introduction

Major international sporting events can raise significant public health challenges for both host and non-host countries.^{1,2} World Cup football tournaments in particular attract widespread public attention from participating nations, and factors such as heightened emotions and alcohol consumption in spectators can contribute to increased violence.^{3,4} For example, an English study found increases in assault-related ambulance call-outs immediately following a World Cup (2006) football match in which England played and later again in the evening.² Although major international football tournaments do not necessarily elevate

overall emergency department (ED) attendances,⁵ assaults can be among the most common causes of ED attendance related to football World Cups, often associated with alcohol use.⁶ A Welsh study found that ED assault attendances increased on days when Wales played international rugby or football tournaments.¹ However, there is little information available on the impact of World Cup football tournaments, specifically on assault-related ED attendances.

The 2010 World Cup was held in South Africa and involved the England team in four of a possible seven matches. This report explores the impact of this World Cup on assault attendances to 15 EDs in England.