RISING CAESAREAN SECTION RATES IN THE CZECH REPUBLIC AND BRAZIL – DETERMINANTS AND COSTS ESTIMATION ANALYSIS*

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Abstract: The rising proportion of caesarean births beyond the World Health Organization 15% threshold level has been a worldwide trend consecutively creating an additional financial burden to health care systems. The Czech Republic used to report low Caesarean Section (CS) rates; nevertheless, since 2004, it has surpassed the recommended level. Currently, it belongs among countries with a 25 to 30% rate. On the contrary, Brazil has been the world's leading country in CS birth rates (57% of deliveries), reaching alarming numbers already in the 1980s. The aim of this paper is firstly to seek the reasoning behind significantly higher numbers of CS rates in Brazil compared to the Czech Republic since the millennia by explaining trends and mindset of social classes, and secondly to estimate extra costs related to a rising number of CS births in Brazil in comparison to the Czech Republic. Since public birth institutions in Brazil lack a decent public recognition, the low and growing middle-income class - characterized with medium/higher education and with a slightly higher average age of the mother at pregnancy - prefer CS deliveries (if affordable) whereas, high-income class mothers prefer to pay for natural births. Brazilian women with the highest education also tend to require natural birth due to more heightened awareness related to CS risks. Simultaneously, the occurrence of CS in the Czech Republic increases with education, reflecting more years spent studying, hence the last age of mothers-to-be. As per results of cost estimation, the extra expenditure related to CS in the Czech Republic for years 2000-2013 are relatively negligible (0.0564% of the Czech 2014 GDP); however, the total costs for the same year corresponds to 0.71% of Brazilian 2014 GDP. If managed to decrease the excess number of CS deliveries, these funds could be reallocated to other health fields, which lack capital support.

Keywords: Czech Republic, Brazil, Caesarean section, cost, social classes

1. Introduction

A rising share of Cesarean Section (CS) deliveries has become a worldwide trend, which has captured greater attention among a wide range of specialists from obstetricians to economists. The world average CS rate increased from 6.7% in 1990 to 19.1% in 2014

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(Betrán et al. 2016). Reasons behind the trends are not self-explanatory and differ significantly from country to country and depend on various factors such as socioeconomic, health condition of a mother and a baby, health care system, traditions, etc. On top of that, a complex principal-agent like the relationship between physicians and patients makes it difficult to say who the ultimate decision-maker is or how the decision has been reached in the end. Factors influencing rising CS rates include increasing age of mothers-to-be, their health condition, baby's health condition, mother's psyche, a belief that CS will be painless, a comfort of knowing the date of delivery, an obstetrician and a "service" received when a planned CS is performed, individual doctor's skills, financial motivation, etc. Hence these causes for high CS rates include both supply and demand factors and are not straightforward to determine which part the final decision comes from.

Some regions pioneer this trend at higher levels compared to others. Latin America belongs among the areas with relatively high overuse of CS deliveries (Ronsmans et al. 2006, Betrán et al. 2007). Its rate has been recently over 40% (DATASUS 2017). In comparison, the European average in 2014 was 25% (Betrán et al. 2016). Yet, the recommended CS ratio deliveries by World Health Organization (WHO) is 15% to ensure optimal benefit to the mother and a child, preventing neonatal and maternal mortality (Betrán et al. 2015, WHO 1985). The incidence of maternal death associated with a cesarean section is 3.5 times higher than in the natural method (Queiroz et al. 2005). Therefore, CS deliveries should be appointed only when medically justified.

Moreover, the CS, as a surgical mode of delivery, generally brings higher costs. Short-term CS' health service costs are estimated to be about two to three times higher than uncomplicated natural delivery (Henderson et al. 2001). Naturally, this raises questions, among others, about the increasing costs related to the rising amount of performed CS and its economic impacts on countries and their health care systems. The global costs of CS overuse were estimated in the World Health Report in 2008. Data obtained from 137 countries revealed an overuse of above 15% of CS births in 69 countries. This translates to 6.20 million CS births performed globally with estimated costs exceeding USD 2.32 billion for the year 2008 (Gibbons et al. 2010), negatively affecting human and financial resources (He et al. 2016), which may be used in different areas in need for resources (Gibbons et al. 2010).

In the paper, we elaborate on CS rates and related costs in two countries – Brazil and the Czech Republic. Both reveal rising CS shares in total deliveries but diverge in historical development. Brazil has been the world's leading country in CS birth rates (57% of deliveries in 2014), reaching alarming numbers already in the 1980s (DATASUS 2017). Such a ratio is quite peculiar considering the economic status of a country in development. On the contrary, the Czech Republic used to report low CS rates; nevertheless, since 2004, it has surpassed the threshold level as well. Currently, it belongs among countries with a rate of around 25% (OECD 2017). The aim of this paper is firstly to seek the reasoning behind significantly higher numbers of CS rates in Brazil compared to the Czech Republic. We attempt to explain the CS trends, particularly in relation to a mindset of social classes, in both countries since the millennia. Secondly, we estimate extra costs related to a rising number of CS births in Brazil in comparison to the Czech Republic.

The paper follows with an overview of factors and mindset of social classes standing behind rising CS deliveries in Brazil and the Czech Republic. Data and methodology are explained in section three. The subsequent chapter provides results and policy discussion. The main findings are summarized in conclusion.

2. Caesarean Sections in Brazil and in the Czech Republic

Brazil is one of the leading countries within the region, reporting high CS rates as well as CS growth rates (Vogel et al. 2015). The higher percentage given in Brazil can be explained by several perspectives. Historically, the CS delivery in Brazil used to have, among others, also an institutional reason. Surgical sterilization, being banned in the country, was factually performed undercover through an inadequate cesarean indication (Cecatti and Faúndes 1991). Information about the advantages and disadvantages of CS available to the general public in women's magazines within the last twenty years provides more or less objective facts even though the sources might be disputable (Torloni et al. 2011) thereby, the lack of awareness should not be the largest influencing factor. Currently, one of the main factors is the mindset for CS deliveries deriving from different social classes characterized by large income distribution disparities. According to IBGE (and Central Bank of Brazil), the social classes are divided by family income per capita. The income up to 291 $R/month (about 30 USD/day) isolates the low-income class with 27% of the Brazilian population. The family income per capita between 291 $R/month and 1019 $R/month defines the middle-income class, which represents the majority of the population (53%), and corresponds to what Pew Research Center defines as an upper middle income (i.e., $20-50 USD/day). The income above 1019 $R divides high-income class counting 20% of the population. In terms of geography, the richer regions in the Southeast, South, and Central of Brazil reveal higher CS rates (DATASUS 2017).

Due to a wide range of social programs aimed at reducing poverty, launched by the former Brazilian president Lula da Silva, Brazil has resulted in an emergence of a sizable middle class. The middle class is historically associated with higher political, social, and economic freedom characterized by higher demand for a quality public service provision, education, housing, employment, lifestyle, physical and financial assets (Ncube and Shimeles 2013, Oduro et al. 2011). In terms of health, the rising middle class is willing to spend more on better private healthcare rather than relying on public birth institutions, which lack decent public recognition and are poorly perceived. By paying for CS births, the medical treatment mothers receive is viewed of more quality, care, and attention. Therefore, middle-income and even low-income women tend to seek CS deliveries to a greater extend to avoid what they consider poor quality care, medical neglect, and traumatic birthing experience with public healthcare providers (Béhague et al. 2002). As a result, middle income and higher-income women are more likely to undergo CS births, supporting the notion that medical intervention represents superior care.

Based on the previous work of Berquó (1993) and Potter et al. (2001), McCallum (2005) notes that obstetricians generally reinforce "*the view that women's choice is behind the rise in rate, suggesting it reflects doctors' responses to women's fears and demands*". Prenatal care, in general, does not psychologically prepare pregnant women for childbirth. Brazilian mothers fear labor pain and hence wish for abdominal birth. They believe that CS delivery, due to painkillers, will be painless. Apart from that, mothers-to-be might prefer to have the doctor they know at the childbirth since they are confident with the gynecologist who has guided them throughout the whole pregnancy. In addition, the cult of the body in Brazil is too forceful. Brazilian women always desire to maintain their shape as a first priority. Consecutively, they fear body damage arising from vaginal birth and hence prefer the CS delivery (McCallum 2005).

However, most women prefer normal delivery in both public and private hospitals, but despite this initial desire, the private sector records more than twice as many surgical deliveries

shaped by the interventionist physician's behavior (Dias et al. 2008). This shift might be explained by several reasons. Concerning the doctors' incentive to CS deliveries, they might prefer those as they are more confident in their surgical skills than their midwifery ones. Surgical skills are more developed in Brazil than in Europe or the United States (McCallum 2005). Apart from that, obstetricians manage to plan the date and time of the labor, which might be convenient both for a mother and a doctor. Planned parturition takes around one hour to one hour and a half, which is significantly less compared to the natural way of birth. Thanks to CS operation, the doctors manage to deliver more babies within the determined time and hence earn a higher income. The relation of principal-agent comes into place as the health professionals can modify the perceived needs of their patients (Hou et al. 2014). In particular, impatient doctors might propitiate mothers during pregnancy that the birth will be natural, though, at the moment of delivery itself, they end up having substantial manipulating space and might push mothers for CS deliveries under any medical reason. Even in the private sphere, women have little power to resist the doctor's claims to authoritative knowledge. Thus, women's capacity to choose is severely compromised from the start (McCallum 2005).

In contrast to Brazil, differences by social classes in the Czech Republic are rather minor, and most of the people classify themselves among the middle social class (Kolářová 2008). The country itself is rather small compared to Brazil, yet there are large differences in CS rates among similarly sized hospitals from different regions e.g. The Institute for the Care of Mother and Child in Prague – 40.6% vs. The University Hospital Brno – 20.7%, or Neratovice Hospital 34.1% (Central Bohemia Region) vs. Vyškov Hospital – 9.3% (South Moravian Region) (Pavlíková 2015). It is rather difficult to exactly determine the causes for such discrepancies, but large perinatal centers generally accumulate high-risk pregnancies resulting in larger numbers of CS (Mardešićová and Velebil 2010). The CS surgery can be performed only under medical indication such as not corresponding size of the pelvis and fetus head, the irregular position of fetus etc. Be the factor on the demand or supply side; it has to be justified. Obstetricians are expected to deliver a healthy baby under all circumstances, therefore they may opt rather for CS than to face litigation if something went wrong. As one of the Czech interviewees[1] noted, the CS is more likely to be performed at the end of a doctor's shift or when a doctor is exhausted. Request and pressure from mothers-to-be, such as those considered as country's famous personalities who prefer scheduled deliveries and push for the surgery, contribute to the rising CS rate. However, a large factor is an age. More and more Czech women postpone their pregnancies to the latter age, which also involves health risks and more frequent need for CS (Interview 2017).

Both pregnancy and birth in the Czech Republic are under medical-led view. Deliveries are institutionalized in public or private hospitals, and costs are covered by the public health care system, which is generally perceived by the Czech population as decent. Doctors' salaries do not reflect whether the obstetrician performed natural births or CSs during his or her shift. Extra costs bared by mothers-to-be are only related to a presence of an accompanying person (usually father or midwife other than regular staff) in the delivery room or a selection of an obstetrician they know, and if not on duty, may arrive to delivery upon a call. While the price of the first service is official and varies from zero to several dozens of USD, the other is rather semi-official and depends on an agreement between an obstetrician and mother.

1 Medical practitioners - obstetricians

According to a medical practitioner from one of Prague's hospitals whom we interviewed, the remuneration can be either free, paid (in hundreds USD), or in exchange for reciprocal service.

3. Data and Methodology

Data used in the article was drawn from the health authority's data sources -The Institute of Health Information and Statistics (UZIS) in the Czech Republic and DATASUS in Brazil. Some information was obtained from interviews with obstetricians and nurses in the Czech Republic. Within the trend analysis, the statistical principle of correlation was applied to examine the relationship between the number of CS births vs. the mother's age and mother's education. This serves to categorize mothers' social class when trying to explain the CS trends.

The financial burden related to the 'additional' number of CS births was estimated for the last available years, 2000-2015. The additional number of abdominal births refers to the percentage over 15% - rate recommended by WHO. The estimated costs were identified by the multiplication of an additional number of CS births by an average cost of CS delivery. The price determination of abdominal birth was challenging, particularly in Brazil, where costs differ greatly depending on a doctor, a hospital facility and its quality, a city and a region, and ownership of an institution (public or private).

Costs in Brazilian public hospitals are fully covered by the health care system whereas, costs in a private clinic are shared among insurance companies, a parent, and the health care system. The extent of cost-sharing depends on an insurance plan and an institution. The costs related to birth can therefore be covered either by the public health system (SUS) or by private insurance companies (contributed individually). The SUS in Brazil covers 100% of costs, though, its utilization derives from social class. The higher the class, the higher the tendency for the use of private institutions. Since the mid-1990s, 90% of the births have been institutional, and 80% of the deliveries have been financed by the SUS (Hou et al. 2014). On the other hand, private insurance companies differ greatly in an offer of their plans, and the coverage of costs vary significantly both geographically and according to the institution. This complexity of the health care system in Brazil constitutes a substantial limitation for average CS costs determination. Moreover, Brazilian statistics classify some of the births as 'ignored', and hence the kind of birth is unclear. However, these cases represent a negligible part and are disregarded for the matter of cost estimation. Having considered the difficulties, the model developed in this study uses simplified, unique price estimation. The cost estimation of additional financial burden related to CS surplus disregarding particular (private/public) source and is calculated with an average Czech price for both countries. Public health care is the only system employed in the Czech Republic therefore, it is relatively easy to determine the costs related to CS. A rough estimation of CS costs is around 30.000 CZK (approximately 1.500 USD), assuming a flawless run (Hovorka 2011). This amount is directly associated with labor only and does not include resources of antenatal and postnatal care. Undoubtedly, birth is an individual occurrence, and the costs may vary significantly from flawless labor to complicated delivery, with potential complexity appearing over the time after the birth itself. Nevertheless, the results of simplified cost estimations in the case of Brazil are rather coarse and must be treated carefully, accompanied by a more detailed discussion (see the previous section).

4. Results and policy discussion

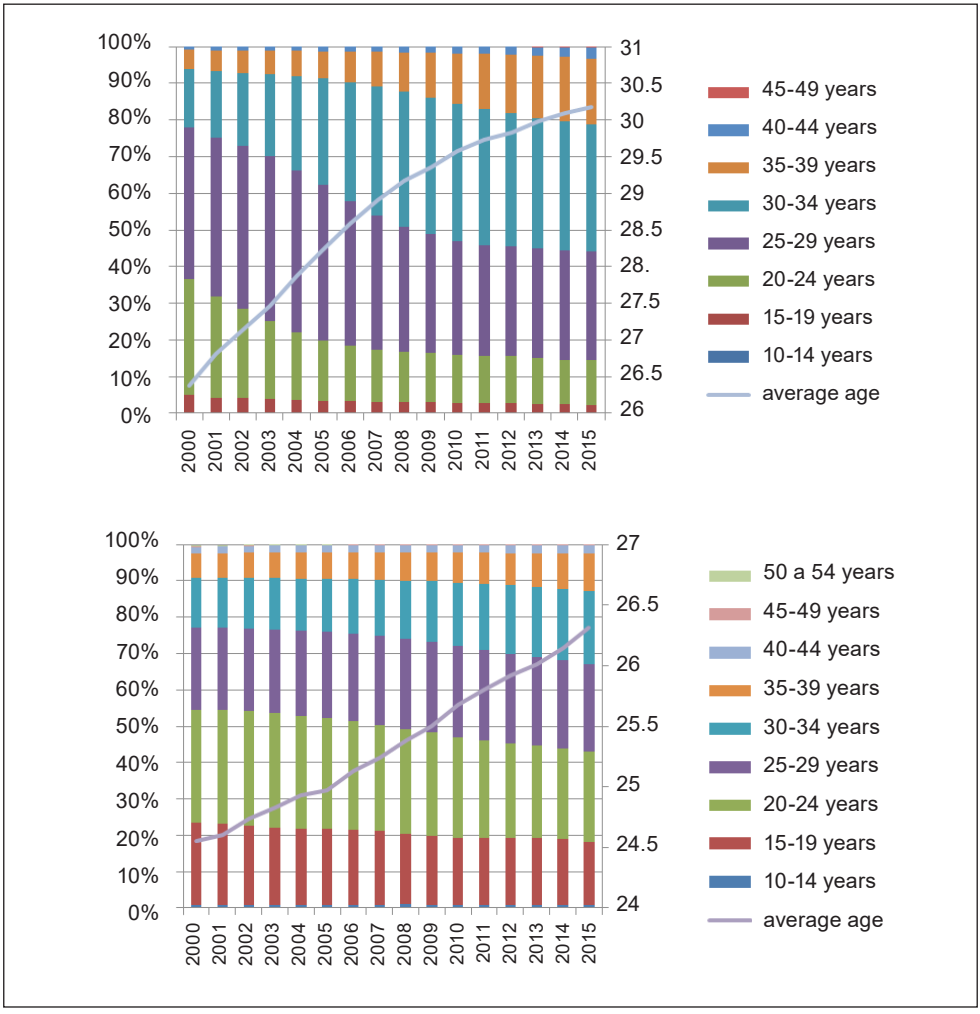
The CS rates in both countries generally increased between the years 2000 and 2015. In the Czech Republic, the CS rate rose from 11.6% to 26.1% (UZIS 2017) and in Brazil, from 37.8% to 55.5%, respectively, with minor fluctuations. Since 2009, a turning point in Brazilian obstetrics, the CS delivery has prevailed. The CS rate reached nearly 57% in 2017 (DATASUS 2017). These excessive CS births generate an additional financial burden in both countries. The Czech Republic registered underuse of CS deliveries, with rates below 15%, compared to natural births within the years 2000 to 2003. Considering the lower rate, these years did not create any additional financial burden in the Czech Republic. Yet, the situation has changed since 2004, when the rate has overcome the set frontier. From 2004 to 2015, the additional financial burden raised to approximately USD 157 million. The total cost estimation in Brazil reached approximately USD 23.4 billion since the millennia. The data revealed that in 2014 the share of health care expenditures on GDP were 7.4% in the Czech Republic and 8.3% in Brazil. Total CS expenditures in the Czech Republic for the same year amounted to 0.27% of health care expenditures, and the additional costs related to CS totaled to 0.12% of health care expenditures. In the case of Brazil, the shares were 1.26% and 0.93%, respectively. The financial burden of additional CS could still be neglected in the Czech Republic, whereas, in Brazil, the value represents a more significant amount of capital. Taking into consideration the level of development, if Brazil managed to decrease the surplus of abdominal operations, the relieved funds could be dedicated to social spending, withdrawing poor inhabitants from extreme poverty and increasing the middle class, or transferred to other spheres of healthcare which currently lack financial support such as mental illnesses.

One of the reasons behind the aforementioned trends is a shift in the age structure of mothers-to-be towards older groups (see graph 1 and 2). The average age in the Czech Republic increased from 26.4 in 2000 to 30.2 in 2015, which is reflected in a share decline among the age groups 20-24 and 25-29, accompanied by an increase in the group 30-34. In the latter years, there has also been a rise in the share of the age group 35-39. In comparison, Brazilian mothers-to-be are on average younger but also show an aging trend from 24.6 in 2000 to 26.3 in 2015. The youngest age groups 15-19 and 20-24 lost their share to groups 25-29 and 30-34.

The correlation results revealed that the dependence increases with the mother's age. For mothers over 30 years of age, the relationship achieves perfect correlation. This owes mainly to risks related to age, suchlike trends in both countries. The correlation for Czech mothers depending on their age is following: -0.91[2] for 20-24, -0.58 for 25-29, 0.97 for 30-34, 0.93 for 35-39 and 0.87 for 40-44. The numbers are alike for Brazil as well: -0.97 for 20-24 age group, 0.54 for 25-29, 0.96 for 30-34, 0.91 for 35-39 and 0.93 for 40-44 year-old mothers. The most significant dependency was recorded by the age group 30-34. There is a clear relationship between increasing maternal average age and increasing share of CS in the total number of births for both countries. The growth rates are particularly fast in Brazil (see Graphs 1 and 2).

2 Significant on the level alfa = 0.05

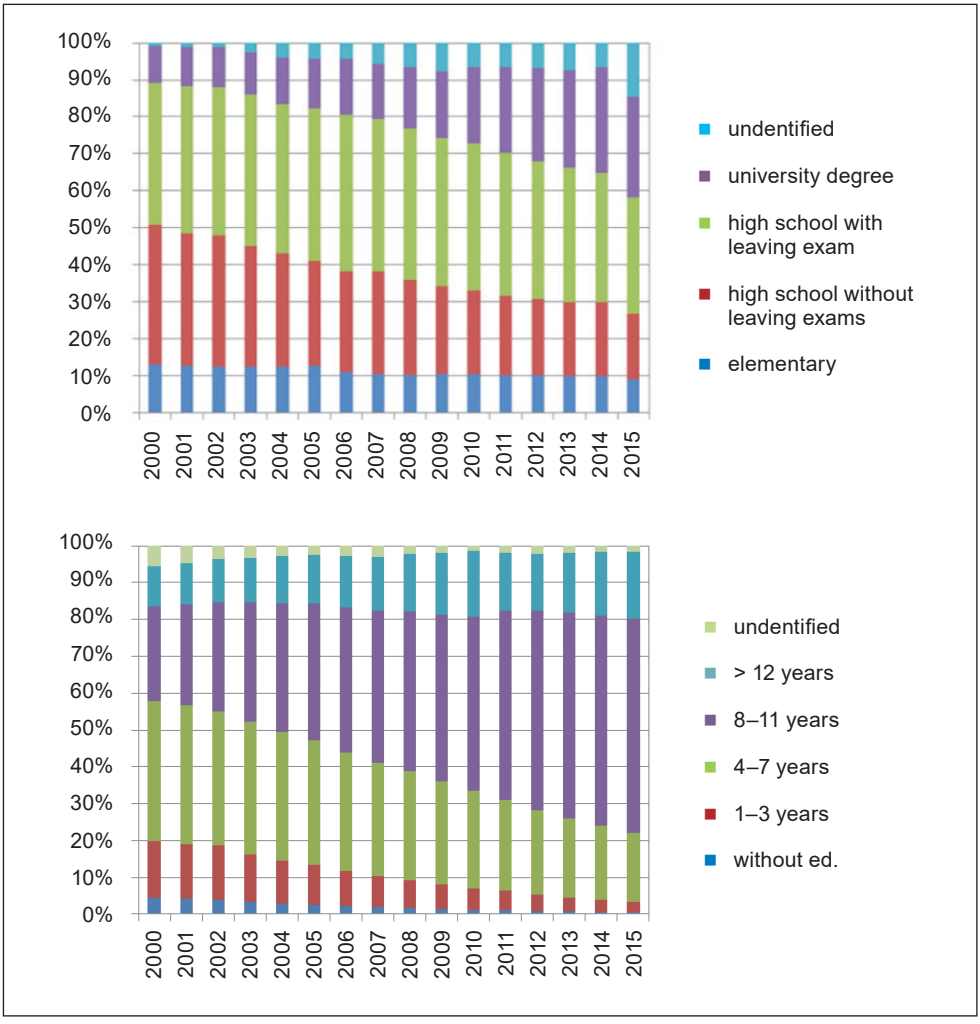
Graph 1 and 2: Mothers-to-be by Age Group (% of Total) and an Average Age in the Czech Republic and Brazil



Source: UZIS (2017), DATASUS (2017).

As mothers-to-be in the Czech Republic and Brazil are getting older, they are also becoming more educated (see Graphs 3 and 4). Brazilian statistical resources divide the mother's education not per institution but by the number of years dedicated to study. Based on trends, the share of mothers with a university degree is on the rise in the Czech Republic, and the percentage of mothers who obtained 8-11 years of education has significantly soared in Brazil since 2000. The second moderately increasing group are mothers who were educated over 12 years.

Graph 3 and 4: Mothers-to-be by Education (Group % of Total)



Source: UZIS (2017), DATASUS (2017).

As per results, mothers with elementary education in the Czech Republic got a correlation of -0.43, a high school without leaving exam -0.78, high school with leaving exam 0.46, and university graduates 0.92. A significant correlation was found only for the last group, "university degree," which reflects the older age of mothers-to-be with potential health risks (e.g., diabetes, obesity) and the need for CS. The correlation results in Brazil for 4-7 years of education (equivalent to elementary education) was -0.98, for 8-11 years (equivalent to high school without leaving exam) the relationship approaches perfect correlation of 0.99 however, with education above 12 years, the relationship is of 0.89. The lower correlation of the last group implies that higher education in Brazil raises awareness of CS costs, benefits and drawbacks, and results in a tendency for natural births.

There have already been some provisions aiming at reducing the CS incidence. Launched government programs intent to decrease the number of CS births highlighting the lower risks involved both to the mother and a child. Nevertheless, these programs need to change the current status quo and shift the mothers' mindset and doctors' preferences, particularly in Brazil. Due to the fact, that CS births in Brazil are connected to better quality treatment in public institutions, such a reshuffle to vaginal birth requires a great effort involving all parties. In order to decrease the proportion, the social security system started to pay obstetricians the same amount of money for both kinds of deliveries. Nevertheless, such a measure did not change the trend, and CS births kept growing. This was mainly due to the fact that obstetricians opted for CS since they managed to proceed with more deliveries at the same time enabling them to earn higher salaries (Murray 2000, Hou et al. 2014). In 2015 the Brazilian government introduced a significant change to the wages of obstetricians. For the natural birth, the obstetricians newly started to earn three times the value of a CS. This rule was already present in the Normative Resolution No. 368. Though, only from 2015 is enforced by judicial decision. In addition, aiming to change the general alertness, the natural births could be exalted in series such as soap operas or by spreading awareness by celebrities who have delivered in a natural way.

Campaigns need to go hand in hand with a movement defending the 'rehumanisation' of childbirth (McCallum, 2005) in order to change the perceived concept. By bringing an element of humanity to the hospitals in both countries may be one aspect of changing approach towards labor, same as pro-natal policies motivating young adults to start families. The latest trends in Brazil indeed start to highlight natural births. As shown by the correlation, mothers with tertiary education demand less CS births and prefer natural births. The most expensive departments of maternity hospitals provide relax areas for mothers-to-be, labor in the water, massages, and other more human ways of natural birth. Nevertheless, the natural birth in these conditions, with a doctor who guided the whole pregnancy, is extremely expensive, and only the wealthiest families can afford it. High-class mothers desire the luxury of playing the main role during labor and not the doctor and his/her planned schedule. Such luxury could be equally obtained with home birth, however, deliveries out of motherhood institutions are yet a rather taboo both in Brazil as well as in the Czech Republic. Legalization of labor in 'labor houses' under midwife supervision or home labors in the Czech Republic may help to reduce CS rates. Still, such a decision is somewhat controversial at the moment.

Notwithstanding nowadays, the adequacy ratio of 15% of CS per country should be reviewed (Gibbons et al. 2010, Betrán et al. 2015). This recommendation from 1985 seems to be outdated in several aspects. In more than 30 years, medical science has made significant progress, and the average mother's age has increased. Pregnancies tend to be postponed to the later age of mothers, and deliveries become more complicated due to various reasons such as a rising trend in multiple births and a greater likelihood of poorer women's health-related to aging. On the contrary, due to the mother's better well-off babies end up being born at a greater size, which results in more complicated vaginal birth. Consequently, the higher use of CS is comprehensible. Nevertheless, these changes do not explain the 57% ratio of abdominal deliveries in Brazil. Overall, if the percentage of CS will be maintained high and will increase globally elsewhere, there will be no need to biologically develop a female body in the way to deliver a baby vaginally, but instead, the female body will evaluate and adapt for elective surgery (for more on evolution and CS see, e.g., Mitteroecker et al. 2017).

5. Conclusion

The worldwide increase of elective CS above the WTO's recommended level has been substantial across all income levels countries. Whereas the situation is particularly alarming in Brazil where the growth of the middle class pushes for greater use of CS births (55.5%), the Czech Republic used to report low CS rates until 2004, and since then it has also been surpassing the threshold level (currently 26.1%). Causes for high CS rates include a wide range of both supply and demand factors. A complex principal-agent like the relationship between physicians and patients makes it difficult to say who the ultimate decision-maker is or how the decision has been reached in the end. Yet, some differences and changes in a perspective towards child delivery can be clearly observed among social classes. Trends reveal that public birth institutions in Brazil lack decent public recognition. Thus, low income and middle-income classes prefer to opt for CS deliveries (if affordable) as they expect a better treatment be it a surgery. Whereas, high-income class mothers, more aware of the pros and cons of CS, prefer to pay for natural births. Births delivered by mostly numbered middle-income class mothers can be characterized with medium/higher education and with a slightly higher average age of the mother at pregnancy. The differences in social classes in the Czech Republic are rather minor. Generally, the occurrence of CS increases with education in contrast to Brazil and may be attributed to the latter age of mother-to-be due to time they spent educating themselves.

Unlike natural birth, abdominal surgery requires higher costs, which consecutively creates an additional financial burden. As per results of cost estimation, the extra expenditure related to CS in the Czech Republic for years 2000-2013 are rather negligible (0.0564% of the Czech 2014 GDP) however, the total costs for the same year correspond to 0.71% of Brazilian 2014 GDP. Even though, the estimates are rather coarse, they may serve as a basis for further, more detailed investigation, and an argument for policymakers to promote policies preventing further excessive upsurge. If managed to decrease the excess number of CS deliveries, funds could be reallocated to other health fields, which lack capital support.

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