Can increased use of ART retrieve the Czech Republic from the low fertility trap?

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Submitted: 2009-10-05 Accepted: 2009-11-10 Published online: 2009-12-28

Key words: **assisted reproduction; fertility; population policy**

Neuroendocrinol Lett 2009; **30**(6):739–748 **PMID:** 20038934 NEL300609A04

Abstract

OBJECTIVE: The aim of the study was to evaluate the importance of increased use of assisted reproduction technologies (ART) for the fertility trends in the Czech Republic.

DATA AND METHODS: Comparative analysis based on demographic and ART data was used. Demographic data have been published by EUROSTAT and the Czech Statistical Office. ART data have collected by ESHRE.

FINDINGS: In the 1990s a trend towards later childbearing contributed greatly to the decline in total fertility rate (TFR) in the Czech Republic. Recently, recuperation of delayed births has resulted in the increase of TFR to 1.5 children per woman which is considered to be a critical minimum level. The highest increase in fertility rates occurred in the age group of 35–39, in which the contribution of ART treatments usually is greatest. Moreover, a substantial increase of multiple births has been registered. In 2005 the estimated share of children born after ART in the Czech Republic (3%) was close to countries with the highest share (Nordic countries, Belgium or Slovenia). However, the Czech Republic registered only half the number of ART cycles per million inhabitants than in those countries. Contrary to Nordic countries the Czech Republic faced an extremely low TFR of 1.28 children per woman. As the estimation of average number of cycles suggests, the need for fertility treatment has not been met in the Czech Republic yet. Moreover, due to the continuous postponement of childbearing to higher women´s age, demand for ART treatment will be even higher in the near future and will probably result in the need of more than 2 500 cycles per million inhabitants in the Czech Republic.

CONCLUSIONS: Spreading of ART is particularly relevant in the countries caught in the low fertility trap as higher impact on fertility trends could be expected. In the Czech Republic there is a chance to get over the critical level of TFR if comprehensive population policy including the improved access to ART based on well-considered strategy with explicit aim to optimize the quality of health care was accepted. However, from the demographic perspective the risk of further delay of childbearing encouraged by ART treatment should be taken into account while making these decisions.

ORIGINAL ARTICLE

INTRODUCTION

Postponement transition towards a late-childbearing regime is the most characteristic feature of fertility change in European countries (Kohler *et al.* 2002). Van de Kaa (2002) suggests that it is the spread of post-modernism, where choices are increasingly based on quality of life issues and the desires for self-fulfilment. Progressive delay of the first childbirth has become a crucial cause of the sharp drop in total fertility rate (TFR for a given year is a measure of the number of children that women would have over their life, if at each age they experienced the age-specific fertility rate of that year) particularly in the Central and Eastern Europe. The lowest level of TFR in Europe of 1.09 children per woman was observed in 1997 in Bulgaria. In the Czech Republic the lowest TFR of 1.13 was recorded in 1999. Currently the lowest TFR of 1.24 is observed in Slovakia. Indeed, the highest fall of TFR occurred in most South and East European countries during the 1990s. Since that time modest increase in TFR with different intensity has been documented across Europe, which gives the sign of pushing the TFR off the bottom. However, a great variability in the current fertility level could be found across Europe (see Figure 1). While some countries are very close to the replacement level (defined as a TFR around 2.1 children per woman), others like the Czech Republic are quite far below it. What are the prospects for the countries with extremely low fertility level? Should governments take actions aimed at increasing the fertility rate?

The ongoing fertility postponement has narrowed the time span available for reproduction and affected the possibility for an increasing proportion of women to achieve their desired fertility due to infertility (subfertility), i.e. the inability to conceive after a year of unprotected intercourse, or sterility impediments. More and more couples also have to accommodate to "shocks" from longer-than-expected waiting-times to pregnancy. The long-term trends towards later childbearing together with the potential effect of new ART (assisted reproduction technology) push the age limit of childbearing to increasingly later stages of the life course (Billari *et al.* 2007). However, biological limits of childbearing have not shifted to later ages. Taking into account the biological limits Goldstein (2006) estimated the "upper limits" of the population average age at first birth to be around 33 years. This would mean that in many European countries the depressed levels of fertility seen due to postponement could continue for decades before limits are reached.

DATA AND METHODS

Data on ART (assisted reproduction technology) were confronted with the demographic data. Data on births collected by the CZSO (Czech statistical office) were used to perform more detailed demographic analysis based on a transversal approach. Data on ART published by the European IVF Monitoring (EIM) were used. Data on ART have been collected from national registers by European Society of Human Reproduc-

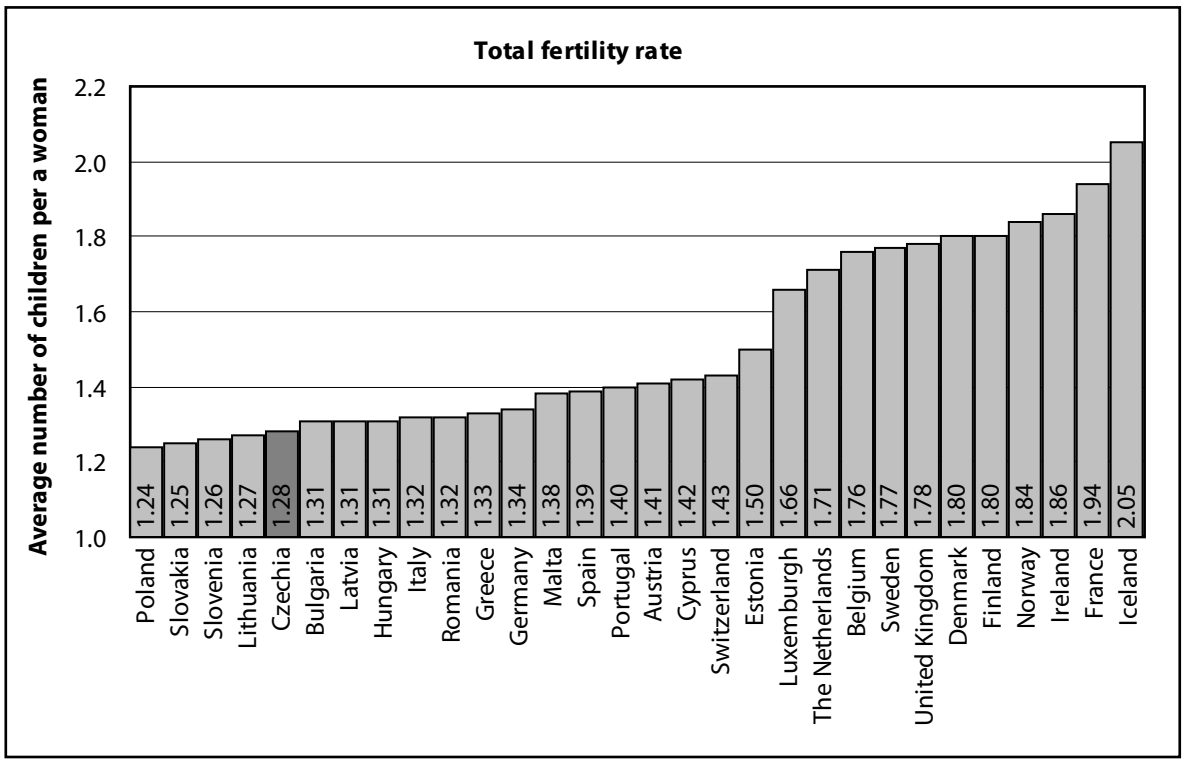

Fig. 1. Total fertility rate in European countries in 2005. Data source: Eurostat.
Notes: TFR = 1.5 children per a woman is the critical minimum level.

tion and Embryology (ESHRE) since 1997. Although the database covers data on IVF (*in vitro* fertilization), ICSI (intra cytoplasmic sperm injection), FER (frozen embryo replacement), ED (oocyte donation), IVM (*in vitro* maturation), and PGD (preimplantation genetic diagnosis), more detailed analysis were based only on IVF/ICSI data. Data on intrauterine insemination (IUI-H and IUI-D) are reported separately and are not included in this analysis. Drawback of this database is its incompleteness as up to now only in 16 countries all clinics have reported to the EIM (Andersen *et al.* 2009). Moreover, data on ART are published with quite a delay which makes any comparison with demographic data problematic.

While in 1997 the Czech Republic provided complete information because all 18 clinics reported to the Czech National Register (Nygren *et al.* 2001) in 2005 only 10 out of 22 clinics in the Czech Republic provided data. Since 1998 reporting of the Czech ART clinics about the outcomes of their treatments has not been mandatory anymore due to change in law that did not ensured the protection of individual data. Only in 2006 a new law No.227/2006 was adopted to set new conditions for the Czech National Register. However, no data from this newly introduced register have been published so far. Thus, as only estimates are available for the Czech Republic in the period of 1998–2005, more qualified analysis could not be done and the comparative analysis has to be interpreted with caution.

TRANSITION OF FERTILITY MODEL IN THE CZECH REPUBLIC AND LOW FERTILITY TRAP

Similarly to most East European countries the Czech Republic has experienced a notable shift in reproductive behaviour after the collapse of the communist regime. Between 1990 and 1996 TFR fell from 1.9 to 1.18 and remained below 1.3 until 2005. An early childbearing pattern retained in the Czech Republic until the beginning of the 1990s has been replaced by a late fertility pattern characterised by a pronounced delay of entry into parenthood. This trend towards later childbearing has contributed greatly to the decline in TFR. A share of delayed births was expected to be eventually recuperated, especially among childless women, but until 2005 the extent of recuperation was insignificant.

Since 2006 the Czech Republic has recorded a surge in the number of live born children inadequately called "baby boom". At the same time TFR rose to 1.5 by 2008 which can be largely attributed to the concurrence of two factors: a late compensation effect of the shift of fertility to a higher age of women and the onset of a new pattern of reproductive behaviour (see Figure 2). This recovery was partially encouraged by the improvements in family policy in the Czech Republic in 2001–2005 as well as expansion of ART clinics. The growing fertility of women at the age of around 30, apparent since 2004, is an indicator of the creation of a new fertility model. The early-childbearing pattern, with a pronounced peak in fertility rates at age 21 has been replaced by a late-childbearing pattern with a peak at age 30 (see Figure 3). The average age of women giving birth to their first child increased by about 5 years, from around 22 years in 1990 to around 27 years in 2008, a rapid change that might continue in the near future. It was expected that most of the delayed births were recuperated by the time women reached their late twenties and early thirties, however this recuperation has been notably smaller in comparison with recuperation at higher ages. Recently the highest increase in fertility rates occurred in the age group 35–39 and it is assumed

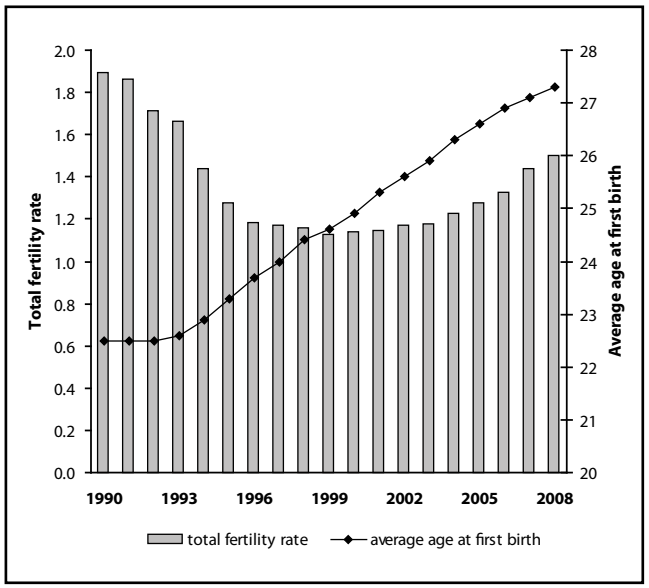

Fig. 2. Trends in total fertility rate and average mother´s age at first birth in the Czech Republic. Data source: Czech statistical office.

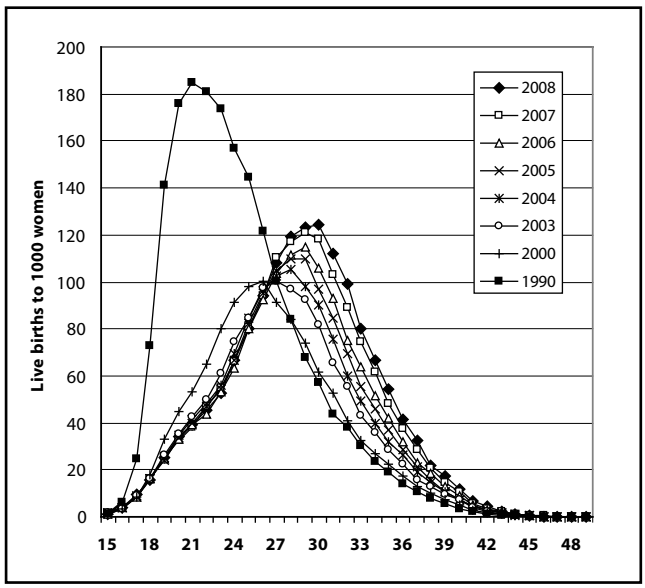

Fig. 3. Trends in age specific fertility rates in the Czech Republic. Data source: Czech statistical office

to be enhanced by ART treatments. Since 1990 fertility rates at age below 25 have declined by more than three-fourths whilst fertility rates at age over 32 have increased by more than 2.5 times. As a result, share of fertility rates at age 30 and over on the TFR substantially increased from 14 per cent in 1990 to 45 per cent in 2008 (see Figure 4). Currently the share of fertility rates at age 30 and over on TFR exceeds 50% in all Nordic countries, Italy and Spain.

As the key role in recent fertility transition plays the postponement, future fertility development depends on the assumption regarding the upper age limit to which Czech women would postpone starting a family. If women postpone childbearing until their late thirties and even early forties they will face rising infertility. Although the data on fertility intentions show that average intended family size remains around two children, Czech women may find it increasingly difficult to reach their desired number of children. Thus, further shift toward later childbearing may lead to a decline in completed fertility among women who are now in their early thirties. For most women who want to have a child beyond the age of 35, or even 40, it may take longer to conceive because of age-related decline in fecundity. The monthly chance of conceiving declines from around 20% at age 25–30 years to 8% at age 40 (van Noord-Zaadstra *et al.* 1991). In addition, 24% of pregnancies started after the age of 40 and 33% started at age 45 do not end in a live birth (Leridon *et al.* 2008). Since the age-related decline in fecundity limits the chance of women to conceive spontaneously, they should have the possibility to get reproductive assistance through infertility treatment.

As the TFR in the Czech Republic is just around the critical level of 1.5 it is questionable whether fertility continues to recover in the near future, remains around its current level or falls back below 1.5. It is argued that countries with a TFR below 1.5 are locked into a "low fertility trap" defined as unwanted demographic regime which a country enters unintentionally and which is very difficult to get out of (Lutz *et al.* 2005a; 2005b). According to this hypothesis TFR below 1.5 constitutes a mechanism of a self-reinforcing process toward lower and lower fertility consequently accelerating ageing and shrinking of a population (more in Lutz *et al.* 2006). As existence of the low fertility trap is considered to be a real danger the best and safest strategy is to avoid stepping into it and make efforts not to let fertility fall below this critical level for an extended period (McDonald, 2006). The recommendation for governments in countries where the TFR has already fallen below 1.5 is that fertility should be urgently brought up to above 1.5 before the regime change is complete and irreversible. According to Lutz *et al.* (2005b) policies that stop further increase in the mean ages at childbearing could be the right policy tool to escape the "low fertility trap" before it closes. Furthermore, Grant (2006) recommended to consider ART a part of the population policy mix to increase fertility. Accordingly, the policies influencing the uptake of ART and possibly contributing to recuperation of delayed births are relevant for the Czech Republic.

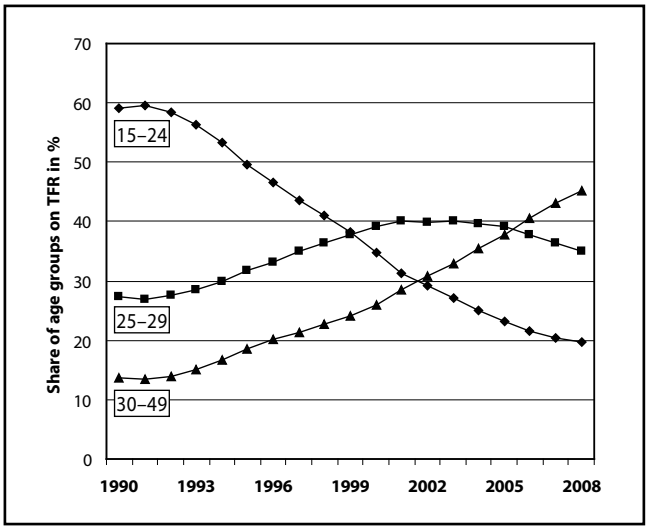

Fig. 4. Trends in the share of age groups on TFR in Czech Republic. Data source: Czech statistical office

INCREASED USE OF ART IN THE EUROPEAN CONTEXT

For the last two decades rising importance of assisted reproduction for fertility trends in European countries has become apparent as new methods are rapidly developed and tested. This "reproductive revolution" is closely related to ongoing postponement of childbearing to ages when more women face infertility. Although the prevalence of infertility and the need for IVF/ICSI treatment is expected to be similar across countries, the availability of ART services is highly variable. Schmidt *et al.* (2007) estimated that 3000 couples per one million inhabitants would be eligible for IVF/ICSI treatment. Provided that at least around 50% of infertile couples seek fertility treatment there is a need for at least 1500 ART treatment per one million inhabitants in each country. Finland and Denmark were the first to be around that amount in 1997 (Nygren *et al.* 2001). However, if we take into account that each couple would need in average more than one cycle of treatment, the real need is much higher and would exceed the 2000 cycles.

Although ART treatment has widespread in most European countries since the 1990s, up to now there is a large variation in the use of ART suggesting the need for fertility treatment has not been met yet in most countries. IVF/ICSI methods are effective treatments but costly. It could be seen that the use of ART is greater in countries that substantially subsidize expenses such as the Nordic countries or Belgium. Currently, in European countries with complete statistics on assisted

reproduction the average number of treatment cycles per one million inhabitants range from 46 in Albania to 2209 in Denmark (Andersen *et al.* 2009). Denmark and Belgium were the only countries where 2000 ART cycles per million was exceeded in 2005 (see Figure 5). The proportion of children born after an ART treatment in 2005 ranged between 0.1 per cent of all live born children in Albania and 3.9 percent in Slovenia (Andersen *et al.* 2009). Next to Slovenia this proportion exceeded 3 per cent only in Denmark (3.5%), Belgium (3.5%) and Iceland (3.3%). Denmark and Iceland have reported the highest share of ART children for a long time but recently a stabilization or fluctuation around the level of 4 per cent could have been observed in these countries suggesting that a possible threshold has been reached (see Figure 6). Between 1997 and 2005 a continuous increase was documented particularly in the countries with smaller value of this share.

As availability of assisted reproduction has been recently expanding in most countries it is expected that more and more infertile couples take up this service. Indeed, in all countries except for Germany a continual increase in the number of provided ART treatments has been documented. Germany gives the evidence of a negative impact of the introduction of more restrictive reimbursement policy since 2004 (Ochel *et al.* 2007). The 2004 Health Reform in Germany has complicated fertility treatment for childless couples by lowering the share of costs by statutory health insurance (i.e. raising co-payments) and by limiting the number of subsidised fertility treatments to three. As a result the number of cycles in Germany declined to only 57 000 cycles in 2004 (53 000 cycles in 2005) compared with over 102 000 cycles in 2003.

In the Czech Republic the continual increase in the number of cycles was registered during the 1990s in connection with an expansion of new private ART clinics. An acceleration of use of ART coincidently occurred in the mid 1990s when a deep decline in number of births was registered (see Table 1). In 1997 the Czech Republic reached more than 700 cycles per one million inhabitants, which was close to the European average. However, in Denmark this amount was two times higher. Even though the Czech Republic has been facing the lack of reliable ART data since the end of the 1990s, its average position within Europe probably has not changed. Mardešić (2006) estimated that about 900 cycles per 1 million inhabitants were carried out in the Czech Republic. This number was close to the data reported in the Netherlands or France in 2005, but made up only half of the quantum registered in Nordic countries. Interestingly, Mardešić (2006) supposed that proportion of children conceived by ART was around 3 per cent which classified the Czech Republic close to the top countries – Belgium and Denmark (see Figure 6 and 9). In the Czech Republic health insurers cover only three treatment procedures for a woman in her life until the age 39 while in Belgium up to six cycles in a lifetime for all ART-related laboratory activities are reimbursed to females aged under 43 (Ombelet, 2007). In addition, if a woman in the Czech Republic gets pregnant after the second procedure and wants to have another child by this method, the insurer covers only one further procedure while in Belgium another six procedures are being covered. On the other side, the legislation in Denmark does not differ much from the Czech Republic. Assisted reproduction in Denmark is provided free of charge to women below the age of 40 who do not have a child with their current partner and is easily accessible at public clinics within the National Health System. Up

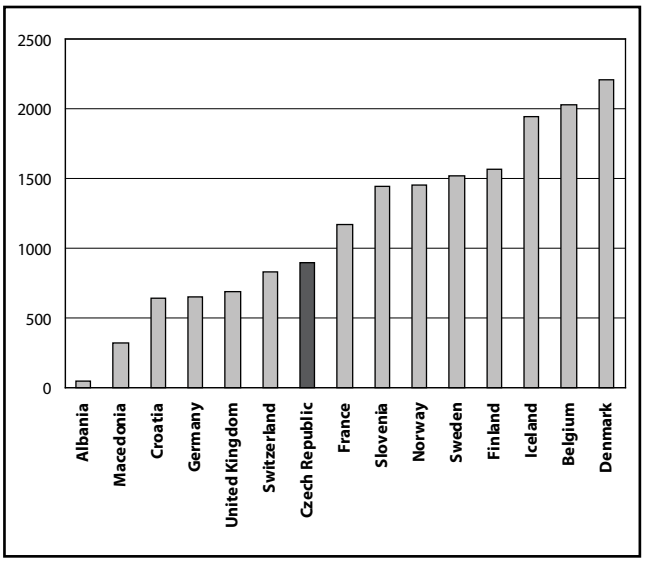

Fig. 5. Number of ART cycles per one million inhabitants in 2005. Data source: EIM report (Andersen *et al*., 2009).
Notes: ART data for the Czech Republic are based on estimation (Mardešic, 2006).

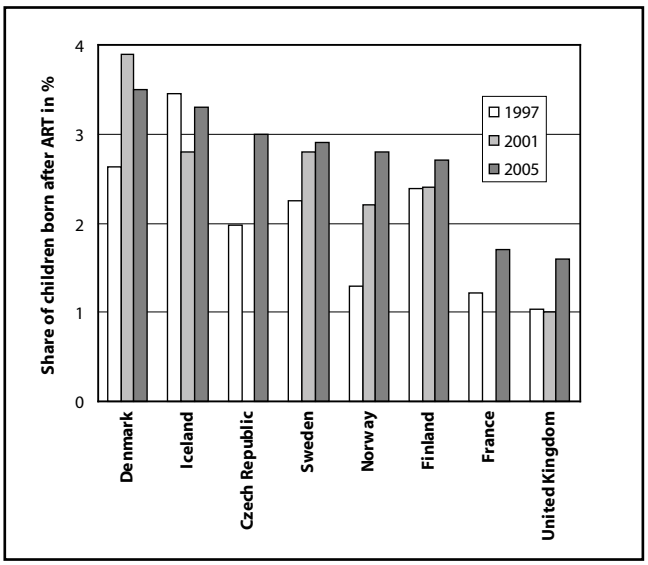

Fig. 6. Trends in the share of children born after ART in some European countries. Data source: EIM report (Nygren et al, 2001; Andersen et al, 2005; Andersen *et al.*, 2009).
Notes: ART data for the Czech Republic in 2005 are estimated (Mardešic, 2006; Kučera *et al*., 2005).

Tab. 1. Live births and ART cycles in the Czech Republic.

year	singletons	twins	triplets	ART cycles per 1 million
1990	128 739	1 152	17	
1991	127 497	1 155	14	
1992	119 791	1 151	16	102
1993	119 271	1 080	13	182
1994	104 876	998	14	245
1995	94 313	1 010	21	435
1996	88 604	1 034	30	638
1997	88 485	1 170	35	764
1998	87 869	1 447	22	767
1999	86 829	1 427	30	827
2000	88 363	1 368	23	
2001	87 887	1 525	13	
2002	89 979	1 502	21	
2003	90 729	1 591	15	
2004	94 246	1 813	19	
2005	98 607	1 926	13	900*
2006	101 855	2 115	15	
2007	110 285	2 298	22	
2008	115 032	2 381	16	

Data source: Czech statistical office and National Register (Burcin *et al*., 2004)
* estimation by Mardesic (2006).

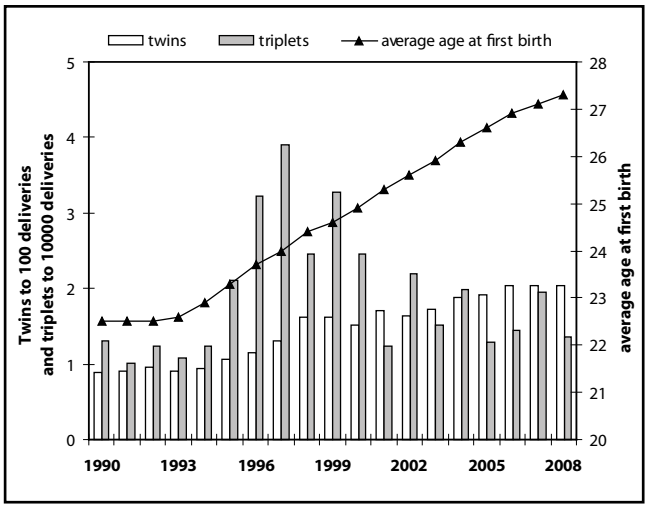

Fig. 7. Trends in twins and triplets versus average age at first birth in the Czech Republic. Data source: Czech statistical office.

to three cycles are provided free of charge. In addition, several regions within Denmark also fully subsidize the provision of ART for women who already have one child with their partner (Andersen *et al.* 2006). Finally, according to surveys, the Czechs support assisted reproduction but they lack knowledge and often overestimate the risk linked to artificial fertilisation.

DEMOGRAPHIC IMPLICATIONS OF ART TREATMENT IN THE CZECH REPUBLIC

ART treatment has contributed to some peculiarities in fertility trends (Stephen, 2000; Land *et al.* 2003; Beemsterboer *et al*. 2006). In the Czech Republic the greatest demographic effect of increased use of ART was seen in the 1990s when a rapid increase of the number and proportion of multiple births occurred. By natural law one delivery of twins occurs in one of 100 singleton births and one delivery of triplets occurs once per 100 twins. This was true in the Czech Republic until the mid 1990s (Rychtaříková, 2007b). During the second half of the 1990s an increase of twin delivery ratio as well as a huge fluctuation in triplet delivery ratio could have been seen as a result of the increased use of ART (see Figure 7). In addition, the sharp decrease of live births in women under 25 years of age probably also contributed to higher ratio of multiple births.

The ART has caused the increase in multiple pregnancy rates due to a common practice of transferring two or more embryos into a woman´s uterus. According to Nygren *et al*. (2001) in 1997 the highest percentage of triple and quadruple transfers after IVF and ICSI was found in the Czech Republic (76%), Greece (76%), Spain (74%), Hungary (72%), Russia (72%), and Portugal (72%). In Sweden and Finland the lowest percentage of transfers of three and more embryos (5%, resp. 10%) was recorded together with the highest proportion of twin transfers (86%, resp. 74%) at that time. Until 2005 a clear trend towards transfer of fewer embryos was registered in all European countries with completed ART data as the percentage of triple and quadruple transfers markedly decreased from 53% to 24% on average. As a consequence, the proportion of multiple (twin and triplet) deliveries after IVF and ICSI declined from 28% in 1997 to 22% in 2005. However, major differences among European countries have outlasted (Andersen *et al.* 2009). While until 2005 the proportion of triple or more embryo transfers has declined to 0 in Sweden and Finland, it has remained around 23% in France and Germany. Considerably growing percentage of single embryo transfer (SET) has become characteristic particularly for Sweden (69%), Finland (50%), and Belgium (48%). On the other side in 2005 the highest percentage of twin transfers was found in the UK (85%), Ireland (80%), Iceland (66%), Germany (66%), and France (60%). In 1997 the Czech Republic registered 1.4 times higher percentage of multiple deliveries after ART treatment (38% versus 28%). As recent demographic data

indicated, a trend towards twin rather than singleton deliveries could be seen in the Czech Republic

Besides transferring more than one embryo, there are other reasons for the ongoing increase in multiple births registered in majority of developed countries. Stephen (2000) estimated that about one third of this increase is probably due to women who took ovulation stimulation drugs without ART. Furthermore, the delayed childbearing is also a contributing factor to higher incidence of spontaneous multiple births as an older woman has higher probability of multiple pregnancy. Since the age of woman at first childbirth has been continuously rising in the Czech Republic it is likely to continue to add to an increase in the twin and triplet ratio in births.

The trends in frequency of multiple deliveries observed in the Czech Republic clearly document that before using modern methods of IVF and ICSI the frequency in multiple births gradually increased with women´s age (Rychtaříková, 2007a). Since the mid 1990s an increase of multiple births was pronounced in the age groups of 30–34 and 35–39, i.e. in those age group with the highest "natural" incidence of multiple births (see Figure 8). Spontaneous multiple births have been augmented by those occurred due to ART and the hierarchy was maintained. Conversely, ART has reversed the natural regularity according to birth order. Until the increased use of ART the incidence of multiple births was higher with increasing birth order. Since 1997 the highest frequency of multiple pregnancies has been registered for the first order (Rychtaříková, 2007b). Finally, the increased frequency of multiple births negatively influences late foetal infant mortality indicator (Rychtaříková, 2007b). Children born from multiple pregnancies are more likely to be premature and are at greater risk of higher morbidity and mortality (Land *et al.* 2003). In the Czech Republic ART has contributed to an increase in proportion of children born with birth weight lower than 2 500 g from 5.7% in 1990 to 7.2% in 2008 and premature children from 3.5% to almost 5% in 2008.

The upper age limit of fertility has been pushed to a new extreme since the 1990s as a result of the progress in reproductive technologies. It will extend further if technologies allow for a more widespread practice of egg donation, or more likely of the strategy to freeze one´s own eggs at younger ages to make use of them at later ages. Whether such development might have an impact on overall fertility rates is not clear so far (Billari *et al.* 2007). Nevertheless, use of ART has a large effect on age-specific fertility rates in the older ages (Stephen, 2000). Between 1990 and 2008 the age-specific fertility rates at ages 40–44 increased three fold in the Czech Republic and currently the fraction of TFR that occurs above the age of 40 is close to 2%. In most West European countries this fraction exceeds 2%. Italy exhibits the highest proportion of births (3.9%) that occur in women aged 40 years and over (Billari *et al.* 2007).

Woman´s natural fertility starts to drop sharply after the age of 35 and older women find it harder to conceive either naturally or with the help of ART. Therefore, the contribution of ART could be offset by the greatly reduced chances of success for older women (Grant, 2006). As the average age of women at first childbirth is increasing, the average age of women seeking ART treatment is also increasing (Sunde, 2007). Unintentionally, the ART policy can contribute to further delay of childbearing. Policies that make ART

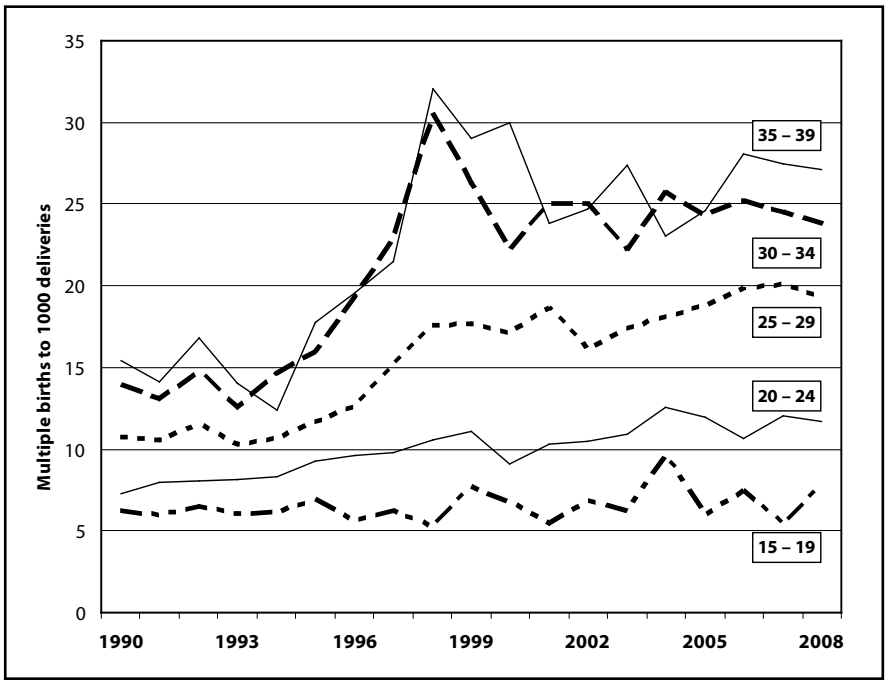

Fig. 8. Trends in multiple births by age of mother in the Czech Republic. Data source: Czech statistical office and Rychtaříková (2007a).

more widely available could further encourage couples to delay starting a family because they might assume that ART would overcome any fertility problems they may encounter (Grant, 2006). However, at present, most common ART methods suffer very low success rates at later childbearing ages, especially at age 40 and above. Only 11% of ART cycles using non-donor eggs or embryos resulted in a live birth when performed at age 41–42 (CDC 2006). Accordingly, any future rise of the importance of ART for fertility development will depend on the improvements of its success rates at late childbearing age (Sobotka *et al.* 2008).

ART AS A PART OF POPULATION POLICY TO ENHANCE FERTILITY

The growing proportion of births conceived through ART coupled with a trend toward later childbearing indicate that ART is likely to become more important for future fertility trends. Leridon (2004) showed that assisted reproduction could partly offset the negative effects of fertility postponement on the ability to conceive. Recently, several other studies have documented that potential contribution of ART to increasing fertility rates was not negligible. An assessment of the demographic impact of ART in Denmark and the UK showed that ART does have potential to contribute to TFR (Grant *et al.* 2006, Hoorens *et al.* 2007). If access to ART in the UK were increased to the level of Denmark, the TFR would increase by 0.04 from 1.64 to 1.68. Although this rise could be considered small, it was found to be equivalent to that achieved by other policy interventions to increase fertility. Likewise, Sobotka *et al*. (2008) explored the impact of ART use on fertility of Danish women born in 1975. The net effect of ART to the increase in their completed fertility was 0.05. All authors have got similar positive results but they differ in opinion on the relevance of such impact. Grand *et al*. (2006) recommend ART to be included in a population policy mix aimed at enhancing fertility rates. Similarly Sunde (2007) believes that increased spending on ART might be a cost-effective measure to cope with declining fertility rates. On the other hand Sobotka *et al*. (2008) are sceptical about suggestions to incorporate ART into pronatalist policies. They warned of possible undesirable effects due to false perception among the wider public that childbearing can be postponed until late reproductive ages.

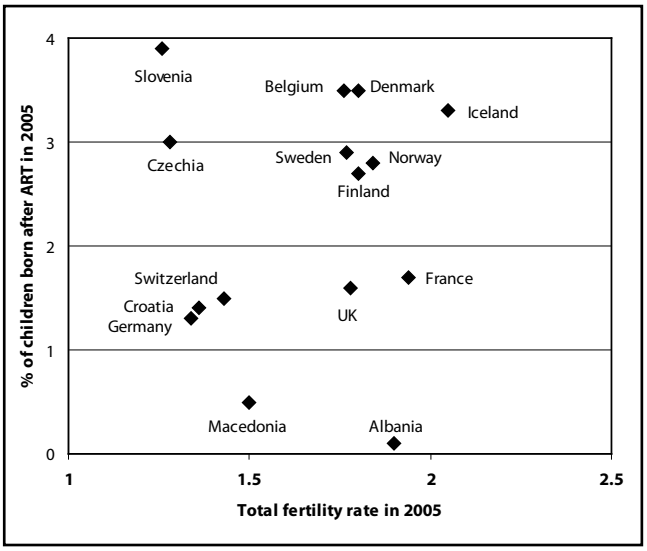

Fig. 9. Total fertility rate versus share of children born after ART in some European countries in 2005. Data source: Eurostat, EIM 2009 report (Andersen *et al*., 2009).
Notes: ART data for the Czech Republic are based on estimation (Mardešic, 2006; Kučera *et al*., 2005).

In Denmark, where ART receives generous public funding compared with funding in the UK, the average age of women treated with ART is lower than in the UK (Hoorens *et al.* 2007). These findings are not in line with the above mentioned concern . Instead, the availability of ART might encourage couples to seek help sooner rather than later. Besides, the current IVF guidelines are discussed in some countries. In the Netherlands or the UK IVF should not be applied before a couple has attempted to conceive naturally for at least 3 years. Habbema *et al*. (2009) demonstrated that making IVF available early after 1 year of infertility with the intention to further increase fertility would be a largely ineffective policy measure with serious costs and side-effects. The possibility of natural conceptions after 1 year of infertility should not be ignored when estimating the impact of early IVF. Nevertheless Habbema *et al*. (2009) proved that full access to IVF after 3 years is important as it increases the TFR.

Despite the fact that until now the support of ART generally has not been a part of national population policies in Europe there are countries such as Nordic countries or Belgium where expenses with ART are subsidized much more than in other countries. Recently Estonia was the only European country that announced reimbursement of IVF treatment with the explicit aim to increase fertility (Grant *et al.* 2006). This act was probably a part of a comprehensive improvement of state family support in 2006 as new maternal/parental leave scheme was introduced at the same time. First findings about the impact on fertility decision making of couples were favourable (Moos *et al.* 2008). Unfortunately data on IVF that could indicate the expected increase in numbers of IVF cycles, are not available in the European register. Nevertheless, recent fertility trends in Estonia clearly document the success of such approach as since 2006 the TFR has been above the level of 1.5. Up to now Estonia seems to be the only country successfully escaping the low fertility trap.

Sunde (2007) pointed out the inverse correlation between the TFR and the number of ART cycles in a given country. Indeed, in 2002 the countries having the highest total fertility rates also reported the highest numbers of ART treatments, but the picture in 2005 was rather different (see Figure 9). In 2005 there were

countries – the Czech Republic and Slovenia – which registered the highest share of children born after ART (3 to 3.9%) together with Nordic countries and Belgium). At the same time in the Czech Republic only half the number of ART cycles per million inhabitants was estimated which classifies the Czech Republic next to France. However, in France only 1.7 percent of children born after ART were registered at that time. Lower number of ART cycles appears to result in greater impact on the relative structure of live born children in the Czech Republic. Provided that the success rate in the Czech Republic and France do not differ significantly, the explanation lies in extremely low TFR of 1.28 in the Czech Republic compared with 1.9 in France. Lower TFR results in lower numbers of born children. Hence, the same number of children born after IVF has greater effect in the country with lower fertility. Although the increased use of ART is limited, the impact on TFR could be crucial in the countries with TFR below 1.5. Therefore it is particularly relevant for the Czech Republic to consider improved access to ART as a part of policies to counteract the population decline.

As the estimation of average number of cycles suggests, the need for fertility treatment has not been met in the Czech Republic yet. Moreover, due to the continuous postponement of childbearing into higher age of women, demand for ART treatment will be even higher in the near future and will probably result in the requirement of more than 2500 cycles per 1 million of inhabitants. Policies to make services more accessible regarding sufficient capacity in clinics as well as to increase awareness among public should be included in the strategy. Nevertheless, the core of better availability of ART seems to be the adoption of more liberal reimbursement legislation like in the countries on the top of ART use. Similarly to Belgium increased number of ART treatments covered by health insurers as well as increased limit of female age could encourage more couples facing infertility to seek help. However, more favourable reimbursement IVF policy in Belgium was adopted in 2002 with a different explicit aim than enhancing fertility. This strategy was accepted in order to prevent multiple pregnancies and turned out to be successful as frequency of twin pregnancies has decreased by 50% (Ombelet, 2007). The other outcome, i.e. an increase in the IVF/ICSI cycles by more than 30% was indirectly intended. Therefore well-considered strategy to improve access to ART treatment is better acceptable and more effective provided that the aim to enhance fertility is explicitly connected with other aims like "optimizing the quality of health care" as the goal of infertility treatment should rather be the birth of a health singleton child.

CONCLUSION

In some recent studies it was showed that ART can play an important role in preventing West European countries from falling into the low fertility trap. We argue that higher impact of spreading of ART could be expected in the countries locked in the low fertility trap. Population policy designed by Estonia could serve as an example for the Czech Republic to follow. Reimbursement of IVF treatment within a comprehensive policy explicitly aimed to increase fertility most likely helped Estonia to get from the low fertility trap back above the critical level of 1.5 children per woman. Accordingly, ART policy should be a part of complex pronatalist policies as no isolated policy itself proved to be effective in this respect. Any government aiming at increasing fertility needs to realize this goal by broadly conceived policies with a long-term commitment (Hoem, 2008).

Furthermore, development of ART has been pushing the upper age limit of fertility to a new extreme. However, it has not been proved so far that births of women at very late age would have an impact on overall fertility level. Therefore, from the demographic perspective it is not relevant to use ART treatment to encourage women to delay childbearing to very late ages. Lastly, although the reproduction gain achieved by application of ART is expected to be increasing, its effect will probably be marginal in comparison with reproduction loss induced by abortions in most European countries (Kocourková *et al.* 2009). Therefore well-designed population policies should also take into account the method of birth control women practice before trying to conceive.

ACKNOWLEDGMENTS

The support provided by the Ministry of Education, Youth and Sports of the Czech Republic, the research project no. MSM 0021620831 is gratefully acknowledged.

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