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RESEARCH ARTICLE

Assisted reproductive technologies in Russia: medical breakthroughs and social problems

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Abstract

The paper considers the role of assisted reproductive technologies in changing the qualitative and quantitative characteristics of Russian fertility. The author analyzes the quantitative and qualitative characteristics of ART in Russia in 1986-2020, their public perception and current problems based on the data of national ART registers, reviews of international professional associations of reproductive specialists, secondary sociological information and hospital statistics. The general trend is the expansion of the geography of reproductive centers and the diversification of services, but the growing demand for ART as methods of alternative conception in the absence of reproductive disorders intensifies public debate around them, especially in the context of religion and children's health. Nevertheless, in conditions of low fertility, the state considers ART as instruments of a pronatal demographic policy and finances them even against the backdrop of the coronavirus pandemic.

Keywords

assisted reproductive technologies; in vitro fertilization; reproductive health; pandemic

JEL codes: I18, J13

Introduction

The very first successful birth after in vitro fertilization (IVF) took place in the UK on July 25, 1978. To honor of this event, since 2018, it was proposed to celebrate the World Day of Assisted Reproductive Technologies (World ART Day; World ART Day) on this day. The holiday was proposed by the Russian Association for Human Reproduction (RAHR), and the idea was supported by the global community of reproductologists and Louise Brown, the very first "test tube baby" (conceived in-vitro): "If people think that my birthday is the most appropriate date to celebrate the results of the excellent work of all those who work in the field of ART, I am happy to support this idea" (Embryo 2020).

Although the IVF technology was complex to perform and expensive, it immediately proved to be highly in demand – despite violent protests from the orthodox public and some medical professionals. Over the past decades, ART have become more complex[1], more effective and enabled having one's own healthy child despite almost any pathology of the parents. However, this only gave grounds to new doubts of dedicated opponents of assisted reproduction. The relevance of ART in the demographic development and population policy of any country is determined by the balance between the costs of their use in public health practices and the achieved results that take into account not only the number of newborns, but also their «quality», as well as the willingness of the society to adopt these technologies. An objective assessment of costs and results is often a complicated task. The reasons are the lack of sufficient representative statistics that characterize quantitative outcomes of the ART, and the absence of an established approach to accounting for qualitative indicators, such as health of newborns, individual cost of treatment, social response to reproductive care, etc., due to the widespread desire of patients to conceal the very fact of participation in ART programs. Therefore, the study of the role and place of ART in modern Russian fertility was carried out on the basis of the information from the National Registers of ART annually compiled by the RAHR, regular reviews of the International Federation of Fertility Societies (*International Federation of Fertility Societies' Surveillance*, *IFFS Surveillance*), the European ART monitoring performed for the European Society for Human Embryology and Reproduction (*The European IVF*-Monitoring Consortium, *EIM*) and the European Society for Human Reproduction and Embryology, *ESHRE*), the 2020 Russian Public Opinion Research Center (VCIOM) survey, as well as content analysis of thematic publications on Internet websites and statistics on Russian and foreign medical institutions published in the media. As a result of this analysis, the author was able to define several major issues related to new trends in the use of ART, as well as the challenges arising in this area.

Quantitative characteristics of ART in Russia: 1986-2020

The main generally accepted quantitative indicators of ART that are important for assessing their role in fertility are:

- the total number of clinics using ART programs,
- the total number of ART cycles conducted in the country,
- the number of cycles per 1 mln of the country population,
- the incidence of pregnancy per one puncture or transfer,
- the number of pregnancies and the number of births occurring with ART,
- the proportion of children born with the aid of ART among all newborns.

These data are presented in the National Registers of ART, which are collected by the RAHR in the form of the European IVF Monitoring Consortium (*EIM ESHRE*), published

1 ART might be divided into basic and additional. Basic ART help to ensure pregnancy. This includes medical induction of ovulation; artificial insemination; IVF and some other technologies. Additional methods increase the effectiveness of general ART or make them possible, and these include: ICSI – "manual" injection of a single sperm into the center of the egg, which increases the probability of fertilization up to 90%; PICSI – a method of sperm selection for ICSI, which involves its quality assessement; PGD – preimplantation genetic diagnosis; assisted hatching, which increases the likelihood of implantation after transfer; donor programs and surrogate motherhood (SM). Pre-treatment examination, PGD, PICSI and SM are not included in the Mandatory Health Insurance (MHI) system.

annually in the *Russian Journal of Human Reproduction*. Since 2005 these data have been published separately, and it also is incorporated into *EIM ESHRE* reports, which are published in the *Human Reproduction* journal. Participation in the Russian register of ART is not mandatory for clinics, so the final country indicators are generally underestimated.

The latest report (2018) covers 182 (79.1%) of the 230 ART centers operating in Russia at that moment. The total number of ART cycles in the report reached 158,815 (in 2017 – 139,779 cycles; +13.6%), i.e., 1,082 cycles per 1 mln of country population (in 2017 – 951 cycles per 1 mln of country population; +13.8%) (National ART registers for 2007–2018). This is about a third less than the European average of 1,500 cycles per 1 mln of population and almost three times lower than total estimates for Denmark, Belgium, Slovenia, where about 3,000 cycles per 1 mln of population result in up to 6% of all births. Although, according to official estimates, no more than 2% of children are born with ART in Russia, the overall dynamics are positive: in 1995-2018, 1,067,514 ART cycles were carried out, as a result of which about 300 thousand children were born. In terms of the number of cycles, the Russian Federation ranks third in the world after the United States of America and Japan (Press Conference... 2020).

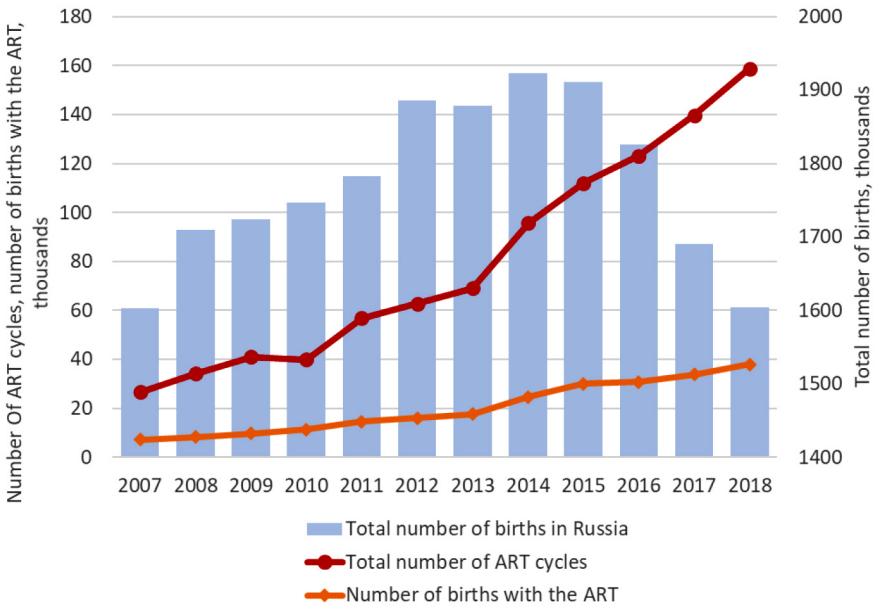


Figure 1. Total number of ART cycles and total number of births in Russia. *Source*: calculated on the basis of (Demographic Yearbook of Russia 2019. Total fertility rate; National registers of ART for 2007-2018)

The described data indicate the growing role of ART in the dynamics of Russian fertility. The strongest demographic results are qualitative and, to a lesser extent, quantitative changes in fertility. Analysis of the National Registers of ART for 2007-2016 has shown that the increase in the number of births occurring after ART (IVF births) was significantly higher than that for natural births: the total fertility rate (TFR) increased by 23.9%, the share of IVF births – by 3.8 times, the total number of births – by 15.3%, and the number of non-IVF

births – by 13.9% (calculated on the basis of Demographic Yearbook of Russia 2019. Total fertility rate; National registers of ART for 2007-2018) (Fig. 1, 2). An increase after 2013 is particularly noticeable, and it refers to the period when ART programs began to be paid for by the Mandatory Health Insurance program (MHI).

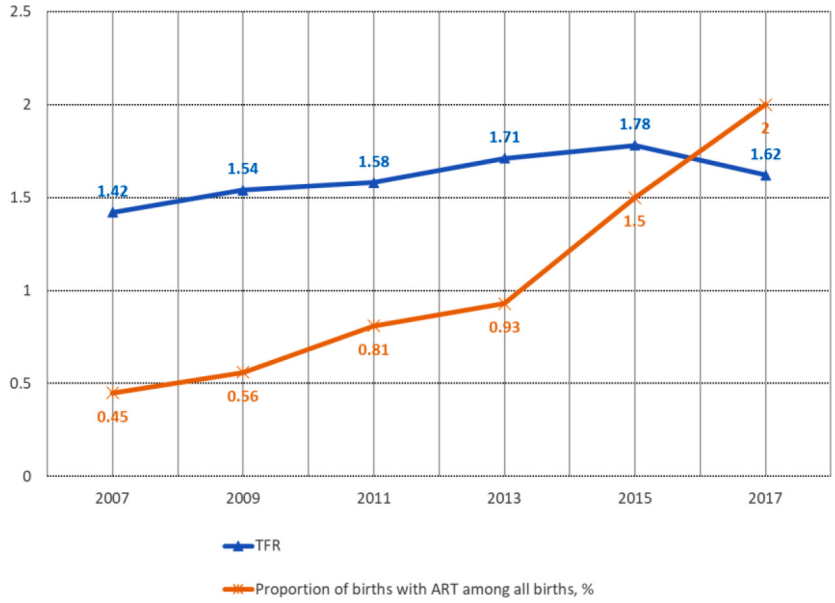


Figure 2. TFR and the proportion of births with ART in Russia. *Source*: calculated on the basis of (Demographic Yearbook of Russia 2019. Total fertility rate; National registers of ART for 2007-2018)

When presenting the TFR as the sum of two components: the TFR of women using ART (infertile) and the TFR of women who do not require assisted technologies (fertile) (Grant et al. 2007: 49-56), one can notice that over the past 10 years, the proportion of TFR generated by ART fertility has grown by 3.5 times, from 0.4 to 1.42 per cent (Fig. 3). This may be due to several reasons, to some extent related to (1) reduced possibilities of natural conception due to impairment of reproductive health (physical infertility), problems with bearing due to chronic diseases, high probability of having a sick child due to genetic pathologies of parents, or (2) "reproductive loneliness" of a healthy woman (social infertility) or birth postponement to an age approaching post-reproductive.

The TFR dynamics in 1998-2017 illustrate opposite trends in natural fertility and ART-fertility, which is clearly seen in the age-specific fertility changes, when those born in natural cycles and those born with the ART are taken into account separately (Fig. 4). If natural fertility rate comes close to zero in older reproductive ages, the estimated contribution of ART-fertility does not decrease with increasing age. Moreover, as the ART procedures become routinized, i.e., get incorporated into the daily practices of standard medical care, they begin to be applied at younger ages: in 1998 there were almost no patients under 25 years old, and the few reproductive centers of the time recorded rare cases of those who are about 20, while two decades later the relative contribution of infertile youth to the total birth rate became almost the same as those of other ages.

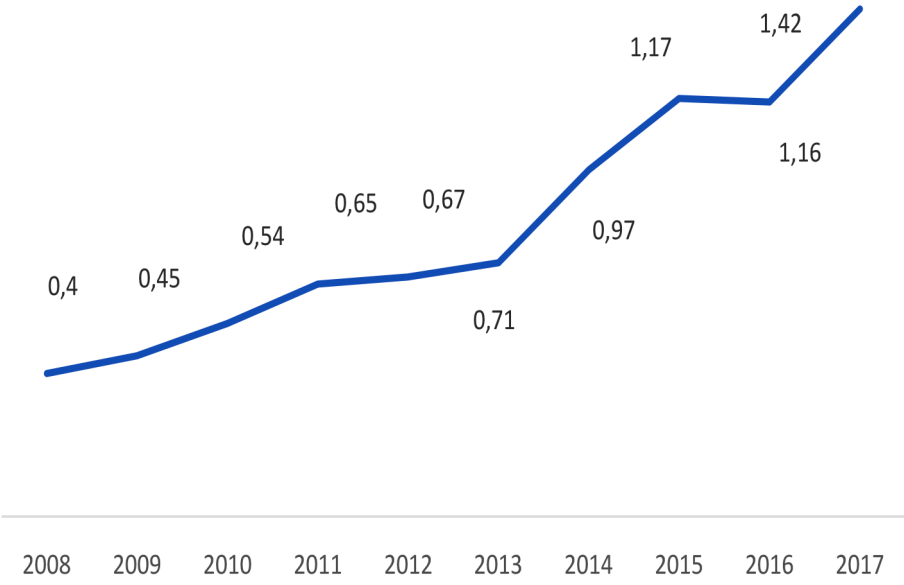
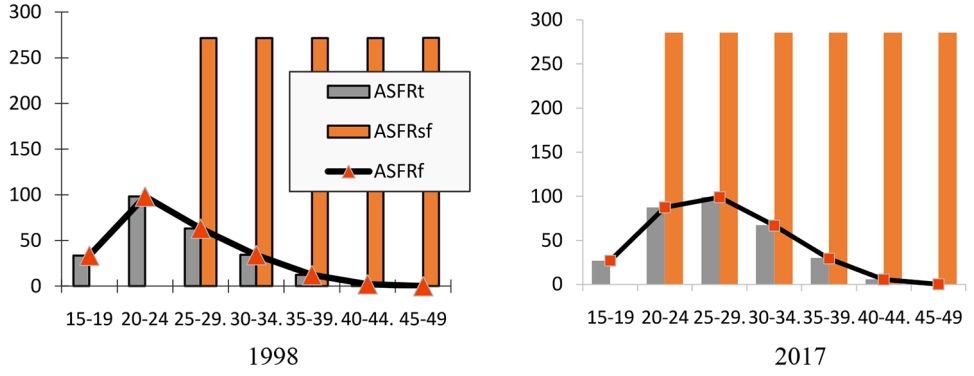


Figure 3. Share of the TFR of the infertile women in the Russian TFR, 2008-2017 (%). *Source*: calculated on the basis of (Demographic Yearbook of Russia 2019. Total fertility rate; National registers of ART for 2007-2018)



ASFRt — age-specific fertility rates for all women
ASFRsf — age-specific fertility rates for women using ART
ASFRf — age-specific fertility rates for women who do not use ART

Figure 4. Model of age-specific fertility in Russia, 1998 and 2017 (‰). *Source*: calculated on the basis of (Grant J. et al. 2007; Assisted Reproductive Technologies. Register for 1998; National registers of ART for 2007-2018)

In accordance with the goals of the Russian demographic policy, one of which is an increase in fertility, 47,5 thousand IVF cycles were conducted in 2016 at the expense of the MHI funds, in 2017 this number grew to 64,6 thousand, in 2018 – over 78 thousand (+21% compared to the previous year), and in 2019 statistics registered almost 80 thousand cycles, which is 15% more than in the same period of 2018 (Kamaev 2020). Against the background of the increase in the number of ART cycles performed within public medical

system (through MHI programs), i.e., free of charge for patients, the number of commercial, i.e., paid by the patient, decreases by many times. In order to attract clients beyond the MHI programs private health centers offer preferential loans divided by phase of treatment, interest-free financing, benefits for those who have already made several inconclusive IVF attempts, discounts for donor biomaterial, etc. In 2018, the MHI Fund revised the basic IVF program, expanding it via including accompanying manipulations and cryopreservation of embryos followed by transfer to the uterus (to reduce the cost of repeat procedures in case of an unsuccessful first attempt). However, within this program only freezing itself is free of charge for patients, while defrosting and planting of embryos, their storage, transportation, post-transfer drug support and pregnancy diagnostics are paid for separately. IVF programs funded by the MHI began to be implemented not only within public, but also within private reproductive centers, which contributed to the expansion of the ART geography, diversification of services through treatment of miscarriage, formation of own cryobanks, organization of andrological and adolescent departments, transition from aggressive medication technologies to modern, close to natural procedures. One of the results was an increase in appeals for repeated births of high priority (third, fourth, fifth), for example, in the Belgorod region the statistics captured high demand for IVF within the framework of the project "Big Belgorod Family" (Valagin et al. 2020).

Public perception of ART

Strangely, society has always been ambivalent not only about ART, but also about the very fact of infertility treatment – this reproductive impairment has often been stigmatized as "punishment for sins." Since infertility does not threaten life and does not increase premature mortality, the State, too, increased attention to this source of potential fertility growth only under the conditions of rapidly falling fertility. The situation was changed by the second demographic transition, in which individualization of reproductive behaviour did not simply cause massive postponement of child birth for an indefinite period, "until one's career is advanced and high level of material well-being is achieved", but also allowed it to be completely abandoned in some cases, and that is when many countries started developing appropriate population policy measures to enhance the pronatal motivation of the population. In Russia, an important change was the introduction of maternity capital for the birth of the second and subsequent children in 2007, and some couples had their children relying on this program. However, for some families conception turned out to be impossible because of secondary infertility, and the demand for treatment of this condition grew up significantly in the following years.

The transition of infertility issue from the individual to the public level of discussion contributed not only to its "emerging from the shadows", but also to the creation of organizations protecting the rights and legitimate interests of patients with this patology, providing them with equal opportunities for treatment with modern methods, among which ART are the main ones. These patient associations, originally formed on the principle of "self-help groups", have eventually come to a much wider range of tasks, including awareness-raising, which allowed to develop a vector of public attitude towards assisted reproduction technologies (Association... 2020). The relevance of the problem was confirmed by the VCIOM survey *Attitude of Russians to the problem of preservation of reproductive health and the perception of IVF* in June 2020, showing that almost one in three respondents could not explain

what *reproductive health* was, ¾ had never consulted any doctor about their reproductive health, $^{2}/_{3}$ had never went to a reproductologist, but 90% of respondents had heard about IVF from the media, the Internet, from relatives or acquaintances, and 84% acknowledge the birth of children with its help. At the same time, $^{2}/_{3}$ of those who have heard about IVF believe that it is financially unavailable to the majority of those who seek it, and only one in three knew about its inclusion in the MHI system (VCIOM Survey... 2020). According to practicing reproductologists, it is the low awareness of the population that causes them to see a specialist only in case of conception failure, often in older reproductive age, when the remaining time is only sufficient to perform IVF, without finding out the causes of pathology or genetic testing. In order to eliminate illiteracy in reproduction topic, one of the Kazan reproductive clinics opened a school of reproductive education, and Izhevsk reproductologists engaged in the promotion of andrological reproductive care (Round table... 2020).

IVF, despite its dynamic development, is not always perceived as a way to improve the demographic situation. The assessment of ART is still ambiguous on the part of the religious communities, that in most cases consider them "morally inadmissible" due to the need to destroy "unwanted" embryos, increased risk of death of the conceived child, as well as violations of child and parental relations in surrogacy (SM) and reproductive donation. Some pediatricians note the adverse effects of ART on the body of the child, including those on the long-term horizon (Baranov et al., 2015), although, according to RAHR, the differences observed in groups of non-ART children and ART-children are insignificant and are mainly explained by the health status of the parents (Beskaravaynaya 2020-2). According to the VCIOM survey, 64% of respondents also believe that children born as a result of IVF do not differ in health from other children (VCIOM Survey... 2020), but in Northern European countries it is noted that 5% of children conceived with the help of ART need increased care within public health systems (Kirkman-Brown et al. 2020).

Relevant problems of ART

Several decades of ART development in the world have shown that their scientific and medical component in many cases comes ahead of both social acceptance and the willingness of States to include some of the ART programs into a set of pronatal measures. Preimplantation genetic diagnosis (PGD), which allows to identify some genetic disorders even before conception still remains one of such methods, and although there is no evidence of complete harmlessness of PGD (the probability of mutations in the genes of the child and change of sexual stereotypes) (Borisova 2011), 43% of the countries providing reports to the *IFFS* declared using PGD (International Federation... 2019). In Russia, PGD is conducted not only in central, but also in regional clinics of the Volga, Ural and the North Caucasus regions, which enables preventing the birth of children with serious genetic disorders, avoiding the potential need to terminate pathological pregnancy and giving a certain guarantee to couples who would not risk having children without it because of the high probability of cancer, cardiovascular disease, diabetes, degenerative disorders of the elderly, some mental disabilities, autism, etc. But such a wide range of reasons can conceal gender preferences: for example, in Dagestan in the early 2000s, only 25% of couples resorting to PGD really wanted to find out the presence of chromosomal abnormalities, and the rest simply intended to know the sex of the child and give up pregnancy if the result did not meet their expectations (Hajiyeva 2014). The main drawbacks of the method remain the high cost compared

to that of basic IVF and relatively low number of resulting births due to the limited number of embryos available for IVF. This is one of the reasons for the MHI Fund to not include this procedure in its programs. However, given the increasing need for medically sound PGD, this method is more and more often being incorporated into ART programs, increasing its availability through the Federal Program of Free IVF Protocol with PGD on MHI (Register of Infertile Couples of Russia 2020).

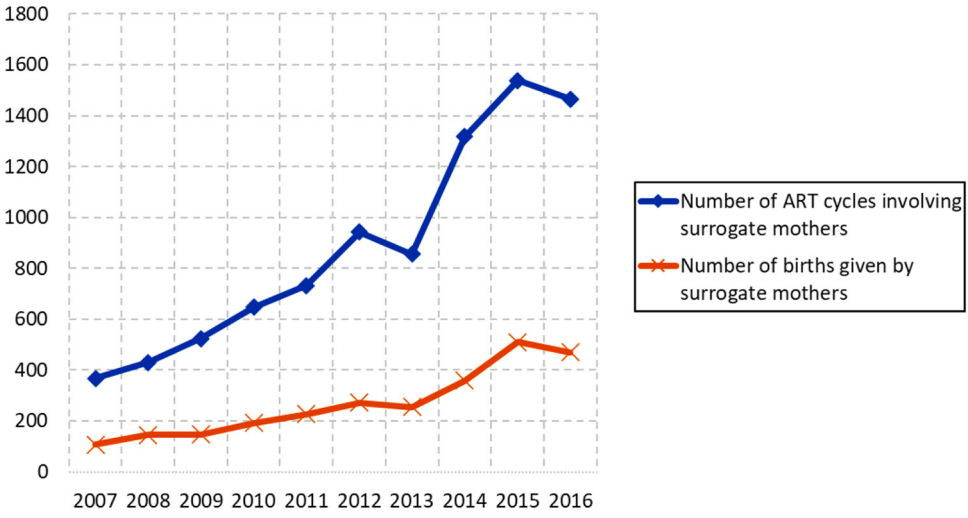


Figure 5. SM Dynamics for 2007-2018. *Source*: (Analysis..., 2020).

Surrogate motherhood (SM), the legal regulation and ethical assessment of which even more often fall behind medical progress in this area, remains problematic. According to the ART RAHR register, the share of SM programs in Russia has been stable in recent years at 1.4% of the total number of ART cycles (calculated according to the National ART registers for 2007-2018). The dynamics of SM were broadly consistent with the overall expansion of supporting reproduction in Russia – since the inclusion of the program in the list of authorized ART its share has hardly changed, accounting for 1.2–1.7% of all cycles (11,196 in total), and 70–80% of surrogate pregnancies (3,423 in total) resulted in births (Analysis... 2020) (Fig. 5). However, some indicators prove SM to be ahead of the general ART development. For example, in 2007-2018, the number of births in ART programs increased by 7.32 times (from 107 to 784), while the number of SM programs went up by 6.33 times (from 367 to 2,323), and the total number ART cycles – by 5.95 times (from 26,670 to 158,815) (calculated on the basis of the National registers of ART for 2007-2018). The observed stability in dynamics indirectly reflects the persisting proportion of patients incapable of unassisted conception, bearing and childbirth among all patients with infertility, and also indicates the presence of clear criteria for the SM application in the country: SM programs are not implemented simply at the will of genetic parents.

A feature of SM programs is the participation of at least three parties in them, i.e., biological (genetic) parents, a surrogate mother and a reproductologist. The necessary legal relations between the participants of the first SM programs were executed individually, but as their scope expanded this role was assigned to intermediary agencies, professionally involved in organizational support for SM programs. Such agencies allow all parties of the

process not only to find each other, keep anonymity and coordinate actions, but also to guarantee legal security for genetic and surrogate parents together with their own commercial interests. At the same time, it is important that SM falls within the business interests of reproductive centers and "surrogacy agencies". Current legislative regulation in Russia refers the use of *SM as a replacement gestation to a method of infertility treatment* for a couple or a single woman who is unable, due to strictly certain medical reasons, to independently carry a pregnancy and give birth to a child. It does not explicitly prohibit the implementation of SM programs with the simultaneous use of donor female and male cells or donor embryos. The tasks of Russian reproductive centers include IVF with the participation of a surrogate mother, but further pregnancy management, delivery, registration of the child's birth, etc., are outside their competence; the surrogate mother abandons the child in the maternity hospital, and only after that the genetic parents draw up the appropriate documents. This priority of a surrogate mother in deciding who owns a child born by her becomes one of the main obstacles to the development of SM in Russia, although in general there is one of the most liberal and least developed legislation on SM. In most countries, CM is either completely prohibited or seriously restricted, which increases the attractiveness of the Russian CM market for foreign patients who, for various reasons, have been refused at home. The legal result of the work of a medical organization is the registration of a document indicating the treatment of infertility in patients using the SM program, subsequently submitted to the registry office. The prenatal care, delivery of the baby, registration of the child birth and participation in its further legal fate are not the subject of an ART contract between the medical organization, potential parents and a surrogate mother.

The surrogate mother is a healthy woman having a child of her own, bearing a child whose genetic parents can pay for her "prenatal babysitting" services. In Russia, the surrogate mother withdraws claim for the child in the maternity hospital, and only after that genetic parents draw up the relevant documents, i.e., the surrogate mother has the right of priority – she may refuse to give the child to its genetic parents. This is a major obstacle to the development of SM, but in general, Russia is one of the countries with the most liberal and least developed legislation on SM, which is why the country is quite popular with foreign patients. In Austria, Germany, Norway, Sweden, certain states in the United States of America (Arizona, Michigan, New Jersey) and France SM is completely prohibited, in other countries there are strict restrictions. According to the Ministry of Health of the Russian Federation, due to the lack of legislative restrictions, a stable market for commercial services for the use of SM has formed in Russia, and the vast majority of services is provided to foreign clients and same-sex couples, although the current Russian legislation does not contain a legal definition of the concept of a single-sex couple. In this regard, the Ministry of Health of the Russian Federation considers the possibility of introducing a ban on SM services for foreign citizens applying to Russian clinics and strict limitations on commercial use of assisted reproductive technologies. According to the Ministry, there is a need to limit the commercial demand for ART from foreign nationals and same-sex couples in order to protect the interests of children born with their use, but professional communities of reproductologists see this as discrimination on the principle of citizenship, contradicting the aims of development of inbound medical tourism and protection of competition. The question of creating a national registry of surrogate mothers, which can be regarded as an attempt to interfere with the privacy of citizens (Analysis... 2020), remains debatable.

The Russian State, despite the ongoing controversy, is actively increasing investments in the field of assisted reproduction. After the extension of IVF funding to private centers,

the effectiveness went lower due to the limited range of manipulations and services included in the state program. According to RAHR, in 2017, their share accounted for 65.4% of all ART cycles, and in the insurance company "Sogaz-Med" out of 25,7 thousand IVF cases paid for with MHI funds, for those insured by the company in 2017-2019 45% of procedures were performed in private clinics; in regional clinics the share of ART paid for with MHI reaches 60% and it increases every year (Beskaravaynaya, 2020-2). Although IVF procedures are the main part of the profit of any reproductology clinic, IVF does not yield significant revenue, as it is focused on the appropriate medical standard and current prices, changes in which may not always be foreseen. One IVF quota costs the state 141 thousand rubles and includes stimulation of ovulation, ovarian puncture, artificial insemination of the obtained cells, the embryonic stage, the process of embryo transfer to the uterus and prenatal care, and starting from 2020 —also cryopreservation of embryos in the amount provided by the federal program of state guarantees. However, the storage of embryos should still be paid privately (Valagin et al. 2020). According to "SOGAZ-Med", the average cost of an IVF cycle for 2017-2019 amounted to 74 thousand to 365 thousand rubles, depending on the region. Many Russian regions form their own programs in addition to federal ones, but even taking into account the regional financing, the MHI tariff generally remains lower than the commercial one: for example, in the territorial program of State guarantees of the Samara region the standard of financial costs for one case of IVF is 118,7 thousand rubles in 2020, and the approximate minimum cost of the service in the Samara clinic "Mother and Child" is 165 thousand rubles (Beskaravaynaya 2020-2). As a result, there is a regional differentiation of IVF availability: in some regions the cycles are paid in full, in others partially, although all citizensinsured via MHI are entitled to two free programs per year.

The Russian IVF market grew by 87% in 2014-2018, or up to 13.5 billion rubles, which might be explained both by an increase in the number of procedures and number of clinics, and by an increase in the cost of the service (Beskaravaynaya 2020-2). Such a dynamics actualizes the need of targeted marketing programs, in particular for older patients, since the current order of the Ministry of Health No. 107n of 30.08.2012 does not impose age limits on the procedure, which increases the number of inconclusive IVF cycles paid for by the MHI. The probability of conception depends on several factors, among which the age of the woman is the determining one, but the average age of the mother at birth of the first child is generally growing, and with it grows the possibility of infertility, maintaining demand for ART.

Reproductive tourism (in some clinics up to 20% of patients come fro abroad) and reproductive donation are perspective directions of IVF business, but the legislative regulation in these areas lags both behind the needs of patients and the growing capacity of reproductive medicine . Social media shows that residents of the EU, the USA and Australia are actively interested in the conditions and cost of IVF in Russia. In America, the success of transfer among patients over 40 years is 2%, while in Russia it reaches about 12%; the IVF cycle without hysteroscopy and preimplantation genetic testing of embryos in a Moscow clinic costs about $3,000, while in America the average price comes up to $10,000, plus $5,000 for stimulation drugs. However, the patients from Europe and China, where there are significant restrictions on these procedures, are more likely to seek donor material, SM programs and PGD in Russia (IVF-system... 2018). Inbound reproductive tourism is a promising direction of the innovative economy, but institutional contradictions with the EU, on which free IVF for EU citizens is possible only within the EU area, remain an obstacle. Everything men-

tioned above suggests that the capacities of the ART market in Russia are not yet exhausted, and its growth potential is 12–15% per year (Beskaravaynaya 2020-2).

The *COVID*-19 pandemic became an unexpected threat for ART in all countries: due to the increasing medicalization of fertility, the possibility of pregnancy among women of reproductive age has become dependent on global anti-epidemic measures that have contributed to increased fear of infection, long-term restrictions due to self-isolation, lack of information and social security as well as financial losses. Recommendations for performing ART cycles during the pandemic were issued by national and international associations of reproductologists. For example, on March 17, 2020 the American Society for Reproductive Medicine (*ASRM*) recommended clinicians not to begin new cycles of assisted ovulation, intrauterine insemination, IVF, "non-urgent egg freezing" and other routine procedures to free up medical workers to combat the coronavirus, to limit contact between staff and patients in case of impossibility of observing social distance, as well as to investigate the impact of the coronavirus on unborn children. These anti-epidemic measures provoked mixed reactions: patients, especially "of age" or those suffering from social infertility, described them as discriminating against the fact that they were unable to get pregnant on their own, and reproductive clinics claimed future losses due to the reduction in activities. The decision on whether to work during the pandemic was made in accordance with national law in different countries: for example, in the USA, private clinics were allowed to continue providing supporting reproduction services, but only if they guaranteed a reduction in the risk of infection and did not put additional strain on the public health care system. The dominance of the individual approach became common, but in most cases patients younger than 35 years old who had not yet started treatment were recommended to postpone it, and those who had already started the treatment or who already reached age of 39 could continue the programs, at least in the most necessary parts of them (e.g., stimulated egg cryopreservation) (Lynn 2020). A separate problem occurred with regard to drug provision: if treatment was delayed, the shelf life of pre-purchased expensive drugs could expire, and clinics wishing to maintain a reputation were forced to acquire new drugs for patients at their own expense (Assistance for Fertility... 2020).

Professional recommendations published at the end of April noted that "despite the temporary absence of large-scale, well-organized research, experimental data and international clinical experience gained during the pandemic indicate very low risks or no risk of sexual transmission of the new coronavirus, adverse effects on sex cells and embryos, no vertical transmission of infection to the fetus or threats to the health of newborns and, in general, a favourable prognosis for pregnancy. <...> The postponement of ART programs, including the transfer of cryopreserved embryos, for a range of categories of infertile patients is a negative prognostic factor in relation to their chances of having a healthy baby, that might make further treatment impossible. Failure to provide medical care for infertile patients using ART, taking into account high mortality rates, is one of the factors contributing to the exacerbation of demographic problems in the country" (Resolution... 2020).

In Russia, most IVF programs were suspended and some reproductive centers were temporary reorganized into COVID hospitals, for example, at the Reserch Center for Obstetrics, Gynecology and Perinatology named after Vladimir Kulakov, which is one of the leading Russian ART centers, patients with depleted ovaries were admitted for IVF, but only to perform cell sampling and cryopreservation. In regions where all types of outpatient care were banned, only online counselling remained available during the two-month lockdown period; due to border closures, it was impossible to bring children born to surrogate mothers for

foreigners out of Russia. The Ministry of Health of the Russian Federation began to give official admissions to the work of reproductive centers only at the end of May, almost a month after a similar decision was made by *ESHRE*, emphasizing that infertility is a disease, and with the stabilization of the *COVID*-19 pandemic, it is necessary to resume ART procedures for clinical indications. One of the reasons for these actions was the fact that forced postponement of treatment due to the spread of the coronavirus provoked stress and depression in patients. Since June 1, 2020, IVF was resumed in Bashkiria, Crimea and Stavropol Krai, from June 8, 2020 in accordance with the Decree of the Mayor of Moscow № 68-UM "On the stages of lifting restrictions established in connection with the introduction of the high alert regime" Moscow commissions on the selection of applicants for IVF funded by MHI also resumed their work. However, in a number of regions, according to the resolutions of chief sanitary doctors, restrictions on receiving non-emergency care in private and public clinics persisted longer (for example, in St. Petersburg); this intensified implementation of remote methods of patient counselling, as well as improving the form of IVF treatment, which excludes hospital stay.

Within a few months, it was found that during the *COVID*-19 pandemic, compared to recent *SARS* and *MERS* pandemics, there were significantly fewer deaths of pregnant women and stillbirths, but more premature babies (43%), intrauterine development delays (9%), and forced social distancing, reduced financial levels and restrictions on access to health care have had a greater negative impact compared to the fear of infection (Bloch et al. 2020). The changed conditions of professional activity not only assumed compliance with the rules of epidemic safety, but also raised new questions: although transmission of the virus from mother to fetus has not been yet recorded, how will the situation develop? Are COVID-19 and vaccination dangerous for pregnant women? Could the vaccine lead to infertility? The negative reproductive consequences of *COVID*-19 have not yet been noted, but further research is needed, especially in men (Valagin et al. 2020).

Hard restrictions, including postponement of treatment in patients with increased risk of severe *COVID*-19 course (patients with diagnosed kidney, liver, lung, endocrine system or cardiovascular diseases, diabetes, immunological disorders, AIDS) until the end of the pandemic, changing the schedule of employees to allocate time for sanitary treatment and disinfection of premises, separation of staff into non-overlapping shifts, the transfer of some accompanying specialists to remote counselling, work with biological material in embryological laboratories as potentially infected, and so on, have led to increased costs, and the resulting economic losses for ART clinics came close to critical (Beskaravaynaya 2020-1). In Russia, in January-July 2020, only 32,632 IVF cycles were carried out with the funds of the basic MHI program, representing only 45.3% of the annual plan foreseen by the Federal project "Financial support for families at the birth of children" of the National Project *Demography* (Government Telegram... 2020).

Conclusion

As for now, relations between the State and reproductive medicine in Russia can be considered settled, and in addition to the program of state guarantees within the framework of the MHI, "conception in vitro" is also funded by the National Project *Demography*, which implies 450,000 free IVF cycles for patients in 2019-2024, the waiting period for which shall not exceed three months (Valagin et al. 2020). The National Reproductive Health Support

Program , which is now being developed, "aims to establish a system for identifying and monitoring reproductive potential in the Russian population of all age groups, which will provide full assistance and support for each patient with infertility from the moment of initial referral to women's consultation or the center of men's health, up to the time the born child reaches 7 years old, taking into account his or her pediatric and genetic profile" (Association... 2020).

Assisted reproduction technologies are innovative and should be seen as a breakthrough, and the public importance of ART in modern conditions involves not only addressing demographic problems, but also the formation of qualitatively new fertility corresponding to the realities of the second demographic transition. ART retain the reproductive function in patients with oncological diseases, which are more and more often identified at young reproductive age, provide conditions for motherhood delayed due to medical and social causes, pausing the "biological clock" by cryopreservation of healthy reproductive cells. Even if the effectiveness of ART does not exceed the indicators of natural cycles, they can solve many social problems, denoting reproductive health not only as a biological, but also as a moral value.

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