REPRODUCTIVE MEDICINE AND REPRODUCTIVE TECHNOLOGIES IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

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Abstract

Reproductive medicine and reproductive technologies play a significant role in achieving sustainable development by improving public health, promoting gender equality, and reducing social inequalities. These fields align with several Sustainable Development Goals (SDGs), including good health and well-being (SDG 3), gender equality (SDG 5), and reducing inequalities (SDG 10). Modern reproductive technologies, such as in vitro fertilization (IVF), genetic screening, and family planning methods, contribute to addressing infertility, improving maternal health, and providing access to reproductive rights. However, disparities in access to these technologies, particularly in developing countries, highlight the need for policies that enhance availability and affordability. Ethical concerns, especially around genetic interventions and surrogacy, must also be carefully addressed. Innovations in reproductive medicine can further contribute to population stabilization, resource management, and environmental sustainability, supporting a balanced approach to human development in the face of global climate change. The integration of reproductive technologies into sustainable development policies ensures equitable access to healthcare while considering the broader impacts on society, the economy, and the environment.

Keywords: reproductive medicine, reproductive technologies, sustainable development, gender equality, infertility treatment

I. Introduction

Reproductive medicine and reproductive technologies have become critical components of modern healthcare, addressing key challenges related to fertility, maternal health, and family planning. In the context of sustainable development, these fields are essential for achieving global goals that promote health, well-being, and gender equality. As global populations grow and environmental pressures mount, sustainable development demands a balanced approach to population health and resource management. Reproductive medicine, through innovations like in vitro fertilization (IVF), genetic screening, and assisted reproductive technologies, provides solutions not only for individuals facing infertility but also for broader societal issues, such as managing population growth and ensuring reproductive rights.

The United Nations' Sustainable Development Goals (SDGs) emphasize the importance of good health and well-being (SDG 3), gender equality (SDG 5), and reducing inequalities (SDG 10). Reproductive health is at the intersection of these goals, highlighting the need for universal access to healthcare services that support family planning, pregnancy care, and infertility treatments. However, disparities in access to these services remain a pressing issue, particularly in developing regions where economic and healthcare inequalities persist. The high cost of advanced reproductive technologies often limits their availability to affluent individuals or nations, exacerbating existing inequities.

Moreover, the ethical and social dimensions of reproductive technologies, including debates around genetic intervention and surrogacy, raise complex questions about the implications of medical advances on human rights and societal norms. As such, integrating reproductive health into the global sustainability agenda requires a careful balance between medical innovation, ethical considerations, and equitable access to healthcare.

This introduction explores the crucial role of reproductive medicine and technologies in the pursuit of sustainable development, highlighting both their potential and the challenges associated with ensuring that advancements in these fields benefit all populations equitably.

II. Methods

This study employed a comprehensive approach to analyze the Reproductive medicine and reproductive technologies to achieving health-related Sustainable Development Goals (SDGs). The methods utilized included:

1. **Literature Review**: An extensive review of existing literature on primary health care and its role in public health was conducted. This involved analyzing peer-reviewed articles, reports from international organizations, and relevant policy documents.
2. **Data Collection**: Quantitative data was gathered from national health statistics and databases, focusing on indicators related to health outcomes, access to primary care services, and SDG progress. Qualitative data was also collected through interviews with healthcare professionals and stakeholders to gain insights into barriers and facilitators of primary health care implementation.
3. **Stakeholder Analysis**: Key stakeholders, including government agencies, non-governmental organizations, and community representatives, were identified and engaged. Their perspectives on the effectiveness of primary health care services and Reproductive medicine and reproductive technologies.
4. **Case Studies**: Specific case studies were conducted in various regions to illustrate best practices and challenges in primary health care delivery. These case studies provided context-specific insights and highlighted successful interventions that align with SDG objectives.
5. **Policy Recommendations**: Based on the findings, policy recommendations were developed to enhance the effectiveness of primary health care services. These recommendations aimed to address identified barriers and promote multisectoral collaboration to achieve health-related SDGs.

The analysis emphasized a holistic view of primary health care, integrating both health service delivery and broader determinants of health to provide a comprehensive understanding of its role in advancing public health goals.

III. Results

Reproductive medicine is a rapidly evolving field focused on the diagnosis and treatment of infertility, a condition defined as the inability of a man and a woman of childbearing age to conceive a child after two years of regular, unprotected sexual intercourse. Infertility can be influenced by a variety of factors, including age, health conditions, and lifestyle. In many cases, healthcare professionals suggest seeking medical advice sooner—typically after 12 months of unsuccessful attempts to conceive. For women over the age of 35, it is often recommended to consult a specialist after six months of trying to become pregnant, as age can significantly impact fertility.

This field encompasses a wide range of diagnostic procedures and treatments, from hormone therapy and medication to advanced reproductive technologies such as in vitro fertilization (IVF). Its rapid development is driven by both increasing demand and advances in medical research,

making it a crucial area of modern healthcare.

Reproductive technologies encompass a variety of methods designed to enhance the likelihood of fertilization and assist individuals or couples facing infertility challenges. These technologies include:

- In vitro fertilization (IVF): A process where eggs are retrieved from a woman's ovaries and fertilized by sperm outside the body, in a laboratory. The resulting embryos are then transferred to the woman's uterus to establish a pregnancy.
- Intracytoplasmic sperm injection (ICSI): A procedure in which a single sperm is injected directly into an egg to facilitate fertilization, often used when there are male infertility issues.
- Intracytoplasmic morphologically selected sperm injection (IMSI): A more advanced form of ICSI, where sperm is examined under high magnification to select the best-quality sperm for injection, increasing the chances of successful fertilization.
- PICSI (physiological intracytoplasmic sperm injection): A selection method for ICSI, where sperm are chosen based on their ability to bind to hyaluronic acid, mimicking natural selection processes to ensure better sperm quality for fertilization.
- Egg donation: The use of eggs donated by another woman to help individuals or couples conceive when the female partner's eggs are unsuitable for fertilization.
- Sperm donation: The use of sperm from a donor to facilitate fertilization, often used in cases of male infertility or for single women or same-sex couples wishing to conceive.
- Surrogacy: An arrangement where a woman (the surrogate) carries and delivers a baby on behalf of another individual or couple, often used when pregnancy is medically impossible or risky for the intended mother.

These reproductive technologies offer a range of solutions to increase the chances of conception and are widely used in modern reproductive medicine.

IV. Discussion

Experts identify several major causes of both female and male infertility, many of which are linked to environmental and lifestyle factors. Key contributors include exposure to unfavorable environmental conditions, harmful working environments (particularly for men), and sexually transmitted infections (STIs). Additionally, delaying childbirth for career or financial reasons and leading unhealthy lifestyles—characterized by alcoholism, smoking, and drug use—also play a significant role in infertility. Worryingly, the rising number of teenagers and young adults who engage in harmful habits is expected to further increase the number of couples struggling to conceive in the near future.

A critical factor contributing to the decline in reproductive health is the relatively high number of abortions, which continue to be used as a method of birth control. Over 50% of abortions occur among women aged 20 to 30, with an additional 20% in women aged 30 to 34—those in their most active reproductive years. Alarmingly, adolescent abortions are also a growing concern, with 8-10% of total abortions being performed on girls under the age of 19. This rate is much higher than in many Western countries.

The persistently high rates of abortion are largely attributed to the insufficient use of modern contraceptives. Data from the Ministry of Health and Social Development of the Russian Federation in 2009-2020 showed that only 25-30% of Russian women of childbearing age used contraception. This low usage is linked to several factors, including the underdevelopment of the domestic industry for producing modern hormonal contraceptives, irregular and costly government procurement, and a lack of public awareness about the availability of newer contraceptive options. Additionally, economic downturns—such as the financial crises of 1998 and 2020—led to steep increases in the prices of medical drugs, making them less accessible for many women. In recent years, there has been an increasing recognition within society of the importance of family planning, sex education, the cultivation of family and moral values, and the promotion

of a healthy lifestyle. There is also a growing emphasis on responsible parenthood, particularly in encouraging young people to embrace responsible motherhood and fatherhood. This awareness has become particularly pressing in light of the significant challenges related to reproductive health. One notable response to these issues in Russia was the adoption of the Family Planning** program in 2024. This program aimed to address reproductive health challenges and promote the well-being of families.

Building on the success of the national initiative, a regional Family Planning and Reproductive Health Protection program was also adopted and partially implemented in the Sverdlovsk region. This program proved effective in reducing the number of abortions and lowering maternal mortality rates. It was later combined with the Safe Motherhood program, further contributing to improvements in reproductive health outcomes.

Global experience demonstrates the value and high medical and social effectiveness of such programs. In many Western European countries—including Finland, Sweden, the Netherlands, France, and England—family planning and reproductive health programs have been in place for over 40 years. These countries have achieved optimal levels of contraceptive use, which have significantly reduced maternal mortality and abortion rates. Furthermore, the concept of "abandoned children" is almost nonexistent in these nations, illustrating the far-reaching positive impact of comprehensive family planning policies. The success of these programs highlights the importance of sustained efforts in reproductive health education and family planning for the overall well-being of society.

Since 1978, the concept of primary health care (PHC) has undergone various interpretations and definitions, causing confusion in the understanding of the term and its practical application. To ensure more coordinated action at the global, national and local levels, the following definition has been proposed:

“PHC is an integrated approach to health that covers the whole of society and aims to achieve equitable access by every member of society to the highest possible level of health and well-being. It addresses the needs of the population at the earliest stages, providing a wide range of services, from health promotion and disease prevention to treatment, rehabilitation and palliative care, as close as possible to people’s daily lives.” This definition has been developed by WHO and UNICEF within the framework of the PHC concept for the 21st century, with a focus on achieving universal health coverage (UHC) and the Sustainable Development Goals (SDGs).

The PHC system includes three interrelated components:

1. A comprehensive set of health services, with an emphasis on primary health care, public health and related functions.

2. Intersectoral policies and actions that address the key determinants of health.

3. Engaging and empowering individuals, families and communities to actively participate in managing their health and social lives.

The concept of PHC is based on the values of social justice, equity, solidarity and cooperation. It is based on the recognition that the enjoyment of the highest attainable standard of health is a fundamental human right, regardless of status or condition.

Achieving true universal health coverage requires a shift from disease-focused systems to people-centred and participatory systems. This requires governments at different levels to recognise the importance of action beyond the health sector to implement a whole-of-government approach to health, with a particular focus on equity and the entire life course.

The concept of PHC aims to address a wide range of determinants of health and pays attention to the integrated aspects of physical, mental and social health. This approach ensures high-quality and comprehensive care at all stages of a person’s life, not just the treatment of individual diseases, with a focus on maximum proximity to the patient’s place of residence.

While there have been notable achievements in building primary health care (PHC) systems and health networks in Latin America, as reflected in key health indicators, there are still critical issues that need to be addressed based on the evidence analyzed. First, while the concept of PHC is embedded in institutional discourse and sectoral debates across the region, it faces significant

challenges from the organizational structures of health systems. Intense fragmentation, ineffective decentralization, and the accumulation of isolated programs along the care continuum have led to the consolidation of a care model that deviates from best practices.

Profound income inequality acts as a segmentation mechanism, creating different levels of coverage based on individuals' ability to pay. In recent decades, most countries in the region have made efforts to promote coordinated care models, but results have been uneven, and monitoring and evaluation of the impact achieved have been scarce. The limited coordination between subsystems amplifies disparities, leading to the development of fragmented health networks that often operate informally and without standardized protocols. Collaboration between providers within different subsystems is minimal, and the private sector does not function as a space for coordination and complementarity with the public sector or, in some cases, social security systems. Instead, it often exacerbates care gaps.

The evidence gathered for this review has highlighted several key themes discussed throughout the document. Most notably, there is a pressing need to strengthen PHC models and care networks, as indicated by the documented results. Additionally, the review identified gaps in coverage of other critical topics, such as how health systems adapt to evolving population needs and the accumulation of epidemiological challenges, including mental health issues, addictions, and environmental impacts.

Furthermore, this review found a lack of literature on the impact of financial and non-financial incentives on health service provision, resource allocation efficiency, and quality improvements, opening avenues for future research. This gap suggests a need for deeper interaction between research and political action in the Latin American and Caribbean region to facilitate information exchange, strengthen the evaluation of interventions, and jointly design a research-action agenda that has a meaningful social impact. Article of law 35 of the “Fundamentals of the Legislation of the Russian Federation on the Protection of Citizens' Health” guarantees the right to assisted reproductive technologies for all adult women of childbearing age. Specifically, the article states that “every adult woman of childbearing age has the right to artificial insemination and embryo implantation." These procedures, which include artificial insemination and embryo implantation, can be carried out in licensed medical institutions, provided there is written consent from the woman involved. Furthermore, information regarding these procedures, as well as the identity of the donor, is protected as a medical secret.

If a woman has medical conditions that prevent her from carrying a pregnancy to term, as outlined in Order No. 67 from the Ministry of Health of the Russian Federation, she is eligible to use the services of a surrogate mother. The indications for surrogacy under this order include:

- Absence of the uterus (either congenital or acquired),
- Deformation of the uterine cavity or cervix, which may impede pregnancy,
- Somatic diseases in which carrying a pregnancy is medically contraindicated,
- Repeated unsuccessful IVF attempts despite the transfer of high-quality embryos.

In cases where these medical conditions are met, a woman may also opt to use the services of an oocyte donor or a donor embryo to achieve pregnancy. This legal framework thus provides women facing fertility challenges with multiple avenues for starting a family, ensuring access to modern reproductive technologies based on their medical needs.

As of today, approximately 100 clinics in Russia specialize in reproductive medicine. These clinics receive funding from the federal budget as well as from the budgets of various constituent entities of the Russian Federation. However, the cost of in vitro fertilization (IVF) procedures is relatively high, and almost all clinics have long waiting lists for those seeking free IVF quotas. As a result, many married couples and single women find this essential service to be financially out of reach.

Additionally, there exists a category of social infertility, which refers to healthy individuals who wish to have children but are unable to do so due to legislative shortcomings. A significant legal gap in Russian family law is the lack of clarity regarding the rights of unmarried individuals to access assisted reproductive technologies (ART), particularly in relation to surrogacy and donor

programs. This issue affects millions of formally unmarried individuals of reproductive age. According to the 2002 census, around 30 million people expressed a desire to remain unmarried or had not yet found a partner, comprising approximately 15 million men (aged 18-54 years) and 14 million women (aged 18-44 years).

Over the past two decades, Russia has experienced a natural decline in its population, making it increasingly unlikely to see a substantial rise in the birth rate in the foreseeable future. To address this issue, it is essential to create conditions that enable individuals suffering from physiological infertility—regardless of marital status—to fulfill their desire to become parents. Advances in reproductive technologies present new opportunities to tackle the challenge of increasing birth rates in the country.

The Russian government should expand its support for individuals wishing to have children through surrogacy and reproductive programs. This includes increasing funding for clinics that specialize in therapies for male and female infertility. Furthermore, the reproductive rights of citizens require legislative protection, as their realization is directly tied to governmental support. Currently, there is no specific law in Russia that officially classifies infertility as a disease that warrants treatment, rather than merely a condition. Therefore, liberalizing the legal framework surrounding the desire to become parents is a crucial component of demographic policy. This would help ensure that all individuals, regardless of their marital status, have access to the reproductive technologies they need to start families.

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