Page 321 - 330 **DOI:** *https://doij.org/10.10000/IJLSI.111865*

INTERNATIONAL JOURNAL OF LEGAL SCIENCE AND INNOVATION

[ISSN 2581-9453]

Volume 6 | Issue 2

2024

Legal Analysis of the Impact of Emerging Technologies on Women's Reproductive Rights

DEEPIKA SHARMA[1]

ABSTRACT

Women have played quite a significant role throughout the long history of humanity and its development whether it be by giving birth to the next generations or through their contribution to political, economic, and social evolution. Despite this women have historically been seen as inferior to their biological counterparts. Numerous efforts have been put to improve women's position in society and the realization of their reproductive rights is one such approach that enables them to take charge of their bodies and destiny and to achieve true gender equality.

In today's knowledge economy, emerging technologies have proved to be an extraordinary tool for promoting and protecting women's reproductive rights. These technologies have had a significant impact on women's reproductive rights, particularly their reproductive healthcare rights. This paper examines the potential that these technologies carry as well as the perils associated with the incorporation of these technologies in the healthcare sector. The authors have also tried to put forward recommendations on how these emerging innovations may be regulated to fully utilize their potential and minimize the risk associated with their use.

Keywords*: Artificial Intelligence, Big data, Blockchain, Reproductive Healthcare Rights.*

I. INTRODUCTION

More than 70 years ago the framers of the Indian Constitution[2] envisioned a nation that is united and integrated and laid down the ideals, goals, and hope for a better tomorrow; along with the institutions and process to achieve these ideals and goals. Unfortunately, Women's Empowerment and Gender Justice have remained a goal we have yet to fully realize.

For women to have more control over resources, their bodies, and their lives, what is required is the expansion of their freedom of choice and action. This freedom of action and decision-making is constrained by several factors, including a lack of adequate investments in

[1] Author is a LLM Graduate from Hidayatullah National Law University, India.
[2] India Const., 1950

 [ISSN 2581-9453]

infrastructure, social norms, and feudal traditions, as well as a lack of well-structured legislation and their implementation. It has proven to be quite difficult to fill these gaps, which has become a huge challenge in contemporary times. Although there is no quick fix, the development of new technology has paved the path for efficient and effective legal reforms that may very well transform healthcare and lead to the empowerment of women in the healthcare field.

With the advent of the COVID-19 pandemic, a swift movement was observed globally to digitalize healthcare service provisions. From health apps to electronic patient records and AI-diagnostic tools to delivery of medication via drones; the emerging technology has allowed us to analyze big data that has aided in unprecedented growth in the healthcare sector. Technology and data processing advancements have made it possible for ever-greater powers to collect, process, and gather intelligence.

One of the key sectors that have shown tremendous growth and success with the development of new technology has been the reproductive and maternal healthcare sector. These emerging technologies have allowed policy-makers to formulate a legal regime that best suits the needs and expectations of women. Research and innovation of new technology in the field of reproductive health are crucial particularly since the research pertains to our future progeny. The emergence of reproductive technology has broken many moral, religious, and ethical traditions since reproduction has always been viewed as a taboo topic, as a private union between two people in a socially accepted union.

Such emerging technologies have shown great promise but at the same time carry huge risks especially when such innovations are born out of a lack of consideration of the privacy and the needs of society and as it is in some cases, with some mala fide intentions or hidden agendas. It has proven an immense challenge to align their potential with the legal, ethical, and technological considerations and challenges.[3] A balance between technological innovations and ethical and legal considerations is required for the maximum utilization of the potential of these technologies.

Since the scope of Reproductive Rights is very vast the paper focuses on the healthcare aspect of these rights concerning three major Emerging technologies and the promise they offer along with the risks they pose that need careful consideration.

II. THE CHANCE AND CHALLENGES OF EMERGING TECHNOLOGY

[3] Gerke, Sara, et al., *Ethical and legal challenges of artificial intelligence-driven healthcare, Artificial intelligence in healthcare*, Academic Press, 295, 297-298, (2020).

(A) Artificial Intelligence

AI has grown quickly in the last couple of decades, showing impressive and still unexplored abilities in many areas, such as healthcare. The role of AI in reproductive health is significant. For instance, AI-driven applications track important health events and give crucial details about self-care, medications, ovulation, mental health, and yoga, among other things. These tools show how AI can improve health management and help people take care of their well-being. AI-based predictive monitoring has also been effective in teaching young people about their reproductive rights and providing information about safe and consensual sexual activities.[4]

AI is also used to detect patterns in a large set of complex data for the prediction of disorders or diseases like breast and cervical cancers as well as help in their detection in the early stages with personalized diagnosis and treatment.[5] There have been breakthroughs in medicines and vaccination of rare as well as genetic disorders that might get transferred from the mother to the child resulting in a lower fetal mortality rate.[6]

Nowadays AI technology is also utilized to make clinical trials and treatment cycles in Assisted Reproductive Technologies (ART) more efficacious, which is not only cost-effective but also has improved the success rate of the treatment significantly by optimizing the treatment cycle.[7] It can also predict the probability of a successful pregnancy and the causes of a failed treatment cycle.[8]

Several medical software has been developed that offer interactive and personalized reproductive services such as self-diagnosis and remote medical expert systems. The patients have the highest possible standard of care with the help of **AI chatbots**.[9]

AI technology also allows healthcare professionals to redesign medication from pre-existing medicines in a way that allows them to fight against any specific issue the woman might be having and also reduce the risk of dosage error.[10] This is especially useful in the case of expecting mothers as AI technology significantly reduces the risk of any harmful reactions or

[4] The Role of Emerging Technologies in Women's Health and Sustainable Development , https://www.accenture.com/_acnmedia/PDF-95/Accenture-Womenshealth-PDF.pdf (Last Visited on April 22, 2024)
[5] Shimizu, Hideyuki, and Keiichi I. Nakayama, *Artificial intelligence in oncology*, 111.5, Cancer Science, 1452, 1452-1460, (2020).
[6] ibid
[7] AI in IVF: a fertile field, https://www.pharmaceutical-technology.com/comment/ai-in-ivf/, (Last Visited on April 22, 2024)
[8] ibid
[9] How Healthcare AI Chatbots Are Transforming The Patient Journey, https://insights.axtria.com/blog/how-healthcare-ai-chatbots-are-transforming-the-patient-journey , (Last Visited on April 22, 2024)
[10] Ahuja, Abhimanyu S, *The impact of artificial intelligence in medicine on the future role of the physician*, PeerJ, 7702, (2019)

risks to the mother or the child.

To keep up with the emerging innovations, the Indian government started an AI Taskforce in 2017 and recommended setting up a key agency.[11] They found that AI could help improve how healthcare services are delivered in rural areas, especially in the care of expecting mothers and children.

The Union Budget for 2024-25 puts a spotlight on increasing the use of AI in many areas, especially in healthcare.[12] There's a strong push to use AI to make public services better, aiming to enhance how efficiently and effectively healthcare is provided.[13] The budget lays out ideas that could help predict diseases better, manage patients more effectively, and make healthcare services run smoother by using advanced AI tech. It also highlights how teaming up with tech companies can spur fresh ideas and innovations in healthcare.[14]

This year's budget also stresses the importance of collaboration between universities and businesses, as well as increasing funding for AI education and training. These efforts are meant to develop a workforce that can effectively implement AI in healthcare and other important areas.

Although this technology holds promise for reproductive healthcare, it also has its limitations. One of the major challenges is that AI is a complicated technology making it practically inaccessible to all but the technically trained. It is hard to formulate a regulation policy for AI since it is a new and upcoming technology capable of monitoring its surroundings, collecting data, and improving its efficiency without much human intervention so much so often it is difficult for AI engineers to control or predict the outputs of AI.

Due to the reflexivity of law, it can be often observed that AI technology reflects discriminatory behaviours or biases that might be programmed intentionally by the developer[15] or maybe accidentally picked up by the AI itself due to the restricted sample size[16]. Irrespective of the intention of the developer such discriminations and biases further get reflected in the laws and

[11] PTI, Central task force on AI recommends setting up of N-AIM, The Indian Express , (March 28, 2018, 10:13 am), https://indianexpress.com/article/india/central-task-force-on-ai-recommends-setting-up-of-n-aim-5114130/
[12] Tech Desk, *Union Budget 2024: Investment provisions in 'AI for India' will help unlock its full potential*, The Times of India, (Jan 30, 2024, 04:13 pm), https://timesofindia.indiatimes.com/business/budget/union-budget-202425-investment-provisions-in-ai-for-india/articleshow/107260874.cms
[13] ibid
[14] ibid
[15] Larry Hardesty, Study finds gender and skin-type bias in commercial artificial-intelligence system, MIT News, (February 11, 2018), https://news.mit.edu/2018/study-finds-gender-skin-type-bias-artificial-intelligence-systems0212#:~:text=artificial%2Dintelligence%20systems,Study%20finds%20gender%20and%20skin%2Dtype%20bias%20in%20commercial%20artificial,percent%20for%20dark%2Dskinned%20women.
[16] ibid

then the society which has proved to be a legal as well as an ethical and technical issue in a sector as sensitive as the reproductive healthcare sector.

AI has also increased the risk of various issues such as data breaches and functional creep that are accentuated by the lack of an effective and efficient legal regime, especially that relating to the privacy of individuals.[17] This frequently impairs a variety of women's reproductive rights, including their right to health, privacy, non-discrimination, and access to technology breakthroughs, among others.

(B) **Blockchain**

Blockchain is another emerging innovation that is finding its footing in many industries, including healthcare. Healthcare domains find the use of blockchain networks in storing and sharing of data of the patients in hospitals, diagnostic labs and with doctors, etc.[18] Therefore, it has improved upon the effectiveness and reliability of sharing medical data, especially data as sensitive as reproductive health data.[19] This frequently impairs a variety of women's reproductive rights, including their right to health, privacy, non-discrimination, and access to technology breakthroughs, among others.[20] Blockchain technology plays a crucial role in revolutionising the healthcare sector, particularly the area of reproductive healthcare. The reproductive health system is shifting toward a patient-centered model that emphasizes two key components: readily available services and appropriate healthcare resources.[21]

With the use of this technology, the arduously long process of health data exchange, which is essential for personalised diagnosis and treatment of new and expecting mothers, may be resolved swiftly. Additionally, improved research and data sharing on reproductive wellness will improve care as well as provide for better treatment plans, especially in places with inadequate infrastructure or with no access to properly trained professionals. Blockchain can also be used to make women aware of their rights and to make information available regarding their rights and support in case of excess internet censorship.[22]

However, due to the immutability of its data, blockchain technology shouldn't be applied arbitrarily in the healthcare industry. Large files or ones that change often may be blocked. All

[17] Gerke, *supra* note 2
[18] Haleem, Abid, et al., *Blockchain technology applications in healthcare : An overview*, 2, International Journal of Intelligent Networks, 130, 132-139, (2021).
[19] ibid
[20] ibid
[21] ibid
[22] Dobbs v. Jackson Women's Health Organization, 2022 U.S. LEXIS 3057

information that is identifying should be kept off the chain.[23]

Another significant problem with applying this cutting-edge technology in the field of reproductive healthcare is a lack of competence. The technological examination and analysis of blockchain applications still have to improve to fully understand and effectively control this technology.

Compliance with current privacy laws while maintaining the network's distributed ledger architecture is another significant technological problem for blockchain's distributed ledger solutions. Since reproductive healthcare data is more sensitive than any other personal health information owing to the stigma associated with it, the blockchain system must be built in a way that makes it hard to be cryptographically hacked.

(C) Big Data Technology

Healthcare systems around the world are struggling due to more elderly people and their health issues, alongside growing technology use and people's high expectations. Improving health results while keeping costs down is tough. Here, big data can offer healthcare workers new ways to meet these challenges. The importance of big data in healthcare depends on our skill to identify patterns and convert large amounts of data into useful information for accurate treatments and making decisions.

The beginning started with just smartphones. These phones may now be used as everything from pedometers to calorie trackers thanks to all these emerging technologies and apps. Today, millions of individuals use this technology to lead better lives.

Various reproductive apps such as Flo Period and Ovulation Tracker, Ovia Fertility & Cycle Tracker, and Natural Cycles – Birth Control, etc. have proved to be revolutionary in helping women track their mensuration cycles and ovulation, along with all the symptoms women experience during these periods, which has become crucial information when it comes to dealing with various reproductive disorders such as endometriosis and polycystic ovarian disorder. These apps have also helped doctors formulate personalised treatment plans depending on the usual symptoms the patient might be facing. Doctors have also been able to predict any disease or disorder a patient might have by just comparing the patient’s symptoms to the information in the database available in these apps.[24]

Another feature would be to spread awareness about fertility, reproductive disorders,

[23] Blockchain: The Immutable Ledger of Transparency in Healthcare Technology, https://sidebench.com/blockchain-healthcare-technology/, (Last Visited on April 24, 2024)
[24] Ahuja, *supra* note 9

pregnancy as well as safe and consensual sexual activities to the users by collecting the data of the users to process and compare to find out any irregularities or signs and symptoms of concern.[25] These apps use the data to connect the users with medical practitioners if the need arises.

The popularity of wearable technology has also lately increased. These gadgets enable users to upload data that is combined with everyone else's workout progress data and measure their daily workout progress and have even been able to detect symptoms of heart attack in individuals[26].

Shortly, patients may even be able to share this data with their physicians, who will be able to utilise it as part of their diagnostic toolkit when a patient sees them with a condition. The general public will still have access to vast, ever-growing databases of information on a person's health status even if there is nothing wrong with them, allowing them to identify early warning signs of issues and make plans ahead of time.

Real-time alerting is a feature that other applications of healthcare data analytics all share.[27] Clinical Decision Support software analyses medical data instantly in hospitals, giving healthcare professionals recommendations while they make directive choices. Technology like this can become an important resource for women since hundreds of cases arise every year globally where women's symptoms are often ignored or forgotten, being chalked up as mensuration pain or even sometimes 'in her head', due to bias against women reflected in society and healthcare sector.

The benefits of big data in healthcare are numerous, and the ones described above are just a few of them. But there are disadvantages as well. One of the primary barriers to the use of big data in medicine is the fact that medical data is scattered across multiple sources that are under the jurisdiction of several institutions and administrative agencies. To combine these data sources, an architecture where all data providers collaborate would be required.

Any company must always worry about security and privacy, but the health sector must worry even more. Hospitals and care facilities regularly handle sensitive patient information that needs to be securely safeguarded. Security might be a problem for these kinds of businesses given that the data is coming from several sources and the information.

[25] Gerke, *supra* note 2

[26] Wu, Min, and Jake Luo, *Wearable technology applications in healthcare: a literature review*, 23, Online J. Nurs. Inform, 3, (2019).

[27] Real-time Alerting in Healthcare, http://ibigdata.in/works/real-time-alerting/ , (Last Visited on October 10, 2022)

Utilizing big data in the healthcare industry requires a variety of techniques and instruments to gather, purify, process, manage, and analyse the vast volumes of data accessible. For typical users who are unfamiliar with these procedures, this may provide a technical constraint due to the amount of knowledge and abilities required.

III. CONCLUSION AND SUGGESTIONS

Digital technology has integrated into the medical field and is prepared to change how medical practitioners work. The importance of technology in healthcare cannot be overstated. By providing real-time access to patient data, technology is now opening the path for quick care management and, in case of emergencies, lowering casualties. Blockchain, artificial intelligence, the Internet of Medical Things, medical apps, and other cutting-edge technology enable this.

The healthcare sector has been pushing to improve the standard of care by incorporating Telehealth and Telemobile apps, wearable health technology, big data, and more to enhance the affordability and accessibility of healthcare services. These emerging innovations have allowed medical professionals to work more effectively and efficiently by streamlining their tasks and providing assistance in data management safely and securely.

However, constant technological advancements have both beneficial and harmful effects on modern civilisation. Attempts have been made to control technology in a way that amplifies its benefits and lessens its drawbacks. But the regulatory regime faces many challenges be it legal, ethical, or technical.

First and foremost is the issue of privacy of the women whose data is entered, monitored, and processed via these technologies as well as the security of this data. Health care data, especially reproductive health care data, is very sensitive data in nature and the issue of privacy needs to be dealt with in twofold ways: 1) Data entered in these databases needs to be stored with proper security measures 2) It has to be ensured that this data is not used by any agency, including the government, to create any unlawful surveillance. Ethical issues also arise here making it pertinent that the laws formulated to regulate these technologies need to incorporate an ethical approach.

Several groups and authors have discussed including an ethical dimension in regulatory rules. One such organisation is NITI Aayog, which has discussed the issue and established some general principles for it, including the Principle of Safety and Reliability, the Principle of Equality, the Principle of Inclusivity and Non-Discrimination, the Principle of Transparency,

the Principle of Accountability, etc.[28]

It also needs to be ensured that the agencies collecting the data do not use it for any other purpose than the one for which the users have consented. To do this, the legal framework must be created while maintaining privacy as a "social idea" rather than an "individual notion."[29] A rights-based model of privacy needs to be put in place instead of a consent-based model of privacy, allowing the users more security and protect the data of the users from being exploited by using the data only for the purpose for which the user has explicitly consented for. It needs to be kept in mind that while guaranteeing women their right to health and the right to enjoy scientific progress, their right to privacy and security are not compromised.

As long as privacy is thought of as mostly originating from individual control, data controllers will continue to take part in actions that restrict the freedom to make choices. It is essential to view privacy as a communal value, and policymaking should ensure its protection and enhancement.[30] Contractual safeguards and legal penalties are often ineffective if platform infrastructures are made to accomplish the exact opposite.

Another issue is the lack of technical knowledge to operate these technologies. Lack of technical know-how has made the regulation of these technologies a near-impossible task. Training the medical staff to use these technologies is one way but also ensuring that the technical engineers create models for these technologies while keeping in mind the ethical principles is necessary. To avoid any black box situation laws should made to regularize and optimize the models to make them more interpretable and understandable as well as to make the developer more accountable for the decisions made by the models based on the data entered.

Making any laws on these emerging innovations can be very challenging given their global nature and application but the lack of any consensus on their regularisation on the global platform. A global law to govern and regularise emerging technology and data protection and security is the need of the hour since data has become as essential as oil in today's time. Any abuse of this data will be a gross infringement of the reproductive rights of women.

Funding of more research into projects on these new technologies by the government is a crucial step too. Policymakers in India must recognize that their duties also include developing standards and guidelines that will guide future data-driven systems and regulatory tools as they

[28] N. I. T. I. Aayog, *Responsible AI.# AIForAll. Approach Document for India Part 1–Principles for Responsible AI*, 1, 4, (2021).
[29] Amber Sinha, *India's Data Protection Framework Will Need to Treat Privacy as a Social and Not Just an Individual Good*, 53, Economic and Political Weekly, 1, 5-6, (2018).
[30] ibid

prepare for the revolution that has begun with the introduction of emerging technology in the healthcare sector. In the interest of Gender Justice, lawmakers must formulate effective and efficient laws to regulate the new technologies in such a way that fully utilizes the potential of these technologies for the protection and promotion of the reproductive rights of women.

*****

 [ISSN 2581-9453]