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MAPPING ANCESTRY, MISSING REGULATION: THE HIDDEN LEGAL CHALLENGES OF CONSUMER DNA TESTING IN INDIA

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ABSTRACT

"The most valuable thing in the twenty-first century may no longer be oil, it may be data. But among all forms of data, none is more personal, permanent, or powerful than the human genome."

Direct-to-Consumer DNA ancestry testing has fundamentally transformed genetic information from a clinical resource into a consumer commodity you can buy for the price of a nice dinner. Companies such as 23andMe, Ancestry DNA, My Heritage and India's own Mapmygenome promise consumers insights into their ancestry, ethnicity, and inherited traits in exchange for a tube of saliva. Behind this seemingly harmless exchange, however, lies one of the most valuable datasets in existence-the human genome. Commercial DNA testing raises novel legal questions concerning ownership, consent, genetic discrimination, cross-border data transfers, constitutional privacy and so on. India has made significant strides in recognising and protecting the right to privacy through the landmark *Puttaswamy* judgment and the Digital Personal Data Protection Act, 2023.[3] India's one serious attempt at a DNA-specific legislation, the DNA Technology (Use and Application) Regulation Bill, built for police investigations, was withdrawn from Parliament in 2023.[4] However, none of these deal

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[4]MohanaBasu, 'What's in DNA Technology Bill Withdrawn by Modi Govt& Why House Panel Wanted Safeguards in Place' *ThePrint* (25 July 2023) https://theprint.in/india/governance/whats-in-dna-technology-bill-withdrawn-by-modi-govt-why-house-panel-wanted-safeguards-in-place/1685328/ accessed 15 July 2026.

with commercial DNA testing. This article examines that regulatory vacuum, argues that genetic data requires legal treatment distinct from conventional personal data, analyses emerging challenges, draws lessons through comparative international approaches, and proposes the outline of an Indian Genetic Information Protection framework.

Keywords -*Direct-to-Consumer DNA Testing; DNA Ancestry testing; Genetic privacy; Genetic Information Protection; Indian Data Protection Law*.

INTRODUCTION

Imagine you order a DNA ancestry kit online. A week after spitting into a tube and mailing it off, a glossy report arrives: your ancestors migrated from Central Asia, you have distant cousins in South Africa, and there's a genetic reason why you can't stand peanuts.

The transaction appears completed. Or is it?

What happens to your saliva sample after the report is generated?

In India, the honest answer is that nobody has bothered to say.

Over years, Direct-to-Consumer DNA testing has evolved into a billion-dollar global industry. The global DTC genetic testing market was valued at approximately USD 2.3 billion in 2025 and is projected to reach nearly USD 6.8 billion by 2033, growing at a compound annual growth rate (CAGR) of around 14%.[5] While the Indian market is still in its early stages, companies such as MapmyGenome and Xcode Life Sciences have expanded into ancestry, nutrigenomics, and preventive health services, with industry reports identifying the Asia-Pacific region as one of the fastest-growing markets for consumer genetic testing.[6]This growth has transformed DNA into a valuable commercial asset. But there are no laws so as to regulate these companies, which is key issue faced in India.

DISTINCTIVE FEATURES OF HUMAN GENETIC DATA

DNA is permanent: DNA (deoxyribonucleic acid) is the hereditary material in humans and almost all other organisms. Nearly every cell in a person's body has the same DNA.With

[5]Grand View Research, 'Direct-to-Consumer Genetic Testing Market Size, Growth Report, 2026-2033' (15 June 2026) https://www.grandviewresearch.com/industry-analysis/direct-to-consumer-genetic-testing-market-report accessed 15 July 2026.

[6]Ibid

very limited exceptions (such as certain immune cells or rare mutations), an individual's nuclear DNA sequence remains substantially stable and unchanged throughout their lifetime.[7]

DNA is predictive: A genetic test can flag inherited risk for cancer, cardiovascular disease, or neurological conditions years before any symptom shows up.

DNA is relational and not individual: Submitting a saliva sample may unintentionally disclose sensitive genetic information concerning siblings, parents, children, or extended family members who have never consented to testing. This makes DNA different from individual privacy and is based on the assumption that no person holds genetic identity in isolation.

These distinctive characteristics distinguish genetic data from ordinary personal information. When DNA moves from clinical settings into the commercial marketplace, these features create unique legal challenges that India's current framework, centred on the DPDP Act and general privacy principles, is ill-equipped to address.

THE ISSUES UNIQUE TO GENETIC DATA

Who owns the human DNA?

When you buy an ancestry kit, the natural assumption is that you are paying for a testing service or reports. But in practice the companies retain far more that. Depending upon the contractual terms, they will be having access to the physical biological sample, the extracted genetic profile, rights to use anonymised data for research, commercial licensing rights, etc. The distinction between ownership of the biological sample and rights over genetic information is rarely explained to consumers. The DNA is simultaneously biological material, personal information, a scientific resource, and a tradeable commercial asset. And the Indian law does not address the basic questions as to whether the DNA should remain as the permanent property of individuals or whether the companies can have limited usage rights. Thus, it creates an imbalance between the contractual consent and autonomy of an individual.

Genetic information – Individual consent vsGenetic privacy

[7]National Human Genome Research Institute, 'DNA, Genes and Chromosomes' (Fact Sheet, 2024) https://www.genome.gov/about-genomics/fact-sheets/DNA-Genes-Chromosomes accessed 17 July 2026.

The modern laws relating to privacy are based on the assumption that if an individual agrees to voluntarily share their personal details, the latter consequences that follows will be valid. But Genetic information puts a bar to this assumption. Suppose, if a person purchases an ancestry kit and the same reveals that her presumed mother isn't her biological mother, exposing the sensitive details as to her father, biological mother, half-siblings, so on.., would be violating the consensual rights of latter people.Thus, DNA cannot be viewed from lens of individual consent alone. Genetic information is shared information. And the privacy laws in India only recognizes the individual consent and doesn't focus on familial genetic privacy.

DNA as commercial commodity

The major misconception surrounding ancestry testing is that companies earn revenue solely by selling testing kits. But the real long-term value for these companies increasingly lies in aggregated genetic databases used for pharmaceutical research, population genetics, and biotech partnerships. With the expansion of these databases, their economic significance increases exponentially. While the consumers get their ancestry report, the companies acquire commercial partnership worth millions of dollars with these expanding genetic databases. And there is no consumer law that requires these companies to expose the profits gained out of retained genetic databases and nothing speaks about sharing of economic benefits derived from the genetic information of the consumers.

Genetic Discrimination

One of the major issues that is associated with DNA commercial testing is not privacy. It is discrimination on the basis of genetic information.Modern genetic testing can identify inherited predispositions towards conditions such as breast cancer, Alzheimer's disease, and numerous hereditary illnesses. There is no law that prohibits an employer, insurer, school, or matrimonial platform in India from asking for a person's genetic test results and acting on them.This raises ethical as well as constitutional concerns. There arises question as to whether an employer could refuse employment because an applicant carries a hereditary disease? Indian law doesn't provide an answer for this.

The 23 and Me crisis

The 23 and Me crisis is an example as to how an unregulated genetic database can go wrong. In 2023, consumer DNA company 23andMe disclosed that hackers had gained access to

customer information through credential-stuffing attacks. The breach ultimately resulted in breaking into 14,000 23 and Me accounts, gaining access to data including ancestry information and family relationship data. The hacker was able to access data belonging to roughly 6.9 million people, nearly half of 23andMe's entire customer base.

The incident reignited global debate regarding the security of commercial genetic databases and the long-term consequences of entrusting private corporations with immutable biological information.

The controversy intensified further when 23andMe later entered Chapter 11 bankruptcy proceedings in the United States in 2025. The fact that one of the world's largest consumer genetic databases could become part of bankruptcy proceedings raised unprecedented legal questions as to What happens to customers' genetic data when a DNA testing company is sold or restructured? Can such data become a transferable corporate asset?

This illustrated that consumer DNA is not merely sensitive information but has become an economically valuable commodity for corporate transactions.

CURRENT INDIAN SCENARIO

The growth of Direct-to-Consumer (DTC) DNA testing has outpaced legislative developments across the world, and India is no exception. While policymakers have debated DNA profiling in criminal investigations and enacted a general data protection statute, there is no law specifically governing recreational or commercial DNA ancestry testing.

Justice K.S Puttaswamy(Retd.) v. UOI (2017)

India's right to privacy can be traced back to the landmark case of Justice K.S Puttaswamy v. UOI. The nine-judge Supreme Court bench unanimously held that privacy is intrinsic to the right to life and liberty under Article 21 of the Constitution.[8]

Digital Personal Data Protection Act, 2023 (DPDP Act)

With the recognition of right to privacy as a constitutional right, Parliament enacted the Digital Personal Data Protection Act, 2023 (DPDP Act) to regulate the processing of digital

[8]Puttaswamy (n 1).

personal data. It was one the major steps taken by the country which had no concerned law governing the privacy matters.[9]

However, despite its importance, the DPDP Act treats genetic information largely as another form of personal data. It does not establish enhanced safeguards specifically tailored to DNA or cross-border transfers of genetic databases. The Actdoesn't say whether consenting to an ancestry test also authorises future pharmaceutical research on the sample, whether a company must destroy the physical sample on request, whether the rights of biological relatives are affected by one person's genetic disclosure and how it can be regulated, so on.

The DPDP Act adopts a technology-neutral approach to personal data. While this ensures flexibility, it also means that genetic data receives no enhanced statutory protection despite posing significantly greater privacy risks than ordinary personal information.

DNA Technology (Use and Application) Regulation Bill

India had tried to take steps to introduce legislation specifically for DNA, that is,the DNA Technology (Use and Application) Regulation Bill,primarily to regulate forensic DNA profiling, criminal investigations, disaster victim identification, and related public functions.

The Bill was concerned with identification for public purposes, not commercial consumer services. It contained detailed provisions relating to DNA laboratories, regulatory oversight, and forensic databases but remained silent regarding recreational ancestry testing offered by private corporations.

The Bill itself attracted widespread criticism from legal scholars, civil society organisations, and parliamentary committees. Critics argued that the legislation lacked sufficient safeguards concerning privacy, proportionality, and retention of DNA profiles.[10]

A parliamentary Standing Committee on Science & Technology, chaired by Rajya Sabha MP Jairam Ramesh, submitted a report in February 2021 recommending significant privacy and

[9]Hogan Lovells, 'India's Digital Personal Data Protection Act 2023 Brought into Force' *Lexology* (17 November 2025) https://www.lexology.com/library/detail.aspx?g=06a5c11c-6f5d-4aec-8d07-851cf89d992d accessed 16 July 2026.

[10]'DNA Technology Regulation Bill Withdrawn from Lok Sabha Amidst Controversy and Concerns' *Republic World* (24 July 2023) republicworld.com accessed 15 July 2026; 'DNA Profiling: Withdrawal of the DNA-Based Technology (Use and Regulation) Bill' (*BNB Legal*, 3 August 2023) https://bnblegal.com/article/dna-profiling-withdrawal-of-the-dna-based-technology-use-and-regulation-bill/ accessed 15 July 2026.

consent safeguards. Later the government withdrew the bill from LokSabha on July 2023 statingthat its core provision has been already identical to the Criminal Procedure (Identification) Act, 2022.

Thus, it left the India with no specific DNA legislation. Even if the bill was introduced, the commercial DNA testing, which involves voluntary submission of genetic information by ordinary citizens would have still remained unregulated.

COMPARATIVE ANALYSIS

There are not any countries that have fully tackled this problem but several have atleast one dedicated legal instrument that recognizes genetic data as a special category.

European Union

Genetic data in the European Union is explicitly protected under the General Data Protection Regulation (GDPR). Article 9 classifies genetic data as a "special category," prohibiting its processing by default unless explicit consent or narrow public health exemptions are met.[11] However, the GDPR does not fully address the shared nature of genetic data, where one person's disclosure can affect family members.[12]The differences in national laws across the EU can also make cross-border research more complex.

United States

The United States adopts a sector-specific approach to protecting genetic information through the Genetic Information Non-discrimination Act of 2008 (GINA).[13] However, this framework has severe limitations. GINA does not cover life, disability, or long-term care insurance, nor does it protect employees in companies with fewer than 15 workers.[14]

United Kingdom

[11] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) [2016] OJ L119/1, art 9.
[12]Róisín Á Costello, 'Genetic Data and the Right to Privacy: Towards a Relational Theory of Privacy?' (2022) 22(1) Human Rights Law Review ngab031 https://doi.org/10.1093/hrlr/ngab031 accessed 15 July 2026.
[13] Genetic Information Nondiscrimination Act of 2008, Pub L No 110-233, 122 Stat 881, ss 101, 202.
[14] Anya E R Prince, 'Preventing Genetic Discrimination in Insurance: Lessons from GINA and the Need for Reform' (2019) 47(4) Journal of Law, Medicine & Ethics 539.

The United Kingdom regulates consumer genetic information through a combination of the UK GDPR, the Data Protection Act 2018, and the Human Tissue Act 2004.[15]Under the UK GDPR, genetic data is treated as special category personal data, requiring enhanced protection and explicit consent for processing. The Human Tissue Act further strengthens this framework by making consent the cornerstone for the storage and analysis of human tissue and criminalising DNA analysis without appropriate consent.[16] However, despite this comprehensive framework, the UK does not have legislation exclusively governing direct-to-consumer DNA ancestry testing. Instead, regulation is spread across multiple statutes, which may create uncertainty regarding the long-term commercial use and ownership of consumer genetic data.[17]

Compared with these jurisdictions, India's legal framework remains incomplete.

While constitutional privacy has been recognised and general data protection legislation enacted, there exists:

- no dedicated regulator for consumer genetic testing;
- no statutory definition of genetic information;
- no prohibition against genetic discrimination;
- no legislation governing commercial ancestry testing;
- no legal recognition of familial genetic privacy.

RECOMMENDATIONS: Towards A Genetic Information Protection Act

The solution for these issues doesn't necessarily mean excessive legislation. What India needs is a targeted and dedicated legal framework rather than relying on the general data protection laws. Therefore, the enactment of a Genetic information Protection Act is proposed. The Act may include the following features-

1. Recognition of Genetic data is highly sensitive information: Genetic information should be recognised as a special category of highly sensitive personal data because it is

[15] Data Protection Act 2018, sch 1; UK General Data Protection Regulation, art 9.
[16] Human Tissue Act 2004, ss 1, 45.
[17] House of Commons Science and Technology Committee, *Commercial Genomics: Direct-to-Consumer Genomic Testing* (HC 2022-23, 94) paras 22–30.

permanent, predictive, and shared among biological relatives, mirroring the GDPR's model rather than the DPDPA's current one-size-fits-all approach.[18]

2. Establishment of a Genetic Information Protection Authority (GIPA):Parliament should establish an independent Genetic Information Protection Authority responsible for:
    - licensing DNA testing companies;
    - conducting compliance audits;
    - investigating complaints;
    - issuing ethical guidelines;
    - enforcing penalties.
3. Mandatory Licensing of commercial DNA testing companies: Anyone offering ancestry or wellness testing services within India (domestic or overseas, website or app) should be required to obtain a regulatory licence based on prescribed standards relating to laboratory accreditation, cybersecurity, consumer transparency, and ethical handling of genetic information.
4. Enhanced consent framework:Consent should be informed, specific and separately obtained for:
    - ancestry analysis;
    - health-related reports;
    - scientific research;
    - commercial partnerships;
    - marketing purposes.

Consumers should also be able to withdraw consent without unnecessary barriers.

5. Right to ownership and control: Consumers should have continuing rights over their biological samples and genetic profiles, including a right to demand destruction of the physical sample, a right to withdraw previously given data from ongoing research, and a right to data portability. Commercial companies should only retain limited rights to carry out their offered services unless the consumer gives informed and complete consent for anything more.

[18] General Data Protection Regulation (EU) 2016/679, art 9 https://gdpr-info.eu/art-9-gdpr/ accessed 15 July 2026.

6. Regulation on secondary use of data: Genetic information collected for ancestry testing should not be repurposed for research, artificial intelligence development, pharmaceutical collaborations, or commercial analytics without obtaining fresh and informed consent from the consumer.
7. Protection of Familial Genetic Privacy:Unlike ordinary personal data, DNA contains information about biological relatives. The law should therefore recognise familial genetic privacy by requiring companies to adopt safeguards when genetic testing may significantly affect identifiable family members.
8. Regulation of Cross-Border Data Transfers: Transfers of genetic information outside India should be permitted only where the receiving country provides an equivalent level of legal protection. Companies should disclose the location of data storage and notify consumers before any international transfer of genetic information.
9. Prohibition of genetic discrimination: Employers, insurers, educational institutions, and financial organisations should be statutorily barred from requiring, requesting, or using genetic information to make decisions affecting an individual's employment, coverage, admission, or creditworthiness.
10. Mandatory retention limits and default sample destruction: The law should set a maximum retention period for both biological samples and raw genetic data, with automatic destruction once that period lapses unless the consumer has given consent for continued storage.
11. A right to pre and post-test genetic counselling: ICMR recommends this; this Act should make it a mandatory, funded service that DTC companies must offerbefore a kit ships and after a report is delivered.[19]
12. Public genetic literacy campaigns:Legislation should be accompanied by public awareness initiatives that help consumers make informed decisions. Educational campaigns in vernacular languages should explain the benefits and limitations of DNA ancestry testing, the potential uses of genetic information, and consumers' rights over their biological samples and data.
13. Special Protection for Minors' Genetic Data: DNA testing of minors should be permitted only where it serves a demonstrable medical or legal purpose.

[19] Indian Council of Medical Research, *National Ethical Guidelines for Biomedical and Health Research Involving Human Participants* (ICMR 2017) https://www.icmr.gov.in/icmrobject/custom_data/pdf/resource-guidelines/ICMR_Ethical_Guidelines_2017.pdf accessed 15 July 2026.

14. Civil Remedies and Compensation: Consumers should have access to effective legal remedies such as- compensation for misuse of genetic information, injunctions against unlawful processing, penalties for unauthorised disclosure or commercial exploitation, etc.

A dedicated Genetic Information Protection Act would thus create a transparent and accountable framework that promotes consumers while also promoting responsible genomic research.

CONCLUSION

The rapid growth of direct-to-consumer DNA testing demands a legal framework that recognises genetic information as more than ordinary personal data. While India has strengthened privacy protection, it continues to lack dedicated regulation for consumer genetic testing. A Genetic Information Protection Act is therefore essential to safeguard privacy, autonomy, and consumer rights while enabling responsible innovation.

Ultimately, the person who order a DNA ancestry kit deserves to know how their genetic information will be collected, stored, and used before they seal the envelope. Today, India's legal framework cannot provide those answers with certainty. If India delays regulation until commercial genetic testing becomes widespread, it risks repeating the mistakes made in regulating social media and personal data—acting only after significant harm has already occurred.