Personal Genomic Mapping (PGM)

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In news– Reliance may soon offer affordable personal genomic mapping (PGM) to Indians.

Genomic mapping by Reliance-

- Reliance acquired Strand Life Sciences in 2021, which developed the genome sequencing kit that is priced at `12,000.
- Currently, in the pilot phase, the kit will be marketed across Reliance's e-commerce platforms.
- Testing will be done through blood samples collected at home.
- There is also a huge biological data opportunity from PGM; mapped at the population level, it can be a huge boost for drug development and disease prevention.

What is PGM?

- **All the genetic information of an organism is called its genome.**
- Its **genomic sequence is the complete list of the nucleotides** (which together make DNA) present in its halpoid set of chromosomes –humans, most commonly, have 46 chromosomes (22 pairs of autosomes, or non-sex chromosomes) and two sex chromosomes (XY in males and XX in females).
- The set comprising one chromosome from each of the 22 autosomal pairs along with XX/XY is called the haploid set.
- Most nucleotide sequences within a species are identical, but it is the variance that gives rise to genomic diversity.
- The Human Genome Project gave us a 'reference' human

genome, but with developments in sequencing technology, and falling costs, it is now possible to map every individual's genome—opening the doors to personal genomic mapping.

- **PGM will help an individual identify and assess the genes that are implicated in a disease** that she currently suffers from as well as diseases that she is predisposed to because of her genes. This can play a **big role in healthcare choices, especially relating to precision medicine,** which is basically tailoring treatment of a condition in view of how your genetic make-up influences the efficacy of treatment options—for instance, reaction to a specific drug.
- It will also allow those intending to have children to make informed plans about their child's health.
- To illustrate, genetic testing—which usually characterises only one gene or part of a gene—has proven helpful in prenatal diagnosis of diseases such as cystic fibrosis.
- Along with this, genomic testing **can help detect risks of multifactorial diseases,** such as diabetes, heart disease, even cancer—a woman carrying the BRCA1 breast cancer gene can have control over preempting the disease, like how actress Angelina Jolie did.

What are the concerns?

- The biggest concern about PGM is the **ethical questions** it is likely to raise. What do we intend to make of our personal genomic data? While there are many beneficial use cases, there is much potential for abuse as well. Combined with the progress in gene-editing technologies, **PGM can very well lead to an industry of "designer" babies.**
- Also, PGM means the biological data can't be anonymised, as **it is mapped against an individual. This fosters chances of abuse if there are no strong measures to keep**

the data secure.

- Another issue is the **vastness of the ‘unknowns’ in the field and how future knowledge can impact** the value of decision made in the present.
- The case of the Chinese researcher who edited the genes of a pair of twins at the in-vitro stage to block HIV can help illustrate this. He likely defeated HIV, but his move could have made the twins more vulnerable to certain other diseases.