India’s Nutritional Transformation – Rise of Functional Foods

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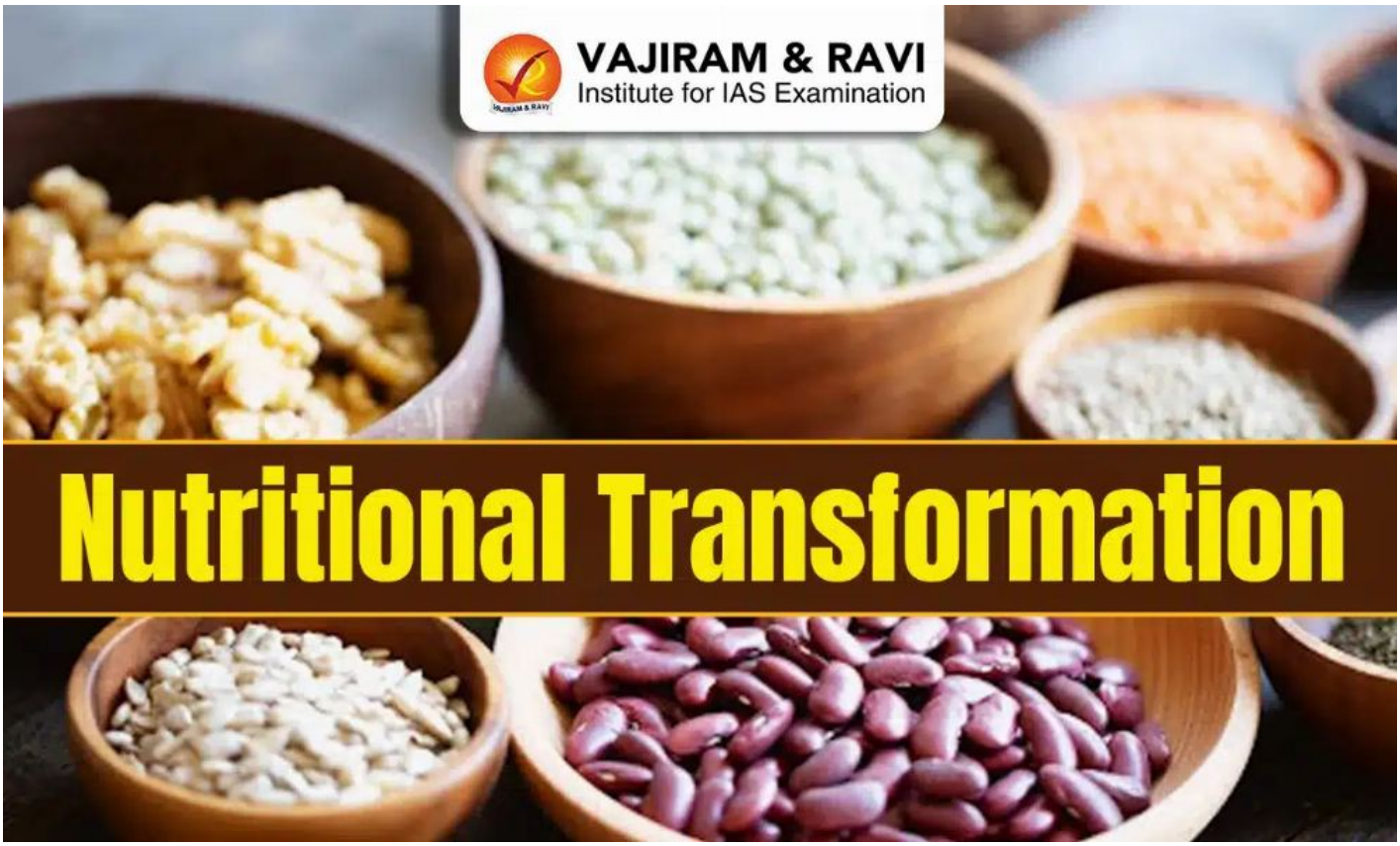

Nutritional Transformation Latest News

- India is focusing on nutritional transformation by promoting functional foods and smart proteins to tackle malnutrition and build sustainable, protein-rich food systems.

Understanding Functional Foods and Smart Proteins

- **Functional foods** are those enriched with nutrients to promote health or prevent disease.
  - Examples include **vitamin-enriched rice, iron-fortified pearl millet, and omega-3-fortified milk** .
  - These foods are developed using cutting-edge technologies such as **nutrigenomics**, **bio-fortification**, **bioprocessing**, and **3D food printing**.
  - Their purpose is to enhance the nutritional value of foods already part of daily diets.

- On the other hand, **smart proteins** represent a transformative shift in how proteins are sourced and produced.
- They are developed through biotechnology to reduce dependence on conventional livestock-based production. Smart proteins can be:
    - **Plant-based proteins**, derived from legumes and cereals to mimic meat and dairy.
    - **Fermentation-derived proteins**, produced using microbial systems.
    - **Cultivated meat**, grown directly from animal cells in bioreactors without slaughter.
- These innovations aim to create sustainable, ethical, and climate-resilient protein alternatives while meeting rising consumer demand for healthier and environmentally responsible food options.

The Need for Nutritional Transformation in India

- India's nutritional imbalance is stark. Despite being one of the world's largest food producers, **over one-third of Indian children remain stunted,** and micronutrient deficiencies are widespread.
- While caloric intake has improved, **protein deficiency** remains a major concern, particularly in rural areas.
- As India's middle class expands and food habits evolve, people increasingly seek food that is not only filling but also nourishing.
- This demands a transition from the current focus on calorie sufficiency to **nutrient sufficiency**.
- Moreover, this transformation is essential to ensure that India's food production systems remain **sustainable and climate-conscious**.
- Traditional livestock farming contributes heavily to greenhouse gas emissions, land degradation, and water stress.
- Functional foods and smart proteins, therefore, provide a **scalable, sustainable, and health-oriented solution** to India's dual challenge of malnutrition and environmental sustainability.

India's Progress in Functional and Smart Food Innovation

- India's biotechnology ecosystem is gradually aligning with this vision. Under the **Biotechnology for Economy, Environment, and Employment (BioE3) Policy**, the government has recognised **functional foods and smart proteins** as strategic innovation areas.
- The **Department of Biotechnology (DBT)** and its public-sector partner **Biotechnology Industry Research Assistance Council (BIRAC)** have launched several funding programmes to support R&D in these domains.
    - Research centres like the **Indian Institute of Rice Research (IIRR)** have developed **zinc-enriched rice**, while **ICRISAT** has pioneered **iron-rich pearl millet**.
    - Private corporations such as **Tata Consumer Products, ITC, and Marico** are investing in fortified foods and health-oriented product lines.
- The **smart protein ecosystem** is also expanding rapidly. As of 2023, India had more than **70 startups** offering over **370 alternative protein products**, including plant-based meat, eggs, and dairy substitutes.
- However, challenges remain.
    - India lacks a **clear regulatory framework** for novel foods such as cultivated meat and precision-fermented proteins.

- The **Food Safety and Standards Authority of India (FSSAI)** has yet to establish definitive guidelines for safety evaluation, labelling, and certification.
- Additionally, large-scale fermentation and biomanufacturing infrastructure remain underdeveloped.

Global Developments and India's Opportunity

- Globally, countries are racing ahead in this new food frontier. Japan pioneered **functional foods regulation** in the 1980s, while **Singapore** became the **first country to approve cultivated chicken** for commercial sale in 2020.
- China has integrated alternative proteins into its **national food-security strategy**, and the **European Union** promotes sustainable protein production under its "**Farm to Fork**" initiative.
- India, with its strong agricultural foundation, biotech capabilities, and large domestic market, is well-positioned to become a major **global supplier** of functional and smart protein products.
- The global market for plant-based foods is projected to reach **$85-$240 billion by 2030**, creating opportunities for **job creation, rural development, and export growth**.

Way Forward

- To harness the potential of functional foods and smart proteins, India needs a **cohesive national framework** that integrates food innovation with public health and sustainability goals. Key steps include:
  - Developing **regulatory clarity** under FSSAI for safety, labelling, and certification of novel foods.
  - Enhancing **public-private partnerships** to build fermentation and biomanufacturing infrastructure.
  - Supporting **farmer inclusion and skill development** to connect traditional agriculture with biotechnology-driven food systems.
  - Promoting **consumer awareness** to overcome scepticism around "lab-made" foods through transparent communication and education.
- If executed effectively, India can achieve a **nutritional revolution**, one that ensures food is healthy, sustainable, and accessible to all.

Source: TH
