

Letter to the Editor

# Navigating Laboratory Medicine's Transformation: Embracing Doughnut Economics for Sustainable Business Redesign

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## Article Info

## Abstract

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### Keywords

Doughnut Economics, Sustainability, Transformation, Emerging Technologies, Innovation, Economy

To the Editor,

In the rapidly evolving field of laboratory medicine, the integration of emerging technologies such as automation, omics, mobile health, and artificial intelligence heralds a transformative era in clinical decision-making and patient outcomes [1,2]. However, the full potential of these advancements can only be realized with a parallel evolution in management and business models within the laboratory sector. This necessitates a paradigm shift towards a sustainable and equitable economic framework that addresses both the global ecological crises and social disparities, which are more and more pronounced due to the current global inflation. The move to more sustainable laboratory practices is mandatory and has been initiated [3,4]. In such a reflection, the “Doughnut Economics” model, conceptualized by Kate Raworth, offers a compelling solution [5]. It proposes a balanced approach between meeting human needs—ensuring everyone has access to life’s essentials—and operating within our planet’s ecological boundaries to maintain its life-support systems. The application of the doughnut economy model in healthcare has great potential [6]. To our knowledge, a discussion around the adoption of Doughnut Economics in laboratory medicine has not yet really happens and emphasizes the importance of a holistic redesign of business practices. This includes the thoughtful integration of innovative technologies to improve clinical outcomes while ensuring equity and minimizing bias in healthcare delivery. Moreover, it advocates for resource optimization strategies that align with ecological boundaries, promoting sustainable practices to minimize environmental impact. The model also calls for community-centric engagement, fostering collaborations that prioritize community well-being and inclusivity in healthcare solutions. Furthermore, it underscores the need for educational and ethical imperatives, embedding ethical considerations and sustainability in the training of healthcare professionals regarding technology applications. The adoption of Doughnut Economics in laboratory medicine presents a transformative opportunity to redefine our science’s approach to sustainability, equity, and innovation. By applying this model, clinical laboratories

can navigate the complex landscape of technological advancements, environmental challenges, and societal needs, ensuring a future where healthcare contributes positively to both human and planetary health. Based on the general concepts around doughnut economy and according to ongoing initiative in healthcare [6-8]. We identified five major applications of Doughnut Economics to laboratory medicine (Figure 1), exploring their potential impacts and the perspectives needed to implement them effectively.

### **Sustainable Laboratory Practices**

Traditional laboratory operations often involve significant resource consumption, including energy, water, and materials, contributing to environmental degradation. Adopting sustainable laboratory practices, such as energy-efficient equipment, water-saving technologies, and waste reduction measures, aligns with the ecological ceiling principle of Doughnut Economics. It not only mitigates the environmental impact but also leads to cost savings and operational efficiencies. In this perspective, clinical laboratories must adopt a long-term view, recognizing that initial investments in sustainability yield long-term benefits. This requires a shift in mindset from short-term cost considerations to long-term value creation for both the laboratory and the environment.

### **Equity in Healthcare Access**

Doughnut Economics emphasizes ensuring no one falls below the social foundation, advocating for universal access to essential services, including healthcare. In laboratory medicine, this translates to making diagnostic services accessible and affordable to all segments of the population, addressing disparities in healthcare access. According to this perspective, clinical laboratories should foster partnerships with public health agencies, non-profits, and communities to expand access to underserved populations. Innovations in mobile health and telemedicine can bridge geographical barriers, but they must be deployed in ways that ensure equity and inclusivity.

### **Integration of Ethical Artificial Intelligence (AI) and Data Analytics**

The potential of AI and machine learning in enhancing diagnostic accuracy and patient outcomes is immense. However, ethical considerations around bias, privacy, and accountability must be addressed. Laboratories adopting AI should ensure these technologies are used in ways that are transparent, equitable, and with a focus on enhancing patient care, reflecting the distributive and regenerative dynamics central to Doughnut. Considering this perspective, developing ethical guidelines and frameworks for the use of AI in laboratory medicine is essential. Engaging with ethicists, patients, and the wider community in these discussions ensures that the deployment of AI technologies aligns with societal values and needs.

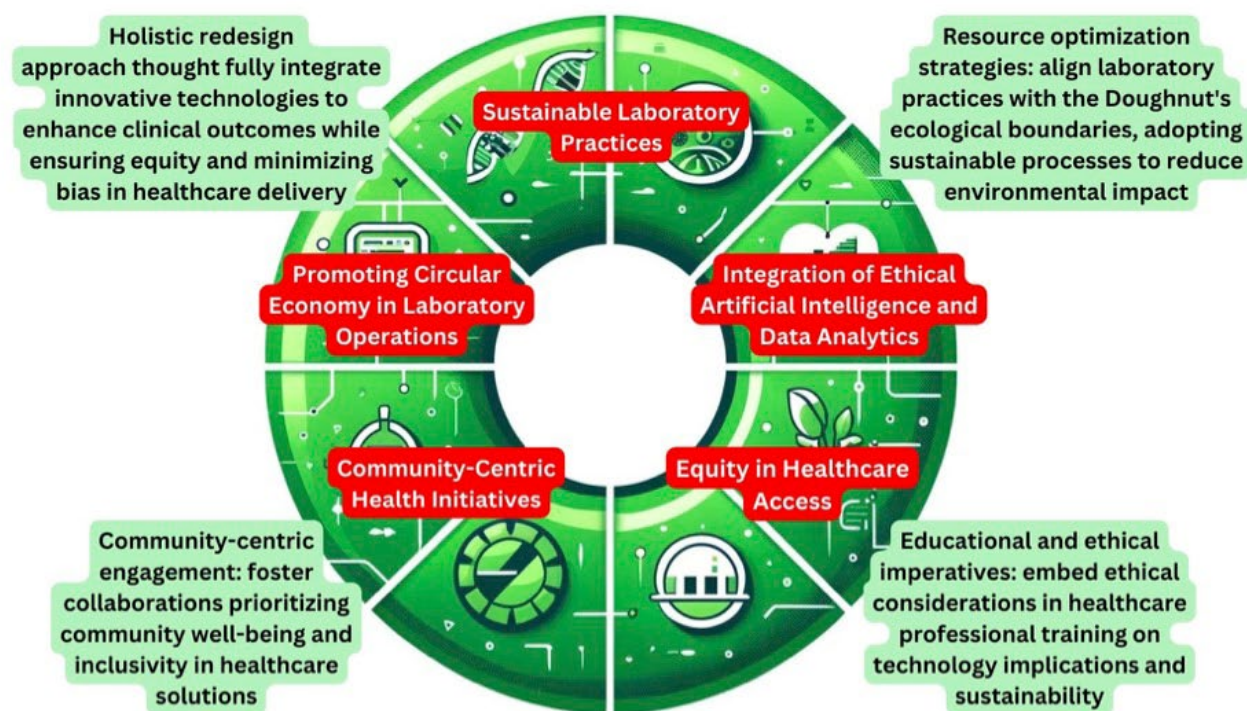
### **Community-Centric Health Initiatives**

Beyond providing diagnostic services, clinical laboratories can play a pivotal role in community health by participating in public health campaigns, disease prevention programs, and health education initiatives. This approach aligns with the Doughnut Economics model by fostering a healthcare system that prioritizes the well-being of the community and the environment. For this perspective, clinical laboratories need to view themselves as integral members of the healthcare ecosystem, with a responsibility that extends beyond the lab's walls. This involves active collaboration with public health organizations, educational institutions, and community groups to address broader health determinants.

### **Promoting Circular Economy in Laboratory Operations**

The circular economy model, closely related to Doughnut Economics, focuses on minimizing waste and making the most of resources. In laboratory medicine, this could involve recycling programs for lab materials, reprocessing of single-use devices where safe and feasible, and adopting green procurement policies. Clinical laboratories must explore innovative ways to reduce their environmental footprint through waste management and resource optimization strategies. This requires collaboration with suppliers, regulators, and waste management services to create a more sustainable laboratory supply chain.

**Figure 1:** Application of the Doughnut Economy Model to Laboratory Medicine



This figure illustrates the adaptation of the doughnut economic model to laboratory medicine, highlighting sustainable practices within the ecological and social thresholds. The inner ring ('Social Foundation') represents essential healthcare and social equity goals that laboratory practices must meet to ensure accessibility and fairness in medical services. The outer ring ('Ecological Ceiling') defines the environmental limits that laboratory operations should not exceed to avoid detrimental impacts on the planet. Between these rings, the diagram maps specific strategies for sustainable and equitable laboratory practices, such as integration of ethical AI, promoting circular economy, and community-centric health initiatives, aligning with both global sustainability goals and healthcare equity. The figure was partially built by the use of CANVA.

In conclusion, the application of Doughnut Economics to laboratory medicine could offer a roadmap for transforming our science into one that is sustainable, equitable, and innovative. It challenges laboratories to rethink their operations, technologies, and their role in society, aligning their practices with the needs of both people and the planet. Implementing these changes will require a shift in perspective, embracing long-term sustainability and equity as core values. By doing so, laboratories can contribute to a healthier future for all, demonstrating the power of combining scientific innovation with ethical and environmental responsibility.

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