

Addressing Racial Disparities in Medical Device and Healthcare Technology Functionality and Clinical Trial Representation

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Abstract: This commentary examines the structural roots and consequences of racial bias in healthcare technology and the persistent underrepresentation of racial and ethnic minorities in clinical research. While medical technologies are often framed as objective and scientifically neutral, this paper argues that they are embedded within broader social, historical, and institutional contexts that shape their development and application. Empirical evidence demonstrates that widely used diagnostic tools, such as pulse oximeters and infrared thermometers, can produce systematically biased readings across racial groups, leading to clinically significant disparities in diagnosis and treatment. Concurrently, clinical trials continue to disproportionately enroll White participants, limiting the generalizability and validity of medical knowledge for diverse populations. The analysis integrates perspectives from social psychology and systems thinking to illustrate how mistrust, implicit bias, historical injustice, and institutional design collectively reinforce inequitable outcomes. These issues are not isolated technical flaws but interconnected failures spanning research design, regulatory oversight, industry incentives, and community engagement. As a result, healthcare systems risk institutionalizing error while perpetuating unequal risk distribution. The paper argues that meaningful reform requires a comprehensive systems-based approach, including regulatory accountability, inclusive research practices, culturally competent methodologies, and sustained community partnerships. Addressing these challenges is essential not only for improving scientific rigor but also for restoring public trust and advancing health equity. Ultimately, the paper positions equity as a foundational requirement for both ethical legitimacy and effective healthcare delivery in diverse societies.

Keywords: Healthcare Equity, Racial Bias, Healthcare Technology, Biotechnology, Clinical Trials, Health Disparities, Health Administration, Medical Device Development, Healthcare Research

JEL Codes: I10, I14, I18, J15, D63, O31

Introduction

Healthcare technology is often presented as objective, scientifically neutral, and universally beneficial. Yet this assumption obscures a persistent and troubling reality, which is that medical devices and clinical research systems do not operate outside of social structure (Springs, 2025; Huff et al., 2024). Rather, they are shaped by historical patterns of exclusion, institutional incentives, and unequal distributions of power (Burrell, 2024). The result is that technologies intended to improve health outcomes may reproduce the very inequities they are supposed to mitigate. This concern is especially visible in the documented racial bias embedded in commonly used diagnostic devices and in the chronic underrepresentation of racial and ethnic minority populations in clinical trials (Hartnett, 2022; Huff et al., 2023; FDA, 2024). When tools such as pulse oximeters and infrared thermometers perform unevenly across populations, and when the populations most affected by disease burdens are insufficiently represented in validation and testing processes, healthcare systems risk normalizing error as though it were scientific certainty.

A deeper analysis reveals that these disparities are not isolated technical defects. They are the downstream consequences of interlocking failures across research design, regulation,

organizational culture, historical ethics, and community engagement. From a social psychological perspective, mistrust, stereotype-based assumptions, implicit bias, and collective memory all shape who is invited into research, who feels safe participating, and whose experiences are treated as credible (Springs, 2025; Huff et al., 2024). From a systems-thinking perspective, inequitable outcomes emerge because multiple institutions—industry, regulators, researchers, healthcare organizations, and community stakeholders—are linked in ways that can amplify exclusion unless deliberate corrective mechanisms are built into the system. Accordingly, a meaningful response requires more than improved devices or better recruitment slogans; it requires structural redesign.

Problem Statement

A significant problem in contemporary healthcare is that critical medical technologies and clinical research processes do not reliably serve racially and ethnically diverse populations equitably. Evidence of this problem is already well established. Hartnett (2022) documents that pulse oximeters and forehead thermometers, both widely used in routine care, may perform differently across racial groups, with potentially serious consequences for diagnosis and treatment. For Black patients, erroneous fever detection or inaccurate oxygen saturation readings can produce delayed intervention, clinical misjudgment, and avoidable harm, particularly in high-risk contexts such as the COVID-19 pandemic (Hartnett, 2022). These are not minor technical irregularities; they are clinically meaningful failures with distributive consequences.

The problem is compounded by the persistent underrepresentation of minority populations in clinical trials and validation studies (Springs, 2025; Huff et al., 2024). As summarized in the source text, Huff et al. (2023) argue that racial and ethnic minority communities are consistently excluded from studies that determine the safety, effectiveness, and generalizability of medical interventions. FDA data further indicates that, in 2020, 75% of clinical trial participants were White, while Hispanic, Black, and Asian participants accounted for 11%, 8%, and 6%, respectively (FDA, 2024). Such disproportionality matters because it means the empirical foundation of healthcare decision-making is often built on incomplete population representation. When research populations are narrow, the conclusions derived from them are similarly narrow, even when they are applied broadly (Burrell & Ulomi, 2011).

Purpose Statement

The purpose of this commentary is to examine how racial bias in healthcare technology and underrepresentation in clinical trials function as interconnected problems shaped by social psychology, historical injustice, and institutional design. This paper argues that equitable reform requires a systems-based response that integrates regulatory accountability, community partnership, ethical reconstruction, culturally competent research practices, and bias-aware technological innovation.

Significance Statement

This issue is significant because it sits at the intersection of scientific validity, public trust, and health justice. When diagnostic tools and research systems fail to account for human diversity, the consequence is not merely methodological weakness; it is a pattern of unequal risk distribution in which already marginalized communities are more likely to be misdiagnosed, excluded, or underserved. The significance is also societal when you consider that mistrust in medical institutions does not emerge in a vacuum, and failure to address its causes weakens public health responsiveness, diminishes research participation, and deepens structural inequities across generations (Huff et al., 2023). Thus, improving equity in this domain is essential not only for better science, but also for restoring legitimacy to healthcare systems that claim to serve all populations.

Historical Mistrust as a Social Psychological Barrier

Historical mistreatment remains one of the most consequential barriers to inclusive clinical research because collective memory powerfully shapes present-day health behavior. Huff et al. (2023) identify the Tuskegee Syphilis Study as a defining example of ethical failure in U.S. public health, noting that African American men were deceived and denied effective treatment. The enduring importance of this history is not simply symbolic. Its legacy continues to influence perceptions of medical research among minority communities, especially where contemporary experiences still reflect unequal treatment (Huff et al., 2023). In social psychological terms, mistrust becomes culturally transmitted, reinforced through family narratives, community knowledge, and repeated signals that institutions remain insufficiently accountable (Springs, 2025; Huff et al., 2024). This distrust has practical consequences for research participation and healthcare uptake (Springs, 2025; Huff et al., 2024).

Communities that have inherited a history of exploitation may reasonably interpret recruitment efforts with caution, especially when researchers appear only during periods of need and disappear once data collection ends (Springs, 2025; Huff et al., 2024). For example, a community asked to enroll in a vaccine trial may not evaluate the request only on scientific merit; participants may also assess whether the institution has demonstrated respect, transparency, and long-term reciprocity. Such decisions are shaped by more than information deficits. They are responses to perceived procedural injustice. Therefore, initiatives that frame low participation simply as a problem of awareness misunderstand the underlying psychology. Trust is not produced by messaging alone; it is produced by consistent ethical conduct over time (Springs, 2025; Huff et al., 2024).

Underrepresentation as a Systems Failure Rather Than an Isolated Recruitment Problem

The underrepresentation of minority populations in clinical trials should be understood as a systems failure rather than a narrow recruitment challenge (Burrell & Ulomi, 2011). Clark et al. (2019) describe a constellation of obstacles, including mistrust, discomfort with the clinical trial process, lack of accessible information, logistical burdens, and limited awareness. Taken together, these barriers reveal that exclusion is reproduced at multiple points in the research pipeline (Springs, 2025; Huff et al., 2024). A systems lens makes clear that the issue is not that certain populations simply choose not to participate. Rather, participation is structured by eligibility rules, site locations, transportation access, staffing patterns, communication style, compensation practices, and institutional assumptions about who constitutes an “ideal” participant.

A practical example illustrates this systems dynamic. Consider a cancer trial offered only at a major academic medical center located far from low-income neighborhoods, scheduled during standard work hours, requiring multiple in-person visits, and using lengthy consent forms written in technical language. Even if the study is theoretically open to all, the system is effectively designed for participants with transportation, flexible employment, high health literacy, and prior trust in large institutions. In this way, exclusion can be produced without any explicit discriminatory intent. Systems thinking is valuable precisely because it exposes how inequity is generated by the interaction of policies, processes, and environments rather than by one actor alone (Springs, 2025; Huff et al., 2024).

The Scientific and Ethical Consequences of Homogeneous Trial Populations

Homogeneous trial populations weaken both the scientific quality and ethical legitimacy of medical research. Clark et al. (2019) argue that when participants are drawn from demographically narrow populations, findings are less generalizable to broader communities. This is a fundamental problem in evidence production. Treatments may vary in effectiveness or safety across populations due to differences in genetics, comorbidities, social conditions, environmental exposures, and patterns of healthcare access (Clark et al., 2019). If these differences are not captured during the

research phase, clinicians later apply supposedly evidence-based interventions to populations that were insufficiently represented in the evidence base (Springs, 2025; Huff et al., 2024).

The ethical implications are equally serious. Exclusion from trials means exclusion from the benefits of scientific visibility (Burrell & Ulomi, 2011). Communities that are not adequately studied remain medically under-known, and what remains under-known often becomes under-treated (Springs, 2025). This creates a cycle in which populations already facing worse health outcomes are also less likely to benefit from precision in diagnosis and therapy (Springs, 2025; Huff et al., 2024). For instance, if device calibration or treatment dosing is based primarily on data derived from White participants, minority patients may receive care built on assumptions that fit them poorly. In this sense, representation is not a matter of public relations; it is integral to whether medicine can claim to be both accurate and just (Burrell & Ulomi, 2011).

Biased Devices and the Myth of Technological Neutrality

The unequal performance of medical devices across racial groups exposes the myth that technology is inherently neutral. Hartnett (2022) shows that devices used daily in healthcare settings, including pulse oximeters and infrared thermometers, may yield differential accuracy depending on the patient population. Such discrepancies matter because device outputs are often treated as authoritative, especially in time-pressured settings where clinicians rely on quantitative readings to guide action. When a device systematically misreads a patient's condition, that error can become embedded in clinical judgment, triage decisions, and treatment pathways.

A systems-based analysis shows that biased performance is rarely the result of one flawed moment in engineering. It often emerges because training datasets, validation samples, design assumptions, and regulatory review processes are insufficiently attentive to demographic variation. Social psychology also matters here when you consider that decision-makers may unconsciously treat White bodies or patients as the unmarked norm and diverse bodies as secondary cases to be considered later, if at all. That normativity then enters device development in subtle but consequential ways. A practical example can be seen in pulse oximetry. If a device overestimates oxygen saturation in darker-skinned patients, clinicians may underestimate respiratory compromise and delay escalation of care. The harm arises not only from the device, but from a larger system that authorizes its output without demanding adequate representational testing.

Social Cognition, Implicit Bias, and Institutional Decision-Making

Bias in clinical research and healthcare technology is not sustained only by explicit discrimination; it is also reproduced through routine social-cognitive processes. Implicit bias, status expectations, in-group preference, and stereotype activation can shape who researchers see as reliable participants, who clinicians perceive as credible reporters of symptoms, and whose concerns are prioritized during study design and implementation. The source text notes that biases among healthcare providers and researchers can contribute to the exclusion of minority participants and undermine diversification efforts (Huff et al., 2023). This is a crucial point because many institutional failures persist precisely because they are enacted through normalized professional habits rather than overtly prejudicial policies (Springs, 2025; Huff et al., 2024).

For example, a trial coordinator may unintentionally spend more time explaining a study to patients who resemble prior participants, assuming they will be more compliant or better able to navigate the process. Similarly, restrictive eligibility criteria may be defended as scientifically necessary even when they disproportionately exclude populations with higher rates of comorbid conditions shaped by structural disadvantage (Springs, 2025; Huff et al., 2024). These patterns reflect more than poor individual choices. They reveal how institutions absorb and operationalize background assumptions about risk, reliability, and worthiness.

Effective reform therefore requires not only procedural changes but also reflective training that helps professionals recognize how cognition and culture shape scientific practice.

Community Engagement as a Mechanism of Trust Repair

Community engagement is often discussed as a recruitment tool, but its deeper value lies in trust repair and shared governance. Corneli et al. (2023) and Clark et al. (2019) both emphasize collaboration with community organizations, healthcare providers, advocacy groups, and faith-based institutions as essential to increasing participation among underrepresented populations. This approach is effective not merely because it expands outreach, but because it redistributes relational authority. When trusted local organizations are involved, research is less likely to appear extractive and more likely to be interpreted as accountable to community interests (Springs, 2025; Huff et al., 2024). Practical examples make this clear. Locating trial enrollment at a community health center rather than exclusively at a tertiary academic hospital can reduce transportation burdens while signaling familiarity and accessibility. Establishing a community advisory board allows residents to question study procedures, compensation structures, and consent language before implementation. Hosting informational sessions in churches, barbershops, schools, or neighborhood centers may also change the psychological meaning of research participation: instead of appearing as an external institutional demand, it becomes part of a dialogue with known and trusted intermediaries. Community engagement works best when it is not symbolic. It must include real opportunities for communities to shape priorities, not merely endorse decisions already made.

Structural and Logistical Barriers to Participation

Structural barriers remain among the most immediate and modifiable obstacles to equitable participation in clinical trials. Clark et al. (2019) and Corneli et al. (2023) identify transportation challenges, time constraints, financial burdens, and restrictive eligibility criteria as major impediments. These constraints are often treated as secondary operational issues, yet they are central to whether a trial is genuinely accessible. A study may advertise inclusivity while maintaining participation requirements that are practically unmanageable for people with hourly wage employment, caregiving obligations, unstable housing, or limited access to paid leave.

A systems-thinking approach requires researchers to design studies around real human conditions rather than idealized participant profiles. Providing transportation vouchers, childcare support, flexible appointment windows, hybrid participation options, and fair compensation can materially shift participation patterns. Revising eligibility criteria is equally important. Overly narrow criteria may exclude participants with common chronic conditions that disproportionately affect marginalized groups, thereby producing a sample that is artificially healthy and socially unrepresentative. For example, a diabetes-related device study that excludes patients with multiple comorbidities may omit many of the very individuals most likely to use the technology in real clinical settings. Structural redesign, then, is not a concession to diversity; it is part of rigorous and reality-based science.

Cultural Competence and Ethical Research Practice

Culturally competent and ethically grounded research practice is indispensable for repairing trust and improving participation. The source material emphasizes the need for training in cultural competence, implicit bias, and respectful engagement, as well as informed consent processes that are transparent and culturally sensitive (Huff et al., 2023; Corneli et al., 2023). These measures matter because ethics is not only about formal compliance with institutional review requirements. It is also about whether participants feel recognized as persons rather than data sources.

A stronger ethical framework includes diverse review boards, plain-language consent materials, multilingual communication, and staffing models that reflect the communities being served. These efforts also improve the quality of informed decision-making. For

instance, a participant who receives a dense, jargon-heavy consent form may technically sign voluntarily while lacking meaningful understanding. By contrast, culturally responsive consent practices, such as verbal explanation, opportunities for family consultation, and clear discussion of risks, benefits, and data use, honor the participant's agency more fully. Ethical rigor and cultural competence are mutually reinforcing: both help create research environments in which respect is visible, not merely promised.

Regulatory Oversight and Institutional Accountability

Regulatory agencies and research institutions must play a more assertive role in preventing inequity rather than merely documenting it after harm occurs. The FDA occupies a particularly important position because regulatory standards shape what evidence is required before devices and interventions are approved for widespread use. As the source text suggests, regulatory frameworks should require testing across diverse populations and incentivize compliance with diversity standards (FDA, 2024). Without such measures, organizations may continue to externalize the costs of exclusion while benefiting from rapid innovation cycles and broad market access.

Institutional accountability must also extend beyond regulation at the point of approval. Corneli et al. (2023) argue for embedding diversity metrics into organizational performance systems and conducting regular assessments of recruitment practices. This is a crucial systems intervention because what institutions measure often determines what they prioritize. If trial leadership is evaluated only on speed, enrollment totals, and budget efficiency, diversity efforts may remain rhetorical. By contrast, when representation, retention, and participant experience are treated as core indicators of quality, the institution's incentive structure begins to shift. Accountability mechanisms are most effective when accompanied by transparent reporting, leadership commitment, and resource allocation sufficient to support meaningful change.

Technology, Innovation, and Equity by Design

Technological innovation can either deepen disparities or help reduce them, depending on how it is governed. The source text proposes the use of machine learning, artificial intelligence, electronic health records, social data, and pharmacogenetic information to identify and correct bias in device development. This is a promising direction, but only if the underlying datasets and design processes are themselves equitable. AI trained on unrepresentative or biased inputs may simply automate existing inequities more efficiently. Therefore, equity by design must become a core principle of innovation rather than an after-the-fact adjustment.

A practical example is instructive. Suppose a company developing a skin-sensing wearable trains its algorithm primarily on lighter skin tones because those data are easier to obtain from prior datasets. Even if the model performs well in aggregate, it may misclassify readings among darker-skinned users and thereby introduce unequal safety risk. An equity-by-design approach would require representative training data, subgroup performance analysis, community-informed testing, and regulatory expectations for demographic transparency. Innovation should not be measured solely by novelty or market viability. It should also be assessed by whether it reduces error, broadens inclusion, and distributes benefit fairly.

A Multistakeholder Path Forward

No single actor can solve these inequities independently because the problem is distributed across a network of institutions, incentives, and historical relationships. The source text repeatedly points toward multistakeholder collaboration involving academia, industry, regulators, community organizations, healthcare providers, and advocacy groups (Clark et al., 2019; Corneli et al., 2023). This collaborative model is especially important from a systems perspective because isolated

interventions often fail when surrounding structures remain unchanged. Community trust efforts will have limited effect if eligibility criteria remain exclusionary; better recruitment will matter less if devices are still validated on narrow populations; and stronger regulation will remain incomplete if institutions do not build internal cultures of accountability.

A durable path forward therefore requires alignment across system levels. Community organizations can help shape ethical and culturally responsive engagement. Researchers can redesign studies for accessibility and representativeness. Regulators can mandate subgroup validation and transparent reporting. Industry can invest in diverse datasets and equitable design. Healthcare institutions can adopt training and accountability structures that make inclusion a routine operational expectation. The central insight is that equity is not the product of one policy or one good intention. It is the outcome of coordinated system design.

Practical and Actionable Recommendations

1. Expand Pharmacists into Proactive Chronic Care Engagement Roles

Train pharmacists and pharmacy technicians to identify, monitor, and proactively engage patients with chronic conditions such as diabetes, hypertension, and asthma using pharmacy visit data and medication refill patterns.

In practice, pharmacies can flag patients with irregular refills or poor adherence and initiate brief check-ins, counseling, or referrals. Where feasible, these efforts can be integrated with care coordination platforms or electronic health records.

Value and utility: Pharmacies represent one of the most frequently accessed points in the healthcare system, particularly for underserved populations. Pharmacists often hold a position of interpersonal trust and accessibility that differs from traditional clinical encounters. This creates a high-impact opportunity for early intervention, improved adherence, and reduction in avoidable complications.

2. Develop Community-Embedded Pharmacy Outreach Programs

Establish pharmacy-led outreach initiatives targeting neighborhoods with high chronic disease burden, including mobile services and culturally tailored education.

In practice, pharmacists can conduct outreach in community spaces such as churches, barbershops, and community centers while offering screenings and medication counseling.

Value and utility: Delivering services in familiar environments reduces psychological barriers and increases engagement. It also reinforces relational trust and aligns healthcare delivery with community social structures.

3. Partner Medical Device Companies with Physicians of Color and Minority Medical Associations

Encourage collaboration with organizations such as the National Medical Association and the Association of American Indian Physicians during device design and validation.

In practice, this includes advisory boards, co-designed studies, and structured feedback loops.

Value and utility: This approach broadens the epistemic base of innovation and reduces blind spots in device development. It also enhances legitimacy and trust among underrepresented communities.

4. Establish Formal Partnerships with Health Systems Serving High-Minority Populations

Prioritize partnerships with hospitals and health systems that serve large minority populations.

In practice, sponsors can conduct trials in these settings, fund research infrastructure, and embed research staff within care environments.

Value and utility: This improves external validity and ensures that research reflects real-world populations. It also integrates research into care delivery rather than isolating it within elite institutions.

5. Partner with the Indian Health Service for Inclusive Research and Device Validation

Create structured collaborations to include Indigenous populations in research and device testing. In practice, this involves co-developing culturally appropriate protocols and respecting tribal governance structures.

Value and utility: This addresses geographic and historical barriers while ensuring that innovations are inclusive of populations often excluded from national datasets.

6. Redesign Clinical Trial Eligibility Criteria to Reflect Real-World Populations

Audit and revise inclusion and exclusion criteria to remove unnecessary restrictions.

In practice, this includes allowing participants with common comorbidities and broadening demographic representation.

Value and utility: This improves the generalizability of findings and aligns research populations with actual clinical populations.

7. Implement Mandatory Bias and Cultural Competence Training for Clinical and Industry Staff

Develop ongoing training programs addressing implicit bias and culturally responsive engagement. In practice, this includes scenario-based learning and evaluation tied to performance.

Value and utility: This reduces the influence of unconscious bias on recruitment and interaction quality, improving both participation and retention.

8. Integrate Equity Metrics into Regulatory and Organizational Accountability Systems

Require reporting of demographic representation and link outcomes to incentives.

In practice, organizations can implement dashboards and tie diversity outcomes to leadership evaluation.

Value and utility: Measurement creates accountability and reinforces institutional prioritization of equity.

9. Leverage Data and AI to Identify and Correct Bias Early in Development

Use diverse datasets and algorithmic audits to detect disparities in device performance.

In practice, developers can conduct subgroup analyses and independent validation studies.

Value and utility: Early detection prevents downstream harm and ensures equitable performance across populations.

10. Create Long-Term Community Advisory Boards with Decision-Making Power

Establish advisory boards composed of community members who influence research design and implementation.

In practice, these boards should be compensated and engaged continuously rather than episodically.

Value and utility: This redistributes power and enhances legitimacy while embedding community perspectives into decision-making.

11. Establish Pharmacy-Based Social Risk Screening and Referral Systems

Train pharmacy staff to screen for social determinants such as food insecurity, housing instability, and transportation barriers.

Value and utility: Addressing upstream social conditions improves medication adherence and health outcomes while integrating pharmacies into broader care ecosystems.

12. Create Minority-Led Clinical Trial Networks

Develop research networks led by investigators from underrepresented communities.

Value and utility: Leadership diversity shifts research priorities and enhances trust while expanding culturally relevant study design.

13. Implement Decentralized and Hybrid Clinical Trial Models

Expand remote participation through telehealth, mobile units, and digital monitoring tools.

Value and utility: This reduces logistical barriers and increases access for individuals with limited mobility or transportation.

14. Introduce Community Health Worker Integration into Clinical Trials

Embed trained community health workers into research teams to support recruitment and retention.

Value and utility: These individuals bridge cultural and linguistic gaps and improve participant engagement through trusted relationships.

15. Require Post-Market Equity Surveillance for Medical Devices

Mandate ongoing monitoring of device performance across demographic groups after approval.

Value and utility: This creates continuous feedback loops and allows correction of disparities that emerge in real-world use.

16. Develop Equity-Centered Reimbursement Models

Incentivize providers and organizations for achieving equitable participation and outcomes.

Value and utility: Aligning financial incentives with equity goals ensures sustained institutional commitment.

17. Create Public Transparency Platforms for Clinical Trial Diversity

Develop publicly accessible databases reporting demographic representation in trials.

Value and utility: Transparency builds trust and allows external accountability from communities and policymakers.

18. Incorporate Behavioral Science into Recruitment Strategies

Use insights from social psychology such as framing, social norms, and trust cues to improve engagement.

Value and utility: Recruitment becomes more effective when it aligns with how individuals make decisions within social contexts.

19. Develop Cross-Sector Data Collaboratives

Facilitate data sharing among healthcare systems, community organizations, and researchers while maintaining privacy protections.

Value and utility: Broader data integration improves understanding of disparities and informs more equitable interventions.

20. Institutionalize Equity Impact Assessments in Innovation Pipelines

Require that new technologies and studies undergo formal evaluation of potential equity impacts before implementation.

Value and utility: This introduces a proactive safeguard, ensuring that inequities are identified and mitigated early rather than corrected after harm occurs.

Taken together, these recommendations shift the system from passive acknowledgment of disparities to active structural redesign. The emphasis is on redistributing access points, diversifying decision-making authority, embedding accountability, and aligning innovation with real-world population needs. If implemented cohesively, these strategies would not only improve representation but fundamentally reshape how healthcare systems produce knowledge, deliver care, and build trust.

Conclusion

Racial bias in healthcare technology and the underrepresentation of minority populations in clinical trials are not incidental defects in an otherwise fair system. They are manifestations of deeper structural dynamics involving historical exploitation, institutional mistrust, biased assumptions, logistical exclusion, and inadequate regulatory safeguards. The evidence presented through Hartnett (2022), Huff et al. (2023), Clark et al. (2019), Corneli et al. (2023), and FDA (2024) points to a clear conclusion: healthcare equity requires more than inclusion rhetoric. It requires systemic transformation.

A socially and scientifically responsible healthcare system must recognize that trust is historically conditioned, that representation is foundational to validity, and that technologies are only as equitable as the systems that produce and regulate them. Practical reform should therefore include representative trial design, community-embedded recruitment, culturally competent and ethically rigorous research practices, stronger accountability metrics, and regulatory expectations that foreground equity from the outset (Burrell & Ulomi, 2011). When these elements are integrated, healthcare innovation becomes more than technically advanced; it becomes more credible, more just, and more responsive to the full diversity of human experience (Springs, 2025; Huff et al., 2024).

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