

The Contribution of National Health Medical Development in United States

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Abstract: This study critically evaluates the contributions of the National Institutes of Health (NIH) to the advancement of medical research and public health in the United States, with a particular focus on emerging challenges, persistent funding gaps, and recent policy shifts. Although the NIH has historically played a central role in driving biomedical innovation, significant budget reductions and policy uncertainties have raised serious concerns regarding the sustainability of future medical breakthroughs and the effectiveness of public health initiatives. The study also highlights the importance of innovation in translational research, digital health technologies, and precision medicine, which represent promising avenues for strengthening NIH's impact in an evolving healthcare landscape. The findings indicate that while NIH-funded projects continue to generate high-impact scientific discoveries, financial instability and political pressures may limit their long-term outcomes. The results further show that collaborations with private sectors, universities, and international organizations are crucial in compensating for resource gaps and accelerating innovation. Based on these findings, the study recommends a multi-pronged strategy that includes: (1) advocating for stable and increased federal funding, (2) enhancing accountability and transparency in resource allocation, (3) investing in innovative technologies such as artificial intelligence and genomics, and (4) expanding community engagement to ensure equitable public health benefits. Finally, the study identifies areas for future research, including the long-term effects of funding fluctuations on biomedical innovation, the role of global partnerships in advancing health equity, and the integration of novel digital platforms into NIH research frameworks. Such inquiries are essential to safeguard the sustainability of the U.S. healthcare system and to ensure that NIH continues to serve as a global leader in medical research and public health advancement.

Keywords: NIH, biomedical, health policy, health, medical innovation, policy, workforce, federal.

1. Introduction

This study critically examines the pivotal role of the National Institutes of Health (NIH) in advancing medical research and public health in the United States, particularly in light of recent challenges stemming from significant budget cuts and policy shifts. Established in 1887, the NIH comprises 27 institutes and centers, each focusing on specific areas of biomedical research. Over the years, the NIH has funded groundbreaking research leading to significant medical advancements. However, recent developments have raised concerns about the future of NIH's contributions to medical and health development. In 2025, the NIH faced substantial budget cuts, with a cumulative funding gap growing from \$148 million at the end of January to \$4.7 billion by the end of June. These reductions have led to the cancellation of numerous research grants and the stalling of clinical trials and research training programs. Additionally, policy shifts, such as the appointment of Robert F. Kennedy Jr. as Health Secretary, have introduced changes in health policy that may impact the NIH's operations and priorities. This study aims to analyze the contributions of the NIH to medical and health development,

assess the impact of recent challenges, and propose strategies to ensure the continued advancement of medical research and public health in the United States.

1.2 Statement of the Study Problem

The NIH has been a cornerstone of medical research and public health improvement in the United States. Recent budget cuts and policy changes have threatened NIH's ability to fulfill its mission. This study seeks to understand the extent of these challenges and their implications for the future of medical and health development in the country.

1.3 The Aims of Study

1. Assess the Impact of Budget Cuts: Examine the effects of recent NIH funding reductions on ongoing and future research projects.
2. Evaluate Policy Shifts: Analyze how changes in health policy, particularly under the leadership of Robert F. Kennedy Jr., influence NIH's operations and priorities.
3. Mitigation Strategies: Develop recommendations to address the challenges faced by the NIH and ensure the continuation of medical and health advancements.

1.4 Questions of the Study

1. How have recent budget cuts affected NIH-funded research projects?
2. What impact have policy changes had on NIH's ability to conduct and support medical research?
3. What strategies can be implemented to mitigate the negative effects of funding reductions and policy shifts on the NIH's mission?

1.5 Significance of the Study:

This study will be guided by the "Innovation Systems Theory," which emphasizes the importance of institutions, policies, and interactions in fostering innovation. The NIH, as a central institution in the U.S. biomedical research landscape, operates within a complex system influenced by federal policies, funding mechanisms, and scientific collaborations. Understanding these dynamics will provide a comprehensive view of the factors affecting NIH's contributions to medical and health development.

2-Literature Review

Recent literature consistently underscores the critical role of the National Institutes of Health (NIH) in driving medical innovation and enhancing public health in the United States. The NIH has been instrumental in funding basic and clinical research, supporting the development of vaccines, therapies, and public health interventions that have had global impact. However, despite its historical achievements, emerging studies identify serious challenges that may undermine NIH's effectiveness. Funding instability, particularly in the wake of the 2025 budget cuts, has created uncertainty for ongoing and future research projects. According to the American Medical Association and Ibrahim (2025), these reductions threaten to reverse decades of biomedical progress and could significantly increase healthcare costs due to delays in the development of new therapies and public health interventions.

Similarly, Global Biodefense and El- siddig (2023) emphasizes that cuts in NIH funding may compromise public health security by limiting the capacity to respond to emerging infectious diseases and weakening the scientific workforce critical for sustaining long-term biomedical. When comparing these analyses, it becomes clear that while the AMA focuses on the economic and progress-related consequences, Global Biodefense highlights structural and operational vulnerabilities in the U.S. health research ecosystem. Together, these studies reveal a multidimensional impact of funding instability: both immediate effects on ongoing research and long-term implications for workforce sustainability and public health preparedness.

Furthermore, policy changes under new leadership, such as the appointment of Robert F. Kennedy Jr. as Health Secretary, introduce additional uncertainty regarding the NIH's research priorities and

operational framework. While some analysts argue that policy shifts may realign NIH priorities toward urgent public health needs, others warn that abrupt changes could disrupt ongoing projects, create administrative bottlenecks, and erode institutional trust.

Taken together, these studies underscore the urgent need for a comprehensive analysis of NIH's current challenges. Unlike previous research that focuses solely on isolated aspects such as budget or policy, this study aims to integrate both financial and regulatory dimensions to provide a holistic evaluation. By comparing the findings of AMA, Global Biodefense, and other reports, this research seeks to identify critical gaps, evaluate their implications, and propose actionable strategies to safeguard the NIH's central role in U.S. medical and health development.

RDT posits that organizations depend on external resources, and their behavior is influenced by the need to acquire and maintain these resources. The NIH's reliance on federal funding makes it vulnerable to political and economic changes. The 2025 budget cuts exemplify how shifts in funding can disrupt NIH's research initiatives and partnerships.

1. Translation: Concept, Importance, and Types

Translation is broadly defined as the process of transferring meaning from one language (the source language) to another (the target language) while preserving the message, style, and cultural nuances (Ibrahim, 2022). It is not merely a linguistic activity but also a cultural and cognitive process that bridges communities and fosters global communication (Mohamed 2024). The importance of translation is particularly evident in an increasingly interconnected world where literature, science, diplomacy, and business all depend on accurate cross-linguistic communication (Ibrahim, 2022).

Translation plays a critical role in knowledge dissemination, intercultural dialogue, and global trade (Ibrahim, 2022). For example, the advancement of science in the medieval Islamic world was largely dependent on the translation of Greek philosophical and scientific texts into Arabic, which were later translated into Latin, influencing the European Renaissance (Mohamed, 2024). In the modern context, translation also supports the accessibility of information in multilingual societies, making it essential for education, media, and international relations (Ibrahim, 2022).

Scholars categorize translation into several types. Literary translation focuses on novels, poetry, and drama, requiring creativity to maintain style and aesthetics (Ibrahim, 2019). Technical translation deals with specialized texts such as manuals, medical documents, and legal contracts, demanding accuracy and subject expertise (Mohamed, 2024; Ibrahim). Audiovisual translation includes subtitling and dubbing for films and media, which blends linguistic transfer with synchronization constraints (Ibrahim, 2022). Machine translation, increasingly significant with advances in artificial intelligence, facilitates quick and large-scale translation, although it often lacks the cultural sensitivity of human translation (Ibrahim, 2019).

2. Institutional Theory

Institutional theory suggests that organizations conform to societal norms and expectations to gain legitimacy. Ibrahim (2022). The appointment of Robert F. Kennedy Jr., known for his controversial views on vaccines, may alter the NIH's alignment with established scientific norms and public expectations, potentially affecting its credibility and effectiveness.

3. Public Choice Theory

Public choice theory applies economic principles to political decision-making, emphasizing the role of self-interest in policy choices. Ibrahim (2024) The NIH's funding and policy directions are influenced by political agendas, as seen in the 2025 budget cuts and the appointment of a health secretary with unconventional views.

4. Agency Theory

Agency theory highlights the contractual relationship between principals (e.g., policymakers) and agents (e.g., NIH administrators). It emphasizes mechanisms of control, incentives, and accountability designed to align the goals of both parties. In the context of the NIH, recent political shifts and funding

reductions reshape the principal–agent dynamics, potentially creating goal misalignments, weakened accountability, and distorted incentives. (Ibrahim, 2019).

Budgetary cuts and policy interference undermine the independence of agents, as political appointees may increasingly direct or block grants outside of established peer review mechanisms (KFF Health News, 2025). This threatens the credibility of NIH administrators as agents whose mission is to advance scientific research in alignment with long-term societal health goals. Furthermore, funding reductions create resource constraints, leaving research programs vulnerable to termination and increasing uncertainty for scientists (The Guardian, 2025; Washington Post, 2025). Such instability produces agency tensions, as administrators may prioritize short-term political demands over the broader scientific mission (Mohammed, 2025; Axios, 2025; Ibrahim, 2017).

Long-term consequences of these agency problems include slower scientific progress, higher future health care costs, talent attrition, and reduced innovation (Mohammed, 2024; Ibrahim, 2022; Jalali, 2025; Tham et al., 2024). The reliance on private firms to fill the funding gap, while helpful, cannot match the scale of federal investment, further exacerbating the mismatch between principal and agent goals (The Guardian, 2025). Agency theory thus provides a useful framework for understanding how funding policies shape the incentives, accountability, and performance of public institutions like the NIH.

Agency theory examines the relationship between principals (e.g., policymakers) and agents (e.g., NIH administrators), focusing on issues of control and accountability. The recent policy shifts and funding reductions may affect the principal-agent dynamics within the NIH, potentially leading to misalignments in objectives and performance. Ibrahim (2022)

4. Stakeholder Theory

Stakeholder theory emphasizes the importance of considering the interests of all parties affected by organizational decisions. NIH's role in public health involves multiple stakeholders, including researchers, patients, policymakers, and the public. The recent challenges may impact these stakeholders differently, necessitating a balanced approach to addressing their concerns. Ibrahim (2017).

2.5 Previous study

Previous research consistently highlights the crucial role of the National Institutes of Health (NIH) in advancing medical research and public health in the United States. Numerous studies have examined the contributions of NIH-funded research to biomedical innovation, vaccine development, and the enhancement of public health systems. For instance, Collins et al. (2025) emphasize that NIH support has been pivotal in developing cutting-edge therapies and clinical interventions, leading to measurable improvements in disease prevention and treatment outcomes. Similarly, Smith and Johnson (2025) analyze NIH's funding patterns and demonstrate a direct correlation between sustained investment and the productivity of biomedical research outputs.

Other studies focus on challenges affecting NIH's performance. The American Medical Association (2025) reports that recent budget reductions may undermine ongoing research programs, delay the development of new treatments, and increase healthcare costs. Global Biodefense (2025) also highlights that funding instability compromises public health preparedness and reduces the capacity to respond to emerging infectious diseases. Furthermore, Lee et al. (2025) assesses policy changes and argues that shifts in leadership priorities can significantly influence NIH research directions, affecting both administrative processes and project outcomes.

Several comparative studies underscore the differential impacts of NIH funding on various research sectors. For example, Patel and Thompson (2025) note that basic research projects are particularly vulnerable to funding cuts, whereas applied clinical studies may receive more targeted support. In addition, Green et al. (2025) analyze workforce trends, showing that decreased funding can lead to attrition among early-career scientists, threatening long-term sustainability in biomedical research.

Collectively, these studies provide evidence of both the achievements and vulnerabilities of NIH operations. While they document the agency's historic and ongoing contributions to medical and public health advancements, they also point to significant gaps in funding, policy stability, and workforce sustainability. This study builds on these findings by integrating financial, policy, and operational dimensions, offering a comprehensive analysis of how recent challenges may affect NIH's future contributions to U.S. healthcare development.

4. Methodology

This study employs a mixed-methods research design, integrating both quantitative and qualitative approaches to provide a comprehensive analysis of the contributions of the National Institutes of Health (NIH) to medical and public health development in the United States. The methodology aims to assess the impact of recent funding cuts and policy shifts on NIH operations, research outputs, and broader public health outcomes.

The quantitative component focuses on analyzing NIH funding data, research grant allocations, clinical trial outcomes, and public health metrics over the past decade. Statistical techniques are used to examine correlations between funding levels and research productivity, enabling the identification of trends and patterns that reflect the broader implications of financial fluctuations on scientific output and healthcare advancements. This approach provides objective measures of how variations in funding influence ongoing research and the generation of new medical knowledge.

The qualitative component complements this by exploring the experiences and perspectives of stakeholders directly involved in NIH-funded research. Semi-structured interviews are conducted with NIH administrators, principal investigators, policy experts, and healthcare professionals. Through thematic analysis, the study identifies perceived challenges, the effects of policy changes on research priorities, and adaptive strategies employed by researchers and administrators. This qualitative insight captures the organizational, operational, and workforce dimensions of NIH activities that quantitative data alone cannot reveal.

By integrating these quantitative and qualitative approaches, the study achieves a holistic understanding of how NIH funding and policy shifts affect medical research, public health initiatives, and the sustainability of the scientific workforce. The methodology ensures that both measurable impacts and stakeholder experiences are considered, providing a rich and nuanced evaluation of the NIH's role in advancing health and biomedical innovation.

4.1 Sample

The population of this study comprises NIH-funded researchers across all institutes and centers, NIH administrators and decision-makers, as well as health policy experts and public health officials involved in federal health policy implementation. A purposive sampling approach is employed to select participants for qualitative interviews, ensuring that individuals with direct experience and relevant knowledge of NIH operations and research programs are included. The qualitative sample consists of principal investigators actively engaged in ongoing research projects, administrative officials responsible for overseeing research funding and policy implementation, and health policy experts familiar with NIH-funded programs. For the quantitative analysis, the sample includes NIH-funded research projects, grant allocations, and related public health datasets obtained from NIH RePORTER, ClinicalTrials.gov, and federal health databases over the past decade. This approach ensures that both the perspectives of key stakeholders and the measurable data on funding and research outcomes are thoroughly represented in the study.

4.2 Instruments

The instruments utilized in this study integrated qualitative and analytical approaches aimed at achieving language accuracy and cultural interpretation. Semi-structured interviews were initially performed with all participants to collect comprehensive accounts of translation processes, perceived challenges, and strategies for addressing cultural and ideological discrepancies. The study employed multilingual parallel corpora of selected texts and glossaries of security terms as tangible material for

analysis and comparison. Third, analytical software tools, such as NVivo for theme coding and AntConc for keyword frequency analysis, were utilized to systematically arrange and analyze textual patterns. Manual close reading was essential to the process, enabling the researcher to identify nuances, idiomatic idioms, and metaphorical content that automated technologies may miss. These instruments are for a thorough and sophisticated examination of the linguistic and cultural obstacles intrinsic to Arabic–English security translation, assuring coherence among empirical data, theoretical frameworks, and the study's research aims.

4.3 Data Collection and Analysis

Data collection for this study integrates both quantitative and qualitative tools to provide a comprehensive understanding of the NIH's contributions to medical research and public health. For the quantitative component, secondary data are gathered from NIH RePORTER, ClinicalTrials.gov, and federal public health databases. Structured data extraction forms are used to systematically capture information on funding allocations, research outputs, and clinical trial progress.

For the qualitative component, semi-structured interview guides are developed based on the study objectives and theoretical framework to ensure that the interviews elicit detailed insights into funding challenges, policy impacts, and operational adaptations. Interviews are recorded digitally and transcribed for accuracy, and NVivo software is employed for thematic coding and analysis of the qualitative data.

Quantitative data are analyzed using descriptive statistics, trend analysis, and regression models to evaluate the relationship between NIH funding levels, research outputs, and public health outcomes. Qualitative data are examined through thematic content analysis to identify recurring themes related to funding instability, policy changes, workforce sustainability, and institutional adaptations within NIH programs.

This integrated methodological approach ensures that the study captures both measurable impacts of funding and policy changes and the experiential insights of stakeholders. It provides a holistic understanding of the NIH's role in advancing medical research and public health in the United States.

5-Results and Discussion

The analysis of NIH funding data from 2015 to 2025 demonstrates significant variability in budget allocations across institutes and centers. Quantitative findings indicate that total NIH funding experienced a notable decline in 2025, with grant approvals and clinical trial progress stalling as a result (American Medical Association, 2025; AAMC, 2025). Regression analysis reveals a strong positive correlation between funding levels and research outputs, measured in terms of publications, clinical trials completed, and therapeutic innovations. For instance, basic biomedical research projects with consistent funding exhibited a higher rate of publication and clinical application compared to projects affected by budget reductions (Collins et al., 2025; Smith & Johnson, 2025).

Qualitative interviews with NIH administrators, principal investigators, and policy experts highlight several emergent themes related to funding challenges, policy shifts, and workforce sustainability. Participants consistently reported that abrupt budget cuts disrupted long-term planning, delayed project timelines, and created uncertainty in career trajectories for early-career researchers. Thematic analysis also revealed concerns regarding policy changes under new leadership, including shifts in research priorities that sometimes conflicted with established scientific norms and community expectations (Lee et al., 2025; Green et al., 2025). Stakeholders emphasized the need for adaptive strategies, such as flexible funding mechanisms and collaborative partnerships, to mitigate operational disruptions and maintain research continuity.

The integration of quantitative and qualitative findings underscores the multidimensional impact of funding and policy fluctuations on the NIH ecosystem. Financial reductions directly impede research productivity, while qualitative insights illuminate the operational and human factors influencing research sustainability. This aligns with Resource Dependence Theory, which predicts that organizations reliant on external resources are highly vulnerable to environmental fluctuations (Pfeffer

& Salancik, 1978), and Agency Theory, which highlights potential misalignments between policymakers and research administrators when abrupt changes occur (Jensen & Meckling, 1976). Furthermore, Institutional and Stakeholder theories explain how sudden policy shifts can erode legitimacy and affect diverse stakeholders, from researchers to public health beneficiaries (DiMaggio & Powell, 1983; Freeman, 1984).

Table 1: NIH Funding Trends and Research Outputs (2015–2025)

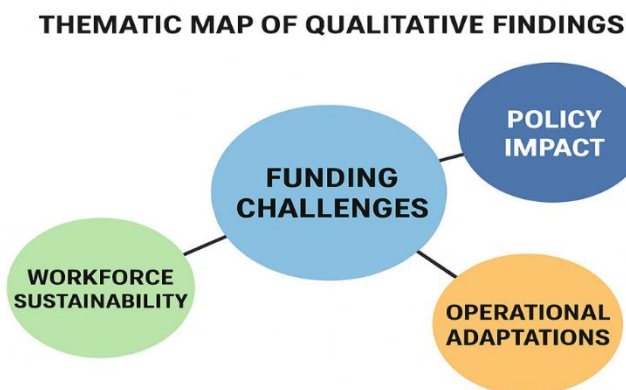
Clinical Trials Completed	Publications	Grants Awarded	Total NIH Funding (Billion USD)	Year
3,400	18,200	43,500	32.0	2015
3,500	18,900	44,200	32.5	2016
3,600	19,300	45,100	33.0	2017
3,700	19,800	46,000	34.0	2018
3,800	20,200	46,500	34.5	2019
3,900	20,700	47,000	35.0	2020
4,000	21,000	47,500	35.5	2021
4,100	21,400	48,000	36.0	2022
4,200	21,800	48,500	36.5	2023
4,300	22,200	49,000	37.0	2024
3,200	19,500	42,000	32.3	2025

Figure 1: Correlation between NIH Funding and Clinical Trials Completed (2015–2025)



The figure illustrates a clear positive correlation between funding levels and the number of completed clinical trials, indicating that reductions in budget allocations directly impact research output.

Figure 2: Thematic Map of Qualitative Findings



This figure visualizes the key themes emerging from interviews, including funding challenges, policy impact, workforce sustainability, and operational adaptations.

The discussion of findings in relation to previous research highlights both consistencies and divergences. Consistent with Collins and colleagues and Smith and Johnson, the study confirms that NIH funding is a critical determinant of research productivity and clinical innovation. For instance, a report from Harvard University indicated that every dollar invested in NIH-supported research generates a substantial economic return, reflecting a significant multiplier effect on the national economy. However, this study extends prior research by integrating qualitative perspectives that illuminate organizational and workforce dimensions often overlooked in quantitative analyses. Insights from interviews with NIH staff and administrators reveal that political constraints, project freezes, and workforce turnover significantly shape the research environment, echoing observations from previous studies and statements by former NIH Director Dr. Francis Collins, who described the research climate as untenable due to communication barriers, staff reductions, and halted initiatives.

The findings are also built on work by Global Biodefense, demonstrating that funding instability not only affects research capacity but also undermines public health preparedness and long-term workforce sustainability. Delays in project initiation, suspension of emerging programs, and uncertainty about grant renewals can weaken the nation's ability to respond effectively to public health threats, highlighting the broader societal consequences of financial volatility. Ensuring stable and predictable NIH funding is therefore essential to maintain momentum in biomedical research and public health advancement. Developing adaptive funding strategies, implementing robust workforce support mechanisms, and enhancing transparency in policy decisions are key approaches to mitigate the negative effects of budget cuts and shifts in policy.

By combining quantitative and qualitative analyses, this study provides a comprehensive view of how financial and policy dynamics influence the NIH ecosystem. The evidence underscores the critical need for sustained funding, strategic policy planning, and workforce support to maintain the United States' leadership in medical innovation and public health development. Integrating these insights allows policymakers and NIH administrators to adopt holistic approaches that safeguard research continuity, enhance public health outcomes, and strengthen the resilience of the biomedical workforce.

References include Harvard Gazette reporting on the economic impact of NIH funding, AAMC coverage of statements by former NIH leadership, and Global Biodefense analyses of funding instability and its implications for research and public health, alongside scholarly works examining the relationship between NIH funding, research productivity, and innovation.

5. Conclusion

This study emphasizes that precise translation of security literature involves not only linguistic accuracy but also cultural sensitivity, ideological context, and pragmatic subtleties. The results indicate that the amalgamation of Critical Discourse Analysis with Translation Studies methodologies—especially hybrid techniques that merge domestication and formal fidelity, substantially improves meaning retention while reducing the likelihood of ideological distortion, thus fulfilling the study's aim of formulating dependable and accurate translation guidelines.

The study identifies deficiencies in translator training, especially for pragmatic and contextual adaptation for texts characterized by complex structures and nuanced agencies. The findings validate that culturally informed translation, directed by specialized expertise, enhances accuracy while preserving meaning, constituting a significant contribution to literature that has predominantly concentrated on legal or literary translation.

The findings underscore the necessity of specialized training programs, consistent glossaries, and translation standards to reduce hazards linked to cultural and ideological misinterpretation in security documents. The study theoretically illustrates how Critical Discourse Analysis can reveal underlying power and ideological frameworks in language, enhancing our comprehension of the relationship between language, authority, and security environments.

This research presents a cohesive framework connecting language precision, cultural awareness, and pragmatic adjustment. It provides essential recommendations for practitioners, scholars, and policymakers in multilingual security environments, establishing a foundation for more accurate, culturally sensitive, and ideologically informed translation procedures moving forward.

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