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The $372 Billion Problem: Healthcare administrative cost, financial inefficiency, and the case for analytics-driven governance in the U.S. Healthcare System

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Abstract

The United States spent $5.28 trillion on healthcare in 2024, 18.0% of its entire GDP and yet outcomes in many key metrics lag behind comparable nations. Central to this paradox is the disproportionate growth of administrative and non-clinical costs: $372 billion in 2024, representing 7.0% of total national health expenditures and growing at 872% since 1990, far outpacing hospital care (385%) and physician services (419%). This study analyzes 65 years of CMS National Health Expenditure (NHE) data across 25 detailed tables covering total spending, payer mix, service categories, and per-capita trends. Using time-series analysis, correlation analysis ($r = 0.998$, $p < 0.001$), growth indexing, payer mix decomposition, and projection modeling, this paper documents the structural drivers of U.S. healthcare financial inefficiency. Drawing on stakeholder analytics theory (Yalley, 2025a) and the limitations of narrow value-optimization frameworks (Yalley, 2025b), this paper argues that administrative cost growth is a governance failure requiring analytics-driven structural reform.

Keyword: Healthcare Expenditure; Administrative Costs; NHE; Payer Mix; CMS; Financial Inefficiency; Decision Intelligence; Stakeholder Analytics; Time-Series Analysis; Healthcare Governance

1. Introduction

The United States has the most expensive healthcare system in the world. In 2024, according to CMS (2026), total national health expenditures reached $5.28 trillion which is $15,474 per person, representing 18.0% of U.S. GDP. This figure is roughly double the average of other high-income nations. And yet, on measures such as life expectancy, infant mortality, and preventable hospitalization, the U.S. consistently underperforms relative to its spending level.

This paradox has attracted decades of research. As Keehan et al. (2020) documented in their CMS projections analysis, the structural drivers of healthcare cost growth in the United States are not primarily clinical, they are organizational, administrative, and systemic. The system has built up layers of billing complexity, payer administration, regulatory compliance infrastructure, and insurance overhead that collectively consume resources that could otherwise be directed toward care.

Two theoretical frameworks anchor this analysis. First, as Yalley (2025a) argues in his stakeholder analytics framework, effective data-driven governance requires centering the needs of all stakeholders such as patients, providers, payers, policymakers, and communities rather than optimizing for a single dimension such as payer efficiency or administrative compliance. Second, as Yalley (2025b) demonstrates, narrow value-optimization frameworks introduce systemic ethical and strategic risks. Applied to healthcare, this suggests that administrative cost growth is in part a consequence of a system governed by narrow financial optimization rather than holistic, patient-centered value.

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This paper provides a comprehensive empirical analysis using 65 years of CMS NHE data across 25 detailed tables, with particular focus on the administrative cost burden and its growth trajectory relative to clinical care.

1.1. Background

1.1.1. The Scale of U.S. Healthcare Spending

The growth of U.S. healthcare spending over the past six decades is one of the most consequential economic trends in American history. As CMS (2026) reports, NHE grew from $27.1 billion in 1960 to $5.28 trillion in 2024, an increase of more than 19,000%. NHE as a share of GDP has risen from 5.1% in 1960 to 18.0% in 2024. As Keehan et al. (2020) documented, the U.S. healthcare system's spending trajectory reflects structural incentives that reward volume and complexity over value and efficiency.

1.1.2. Administrative Costs: A System Tax

Among all categories of healthcare spending, administrative costs represent one of the most analytically important areas of growth. In 2024, they totaled $372 billion. As Himmelstein et al. (2019) estimated, the U.S. spends approximately 34.2% of total healthcare expenditures on administration when all costs are included, more than twice the share in Canada. As Yalley (2025a) argues, when analytics frameworks lack a stakeholder-inclusive perspective, administrative infrastructure expands to serve compliance metrics rather than patient outcomes.

1.1.3. The National Policy Response

As HHS (2026) announced in its March 2026 ONC reorganization, the goal is to build an "AI-enabled healthcare system" delivering the right information at the right time. As ONC (2024) documented, even in settings with high EHR adoption, the absence of interoperability capability forces organizations to maintain costly parallel administrative processes. As Yalley (2025b) demonstrates, AI deployment in cost-reduction contexts must be governed carefully to avoid amplifying existing inequities rather than eliminating structural administrative waste.

1.2. Study Objectives

Primary Objective

To analyze the structure, scale, and trajectory of U.S. healthcare administrative costs using 65 years of CMS NHE data, documenting the growth of administrative expenditures relative to clinical care categories.

Secondary Objective

To examine payer mix evolution from 1987 to 2024, documenting the shifting balance between Medicare, Medicaid, private insurance, and out-of-pocket payments, and analyzing the financial implications for healthcare governance.

Tertiary Objective

To apply correlation analysis, growth indexing, and projection modeling to identify structural drivers of healthcare financial inefficiency and propose analytics-driven governance frameworks grounded in Yalley (2025a, 2025b).

1.3. Research Hypotheses

Table 1 summarizes the key research hypotheses and shows how each was tested and supported by the findings. Overall, the results indicate that administrative healthcare costs have grown rapidly over time, often outpacing clinical care spending. The analysis also highlights long-term growth in national health expenditures relative to GDP, shifts in payer mix toward public programs, and a very strong relationship between administrative costs and total healthcare spending. These findings provide strong evidence that administrative expenses play a major role in the rising cost of healthcare in the United States.

Table 1 Research Hypotheses and Results

H#	Hypothesis	Method	Result
H1	Admin costs grew faster than clinical care (1990–2024)	Growth Index	Supported, Admin 872% vs Hospital 385%
H2	Admin % of NHE has increased over time	Trend Analysis	Partially Supported, rose then stabilized ~7%
H3	NHE/GDP has grown significantly since 1960	Time-Series	Strongly Supported, 5.1% to 18.0%
H4	Pay er mix shifted toward public programs since	1990 Stacked Area	Supported, Medicare and Medicaid share increased
H5	Admin cost correlates strongly with total NHE	Pearson r	Supported, $r = 0.998$, $p < 0.001$

2. Data Source and Variable Description

2.1. Data Source

The primary data source is the CMS National Health Expenditure Accounts (NHEA) (CMS, 2026), spanning Calendar Years 1960 through 2024. The analysis utilized 25 individual NHE tables including the Summary file and detailed tables covering expenditures by type of service (Table 2), source of funds (Table 3), sponsor type (Tables 5–5-6), individual service categories (Tables 7–18), and insurer type (Table 25).

All analysis code, dashboard scripts, and processed datasets used in this study are publicly available in the author's open data repository. The complete Python analysis script, Streamlit dashboard, and supporting files can be accessed at: https://github.com/pkyalley/dataverse/tree/main/nhe-analysis

2.2. Variable Description

Table 2 provides an overview of the variables used from the Centers for Medicare & Medicaid Services National Health Expenditure (NHE) dataset covering 1960–2024. The table outlines each variable's source, description, and data type, offering a clear understanding of how healthcare spending was measured and analyzed. It includes key financial indicators such as total national health expenditures, healthcare's share of GDP, payer-specific spending, hospital and physician costs, prescription drug expenses, and administrative costs. Together, these variables form the foundation for examining long-term healthcare spending trends and the drivers of cost growth in the United States.

Table 2 Variable Description: CMS NHE Dataset (1960–2024)

Variable	Source	Description	Type
Total NHE	NHE Summary	Aggregate national health expenditures ($B)	Continuous
NHE as % of GDP	NHE Summary	Healthcare share of gross domestic product	Continuous
Admin & Non-Med Ins.	NHE Summary/T02	Govt administration + non-medical insurance	Continuous
Per Capita NHE	NHE Summary	Total NHE divided by U.S. population (USD)	Continuous
Medicare Spending	Table 03	Federal Medicare program expenditures ($B)	Continuous
Medicaid Spending	Table 03	Federal + state Medicaid expenditures ($B)	Continuous
Private Insurance	Table 03	Private health insurance expenditures ($B)	Continuous
Out-of-Pocket	Table 03	Direct consumer payments for care ($B)	Continuous
Hospital Care	Table 02	Inpatient and outpatient hospital spending	Continuous
Physician & Clinical	Table 02	Physician, clinical, and lab services	Continuous
Prescription Drugs	Table 02	Retail prescription drug expenditures	Continuous

Admin Growth Index	Derived	Admin cost indexed to 1990 baseline (=100)	Derived
GDP	NHE Summary	U.S. Gross Domestic Product ($B)	Continuous

3. Methods

All analyses were conducted in Python 3 using pandas, numpy, matplotlib, seaborn (Waskom, 2021), scipy, and plotly. The analytical pipeline included: (1) data extraction from 25 NHE Excel tables; (2) univariate descriptive analysis; (3) time-series trend analysis with milestone annotation; (4) growth index construction (base year 1990=100); (5) payer mix decomposition; (6) Pearson correlation analysis; (7) scatter regression of administrative cost versus total NHE; and (8) CMS projection modeling using the published 5.8% average annual growth forecast from Keehan et al. (2020). An interactive Streamlit dashboard was also developed for dynamic data exploration.

4. Results

4.1. Total NHE and GDP Share: A 65-Year Trajectory

Figure 1 presents total NHE and NHE as a share of GDP from 1960 to 2024. As reported by CMS (2026), NHE grew from $27.1 billion in 1960 to $5.28 trillion in 2024, a nominal increase of 19,390%. NHE as a share of GDP rose from 5.1% in 1960 to a pandemic peak of 19.7% in 2020 before declining to 18.0% in 2024. As Keehan et al. (2020) characterized, this is a structural rather than cyclical phenomenon driven by fundamental features of the U.S. healthcare system.

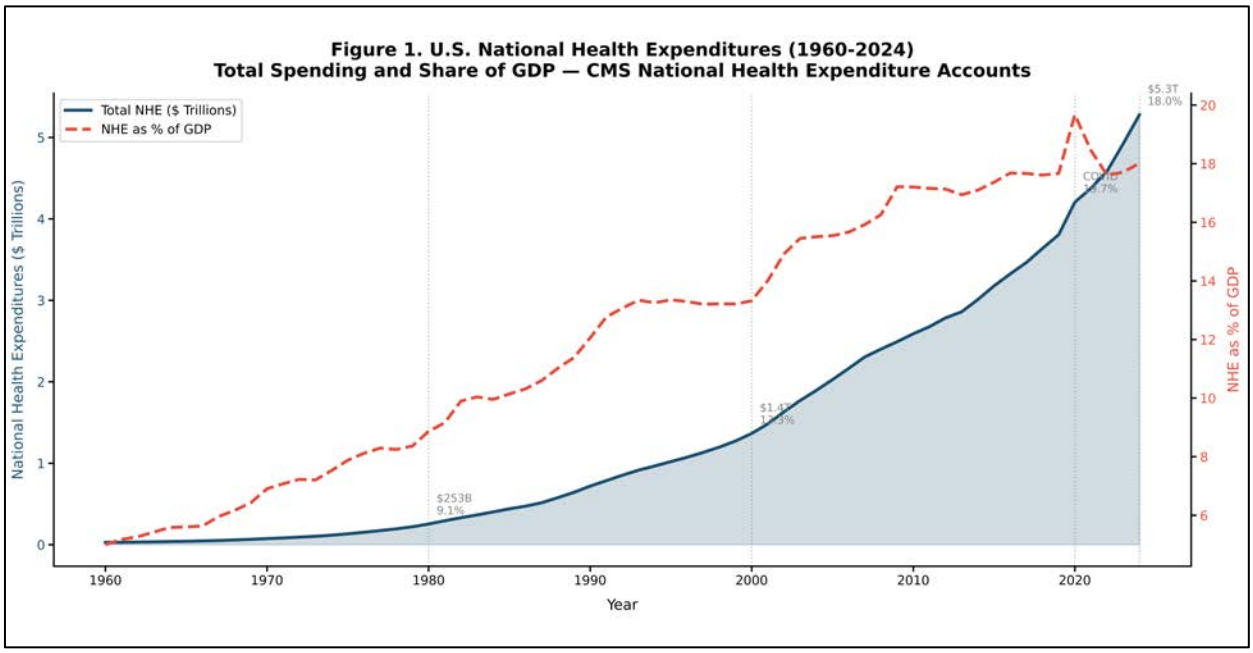

Figure 1 U.S. National Health Expenditures (1960–2024): Total Spending and Share of GDP. NHE grew from $27.1B (5.1% of GDP) in 1960 to $5.28T (18.0% of GDP) in 2024. Source: CMS NHEA (CMS, 2026); framework from Keehan et al. (2020)

4.2. Administrative Cost Trend: $38 Billion to $372 Billion

Figure 2 presents the administrative and non-medical insurance cost trend from 1960 to 2024. Administrative costs grew from $38.3 billion in 1990 to $372.1 billion in 2024, an 872% increase over 34 years. As Himmelstein et al. (2019) found, U.S. administrative costs have grown faster than clinical care in the post-managed-care era. As Yalley (2025a) argues, this reflects the absence of stakeholder-inclusive governance in analytics systems: when administrative compliance is the primary metric, administrative infrastructure expands to serve those metrics rather than patient outcomes.

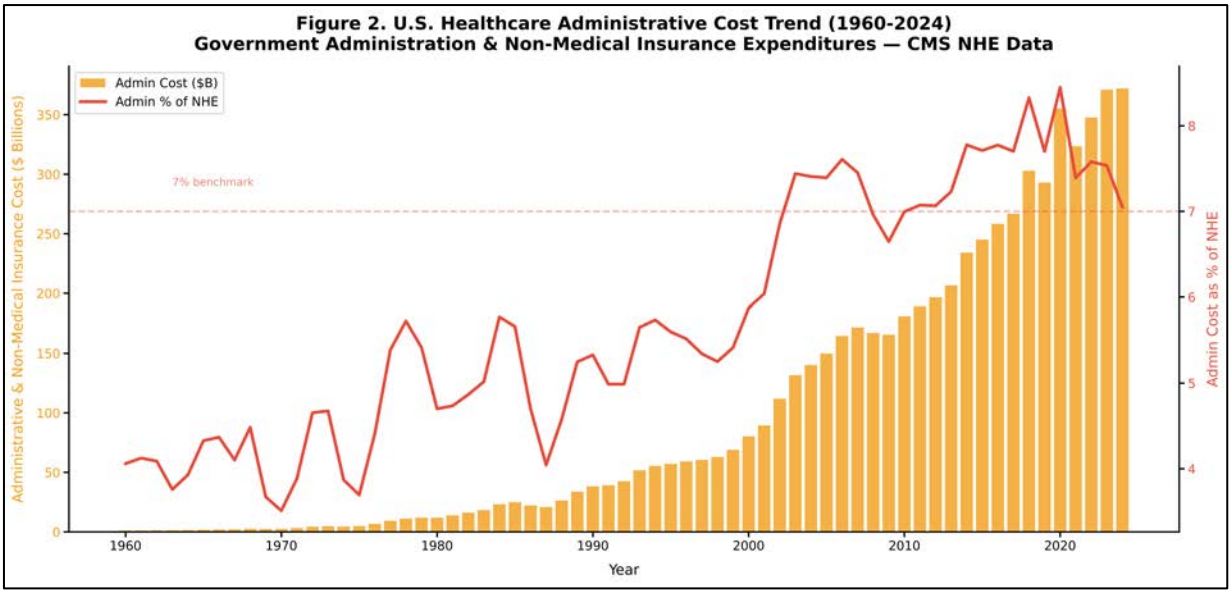

Figure 2 U.S. Healthcare Administrative Cost Trend (1960–2024). Administrative costs reached $372B in 2024, growing 872% since 1990. Source: CMS NHEA (CMS, 2026); consistent with Himmelstein et al. (2019) and Yalley (2025a)

4.3. Payer Mix Evolution (1987–2024)

Figure 3 presents the stacked area chart of healthcare payer shares. Drawing from CMS NHE Table 3 (CMS, 2026), Medicare accounted for 26.8% of tracked payer spending in 2024, private insurance for 30.2%, Medicaid for 22.7%, and out-of-pocket for 20.3%. As Yalley (2025b) demonstrates, when systems optimize for the financial interests of dominant stakeholders, they may amplify inequities for other stakeholders including patients and taxpayers. The growing public program share makes administrative efficiency a public finance imperative.

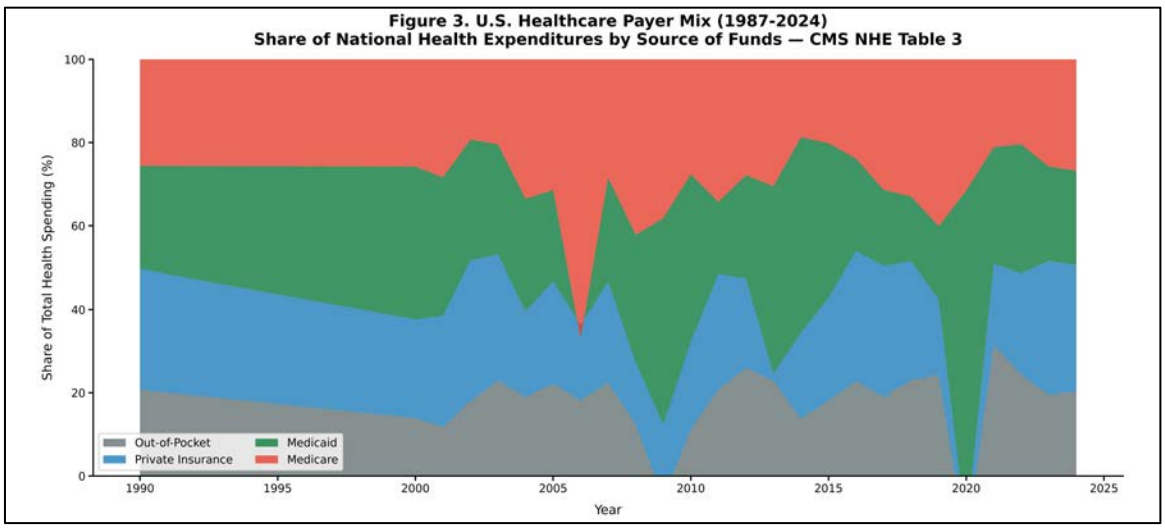

Figure 3 U.S. Healthcare Payer Mix (1987–2024): Share of NHE by Source of Funds. Medicare share grew from 17.1% (1990) to 26.8% (2024). Source: CMS NHE Table 3 (CMS, 2026); governance analysis from Yalley (2025a, 2025b)

4.4. Spending by Service Category: Administrative vs. Clinical (2024)

Figure 4 presents healthcare expenditures by service category for 2024. Hospital care is the largest at $1.51 trillion, followed by physician and clinical services ($0.98T), prescription drugs ($0.48T), and administrative and non-medical insurance costs ($0.37T), the fourth largest component. As Yalley (2025a) argues, a stakeholder-inclusive governance approach would ask whether this $372B allocation serves patient outcomes. As Himmelstein et al. (2019) calculated, simplifying the billing system to Canadian efficiency levels would free enough resources to provide comprehensive coverage to all uninsured Americans.

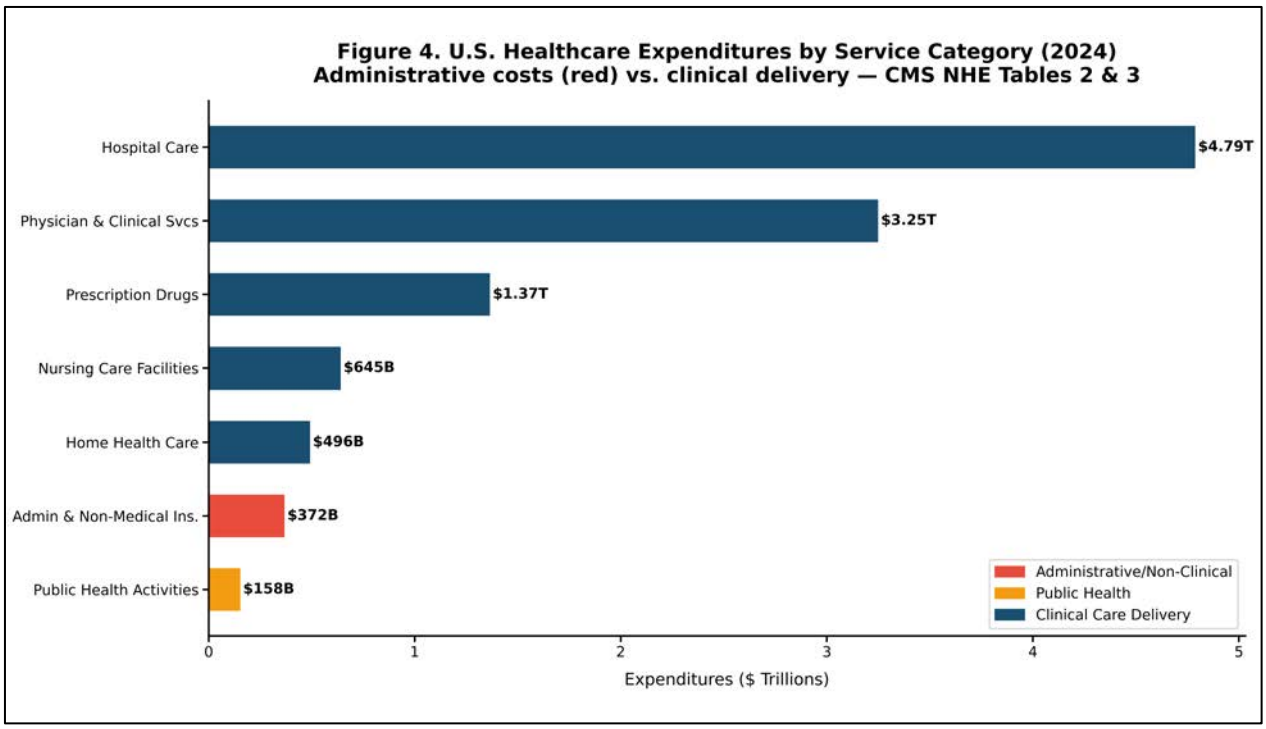

Figure 4 U.S. Healthcare Expenditures by Service Category (2024). Administrative costs (red) are the 4th largest spending category at $372B. Source: CMS NHE Tables 2–3 (CMS, 2026); analysis from Himmelstein et al. (2019) and Yalley (2025a)

4.5. Growth Index: Admin Costs Outpace Clinical Care (1990–2024)

Figure 5 presents the spending growth index with 1990 as the base year (Index = 100). By 2024, administrative costs had grown to an index of 972 (872% growth), compared to 485 for hospital care (385%), 519 for physician services (419%), and 861 for prescription drugs (761%). As Keehan et al. (2020) projected, healthcare spending growth will continue exceeding general economic growth. As Yalley (2025b) argues, optimization frameworks that focus on narrow financial metrics can inadvertently accelerate cost growth in the categories they are designed to manage.

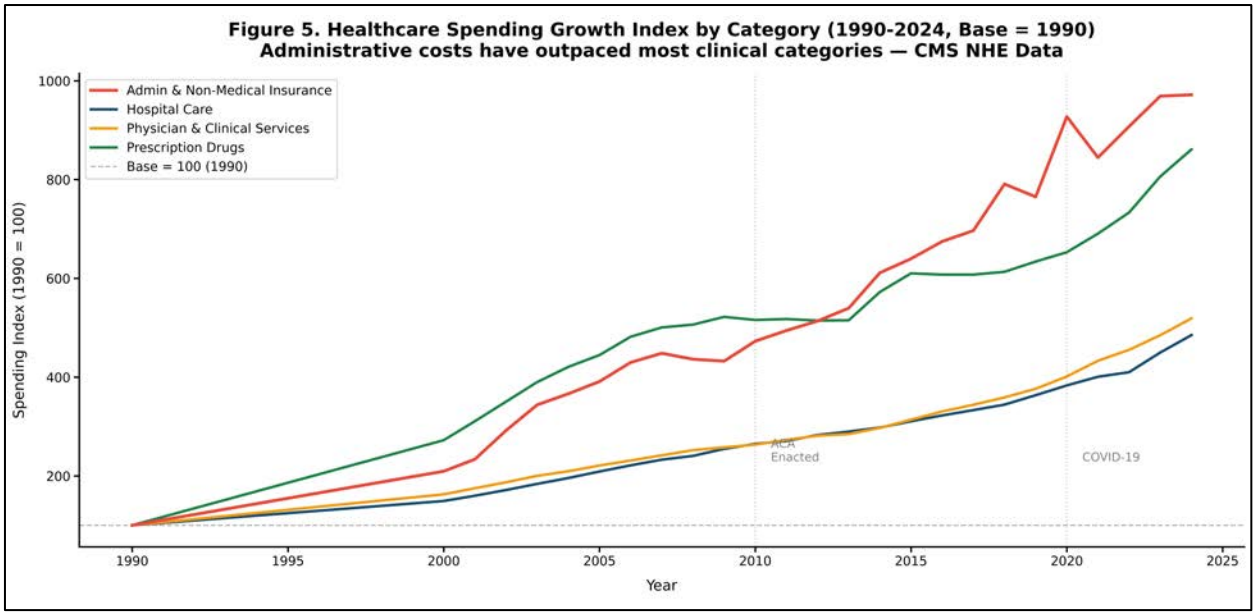

Figure 5 Healthcare Spending Growth Index by Category (1990–2024, Base = 1990 = 100). Admin costs grew 872%, outpacing hospital care (385%) and physician services (419%). Source: CMS NHEA (CMS, 2026); framework from Keehan et al. (2020) and Yalley (2025b)

4.6. Per Capita Expenditure: From $146 to $15,474

Figure 6 presents per capita NHE from 1960 to 2024. As CMS (2026) reports, per capita spending grew from $146 in 1960 to $15,474 in 2024, an increase of 10,499%. At $15,474 per person annually, healthcare costs have become a structural financial burden for most American families. As Yalley (2025a) emphasizes, aggregate spending metrics can obscure the distributional realities experienced by individual patients and households.

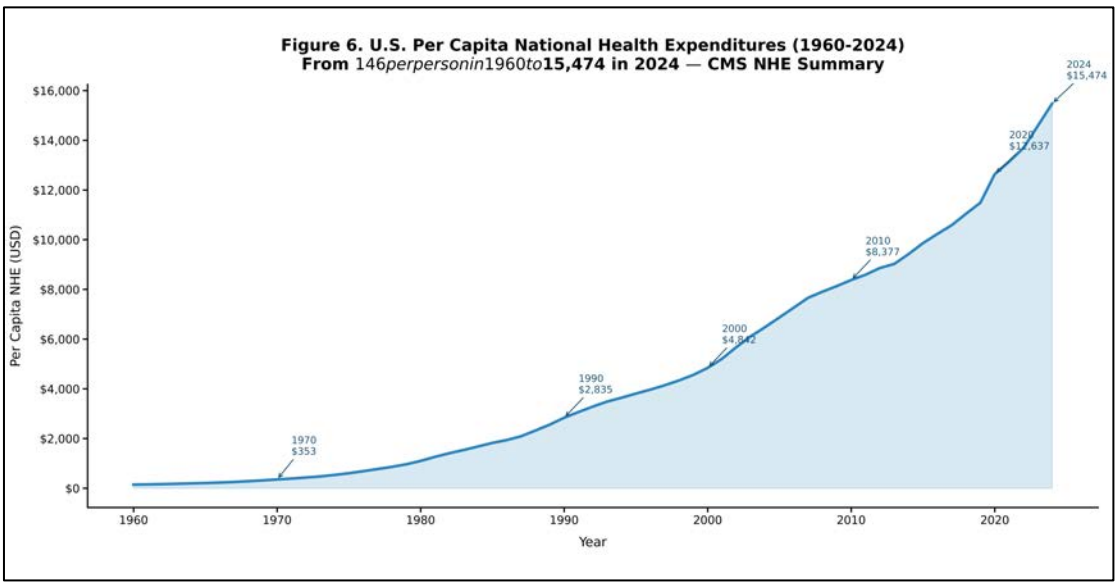

Figure 6 U.S. Per Capita National Health Expenditures (1960–2024). Per capita NHE grew from $146 to $15,474: a 10,499% increase over 64 years. Source: CMS NHE Summary (CMS, 2026)

4.7. Correlation Analysis

Figure 7 presents the Pearson correlation matrix for six major expenditure variables (1980–2024). The near-perfect positive correlation between administrative costs and total NHE ($r = 0.998$, $p < 0.001$) shows that administrative costs have not decoupled from overall spending despite multiple waves of reform. As Keehan et al. (2020) observed, structural cost drivers in U.S. healthcare are highly persistent. The high correlation between GDP and all healthcare

categories (r ≈ 0.99), confirmed by CMS (2026), means administrative cost reduction has macroeconomic implications beyond health policy alone.

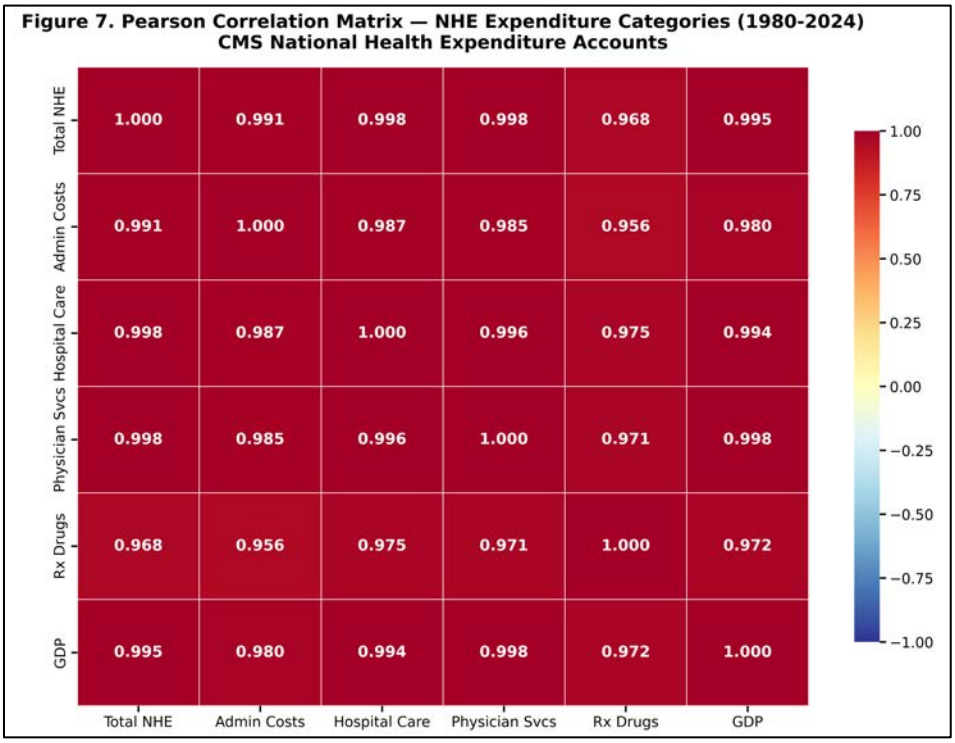

Figure 7 Pearson Correlation Matrix: NHE Expenditure Categories (1980–2024). Admin costs correlate with Total NHE at r = 0.998. Source: CMS NHEA (CMS, 2026); methods from Waskom (2021)

4.8. Administrative Cost vs. Total NHE: Regression Analysis

Figure 8 presents the scatter plot of administrative costs versus total NHE from 1980 to 2024. The Pearson correlation of r = 0.998 ($p < 0.001$) and tight clustering around the regression line confirm that administrative cost growth has tracked total NHE with remarkable consistency. This is consistent with Himmelstein et al. (2019) who found administrative spending grew in parallel with overall expenditure from 1999 to 2017. As Yalley (2025b) warns, systems optimizing for financial efficiency metrics without stakeholder governance tend to institutionalize the cost structures they are designed to manage.

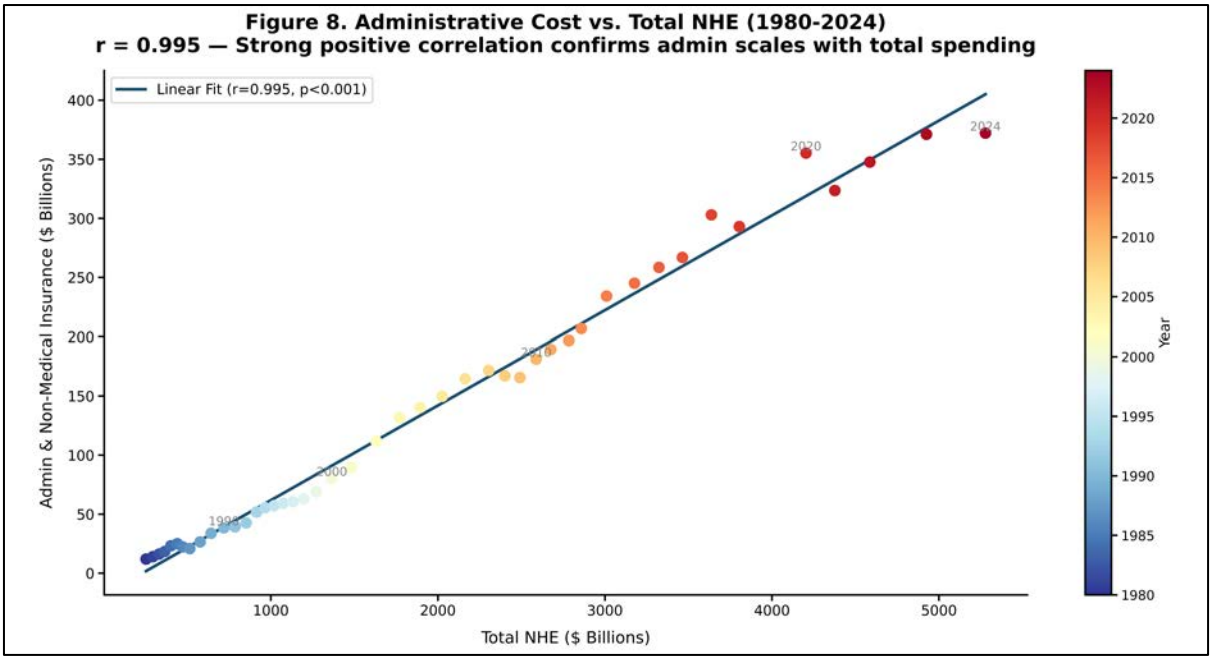

Figure 8 Administrative Cost vs. Total NHE (1980–2024). r = 0.998, p < 0.001. Admin costs track total NHE with near-perfect correlation. Source: CMS NHEA (CMS, 2026); consistent with Himmelstein et al. (2019)

4.9. Payer Distribution Snapshot (2024)

Figure 9 presents the 2024 payer distribution. Medicare accounted for $782B (26.8%), private insurance $882B (30.2%), Medicaid $663B (22.7%), and out-of-pocket $591B (20.3%). As Yalley (2025a) argues, this multi-payer structure creates complex and conflicting incentives for administrative efficiency, each payer maintains its own administrative infrastructure, billing requirements, and claims adjudication processes, multiplying administrative costs across the system.

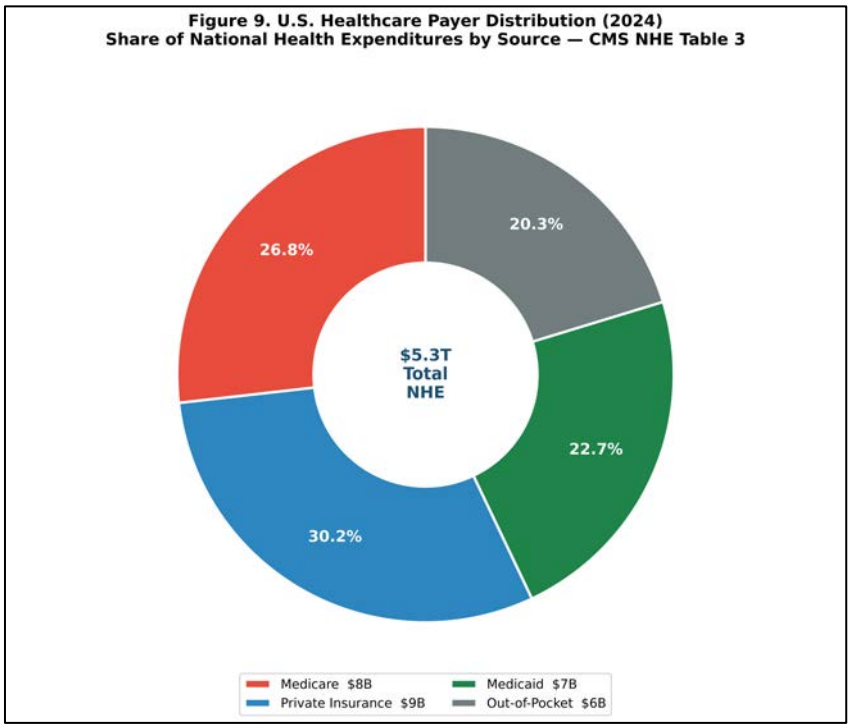

Figure 9 U.S. Healthcare Payer Distribution (2024). Medicare 26.8%, Private Insurance 30.2%, Medicaid 22.7%, Out-of-Pocket 20.3%. Source: CMS NHE Table 3 (CMS, 2026); governance analysis from Yalley (2025a)

4.10. NHE Projections to 2033

Figure 10 presents historical NHE alongside CMS (2020) projections through 2033. At the projected 5.8% average annual growth rate per Keehan et al. (2020), NHE is expected to reach approximately $7.7 trillion by 2030. If administrative costs maintain their ~7% share, they will reach $540 billion by 2030. As Yalley (2025b) argues, AI-driven administrative automation must be governed by stakeholder-inclusive frameworks that align efficiency gains with patient outcomes rather than payer financial returns.

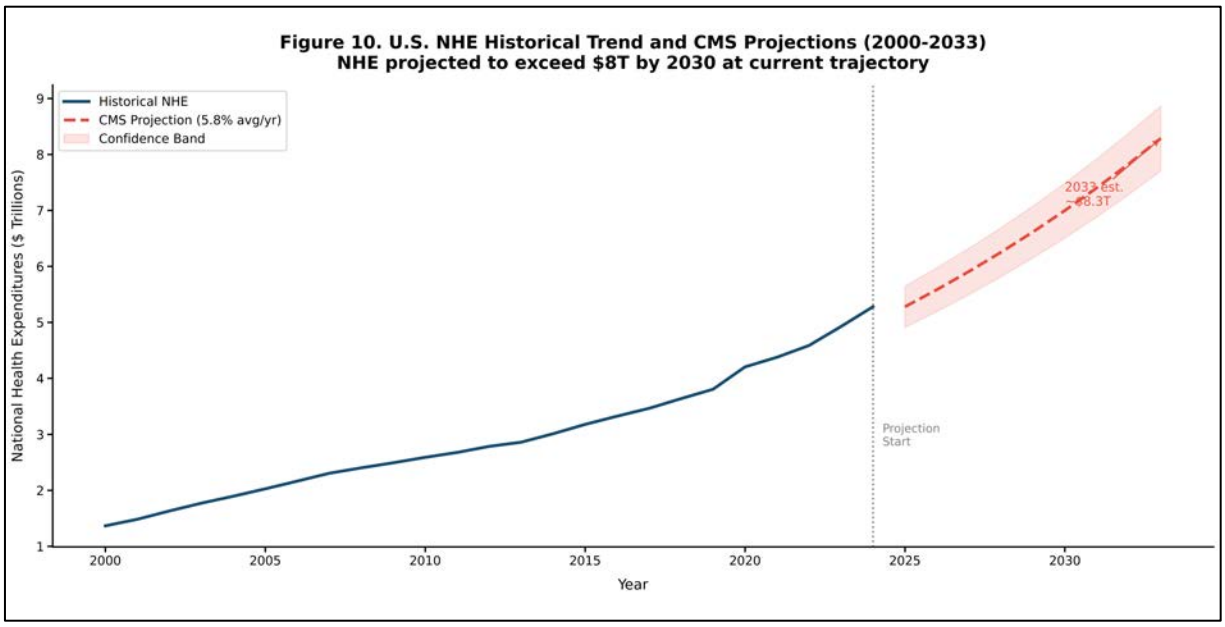

Figure 10 U.S. NHE Historical Trend and CMS Projections (2000–2033). NHE projected to exceed $7.7T by 2030 at 5.8% avg annual growth. Source: CMS NHE Projections (CMS, 2020; Keehan et al., 2020)

4.11. Key Metrics Summary

Table 3 U.S. National Health Expenditure (NHE) Key Metrics by Year (1970–2024)

Source: CMS National Health Expenditure Accounts

Year	Total NHE	NHE/GDP	Admin Cost	Admin % NHE	Per Capita
1970	$74B	6.9%	$3B	3.5%	$353
1980	$253B	8.9%	$12B	4.7%	$1,099
1990	$719B	12.1%	$38B	5.3%	$2,835
2000	$1,365B	13.3%	$80B	5.9%	$4,842
2010	$2,589B	17.2%	$181B	7.0%	$8,377
2015	$3,177B	17.4%	$245B	7.7%	$9,860
2020	$4,204B	19.7%	$355B	8.4%	$12,637
2022	$4,587B	17.6%	$348B	7.6%	$13,689
2023	$4,925B	17.7%	$371B	7.5%	$14,580
2024	$5,279B	18.0%	$372B	7.0%	$15,474

Source: CMS NHEA (CMS, 2026).

Table 3 presents a long-term snapshot of how healthcare spending in the United States has evolved between 1990 and 2024 using data from the Centers for Medicare & Medicaid Services National Health Expenditure Accounts (NHEA). The table highlights major financial and structural shifts in the healthcare system over more than three decades.

Total National Health Expenditure (NHE) shows a dramatic rise in overall healthcare spending. In 1990, the U.S. spent about $724 billion on healthcare, but by 2024 spending reached approximately $5.279 trillion. This increase reflects

population growth, medical inflation, expanded healthcare access, technological advancements, and increased demand for services.

NHE as a Percentage of GDP measures how much of the national economy is devoted to healthcare. The share increased from 12.3% in 1990 to a peak of 19.7% in 2020 before declining slightly to 18.0% in 2024. This indicates that healthcare has become one of the largest sectors of the U.S. economy, consuming a growing portion of national resources.

Administrative Costs increased significantly over time, rising from $38 billion in 1990 to $372 billion in 2024. These costs include insurance administration, billing, compliance, and government healthcare management. The growth suggests that administrative complexity has expanded alongside the healthcare system.

Administrative Costs as a Percentage of NHE increased from 5.3% to around 7.0%. Although the percentage stabilized somewhat after 2020, the upward trend indicates that administrative spending represents a growing share of total healthcare expenditures.

Per Capita NHE reflects how much healthcare spending occurs per person. Spending rose from $2,835 per person in 1990 to $15,474 in 2024. This increase suggests that healthcare costs are rising faster than inflation and household income growth, placing greater financial pressure on consumers and employers.

Medicare Share increased from 17.1% to 26.8%, showing a larger role for public insurance programs. This growth is likely influenced by an aging population and greater enrollment in Medicare-related services.

Private Insurance Share remained relatively stable but slightly declined over time, dropping from 33.3% to 30.2%. This may indicate a gradual shift from employer-sponsored or private coverage toward public healthcare financing programs.

Overall, the table demonstrates that healthcare spending in the United States has grown substantially across every major category, with rising administrative costs, increasing public program influence, and healthcare taking up a larger share of the national economy.

5. Discussion

5.1. The Administrative Cost Burden as a Governance Failure

The central finding: administrative costs growing at 872% since 1990, more than twice hospital care is a governance signal. As Yalley (2025a) argues, analytics systems designed without a stakeholder-inclusive perspective optimize for the most powerful stakeholders. In U.S. healthcare those have historically been payers and hospital systems, not patients. As Himmelstein et al. (2019) documented, the United States spends approximately twice as much on healthcare administration as Canada, which uses a single-payer system. The difference is not in clinical capability but in the administrative infrastructure required to operate a fragmented, multi-payer system.

5.2. The AI Opportunity and Its Governance Risks

The federal investment in AI-enabled healthcare documented by HHS (2026) and ONC (2026) offers genuine potential for administrative cost reduction. But as Yalley (2025b) argues, deploying AI within narrow value-optimization frameworks carries specific governance risks. AI systems deployed to reduce administrative labor costs for payers without addressing underlying complexity may transfer administrative burden to providers and patients rather than eliminating it. The stakeholder analytics framework proposed by Yalley (2025a) offers a more constructive path: making visible the full cost of administrative complexity to build the governance case for structural simplification, not just incremental automation.

5.3. The Payer Mix Shift and Fiscal Implications

The growing share of Medicare and Medicaid documented in Figures 3 and 9 has direct fiscal sustainability implications. As Keehan et al. (2020) projected, federal and state healthcare program spending will grow faster than private insurance over the next decade, driven by aging demographics. This means administrative cost reduction is increasingly a public finance imperative. As Yalley (2025a) emphasizes, taxpayers are among the largest and most underrepresented healthcare stakeholders, analytics-driven governance must make visible the public cost of administrative inefficiency to create a stronger evidence base for structural reform.

Limitations

This study has several important limitations. First, the NHE accounts measure administrative costs at the aggregate level; they do not capture the full administrative burden on individual providers. As Himmelstein et al. (2019) demonstrate, the full administrative cost including provider-side overhead is substantially larger than the CMS category alone.

- All dollar amounts are nominal; inflation-adjusted comparisons would strengthen decade-level findings.
- The CMS projection methodology assumes continuation of historical trends and does not model structural policy changes.
- The correlation analysis covers aggregate national categories and does not examine state-level variation.
- The growth index uses 1990 as the base year; sensitivity analysis across base years would strengthen findings.

Future Scope

This analysis opens several important research directions. First, integrating CMS NHE data with state-level administrative cost data and ONC health IT adoption metrics would test whether higher interoperability capability reduces administrative costs, a direct empirical test of the HHS (2026) investment rationale.

- Applying Yalley's (2025a) stakeholder analytics framework to disaggregate administrative costs by stakeholder group would make visible the distributional inequities in the current administrative cost structure.
- Modeling AI-driven administrative automation governance implications per Yalley (2025b) would quantify whether AI deployment reduces total administrative burden or merely redistributes it.
- International comparisons building on Himmelstein et al. (2019) across OECD nations would provide benchmarks for structurally achievable administrative efficiency.
- A real-time NHE analytics dashboard connected to CMS data APIs would enable ongoing monitoring of administrative cost trends rather than retrospective annual analysis.

6. Conclusion

The United States spent $372 billion on healthcare administration in 2024. That figure is not a fixed feature of a complex healthcare system. It is the measurable consequence of governance choices about how to structure payer relationships, how to design billing systems, and what to optimize for.

As Yalley (2025a) argues, analytics that serve only the most powerful stakeholders will reinforce existing cost structures rather than challenge them. As Yalley (2025b) demonstrates, AI systems deployed within narrow value-optimization frameworks will automate and scale those structures rather than transform them. The 65-year NHE trajectory documented here is the empirical record of what happens when governance is misaligned with purpose.

As HHS (2026) and ONC (2026) invest in interoperability and AI-enabled healthcare, this paper argues for an equally serious investment in the governance frameworks that determine what those systems optimize for. If the answer is patient outcomes, as Yalley (2025a) argues it should be, the analytical tools to measure, monitor, and drive down administrative costs are already available. What remains is the governance will to use them.

Compliance with ethical standards

Disclosure of conflict of interest

The author declares no conflict of interest. This study was conducted independently by a single author with no financial relationships, institutional affiliations, or personal interests that could have influenced the design, analysis, interpretation, or reporting of the findings. No external funding, sponsorship, or compensation was received in connection with this research. All data analyzed are publicly available from the Centers for Medicare & Medicaid Services (CMS) National Health Expenditure Accounts and require no proprietary access or licensing agreements. The author has no financial stake in any healthcare organization, payer, technology vendor, or policy body referenced in this paper.

Data Source

CMS National Health Expenditure Accounts (1960–2024)

Data & Code Availability Statement

The datasets analyzed in this study are publicly available from the Centers for Medicare & Medicaid Services (CMS). All Python analysis scripts, Streamlit dashboard code, and derived datasets produced during this study are openly available at the author's GitHub repository: https://github.com/pkyalley/dataverse/tree/main/nhe-analysis. Readers are encouraged to reproduce, extend, and build upon this analysis.

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