

A Context-Specific Model for Transforming Payame Noor University into an Entrepreneurial University: Identification and Prioritization of Factors Affecting Human Resource Performance Using Fuzzy Delphi–AHP and BSC Methods

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ABSTRACT

This study aimed to comparatively investigate and analyze the role of social-class disparity and life expectancy in health expenditure in Iran, Germany, and France. The study employed a descriptive-analytical and comparative research design and incorporated both quantitative and qualitative data. The quantitative data included indicators of social-class disparity, life expectancy, healthcare-system quality, per capita income, health policies, and health literacy over the period from 2015 to 2025. These data were analyzed using panel regression models and correlation analysis. The qualitative data were collected through content analysis of official documents, international and national reports, and the health policies of the three countries. The findings indicated that increases in social-class disparity and life expectancy lead to higher health expenditure; however, the role and effect of social-class disparity were greater in Iran than in Germany and France. In developed countries such as Germany and France, extensive insurance coverage, preventive policies, and improvements in the quality of healthcare services have reduced the financial burden on households and facilitated better management of health expenditure. Iran continues to experience rising healthcare costs because of resource constraints and inequalities in access to healthcare services, although policies such as universal health insurance and the Health Transformation Plan have alleviated some of these problems.

Keywords: social-class disparity, life expectancy, health expenditure, preventive policies, Iran, Germany, France.

Introduction

Health expenditure is a central component of socioeconomic development because it reflects not only the resources allocated to disease prevention, diagnosis, treatment, rehabilitation, and long-term care, but also the capacity of a society to protect its population against the financial consequences of illness. Sustainable health financing is closely connected to human development, labor productivity, social welfare, and the achievement of national development objectives. Nevertheless, the level and distribution of health expenditure are not determined exclusively by the prevalence of disease or the technological capacity of healthcare systems. They are also shaped by demographic transitions, income distribution, social stratification, institutional arrangements, public financing,



Article history:
Received 19 April 2026
Revised 13 July 2026
Accepted 16 July 2026
Initial Publish 27 July 2026
Published online 01 July 2027

How to cite this article:

Ghasemkhani, N., Peykarjou, K., & Agheli, L. (2027). A Context-Specific Model for Transforming Payame Noor University into an Entrepreneurial University: Identification and Prioritization of Factors Affecting Human Resource Performance Using Fuzzy Delphi–AHP and BSC Methods. *Journal of Management and Business Solutions*, 5(4), 1-23. <https://doi.org/10.61838/jmbs.389>



insurance coverage, environmental conditions, and the accessibility and quality of healthcare services. The COVID-19 pandemic demonstrated how health emergencies can interact with pre-existing social, environmental, and economic vulnerabilities, revealing that unequal societies may experience both greater health losses and more uneven financial consequences (1). Pandemic-related pressures also showed that government budgets for health, education, and nutrition cannot be examined independently, because reduced investment in one dimension of human development may intensify healthcare needs and expenditure in another (2). Consequently, understanding health expenditure requires an integrated framework that considers inequality, population health, demographic longevity, public policy, and the institutional characteristics of healthcare systems.

Social-class disparity is one of the most important structural factors affecting health outcomes and healthcare expenditure. Economic inequality influences where people live, the quality of their nutrition, occupational risks, exposure to environmental hazards, educational opportunities, health-related knowledge, access to preventive care, and their ability to pay for medical services. Individuals and households in lower socioeconomic groups are more likely to postpone treatment, experience unmet healthcare needs, rely on lower-quality services, and incur catastrophic or impoverishing out-of-pocket expenses. Unequal access to healthcare facilities can therefore obstruct progress toward the Sustainable Development Goals by reinforcing the relationship between poverty, illness, and social exclusion (3). Evidence from Nigeria similarly indicates that healthcare access and equity remain strongly dependent on income, location, infrastructure, and institutional capacity, illustrating how deficiencies in service distribution can translate social inequality into unequal health outcomes (4). Gender may further intensify these disparities, as unequal household resources, social roles, and decision-making power can produce gender-specific barriers to healthcare utilization (5). Accordingly, class inequality should not be understood merely as a difference in income; it is a multidimensional condition that influences healthcare needs, patterns of utilization, financing mechanisms, and the distribution of health expenditure.

The relationship between inequality and health expenditure is theoretically complex. On the one hand, greater income inequality may increase aggregate health expenditure because disadvantaged groups experience a higher burden of preventable disease, delayed treatment, multimorbidity, and financial vulnerability. On the other hand, inequality may suppress recorded healthcare utilization when low-income populations cannot afford treatment, meaning that low expenditure may coexist with substantial unmet need. Studies of African countries indicate that income inequality can adversely affect both health and education, although the magnitude of its effect depends on the level, composition, and effectiveness of public spending (6). Research on determinants of health inequality in sub-Saharan Africa has also emphasized the influence of income, public resources, service availability, and broader macroeconomic conditions on disparities in health outcomes (7). Cross-country evidence from African regional economic communities demonstrates that variations in household out-of-pocket health expenditure are associated with economic conditions, healthcare financing structures, and institutional differences among countries (8). Moreover, health-outcome disparities within regional economic communities show that national averages may conceal substantial differences among socioeconomic groups and territorial units (9). These findings suggest that the consequences of class disparity for health expenditure depend on whether healthcare costs are pooled collectively through taxation and insurance or transferred directly to households.

The economic position of households also affects expenditure behavior more broadly. Consumption patterns are shaped not only by objective income but also by how individuals perceive their own socioeconomic position and compare themselves with peers (10). Such social comparisons may alter decisions regarding preventive care,

medical consultations, insurance participation, nutrition, and other health-related expenditures. Among low-income families, constrained expenditure patterns can adversely affect child development and increase psychological and social risks, indicating that household budget limitations have long-term health consequences beyond immediate medical spending (11). The distribution of products harmful to health among Iranian households further demonstrates that health-related consumption is socially patterned and that socioeconomic inequality can influence exposure to behavioral risk factors (12). Therefore, class disparity may increase health expenditure through several pathways: greater exposure to health risks, reduced use of preventive services, delayed diagnosis, reliance on out-of-pocket payments, and the accumulation of chronic health conditions requiring more expensive treatment.

Social-class disparity is itself multidimensional and cannot be fully represented by current income alone. Asset ownership, employment security, educational attainment, migration status, ethnicity, caste, religion, and vulnerability to downward mobility may all determine a household's position within the social hierarchy. Mapping asset disparities provides a broader assessment of inequality by capturing differences in accumulated wealth and long-term economic security (13). Research on middle-class vulnerability has similarly shown that households classified as middle class may remain highly exposed to economic shocks, medical costs, unemployment, and declining income (14). Analyses of economic disparities between ethnic groups indicate that middle-class attainment may vary substantially across populations even when nominal income categories appear similar (15). Recent migration can also interact with local income disparities and change the distribution of opportunities, public resources, and social pressures over time (16). In addition, human development differs across social and religious groups because social identity may influence access to education, employment, healthcare, and public support (17). These dimensions are relevant to health expenditure because households with unstable economic positions may face greater difficulty maintaining insurance coverage, absorbing unexpected medical costs, or investing in preventive healthcare.

Employment conditions constitute another mechanism linking social stratification to health and longevity. Informal workers often lack stable income, occupational protection, paid sick leave, retirement security, and comprehensive health insurance. These disadvantages affect both exposure to health risks and the ability to obtain timely care. Evidence on informal workers shows that the determinants of life expectancy can differ across points of the health distribution, indicating that socioeconomic and occupational factors do not affect all population groups uniformly (18). Difficult school-to-work transitions and the risk of becoming not in employment, education, or training may also produce long-term disadvantages in income, social protection, and health (19). The institutional design of health insurance can reinforce such class differences when individuals are expected to make complex choices among plans with unequal financial risks. Research on employer-sponsored health insurance has shown that shifting responsibility for insurance selection to individuals may operate as a class-biased institutional change because higher-income and better-informed employees are more capable of navigating complicated benefit structures (20). Thus, the relationship between class disparity and health expenditure also depends on labor-market institutions and the extent to which healthcare financing protects people whose employment status is unstable or disadvantaged.

Life expectancy is another major determinant of health expenditure. Rising life expectancy is generally interpreted as evidence of improved living standards, medical progress, effective disease control, and better access to healthcare. However, longer lives may increase demand for chronic disease management, pharmaceuticals, rehabilitation, long-term care, and repeated medical interventions, particularly when gains in longevity are not

accompanied by equivalent improvements in healthy life expectancy. The relationship is therefore bidirectional: higher health expenditure may contribute to increased life expectancy, while longer life expectancy may subsequently increase healthcare needs and costs. The decomposition of life satisfaction among older adults across caste groups demonstrates that socioeconomic inequalities continue to influence well-being in later life (21). Childhood socioeconomic conditions may also shape adult health and aging through cumulative biological, behavioral, and social pathways, meaning that expenditure in old age partly reflects disadvantages experienced decades earlier (22). Consequently, population aging should not be treated as a purely demographic phenomenon; it is also the cumulative outcome of social inequality over the life course.

The effect of longevity on expenditure depends substantially on the morbidity profile of older populations. When longer life is accompanied by delayed disease and preserved functional capacity, the financial implications may be more manageable. Conversely, when additional years of life are characterized by multimorbidity, disability, and dependence, expenditure may rise considerably. Micro-level evidence indicates that income inequality is associated with different patterns of multimorbidity, suggesting that disadvantaged groups may enter old age with a heavier burden of simultaneous chronic conditions (23). Improvements in health capital through emerging technologies may enhance prevention, diagnosis, and treatment and support more inclusive prosperity, but technological diffusion can also raise healthcare expenditure and create new inequalities if access is uneven (24). Pharmaceutical innovation presents a similar challenge: new medicines may improve survival and quality of life, yet affordability and reimbursement policies determine whether these benefits are distributed equitably. Evidence regarding national drug-price negotiations indicates that reimbursement mechanisms can influence medicine accessibility, utilization, and cost (25). Therefore, the expenditure consequences of increased life expectancy are mediated by disease patterns, medical technology, pharmaceutical pricing, and the effectiveness of healthcare purchasing.

Unexpected mortality shocks also affect the relationship between life expectancy and health spending. The COVID-19 pandemic produced substantial regional variation in excess mortality and disrupted long-term improvements in longevity across Europe (26). Such shocks can simultaneously increase short-term healthcare expenditure, reduce life expectancy, expose regional inequalities, and place lasting pressure on health systems. Environmental conditions constitute an additional source of health risk. Environmental degradation, income disparities, technological development, and food availability jointly influence quality of life and population health (27). Provincial evidence from China indicates that environmental degradation and income disparity can interact in shaping national and subnational health outcomes (28). Environmental governance efficiency may also affect residents' life satisfaction, implying that the quality of public institutions influences both objective health conditions and subjective well-being (29). These findings are important for health-expenditure analysis because environmentally induced illness and regional differences in governance may increase healthcare demand independently of individual income and demographic aging.

The allocation of healthcare resources is a crucial institutional mechanism through which governments can moderate the effects of inequality and longevity on expenditure. Even when total health spending is relatively high, unequal geographic and socioeconomic distribution of physicians, nurses, hospitals, and preventive services may generate poor outcomes and inefficient expenditure. The equitable allocation of public-health human resources requires attention to multiple dimensions of inequality rather than reliance on population size alone (30). Similarly, health-equity assessment should integrate the social determinants of health and use systematic methods to identify priorities, vulnerable populations, and policy gaps (31). When healthcare resources are concentrated in affluent

regions or urban centers, disadvantaged populations may experience delayed care and higher long-term treatment costs. By contrast, equitable primary care, preventive interventions, and early diagnosis can reduce avoidable hospitalization and improve the efficiency of public expenditure.

Payment and reimbursement arrangements also determine whether increased spending translates into better and more equitable health outcomes. Traditional fee-for-service systems may encourage service volume without necessarily improving quality, whereas alternative and value-based payment models seek to link financing to outcomes and efficiency. However, such reforms can either reduce or reinforce health disparities depending on how patient risk, provider incentives, and social vulnerability are incorporated into payment formulas (32). Public expenditure may therefore have different distributive consequences according to institutional design. A country may allocate substantial resources to healthcare while retaining high out-of-pocket costs, unequal access, and inefficient service delivery. Conversely, comprehensive insurance pooling and regulated purchasing can protect households from financial hardship even when aggregate expenditure is high. The relationship between inequality, life expectancy, and health expenditure must thus be interpreted within the financing and governance structure of each healthcare system rather than solely through the magnitude of spending.

Iran, Germany, and France provide a meaningful basis for comparative analysis because they differ in economic conditions, welfare-state arrangements, insurance structures, resource availability, and patterns of healthcare access. Germany and France operate mature social health-protection systems characterized by broad insurance coverage, extensive risk pooling, and comparatively strong public regulation. Iran has also implemented major reforms intended to extend insurance coverage and improve access, but its health system continues to face fragmentation, fiscal constraints, regional disparities, inflationary pressures, and substantial household payments. In such a context, class disparity may have a stronger effect on both healthcare utilization and financial burden. Differences in poverty measurement are also relevant because the estimated relationship between poverty and subjective well-being can change when national or regional poverty thresholds are used (33). This implies that cross-country comparisons should account for variation in living costs, welfare systems, and definitions of socioeconomic disadvantage rather than treating income categories as directly equivalent.

Comparing these three countries also enables a distinction between aggregate health expenditure and household financial exposure. A rise in national health spending may reflect expanded insurance coverage, improved access, population aging, technological advancement, or higher service quality. It may therefore be socially beneficial even when total expenditure increases. In contrast, rising out-of-pocket expenditure among low-income households may indicate inadequate financial protection and can exacerbate poverty and inequality. Public policies should consequently be evaluated according to both expenditure levels and expenditure distribution. The central analytical question is not merely whether inequality and life expectancy increase healthcare costs, but how healthcare institutions redistribute those costs among governments, insurers, employers, and households. Existing research offers substantial evidence on income inequality, access, longevity, household expenditure, and health-system arrangements, yet comparative evidence integrating these factors across Iran, Germany, and France remains limited.

Accordingly, the aim of the present study was to comparatively examine the effects of social-class disparity and life expectancy on health expenditure in Iran, Germany, and France while accounting for healthcare quality, per capita income, health-policy coverage, and health literacy.

Methods and Materials

This study employed a descriptive-analytical and comparative design to examine the effects of two important factors—social-class disparity and life expectancy—on health expenditure in Iran, Germany, and France. The descriptive-analytical nature of the study means that the existing status of these variables and their relationships with health expenditure in each country is first described in detail. The data are then analyzed to examine the relationships and mutual effects among these factors.

The statistical sample of this study consisted of extensive, multidimensional data relating to key health and socioeconomic indicators in Iran, Germany, and France over the 10-year period from 2015 to 2025. The data included health expenditure as the dependent variable and social-class disparity indicators, such as the Gini coefficient, and life expectancy as the independent variables.

The data were collected through a combination of methods to provide comprehensive and multidimensional coverage of the relevant issues. First, a literature review was conducted using various sources, including books, scientific articles, and specialized documents, to obtain theoretical and empirical knowledge regarding the effects of social-class disparity and life expectancy on health expenditure. In addition, official documents and materials relating to healthcare systems, health policies, and socioeconomic indicators in Iran, Germany, and France were analyzed as another method of data collection. Secondary statistical data obtained from authoritative sources, such as the World Health Organization, the World Bank, and the national statistical agencies of the countries under investigation, also constituted an important part of the study. Furthermore, authoritative scientific databases, including PubMed and JSTOR, were used to access current scientific articles and research studies. The integration of these methods and sources enabled the study to incorporate valid quantitative data while also addressing the qualitative and theoretical dimensions of the subject, thereby enhancing the accuracy, validity, and generalizability of the findings.

This study was conducted using a mixed-methods design comprising three principal stages: econometric analysis, qualitative analysis, and comparative analysis. In the first stage, a panel-data regression model was specified for Iran, Germany, and France over the period from 2015 to 2024 to investigate the effects of variables such as social-class disparity, life expectancy, healthcare-service quality, and other economic and social variables on health expenditure. Several diagnostic tests were used to evaluate the model, including the Chow F-test, the Hausman test, and unit-root tests. In the second stage, qualitative content analysis was conducted on policy documents and reports from the three countries, using coding procedures to identify the principal patterns and themes in their health policies. The qualitative data were collected from various sources, including national documents and interviews. In the third stage, comparative analysis was conducted by comparing the health policies and healthcare systems of Iran, Germany, and France. The purpose of this analysis was to identify similarities and differences in the management of health expenditure, insurance policies, and access to healthcare services in these countries.

Table 1. Required Statistical Information

No.	Variable	Operationalization and Unit of Measurement	Primary Data Source
1	HealthExp	Dependent variable: health expenditure as a percentage of gross domestic product	World Bank
2	Gini	Independent variable: Gini coefficient, ranging from 0 to 1	World Bank
3	LifeExp	Independent variable: life expectancy at birth, measured in years	World Health Organization
4	QualHealth	Control/mediating variable: Healthcare Access and Quality Index	Institute for Health Metrics and Evaluation

5	GDPpc	Control variable: gross domestic product per capita, measured in constant U.S. dollars	International Monetary Fund
6	HealthPolicy	Moderating variable: health-service coverage index	World Health Organization
7	HealthLit	Moderating variable: adult literacy rate, measured as a percentage and used as a proxy for health literacy	World Bank/UNESCO

Temporal scope: The present study was conducted during the winter of 2025–2026.

Geographical scope: The geographical scope of the present project was limited to Iran, Germany, and France.

Thematic scope: The effects of social-class disparity and life expectancy on health expenditure in Iran, Germany, and France constituted the thematic scope of the study.

Hypotheses

1. An increase in social-class disparity leads to an increase in health expenditure in Iran, Germany, and France.
2. An increase in life expectancy leads to an increase in health expenditure in Iran, Germany, and France.
3. There are significant differences among Iran, Germany, and France in the effect of social-class disparity on health expenditure.

Findings and Results

This section analyzes the quantitative data obtained from various statistical models. Its purpose is to examine the complex relationships between the independent variables—social-class disparity and life expectancy—and the dependent variable—health expenditure—in Iran, Germany, and France. Two principal methods, namely multiple linear regression and correlation analysis, were used to analyze the data. Each method provides a useful instrument for examining how these variables influence health expenditure. Multiple linear regression was used to investigate the simultaneous effects of social-class disparity and life expectancy on health expenditure in Iran, Germany, and France. This model allows researchers to assess the independent effect of each variable while controlling for other relevant factors.

The regression model is expressed as follows:

$$\text{HealthExp}_{it} = \beta_0 + \beta_1 \text{Gini}_{it} + \beta_2 \text{LifeExp}_{it} + \beta_3 \text{QualHealth}_{it} + \beta_4 \text{GDPpc}_{it} + \beta_5 \text{HealthPolicy}_{it} + \beta_6 \text{HealthLit}_{it} + u_i + \varepsilon_{it}$$

In this model:

β_0 = intercept or constant term of the model

β_1, β_2 = coefficients of the independent variables, namely social-class disparity and life expectancy

β_3, β_4 = coefficients of the mediating variables, namely healthcare-system quality and per capita income

β_5, β_6 = coefficients of the moderating variables, namely health policies and health literacy

u_i = unobserved country-specific effect

ε_{it} = random error term

The results of the economic analyses are presented on the basis of the panel-data regression model estimated for Iran, Germany, and France. The primary purpose of the study was to investigate the effects of social-class disparity and life expectancy on health expenditure in these countries. First, the results of the diagnostic tests for the panel-data regression model are reported to determine the most appropriate model specification—fixed effects

or random effects—and to assess the characteristics of the data, including their stationarity. These analyses provide a more precise representation of the relationship between socioeconomic variables and health expenditure and enhance the accuracy and validity of the regression results. The regression coefficients and their statistical significance are subsequently examined for key variables, including social-class disparity, life expectancy, and other economic variables in each country.

The following table reports the results of several tests used to evaluate the panel-data regression model, including the Chow F-test, the Hausman test, and the unit-root test, for Iran, Germany, and France. These tests were used to determine the appropriate model specification—fixed effects or random effects—and to examine the stationarity of the data.

Table 2. Results of the Diagnostic Tests for the Panel-Data Regression Model

Test	Iran	Germany	France	Interpretation
Chow F-test	0.012	0.034	0.019	Selection of the fixed-effects model
Hausman test	0.045	0.028	0.037	Superiority of the fixed-effects model
Unit-root test	0.123	0.112	0.119	Stationarity of the variables

The results of the Chow F-test and the Hausman test indicate that the fixed-effects model is appropriate for analyzing the data because the p values were below .05 in all three countries. This selection indicates that the fixed-effects model can appropriately model the effects of the variables. In addition, the unit-root test results for the three countries indicate that the data are stationary and do not require differencing.

The following table reports the regression coefficients and their statistical significance for the principal model variables, including social-class disparity, represented by the Gini coefficient, life expectancy, and gross domestic product per capita, for each country.

Table 3. Regression Coefficients and Their Statistical Significance for the Principal Variables

Variable	Coefficient: Iran	Coefficient: Germany	Coefficient: France	p : Iran	p : Germany	p : France
Social-class disparity	0.422	0.318	0.296	.004	.009	.022
Life expectancy	0.316	0.458	0.421	.001	.001	.002
Gross domestic product per capita	0.155	0.138	0.121	.015	.027	.041
Healthcare-service quality	0.221	0.209	0.189	.027	.019	.025
Health-service coverage index	0.179	0.142	0.133	.033	.045	.053

In all three countries, social-class disparity, as measured by the Gini coefficient, had a positive effect on health expenditure, with the largest effect being observed in Iran. Thus, as social-class disparity increases, health expenditure also increases. This relationship was also observed in Germany and France, although its magnitude was smaller, possibly because of universal health insurance and extensive healthcare coverage in these countries. Life expectancy also had a positive and statistically significant effect on health expenditure in all three countries. This effect was particularly pronounced in Germany, where increases in life expectancy were associated with higher health expenditure, although the effect was smaller in Iran and France. Gross domestic product per capita also had a positive and statistically significant effect on health expenditure in all three countries, with the largest coefficient being observed in Iran. This finding indicates that countries with higher gross domestic product generally allocate more resources to the healthcare sector. Finally, healthcare-service quality and the health-service coverage index also had positive and statistically significant effects on health expenditure, particularly in Iran and Germany, where improvements in healthcare quality and insurance coverage led to higher health expenditure.

The following table presents the results of the fixed-effects panel-data regression model for health expenditure in Iran, Germany, and France. The model examines the effects of various variables on health expenditure.

Table 4. Effects of the Independent Variables on Health Expenditure: Fixed-Effects Model

Model Component	Iran	Germany	France
Effect of social-class disparity	0.422***	0.318***	0.296**
Effect of life expectancy	0.316***	0.458***	0.421***
Effect of gross domestic product per capita	0.155**	0.138**	0.121**
Effect of healthcare-service quality	0.221**	0.209**	0.189**
Effect of the health-service coverage index	0.179**	0.142**	0.133**
Chow F-test	0.012	0.034	0.019
Hausman test	0.045	0.028	0.037

In all three countries, social-class disparity, as represented by the Gini coefficient, had a positive and statistically significant effect on health expenditure. The effect was greatest in Iran, with a coefficient of 0.422, indicating a stronger and more direct relationship between increasing social-class disparity and increasing health expenditure. The corresponding effects in Germany and France were 0.318 and 0.296, respectively. Although the effects were also present in these two countries, their magnitude was lower than in Iran because of their more advanced healthcare systems and more comprehensive insurance coverage. In addition, life expectancy had a positive and statistically significant effect on health expenditure in all three countries. The largest effect was observed in Germany, with a coefficient of 0.458. This finding reflects Germany's advanced healthcare system, in which longer life expectancy generates greater demand for medical and healthcare services and consequently increases expenditure. Gross domestic product per capita also had a positive and statistically significant effect on health expenditure in all three countries. However, the effect was slightly greater in Iran than in Germany and France, which may be attributable to financial resource constraints in Iran and the greater effort required to finance healthcare expenditure. Finally, the Chow F-test and Hausman test results indicate that the fixed-effects model is the most appropriate model for analyzing the data. This means that country-specific effects remain stable throughout the study period.

The results for each variable are presented below.

The Gini coefficient, which represents the degree of income inequality or social-class disparity, had a statistically significant effect on health expenditure in all three countries. The findings indicate that increases in the Gini coefficient were associated with increases in health expenditure in Iran, Germany, and France. In Iran, the Gini coefficient had a higher regression coefficient of 0.422, indicating that any increase in income inequality may have a greater effect on increasing health expenditure. This means that as the social-class gap widens in Iran, individuals face greater healthcare needs and costs because economic inequality makes healthcare services more difficult to access for lower-income groups. The same relationship was observed in Germany and France, although the magnitude of the effect was slightly lower, with coefficients of 0.318 and 0.296, respectively. This difference may be attributable to the more advanced healthcare systems and more extensive health-insurance coverage in these countries, which reduce the effect of income inequality on health expenditure.

Life expectancy, as one of the most important indicators in health analysis, had a statistically significant relationship with health expenditure in all three countries. In each country, an increase in life expectancy resulted in an increase in health expenditure. The largest effect was observed in Germany, with a coefficient of 0.458. This finding may indicate that in more developed countries, longer lifespans create a greater need for medical and

healthcare services. The same relationship was observed in Iran and France, with coefficients of 0.316 and 0.421, respectively, although the magnitude of the effect was greater in France than in Iran. These differences may be associated with the healthcare systems and the quality of medical services in the three countries. In Iran, because of economic constraints and related challenges, the effect of increased life expectancy on health expenditure may be smaller than in a country such as Germany.

Gross domestic product per capita: Gross domestic product per capita had a positive and statistically significant effect on health expenditure in all three countries. An increase in per capita income naturally enhances individuals' financial capacity to pay for healthcare services. In Iran, the higher coefficient of 0.155 indicates that the effect of GDP per capita on health expenditure was greater than in Germany and France. This finding demonstrates a stronger relationship between economic conditions and healthcare expenditure in countries with less-developed social protection systems. The corresponding coefficients for Germany and France were 0.138 and 0.121, respectively, indicating that the effect of this variable was weaker in these countries than in Iran.

Healthcare Access and Quality Index: This index represents the quality and accessibility of healthcare services. The results indicate that improvements in access to healthcare services are associated with higher health expenditure. In Iran, this variable had a statistically significant coefficient of 0.221, which may be attributable to existing limitations in access to healthcare services. The same effect was observed in Germany and France, with coefficients of 0.209 and 0.189, respectively. However, access to healthcare services appears to be comparatively better in these countries, which may explain why its effect on health expenditure was smaller.

This section presents the regression-analysis results for the effects of social-class disparity, as measured by the Gini coefficient, and life expectancy on health expenditure in Iran, Germany, and France. More specifically, the table illustrates the positive or negative relationship between each variable and health expenditure. The interaction of these variables with health expenditure is also compared across the three countries, and significant cross-country differences are explicitly identified. These findings can help policymakers identify the similarities and differences in the effects of these factors across countries.

Table 5. Regression-Analysis Results for the Effects of Social-Class Disparity and Life Expectancy on Health Expenditure

Variable	Iran	Germany	France	Interpretation
Gini coefficient: social-class disparity	0.422***	0.318***	0.296**	Positive and statistically significant relationship
Life expectancy	0.316***	0.458***	0.421***	Positive and statistically significant relationship
Gross domestic product per capita	0.155**	0.138**	0.121**	Positive and statistically significant effect
Healthcare Access and Quality Index	0.221**	0.209**	0.189**	Positive and statistically significant relationship

The results presented in the table indicate that both social-class disparity and life expectancy had positive and statistically significant effects on health expenditure. In particular, increasing social-class disparity, as measured by the Gini coefficient, led to higher health expenditure in Iran, Germany, and France. However, this effect was greater in Iran than in the other two countries, which may be attributable to higher levels of inequality and greater limitations in access to healthcare services in Iran. Life expectancy also increased health expenditure in all three countries, although its effect was greater in Germany than in Iran and France. This finding may reflect Germany's more advanced healthcare system and higher medical costs. The control variables, including gross domestic product per capita and the Healthcare Access and Quality Index, also had significant effects on health expenditure, indicating that economic conditions and access to healthcare services influence healthcare costs.

In this section, coding was used to conduct a qualitative content analysis of policy documents and reports. Coding refers to the assignment of specific codes to different sections of textual documents to extract the principal themes and patterns related to the subject of the study. The coding procedures used to examine the relationship among social-class disparity, life expectancy, and health expenditure in Iran, Germany, and France are presented below. Following the coding process, the principal themes extracted from the policy documents are summarized in the following table.

Table 6. Coding and Theme Extraction From Policy Documents and Reports

Code	Country	Extracted Theme	Explanation
Code 1: Social-class disparity and access to healthcare services	Iran	Inequality in access to healthcare services	Policy documents indicate a substantial gap in access to healthcare services in Iran, resulting in increased out-of-pocket health expenditure.
Code 2: Expansion of insurance coverage	Iran	Inadequate insurance coverage and inequality	Iranian health policies emphasize expanding insurance coverage; however, because of economic difficulties and limited resources, adequate coverage is not available to all groups, particularly low-income populations.
Code 3: Increased access to healthcare services	Germany	Effect of universal insurance policies on reducing healthcare costs	Germany's public insurance system increases access to healthcare services for all social groups and reduces out-of-pocket expenditure.
Code 4: Support for vulnerable populations	France	Reduction of inequality through support for low-income populations	French policy documents emphasize reducing inequalities in access to healthcare services, particularly for low-income groups that benefit from greater insurance support.
Code 5: Effect of health policies on life expectancy	Germany and France	Relationship between health policies and increased life expectancy	Universal health policies in Germany and France increase population life expectancy and consequently increase health expenditure.
Code 6: Health expenditure and financing programs	Iran	Problems in healthcare financing	Because Iranian health-financing programs depend on limited public resources, they have not fully covered the population's needs, and out-of-pocket health expenditure has consequently increased.
Code 7: Insurance policies and cost reduction	France	Universal health-insurance system and reduced out-of-pocket expenditure	France's universal health-insurance system has reduced out-of-pocket expenditure and enabled individuals to access healthcare services at lower costs.
Code 8: Effects of socioeconomic policies on health expenditure	Iran	Inability of existing policies to reduce social-class disparity	Iran's economic and social policies have not effectively reduced social-class disparity, and low-income groups experience particular difficulty financing healthcare services.

The coding results demonstrate that the policy documents of each country contain different patterns concerning the effects of social-class disparity and life expectancy on health expenditure. In Iran, inequality in access to healthcare services and inadequate insurance coverage for low-income groups increase out-of-pocket health expenditure. In Germany and France, public insurance systems and healthcare-financing programs have helped reduce healthcare costs and increase access to healthcare services for all social groups. These programs have been particularly influential in reducing social-class disparities and increasing life expectancy. The documents also indicate that Iran's social and economic policies have not effectively reduced economic inequalities, ultimately contributing to increased health expenditure. The codes and extracted themes provide a deeper understanding of the relationship among social-class disparity, life expectancy, and health expenditure in different countries and may be used to improve health policies and reduce healthcare costs.

In this section of the study, a comparative analysis of health policies and healthcare systems in Iran, Germany, and France was conducted. The principal purpose of this analysis was to examine the management of health expenditure, identify similarities and differences in insurance policies and healthcare coverage, and determine how the healthcare and social systems of each country affect the relationship of social-class disparity and life expectancy with health expenditure.

In Iran, healthcare costs are financed primarily by the government. However, because of economic problems and constraints on public resources, a considerable proportion of healthcare costs is paid directly by individuals. Iran's insurance system is inadequate, particularly for low-income populations, and access to healthcare services remains limited for these groups. Consequently, lower-income individuals are required to pay a greater proportion of medical expenses out of pocket. In Germany and France, healthcare systems provide effective coverage of healthcare expenditure. In Germany, the universal health-insurance system extensively covers citizens' medical costs, with only a limited portion being paid directly by insured individuals through co-payments. France's universal health-insurance system operates similarly and guarantees access to healthcare services for all citizens. Overall, the healthcare systems of Germany and France minimize individual health expenditure and prevent healthcare costs from imposing substantial financial pressure on low-income populations.

The comparative analysis reveals both similarities and differences in health policies and insurance coverage. One of the principal similarities among Germany, France, and Iran is their attempt to increase access to healthcare services and reduce healthcare costs. In all three countries, health policies are intended to provide insurance coverage and expand access to healthcare services. However, substantial differences exist in the implementation of these policies. In Germany and France, universal health-insurance systems effectively cover medical expenses and enable lower-income individuals to access healthcare services. In Iran, particularly in less-developed regions, insurance coverage remains incomplete, and many lower-income individuals are unable to afford medical expenses. Consequently, individuals in Iran pay a greater proportion of healthcare costs out of pocket, increasing the financial pressure placed on them.

Healthcare and social systems in different countries have different effects on social-class disparity and life expectancy. In Germany and France, universal insurance systems and healthcare-financing programs have effectively reduced social-class disparities and provided all social groups with access to healthcare services. Consequently, the effect of social-class disparity on health expenditure has been reduced in these countries. These systems have also contributed to increased life expectancy because individuals can readily access medical services, facilitating disease prevention and improvements in public health. In Iran, because of deficiencies in insurance coverage and healthcare financing, lower-income individuals cannot effectively use healthcare services, which may increase their healthcare costs and financial burden. Problems in access to healthcare services, particularly among low-income groups, have caused these individuals to pay a greater proportion of healthcare expenses out of pocket, making the adverse effects of social-class disparity particularly apparent in Iran.

Table 7. Comparison of Healthcare Systems and Health-Expenditure Management in Iran, Germany, and France

Characteristic	Iran	Germany	France
Management of health expenditure	A substantial proportion is paid out of pocket; problems exist in securing public financial resources	Primarily financed through universal health insurance	Primarily financed through universal health insurance
Insurance coverage	Inadequate insurance coverage for low-income groups	Universal insurance coverage for all individuals	Universal insurance coverage for all individuals
Access to healthcare services	Limited for low-income populations and people in remote areas	Extensive and accessible to all social groups	Extensive and accessible to all social groups
Effect of social-class disparity on health expenditure	Substantial adverse effect and high out-of-pocket expenditure	Reduced effect of social-class disparity and lower out-of-pocket expenditure	Reduced effect of social-class disparity and lower out-of-pocket expenditure
Effect on life expectancy	Limited because of problems in access to healthcare services	Increased life expectancy because of access to healthcare services	Increased life expectancy because of access to healthcare services

The comparative analysis indicates that healthcare systems in Germany and France effectively finance health expenditure through universal health insurance and public resources. This approach has contributed to reductions in social-class disparities and increases in life expectancy in these countries. In contrast, deficiencies in insurance coverage and healthcare financing in Iran have increased out-of-pocket health expenditure, particularly among low-income groups. This finding demonstrates the need to strengthen Iran's insurance system and improve access to healthcare services to reduce social-class disparities and minimize health expenditure.

This section examines the regression-analysis results concerning the Gini coefficient, which represents social-class disparity, and its effect on health expenditure in Iran, Germany, and France. The purpose of the analysis was to determine whether increasing social-class disparity has a similar effect on health expenditure in the three countries. The results indicate that the relationship between the Gini coefficient and health expenditure in Iran was strong and statistically significant. In other words, increasing social-class disparity in Iran led to higher health expenditure. This finding is particularly attributable to limitations in insurance coverage and access to healthcare services among lower-income groups. Because lower-income individuals are unable to finance medical costs, they are required to pay higher expenses out of pocket. The relationship was stronger in Iran than in Germany and France because, in addition to economic inequality, adequate insurance coverage is not consistently available to low-income populations in Iran. In Germany, the regression results indicated that the relationship between the Gini coefficient and health expenditure was comparatively weaker. Despite the existence of social-class disparities, Germany's universal health-insurance system effectively reduces medical costs for all social groups. Low-income individuals can readily access healthcare services, and the insurance system reduces the effect of social-class disparity on health expenditure. Thus, extensive insurance coverage in Germany considerably reduces the effect of social-class disparity on health expenditure. Similar results were observed in France. The relationship between the Gini coefficient and health expenditure was also weaker in France than in Iran. As in Germany, France's universal health-insurance system effectively reduces healthcare costs for all social groups and enables low-income individuals to access healthcare services. This advanced system reduces the economic burden on lower-income groups, and the effect of social-class disparity on health expenditure is substantially weaker in France than in Iran.

Table 8. Effect of the Gini Coefficient on Health Expenditure in Iran, Germany, and France

Country	Gini Coefficient	Relationship With Health Expenditure	Conclusion
Iran	0.40–0.50	Positive and statistically significant	Increasing social-class disparity leads to increased out-of-pocket health expenditure.
Germany	0.30–0.40	Weak and less statistically significant	The universal insurance system reduces the effect of social-class disparity on health expenditure.
France	0.30–0.35	Weak and less statistically significant	Universal insurance coverage in France reduces the effect of social-class disparity on health expenditure.

Overall, the panel-data regression analyses indicate that the effect of social-class disparity on health expenditure is substantially weaker in countries with universal health-insurance systems and comprehensive healthcare coverage, such as Germany and France. In contrast, in countries such as Iran, where insurance coverage is inadequate and the healthcare system is less integrated, social-class disparity has a greater effect on health expenditure. These findings indicate that strengthening the insurance system and improving access to healthcare services may play an important role in reducing the effect of social-class disparity on health expenditure in countries such as Iran.

Second Hypothesis: An Increase in Life Expectancy Leads to an Increase in Health Expenditure in Iran, Germany, and France

This section examines the regression-analysis results concerning life expectancy and health expenditure. The primary purpose of the analysis was to determine whether increasing life expectancy in Iran, Germany, and France leads to higher health expenditure. Differences in the magnitude of this effect across the three countries were also examined.

For this analysis, life expectancy was entered into the panel-data regression model as the independent variable, whereas health expenditure was entered as the dependent variable. The findings indicate a statistically significant relationship between increasing life expectancy and health expenditure in all three countries, although the magnitude of the relationship differed across countries.

Iran: The regression-analysis results for Iran indicated a positive and statistically significant relationship between life expectancy and health expenditure. In other words, as life expectancy increases in Iran, health expenditure also increases. This finding may be explained by the fact that increased life expectancy generally results in a larger older population requiring more medical and healthcare services. In Iran, because of inadequacies in the healthcare system and limited financial resources, increasing life expectancy, particularly among older adults, directly increases health expenditure. Therefore, this relationship is especially pronounced among older populations because of deficiencies in healthcare and insurance services.

Germany: In Germany, the relationship between life expectancy and health expenditure was also positive and statistically significant. However, the text of the comparative interpretation indicates that the financial consequences of this relationship for individuals are less severe than in Iran. Increased life expectancy in Germany is partly associated with the existence of an advanced healthcare system and universal health insurance, which effectively covers healthcare costs. Nevertheless, as life expectancy increases and the older population grows, demand for healthcare services rises, consequently increasing overall health expenditure. In Germany, these additional expenses are financed primarily through public and insurance resources, and the financial burden on individuals is therefore less pronounced than in Iran.

France: In France, the relationship between life expectancy and health expenditure was similar to that observed in Germany. Increasing life expectancy generates greater demand for healthcare services, particularly among older adults. However, because France has universal health insurance and comprehensive healthcare coverage, healthcare expenses are financed primarily through insurance and public resources. Therefore, although health expenditure increases as life expectancy rises, the direct financial effect on individuals is lower than in Iran.

Table 9. Relationship Between Increased Life Expectancy and Health Expenditure in Iran, Germany, and France

Country	Relationship Between Life Expectancy and Health Expenditure	Conclusion
Iran	Positive and statistically significant	Increased life expectancy leads to higher health expenditure, particularly among older adults, because of deficiencies in the financing and provision of healthcare and insurance services.
Germany	Positive and statistically significant	Increased life expectancy raises demand for healthcare services, but the insurance system facilitates the financing of these costs.
France	Positive and statistically significant	Increased life expectancy is positively associated with healthcare costs, but universal insurance coverage reduces the adverse financial effects on individuals.

Ultimately, the results demonstrate that increasing life expectancy raises health expenditure in all three countries, although the magnitude and distribution of this effect differ. In Iran, the relationship imposes greater pressure on low-income groups because of problems within the healthcare and insurance systems. In Germany and France, despite greater demand for healthcare services resulting from increased life expectancy, universal health-insurance systems effectively cover healthcare costs and impose less financial pressure on the population. These differences indicate that in countries with advanced healthcare systems, increases in life expectancy have less severe adverse consequences for household health expenditure.

Third Hypothesis: There Are Significant Differences Among Iran, Germany, and France in the Effect of Social-Class Disparity on Health Expenditure

This section examines the regression-analysis results concerning social-class disparity, represented by the Gini coefficient, and health expenditure in Iran, Germany, and France. The purpose of the analysis was to compare the effect of social-class disparity on health expenditure in the three countries and identify significant differences in this respect. The effects of each country's socioeconomic conditions and specific health policies on these differences were also considered.

Iran: The regression-analysis results indicated that the Gini coefficient, representing social-class disparity, had a strong and statistically significant relationship with health expenditure in Iran. This means that increasing social-class disparity directly increases health expenditure in Iran. This relationship may be attributed to the inability of lower-income individuals to finance medical expenses through inadequate insurance and public support. Lower-income groups in Iran are required to pay a large proportion of medical expenses out of pocket because the insurance system and healthcare services are insufficient for these populations. This effect is stronger in areas characterized by greater social-class disparities and places additional pressure on health expenditure.

Germany: In Germany, a relationship was observed between social-class disparity and health expenditure, but because of the universal health-insurance system, the effect was considerably weaker than in Iran. Most healthcare costs in Germany are financed through public health-insurance arrangements, and access to medical services is available to all social groups, particularly lower-income populations. Consequently, despite the existence of social-class disparities, their effect on health expenditure has been substantially reduced. Because of universal health insurance and extensive healthcare coverage, lower-income groups experience relatively limited financial pressure from health expenditure.

France: In France, as in Germany, a relationship existed between the Gini coefficient and health expenditure, although it was weaker than in Iran. France's universal health-insurance system has reduced the effect of social-class disparity on health expenditure. The system effectively covers medical costs for all social groups, including lower-income populations. Members of lower socioeconomic groups can readily access medical services, thereby reducing the effect of social-class disparity on health expenditure.

Table 10. Comparison of the Effect of Social-Class Disparity on Health Expenditure in Iran, Germany, and France

Country	Relationship Between Social-Class Disparity and Health Expenditure	Reasons for the Difference
Iran	Strong and statistically significant	Inadequate insurance system, insufficient healthcare coverage, and economic difficulties
Germany	Weaker than in Iran	Universal health-insurance system and extensive healthcare-service coverage
France	Weaker than in Iran	Universal health-insurance system and extensive healthcare-service coverage

In conclusion, significant differences exist among Iran, Germany, and France in the effect of social-class disparity on health expenditure. Social-class disparity has a greater effect on health expenditure in Iran, whereas universal health-insurance systems and extensive healthcare-service coverage in Germany and France have weakened this relationship. These differences emphasize that strengthening insurance systems and improving healthcare-service coverage may reduce the adverse effects of social-class disparity on health expenditure in countries with conditions similar to those of Iran.

Discussion and Conclusion

The present study comparatively examined the effects of social-class disparity and life expectancy on health expenditure in Iran, Germany, and France. The quantitative findings showed that social-class disparity, measured by the Gini coefficient, had a positive and statistically significant effect on health expenditure in all three countries. However, the magnitude of this effect differed considerably, with the strongest coefficient observed in Iran, followed by Germany and France. Life expectancy also had a positive and significant association with health expenditure in all three countries, although the largest coefficient was found for Germany, followed by France and Iran. Gross domestic product per capita and the quality and accessibility of healthcare services were likewise positively associated with health expenditure. The qualitative and comparative findings supported the econometric results by showing that the effects of inequality and longevity on expenditure are conditioned by insurance coverage, healthcare financing, service availability, preventive policies, and the degree of financial protection provided to households. Whereas Germany and France distribute a substantial proportion of healthcare costs through universal insurance and public financing mechanisms, Iran continues to experience greater inequality in access, more limited resource availability, and a heavier out-of-pocket burden, particularly among lower-income households.

The first major finding was that increasing social-class disparity was associated with increasing health expenditure in all three countries. This result confirms the first hypothesis and indicates that unequal income distribution is not only a social or economic problem but also an important determinant of healthcare costs. Income inequality can increase expenditure through several interconnected pathways. Lower-income populations are more likely to experience unfavorable living conditions, nutritional deficiencies, occupational hazards, delayed diagnosis, limited preventive care, and a higher burden of chronic disease. These conditions may eventually require more intensive and costly medical interventions. Previous evidence has similarly shown that unequal access to healthcare facilities can undermine health outcomes and impede progress toward sustainable development because disadvantaged groups are often unable to obtain timely and appropriate care (3). The findings are also consistent with research indicating that income inequality adversely affects population health and that the effectiveness of public expenditure determines whether such inequalities are reduced or reproduced (6). Accordingly, the positive coefficient of the Gini index in the present study may reflect both the higher healthcare needs produced by socioeconomic disadvantage and the greater inefficiency associated with delayed treatment.

The effect of social-class disparity was strongest in Iran, where the Gini coefficient had a regression coefficient of 0.422, compared with 0.318 in Germany and 0.296 in France. This result supports the third hypothesis concerning significant cross-country differences in the influence of class disparity on health expenditure. The stronger Iranian coefficient can be explained by the interaction between economic inequality, incomplete insurance protection, regional disparities, and reliance on out-of-pocket payments. When lower-income households lack adequate

insurance coverage, they may postpone preventive services and primary care until their conditions become severe, thereby increasing the eventual cost of treatment. Evidence from Iran showing that the consumption of products harmful to health is unequally distributed among households reinforces the argument that socioeconomic position shapes both exposure to health risks and subsequent healthcare needs (12). Moreover, health-equity assessment in Iran requires systematic attention to the social determinants of health because differences in income, residence, employment, and service availability can create multiple and cumulative forms of disadvantage (31). The present findings therefore suggest that the effect of inequality on expenditure in Iran is amplified not only by unequal income but also by the institutional inability to fully compensate for that inequality through accessible and financially protective healthcare.

The weaker effects observed in Germany and France do not mean that socioeconomic inequality is irrelevant in these countries. Rather, their more comprehensive insurance and social-protection arrangements appear to moderate the translation of income inequality into direct household healthcare costs. This interpretation is consistent with studies demonstrating that healthcare financing arrangements can either intensify or reduce class-based differences in access and expenditure. Goldstein and Wharam showed that the design of health-insurance choice can create class-biased outcomes when individuals differ in their capacity to understand and manage complex insurance arrangements (20). Similarly, alternative payment and value-based purchasing systems may reduce disparities only when social risk and unequal patient needs are explicitly incorporated into financing mechanisms (32). In Germany and France, broad risk pooling and relatively extensive insurance coverage appear to reduce the direct effect of inequality on health expenditure. However, the continued statistical significance of the Gini coefficient indicates that universal coverage alone does not entirely eliminate socioeconomic differences in health needs, service utilization, or long-term health outcomes.

The study also found a positive and statistically significant relationship between life expectancy and health expenditure in Iran, Germany, and France, thereby supporting the second hypothesis. Increased life expectancy is generally a desirable outcome because it reflects improvements in living conditions, healthcare access, disease prevention, and medical technology. Nevertheless, greater longevity can increase expenditure when additional years of life are accompanied by chronic disease, multimorbidity, disability, or a need for long-term care. The present results are consistent with evidence that socioeconomic conditions experienced across the life course influence adult health and aging, so healthcare needs in later life partly reflect cumulative disadvantages beginning in childhood (22). They also align with research demonstrating that disparities in life satisfaction and well-being remain visible among older adults from different social groups (21). Thus, increased life expectancy does not automatically imply a proportional increase in healthy life expectancy, and longer lives may require greater expenditure on pharmaceuticals, outpatient care, hospitalization, rehabilitation, and elderly support.

The effect of life expectancy was greatest in Germany, with a coefficient of 0.458, followed by France with 0.421 and Iran with 0.316. This pattern may be attributable to the more advanced and accessible healthcare systems in Germany and France, where older populations are more likely to receive continuous treatment, diagnostic services, long-term care, and expensive medical technologies. In these systems, greater expenditure may reflect the capacity to respond to age-related healthcare needs rather than a failure of financial protection. The association between inequality and multimorbidity reported in China similarly shows that population aging and chronic disease are shaped by socioeconomic conditions and can create complex patterns of healthcare demand (23). Emerging technologies may improve health capital and extend longevity, but their adoption can also increase costs, especially

when new diagnostic and therapeutic services become widely available (24). Therefore, the larger coefficients in Germany and France may reflect both longer survival and more comprehensive treatment of chronic and age-related conditions.

The smaller coefficient for life expectancy in Iran should not necessarily be interpreted as evidence that aging places less pressure on households or the health system. It may instead reflect limited utilization, unmet healthcare need, incomplete service coverage, and financial barriers that prevent older people from receiving all required services. In settings where access is constrained, recorded health expenditure may underestimate actual healthcare need. Evidence concerning informal workers indicates that the determinants of life expectancy vary across the health distribution and are influenced by occupational conditions, income insecurity, and access to social protection (18). Economic and employment vulnerability may therefore restrict the ability of older or disadvantaged populations to use healthcare services, even when their need is substantial. The comparatively lower Iranian coefficient may consequently indicate a combination of lower service availability and a greater concentration of costs among households that are able to access treatment.

The positive association between gross domestic product per capita and health expenditure in all three countries indicates that higher national and individual income expands the capacity to finance healthcare. This result is compatible with the view that health services are partly income-responsive: as income rises, governments and households demand more comprehensive, higher-quality, and technologically advanced care. However, the effect of income depends on how resources are distributed. Studies of asset inequality have shown that current income alone does not capture long-term economic security, because differences in accumulated assets shape the capacity of households to withstand medical shocks (13). Middle-class households may also remain vulnerable to sudden illness, unemployment, and healthcare costs despite appearing economically secure in conventional income classifications (14). Consequently, growth in per capita income may increase aggregate health expenditure without necessarily ensuring equitable access or protecting vulnerable populations.

The finding that healthcare quality and access were positively associated with health expenditure may initially appear counterintuitive because improved access is often expected to reduce costs through prevention and early treatment. Nevertheless, greater accessibility can increase measured expenditure by enabling more people to use services that were previously unavailable or unaffordable. Improved quality may also involve investment in skilled personnel, modern facilities, medicines, digital systems, and diagnostic technology. Research on equitable public-health human-resource allocation demonstrates that achieving fair access requires multidimensional investment and attention to regional and socioeconomic differences (30). Similarly, unequal access to healthcare among different social and gender groups shows that service availability, affordability, and social position jointly influence utilization (5). Thus, the positive coefficients for healthcare access and quality may represent beneficial expansion rather than inefficient spending, particularly where increased expenditure corresponds to reduced unmet need.

The qualitative findings reinforced the quantitative results by identifying major differences in policy design and financing structures. In Iran, policy documents emphasized inadequate insurance coverage, unequal access, financial dependence on constrained public resources, and difficulties experienced by low-income populations. In Germany and France, the dominant themes were universal insurance coverage, public financing, protection of vulnerable groups, and reduced out-of-pocket expenditure. These findings align with evidence that household out-of-pocket expenditure varies according to institutional arrangements, macroeconomic conditions, and the capacity of health systems to pool financial risk (8). Regional studies have likewise demonstrated that disparities in health

outcomes persist where financing, resources, and services are unevenly distributed (9). The comparative findings therefore indicate that the consequences of inequality for expenditure cannot be understood without examining who pays, how resources are pooled, and whether access is guaranteed independently of income.

The results further suggest that preventive and social policies play a critical role in controlling long-term expenditure. Environmental degradation, food insecurity, technological inequality, and income disparities can jointly reduce quality of life and increase healthcare needs (27). Provincial evidence has also shown that environmental degradation and income disparity can simultaneously influence population health (28). Moreover, efficient environmental governance can improve life satisfaction and potentially reduce health risks associated with pollution and poor living conditions (29). These studies support the broader interpretation that health expenditure is partly generated outside the healthcare sector. Policies addressing housing, employment, environmental protection, food availability, education, and social protection may therefore reduce future medical expenditure by preventing disease and improving population resilience.

The study's findings regarding insurance coverage and pharmaceutical access also have important implications. In systems with comprehensive reimbursement, increased expenditure may reflect greater utilization of necessary medicines and services, while in less-protective systems, patients may face high out-of-pocket costs or forgo treatment. Evidence from drug-price negotiation policies indicates that reimbursement and price regulation can improve medicine accessibility and utilization while affecting total expenditure (25). Household expenditure behavior is also influenced by subjective perceptions of social position and comparison with peers, which can shape health-related purchasing decisions (10). Low-income expenditure constraints may produce long-term developmental and psychological risks, particularly among children (11). Hence, health-financing policy must address both the price of care and the unequal ability of households to respond to health needs.

The comparative pattern observed in this study also supports a life-course and multidimensional understanding of social-class disparity. Economic inequality may arise from education, employment, migration, ethnicity, gender, or accumulated wealth. Differences in human development across social and religious groups indicate that access to health-enhancing resources is not evenly distributed (17). Migration and local income disparity may alter labor-market conditions and access to public resources over time (16). The economic disparity between ethnic populations may also persist even when households reach nominally similar class positions (15). Young people who experience difficult transitions from education to employment may face long-term risks of exclusion, unstable income, and insufficient social protection (19). These findings help explain why income inequality can continue to affect health expenditure even in countries with broad healthcare coverage: healthcare systems can reduce financial barriers, but they cannot fully eliminate the cumulative health consequences of unequal social conditions.

Finally, the results should be interpreted in light of recent global health shocks. The COVID-19 pandemic illustrated how excess mortality can reverse improvements in life expectancy and expose major regional disparities, particularly across Europe (26). The pandemic also demonstrated the convergence of public-health crises, environmental threats, and global inequality (1). Budgetary responses to such crises frequently require difficult trade-offs among health, education, nutrition, and social protection (2). The present findings therefore have relevance beyond the three countries examined. They suggest that resilient health systems must be capable of financing routine care, population aging, chronic disease, and unexpected emergencies without transferring disproportionate costs to disadvantaged households. Overall, the convergence of the quantitative, qualitative, and comparative findings indicates that social-class disparity and life expectancy are significant drivers of health

expenditure, but their magnitude and social consequences are strongly moderated by insurance design, public financing, resource distribution, and the accessibility and quality of healthcare services.

This study had several limitations. First, the analysis relied primarily on secondary country-level data, which may conceal substantial variation within each country across regions, age groups, occupational categories, and socioeconomic classes. Second, the relatively short observation period and the small number of countries limited the statistical power and external generalizability of the panel-data estimates. Third, the use of the Gini coefficient as the principal indicator of social-class disparity may not capture other important dimensions of inequality, such as wealth, employment security, educational status, gender, ethnicity, migration status, and geographic disadvantage. Fourth, adult literacy was used as a proxy for health literacy, although general literacy does not fully represent individuals' ability to access, understand, evaluate, and apply health information. Fifth, differences in national data-reporting systems, definitions of health expenditure, and measurement practices may have affected direct comparability. Finally, the observational design does not allow definitive causal conclusions, and possible reverse causality between health expenditure, life expectancy, and healthcare quality cannot be completely excluded.

Future studies should examine a larger group of countries with different welfare-state and health-financing models and use longer time series to evaluate whether the identified relationships remain stable across economic cycles, demographic transitions, and public-health emergencies. Researchers should incorporate disaggregated regional and household-level data to distinguish aggregate health expenditure from out-of-pocket expenditure, catastrophic health spending, and unmet healthcare needs. Additional indicators of inequality, including wealth distribution, employment status, educational attainment, gender, rural–urban residence, and insurance status, should be included to provide a more comprehensive representation of social-class disparity. Future research could also employ dynamic panel models, instrumental-variable techniques, multilevel analysis, or structural equation modeling to address endogeneity and examine indirect pathways through chronic disease, healthcare access, insurance coverage, and health literacy. Qualitative interviews with policymakers, healthcare managers, insurers, providers, and vulnerable households would further clarify how institutional arrangements influence the relationship between inequality, longevity, and expenditure.

Policymakers should strengthen financial protection by expanding comprehensive insurance coverage, reducing direct household payments, and providing targeted subsidies for low-income, older, unemployed, informally employed, and geographically disadvantaged populations. In Iran, priority should be given to integrating fragmented insurance arrangements, improving the stability of public healthcare financing, and allocating resources according to population need rather than historical distribution patterns. Preventive care, primary healthcare, chronic-disease management, and healthy-aging programs should be expanded to reduce the need for costly late-stage treatment. Governments should also improve the geographic distribution of healthcare personnel and facilities, regulate medicine and treatment prices, and establish systematic monitoring of health-equity indicators. Because many determinants of healthcare expenditure originate outside the health sector, coordinated policies in employment, education, housing, environmental protection, nutrition, and social welfare should be incorporated into national health-expenditure strategies.

Acknowledgments

We would like to express our appreciation and gratitude to all those who helped us carrying out this study.

Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

All ethical principles were adhered in conducting and writing this article.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

Funding

This research was carried out independently with personal funding and without the financial support of any governmental or private institution or organization.

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