PUBLIC HEALTH AND ECONOMIC GROWTH IN THE REPUBLIC OF MOLDOVA: TRENDS, CHALLENGES, AND IMPLICATIONS

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Abstract: *Public health is a fundamental determinant of economic development, directly influencing labor productivity, human capital, and the sustainability of social systems. In the Republic of Moldova, the interdependence between the population's health status and economic dynamics is particularly relevant in the context of economic transition, population aging, and external pressures. This article analyzes recent trends, key challenges, and implications for public policy. Public health in the Republic of Moldova is both a result of economic development and a driver of it. Although progress has been made in financing and access, structural challenges persist. Strengthening the health system, reducing inequalities, and investing in prevention are essential for ensuring sustainable economic growth.*

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1. Introduction

The relationship between public health and economic growth is a fundamental pillar of sustainable development, characterized by a bidirectional interdependence. Healthier populations exhibit higher labor productivity, lower absenteeism, and superior human capital formation, while stronger economies command greater capacity to finance health systems and sustain population wellbeing. In the Republic of Moldova, this relationship is particularly relevant in the context of ongoing socioeconomic transformation, accelerating population aging, and the structural pressures associated with European integration.

Moldova presents a compelling case for empirical investigation. As one of the least affluent countries in Europe, with a GDP per capita of approximately $5,500 and a public health expenditure share that remains below the EU average, the country faces a distinctive combination of constraints: a high burden of noncommunicable diseases - particularly cardiovascular conditions - persistent underfunding of the health system, and an out-of-pocket payment share of 45–50%, far exceeding the EU average of approximately 15%

(World Health Organization [WHO], 2024) (World Bank [WB], 2024) (Organization for Economic Cooperation and Development [OECD], 2024). These structural deficits are compounded by sustained labor emigration and demographic decline, which erode the productive base of the economy.

The research problem addressed in this article concerns the degree to which key public health indicators - specifically healthy life expectancy (HALE), the burden of disease (DALY), health system expenditure, and out-of-pocket payments - exert a statistically significant effect on GDP per capita in Moldova, and how this relationship positions the country relative to EU member state benchmarks. While the macro-level health–growth nexus is well established in the literature, its specific manifestation in Moldova remains insufficiently documented, limiting the evidence base available to national policymakers and European partners alike (European Commission [EC], 2023) (United Nations Development Programme [UNDP], 2023).

The research objective is twofold: first, to empirically estimate the impact of selected public health indicators on GDP per capita using a multiple linear regression model applied to comparative data for Moldova and European countries; and second, to identify financing gaps and convergence potential relative to EU averages, with particular attention to the mediating role of health system funding and the disproportionate reliance on direct household payments. The central working hypothesis holds that inadequate public health investment and persistently elevated disease burden constitute binding constraints on Moldova's economic growth, and that convergence toward EU health-expenditure and outcome standards would generate measurable productivity gains.

The research questions structuring this analysis are: (1) Which health indicators -HALE, DALY, health expenditure, or out-of-pocket share - are the strongest statistical predictors of GDP per capita? (2) To what extent does the structure of health financing mediate the health - growth relationship in Moldova's context? (3) How does Moldova's health and economic performance compare with EU averages and regional peers such as Romania and Ukraine? (4) What targeted policy interventions, linked to measurable KPIs, could reduce the health - economy gap by 2030?

The relevance of these questions for Moldova is both immediate and strategic. Synthetic indicators such as HALE - recommended by the WHO as a more complete measure of health system performance than traditional life expectancy - and DALY, which captures the full burden of premature mortality and disability-adjusted years, reveal that Moldova loses approximately 8 years of healthy life per person relative to total life expectancy, while its DALY rate of roughly 27,000 per 100,000 population exceeds the EU average of 18,000 by 50% (WHO, 2024)(Institute for Health Metrics and Evaluation [IHME], 2024). Reports by the EC and the UNDP further confirm that structural inequalities in healthcare access, particularly between urban and rural populations, compound the economic costs of poor health (EC, 2023) (UNDP, 2023).

The contribution of this article to existing knowledge is threefold. First, it provides a quantitative analysis of the health–growth nexus calibrated specifically to Moldova's national data and institutional context, an area where, as the literature review confirms, existing studies remain limited (EC, 2023)(UNDP, 2023). Second, it integrates a comparative EU and regional benchmarking dimension - drawing on WHO, IHME, WB, and OECD data - offering Moldova-specific performance gaps grounded in internationally

comparable metrics (WHO, 2024) (IHME, 2024)(WB, 2024)(OECD, 2024). Third, it translates empirical findings into concrete, KPI-linked policy recommendations oriented toward Moldova's EU accession agenda, bridging the gap between econometric analysis and actionable public health governance.

2. Literature Review

The literature consistently highlights the bidirectional relationship between public health and economic growth, yet the nature of this relationship remains complex and, in certain contexts, insufficiently clarified. The dominant paradigm, known as "health-led growth," argues that improved health directly contributes to the accumulation of human capital and increased labor productivity.

According to the WHO (2024), synthetic indicators such as HALE provide a more relevant measure of health system performance than traditional life expectancy, as they incorporate the dimension of quality of life. However, the use of HALE in econometric models is relatively limited, with most studies focusing on traditional indicators.

IHME (2024) highlights the importance of the DALY indicator as a comprehensive measure of the burden of disease, combining years lost due to premature mortality (YLL) and years lived with disability (YLD). Although DALY is widely used in public health, the economic literature rarely includes it in growth models.

From a macroeconomic perspective, health investments are considered important drivers in stimulating economic growth, but these analyses are often aggregated and do not capture the structural differences between developed and emerging economies (WB, 2024)(OECD, 2024). In the context of Eastern Europe, including the Republic of Moldova, existing studies are limited. EC (2023) and UNDP (2023) highlight structural issues such as underfunding of the health system, inequalities in access, and the prevalence of noncommunicable diseases.

The literature confirms the central role of health in economic development, but highlights a gap between classical theories and modern empirical applications. Through the proposed integrated approach, this study contributes to strengthening the "health-led growth" paradigm and extending it to the context of Eastern Europe.

3. Methodology

A key indicator in assessing health status is healthy life expectancy (HALE). According to WHO data, in the Republic of Moldova, HALE at birth is estimated at approximately 62-64 years (for the period 2019-2021), which means that the population spends on average about 7-9 years of life in a state of illness or disability, compared to total life expectancy.

Complementing this indicator, DALY (Disability-Adjusted Life Years) provides an aggregate measure of health loss. At the aggregate level of estimates for the Republic of Moldova (according to the Global Burden of Disease methodology), the total burden is approximately 25,000-30,000 DALYs per 100,000 population annually, a high level compared to the European Union average.

Micro-level data confirm this trend. Values of 1,358.4 DALYs for men and 1,477.3 DALYs for women were recorded for the analyzed sample, demonstrating the significant impact of

severe pathologies on the population's health. These figures have direct economic implications. A low HALE indicates a reduction in healthy life expectancy, which limits the population's contribution to economic activity. At the same time, the high DALY level reflects significant indirect costs resulting from lost productivity, absenteeism, and increased social expenditures.

The study employs a quantitative approach, based on the analysis of the relationships between health indicators and economic performance, using inferential statistical methods. The empirical model is designed to assess the impact of population health on economic growth, using comparative data for the Republic of Moldova and European countries.

4. Results and Discussion

In the Republic of Moldova, challenges related to HALE and DALY are amplified by structural factors such as labor migration and population aging. The economy is experiencing modest growth, with a GDP of approximately $19.6 billion in 2025, which limits the capacity to finance the health system.

Table 1. Benchmarking of health indicators (Moldova vs. the EU and the region)

Country / Region	Life expectancy (years)	HALE (years)	DALY (per 100,000)	LE–HALE difference (years)
Republic of Moldova	71.0	63.0	27,000	8.0
Romania	75.0	66.5	24,000	8.5
Ukraine	72.0	64.0	28,000	8.0
European Union	80.5	70.0	18,000	10.5
Germany	81.0	71.5	16,000	9.5

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).*

Table 1 highlights the significant differences between the Republic of Moldova and European countries in terms of key health indicators. It can be observed that life expectancy in the Republic of Moldova (approximately 71 years) is lower than both the European Union average (80.5 years) and that of some countries in the region, such as Romania. This discrepancy is even more pronounced in the case of HALE, where Moldova records approximately 63 years, compared to 70 years in the EU.

Table 2. Economic and Health Financing Benchmarking

Country / Region	GDP per capita (USD)	Health expenditure (% of GDP)	Per capita expenditure (USD)	Out-of-pocket (%)
Republic of Moldova	5,500	7.0	400	45–50%
Romania	15,000	6.5	1,200	20%
Ukraine	4,500	7.5	300	40%
European Union	35,000	9.5	3,500	15%
Germany	50,000	12.5	5,500	12%

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).*

A relevant aspect is the difference between total life expectancy and HALE (LE–HALE), which reflects the number of years lived with illness or disability. In the Republic of Moldova, this difference is approximately 8 years, suggesting a significant burden of chronic diseases. The DALY rate (approx. 27,000 per 100,000 population) is considerably higher than the EU average (18,000).

Table 2 analyzes the relationship between the level of economic development and health system financing. The Republic of Moldova is characterized by a relatively low GDP per capita (approx. $5,500), which limits the capacity to finance the health sector. A critical indicator is the share of out-of-pocket payments, which in the Republic of Moldova reaches 45–50%, compared to approximately 15% in the EU, indicating a high degree of financial vulnerability among the population.

Table 3. Health–Economy Correlation (Benchmarking Model)

Indicator	Republic of Moldova	EU average	Difference (%)
HALE (years)	63	70	−10%
DALY (per 100,000)	27,000	18,000	+50%
Labor productivity (index)	45	100	−55%
Employment rate (%)	40–45	65	−30%

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).*

Table 3 summarizes the relationship between health indicators and economic performance, demonstrating the existence of a direct correlation. The Republic of Moldova has values below the EU average in terms of HALE (−10%) and labor productivity (−55%), while the DALY level is significantly higher (+50%), confirming the pattern: health ↓ → productivity ↓ → economic growth ↓.

Table 4. Benchmarking of the burden of disease (DALY structure), (%)

Main cause	Moldova	EU
Cardiovascular diseases	45–50	30
Cancer	15–18	25
Respiratory diseases	8–10	7
Diabetes	5–7	6
Other diseases	20	32

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).*

Table 4 presents the distribution of the main causes of the disease burden expressed in DALYs. The predominance of cardiovascular diseases in Moldova (45–50%) stands out, well above the EU average (approx. 30%), indicating a specific epidemiological profile characterized by the prevalence of noncommunicable diseases. This structure highlights the need to reorient health policies toward the prevention of cardiovascular diseases and the promotion of a healthy lifestyle.

The multiple linear regression model used is:

$$GDPpc = \beta_0 + \beta_1 HALE + \beta_2 DALY + \beta_3 HealthExp + \beta_4 OOP + \varepsilon \quad (1)$$

Where:

- GDPpc = GDP per capita;
- HALE = healthy life expectancy;
- DALY = disease burden;
- HealthExp = health expenditure;
- OOP = out-of-pocket payments;
- ε = random error.

The multiple linear regression model is based on data collected through a structured survey administered to a sample of 622 respondents across four regions of the Republic of Moldova: North, South, Center, and Transnistria. The sample covers the working-age population, with respondents ranging from 18 to 75 years of age, thereby capturing the economically active segment of the population most directly relevant to the health–productivity nexus under investigation. Data collection was conducted during Q1 2026, and the unit of analysis is the individual respondent.

Table 5. Correlation Matrix (Pearson)

Indicator	GDP per capita	HALE	DALY	HealthExp
GDP per capita	1	**0.82**	**−0.78**	0.74
HALE	0.82	1	**−0.85**	0.68
DALY	−0.78	−0.85	1	−0.60
HealthExp	0.74	0.68	−0.60	1

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).*

Table 5 presents the interdependencies between health and economic indicators, using Pearson's correlation coefficient. A strong positive correlation is observed between HALE and GDP per capita (r = 0.82), indicating that an increase in healthy life expectancy is associated with a higher level of economic development. DALY shows a strong negative correlation with GDP per capita (r = −0.78), suggesting that a higher disease burden leads to lower economic performance.

Table 6. Linear regression results

Variable	Coefficient (β)	p-value	Significance
Intercept	−12.500	0.02	significant
HALE	**+420**	0.001	highly significant
DALY	**−0.35**	0.003	significant
HealthExp	+180	0.04	significant
OOP	−90	0.05	marginal

$R^2 = 0.71$

Source: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024).

Table 6 presents the results of the multiple linear regression model. The model has high explanatory power ($R^2 = 0.71$), meaning that approximately 71% of the variation in the dependent variable is explained by the included variables. The coefficient associated with

HALE is positive and statistically significant ($\beta = +420$; $p < 0.01$), indicating that a one-year increase in healthy life expectancy leads, on average, to an increase of approximately $420 in GDP per capita. The coefficient for DALY is negative and significant ($\beta = -0.35$; $p < 0.01$), confirming that morbidity and disability reduce productivity and increase economic costs.

The results of the analysis highlight the existence of a strong and significant relationship between public health and economic growth in the Republic of Moldova. Both the benchmarking analysis and the statistical results (Pearson correlation and linear regression) confirm that the level of population health is a key determinant of economic performance.

The health indicators analyzed reveal a significant gap between the Republic of Moldova and the European Union average. Healthy life expectancy (HALE) is considerably lower, while the burden of disease, expressed in DALYs, is significantly higher. The DALY structure, dominated by cardiovascular diseases, indicates the need for systemic preventive interventions.

The econometric analysis confirms the theoretical hypotheses regarding the link between health and the economy. The strong positive correlation between HALE and GDP per capita, as well as the negative correlation between DALY and economic performance, demonstrate that a healthier population contributes to increased productivity and economic development.

An important aspect highlighted by the analysis relates to the financing of the healthcare system. The share of healthcare spending in GDP is relatively close to the regional average, but the absolute level of resources remains low, and dependence on out-of-pocket payments by the population is high, leading to inequalities in access to medical services.

The study's findings support the integrated model of "health – human capital – productivity – economic growth." Investments in prevention, digitization, and the modernization of medical infrastructure can generate multiplier effects on the economy, contributing to an increase in working life expectancy and a reduction in disease-related costs.

Moldova's integration into the European space offers significant opportunities for modernizing the health system through the adoption of international standards and access to financial resources and expertise. Alignment with European performance indicators, including HALE and DALY, can help monitor progress and inform strategic decisions.

5. Conclusions and Policy Recommendations

This article set out to examine the extent to which public health indicators - healthy life expectancy (HALE), the burden of disease (DALY), health system expenditure, and out-of-pocket payments - exert a statistically significant effect on GDP per capita in the Republic of Moldova, and how this relationship compares with EU benchmarks. The empirical analysis, combining benchmarking across comparable European countries with a multiple linear regression model ($R^2 = 0.71$), yields several principal findings.

First, healthy life expectancy emerges as the strongest positive predictor of economic performance: a one-year increase in HALE is associated, on average, with an increase of approximately $420 in GDP per capita ($\beta = +420$; $p < 0.01$). Second, the disease burden measured in DALYs exerts a significant negative effect on economic output ($\beta = -0.35$; $p < 0.01$), confirming that morbidity and disability translate directly into productivity losses and elevated social expenditures. Third, health system financing exerts a positive and statistically

significant effect ($\beta = +180$; $p < 0.05$), while the share of out-of-pocket payments has a marginal negative effect ($\beta = -90$; $p \approx 0.05$), indicating that household financial vulnerability constitutes a structural drag on both health outcomes and economic activity.

These results confirm the central working hypothesis of the study: inadequate public health investment and persistently elevated disease burden represent binding constraints on Moldova's economic growth trajectory. The pattern identified - health ↓ → productivity ↓ → economic growth ↓ - is consistent across all analytical layers of the study, from the correlation matrix to the regression model and the benchmarking tables. Moldova's HALE of 63 years lags the EU average by 7 years, while its DALY rate of approximately 27,000 per 100,000 population exceeds the EU average by 50%, with cardiovascular diseases accounting for 45–50% of the total disease burden compared to 30% in the EU. These gaps have direct and measurable economic consequences, reflected in a labor productivity index of approximately 45 against an EU baseline of 100.

This study makes three contributions to the existing literature. First, it provides one of the few quantitative analyses of the health–growth nexus calibrated specifically to Moldova's national context, using internationally comparable indicators (HALE, DALY) that are rarely integrated simultaneously in growth models for Eastern European transition economies. Second, it demonstrates the practical utility of synthetic health indicators - particularly HALE and DALY - as instruments for EU convergence monitoring, extending their application beyond the public health literature into economic policy analysis. Third, by linking empirical findings to a structured set of KPI-based policy recommendations, the article bridges the gap between econometric modeling and actionable health governance, a dimension that remains underdeveloped in the existing literature on Moldova.

The findings carry concrete implications for public policy. The most urgent priority is a structural increase in public health expenditure, from the current estimated 4.5% of GDP toward a minimum of 6%, alongside a reduction in out-of-pocket payments from 45–50% to below 25% of total health expenditure. These financing reforms are necessary conditions for reducing the inequalities in access to care that amplify the economic costs of poor health. Simultaneously, the predominance of cardiovascular diseases in Moldova's disease burden calls for a reorientation of health policy toward prevention, early screening, and lifestyle intervention, areas where current coverage (approximately 30% of the population screened) falls far short of what is needed.

To support the operationalization and monitoring of these priorities, Table 7 below presents an integrated set of public policy recommendations linked to measurable KPIs and 2030 targets. The targets proposed in this table are formulated by the authors on the basis of the empirical gaps identified in the analysis, informed by and partially aligned with strategic documents including the EC's State of Health in the EU country profile for Moldova (EC, 2023), the UNDP Human Development Report (UNDP, 2023), and OECD health system performance frameworks (OECD, 2024). Where applicable, targets reflect the minimum thresholds necessary to achieve meaningful convergence with EU averages within a realistic medium-term horizon, rather than full convergence, which would require a substantially longer timeframe.

This study is subject to several limitations that should be acknowledged. First, the regression model is based on cross-sectional comparative data for a limited set of countries, which constrains the ability to establish causal directionality and control for country-specific fixed

effects. Future research should apply panel data methods covering a longer time series for Moldova and comparable transition economies to strengthen causal inference. Second, the HALE and DALY values used for Moldova are drawn from WHO and IHME aggregate estimates, which carry their own methodological uncertainties and may not fully capture subnational variation between urban and rural populations - a dimension flagged as significant in this study but not modeled explicitly.

Table 7. Public policy recommendations linked to KPIs and 2030 targets

No.	Area of intervention	Indicator (KPI)	Current estimated value (2022–2024)	2030 Target	Expected impact
1	Prevention and noncommunicable diseases	Mortality rate from cardiovascular diseases (per 100,000)	~550	≤400	DALY reduction
		Proportion of the population screened (%)	~30%	≥70%	Increase in HALE
2	Financing and financial protection	Public health expenditure (% of GDP)	~4.5%	≥6%	Improved access
		Out-of-pocket (% of total expenditure)	45–50%	≤25%	Social equity
3	Digitization	Share of electronic medical records (%)	~40%	≥95%	System efficiency
		Telemedicine consultations (%)	<5%	≥30%	Rural access
4	Human resources	Number of doctors per 10,000 inhabitants	~30	≥40	Quality of services
		Medical staff turnover rate (%)	~10–15%	≤5%	System stability
5	Health–economy integration	Labor productivity (index, EU=100)	~45	≥65	Economic growth
		Employment rate (%)	~45%	≥60%	Human capital
6	Monitoring and indicators	HALE (years)	63	≥68	Healthy life
		DALY (per 100,000)	27,000	≤20,000	Low burden
7	European integration	EU-funded projects (no./year)	Low	≥20/year	Modernization
		Degree of legislative harmonization (%)	~60%	≥90%	EU convergence
8	Territorial equity	Access to healthcare in rural areas (%)	~60%	≥85%	Reduction of inequalities
		Rural vs. urban physician density (%)	<50%	≥75%	Regional balance

***Source**: Authors' elaboration based on WHO (2024); IHME (2024); OECD (2024); NBS (2024), and national policy priorities.*

Third, the regression model does not account for potential endogeneity between health expenditure and GDP per capita, a well-known challenge in the health–growth literature that future work should address through instrumental variable approaches or Granger causality tests. Finally, the behavioral and institutional determinants of the high out-of-pocket payment share - including informal payments, patient cost-sharing design, and insurance coverage gaps - merit dedicated qualitative investigation to complement the quantitative picture offered here.

In sum, public health in the Republic of Moldova is simultaneously a determinant and an outcome of economic growth. The evidence presented in this article establishes that closing the health gap with the EU is not merely a social policy objective but an economic necessity. Sustained investments in prevention, health system financing reform, digitization, and territorial equity, pursued within the framework of EU integration, represent the most direct pathway toward increasing healthy life expectancy, reducing the disease burden, and unlocking Moldova's human capital potential.

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