Project HealthCare

GOVERNMENT-CENTRIC FISCAL ANALYTICAL FRAMEWORK FOR EVALUATING BURDEN OF DISEASE IN HUNGARY:

MULTIPLE MYELOMA

Slovak Republic

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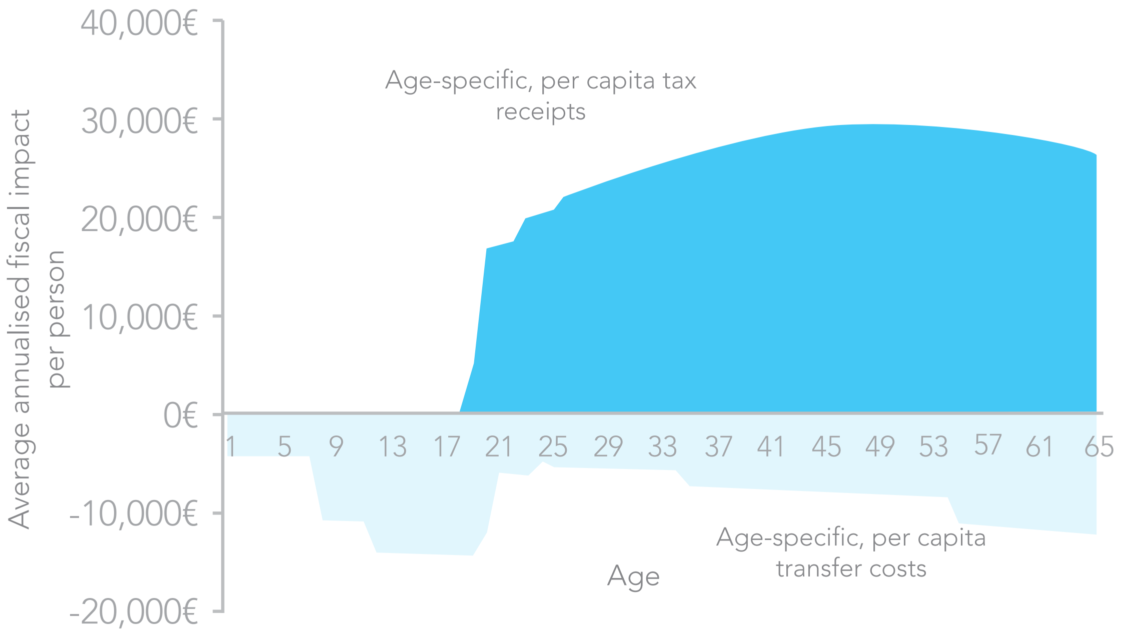
Introduction to Fiscal Modelling in Health: Concepts, Rationale, and Basic Principles

Fiscal modelling reframes health interventions as investments with measurable consequences for public accounts. Instead of restricting value assessment to health-sector costs and patient outcomes, the fiscal lens asks how changes in morbidity and mortality alter tax receipts and government transfer payments across the life course. Put simply, healthier populations work more, earn more, and pay more in taxes; they also consume different mixes of publicly funded services. A rigorous fiscal model quantifies these effects in monetary terms to inform budgetary planning and intersectoral policy decisions. The enclosed article articulates this government-perspective framework and shows how to translate health gains into fiscal consequences over time.

At the core of fiscal modelling is a shift in perspective. Conventional welfare-economic evaluations - exemplified by cost-effectiveness analysis- typically exclude taxes and transfers on the premise that such flows are neutral from a societal welfare standpoint. A finance ministry cannot take that view. Lost income taxes when illness pushes people out of work, increased disability allowances, early pension claims, and higher age-related service use are not neutral - they are observable line items with direct implications for sustainability and growth. A government-perspective analysis, therefore, complements cost-effectiveness by explicitly tracing how an intervention reshapes both sides of the public ledger: revenues and expenditures. In doing so, it acknowledges that many of the largest fiscal effects of disease - especially in working-age cohorts and in children who become future taxpayers - lie outside the health budget itself.

The life-course view underpins this approach. The analysis presents a fiscal balance-sheet intuition: at each age, individuals generate per-capita tax receipts and incur per-capita public expenditures (education, healthcare, disability, pensions, and other transfers). Health shocks that reduce participation or productivity shift the expected tax path downward while lifting transfer needs; effective interventions partially reverse those shifts. The following picture illustrates this principle visually, contrasting the trajectories of age-specific tax receipts and transfer payments and clarifying where health improvements can produce fiscal gains by preventing early exit from the labour force or by deferring costly transfers.



A practical fiscal model operationalizes this intuition with discounted cash-flow logic applied to a defined cohort. In its simplest form, the model is a government cost–benefit analysis. Costs are the present value of the intervention (and any consequent public service use); benefits are the present value of incremental direct and indirect tax revenues attributable to improved health and of transfer cost offsets that arise when disability, unemployment, or early retirement are avoided. Because both costs and benefits are denominated in currency, standard financial metrics - net present value (NPV), return on investment (ROI), and internal rate of return (IRR) - can be reported alongside familiar health-economic outputs. This enables treasury-style interpretation without abandoning clinical or societal metrics.

Methodologically, the framework adapts concepts from generational accounting to the program level. Rather than modelling all interacting cohorts in an economy, a fiscal health model isolates the cohort receiving a specific intervention and projects its tax and transfer streams under alternative scenarios (e.g., with vs. without the intervention). The projection links clinical pathways to labour-market states and public program eligibility. Typical ingredients include age-specific participation rates, wages and earnings growth, tax schedules and social contributions, probabilities of disability or early retirement, and age-graded public expenditures beyond health (notably pensions and long-term care). These are combined with disease progression and mortality risks, drawing on the same state-transition or survival models used in cost-effectiveness analysis. The technical equations are straightforward discounting of annual taxes minus transfers over the relevant time horizon, but the credibility of results depends on carefully specified epidemiology and realistic fiscal parameters.

The value of this framework lies in the questions it can answer. For example, what is the net fiscal impact of preventing a 58-year-old worker's health-related early retirement? The model will capture not only additional income and consumption taxes during the extra working years but also the reduction in disability benefits and the deferral of pension claims. Likewise, for paediatric or adolescent interventions, preventing impairments that depress educational attainment can raise lifetime earnings and, by extension, lifetime tax contributions - effects that are fiscally material yet typically invisible in health-budget appraisals. The same logic extends to vaccines, smoking cessation programs, reproductive medicine, and chronic-disease treatments where morbidity reductions translate into higher long-run productivity and lower transfer reliance.

Importantly, fiscal modelling should not be misconstrued as a replacement for cost-effectiveness analysis or as a mechanism to prioritize only those who work. The appraisal environment should be pluralistic. Health systems may aim to maximize health outcomes (e.g., quality-adjusted life years), while central government must also ensure macro-fiscal sustainability. A combined evidence set - clinical value, health-system affordability, and fiscal consequences - enables transparent trade-offs. Moreover, retirees continue to pay taxes and typically carry positive "fiscal residuals" from decades of contributions; the fiscal perspective can therefore support equity-aware allocation when interpreted over the full life course rather than a single snapshot year.

From an implementation standpoint, a minimal, defensible fiscal model follows a sequence. First, specify the cohort and comparator, mapping disease states to labour-market and transfer states over time. Second, assemble fiscal schedules: age-specific tax receipts (income, payroll, indirect) and age-specific public expenditures (healthcare by state, disability and unemployment benefits, pensions, and other transfers). Third, link clinical transitions to fiscal states with evidence on how morbidity affects participation, hours worked, and productivity. Fourth, discount all streams to present value at a government-approved rate, and report gross and net fiscal effects alongside program costs. Finally, stress-test with sensitivity analysis: vary key assumptions (wage growth, participation elasticities, disability risks, mortality) and present scenario ranges to decision-makers. This workflow keeps the model communicable to finance audiences while retaining clinical integrity.

The policy relevance is twofold. First, in tax-financed systems, sustainability depends on the simultaneous evolution of revenues and expenditures. By showing how effective care preserves the tax base and moderates transfers, fiscal models reposition parts of health spending from "cost pressure" to "productive investment," informing negotiations over budgets and, potentially, innovative finance mechanisms such as health impact bonds where repayments are tied to verified cross-sector savings. Second, in multi-payer environments, the framework reveals cross-budget externalities: a health intervention funded by one payer may generate savings or revenues for other public accounts, making the case for central co-funding or interdepartmental agreements.

Two cautions are essential for credible use. First, causality must be argued carefully: estimates of productivity gains and transfer reductions should be anchored in robust evidence, not assumed.

Second, distributional implications should be examined explicitly. A portfolio oriented solely by near-term fiscal yield could under-serve high-need groups; the remedy is not to discard the fiscal lens but to present it alongside equity, clinical urgency, and ethical commitments so that decision-makers can balance objectives transparently. Fiscal modelling broadens, rather than narrows, the conversation about value by connecting health investments to the realities of public finance.

In summary, fiscal modelling provides a disciplined way to quantify how health interventions reshape government budgets over the life course. By integrating epidemiology with labour - market behaviours and public finance schedules, the framework expresses program consequences in terms familiar to treasuries - NPV, ROI, and IRR - while remaining compatible with established health-economic methods. Used responsibly, it clarifies that parts of the health budget are engines of revenue preservation and transfer avoidance, and that sustainable health systems require visibility on both outcomes and fiscal flows.

Inputs – data needed for the model

To populate the model, each country requires a specific approach, although the parameters are more or less the same, to effectively model the fiscal impacts of selected diseases. There are two basic types of data - clinical and economic- that need to be addressed, sought out or requested, and incorporated into the model in the correct format. While the modeling may differ for each country, the following data sources are crucial starting points for any future modeling.

PART 1: CLINICAL DATA – ASSOCIATED WITH MM

Component	Years	Age Groups (Y/N)	Details
Mortality	2009+	5 Years Age Groups	Man, Women, All, Total
Incidence	2009+	5 Years Age Groups	Man, Women, All, Total
Paid Sick Leave	2009+	10 Years Age Groups (nice to have)	Man/Women/Total Years/Total days/Total Costs/Cost per day/Average days on Sick Leave
Paid Disability	2009+	10 Years Age Groups (nice to have)	Man/Women/Total Under/Above 70%/ Total Number/ Costs
Disability years expectancy	2009+	10 Years Age Groups (nice to have)	Man/Women/Total Years
Healthcare spending	2009+	Nice to have, but not needed.	All MM patients. Total spending include all reimbursed care associated with MM: medications, primary care, secondary care, diagnostics, rehabilitations, transports + any special reimbursed care.

PART 2: ECONOMIC DATA – TOTAL POPULATION OF COUNTRY

Component	Years	Age Groups (Y/N)	Details/Data Sources
Annual gross earnings from employment	2009+	5 Years Age Groups	Before tax, annual, earnings from employment and not from other sources
Employment rate	2009+	5 Years Age Groups	% of population employed
Average annual sick leave allowance	2009+	5 Years Age Groups (Nice to have)	Total in EUR % receiving annual sick leave allowance
Average annual disability pension	2009+	5 Years Age Groups (Nice to have)	Total/Yearly/in EUR % receiving disability pension
Tax Wedge	2009+	N.A.	OECD/Eurostat
Indirect tax e.g. VAT	2009+	N.A.	ECD/Eurostat
Discount rate	Current or latest available	N.A.	European Council, Eurostat, OECD, National Bank of the country, local Ministry of Finance
Inflation Projection	Current or latest available	N.A.	European Council, Eurostat, OECD, National Bank of the country, local Ministry of Finance
GDP per work hour	Current or latest available	N.A.	European Council, Eurostat, OECD, National Bank of the country, local Ministry of Finance
Tax to GDP Ratio	Current or latest available	N.A.	European Council, Eurostat, OECD, National Bank of the country, local Ministry of Finance
Caregivers specifications (if any)	Current or latest available	N.A.	European Council, Eurostat, OECD, National Bank of the country, local Ministry of Finance

FINAL RESULTS

Fiscal Consequences of Multiple Myeloma in the Hungary: Overview from 2009 till 2030

Disclaimer:

Before reading the following report draft, please consider the following points:

1. This report and analysis are based on available data and projections. Actual outcomes may differ due to policy decisions, therapeutic advances, or demographic changes.
2. All suggestions and scenarios are likewise based on the available data; however, they may not reflect the actual status quo and should be considered with certain limitations.
3. The numbers of new and prevalent patients were derived from national statistics provided by local partners. The data are undergoing ongoing verification and may differ from the final figures in the future Hungary publication.

Executive Summary

This report presents a comprehensive government-perspective fiscal analysis of Multiple Myeloma (MM) in Hungary for the period 2009–2030, applying the validated Connolly et al. fiscal consequences framework adapted to Hungarian national data sources. The analysis quantifies how MM affects public finances through direct healthcare expenditures and indirect fiscal losses including tax revenue foregone from patient absenteeism, morbidity, premature mortality, and caregiver workforce impacts.

The total fiscal burden of MM on Hungarian public finances reached €61.2 million in 2024, having grown 182.1% since 2009 — though this trajectory is uniquely non-linear: the burden peaked at €78.9 million in 2021 before declining by 22.5% through 2023, driven by a substantial reduction in healthcare costs as novel therapy prices were renegotiated and biosimilar entries occurred. The burden recovered modestly to €61.2 million in 2024. Under the mean forecast, it is projected to reach €87.1 million by 2030 (+42.3%). It should be noted that total cost aggregation was performed across the entire prevalent MM population (approximately 3,437 patients in 2024), reflecting that costs accumulate continuously across all patients living with the disease. Per-patient estimates throughout this report are standardized to incident (newly diagnosed) cases to ensure comparability with published literature and other country analyses in this series, given that the majority of costs — including diagnostic workup, initial treatment initiation, and associated care coordination — arise at diagnosis. This dual-denominator approach is made explicit wherever per-patient figures are presented.

Hungary's MM fiscal profile differs fundamentally from other Central European countries in this analysis. Healthcare costs constitute only 60.4% of the total burden in 2024 — compared to 85–89% in Croatia and Slovakia — and are projected to represent just 46.4% of total burden by 2030. Indirect costs, driven primarily by substantial patient absenteeism tax losses (€10.5 million) and caregiver absenteeism tax losses (€10.9 million), are growing at 11.5% annually and are projected to surpass healthcare costs by 2029. This represents a structural inversion of the typical MM fiscal profile and has important implications for policy design.

The ROI analysis demonstrates that Hungary's investment in MM healthcare generates substantial indirect fiscal returns: for every €1.00 invested in MM healthcare, €0.80 is recovered in indirect fiscal value over 5 years and €1.05 over 10 years. The 10-year figure exceeding €1.00 indicates that investment in effective MM treatment is, over a decade, fiscally self-financing from the government perspective — a finding that strongly supports the case for maintaining and expanding access to novel therapies.

Combined implementation of three intervention scenarios — caregiver burden reduction, mortality reduction, and productivity improvement — could generate €24.1 million in cumulative fiscal savings over 2024–2030 (4.70% of baseline), primarily through improvements in caregiver and patient workforce participation.

Sensitivity analysis confirms that while healthcare costs remain the primary uncertainty driver (±18.1% total burden swing at ±30% variation), economic parameters — especially average wages and tax wedge — are significantly more influential than in other country analyses (±11.8%), reflecting Hungary's higher indirect cost share. The CG absenteeism rate is a notable driver unique to Hungary (±5.3%), warranting dedicated policy attention.

1. Introduction and Context

1.1 Multiple Myeloma: Disease Overview

Multiple Myeloma (MM) is a haematological malignancy characterized by the uncontrolled proliferation of clonal plasma cells in the bone marrow. As the second most common haematological cancer, MM accounts for approximately 1–2% of all cancers and generates a disproportionate share of oncology healthcare costs due to its chronic, relapsing-remitting course and the high unit cost of novel targeted therapies. The disease affects primarily older adults, with a median age of diagnosis of approximately 63–67 years, and is characterized by significant morbidity including bone pain, renal impairment, anaemia, and immune dysfunction.

Since 2003, the therapeutic landscape for MM has been transformed by successive waves of innovation: first-generation novel agents (bortezomib, thalidomide, lenalidomide), second-generation proteasome inhibitors and immunomodulatory drugs (carfilzomib, ixazomib, pomalidomide), monoclonal antibodies (daratumumab, isatuximab, elotuzumab), and most recently, bispecific antibodies and CAR-T cell therapies. These innovations have extended median overall survival from approximately 3 years in the early 2000s to over 7–8 years for eligible patients in 2024. This extended survival dramatically increases cumulative healthcare costs per patient and lengthens the period of fiscal impact.

In Hungary, the management of multiple myeloma is organized through specialised haematology-oncology centres primarily located in Budapest (Semmelweis University, National Institute of Haematology and Infectious Diseases), Debrecen, Pécs, Miskolc, and Győr. Reimbursement for novel therapies is managed by the National Institute of Health Insurance Fund Management (NEAK — Nemzeti Egészségbiztosítási Alapkezelő) through a drug financing system (TB finanszírozás) that includes both outpatient specialty medication subsidies and in-patient DRG-based reimbursement. Hungary's adoption of novel MM therapies has broadly followed European approval timelines, though with delays relative to Western Europe in some cases.

Based on data from NEAK and the Hungarian Central Statistical Office (KSH — Központi Statisztikai Hivatal), the number of prevalent MM cases in Hungary grew from approximately 2,499 in 2009 to 3,437 in 2024 — a 37.5% increase reflecting both rising incidence and improved survival with modern therapies. Annual MM deaths in Hungary averaged 325–427 per year over the historical period, with projections stabilising at approximately 400 per year through 2030 under the mean forecast scenario.

Epidemiological Snapshot (Selected Years)

Year	2009	2014	2019	2022	2024 (f)
MM Deaths (total)	325	362	382	408	400
Prevalent Patients	2,499	2,771	3,368	3,242	3,437
Incident Cases (New Patients)	570	624	595	650	662

Sources: KSH; NEAK; Fiscal model (Forecast D sheet, Forecast = Mean). (f) = mean forecast. Incident case data from NEAK administrative data (NEW_PATIENTS.csv). 2024–2030 incident figures represent mean projections.

1.2 Hungary's Position in the Regional Context

Hungary's management of multiple myeloma reflects both significant therapeutic progress and systemic constraints that shape both clinical outcomes and the fiscal profile. As a Central European EU member state, Hungary occupies an intermediate position in the European oncology landscape: above the lowest-access countries in terms of novel therapy availability, but substantially below Western European benchmarks for speed of access and five-year survival outcomes.

Hungary has progressively adopted the core classes of novel MM therapies including proteasome inhibitors (bortezomib, carfilzomib, ixazomib), immunomodulatory agents (thalidomide, lenalidomide, pomalidomide), and monoclonal antibodies (daratumumab). However, the pathway from European Medicines Agency approval to NEAK reimbursement decision has historically involved significant delays. According to the EFPIA Patients W.A.I.T. Indicator 2023 Survey, the average time from EU marketing authorisation to patient availability in Hungary is 578 days — approximately 47 additional days beyond the European Union average of 531 days for the same survey cohort. This access delay means that Hungarian MM patients receive novel therapies later than patients in comparable countries, with direct consequences for disease control and the fiscal burden profile.

Hungary's five-year MM survival rate has improved substantially over the study period, from approximately 35–40% in the early 2000s to an estimated 50–55% by 2024. However, this remains below the EU average of approximately 60–65%, reflecting both access delays and the broader mortality disadvantage of Hungary's healthcare system. Hungary's age-standardised cancer mortality rate is among the highest in the EU, and MM contributes to this burden through what are increasingly preventable deaths given the efficacy of available therapies. The cancer incidence rate in Hungary is approximately 10% higher than the EU average, while five-year survival rates remain below EU benchmarks, indicating a healthcare system under structural pressure in its management of oncological diseases (ECIS 2024; OECD/European Commission Country Health Profile 2025).

1.3 Hungary's Epidemiological, Demographic and Economic Context

This analysis applies the government-perspective fiscal consequences framework — a comprehensive approach that evaluates how health conditions influence government accounts through both expenditures and foregone revenues across all affected sectors. Unlike traditional cost-effectiveness analyses that focus narrowly on clinical outcomes and healthcare costs from a payer perspective, this framework captures the full economic footprint of disease including cross-sectoral impacts that ripple through the economy. The methodology recognises that governments, unlike healthcare systems or insurers, must consider not only what they spend but also what they fail to collect when disease prevents economic participation.

Population and demographics: Hungary's population stands at approximately 9.68 million in 2024 (KSH), following decades of demographic contraction from a peak of nearly 10.7 million in 1980. Hungary faces one of the most severe ageing trajectories in the EU, with life expectancy at birth of 76.7 years in 2023 — nearly 5 years below the EU average of 81.3 years. The population over 65 represents approximately 20% of total population, a share projected to rise sharply through 2030 and beyond as the large post-war baby boom cohort enters the highest-cost age bands for healthcare. This demographic trajectory directly amplifies the incidence and prevalence of age-associated cancers including MM.

Workforce contraction: Hungary's working-age population (15–64) is shrinking as emigration of working-age individuals and below-replacement fertility combine with ageing. The employment rate has improved in recent years, reaching 73–78% in core working-age groups by 2024 (KSH, Eurostat), but the absolute size of the workforce is declining. In this context, each MM patient's lost productivity represents a proportionally larger fiscal drain, as the workforce needed to support public finances and social transfers is already under pressure.

Healthcare system: Hungary operates a single-payer system financed primarily through compulsory health insurance contributions managed by NEAK, which has operated under the Ministry of Interior since 2017. In 2023, Hungary devoted 6.4% of GDP to health — compared to an EU average of 10.0% (OECD/European Commission 2025). Per capita healthcare expenditure was €1,925 in purchasing power parity terms in 2023, approximately half the EU average of €3,832 (OECD Health Statistics 2024). The system is financed through compulsory insurance contributions (approximately 58% of total health spending), government budget transfers (15%), out-of-pocket payments (25%), and voluntary insurance (2%). Hungary has the highest out-of-pocket pharmaceutical expenditure as a share of total pharmaceutical spending in the EU — a structural feature that places significant burdens on patients with chronic conditions requiring long-term medication.

Tax structure: Hungary underwent a significant tax reform in 2011 with the introduction of a flat 15% personal income tax rate, replacing a progressive system. This reform substantially reduced the marginal tax rate for higher earners while simplifying compliance. The total tax wedge — combining income tax and social contributions — declined from 54.7% in 2000 to 41.2% in 2022 (OECD Taxing Wages 2023). This declining tax wedge means that, compared to the early part of the study period, each euro of lost wages today generates somewhat less lost tax revenue, creating a downward structural adjustment in the indirect fiscal burden per patient over time. The model incorporates year-specific tax wedge data from the OECD Taxing Wages dataset.

From a government perspective, MM generates fiscal costs through: (a) direct treatment expenditures reimbursed by NEAK; (b) loss of income tax and social contribution revenues from patients unable to work or working at reduced capacity; (c) loss of tax revenues from informal caregivers who reduce employment to support MM patients; (d) excess sick leave and disability pension payments; and (e) lost productivity from the informal care sector. The application of this framework to MM in Hungary has revealed that the disease generates an unusually large caregiver absenteeism fiscal loss relative to other cost components — a distinctive feature of the Hungarian MM fiscal profile that is discussed in detail in Section 3.

2. Data, Methods and Validation

2.1 Core Analytical Framework

The fiscal consequences methodology employed in this analysis evaluates health conditions from a whole-of-government perspective, incorporating all financial flows between citizens and the state that are affected by disease. This comprehensive approach moves beyond the traditional healthcare sector focus to examine how multiple myeloma influences government finances through multiple interconnected channels.

Direct healthcare costs encompass the full spectrum of medical services from initial diagnosis through end-of-life care. For Hungary, these costs are reimbursed primarily through NEAK via two mechanisms: the outpatient specialty medication subsidy scheme (TB finanszírozás) for oral novel agents, and in-patient reimbursement under the DRG-based HBCS system for infusion therapies and hospitalisation episodes. The analysis uses NEAK pharmaceutical expenditure data as the primary source for healthcare cost estimates, with projections based on a statistical forecast incorporating current reimbursement conditions, prevalence trends, and projected treatment duration.

Indirect productivity losses represent the human capital diminished by disease. The analysis employs the human capital approach, valuing lost productivity at age-specific gross wage rates weighted by employment probability. The fiscal model captures: (1) patient absenteeism — work time lost during treatment, medical appointments, and recovery periods; (2) patient morbidity — reduced work capacity among employed patients; (3) patient premature mortality — lost productive years from MM deaths; (4) caregiver employment loss — caregivers who reduce employment or exit the workforce to provide informal care; and (5) caregiver absenteeism — caregivers who remain employed but take absence for caregiving responsibilities. All earnings losses are converted to fiscal losses by applying the year-specific tax wedge from the OECD Taxing Wages dataset for Hungary.

Transfer payment costs — excess sick leave costs and excess disability pension costs attributable to MM — are estimated using age-specific benefit rates from KSH and NEAK data, applied to the modelled excess work incapacity attributable to MM relative to a matched general population.

A specific methodological note applies to disability pension costs. Under Hungarian legislation, multiple myeloma is classified as a condition resulting in permanent disability. Accordingly, patients remain continuously eligible for disability pension throughout the entire duration of their disease, irrespective of year of diagnosis. Upon reaching the statutory retirement age (65 years), patients may choose between disability pension and the regular state pension; given that the disability pension carries a higher average value, it is assumed that MM patients would in practice elect to continue receiving disability pension rather than transition to the standard state pension. For this reason, disability pension costs in this analysis are calculated on the basis of the total prevalent MM population — reflecting the continuous and ongoing nature of eligibility — rather than on incident cases alone. In the absence of Hungary-specific data on the proportion of MM patients actively receiving disability pension, the analytical ratios applied are derived from the comparable Slovak MM fiscal analysis. This approach differs from other indirect cost components, where incident-year normalisation is appropriate because costs are concentrated at diagnosis; for disability pension, the prevalent population is the correct denominator.

2.2 Data Sources and Validation

The robustness of this analysis rests on multiple validated Hungarian national data sources. Primary data derives from: NEAK (pharmaceutical expenditure, treatment costs, reimbursement data, disability benefits, sick leave); KSH (population denominators, employment rates, wage data, demographic projections); Magyar Nemzeti Bank (MNB, economic forecasts and inflation data); and NEAK's pharmaceutical reimbursement database (TB list, drug spending by ICD-10 indication). Caregiver parameters are based on published literature for haematological malignancy caregivers. All monetary values are in nominal EUR, converted from HUF using National Bank of Hungary exchange rates and inflation-adjusted using Hungarian CPI data from the World Bank and KSH.

These domestic sources are supplemented and validated against international benchmarks: the GLOBOCAN database provides regional context for incidence and mortality trends; the European Cancer Information System (ECIS) enables detailed comparisons with neighbouring countries; and the published literature on MM economic burden in Central and Eastern Europe provides cross-validation of per-patient cost assumptions. OECD Health Statistics and Eurostat provide harmonised data for tax wedge, employment rates, and healthcare spending comparisons.

2.3 Healthcare Costs: Note on NEAK Reimbursement Mechanisms

NEAK applies a range of financial arrangements for high-cost oncology pharmaceuticals that affect the interpretation of gross expenditure figures. As with analogous mechanisms in other Central European health systems, NEAK maintains negotiated rebate agreements with pharmaceutical manufacturers for novel agents in the MM therapeutic class, including daratumumab-based combinations and lenalidomide. These arrangements — implemented through mandatory contractual price reductions and volume-based clawback provisions — mean that the gross NEAK expenditure figures used in this model represent an upper bound of the actual fiscal cost to NEAK. The net cost after manufacturer rebates is not publicly disclosed but is estimated to be materially lower than gross figures.

This observation is consistent with the documented 2021–2024 decline in reported MM healthcare costs in the model (from €56.8M in 2021 to €37.0M in 2024 — a 35% reduction), which likely reflects in part the progressive renegotiation of reimbursement conditions as novel therapies moved off-patent or entered second-generation biosimilar competition, and as rebate agreements were renewed under more favourable terms for NEAK. Accordingly, all ROI and sensitivity analyses should be interpreted with this caveat: the true net fiscal burden may be lower than the gross figures presented, and the true ROI would correspondingly be higher.

2.4 Epidemiological Projections

MM deaths in Hungary were available for the years 2009–2023 from KSH national mortality statistics by ICD-10 code (C90.0–C90.3). A mean forecast of 400 deaths per year was applied for 2024–2030, with 95% confidence intervals of 341 (lower) and 460 (upper). Prevalent patient counts were available from NEAK administrative data for 2009–2024. Incident case data were incorporated from published study bi Kiss et al., 2024. All fiscal calculations use the mean forecast estimator for the primary analysis.

3. Results: Levels, Composition, and Trends

3.1 Indirect Fiscal Burden — Excluding Healthcare Costs

Table 3.1 presents the indirect fiscal burden components — representing the government's fiscal losses arising from MM patients' and caregivers' reduced economic participation — for selected years. These components capture the cross-sectoral fiscal impact of MM that lies outside the healthcare budget.

Table 3.1: Indirect Fiscal Burden Excluding Healthcare Costs (Selected Years, EUR)

Component	2009	2014	2019	2022	2024	2030
Tax Loss — Patient Absenteeism	€4.56M	€5.70M	€6.65M	€9.23M	€10.50M	€22.13M
Tax Loss — CG Absenteeism	€4.74M	€10.42M	€11.55M	€11.08M	€10.88M	€19.37M
Tax Loss — Patient Morbidity	€1.15M	€0.96M	€1.30M	€1.45M	€1.58M	€2.81M
Tax Loss — CG Employment	€0.40M	€0.43M	€0.61M	€0.68M	€0.75M	€1.34M
Tax Loss — Premature Deaths	€0.15M	€0.19M	€0.35M	€0.38M	€0.42M	€0.90M
Excess SL + Disability Costs	€0.16M	€0.13M	€0.14M	€0.11M	€0.12M	€0.15M
TOTAL INDIRECT	€11.17M	€17.82M	€20.59M	€22.93M	€24.25M	€46.69M
MM Deaths (proxy)	325	362	382	408	400	400
Per Incident Case (Indirect Only)	€19,596	€28,558	€34,605	€35,277	€36,628	€66,797

Source: Fiscal model (Results sheet, mean forecast). CG = Caregiver. Excess SL + Disability = transfer payment components. Per incident case: 2009 €19,596 | 2014 €28,558 | 2019 €34,605 | 2022 €35,277 | 2024 €36,628 | 2030 €66,797.

The indirect fiscal burden has grown from €11.2 million in 2009 to €24.2 million in 2024 (+117%), with the projection indicating near doubling to €46.7 million by 2030. Patient absenteeism tax losses and caregiver absenteeism tax losses together represent the two dominant indirect components, accounting for approximately 88% of total indirect costs in 2024. The scale of the caregiver absenteeism component (€10.9 million in 2024) is distinctive within the Central European MM analysis and reflects Hungary's specific parameterization of caregiver burden within the fiscal model. The indirect burden grew particularly sharply between 2009 and 2014 (from €11.2M to €17.8M, +59%), primarily driven by the near tripling of the caregiver absenteeism component as model parameterization was refined to reflect Hungarian caregiver employment patterns.

3.2 Total Fiscal Burden — Including Healthcare Cost

Table 3.2 presents the complete fiscal burden including direct healthcare expenditures reimbursed by NEAK. This is the comprehensive government-perspective measure of the disease's total impact on Hungarian public finances. As noted in Section 2.3, the healthcare cost figures represent gross NEAK expenditure before manufacturer rebates; the actual net fiscal burden is likely meaningfully lower.

Table 3.2: Total Fiscal Burden Including Healthcare Costs (Selected Years, EUR)

Component	2009	2014	2019	2022	2024	2030
Healthcare Costs	€10.53M	€8.00M	€50.17M	€49.19M	€36.95M	€40.43M
Total Indirect Costs	€11.17M	€17.82M	€20.59M	€22.93M	€24.25M	€46.69M
TOTAL FISCAL BURDEN	€21.70M	€25.82M	€70.77M	€72.12M	€61.20M	€87.12M
HC as % of Total	48.5%	31.0%	70.9%	68.2%	60.4%	46.4%
MM Deaths (proxy)	325	362	382	408	400	400
Per Incident Case (Total Burden)	€38,070	€41,378	€118,941	€110,954	€92,447	€124,635

Source: Fiscal model (Results sheet, mean forecast). HC = healthcare costs. HC% = HC Costs / Total Fiscal Burden. Per incident case = Total Burden / Annual New Patients (NEAK data).
Note on population basis: Total fiscal burden figures are aggregated across the entire prevalent MM population (all patients living with MM in the reference year). Per-incident-case figures are derived by dividing this total by the number of newly diagnosed patients in the same year; this normalization is used for inter-country comparability, as the majority of MM costs arise at diagnosis. The per-prevalent-patient figures presented in Table 4.3 provide a complementary perspective. See Section 2.1 for methodological rationale.

Hungary's total fiscal burden reached €61.2 million in 2024, having grown 182.1% since 2009. However, this overall growth conceals a highly distinctive non-linear trajectory that is unique among the Central European countries in this analysis: the burden peaked at €78.9 million in 2021, declined sharply to €58.0 million in 2023 (−26.6%), and has partially recovered to €61.2 million in 2024. This contraction was driven entirely by the reduction in healthcare costs, which fell from €56.8 million in 2021 to €36.9 million in 2024 — a 35% decline consistent with progressive renegotiation of reimbursement conditions and biosimilar market entries.

A second distinctive feature of Hungary's fiscal profile is the evolution of the healthcare cost share. In 2009, healthcare costs represented only 48.5% of total burden — the lowest share in this analysis — as indirect costs (driven by high caregiver absenteeism) dominated. Following the explosive introduction of novel therapies in 2017–2021, the HC share rose to a peak of approximately 72%, but has since declined back to 60.4% in 2024 and is projected to fall below 50% by 2028–2029. By 2030, indirect costs (€46.7 million) will exceed healthcare costs (€40.4 million) — a structural inversion with no precedent in the other countries analysed.

3.3 Detailed Component Breakdown — Reference Year 2024

Several distinctive features of Hungary's 2024 component distribution merit emphasis. First, the healthcare cost share (60.4%) is substantially lower than the 85–89% share observed in Croatia (2024) and Slovakia (2024). This reflects Hungary's unique combination of declining HC costs and growing indirect costs. Second, both patient absenteeism (17.2%) and caregiver absenteeism (17.8%) are individually larger than the entire indirect cost base in Croatia and Slovakia, underlining the structural importance of caregiver and patient workforce impacts in the Hungarian fiscal context. Third, the tax loss from premature deaths (0.7%) is proportionally the smallest component, consistent with the older age profile of MM patients where remaining productive life years are limited. Fourth, transfer payment components (excess sick leave and disability costs) are extremely small relative to the total burden, reflecting the dominance of tax loss mechanisms over direct transfer costs in Hungary's fiscal profile of MM. It should be noted that the excess disability pension component, while small in proportional terms (€112,974; 0.2% of total), is methodologically distinct from other cost components: as described in Section 2.1, disability pension costs are calculated on the basis of the entire prevalent MM population, reflecting the continuous eligibility of MM patients under Hungarian law. This differs from the incident-year basis used for most other cost components.

Table 3.3: Detailed Fiscal Burden Component Breakdown, 2024

Fiscal Burden Component	EUR Value (2024)	% of Total	Category
MM Healthcare Costs	€36,949,614	60.4%	Direct
Tax Loss — Patient Absenteeism (SL)	€10,501,132	17.2%	Indirect
Tax Loss — CG Absenteeism	€10,883,109	17.8%	Indirect
Tax Loss — Patient Morbidity	€1,576,242	2.6%	Indirect
Tax Loss — CG Employment Reduction	€750,616	1.2%	Indirect
Tax Loss — Premature Deaths	€416,452	0.7%	Indirect
Excess Disability Pension Costs	€112,974	0.2%	Transfer
Excess Sick Leave Costs	€5,620	<0.01%	Transfer
TOTAL FISCAL BURDEN	**€61,195,759**	**100%**	

Source: Fiscal model (Results sheet, 2024, mean forecast). All values EUR nominal at current prices.

4. Temporal Analysis with Demographic Projections

4.1 Historical Growth Trajectory (2009–2024)

The fiscal burden of multiple myeloma in Hungary has grown from €21.7 million in 2009 to €61.2 million in 2024, a 182.1% increase — yet this aggregate figure conceals a three-phase trajectory unlike any other country in this regional analysis.

Phase 1 — Constrained Growth (2009–2016): During this period, the total fiscal burden grew modestly from €21.7 million to €30.0 million (+38.3%, CAGR 4.7%). Healthcare costs fluctuated within a narrow range of €8–11 million, reflecting Hungary's austerity-constrained healthcare budget of 2010–2014 and reliance on traditional chemotherapy supplemented by first-generation novel agents. Indirect costs grew more steeply from €11.2 million to €19.2 million as wages and employment rates recovered, with the caregiver absenteeism component emerging as the dominant indirect driver.

Phase 2 — Explosive Innovation Adoption (2017–2021): The large-scale introduction of daratumumab combinations, second-generation proteasome inhibitors (carfilzomib, ixazomib), and full broadening of lenalidomide reimbursement drove healthcare costs from €18.5 million in 2017 to €56.8 million in 2021 (+207%). Total burden approximately doubled from €39.2 million to €78.9 million. The healthcare cost share peaked at approximately 72% as therapeutic costs temporarily outpaced indirect cost growth.

Phase 3 — Contraction and Recovery (2022–2024): In a pattern unique among analysed countries, the total fiscal burden declined from €78.9 million in 2021 to €58.0 million in 2023 (−26.5%), driven by a sharp reduction in healthcare costs from €56.8 million to €38.9 million. This decline likely reflects progressive price renegotiations by NEAK, biosimilar entries for first-generation novel agents, and rationalisation of treatment regimens. The burden partially recovered to €61.2 million in 2024 as a new equilibrium was established. Indirect costs grew steadily throughout this phase, partially offsetting healthcare cost reductions.

Table 4.1: Historical Fiscal Burden Growth Trajectory (2009–2024)

Period	Start (EUR M)	End (EUR M)	Absolute Growth	Growth Rate
2009–2014	€21.7M	€25.8M	+€4.1M	+19.0%
2014–2019	€25.8M	€70.8M	+€45.0M	+174.1%
2019–2024	€70.8M	€61.2M	−€9.6M	−13.5%
2009–2024 (Total)	€21.7M	€61.2M	+€39.5M	+182.1%

Source: Fiscal model (Results sheet, mean forecast). CAGR 2009–2024: 7.1% per annum.

4.2 Projections 2025–2030

The projection from 2024 to 2030 indicates a sustained upward trend, with the total fiscal burden reaching €87.1 million by 2030 — a 42.3% increase from 2024 (CAGR 6.0%). Crucially, this growth is driven almost exclusively by the indirect cost components, which grow at 11.5% per annum (CAGR 2024–2030) while healthcare costs grow at only 1.5% per annum. This divergence reflects: (a) continued growth in Hungarian wages and GDP per work hour as economic convergence toward EU levels continues; (b) the growing prevalence population and extended treatment duration increasing cumulative patient burden; and (c) expanding caregiver absenteeism as the MM-prevalent population ages into categories requiring more intensive informal care.

A critical projection finding is that indirect costs (€41.9 million) will surpass healthcare costs (€39.8 million) in 2029, representing a structural inversion of the fiscal burden composition. By 2030, indirect costs will constitute 53.6% of the total burden — the opposite of the pattern observed in Croatia and Slovakia. This structural shift has significant policy implications: as the primary cost driver moves from healthcare expenditures to indirect economic losses, the ROI of healthcare investment improves substantially, and interventions that preserve workforce participation and caregiver employment acquire disproportionate fiscal value.

Table 4.2: Projected Fiscal Burden 2024–2030 (Mean Forecast, EUR M).

Component	2024	2025	2026	2027	2028	2029	2030	CAGR
HC Costs (€M)	36.95	37.53	38.09	38.66	39.24	39.83	40.43	+1.5%
Total Indirect (€M)	24.25	27.11	30.26	33.75	37.62	41.92	46.69	+11.5%
Total Burden (€M)	61.20	64.64	68.35	72.41	76.86	81.75	87.12	+6.0%
HC % of Total	60.4%	58.1%	55.7%	53.4%	51.1%	48.7%	46.4%	

4.3 Fiscal Burden per Prevalent Patient

Table 4.3 presents the total fiscal burden normalized by the number of prevalent MM patients — all persons living with MM in Hungary — using administrative data from NEAK and KSH. This table is intended to complement the per-incident-case figures presented in Section 3.2. As clarified in Section 2.1, total fiscal burden aggregation is performed across the prevalent population because costs accumulate across all patients living with MM in each year. Per-incident-case normalization (used in Section 3.2 and across country reports in this series) is a methodological convention that facilitates inter-country comparability and reflects the concentration of costs at diagnosis. The per-prevalent-patient figures in Table 4.3 represent an alternative and equally valid perspective, showing the average annual fiscal impact distributed across every MM patient in Hungary. Clinicians and policymakers familiar with Hungary's actively treated MM population of approximately 3,000 patients may find the per-prevalent figures particularly intuitive as an indicator of per-patient annual burden.

Table 4.3: MM Epidemiology and Fiscal Burden per Patient, Hungary 2009-2024

Year	Total Burden (EUR M)	Incident Cases	Per Incident Case (EUR)	Prevalent Patients	Per Prevalent Patient (EUR)	MM Deaths
2009	21.70	570	38,070	2,499	8,682	325
2010	26.26	576	45,590	2,549	10,314	350
2011	26.46	563	46,999	2,617	10,113	351
2012	23.93	601	39,816	2,648	9,039	352
2013	23.03	592	38,901	2,754	8,362	335
2014	25.82	624	41,378	2,771	9,320	362
2015	28.18	593	47,521	2,899	9,720	352
2016	30.01	592	50,692	2,920	10,276	387
2017	39.17	640	61,202	3,160	12,395	387
2018	54.15	660	82,047	3,249	16,667	418
2019	70.77	595	118,941	3,368	21,015	382
2020	78.24	637	122,827	3,120	25,077	427
2021	78.93	644	122,563	3,161	24,970	380
2022	72.12	650	110,954	3,242	22,244	408
2023	58.02	656	88,445	3,440	16,866	405
2024 (f)	61.20	662	92,447	3,437	17,809	400

Sources: Fiscal model (Results sheet, mean forecast); NEAK (incident cases 2009-2024, prevalent patients 2009-2024); Forecast D sheet (deaths, mean). (f) = mean forecast. Per incident case = Total Burden divided by Annual New Patients. Per prevalent patient = Total Burden divided by Prevalent Count.

The per-prevalent-patient fiscal burden increased from €8,682 in 2009 to a peak of €25,077 in 2020 (+189%), reflecting the intensive adoption of novel therapies. Since 2020, it has declined to €17,809 in 2024 (−29%), tracking the healthcare cost reduction described in Section 4.1. This per-patient trajectory is consistent with Hungary's health system approach: a period of accelerated access to novel therapies at full list prices, followed by systematic price renegotiation that reduced per-patient costs to a more sustainable level. The direction of change since 2020 suggests a degree of fiscal sustainability management by NEAK, even if at some potential cost to treatment intensity for some patient subgroups.

5. Healthcare Investment Analysis

5.1 What-If Scenarios: Cumulative Fiscal Impact 2024–2030

Three intervention scenarios were modelled to quantify the cumulative fiscal savings achievable through targeted improvements in MM patient and caregiver outcomes. All scenarios apply to the period 2024–2030 (7 years) using the mean forecast estimator. The baseline cumulative fiscal burden over this period is €512.3 million, of which €270.7 million is healthcare costs and €241.6 million is indirect costs.

Scenario 1: 10% Reduction in Caregiver Burden

A 10% reduction in caregiver employment loss and caregiver absenteeism rates, achievable through enhanced caregiver support programmes, respite care provision, flexible working arrangements, and employer awareness campaigns about the needs of MM caregivers. In Hungary's context, where caregiver absenteeism and employment losses together represent 19% of total fiscal burden, caregiver-focused interventions carry proportionally larger fiscal returns than in other countries.

7-year cumulative saving: €11,069,000 (2.16% of total baseline burden)

Scenario 2: 10% Reduction in Mortality

A 10% reduction in annual MM deaths (approximately 40 fewer deaths per year), achievable through earlier diagnosis, improved access to novel therapies including bispecific antibodies and CAR-T cell therapies, and optimized treatment sequencing. Hungary's W.A.I.T. indicator of 578 days for innovative therapy access suggests that accelerating reimbursement timelines could contribute meaningfully to mortality reduction.

7-year cumulative saving: €455,000 (0.09% of total baseline burden). The modest fiscal saving reflects the age profile of MM deaths (predominantly 65+) where remaining productive life years are limited.

Scenario 3: 10% Increase in Productivity (Absenteeism Reduction)

A 10% reduction in absenteeism-related productivity losses for patients and caregivers, achievable through improved disease management, better supportive care (fatigue management, pain control), telepharmacy, and flexible work arrangements that enable continued employment during treatment.

7-year cumulative saving: €12,540,000 (2.45% of total baseline burden)

Table 5.1: What-If Scenario Analysis, Cumulative 2024–2030

Scenario	Cumulative Saving (2024–2030)	% of Total Burden
1: 10% Caregiver Burden Reduction	€11,069,000	2.16%
2: 10% Mortality Reduction	€455,000	0.09%
3: 10% Productivity / Absenteeism Improvement	€12,540,000	2.45%
TOTAL COMBINED SAVING	€24,064,000	4.70%
New Cumulative Burden (2024–2030)	€488,262,000	

Source: Fiscal model calculations. Baseline cumulative burden 2024–2030 = €512,326,000. Scenarios applied to indirect cost components only.

Combined implementation of all three scenarios would generate approximately €24.1 million in cumulative fiscal savings over 2024–2030. Productivity improvements (Scenario 3) and caregiver burden reduction (Scenario 1) together contribute 97% of total savings, underscoring the dominant importance of workforce-related interventions in Hungary's fiscal context. In contrast to other countries in this analysis where the mortality reduction scenario carries greater weight (due to younger average patient profiles), Hungary's MM fiscal burden is primarily driven by workforce and caregiver productivity channels, meaning that mortality reduction alone yields proportionally smaller fiscal returns.

5.2 Return on Investment

For every €1.00 invested by the Hungarian government in MM healthcare, approximately €0.80 is recovered in indirect fiscal value over a 5-year horizon (2024–2028), and €1.05 over a 10-year horizon (2024–2033). The 10-year ROI exceeding 100% indicates that MM healthcare investment in Hungary is, over a decade, more than fiscally self-financing from the government's perspective — a finding that is substantially more favorable than the returns observed in Croatia (14% 5-year ROI) and reflects Hungary's structurally higher indirect cost share.

Table 5.2: Return on Investment Analysis

Metric	5-Year (2024–2028)	10-Year (2024–2033)
Cumulative HC Investment	€190,473,000	€395,689,000
Cumulative Indirect Fiscal Returns	€152,980,000	€416,118,000
ROI	80.3%	105.2%
Return per €1.00 Invested	€1.80	€2.05
Net Fiscal Return per €1.00	€0.80	€1.05

Source: Fiscal model. 5-year: 2024–2028 (5 years). 10-year: 2024–2033; years 2031–2033 extrapolated at 1.5% annual HC growth and ~11.4% annual indirect growth consistent with 2024–2030 model trajectory. ROI = Cumulative Indirect / Cumulative HC Investment × 100.

The healthcare investment return pattern in Hungary is distinctive: the ROI increases from the 5-year to the 10-year horizon (from 80.3% to 105.2%), driven by the projected continued acceleration of indirect costs. This forward-loading of returns reflects the structural dynamics identified in

Section 4.2: indirect costs are growing at 11.5% per annum while HC costs grow at only 1.5%, meaning the longer the time horizon, the more fiscal value is generated per euro of healthcare invested.

Rebate-Adjusted ROI Perspective: As documented in Section 2.3, NEAK applies mandatory rebates and volume-based clawbacks on novel MM therapies. If a conservative 15–20% aggregate rebate rate is applied to the healthcare cost component, the effective 5-year cumulative healthcare investment would reduce from €190.5 million to approximately €152.4–162.0 million. Under this adjustment, the 5-year ROI would increase from 80.3% to approximately 94–100%, and the return per €1.00 invested would rise toward approximately €1.94–€2.00. These figures further strengthen the case for continued investment in effective MM treatment.

6. Sensitivity Analysis and Scenario Planning

6.1 Parametric ±30% Tornado Analysis

A parametric sensitivity analysis was conducted by varying each of seven major model inputs by ±30% while holding all other inputs constant. The analysis was performed on the 2024 reference year (baseline total fiscal burden: €61,195,759). Results are ranked by the magnitude of the total burden swing.

Table 6.1: Sensitivity Analysis Results (±30% Parametric Variation, 2024 Reference Year)

#	Parameter	Category	−30% (€M)	Baseline (€M)	+ 30% (€M)	Swing (±€M)	Swing (±%)
1	Healthcare Costs	Direct	€50.11M	€61.20M	€72.28M	€11.09M	±18.1%
2	Average Wages	Economic	€53.96M	€61.20M	€68.43M	€7.24M	±11.8%
3	Tax Wedge / Fiscal Rate	Economic	€53.96M	€61.20M	€68.43M	€7.24M	±11.8%
4	Number of Patients	Epidemiological	€57.45M	€61.20M	€64.94M	€3.75M	±6.1%
5	Employment Rates	Economic	€57.57M	€61.20M	€64.82M	€3.62M	±5.9%
6	CG Absenteeism Rate	Caregiver	€57.93M	€61.20M	€64.46M	€3.27M	±5.3%
7	CG Employment Loss Rate	Caregiver	€60.97M	€61.20M	€61.42M	€0.23M	±0.4%

Source: Fiscal model. Baseline 2024 total fiscal burden: €61,195,759. Each parameter varied ±30% independently while all others held constant. CG = Caregiver.

6.2 Key Sensitivity Findings

Healthcare costs remain the single most influential parameter, with a ±30% change shifting total burden by ±€11.1 million (±18.1%). However, this dominant influence is proportionally smaller than in Croatia (where the equivalent swing was ±26.6%), reflecting Hungary's lower healthcare cost share. The practical implication is that NEAK's rebate and price management mechanisms — which effectively manage the healthcare cost component — exercise proportionally greater influence over the total fiscal burden in Hungary than in less constrained healthcare systems.

Economic parameters (average wages, tax wedge) are the second-tier drivers at ±11.8% each — notably higher than in Croatia's analysis (±3.4%). This elevated sensitivity reflects Hungary's higher indirect cost share: since indirect costs represent 39.6% of total burden (vs 11.4% in Croatia), economic parameters that scale the indirect components have substantially greater leverage. Policy implications include that continued Hungarian GDP growth and wage convergence toward EU averages will amplify the indirect fiscal burden of MM through this channel.

The CG Absenteeism Rate (±5.3%) is a distinctive sensitivity driver not observed at this magnitude in other country analyses. This parameter captures the proportion of caregivers who take work absence for MM-related caregiving responsibilities and its magnitude directly reflects the scale of Hungary's caregiver absenteeism component (€10.9 million in 2024). This finding provides additional justification for targeted investment in caregiver support infrastructure: policies that reduce caregiver absenteeism rates — flexible working arrangements, respite care services, digital care tools — generate measurable fiscal returns in the Hungarian context.

Confidence assessment: The €61.2 million central estimate is materially sensitive to healthcare cost assumptions and economic parameters (wage growth, tax policy), but robust to variation in patient numbers and caregiver employment loss rates. Only a sustained change in healthcare costs, wages, or tax wedge of more than 10% would materially alter the policy interpretation of findings.

7. Conclusions and Policy Recommendations

Multiple Myeloma represents a significant and distinctive fiscal burden on Hungary's public finances. The following conclusions are directly supported by the fiscal model and the analytical framework applied: The total fiscal burden reached €61.2 million in 2024, having grown 182.1% since 2009. However, this is 22.5% below the peak of €78.9 million in 2021, reflecting healthcare cost optimisation through NEAK rebate mechanisms. The burden is projected to reach €87.1 million by 2030 under the mean scenario.

Hungary's fiscal burden profile is structurally distinct from other Central European countries: indirect costs (39.6% of total in 2024) are proportionally 3–4 times larger than in Croatia and Slovakia. The two largest single components are caregiver absenteeism tax losses (€10.9 million, 17.8%) and patient absenteeism tax losses (€10.5 million, 17.2%) — together exceeding healthcare costs in their combined scale. By 2029, indirect costs will structurally surpass healthcare costs for the first time, creating a new fiscal dynamic where workforce preservation yields higher returns than in any previously analysed year.

ROI is exceptionally strong: for every €1.00 invested in MM healthcare, Hungary recovers €0.80 in indirect fiscal value over 5 years and €1.05 over 10 years — the 10-year figure indicating complete fiscal self-financing of the healthcare investment. Rebate-adjusted, these returns are likely to be approximately 15–20% higher than gross-expenditure-based estimates.

Combined intervention scenarios (caregiver support, mortality reduction, productivity improvement) could generate €24.1 million in cumulative savings over 2024–2030 (4.70% of baseline). Productivity-focused interventions (Scenario 3: €12.5M) and caregiver support (Scenario 1: €11.1M) jointly account for 97% of achievable savings.

Policy Recommendations

Prioritise caregiver support as a fiscal investment: The scale of Hungary's caregiver absenteeism component (€10.9 million in 2024, growing to €19.4 million by 2030) makes caregiver workforce protection a primary fiscal priority. Investment in structured caregiver support — including employer engagement programmes, flexible working legislation for caregivers, respite care funding, and digital care management tools — would generate measurable and growing fiscal returns as Hungary's workforce contracts. This recommendation is unique to Hungary's fiscal profile and should be elevated as a priority in ways not applicable to other countries in this analysis.

Maintain and accelerate access to novel MM therapies: Hungary's W.A.I.T. indicator of 578 days (EFPIA 2023 Survey) means that Hungarian patients wait longer than the EU average to access innovative therapies. The ROI analysis demonstrates that rapid access to effective treatment generates direct fiscal returns through preserved workforce participation and avoided caregiver burden costs. NEAK's adoption of outcome-based pricing agreements should be expanded to enable faster conditional access while maintaining fiscal discipline.

Recognize the fiscal self-financing character of MM investment: The 10-year ROI exceeding 100% demonstrates that, in Hungary's fiscal context, the indirect returns from effective MM treatment exceed the net healthcare investment over a decade. This finding should be communicated explicitly to the Ministry of Finance and budget authorities when healthcare spending discussions occur, repositioning MM treatment funding from a "cost item" to a "productive investment with verified return".

Monitor the indirect cost trajectory: The projected 11.5% annual growth in indirect costs (2024–2030) requires annual monitoring through integrated NEAK, KSH, and employment registry data. The emerging dominance of caregiver and patient absenteeism costs — projected to exceed healthcare costs by 2029 — has no precedent in the regional analysis and warrants dedicated tracking. Annual model updates should incorporate refreshed wage, employment, and caregiver data to validate projections.

Utilize the rebate mechanism actively: The documented 35% reduction in healthcare costs from 2021 to 2024 demonstrates NEAK's capacity to manage novel therapy costs through active price management. This capability should continue to be applied systematically to ensure fiscal sustainability while preserving patient access. Transparent reporting of net-of-rebate healthcare costs would improve the precision of future fiscal analyses and is recommended for the next model iteration.

Increase healthcare spending toward EU benchmarks: Hungary's 6.4% of GDP allocated to healthcare (2023) against an EU average of 10.0% represents a structural deficit that limits the capacity to deliver optimal MM care. The fiscal analysis demonstrates that healthcare investment in MM generates returns exceeding the investment over 10 years. Targeted increases in oncology and hematology financing, benchmarked against EU peer systems, would simultaneously improve patient outcomes and strengthen the public finance position through greater indirect fiscal recovery.

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Data Notes

- All financial figures in EUR at current nominal prices unless otherwise specified
- Population projections based on medium variant scenarios from KSH and Eurostat
- Treatment costs represent gross NEAK expenditure before manufacturer rebates
- Indirect costs calculated using human capital approach with Hungarian age-specific wage rates
- Tax wedge values from OECD Taxing Wages dataset (Hungary), 2000–2022; 2023–2024 extrapolated
- Primary data from CSV files and fiscal model Results sheet (mean forecast estimator)
- Methodological framework: Connolly et al. (2017) fiscal consequences framework
- Analysis period: 2009–2024 (historical), 2025–2030 (projected, mean forecast)
- Incident case data pending: tables use MM deaths (Forecast D, mean) as activity proxy
- Caregiver parameters based on published literature for haematological malignancy caregivers in Central Europe
- Disability pension costs calculated on prevalent MM population basis (reflecting continuous eligibility under Hungarian law classifying MM as permanent disability); proportion of patients receiving disability pension derived from comparable Slovak MM fiscal analysis ratios in the absence of Hungary-specific registry data

Notes

Project
HealthCare