Partnership for Health System Sustainability & Resilience

WORLD ECONOMIC FORUM

In collaboration with Partnership for Health System Sustainability and Resilience

Acting Early on Non-Communicable Diseases: A Framework for Health System Transformation

WHITE PAPER

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Foreword

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Health systems worldwide face an escalating challenge: populations are living longer but are increasingly burdened by chronic conditions that diminish quality of life and strain finite resources. Non-communicable diseases (NCDs) are already compromising the sustainability and resilience of health systems, and the window for corrective action is narrowing.

The Partnership for Health System Sustainability and Resilience (PHSSR) commissioned this analysis using a framework developed at the London School of Economics (LSE). Leading researchers in eight countries – Canada, France, Germany, Greece, Italy, Japan, Poland and Spain – have examined why health systems, even those with well-resourced universal coverage, struggle to act early on NCDs. While these countries represent diverse demographics, financing models and governance structures, they share common problems of access and delivery.

Rather than country-specific recommendations, this paper outlines the structural barriers preventing early action and provides a framework for addressing them. The focus is on: cardiovascular disease; cancer; diabetes; chronic kidney disease; and chronic respiratory diseases. These five NCD categories account for over 80% of premature mortality.

Several key findings emerge. First, performance variation both within and across countries reveals that superior outcomes are achievable with existing resources – the question is organization, prioritization and reallocation towards preventative strategies. Second, successful interventions require complementary action: screening programmes fail without functioning referral pathways; prevention initiatives fall away without sustained financing; clinical guidelines achieve little without implementation mechanisms. Finally, achieving better outcomes requires education and the means to address existing inequalities.

We hope this white paper reaches a wide audience of policy-makers, clinicians, researchers, patient advocates and all those concerned with acknowledging the increasing burden of NCDs globally. There is growing evidence of effective care for NCDs. This paper helps identify the barriers to implementation. It serves as a reminder that NCDs, as well as communicable diseases, remain a challenge even in well-resourced healthcare systems.

Executive summary

Despite evidence of what works in tackling NCDs, consistent delivery proves elusive in even the most sophisticated health systems. Success requires integrated action, not piecemeal reforms.

Non-communicable diseases account for 75% of global deaths and threaten health system sustainability worldwide.[1] Despite robust evidence that early intervention is cost-effective in improving outcomes and minimizes environmental impact, most health systems remain oriented towards reactive, late-stage care.

This white paper draws on comprehensive assessments by the Partnership for Health System Sustainability and Resilience (PHSSR) of eight health systems: Canada, France, Germany, Greece, Italy, Japan, Poland and Spain. Despite different stages of economic development, system structures and policy approaches, these countries face remarkably similar challenges in addressing NCDs effectively.

The analysis reveals critical dynamics:

- Health systems perpetuate existing inequalities without deliberate intervention prioritizing underserved populations.
- Resources frequently fail to align with population needs. Technology, infrastructure and workforce supply prove insufficient without deliberate attention to distribution, organization and coordination.
- Performance varies dramatically even within countries, revealing both significant untapped potential and an urgent need for coherent action.
- Health systems fail to act early and miss critical synergies, organizing care around single diseases despite biological interconnections between conditions.

The paper provides actionable recommendations across six interconnected domains:

- Prevention and care
- Governance and accountability
- Financing mechanisms
- Workforce development
- Medicines and technologies
- Environmental sustainability and climate adaptation

These are underpinned by five principles for transformation: address root causes across sectors; integrate action within health systems; design explicitly for equity; sustain commitment beyond political cycles; and enable evidence-based implementation.

Wide variations in performance – both within and between countries – reveal that no system excels at everything, but each has experiences to offer. Success requires coordinated action within health systems, and shared learning can accelerate progress across all domains.

Introduction

Early intervention in NCDs improves outcomes and can reduce costs. Transforming health systems from reactive to preventative care is one of healthcare's most critical challenges – and opportunities.

In 2021, non-communicable diseases caused an estimated 43.8 million deaths worldwide, accounting for approximately 75% of all non-pandemic-related deaths.[2] Despite decades of evidence about effective interventions, current trajectories fall dangerously short of United Nations Sustainable Development Goal target 3.4, which commits to reducing premature NCD mortality by one-third through prevention and treatment by 2030. The UN Secretary-General's 2025 progress report warns that without urgent action, NCDs will erode human capital, overwhelm health systems and divert resources to treating conditions that could have been prevented.[3]

This white paper examines countries at advanced stages of the epidemiological transition, where populations live longer with multiple chronic conditions. In these contexts, the primary challenge has shifted from preventing premature mortality to managing rising multimorbidity, coordinating fragmented care and addressing persistent inequalities. Understanding how even well-resourced systems struggle with structural barriers – and where some have succeeded – offers critical insights for health system transformation globally.

This analysis is based on a synthesis of eight new country assessments conducted by PHSSR using a structured research framework developed by the LSE.[4] The countries – Canada, France, Germany, Greece, Italy, Japan, Poland and Spain – represent diverse contexts:

- **Varied demographic stages:** From relatively younger populations in Canada and Poland to super-aged societies in Japan and Italy
- **Different financing models:** Tax-funded systems (Canada, Italy, Spain), social health insurance (France, Germany, Japan, Poland) and mixed models (Greece)
- **Diverse geographical challenges:** From Canada's vast distances to Greece's island populations to urban–rural divides
- **Different governance structures:** Centralized systems (France, Japan) vs. federal structures (Canada, Germany) vs. regional autonomy (Italy, Spain)

Each country research team conducted comprehensive assessments, including desk reviews, stakeholder surveys and roundtable discussions with clinicians, policy-makers, patient advocates and private-sector representatives.

This white paper examines the evolving NCD burden before analysing six health system domains, determining capacity for early action. The conclusion synthesizes key findings and presents key principles for transformation.

The analysis focuses on five interrelated NCD categories accounting for over 80% of premature NCD deaths: cancer; cardiovascular disease; diabetes; chronic kidney disease; and chronic respiratory diseases.[5] These conditions share common risk factors (tobacco, poor diet, physical inactivity, obesity), prevention pathways and biological mechanisms – diabetes drives kidney disease, hypertension damages both the heart and kidneys, obesity increases the incidence of multiple cancers. This interconnection means that effective action on one condition creates cascading benefits for others. The paper emphasizes cross-disease strategies that capture these synergies rather than disease-specific interventions.

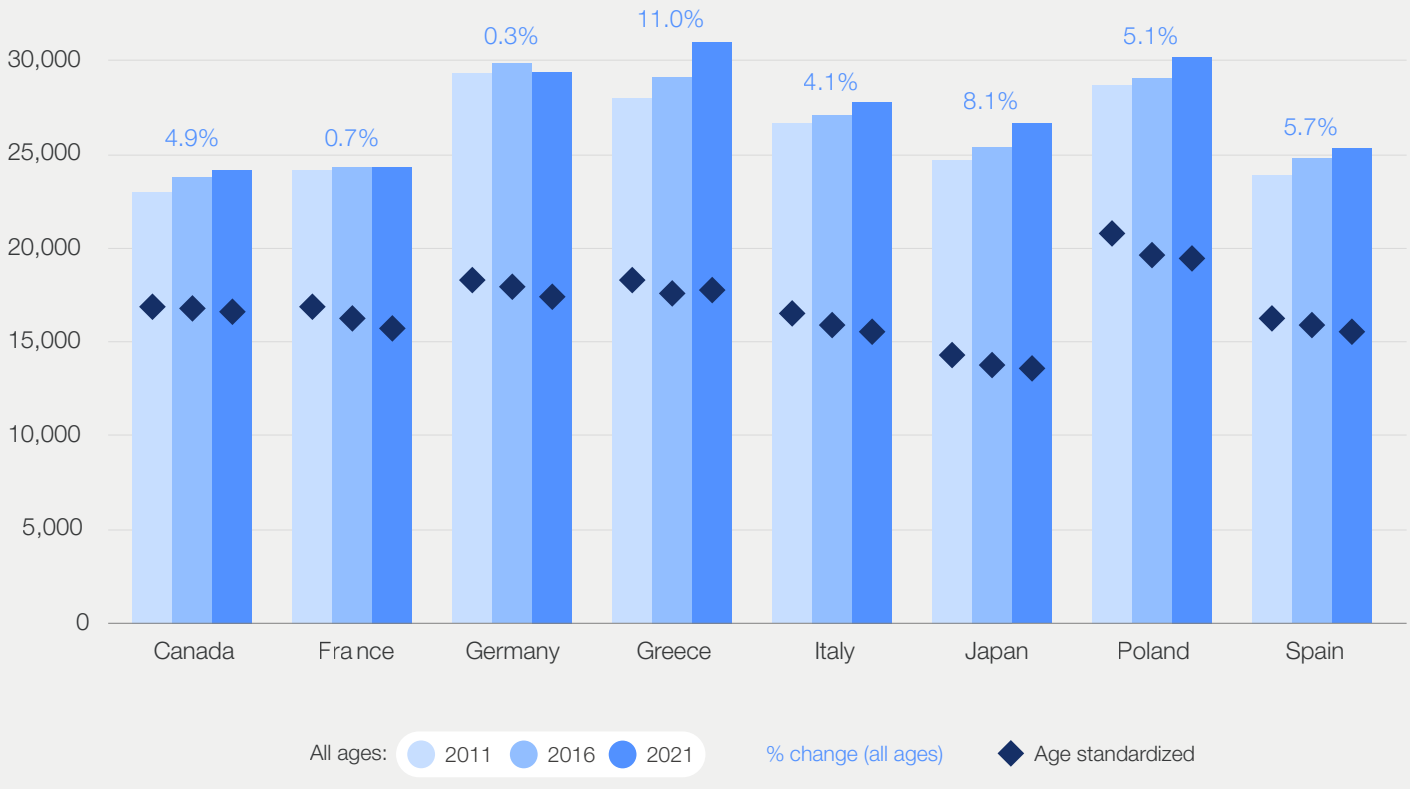
1 The evolving burden of NCDs

Understanding NCD trajectories and variations reveals where transformation is most needed and most achievable. Performance differences demonstrate that improvement is feasible with existing resources.

The eight countries examined achieve high life expectancies (77.2 to 84.1 years) yet face mounting challenges from NCDs.[6] Age-standardized NCD mortality rates vary widely, from 230.7 per 100,000 population (Japan) to 460.2 (Poland), highlighting substantial room for improvement even among high-income countries with advanced health systems.[7]

Disability-adjusted life years (DALYs) measure the overall disease burden by combining years of life lost due to premature death with years lived with disability. One DALY equals one lost year of healthy life. DALYs allow comparison of disease burden across different conditions and populations. Age-standardized DALYs adjust for differences in population age structure, enabling fair comparisons between countries or across time periods.

FIGURE 1 **All NCDs – DALYs (per 100,000), all ages and age-standardized, 2011, 2016 and 2021[8]**



Source: Adapted from: Institute for Health Metrics and Evaluation (IHME). (2023). *Global burden of disease study 2023*

Mortality reductions are slowing. Between 2000 and 2021, all countries reduced age-standardized NCD mortality, yet the pace of improvement has slowed. The average annual mortality reduction across the sample of countries declined from 1.78% in the 2000–2010 period to just 0.98% in the 2010–2021 period, a 45% deceleration affecting even the strongest performers.

Age-adjusted and unadjusted measures of disease burden measures tell two different stories. When adjusted for age, DALYs from NCDs fell across all countries, showing that people at any given age face lower risks than before. Yet total unadjusted DALYs increased universally.[9] This divergence reflects how population ageing transforms health systems: more people are living to ages where accumulated lifetime exposures result in chronic disease, placing growing demands on health systems even as age-specific risks decline.

1.1 Disease-specific patterns and trends

Cardiovascular disease (CVD) illustrates what sustained intervention can achieve. Most countries show consistent declines in both adjusted and unadjusted burden. These improvements reflect comprehensive approaches combining primary prevention with acute care innovations including minimally invasive procedures, and organized stroke networks. Yet substantial variation persists: Poland's CVD burden remains more than double Canada's, while Germany reports avoidable heart failure hospitalizations exceeding averages for countries in the Organisation for Economic Co-operation and Development (OECD), despite its comparatively well-resourced healthcare system.

Cancer contributes the largest share of DALYs in six of eight countries, overtaking cardiovascular disease.[10] While age-adjusted rates are falling, outcomes depend heavily on early detection. In Canada, five-year breast cancer survival exceeds 89%, while lung cancer survival remains at 22%.[11,12] This reflects when disease is diagnosed: breast cancer most frequently at Stage 1, lung cancer at Stage 4.[13] Gender-specific outcomes reveal historical smoking patterns: in Spain, male lung cancer DALYs declined, while female rates increased, reflecting smoking uptake among women since the 1970s.[14,15]

Diabetes presents the most alarming trajectory among all NCDs examined. Between 2011 and 2021, unadjusted diabetes DALYs increased universally, exceeding 30% in several countries.[16] More concerning, age-adjusted rates also rose in seven out of eight countries, with only Italy achieving a decline.[17] Even otherwise strong performers suffered: Canada experienced a 21.3% age-adjusted increase despite having the lowest overall NCD burden, while Japan saw a 14.8% increase despite its world-leading life expectancy. The implications extend beyond diabetes itself: uncontrolled diabetes drives chronic kidney disease, amplifies cardiovascular risk and worsens multiple conditions. Diabetes-related amputation rates ranged from 2.5 per 100,000 in Italy to 8.5 in Germany,[18] revealing systemic failures even in well-resourced health systems.

Chronic kidney disease (CKD) presents a mixed picture that varies dramatically by country. Between 2011 and 2021, unadjusted CKD DALYs increased in seven out of eight countries. Greece's 134% unadjusted increase likely reflects improved diagnosis rather than true deterioration. Spain and Japan achieved age-adjusted declines despite unadjusted increases, while Poland achieved both.[19] However, major diagnostic gaps persist universally. France reports 95.5% of stage 3 CKD cases go undiagnosed, with 25% of patients beginning haemodialysis in emergencies.[20] Early detection and guideline-directed medical therapy can slow progression and reduce burden.[21]

The missed opportunity is striking. CKD links directly to diabetes and hypertension – conditions already monitored regularly. Systematic screening integrated into existing diabetes and hypertension management would simultaneously address multiple conditions through cascading prevention yet this remains largely unexploited. Without integration, health systems continue to catch CKD at its most expensive and debilitating stages.

Chronic respiratory diseases are a significant cause of preventable hospitalizations. Chronic obstructive respiratory disease (COPD) and asthma admission rates vary fivefold among countries, from 23 per 100,000 in Italy to 193 in Germany in 2021.[22] These hospital admissions often reflect gaps in primary care, as many exacerbations could be prevented through outpatient management. Studies estimate that two-thirds of people with airflow obstruction have no prior diagnosis, a finding consistent across multiple countries.[23] Gender disparities in mortality rates are also apparent, with increased deaths from COPD particularly among women, contributing to a slowdown in life expectancy gains in Germany.[24] Overall, underdiagnosis, alongside marked variations in hospitalization rates, point to unmet need and missed opportunities for early intervention.

1.2 Risk factors and inequalities

Modifiable risk factors cluster systematically along lines of socioeconomic disadvantage. In Germany, smoking rates in low-education groups are twice those in high-education groups.[25] Obesity affects over 25% of some populations, with factory workers showing 50% higher rates than managers.[26] Physical inactivity persists despite evidence that even modest activity reduces NCD risk substantially.

Environmental exposures compound social disadvantage. Air pollution causes approximately 48,000 deaths annually in France, with the most deprived areas facing a tenfold higher risk of exposure to environmental hazards, and pollution-reduction policies disproportionately benefiting wealthy neighbourhoods.[27] In Italy, environmental health risks are particularly pronounced in specific geographical areas, including air-quality risks in the Po Valley and major urban centres such as Rome and Naples.

Geographical inequities create systematic disadvantages in every country examined. Rural populations face longer distances to access services, reduced specialist availability and financial barriers from travel costs, challenges particularly acute in Canada's remote regions and Greece's island communities. Strikingly, variations in screening coverage and specialist access within countries often exceed differences between countries.

Socioeconomic factors create profound health disparities. Even in France, which has among the most universal and progressive health systems in the world, the poorest populations show 13-year shorter life expectancies than the wealthiest. These gaps had been narrowing since the Industrial Revolution but are widening again—a reversal linked to sedentary lifestyles and differential exposure to commercial determinants of health. Inequalities widen further after chronic disease develops, with the life expectancy difference between the richest and poorest increasing from four to six years post-diagnosis.[28]

These patterns reveal fundamental misalignments between how health systems are organized and what populations need. Piecemeal reforms cannot address problems that arise from fundamental structural misalignments. Meaningful progress requires simultaneous action across prevention and care delivery; financing; governance; workforce; technology; and environmental sustainability. The subsequent sections examine these six critical domains and how they must work together to enable earlier, more equitable intervention.

2 The prevention and care continuum

Effective NCD action requires coordination, from population prevention through screening to disease management. Yet systematic failures fragment patient journeys and delay necessary interventions.

2.1 **Primary prevention:** Addressing environmental, social and structural factors

Current landscape

Primary prevention aims to reduce disease incidence by addressing modifiable risk factors before disease develops. Despite clear evidence linking tobacco use, poor diet, physical inactivity and harmful alcohol consumption to NCDs, translating this knowledge into effective population-level interventions remains challenging.

Prevention strategies targeting individual behaviour show limited impact without addressing structural determinants. France's high cigarette prices have minimal effect where social acceptability persists.[29] Germany's voluntary industry commitments depend on manufacturers choosing healthier reformulations.[30] Greece's anti-smoking law initially succeeded but compliance deteriorated when enforcement weakened.[31] Health promotion rarely sustains across the life course, concentrating in childhood despite evidence that transition periods – adolescence, employment entry, retirement – represent high-risk windows for behavioural deterioration.

Across these examples, approaches that rely on individuals making different choices – whether through price signals, voluntary industry action or behavioural restrictions – prove insufficient without addressing the environmental, social and structural factors that shape those choices, and health systems bear the resulting burden.

Policy levers

- **Implement comprehensive fiscal measures:** Deploy evidence-based taxation on tobacco, alcohol and sugar-sweetened beverages at levels demonstrably changing purchasing behaviour, with regular adjustment for inflation and affordability. Ring-fence revenues specifically for prevention programmes and ensure coordination across jurisdictions to prevent cross-border purchasing undermining policy effectiveness.
- **Create regulatory environments supporting healthy choices:** Establish comprehensive marketing restrictions on unhealthy products aimed at children across all media, including digital platforms. Mandate reformulation targets for processed foods with clear timelines and penalties for non-compliance. Implement smoke-free environments with sustained enforcement, learning from countries where initial success deteriorated without consistent monitoring.
- **Develop life-course health promotion:** Integrate health education throughout educational curricula from early childhood, covering nutrition, physical activity, mental health and substance-use prevention. Ensure programmes adapt to critical life transitions when health behaviours often deteriorate, with targeted interventions at vulnerable periods.
- **Address social determinants:** Recognize that behavioural risk factors reflect social and environmental contexts. Prevention strategies must explicitly target disadvantaged populations that experience the highest exposure to health risks while facing the greatest barriers to healthy behaviours.

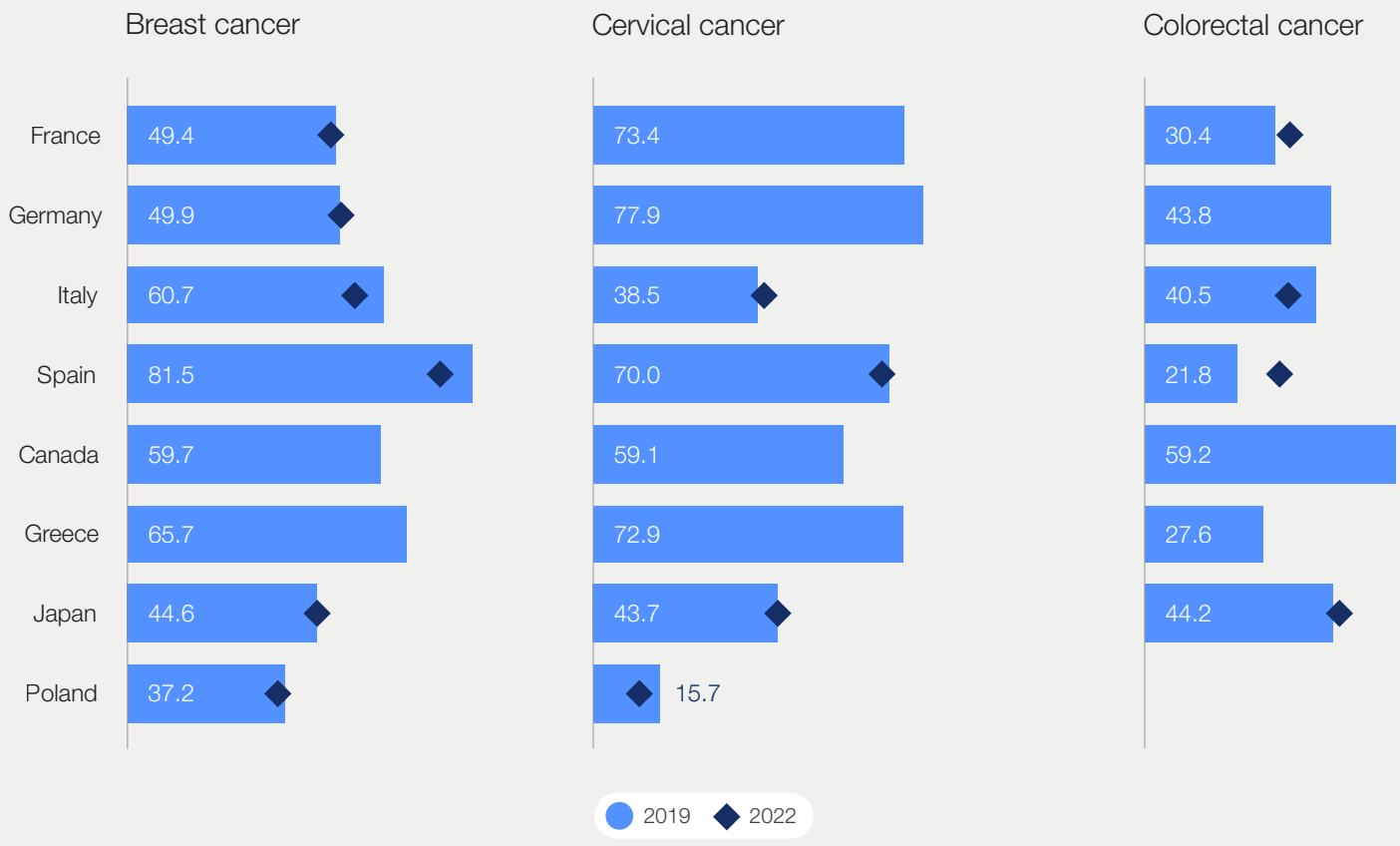
2.2 **Secondary prevention:** Screening and early detection

Current landscape

Cancer screening programmes show substantial variation that cannot be explained by resource availability alone. Cervical screening participation ranged from 15.7% in Poland to 70% in Spain – a fourfold difference between countries with comparable wealth.[32] Within Italy, colorectal screening varies 14-fold between regions.[33] Lung cancer screening remains inconsistent despite national endorsements.

In Japan, 56.6% of lung cancers are diagnosed at a late stage despite 45% screening participation,[34] revealing gaps between access and effective detection. In Ontario, Canada, screening rates are notably lower among low-income communities, newcomers and people experiencing housing instability.[35]

FIGURE 2 **Cancer screening (percentage of those in specified age range), 2019 and 2021[36]**



Source: Adapted from: Organisation for Economic Co-operation and Development (OECD) and European Commission. (2024). *Health at a glance: Europe 2024: State of health in the EU cycle*. OECD Publishing, Paris

For non-cancer NCDs, systematic screening remains underdeveloped. Despite the availability of simple, low-cost tests and clear disease burden evidence, screening lags. Chronic kidney disease affects 10–15% of adults but lacks organized screening, with France reporting 25% of patients beginning haemodialysis in emergency situations,[37] an outcome indicating systematic absence of mechanisms identifying declining kidney function before crisis occurs. Among PHSSR countries, only Japan's Specific Health Check-Ups (SHCs) includes urinalysis as standard, though they are notably lacking the estimated glomerular filtration rate (eGFR) testing that would identify additional cases. Poland recently integrated kidney function assessment into its national preventive programme, though coverage remains uncertain given the historically low uptake of available screening.

Beyond underuse, screening programmes remain fragmented despite obvious opportunities for integration. Poland's COPD screening includes chest imaging but does not systematically screen for lung cancer, missing the opportunity to detect both conditions in high-risk populations through a single imaging modality. Recent international commitments – including the 2025 World Health Assembly resolution on lung health[38] and the UN High-Level Meeting political declaration[39] – emphasize integrated approaches for lung health, but implementation lags behind.

Similarly, while cardiovascular disease, kidney disease and metabolic conditions share common risk factors and pathophysiology, screening remains siloed by condition. Recent guidelines recommend integrated screening approaches, recognizing that simultaneous assessment improves early detection and enables comprehensive risk stratification.[40]

The gap between programme availability and population participation reveals deeper barriers. Poland's transition from "Prevention 40 PLUS" (20% uptake despite extensive promotion) to the expanded "My Health" programme illustrates the challenge: broadening eligibility without addressing participation barriers may simply extend non-participation.[41] Japan's SHCs achieved only 58.1% participation despite universal coverage and no financial barriers,[42] while Germany's cardiovascular screening reaches just 24% annually despite full insurance coverage.[43,44] These patterns across diverse systems demonstrate that engagement requires addressing time constraints, health literacy, trust and perceived relevance – factors policy frameworks rarely consider.

Policy levers

- **Implement systematic risk stratification:** Use validated tools such as SCORE2,[45] moving beyond age-based criteria to incorporate multiple factors influencing disease probability. Improve systematic recording of social determinants within electronic health records, which current systems typically ignore despite their profound influence on disease development.
- **Integrate screening with risk factor management:** Systematically link early detection to interventions addressing modifiable risks. Ensure cardiovascular and metabolic screening connects directly to stopping smoking, nutritional counselling and support for physical activity. Integrate stopping smoking within lung cancer screening pathways.
- **Expand screening programmes with explicit, mandatory equity targets:** Implement opt-out enrolment with proactive recall, mobile screening units for rural areas and flexible scheduling. Systematically evaluate why eligible populations do not participate and invest in targeted awareness campaigns, simplified pathways and community engagement.
- **Strengthen primary care as the foundation for opportunistic detection:** Expand authority to independently diagnose and initiate treatment for common NCDs such as diabetes, hypertension and COPD. Primary care providers should systematically review and optimize treatment and care plans.
- **Invest in diagnostic capacity by ensuring access to essential tools:** Use spirometry for respiratory disease, computed tomography (CT)/magnetic resonance imaging (MRI) scanning and endoscopy for cancer detection, electrocardiogram (ECG) for cardiovascular conditions and point-of-care testing for diabetes and kidney disease.
- **Ensure sustainable financing:** Provide dedicated, long-term funding integrated into regular health budgets rather than temporary sources, covering the full pathway from screening through diagnostic confirmation to treatment initiation.

2.3 **Tertiary prevention:** Referral and access to specialist care

Current landscape

Following abnormal screening results, patients must navigate referral pathways to reach specialist care. These transitions represent critical junctures where delays can alter disease outcomes, particularly for conditions where treatment effectiveness depends on disease stage.

Referral mechanisms vary widely. Spain has positioned primary care as a gatekeeper determining appropriate specialist input, while Greece operates without effective gatekeeping and with insufficient primary care services – only 6% of physicians work in general practice compared to the EU average of 21%.[46] Germany combines gatekeeping with guaranteed specialist access within four weeks, though implementation varies by specialty and region. Japan operates without standardized referral criteria, creating variability where outcomes depend heavily on individual physician judgement.

Geographical disparities compound access challenges. Rural and remote populations face disadvantages throughout specialist access pathways that transcend health system models. Poland's specialist concentration in Warsaw, Kraków and Gdańsk leaves rural voivodeships with less than half the specialist density. Greece's island populations require air or sea travel to reach specialist services, compounding delays in investigation and treatment.

Fragmented information systems impede coordination of care. Despite the near-universal adoption of electronic health records (EHR) in some countries, system interoperability remains problematic. Spain has achieved 99% primary care adoption of electronic health records (EHR), yet only eight of 17 autonomous regions can effectively share medical data.[47] Italy faces similar fragmentation, forcing patients to carry paper documents among providers despite universal EMR adoption.

Policy levers

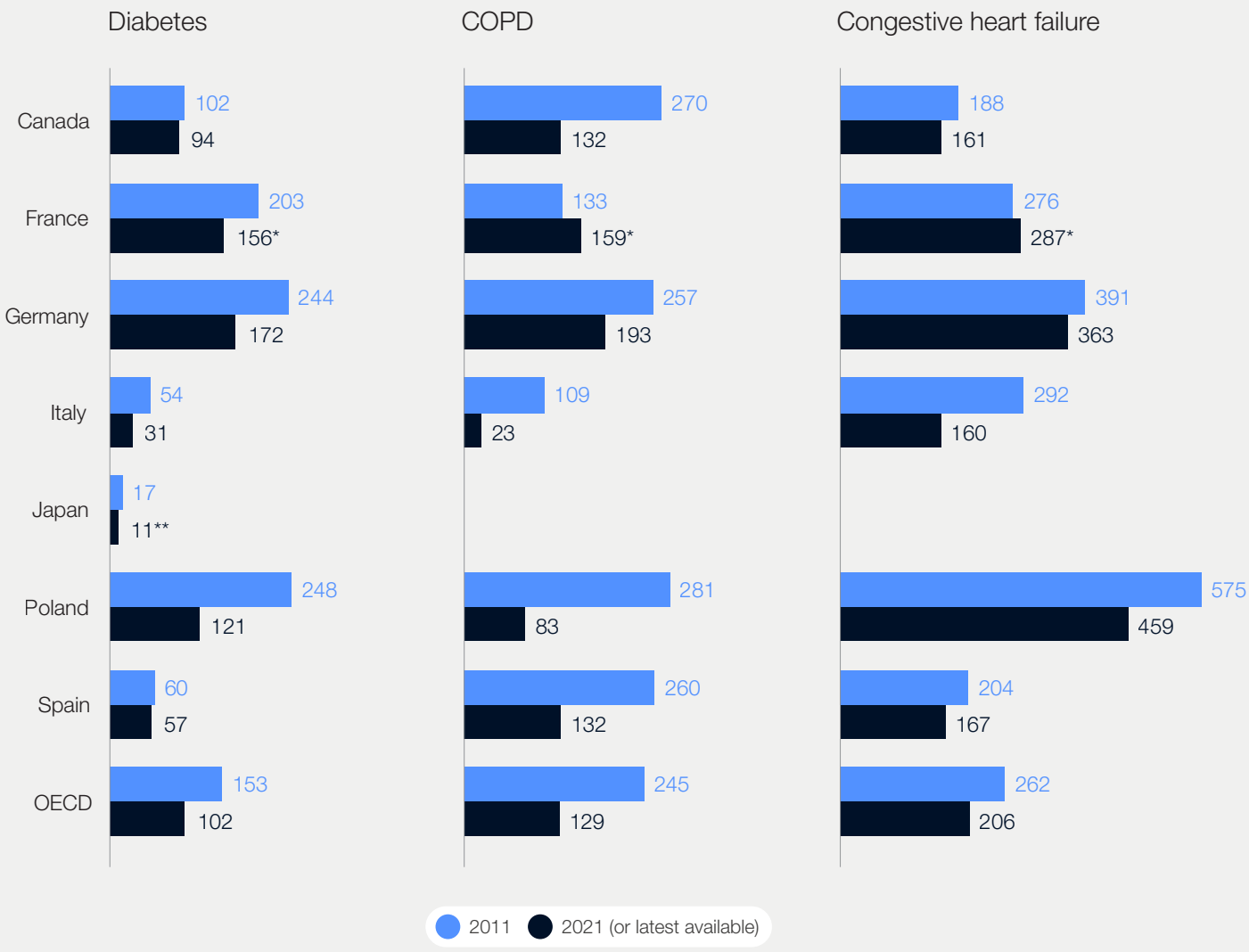
- **Establish clear referral criteria with supporting infrastructure:** Ensure systematic dissemination and adherence to evidence-based guidelines specifying when specialist referral adds value vs. when primary care management is appropriate. Embed criteria in clinical decision support systems with regular updates and mechanisms to monitor compliance.
- **Implement target maximum waiting times:** Set explicit time frames for specialist consultation following referral, with enforcement mechanisms and consequences for non-compliance. Cover complete pathways from referral to initial specialist assessment, with operational capacity developed to meet standards consistently.
- **Create unified information systems:** Enable information-sharing between primary and specialist care through interoperable electronic systems. This requires not just technical standards but governance frameworks that mandate data-sharing while protecting privacy, enabling specialists to access comprehensive patient histories and primary care to receive timely feedback.
- **Build monitoring systems tracking complete pathways:** Measure total time from initial referral through specialist assessment to treatment initiation, disaggregated by condition, geography and socioeconomic status. Use regular public reporting to drive improvement through transparency while identifying where targeted interventions are most needed.
- **Address geographical disparities:** Develop hub-and-spoke models linking rural primary care to urban specialists, expand telemedicine for consultations not requiring physical examination and deploy mobile specialist services on regular schedules. Provide transport support and accommodation assistance for rural populations facing compound disadvantages.

2.4 **Tertiary prevention:** Treatment and disease management

Current landscape

Successful models demonstrate what structured chronic disease management can achieve. Germany's Disease Management Programmes (DMPs), introduced in 2002 and now covering millions of patients with chronic conditions, have documented significant improvements – for example, better HbA1c control for diabetes and reduced hospitalizations for cardiovascular disease.[48,49] However, significant implementation challenges have been raised, including administrative burden, limited flexibility for individualizing treatment and variable regional uptake.[50] Italy's DM77 reform, implemented in 2022, establishes community health centres as integrated care hubs with multidisciplinary teams, representing substantial reorganization of primary care infrastructure, though the reform remains in the early implementation stages.

FIGURE 3 **Hospital admissions for congestive heart failure, diabetes and COPD (adults per 100,000)[51]**



Notes: * = 2019 data; ** = 2020 data.

Source: Adapted from: Organisation for Economic Co-operation and Development (OECD). (2023). *Health at a glance 2023: OECD indicators*. OECD Publishing, Paris

Yet fundamental challenges persist across all health systems examined. Disease-management programmes typically remain disease-specific, creating fragmented care for populations with multimorbidity. Despite rising levels of complex multimorbidity in all of the countries in scope, none has developed comprehensive clinical guidelines for multimorbidity management. This results in clinicians navigating complex decisions without evidence-based guidance, often defaulting to treating each condition in isolation. This gap between health system organization (structured around single diseases) and population needs (increasingly characterized by multiple interacting conditions) represents perhaps the most fundamental misalignment in contemporary chronic disease management.

Even for single conditions with well-established treatment protocols, substantial gaps exist between clinical guidelines and actual practice. Evidence from heart failure and CKD management demonstrates that a significant proportion of diagnosed patients do not receive guideline-directed medical therapy, with therapeutic inertia and fragmented care pathways contributing to suboptimal medication optimization.[52,53] This means a significant lost opportunity to improve outcomes.

Policy levers

- **Develop guidelines for multimorbidity with practical decision support:** Move beyond single-disease guidelines to address common disease combinations explicitly, providing frameworks for prioritizing interventions when recommendations conflict and protocols for deprescribing when risks exceed benefits.
- **Scale disease-management programmes with systematic enrolment:** Shift from voluntary participation to opt-out enrolment, ensuring programmes reach those most in need. Combine with demand projections and corresponding capacity investment. Link funding to achieving both high coverage and quality outcomes.
- **Strengthen medication management for complex patients:** Implement regular comprehensive medication reviews considering all conditions together. Embed pharmacists within primary care multidisciplinary teams, with decision support tools identifying potentially harmful interactions, particularly for older adults with polypharmacy.
- **Invest in structured self-management support:** Develop programmes that go beyond information provision to build practical skills, with ongoing support systems. Recognize self-management support as an essential clinical service requiring dedicated resources, including peer-support networks and validated digital tools.
- **Build crisis-resilient chronic disease care:** Establish explicit protocols for maintaining essential NCD services during emergencies. Develop remote management capabilities that can be rapidly activated, ensure supply chain resilience for essential medications and incorporate lessons from COVID-19 into permanent preparedness plans.
- **Implement continuous quality-improvement systems:** Establish mechanisms ensuring implementation through regular audits with feedback to providers and quality indicators reflecting patient outcomes rather than just process measures. Embed quality improvement in routine practice with continuous performance monitoring.

3 Enablers of early action

Health system transformation demands more than clinical excellence: it requires aligned governance, sustainable financing, capable workforces, accessible technologies and climate-resilient infrastructure working together.

3.1 Health system governance

Current landscape

Governance structures vary widely among the PHSSR countries. Japan's structured approach, with dedicated ministerial divisions for each major NCD category supported by expert committees systematically integrating perspectives from key stakeholders, provides clear accountability lines and ensures that technical expertise, patient experience and implementation capacity all inform policy development. In Canada, patient-oriented research networks, particularly the Strategy for Patient-Oriented Research (SPOR) networks, successfully embed lived experience into research and policy design, with advocacy organizations such as Diabetes Canada and the HeartLife Foundation directly shaping federal frameworks.

The governance challenge extends beyond structures to accountability and enforcement. Monitoring systems document problems without triggering corrective action. Strategic planning reflects political priorities and institutional capabilities more than epidemiological burden. Cross-sectoral coordination bodies exist but typically lack budgetary authority, operating through voluntary cooperation that struggles to overcome sector-specific incentives prioritizing narrow mandates over population health.

However, fragmentation remains pervasive, undermining coherent NCD responses. Federal and regional systems create inconsistent coverage and duplicated efforts. Canada's 13 jurisdictions develop separate approaches to screening, treatment and coverage with limited coordination beyond annual ministerial meetings. National oversight often lacks enforcement powers: Spain's regional autonomy enables innovation but creates postcode lotteries in prevention. Cross-sectoral coordination remains limited despite rhetoric: Poland's 2015 Public Health Act mandates multisectoral involvement, yet implementation stays within health sector boundaries.

Meaningful stakeholder engagement in policy development is often lacking. Japan's policy councils have limited patient and citizen representation, with technical language creating participation barriers. The 2025 review of the High-Cost Medical Expense Benefit System – affecting millions of patients – proceeded with only four committee discussions, illustrating insufficient consultation processes.[54]

Most critically, monitoring exists but rarely triggers corrective action. This reveals governance structures that document problems without mechanisms to compel solutions. Italy's systematic documentation of significant regional disparities is a vital step towards addressing them but has yet to trigger effective remediation.

Gaps in strategic planning reflect both political priorities and institutional capabilities. France lacks coordinated multi-annual targets for all major NCDs despite having a national health strategy, while Poland has no operational strategy for stroke. Canada demonstrates comprehensive cancer control strategies but more limited frameworks for cardiovascular, renal and respiratory diseases, with civil society organizations attempting to address gaps. Priority-setting is never a purely technical matter and reflects advocacy strength and political salience as well as disease burden.

Policy levers

- **Establish multisectoral coordination bodies:** Create cross-ministerial mechanisms with clear mandates, adequate resources and genuine budgetary authority to align policies across health, education, finance, agriculture and urban planning sectors. These must move beyond advisory roles to have real influence over resource allocation and policy priorities.
- **Develop comprehensive NCD registries:** Build integrated, interoperable systems tracking NCD incidence, risk factors, treatment patterns and outcomes across the entire care continuum. This requires not only technical investment but governance frameworks mandating data-sharing while protecting privacy.
- **Ensure investments are evidence-based:** Require that funding decisions explicitly reference national health data, burden of disease assessments and effectiveness evidence, including health technology assessment (HTA) for NCD interventions.
- **Implement robust monitoring with accountability:** National strategies require not just targets but clear implementation plans with specific responsibilities, timelines and accountability for results. Independent monitoring bodies should assess progress with genuine authority to recommend course corrections, with findings directly linked to budget cycles and policy decisions.
- **Institutionalize meaningful stakeholder engagement:** Create formal mechanisms for patient and public involvement providing real influence over policy development, with adequate resources for stakeholder organizations to participate effectively. However, structure involvement to provide input and accountability without creating veto points enabling special interests to obstruct evidence-based policies.

3.2 Health system financing

Current landscape

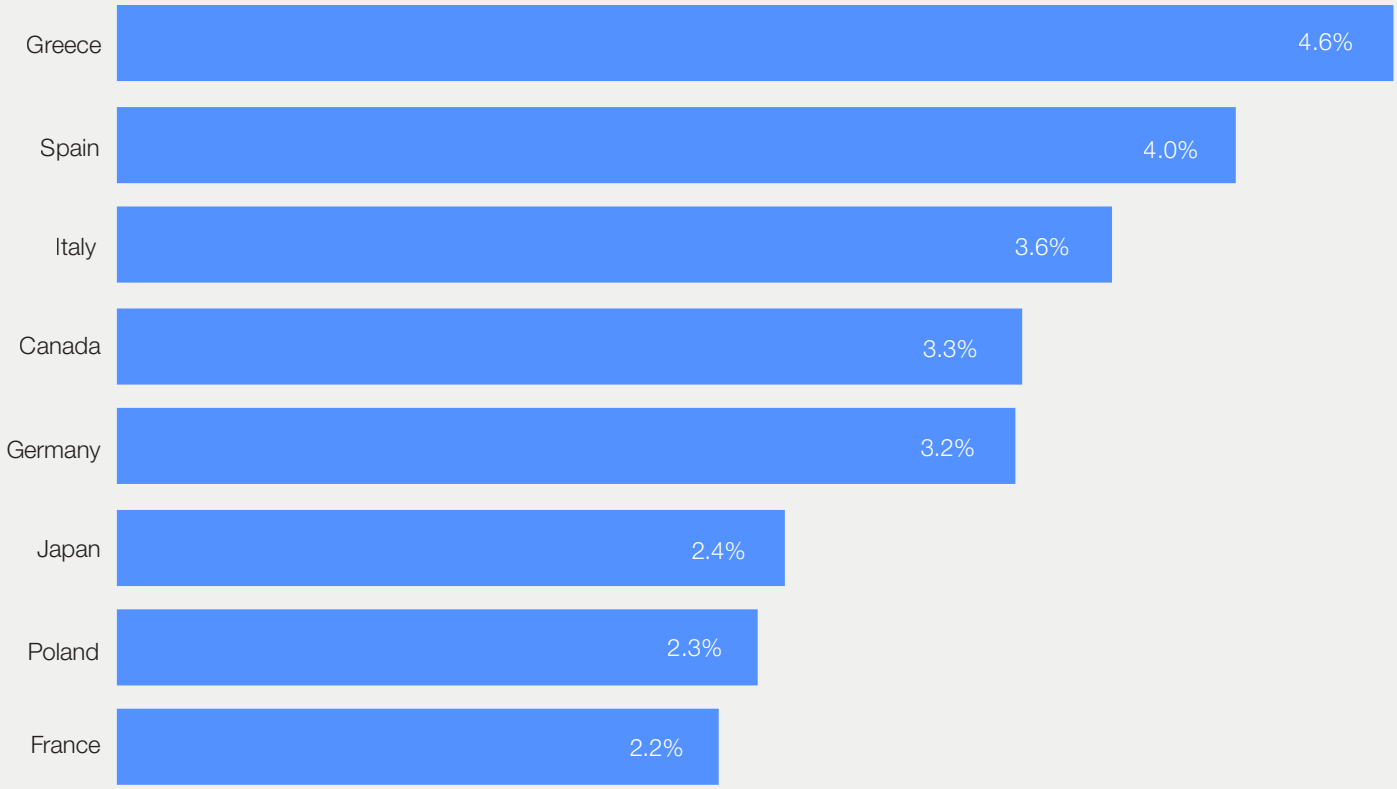
Countries spend close to 10% of gross domestic product (GDP) on healthcare, yet only a small proportion of this is dedicated to preventative interventions, and payment mechanisms do not sufficiently incentivize them. Greece increased prevention allocation from 1.3% to 4.5% in 2019–2022,[55] demonstrating that reallocation is feasible with political commitment, though this increase relies heavily on temporary EU structural funds, raising questions about long-term sustainability. Fee-for-service payment remains dominant in many countries, rewarding throughput over coordination.

Financial protection gaps persist even under universal coverage, with chronic disease patients facing cumulative costs over years. Furthermore, regional allocation formulas often miss the concentration of risk factors in deprived areas, the higher costs of engaging hard-to-reach populations and the infrastructure deficits that require additional investment to achieve equivalent outcomes.

Out-of-pocket payments create systematic disadvantages. Greece's poorest households spend 9% of expenses on medications alone vs. 2.7% for the wealthiest households.[56] Italy recorded €40.6 billion in household out-of-pocket expenditure in 2023, showing steady annual increases outpacing income growth.[57] The phenomenon of "financial toxicity" documented in Italy, where patients experiencing financial hardship face 1.2 times greater mortality risk,[58] demonstrates how economic barriers translate directly into health outcomes.

Payment systems reward volume over value, acute interventions over prevention and fragmented care over coordination. Germany's fee-for-service system illustrates these perverse incentives clearly: providers receive reimbursement for each discrete service but typically receive no compensation for time spent consulting with other providers or coordinating care across settings, contributing to persistently high rates of avoidable hospitalizations for chronic conditions such as diabetes, COPD and heart failure despite the country's substantial healthcare resources. Average primary care consultation times of only eight minutes in Germany reflect how providers respond rationally to payment incentives by maximizing volume, but such brief encounters cannot accommodate the comprehensive assessment, patient education and relationship-building that effective chronic disease management requires.

FIGURE 4 | **Out-of-pocket spending on health as a percentage of final household consumption, 2021 (or nearest year)[59]**



Source: Adapted from: OECD (2023), *Health at a glance 2023: OECD indicators*. OECD Publishing, Paris

Policy levers

- **Increase prevention investment:** Move beyond marginal adjustments to meaningful reallocation towards prevention. Establish transparent tracking systems across all funding sources and protect prevention budgets through multi-year commitments, reflecting the long-term nature of prevention benefits.
- **Strengthen financial protection:** Minimize out-of-pocket healthcare costs and implement means-tested exemptions providing enhanced protection for those with chronic conditions who face cumulative costs over years. Simplify administrative access and monitor financial protection by socioeconomic status to trigger policy responses when disparities emerge.
- **Reform resource allocation:** Ensure allocation formulas reflect the true costs of delivering care in different contexts, including social deprivation, infrastructure limitations and the challenges of serving dispersed populations. Areas facing multiple disadvantages require additional support to achieve equitable outcomes.
- **Embed the value of prevention:** Systematically consider prevention benefits using appropriate time horizons capturing long-term value. Develop mechanisms allowing health systems to benefit from the broader savings that their prevention activities generate.
- **Create financing mechanisms rewarding coordination:** Move from fragmented funding streams to population-based or bundled payments encouraging collaboration across providers. Explicitly recognize prevention and coordination activities in payment systems.
- **Reform payment systems:** Transition primary care from fee-for-service towards capitation-based models providing predictable funding for prevention and chronic disease management. Where pay-for-performance is considered, careful design is essential. Priority should go to removing perverse incentives, ensuring adequate reimbursement for consultation time and team-based care.

3.3 Workforce capacity and development

Current landscape

Health system workforce challenges extend beyond numbers to fundamental mismatches in composition, distribution and training. The declining attractiveness of primary care and prevention specialties creates structural obstacles to NCD management even in countries expanding overall workforce capacity.

Medical education continues to emphasize acute care despite the reality that most graduates will spend their careers managing chronic conditions. Geographical concentration in urban centres operates even within publicly funded systems, driven by market forces that payment reforms have failed to counteract.

FIGURE 5 **Practising generalist doctors, specialist doctors and nurses per 1,000 population, 2015 and 2022**[60]

Notes: d = deviation from the definition; e = estimated value

Source: Adapted from: OECD (2023), *Health at a glance 2023: OECD indicators*. OECD Publishing, Paris

Some countries are taking bold action: Poland increased medical school admissions by 92.3%;[61] Germany expanded medical assistant roles for task-shifting. Yet workforce composition remains poorly matched to NCD needs. Primary care faces critical shortages with only 6% of Greek physicians in general practice vs. an EU average of 21%.[62] Greece has the EU's highest physician density yet the lowest nursing density, creating an imbalance that forces patients to bypass primary care entirely and seek specialist care for routine conditions. Geographical maldistribution leaves rural areas systematically underserved. Ageing workforces compound the challenges, with Polish physicians averaging over 50 years of age. Task-shifting initiatives show promise but remain limited by regulatory barriers and professional resistance.

Medical education maintains a traditional emphasis on acute care with limited focus on prevention, health promotion and integrated chronic disease management. Health systems struggle to attract clinicians into the roles most critical for NCD prevention and management. Younger doctors increasingly favour part-time work and technology-oriented specialties.[63,64,65] These patterns reflect not just individual preferences but incentive structures.

Policy levers

- **Develop comprehensive workforce planning:** Create long-term strategies that genuinely reflect future population health needs rather than perpetuating historical patterns. Model demographic transitions and disease trends while considering how new care models might affect workforce demands.
- **Address geographical and specialty maldistribution:** Create compelling reasons for practice in underserved areas through combinations of financial incentives, career development opportunities and infrastructure support. This might include service obligations for publicly funded education or rotational models maintaining urban connections.
- **Expand professional roles:** Enable all health professions to work at full scope of practice while creating new roles specifically designed for chronic disease prevention and management. Pharmacists and nurses could manage stable chronic conditions within appropriate frameworks, requiring aligned regulatory, legal and payment systems.
- **Reform professional education:** Shift from traditional acute care focus to prepare graduates for chronic disease management reality. Embed prevention, behaviour change and multimorbidity management throughout curricula. Ensure interprofessional education teaches collaborative practice.
- **Create sustainable careers:** Address the persistent shortage of primary care and prevention specialists by tackling income disparities with specialists while providing intellectual stimulation. Reduce the administrative burden and ensure prevention activities are properly resourced within job plans.
- **Invest in demand reduction:** Rather than assuming that endless workforce expansion can meet growing NCD demands, develop evidence-based self-management programmes genuinely enabling patients to manage their conditions. Use group consultations, peer support and validated digital tools.

3.4 Medicines and technologies

Current landscape

Diagnostic infrastructure reveals significant geographical disparities. Japan shows threefold variations in imaging equipment availability between prefectures,[66] while Italy reports that 37.3% of diagnostic equipment is more than 10 years old. Precision diagnostics face even more restricted access: Japan limits cancer gene panel testing to patients who have exhausted standard treatments,[67] while Greece's biomarker testing depends on ad hoc charitable grants rather than systematic coverage.

Innovative medicine development is weakening in some contexts. European clinical trial activity and regulatory approvals are declining, with European Medicines Agency (EMA) approvals falling from 71% of new active substances in 2018 to just 30% in 2024, while in 2023 the four largest EU member countries saw the lowest number of new drug launches since 2014, representing a widening gap with the US.[68] In 2024, the Joint Clinical Assessment, a coordinated EU-level evaluation mechanism for new medicines, was introduced for two oncology products. This represents initial progress towards a more streamlined evaluation, though implementation remains at an early stage.[69]

Access to innovative medicines shows progress alongside persistent delays. Germany achieves a median 52 days from regulatory approval to availability, the fastest among comparable countries.[70] Italy's €500 million Innovative Drugs Funds and France's "direct access" pilot demonstrate innovative financing mechanisms. Yet substantial delays persist: France faces a median 523 days to availability for high-priority drugs, while Greece exceeds 600 days from approval to reimbursement.[71] In Japan, 72.4% of US/EU-approved medications remained unavailable between 2016 and 2020.[72]

Despite near-universal EMR adoption in several countries, interoperability and data-sharing between providers remain significant barriers to coordinated and proactive care. Only eight of Spain's 17 regions can share medical data,[73] while Italy's systems cannot exchange information between care settings. Germany's 44 approved digital therapeutics face integration challenges, with physicians uncertain about prescribing protocols.[74]

Populations most affected by NCDs face systematic digital exclusion. In Japan, which has the world's oldest population, 50.9% of citizens aged over 70 are not familiar with smartphones,[75] while 78% of Spanish NCD patients over 70 lack digital autonomy,[76] creating barriers that training alone cannot overcome.

Policy levers

- **Accelerate access to innovations:** Reform approval and reimbursement pathways to reduce delays between regulatory approval and patient access. Implement fast-track processes for breakthrough NCD therapies with clear timelines, early-access programmes and dedicated innovation funds. Consider risk-sharing agreements for expensive therapies with uncertain benefits.
- **Ensure equitable diagnostic infrastructure:** Address regional disparities through minimum standards for technology accessibility based on equity criteria and population health benefits. Introduce systematic renewal programmes, mobile diagnostic units for underserved areas and hub-and-spoke models. Expand public coverage for molecular testing where results may influence treatment decisions.
- **Build interoperable digital infrastructure:** Establish mandatory open standards enabling care coordination. Create governance structures with genuine authority to enforce standards and resolve stakeholder disputes. Balance privacy protection with research needs through trusted environments.
- **Reform clinical trial infrastructure:** Address barriers causing countries to lose their competitive position. Unify ethics approval processes, streamline administrative requirements and invest in clinical trial networks. Develop real-world evidence capabilities by leveraging electronic health records.
- **Bridge the digital divide:** Address evidence that half of citizens aged over 70 in some countries cannot use digital devices. Mandate accessibility standards for health interfaces, provide support services and maintain non-digital alternatives.

3.5 Environmental sustainability and climate adaptation

Better prevention and care pathways simultaneously reduce emissions and improve outcomes for climate-vulnerable NCD patients.

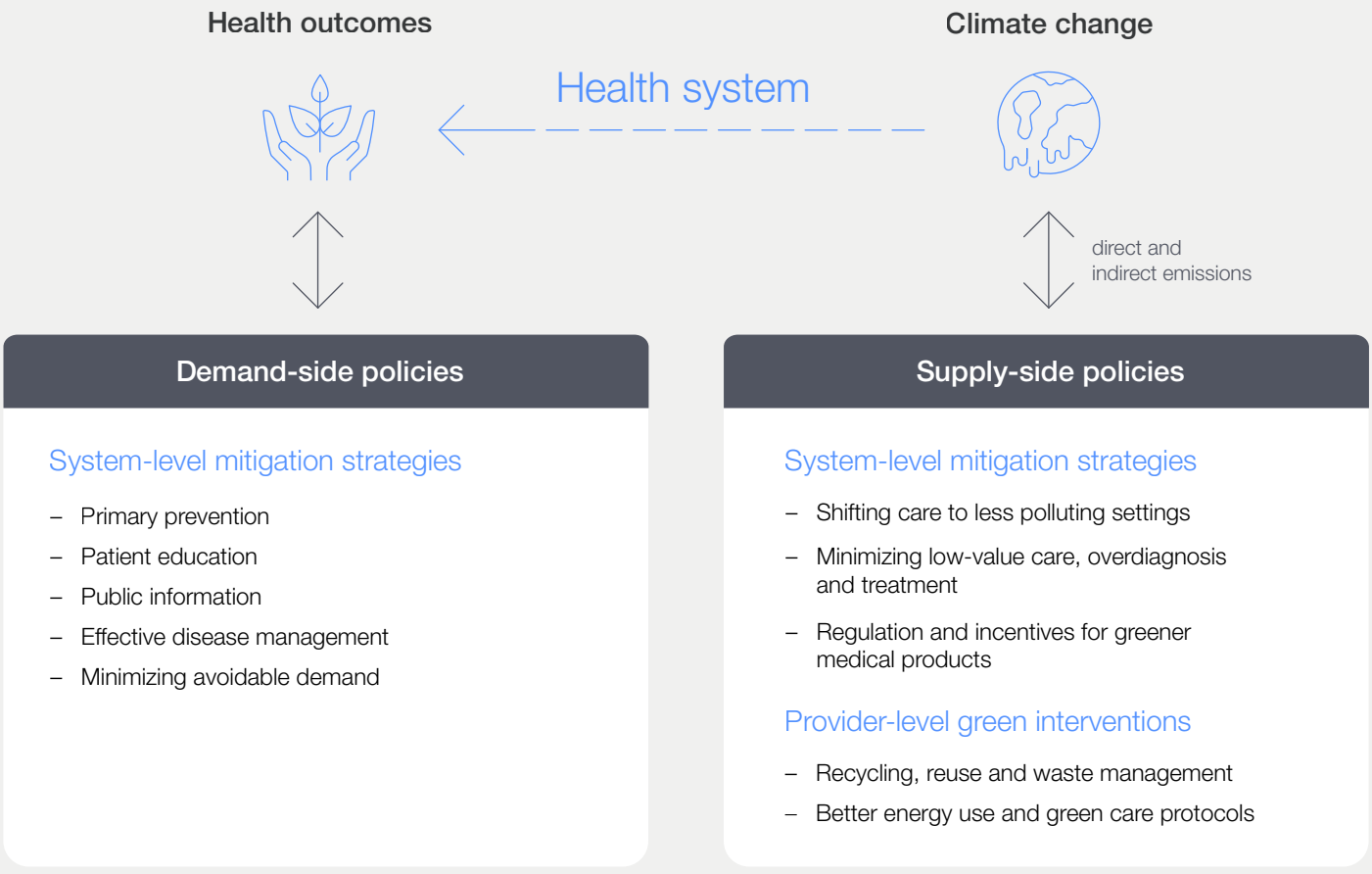
Current landscape

NCD patients face disproportionate climate risks from various vulnerabilities. Extreme heat exacerbates cardiovascular and respiratory conditions: deaths from heatstroke in Japan increased fivefold from 1995 to 2023, with 83.3% among those aged over 65. Power outages threaten refrigerated medications and medical devices. Extreme weather disrupts routine care precisely when health systems are facing maximum stress. Air pollution causes approximately 48,000 deaths annually in France,[77] with the most deprived areas facing tenfold higher exposure risk.[78]

Adaptation frameworks are emerging, but implementation is incomplete. Italy's Heat Health Watch Warning Systems enable 72-hour forecasts, while Japan combines "Heatstroke Alerts" with housing insulation subsidies. Spain's Health and Environment Strategic Plan addresses air quality and urban health impacts. Yet translation into NCD-specific protocols remains limited: heat warnings rarely trigger modified care protocols, despite cardiovascular medications requiring dosage adjustment during heatwaves. France's experience illustrates the challenge: despite implementing heat warnings after the deadly 2003 heatwave, heat-related deaths increased 60% between 2000 and 2022.

Healthcare systems simultaneously contribute significantly to the climate crisis. Healthcare accounts for 3.8–7.6% of national carbon emissions, with per capita emissions varying more than twofold from 172 kg CO_2 equivalent in Poland to 996 kg in Japan.[79] Higher emissions intensity correlates with technology-intensive, hospital-centred care models, while community-based approaches achieve lower environmental impact. Yet most countries lack comprehensive emissions measurement systems.

FIGURE 6 **Relationship between the healthcare system, climate change and sustainability strategies and interventions[80]**



Source: Adapted from: Or, Z. and Seppänen, A. V. (2024). The role of the health sector in tackling climate change: A narrative review. *Health Policy, 143*

Opportunities for co-benefits remain largely untapped. Better NCD outcomes simultaneously reduce emissions: preventing chronic kidney disease progression can halve the condition's CO_2 impact by avoiding dialysis,[81] while Canada's virtual care expansion avoided 330,000 tonnes of CO_2 emissions in 2021 alone.[82] Yet such co-benefits typically remain unquantified and unvalued in resource allocation, perpetuating high-emission care models even when lower-emission alternatives would improve both health outcomes and environmental sustainability.

Policy levers

- **Develop comprehensive emissions measurement:** Create standardized methodologies for calculating healthcare emissions from pharmaceutical life cycles through service delivery. Demonstrate how better patient outcomes reduce environmental footprint, supporting the case for improved care pathways.
- **Build climate-resilient services:** Systematically assess climate vulnerabilities for NCD patients who face disproportionate risks. Develop adjusted clinical protocols for heatwaves and climate events, ensure medication security during power outages and translate heat warnings into modified care advice.
- **Quantify environmental co-benefits:** Calculate emissions avoided through prevention programmes, community-based care and virtual consultations. Incorporate environmental co-benefits into investment decisions, systematically pursuing synergies.
- **Integrate health-environment governance:** Create formal mechanisms linking health and environmental agencies. Establish joint planning for health and climate strategies, shared accountability frameworks and coordinated response protocols.
- **Address environmental health inequities:** Ensure climate adaptation measures explicitly target vulnerable populations. Direct environmental health interventions – including air-quality improvements and cooling infrastructure – to populations facing multiple disadvantages.

Conclusion

There is a moral and financial imperative to transforming health and social systems in order to combat NCDs effectively.

Transformation requires coordinated action to address systemic barriers. Effective and feasible solutions exist for achieving equitable, sustainable health systems. Analysis across eight diverse health systems reveals barriers transcending individual country contexts, pointing to structural challenges requiring systemic solutions rather than incremental adjustments.

Temporal misalignment creates powerful disincentives for prevention and early intervention. Investments carry upfront costs while benefits materialize over decades, far beyond annual budget cycles and political terms. Fragmented governance compounds this by distributing responsibility across sectors without coordination mechanisms, while care remains organized around single diseases. Even where evidence-based interventions improve outcomes, inconsistent implementation and fragmented delivery limit population-level impact, reinforcing inequities.

Payment systems systematically reinforce these problems by rewarding volume over value. Market forces concentrate healthcare workers and diagnostic technologies in urban centres, creating systematic disadvantages for populations facing the highest NCD burden. Adoption of technology without organizational change amplifies rather than resolves fragmentation. Screening programmes achieve 80% coverage in some regions, while others reach barely 20% despite comparable resources, demonstrating that equity requires deliberate design.

A framework for transformation

The framework addresses these systemic barriers through coordinated action across six interconnected domains: prevention and care; governance and accountability; financing mechanisms; workforce development; medicines and technologies; and environmental sustainability. Success depends on recognizing their interdependence: screening programmes require functioning referral pathways; prevention initiatives require sustained financing; and clinical guidelines require implementation mechanisms.

Key principles guide this transformation:

- **Address the root causes across sectors:** NCDs arise from biological, behavioural, environmental and social factors. Effective action requires coordination across health, education, finance, agriculture and urban planning, supported by governance structures with authority to align policies and resources.
- **Integrate action within health systems:** Effective responses require coordinated action across all health system functions – from prevention to care delivery, financing to workforce development – linked with broader sectoral efforts.
- **Design explicitly for equity:** Universal coverage does not automatically ensure equitable outcomes. Interventions must deliberately reach disadvantaged populations through targeted programme design, systematic monitoring by socioeconomic status and geography, and responsive mechanisms addressing identified disparities.
- **Sustain commitment beyond political cycles:** Meaningful NCD reduction requires sustained investment over decades. This demands protected multi-year prevention budgets, accountability structures maintaining focus despite leadership changes and planning aligned with time frames over which health benefits accrue.
- **Enable evidence-based implementation:** Comprehensive disease registries, regular evaluation of intervention effectiveness and mechanisms translating findings into policy adjustments are essential. Data collection must be accompanied by governance frameworks ensuring that evidence informs decision-making and resource allocation.

Health systems that invest in prevention, risk-stratified detection, shorter diagnostic pathways and integrated chronic care can bend the disease burden trajectory despite ageing populations. The barriers to acting early are temporal, institutional and incentive-based rather than technical. Solutions exist, and the question is not whether health systems can afford to transform but whether they can afford not to.

For millions living with NCDs and millions more at risk, early action vs. delayed intervention determines quality of life, independence and survival. The path forward demands political courage, sustained commitment and recognition that acting early is not only cost-effective but morally imperative.

Appendix: PHSSR references

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