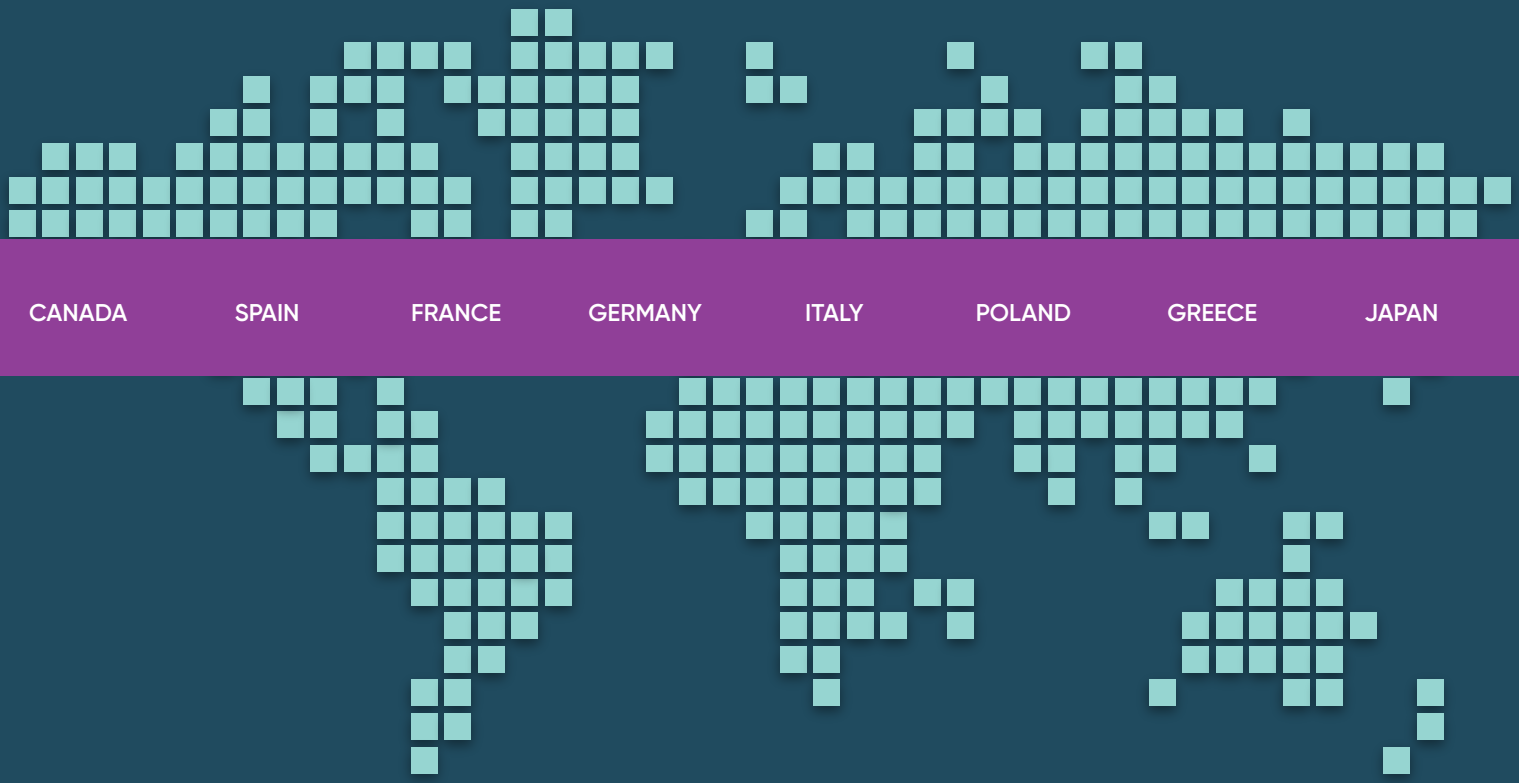
Partnership for Health System Sustainability and Resilience

SYNTHESIS REPORT

Policy roadmaps for acting early on NCDs



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For further information on PHSSR, please visit www.phssr.org.

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Executive summary

Introduction

This analysis, conducted by the Partnership for Health System Sustainability and Resilience (PHSSR), examines eight health systems that have achieved high rates of health coverage and high life expectancies, yet face mounting challenges from NCDs: Canada, France, Germany, Greece, Italy, Japan, Poland, and Spain. The report focuses on four disease categories that collectively represent over 80% of premature NCD deaths: cancer; cardiovascular disease, diabetes and chronic kidney disease; and chronic respiratory diseases. Drawing from comprehensive country assessments using a structured research framework, the report examines both service delivery across the care continuum and the system enablers that determine effectiveness, including governance, financing, workforce, medicines and technologies, and environmental sustainability.

All eight countries have demonstrated significant achievements in health system development, with life expectancies ranging from 77.2 to 84.1 years and age-adjusted NCD mortality falling consistently over the past two decades. Countries have proven that dramatic improvements remain achievable: some have halved cardiovascular disease burden through sustained prevention, others have achieved world-leading low premature mortality rates, and reach millions annually through population screening programmes. System innovations, from expanded diagnostic capabilities in primary care to structured chronic disease management programmes, show that health systems can successfully reorganise for earlier intervention. These diverse successes prove that transformation is possible regardless of starting point or system design.

Yet despite these foundations, a consistent pattern emerges: health systems are intervening too late. Prevention remains undervalued despite proven cost-effectiveness, early detection is inconsistent, referral pathways are slow and fragmented, and chronic disease management is poorly aligned to the needs of patients with multiple long-term conditions. The evidence shows that solutions exist and are technically feasible, but implementation lags. Acting earlier across the care continuum represents both the critical challenge and achievable opportunity for the next decade.

Current burden and future trajectories

Age-adjusted disability-adjusted life years (DALYs) from NCDs have fallen across all countries, reflecting real progress in controlling age-specific risks. Yet unadjusted DALYs have risen, showing how population ageing brings accumulated lifetime exposures into clinical manifestation. Health systems therefore face growing pressure not because ageing causes disease, but because more people are living to an age where accumulated risks emerge as chronic illness.

Cardiovascular disease illustrates what sustained intervention can achieve, with consistent declines in both adjusted and unadjusted burden in most countries. Cancer now accounts for the largest share of DALYs in six of eight countries, and while age-adjusted rates are falling, outcomes remain highly stage-dependent, underlining the importance of timely detection. Diabetes presents the most concerning trajectory, with rising burdens even after age adjustment in seven of eight countries, a sign of worsening metabolic health that goes beyond demographic change. Chronic kidney disease trends are concerning, with an increasing burden in seven of the eight countries in our sample. Chronic respiratory diseases are also a significant contributor to the NCD burden, with COPD and asthma driving avoidable hospitalisations, intensified by under-diagnosis and continued exposure to tobacco smoke and air pollution.

Inequalities are pronounced: socioeconomic gradients in life expectancy and chronic disease outcomes persist, with France, for example, showing a 13-year life expectancy gap between the poorest and richest 5% of men. Geographic disparities within countries often exceed those observed between countries. These inequities compound disadvantage, leaving rural and low-income populations systematically underserved.

Acting early across the care continuum

Primary prevention & health promotion

CURRENT LANDSCAPE: Several countries have implemented effective prevention measures: France pioneered sugar-sweetened beverage taxation with demonstrated impact, Japan's comprehensive Health Japan 21 framework sets measurable targets across risk factors. However, implementation and enforcement of existing policies are uneven, health promotion efforts are rarely sustained across the life course, and vaccination coverage for NCD-relevant pathogens shows marked socioeconomic gradients.

RECOMMENDATIONS:

- **Implement comprehensive fiscal measures to discourage unhealthy behaviours:** Deploy evidence-based taxation on tobacco, alcohol and sugar-sweetened beverages at levels that demonstrably change 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 that undermines policy effectiveness.

- **Create regulatory environments that support healthy choices:** Establish comprehensive restrictions on marketing unhealthy products to 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 with systematic education:** 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 – particularly adolescence, employment entry, and retirement – with targeted interventions at these vulnerable periods.

- **Strengthen vaccination programmes for NCD prevention:** Achieve high coverage for HPV vaccination through school-based programmes using opt-out rather than opt-in models, with targeted catch-up campaigns for missed cohorts. Ensure comprehensive hepatitis B vaccination for infants and at-risk adult populations. Monitor coverage by socioeconomic status and geography to identify and address disparities in protection.

Secondary prevention: Screening & early detection

CURRENT LANDSCAPE: Organised screening programmes show promise where implemented well, but progress is needed across all countries in our sample: for example, cervical screening participation in 2019 ranged from 15.7% in Poland to 70% in Spain, while within Italy, colorectal screening varies 14-fold between regions. A significant proportion of serious conditions are identified through emergency routes rather than planned pathways. For non-cancer NCDs, systematic screening remains limited despite simple, low-cost tests. Chronic kidney disease affects 10-15% of adults but lacks organised screening in most countries, with France reporting 25% of patients beginning haemodialysis in emergency situations.

RECOMMENDATIONS:

- **Implement systematic risk stratification for screening programmes:** Systematically deploy validated risk assessment tools like SCORE2 for cardiovascular risk and polygenic risk scores where appropriate, moving beyond simple age-based criteria. Critically, improve recording of social determinants of health so they can be incorporated into risk models, as current systems systematically ignore socioeconomic factors despite their influence on disease development. Use stratification to determine screening frequency, modality, and follow-up intensity.

- **Expand screening programmes with explicit equity targets:** Since NCDs disproportionately affect underserved populations, screening programmes must include mandatory coverage targets for these communities. Healthcare systems should implement opt-out enrollment with proactive recall, deploy mobile screening units for rural areas, and offer flexible scheduling including evenings and weekends. Regions should face be incentivised to reach participation thresholds among disadvantaged groups. While engaging high-risk underserved populations requires additional resources, this investment is essential for detecting disease when interventions can still be curative or disease-modifying.

- **Strengthen primary care as the foundation for opportunistic detection:** Expand primary care authority and capabilities to independently diagnose and initiate treatment for common NCDs, following evidence that greater autonomy improves treatment initiation without increasing misdiagnosis. Ensure payment systems recognise and reimburse opportunistic screening activities performed during routine visits. Improve access to essential diagnostic tools including spirometry for respiratory disease, ECG capabilities for cardiovascular conditions, and point-of-care testing for diabetes and kidney disease.

- **Invest in diagnostic capacity to improve earlier diagnosis of NCDs**: Improve access to essential diagnostic tool for major NCDs: spirometry for respiratory disease, CT scans, MRI scans, and endoscopy to improve early diagnosis of cancer, ECG capabilities for cardiovascular conditions, point of care blood glucose testing, and urine testing for proteinuria

- **Develop systematic protocols for managing abnormal findings:** Establish clear pathways for abnormal findings identified during routine encounters, with defined timeframes for follow-up and diagnostic confirmation including fast-track referrals for suspected cancer. Specify which conditions primary care can diagnose independently versus those requiring specialist confirmation, avoiding both unnecessary referrals and dangerous delays.

- **Ensure sustainable financing for screening programmes:** Move beyond temporary funding that undermines programme effectiveness and population trust. Establish dedicated, long-term funding integrated into regular health budgets rather than dependent on external or time-limited sources. This must cover not just screening tests but the full pathway from abnormal results through diagnosis to treatment initiation.

- **Address implementation barriers beyond programme design**: The persistent gap between programme availability and population participation requires systematic evaluation of why eligible populations do not participate. Invest in targeted awareness campaigns, simplify patient pathways, engage communities, and adapt programmes based on findings rather than assuming that availability equals access.

Tertiary prevention: Referral & access to specialist care

CURRENT LANDSCAPE: Referral pathways from primary to specialist care vary widely across countries, from structured gatekeeping to fragmented self-referral systems. While some countries guarantee specialist access timeframes and others have developed coordination protocols, implementation remains uneven. Information sharing between providers faces persistent barriers despite widespread digitalisation, with most systems unable to exchange data across care settings. Geographic disparities in specialist availability create substantial access challenges, particularly for rural populations facing longer waits and travel distances. Critically, comprehensive monitoring of complete pathway times from referral through treatment remains absent, limiting health systems' ability to identify and address bottlenecks that delay necessary care.

RECOMMENDATIONS:

- Establish clear referral criteria with supporting infrastructure: Develop evidence-based guidelines specifying when specialist referral adds value versus when primary care management is appropriate. Embed these criteria in clinical decision support systems with regular updates based on emerging evidence. Critically, ensure primary care has the resources and authority to manage conditions within their scope, avoiding unnecessary referrals that fragment care.

- Implement target maximum waiting times for specialist access: Set explicit timeframes for specialist consultation following referral, with enforcement mechanisms and consequences for non-compliance. These targets must cover the complete pathway from referral to initial specialist assessment, with operational capacity developed to meet standards consistently rather than creating aspirational targets without delivery capability.

- Create unified information systems for seamless coordination: Enable information sharing between primary and specialist care through interoperable electronic systems, eliminating the current reality where patients carry paper documents between providers. This requires not just technical standards but governance frameworks that mandate data sharing whilst protecting privacy, enabling specialists to access comprehensive patient histories and primary care to receive timely feedback.

- Address geographic disparities in specialist access: 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 who face compound disadvantages at every stage of the referral pathway.

- Build monitoring systems that track complete pathways: Measure not just individual waiting times but total time from initial referral through specialist assessment to treatment initiation, disaggregated by condition, geography, and socioeconomic status. Use regular public reporting of pathway performance to drive improvement through transparency whilst identifying where targeted interventions are most needed.

Tertiary prevention: Treatment & disease management

CURRENT LANDSCAPE: Successful models demonstrate potential: Germany's Disease Management Programmes (DMPs) provide structured care to millions with documented improvements in outcomes, while Italy's new DM77 reform establishes community health centres as integrated care hubs. Yet challenges persist. Disease-management programmes often remain disease-specific and administratively heavy. Despite 68.1% of Italian citizens aged 65+ receiving prescriptions for at least five different substances, no country has developed comprehensive guidelines for multimorbidity management. High rates of avoidable hospitalisation in some settings indicate gaps in coordination, while the pandemic revealed extreme vulnerability of NCD services to disruption.

RECOMMENDATIONS:

- Develop guidelines for multimorbidity with practical decision support: Move beyond single-disease guidelines to address common disease combinations explicitly, providing frameworks for prioritising interventions when recommendations conflict and protocols for deprescribing when risks exceed benefits. Clinical decision support tools should help reconcile competing guidelines whilst maintaining focus on what matters most to individual patients rather than disease-specific targets.

- **Scale disease management programmes with systematic enrolment:** Shift from voluntary participation to opt-out enrolment, ensuring programmes reach those most in need rather than just motivated volunteers. This must be combined with demand projections and corresponding capacity investment. Link programme funding to achieving both high coverage and quality outcomes that matter to patients, not just process measures.

- **Strengthen medication management for complex patients:** Implement regular comprehensive medication reviews that consider all conditions together rather than disease-by-disease. Embed pharmacists within primary care multidisciplinary teams as active partners, with decision support tools identifying potentially harmful interactions and optimisation opportunities, 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 helping patients navigate daily management challenges. Recognise self-management support as an essential clinical service requiring dedicated resources rather than an optional extra, including peer support networks and validated digital tools.

- **Build crisis-resilient chronic disease care:** Establish explicit protocols for maintaining essential NCD services during emergencies, defining minimum service packages that must continue during disruptions. 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:** Beyond developing guidelines, establish mechanisms ensuring implementation through regular audits with feedback to providers, support for improvement initiatives, and quality indicators reflecting patient outcomes rather than just process measures. Embed quality improvement in routine practice with continuous performance monitoring rather than treating it as an additional burden.

System enablers

Governance & accountability

CURRENT LANDSCAPE: Japan's structured approach with dedicated ministerial divisions and expert committees provides clear accountability lines, while Canada's patient-oriented research networks successfully embed lived experience into policy design. However, fragmentation remains common across countries. Federal and regional systems create inconsistent coverage, national oversight often lacks enforcement powers, and cross-sectoral coordination on social determinants remains limited despite widespread recognition of their importance. Monitoring exists but rarely triggers corrective action: Italy's documentation of extreme regional disparities has not produced effective interventions to address inequities.

RECOMMENDATIONS:

- **Establish multi-sectoral coordination bodies with real authority:** Create cross-ministerial bodies 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, with formal accountability for achieving cross-sectoral objectives.

- **Develop comprehensive NCD registries for evidence-based decisions:** 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 whilst protecting privacy, enabling systematic monitoring of progress and identification of gaps.

- **Ensure NCD investments are monitored with return on investment evaluated:** Require that funding decisions explicitly reference national health data, burden of disease assessments, and effectiveness evidence. Strengthen health technology assessment for NCD interventions and mandate cost-effectiveness evaluation for both existing and novel programmes, ensuring resources flow to proven interventions.

- **Implement robust monitoring with consequences for non-delivery:** National strategies require not just targets but clear implementation plans with specific responsibilities, timelines, and consequences. Independent monitoring bodies should assess progress with genuine authority to recommend course corrections, with findings directly linked to budget cycles and policy decisions rather than producing reports without impact.

- **Institutionalise meaningful stakeholder engagement:** Create formal mechanisms for patient and public involvement providing real influence over policy development, with adequate resources for stakeholder organisations to participate effectively. However, structure involvement to provide input and accountability without creating veto points that enable special interests to obstruct evidence-based policies.

Healthcare financing

CURRENT LANDSCAPE: Despite spending 9.7% of GDP on healthcare on average, all countries allocate less than 5% to prevention. Greece increased prevention spending from 1.30% to 4.50% between 2019–2022, demonstrating that reallocation is possible with political commitment. France's ALD scheme provides comprehensive financial protection for chronic conditions, showing how layered mechanisms can address vulnerability. Yet fee-for-service remains dominant, rewarding throughput over coordination. Financial protection gaps persist even under universal coverage, with chronic disease patients facing cumulative costs over years. Regional allocation formulas rarely reflect true needs, with Italy showing two-fold per capita spending variations that reinforce geographic inequities.

RECOMMENDATIONS:

- **Increase prevention investment through structural budget reforms:** Move beyond marginal adjustments to meaningful reallocation of resources toward prevention, currently below 5% in all studied countries. Establish transparent tracking systems across all funding sources and protect prevention budgets through multi-year commitments reflecting the long-term nature of prevention benefits. Base investment levels on population health needs and effectiveness evidence rather than historical patterns.

- **Strengthen financial protection for chronic disease patients:** minimise out-of-pocket healthcare costs and implement means-tested exemptions to provide enhanced protection for those with chronic conditions who face cumulative costs over years. Simplify administrative access to avoid excluding those most in need, and monitor financial protection by socioeconomic status to trigger policy responses when unacceptable disparities emerge.

- **Reform resource allocation to address territorial inequities:** Ensure allocation formulas reflect the true costs of delivering care in different contexts, including social deprivation, infrastructure limitations, and the challenges of serving dispersed rural populations. Areas facing multiple disadvantages require additional support to achieve equitable outcomes rather than merely equal funding, with central mechanisms retaining flexibility to address persistent inequities.

- **Embed prevention value in all resource decisions:** Systematically consider prevention benefits using appropriate time horizons that capture long-term value. This might involve treating prevention as investment rather than expenditure, or developing mechanisms allowing health systems to benefit from the broader economic and social savings their prevention activities generate.

- **Create financing mechanisms that reward coordination:** Move from fragmented funding streams to population-based or bundled payments that encourage collaboration across providers. Explicitly recognise prevention and coordination activities in payment systems rather than expecting them as unfunded additions to clinical work, ensuring these essential functions are properly resourced.

- **Reform payment systems to align with chronic disease needs:** Transition primary care from fee-for-service toward capitation-based models providing predictable funding for prevention and chronic disease management. Where pay-for-performance is considered, careful design is essential to avoid unintended consequences. Priority should go to removing perverse incentives in current systems, ensuring adequate reimbursement for consultation time and team-based care.

Workforce capacity

CURRENT LANDSCAPE: Some countries are taking bold action: Poland increased medical school admissions limits by 92.3%, and Germany has expanded the role of medical assistant for greater 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 versus and EU average of 21%. Geographic maldistribution leaves rural areas systematically underserved across all countries. Ageing workforces compound challenges, with Polish physicians averaging over 50 years of age. Task-shifting initiatives show promise but remain limited by regulatory barriers and professional resistance.

RECOMMENDATIONS:

- **Develop comprehensive workforce planning linked to NCD projections:** Create long-term strategies genuinely reflecting future population health needs rather than perpetuating historical patterns. Model demographic transitions and disease trends whilst considering how new care models and prevention investments might affect workforce demands. Integrate planning across all health professions with continuous monitoring of alignment with evolving needs.

- **Address geographic and specialty maldistribution comprehensively:** Create compelling reasons for practice in underserved areas through combinations of financial incentives, career development opportunities, and infrastructure support that makes rural practice genuinely attractive. This might include service obligations for publicly-funded education, rotational models maintaining urban connections, or regulatory approaches limiting further concentration in oversupplied areas.

- **Expand professional roles to optimise skill-mix:** Enable all health professions to work at full scope of practice whilst creating new roles specifically designed for chronic disease prevention and management. For example, pharmacists and nurses could manage stable chronic conditions within appropriate frameworks, but this requires aligned regulatory, legal, and payment systems that support rather than obstruct such practice changes.

- **Reform professional education with mandatory NCD competencies:** Shift from traditional acute care focus to prepare graduates for chronic disease management reality. Embed prevention, behaviour change, and multimorbidity management throughout curricula whilst ensuring interprofessional education teaches collaborative practice. Digital health capabilities should become core competencies with continuous professional development maintaining currency.

- **Create sustainable careers in prevention and primary care:** Address the persistent shortage of primary care and prevention specialists by tackling income disparities with specialists whilst providing intellectual stimulation through research opportunities and academic positions. Reduce administrative burden through infrastructure support and ensure prevention activities are properly resourced within job plans rather than squeezed into overwhelming workloads.

- **Invest in systematic demand reduction:** Rather than assuming endless workforce expansion can meet growing NCD demands, develop evidence-based self-management programmes that genuinely enable patients to manage their conditions. Measure workforce time saved to justify continued investment. Use group consultations, peer support, and validated digital tools whilst avoiding simply shifting burden to patients, particularly those facing disadvantage.

Medicines and technologies

CURRENT LANDSCAPE: Innovation in access mechanisms shows progress: Italy's €500 million Innovative Drugs Funds ensure breakthrough therapies reach patients, France's 'direct access' pilot provides immediate reimbursement for major therapeutic advances, and Germany's DiGA framework pioneers digital therapeutic reimbursement. Yet systematic delays persist: Greece faces over 600 days from regulatory approval to reimbursement, while Japan sees 72.4% of US/EU-approved medications remain unavailable. Digital infrastructure adoption is widespread with near-universal EMR adoption in several countries, but interoperability failures prevent care coordination. The populations most affected by NCDs face systematic barriers to digital health adoption.

RECOMMENDATIONS:

- **Accelerate access to high-value innovations:** Reform approval and reimbursement pathways to reduce delays between regulatory approval and patient access, which can exceed 600 days in some countries. Implement fast-track processes for breakthrough NCD therapies with clear timelines, early access programmes bridging regulatory and reimbursement decisions, and dedicated innovation funds providing temporary coverage during price negotiations. Consider risk-sharing agreements for expensive therapies with uncertain benefits.

- **Ensure equitable diagnostic infrastructure:** Address regional disparities in access to diagnostics, establishing minimum standards for technology availability, systematic renewal programmes with protected funding, mobile diagnostic units for underserved areas, and hub-and-spoke models linking rural to urban facilities. Expand coverage for molecular testing and precision diagnostics when results influence treatment decisions.

- **Build interoperable digital health infrastructure:** Establish mandatory open standards enabling care coordination, addressing the current reality where countries with near-universal EMR adoption cannot share data between providers or regions. Create governance structures with genuine authority to enforce standards and resolve stakeholder disputes that have delayed progress for decades. Balance privacy protection with research needs through trusted environments and clear AI guidance.

- **Reform clinical trial and innovation infrastructure:** Address barriers causing countries to lose competitive position despite strong infrastructure. Unify ethics approval processes to replace fragmented regional systems, streamline administrative requirements, and invest in clinical trial networks with sustainable funding. Develop real-world evidence capabilities leveraging electronic health records and improve patient recruitment through accessible information.

- **Bridge the digital divide for older adults with NCDs:** Address evidence that half of citizens over 70 in some countries cannot use digital devices and most chronic patients over 70 lack autonomy with digital tools. Mandate accessibility standards for health interfaces, provide support services including helplines and in-person assistance, and maintain non-digital alternatives. Integrate digital literacy training with chronic disease management programmes.

Environmental sustainability

CURRENT LANDSCAPE: Healthcare contributes 3.8–7.6% of national carbon emissions across studied countries. Some countries show leadership, France's 2023 healthcare sustainability roadmap encourages low-carbon and local supply chains and aims to develop methodologies to assess the carbon footprint of medicines and devices, while Spain's Health and Environment Strategic Plan focuses on climate impacts to NCDs such as air and water quality, chemical exposures, and urban health. Italy's Heat Health Watch Warning Systems enable 72-hour forecasts for healthcare preparation. However, most countries lack comprehensive measurement of health system emissions, and adaptation planning for climate impacts on NCD patients remains underdeveloped. Environmental health interventions risk exacerbating inequities when benefits concentrate in wealthier communities.

RECOMMENDATIONS:

- **Develop comprehensive emissions measurement across care pathways:** Create standardised methodologies for calculating healthcare emissions from pharmaceutical lifecycles to service delivery and patient travel. Demonstrate how better patient outcomes reduce environmental footprint, supporting the case for improved care pathways and guideline adherence. Enable industry benchmarking to track progress in reducing environmental impact at source through innovation.

- **Build climate-resilient NCD services:** Systematically assess climate vulnerabilities for NCD patients who face disproportionate risks from extreme weather. Develop adjusted clinical protocols for heatwaves and other climate events, ensure medication security during power outages, and translate heat warnings into modified care advice for chronic disease patients. Create protocols for maintaining service continuity during climate-related disruptions.

- **Quantify and value environmental co-benefits:** Calculate emissions avoided through prevention programmes, community-based care, and virtual consultations, despite these benefits currently being unquantified in resource allocation. Incorporate environmental co-benefits into investment decisions, systematically pursuing synergies rather than managing assumed trade-offs between health and environmental objectives.

- **Integrate health and environmental governance:** Create formal mechanisms linking health and environmental agencies beyond current fragmented approaches. Establish joint planning for health and climate strategies, shared accountability frameworks, and coordinated response protocols for climate-related health events. Move from policy frameworks to operational integration enabling systematic action.

- **Address environmental health inequities in adaptation:** Ensure climate adaptation measures explicitly target vulnerable populations, as current approaches can disproportionately benefit those with greater resources. Direct environmental health interventions including air quality improvements and cooling infrastructure to populations facing multiple disadvantages. Provide rural and remote communities with adaptation planning and basic infrastructure despite their particular vulnerabilities.

Conclusion

The eight health systems examined demonstrate both significant achievements and persistent challenges. They have built robust infrastructure, achieved high rates of health coverage, and made substantial progress in reducing age-adjusted NCD mortality. Yet the principal barriers to acting early are temporal, institutional and incentive-based rather than technical. Prevention requires upfront costs with benefits beyond electoral cycles; workforce and infrastructure concentrate in urban centres while need is greatest in underserved areas; and payment systems reward activity

over outcomes. The pandemic demonstrated health systems' capacity for rapid change when compelled. Similar resolve is now needed for early action on NCDs, where delays lock in decades of avoidable burden.

Performance differences within and between countries show that improvement is feasible with existing knowledge and resources. Systems that shift investment and emphasis toward prevention, risk-stratified detection, shorter diagnostic pathways, and integrated chronic care can bend the trajectory of disease burden despite ageing populations. Those that delay will entrench inequity and escalate future costs. The choice is between preserving late intervention or advancing structural reform that achieves earlier, coordinated, and equitable care. The path forward demands political courage, sustained commitment, and recognition that acting early is not only cost-effective but morally imperative.

Abbreviations

AI	Artificial Intelligence
ALD	Affection de Longue Durée/Long-Term Illness (France)
BMI	Body Mass Index
CIHI	Canadian Institute for Health Information
CKD	Chronic Kidney Disease
CNAM	National Health Insurance Fund (France)
CO_2	Carbon Dioxide
COPD	Chronic Obstructive Pulmonary Disease
CT	Computed Tomography
CVD	Cardiovascular Disease
DALY	Disability-Adjusted Life Year
DiGA	Digital Health Applications (Germany)
DMP	Disease Management Programme (Germany)
ECG	Electrocardiogram
eGFR	Estimated Glomerular Filtration Rate
EHR	Electronic Health Record
EMR	Electronic Medical Record
EU	European Union
FAVO	Federazione italiana delle Associazioni di Volontariato in Oncologia (Italy)
GBA+	Gender-Based Analysis Plus (Canada)
GDP	Gross Domestic Product
GHO	Global Health Observatory
HAS	Haute Autorité de Santé (France)
HbA1c	Hemoglobin A1c
HiAP	Health in All Policies
HPV	Human Papillomavirus
HTA	Health Technology Assessment
IHD	Ischaemic Heart Disease

IHME	Institute for Health Metrics and Evaluation
KBV	Kassenärztliche Bundesvereinigung (Germany)
LCA	Life-Cycle Analysis
LSE	London School of Economics and Political Science
MHLW	Ministry of Health, Labour and Welfare (Japan)
MRI	Magnetic Resonance Imaging
MTLC	Multiple Long-Term Conditions
NCD	Non-Communicable Disease
OECD	Organisation for Economic Co-operation and Development
PET	Positron Emission Tomography
PHAC	Public Health Agency of Canada
PHSSR	Partnership for Health System Sustainability and Resilience
R&D	Research and Development
SMART	Specific, Measurable, Achievable, Relevant, Time-bound
SNPS	National System for Prevention of Health Risks (Italy)
UK	United Kingdom
US/USA	United States/United States of America
VAT	Value Added Tax
VHI	Voluntary Health Insurance
WHO	World Health Organization

List of figures

Introduction

The global NCD crisis

Non-communicable diseases (NCDs) represent the defining health challenge of the 21st century. In 2021, NCDs were responsible for an estimated 43.8 million deaths worldwide, accounting for approximately 75% of all non-pandemic-related deaths, while also increasing people's vulnerability to the virus (WHO, 2024a). In addition to their health impact, NCDs impose substantial direct costs to healthcare systems from healthcare utilisation and pharmaceutical expenditure and indirect costs through productivity losses, placing immense pressure on health systems already straining to meet needs with constrained resources. Their treatment also contributes a significant proportion of health systems' carbon emissions, escalating with disease progression.

NCDs have been included in the 2030 Agenda for Sustainable Development represented global recognition of this crisis, with target 3.4 committing to reduce premature mortality from NCDs by one third through prevention and treatment. Yet as the United Nations prepares for its fourth high-level meeting on NCDs in 2025, the world is not on track to meet this target. The UN Secretary-General's 2025 progress report emphasises that without urgent, concerted action, the long-term trajectory of NCDs will have profound socioeconomic impacts, weakening human capital and diverting resources to treating conditions that could have been prevented (United Nations, 2025).

While low- and middle-income countries bear a disproportionate burden, accounting for 73% to 86% of premature deaths from NCDs, high-income countries face major challenges including aging populations with multiple long-term conditions (MTLCs), rising healthcare costs, budget impact associated with novel treatments and technologies,, and persistent health inequalities within their borders. The rise of NCDs represents a troubling reversal of 20th-century health equity gains, when public health initiatives and welfare state protections helped narrow health disparities. However, today's emphasis on personal responsibility for health choices combined with the scaling back of welfare state protections has been associated with widening health disparities.

Addressing NCDs effectively requires comprehensive approaches that mobilise health systems to actively counter rather than inadvertently reinforce social disadvantage. This requires more proactive intervention, encompassing not just primary prevention but timely and equitable access to appropriate care for secondary and tertiary prevention, from identifying at-risk populations through screening programmes, to prompt diagnosis using necessary technologies, to swift referral to evidence-based treatment and disease management that prevents progression and complications. But although the case for early intervention is well-established and increasingly recognised in national health strategies, there is often a gap between rhetoric and practice.

Policy Roadmaps for Acting Early on NCDs

In this context, the Partnership for Health System Sustainability and Resilience (PHSSR) has launched its Policy Roadmaps for Acting Early on NCDs, bringing together research teams from eight high-income countries to conduct systematic assessments of their health systems' capacity for early action. This report synthesises findings and recommendations from forthcoming the reports on Acting Early on NCDs in Canada, France, Germany, Greece, Italy, Japan, Poland, and Spain, developed through evidence review and extensive stakeholder consultation within each national context, with a common research framework.

Our research focuses on four disease categories accounting for over 80% of premature NCD deaths: cancer; cardiovascular disease, diabetes and chronic kidney disease; and chronic respiratory diseases (United Nations, 2025). While NCDs encompass a broader spectrum including neurological, musculoskeletal, and mental health conditions, these four categories were selected for their disproportionate impact, established evidence base for early intervention, and interconnected nature through shared risk factors and pathways, meaning that they frequently co-occur. This provides the rationale for examining these diseases together, as interventions targeting one condition often influence outcomes across multiple NCDs.

All countries show substantial variations in NCD outcomes: mortality rates range two-fold between Japan (230.7 per 100,000) and Poland (460.2 per 100,000), whilst within-country disparities are even more striking, with screening coverage varying up to 14-fold between regions in Italy. These variations demonstrate that current performance levels are not fixed constraints but reflect political choices, resource allocation decisions, and implementation capacity. Critical gaps persist between evidence and practice across all countries: prevention spending remains below 5% of health budgets universally, with chronic conditions frequently undiagnosed, and proven interventions systematically underutilised despite widespread recognition of their effectiveness.

Perhaps most concerning, the analysis reveals that whilst mortality from NCDs continues to decline, the burden of disease as measured by disability-adjusted life years actually increased in all eight countries between 2011 and 2021. The pace of mortality improvement itself has slowed by 45%, from 1.78% annual reduction during 2000–2010 to just 0.98% during 2010–2021. Yet the evidence also points to enormous potential for improvement. Countries that have achieved specific successes, such as Japan's 38.6% reduction in premature mortality, substantial cardiovascular disease reductions in several countries, and pandemic-driven digital health transformations, which demonstrate that substantial improvements are achievable with focused action and political commitment.

The research teams have identified different solutions to these challenges that reflect their countries' unique institutional contexts and health system architectures. These policy levers are holistic in scope, covering the organisation and delivery of health care services, their governance, how they are financed, the health and care workforce, how systems make use of medicines and technologies, and environmental sustainability and resilience. Common themes emerge, for instance around the need for integrated care models, data infrastructure enabling outcome tracking, and financing reforms that incentivise early action across the care spectrum. These levers align with and extend beyond the UN's existing recommendations.

This synthesis does not present universal prescriptions but rather offers a menu of policy options developed by countries grappling with similar challenges. Whilst the ultimate destination of reducing NCD burden through early action may be shared, the pathways must be tailored to each country's unique circumstances, resources, and institutional arrangements. These findings have immediate relevance for the upcoming UN General Assembly discussions on NCDs, providing evidence-based options for the health system reform required to meet global targets. Full country reports forthcoming in Q4 2025 will offer more detailed analysis of national contexts and implementation strategies.

Methodology

The Partnership for Health System Sustainability and Resilience (PHSSR) commissioned research teams in eight countries to assess their health systems' capacity to act early on non-communicable diseases (NCDs): Canada, France, Germany, Greece, Italy, Japan, Poland, and Spain. These countries were selected to reflect a range of different demographic, economic, and healthcare financing (i.e general and local taxation, social health insurance systems), and provision (i.e. predominantly public, or mixed public and private provision) contexts.

The country research teams, each led by leading academics, followed a structured methodology, applying a common research framework developed by LSE based on a literature review and consultation with expert stakeholders (see Appendix) whilst maintaining flexibility to address local priorities. The research process began with comprehensive desk reviews examining existing evidence on NCD interventions, current policies, and health system performance. This was complemented by extensive stakeholder consultation, with each country conducting surveys and roundtable discussions with participants including academics, clinicians, policymakers, patient advocates, and private sector representatives. The resulting country reports will provide in-depth analysis of health system strengths and weaknesses along with specific policy recommendations.

For this synthesis, a systematic analytical framework was applied to extract and summarise best practices, challenges and recommendations across the participating countries. Extracted insights were extracted and organised into a matrix that allowed for structured comparison across countries. Insights were summarised and grouped to highlight key themes whilst preserving country-specific contexts and nuances. This was used to provide the basis for the narrative synthesis presented in this report.

Limitations

This synthesis draws from eight country reports which drew on data with varying indicator definitions, measurement periods, and reporting standards. In places, we have drawn upon standardised international data sets to enable direct comparisons rather than national data sources used in the country reports. The selection of illustrative examples from the extensive evidence may not fully capture each country's complexity or the relative importance of different findings. Moreover, while country reports incorporated stakeholder consultations, this synthesis primarily reflects documented evidence rather than a full range of professional and patient perspectives.

The analysis is limited to high-income countries with developed health systems, and findings may not apply to other contexts. The policy levers identified represent patterns observed across country experiences, and countries considering these options should adapt them to their specific institutional contexts, resource constraints, and population needs. PHSSR plans to extend this analysis to low- and middle-income countries.

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Expert panel

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Report structure

The report is organised into four main parts across eleven chapters. The report is designed to be read either sequentially for a comprehensive understanding or selectively for specific topics of interest.

Chapters 2 – 10 include policy levers derived from the evidence presented. Cross-cutting themes – particularly equity, implementation challenges, and the gap between evidence and practice – appear throughout all sections.

Part I: Population Health

Chapter 1 examines the current state of NCDs across the eight countries, analysing disease burden, risk factors, and health inequalities. This establishes the epidemiological foundation for understanding where early intervention is most needed.

Part II: The Care Continuum follows the patient journey through the health system

Chapter 2 explores primary prevention and population health promotion

Chapter 3 examines secondary prevention: screening, and early detection programmes

Chapter 4 analyses tertiary prevention: referral pathways

Chapter 5 addresses tertiary prevention: treatment and disease management

Part III: System Enablers examines the foundational elements that prevention, diagnosis, and management of NCDs

Chapter 6 analyses governance structures and accountability mechanisms

Chapter 7 explores financing models and resource allocation

Chapter 8 examines workforce capacity and development needs

Chapter 9 addresses medicines, technologies, and digital health infrastructure

Chapter 10 considers environmental sustainability and climate resilience

Part IV: Synthesis and Conclusions

Chapter 11 draws together insights from across the report to identify common challenges, promising practices, and opportunities for transformation

PART I

Population health

1 The burden of NCDs, risk factors and inequalities

This chapter examines the current burden of non-communicable diseases (NCDs), their risk factors and distribution across eight high-income countries (i.e Canada, France, Germany, Greece, Italy, Japan, Poland, and Spain) providing the epidemiological foundation for understanding how their health systems are performing and where early intervention is most needed.

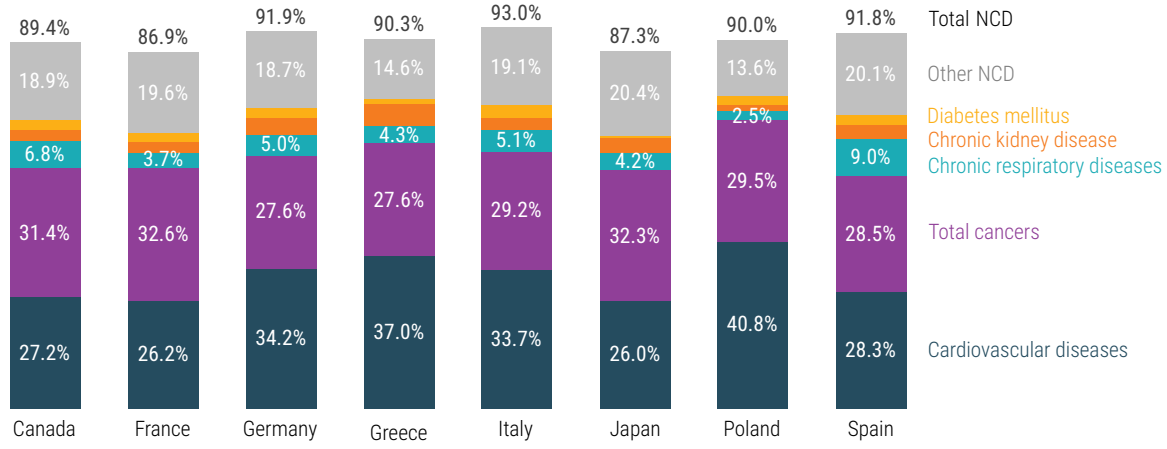
Acknowledging that population ageing does not cause the rising NCD burden but reveals accumulated risks across the life course that health systems can significantly mitigate, this chapter analyses population health through three lenses: the overall burden of NCDs and its evolution, the disease-specific patterns across five major NCD categories, and the distribution of risk factors and inequalities across populations. The analysis reveals three critical patterns that frame all subsequent discussions in this report. First, the divergence between unadjusted and age-adjusted DALY trends demonstrates that whilst countries are reducing age-specific risks for some conditions, population ageing ensures that actual health system burdens continue rising. Second, disease trajectories vary markedly: cardiovascular disease shows success with declining burdens, cancer maintains progress despite demographic pressures, whilst diabetes reveals systemic failure with deteriorating outcomes across all ages. Third, NCDs concentrate along predictable lines of geographic, socioeconomic and educational disadvantage, with risk factors clustering systematically among vulnerable populations in patterns that health systems often reinforce rather than mitigate.

Current NCD burden and trajectories

Mortality rates

The eight countries studied present a complex picture of NCD burden that defies simple categorisation. Whilst all have achieved life expectancies that are high by global standards, ranging from 77.2 years (Poland) to 84.1 years (Japan), this nearly seven-year gap reflects important variations in disease burden and population health trajectories (IHME, 2023). NCDs account for 87–93% of all deaths across the studied countries (Figure 1), yet substantial variation persists in both overall and premature mortality. In 2021, age-standardised NCD mortality rates ranged from 230.7

Figure 1: Proportion of all deaths due to NCDs (%), 2019



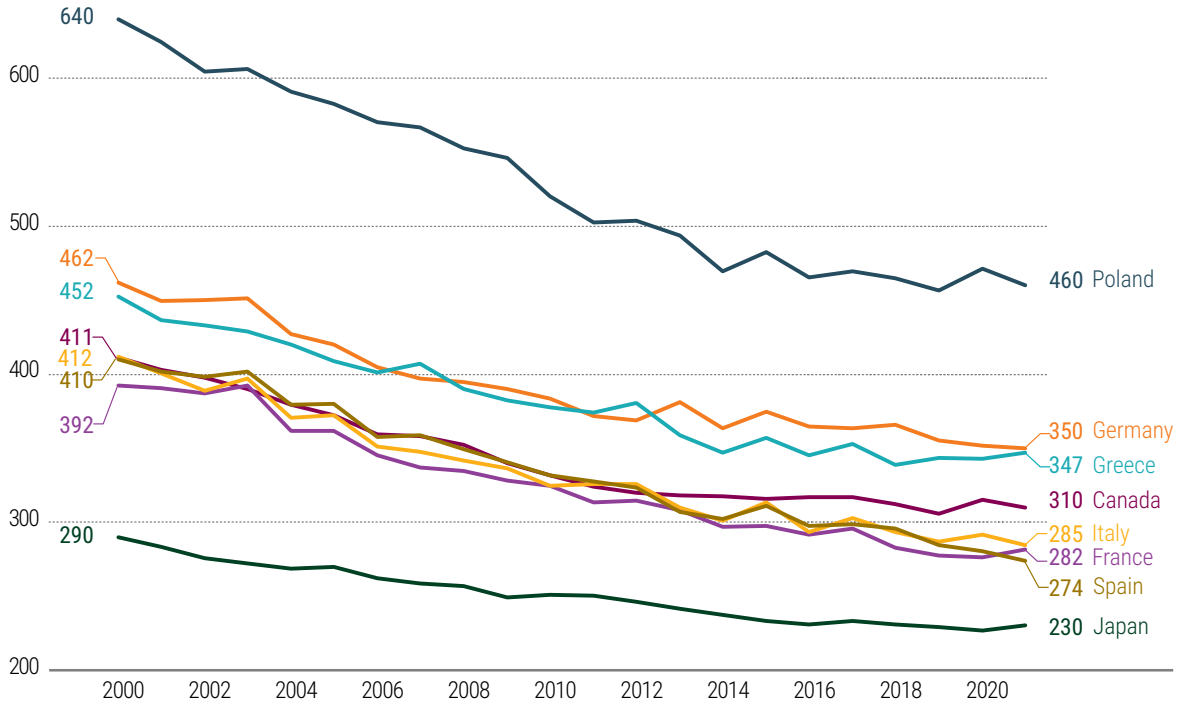
Source: WHO, 2025a.

per 100,000 in Japan to 460.2 in Poland, a two-fold difference that persists despite universal access to medical knowledge and similar levels of economic development.

As Figure 2 shows, between 2000 and 2021, all countries achieved reductions in age-standardised mortality from NCDs, though at markedly different rates. Spain and Italy achieved the most dramatic transformations, with reductions exceeding 30%. Poland achieved the largest absolute reduction yet remains the worst performer due to its exceptionally high baseline (640.1 in 2000), while Japan's more modest 20.5% reduction may partly reflect the challenge of improving from an already-low baseline.

Critically, the pace of NCD mortality reduction has slowed markedly across all eight countries. During 2000–2010, countries achieved an average annual reduction of 1.78%, but this declined to 0.98% during 2010–2021, a 45% relative slowdown. This deceleration was universal, affecting even the strongest performers. Spain, despite achieving the fastest improvement rate in the second decade (1.58% annual reduction), still experienced slower progress than its own first-decade performance (1.91%). This pattern, where even the best contemporary performer cannot match earlier rates of improvement, underlines the systemic nature of the challenge.

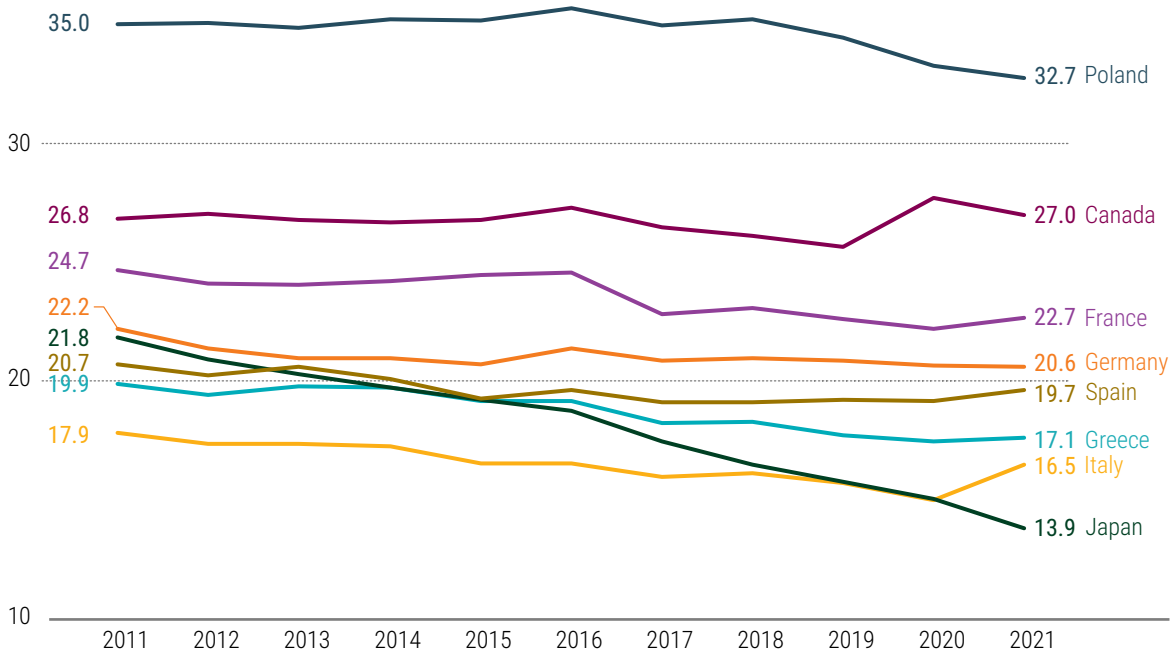
Figure 2: Age-standardised NCD mortality rate (per 100,000 population), 2000–2021



Source: WHO, 2025b.

Figure 3 showing GHO data on premature NCD mortality (i.e. the proportion of deaths before age 70) reveals more disparities. In 2021, rates ranged from 13.85% in Japan to 32.71% in Poland, a 2.4-fold variation suggesting that health system differences are particularly pronounced in preventing early deaths. Between 2012 and 2021, Japan achieved a remarkable 38.6% reduction (from 22.56% to 13.85%), demonstrating that substantial progress is possible, even from a strong baseline. Most European countries achieved modest reductions of 6–12%. However, Canada stagnated (26.86% to 26.99%), while Poland maintained rates more than double Japan's. The COVID-19 pandemic exposed underlying vulnerabilities, with Canada experiencing a sharp spike in 2020 (+2.05 percentage points) while most European countries maintained their trajectories. Notably, Japan continued improving even during the pandemic, reducing premature mortality by 1.92 percentage points between 2019–2021.

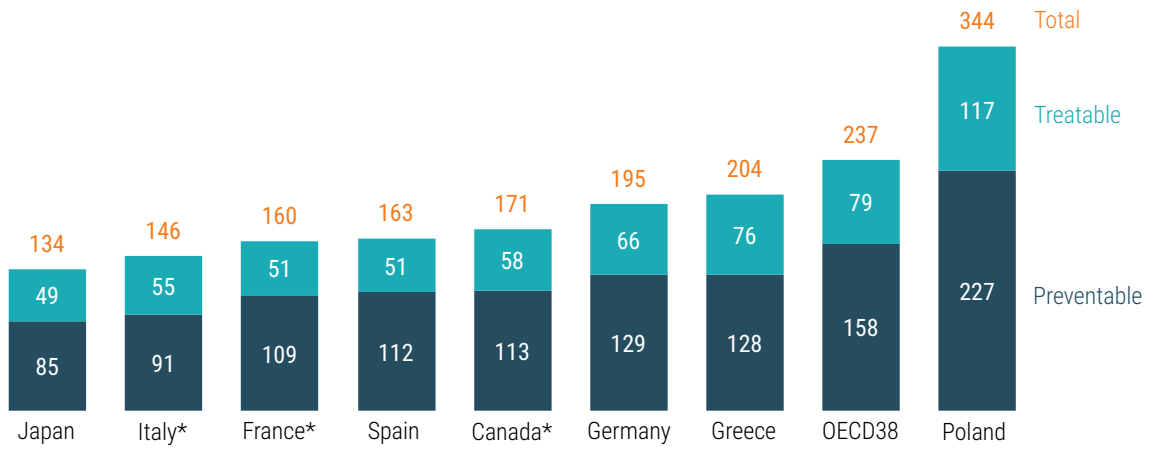
Figure 3: Premature deaths due to NCDs as a proportion of all NCD deaths (%), 2011–2021 or latest



Source: WHO, 2025c.

Figure 4 shows OECD data on preventable and treatable mortality, offering additional insight into where health systems can intervene effectively. Combined avoidable mortality varies 2.6-fold across the eight countries, from 134 per 100,000 in Japan to 344 in Poland. Poland shows the highest rates in both dimensions, with preventable mortality (227 per 100,000) and treatable mortality (117) far exceeding all other countries and OECD38 averages (158 and 79 respectively). France and Spain achieve among the lowest treatable mortality rates (both 51 per 100,000) while their preventable mortality remains near the OECD average, suggesting strong healthcare systems but persistent challenges in primary prevention. All countries show preventable mortality exceeding treatable mortality, with ratios ranging from 1.65:1 to 2.20:1, indicating greater potential for impact through primary prevention.

Figure 4: Total avoidable mortality by component (per 100,000 population), 2021



Note: * most recent data point corresponds to 2016–19.
Source: OECD, 2023a.

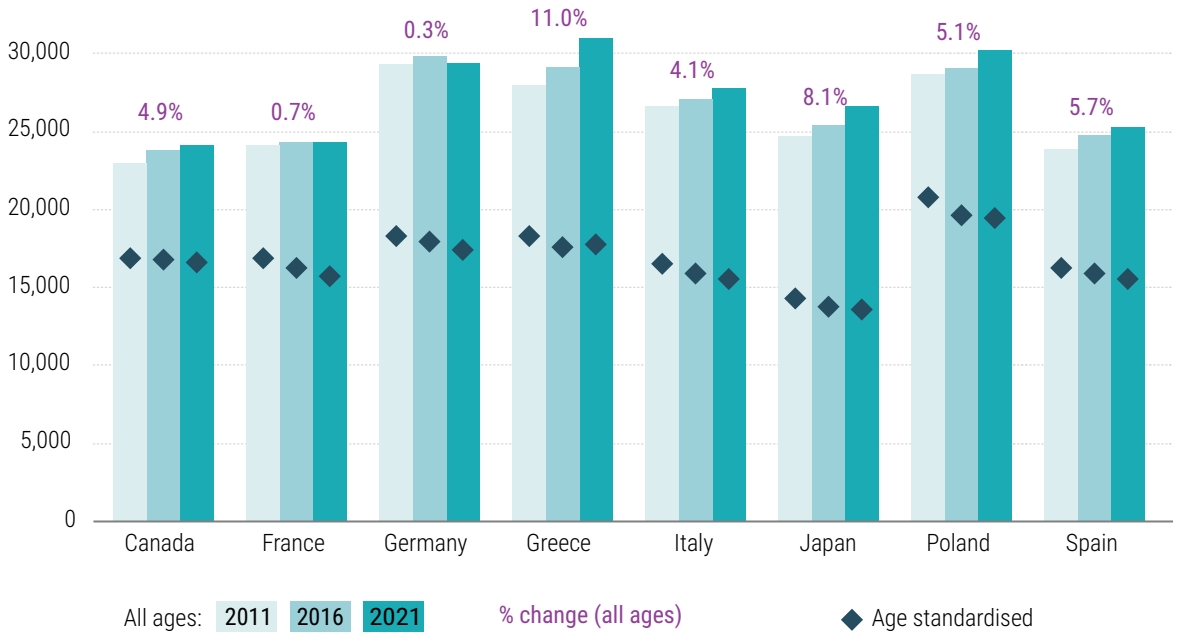
Morbidity

While mortality data reveals the ultimate impact of NCDs, Disability-Adjusted Life Years (DALYs) provide a more comprehensive picture by capturing both years of life lost to premature death and years lived with disability. This metric is particularly crucial for understanding NCDs, which often involve prolonged periods of morbidity that substantially impact quality of life and healthcare resource utilisation before causing death.

Throughout this analysis, we report both unadjusted and age-adjusted DALY rates to reveal different dimensions of the NCD challenge. Unadjusted rates reflect the actual burden on health systems: the real service demand and resource needs. Age-adjusted rates reveal whether countries are successfully reducing risks at given ages. This distinction is diagnostic: when adjusted rates fall while unadjusted rates rise (as with CVD and cancer), it signals progress in risk reduction that population ageing renders invisible. When both rise (as with diabetes), it reveals systemic failure in prevention across all ages.

Figure 5 shows IHME data on age-standardised DALY rates from NCDs. The divergence between unadjusted and age-adjusted DALY trends reveals a critical insight about the nature of the NCD burden. Between 2011 and 2021, unadjusted NCD DALYs increased in all eight countries, yet age-adjusted rates decreased universally. This pattern is most extreme in Japan where age-adjusted DALYs are approximately 51% of unadjusted in 2021. While biological aging is inevitable, much of the NCD burden reflects modifiable risks accumulated across the life course. The high NCD prevalence in older populations reflects decades of missed prevention opportunities earlier in life, underscoring the critical need for early intervention.

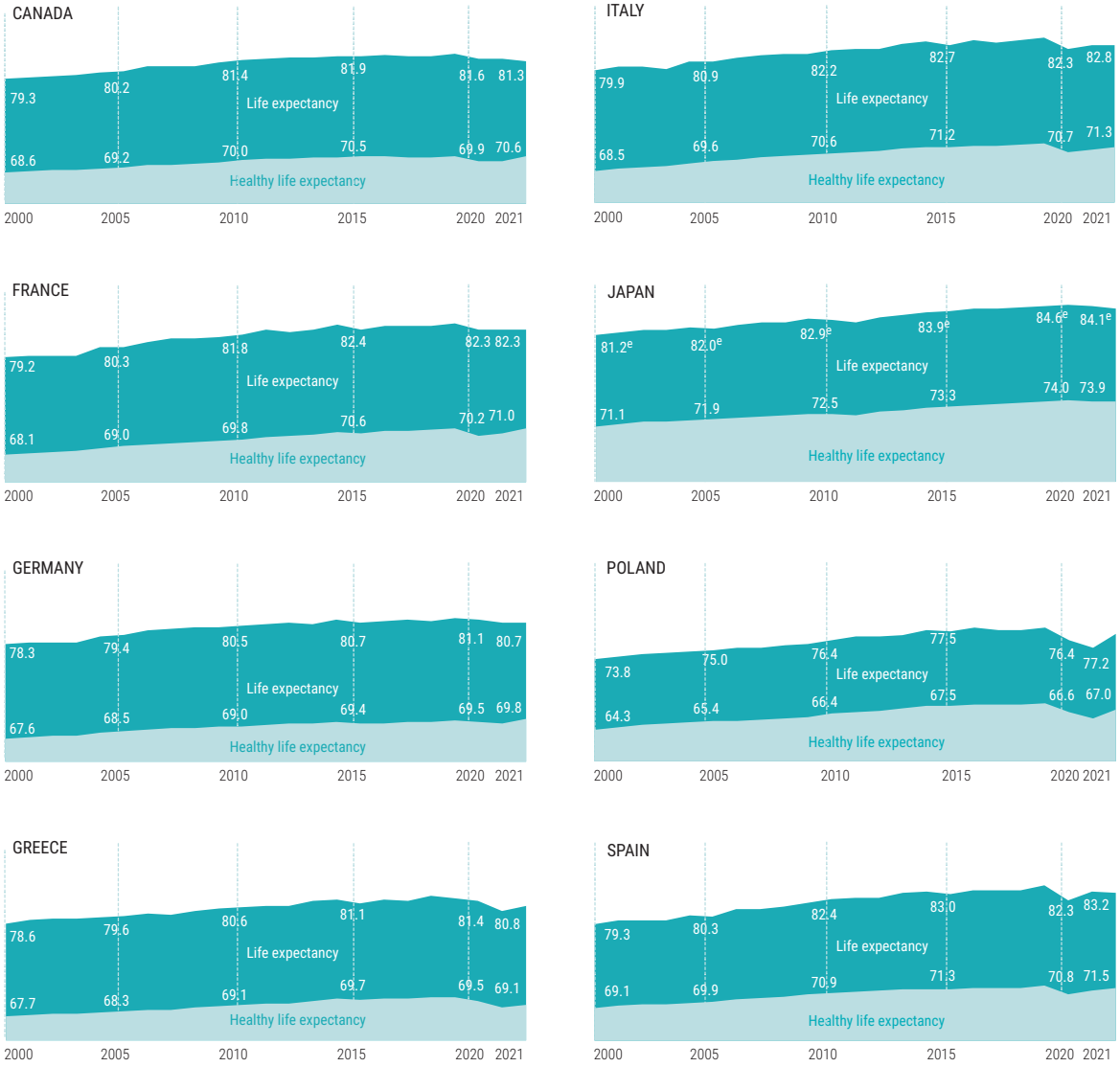
Figure 5: All NCDs – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



Source: IHME, 2023.

Figure 6, again using data from IHME's Global Burden of Disease Study, shows that life expectancy and healthy life expectancy have both increased since 2020, but healthy life expectancy remained around 10 years behind total life expectancy across all countries in our sample.

Figure 6: Life expectancy and healthy life years, 2000–2021



Source: IHME, 2023.

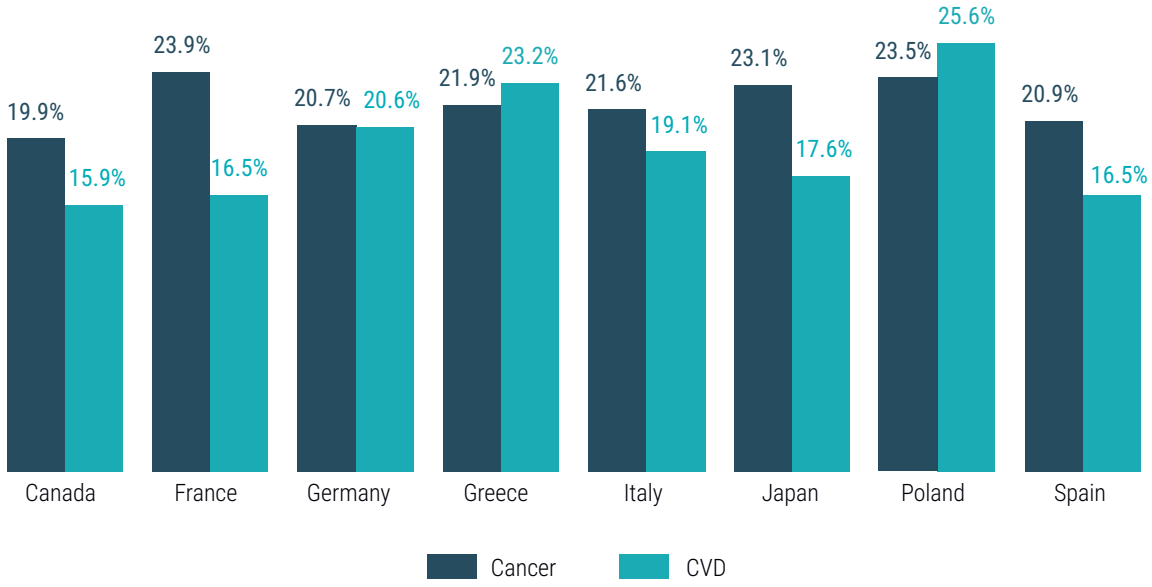
Disease-specific trajectories

While NCDs share common risk factors and pathways, their manifestation varies substantially across countries, with critical implications for intervention strategies. Analysis of the five major NCD categories of cancer, cardiovascular diseases, chronic respiratory diseases, diabetes, and chronic kidney disease, reveals not only which conditions drive the burden but also concerning trends that suggest current approaches may be inadequate.

While cardiovascular disease remains the leading cause of death in most countries in our sample, cancer now exceeds CVD in terms of DALYs in six of the eight countries. As Figure 7 shows, in France, the gap is particularly notable, with cancer accounting for 23.9% of NCD DALYs compared to

16.5% for cardiovascular disease. Japan shows a similar pattern (23.1% vs 17.6%), followed by Spain (20.9% vs 16.5%), Italy (21.6% vs 19.1%), and Canada (19.9% vs 15.9%). Germany represents a transition point with near-parity between cancer (20.7%) and cardiovascular disease (20.6%). Only Poland and Greece maintain cardiovascular disease as their dominant burden in DALY terms, though the margins remain relatively narrow: 25.6% vs 23.5% in Poland and 23.2% vs 21.9% in Greece (IHME, 2013). This epidemiological transition reflects relative success in cardiovascular prevention as much as challenges in cancer control.

Figure 7: Proportion of NCD DALYs from cardiovascular disease and cancer, 2021



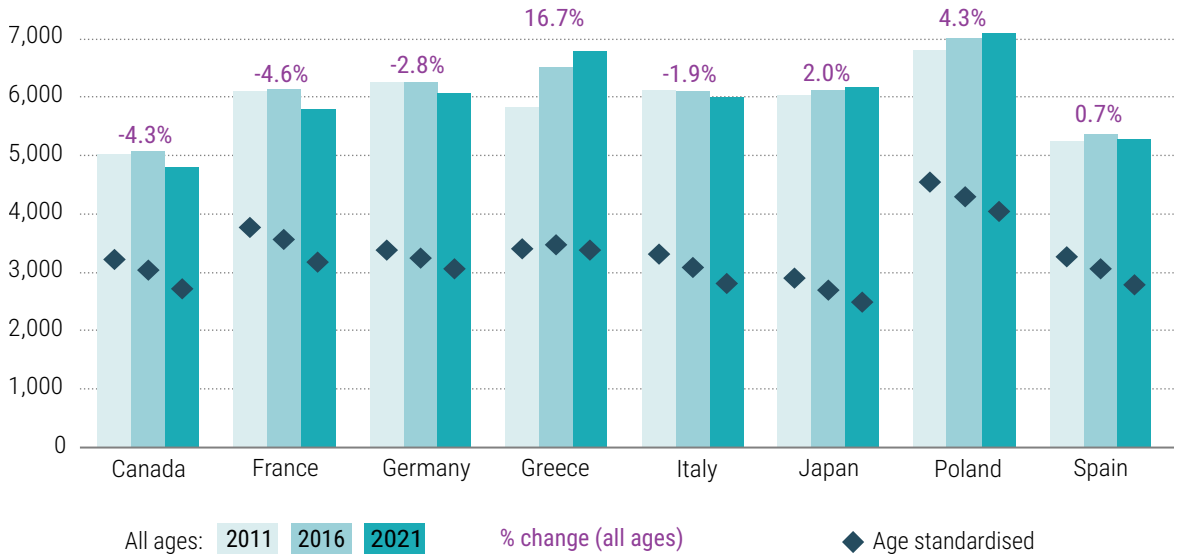
Source: IHME , 2023.

Cancer: Progress amid persistent challenges

Cancer has become the leading contributor to NCD disability-adjusted life years in six of the eight studied countries, reflecting a shift in disease burden patterns. As Figure 8 shows, While age-adjusted cancer DALYs fell substantially in all countries between 2011–2021 (for example, France -15.7%, Canada -15.8%), unadjusted rates showed varied patterns. In 2021, unadjusted cancer DALYs ranged from 4,806 per 100,000 in Canada to 7,109 in Poland, representing approximately one-fifth to one-quarter of the total NCD burden across all countries (IHME, 2023). In Spain, unadjusted cancer DALYs rose 2011–2016 then fell 2016–2021, leaving 2021 slightly above 2011 levels (+0.7%). Greece showed unadjusted increases in both intervals, more sharply in the first period, while Japan and Poland also experienced overall increases. This divergence between falling age-adjusted rates and stable or rising unadjusted rates indicates sustained progress in cancer prevention and treatment, but population ageing continues to drive up the observed burden in several systems.

Gender-specific trajectories in lung cancer reveal the long shadow of historical smoking patterns. In Spain, between 2000 to 2021 age-standardised DALYs among men declined from 1,497.8 to 969.0 per 100,000 population, but increased from 175.3 to 277.4 among women (IHME, 2023). France reports similar patterns, with lung cancer burden reduction of only 6.1% between 1990 and 2019, far below the European average reduction of 23.3% (Francis-Oliviero et al., 2024), and incidence in women beginning to increase, reflecting smoking uptake among women since the 1970s (Olié et al., 2020). These divergent trajectories, occurring 20-30 years after changes in smoking behaviour, underscore the temporal dynamics that complicate prevention efforts and political accountability.

Figure 8: Cancer – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



Source: IHME, 2023.

Five-year survival rates provide another lens on cancer system performance, revealing both achievements and persistent challenges. Canada reports survival ranging from 22% for lung cancer to 91% for prostate cancer, with breast cancer at 89%, uterine at 82%, and bladder at 77% (Statistics Canada, 2025c; Canadian Cancer Registry, 1992–2017). Spain shows comparable patterns with prostate cancer survival at 89.8% and breast at 85.5%, but lung cancer survival remains dismally low at 17.6% for women and 12.7% for men (International Agency for Research on Cancer, n.d.). These survival disparities reflect a combination of biological factors, stage at diagnosis, and treatment availability. In Canada, breast cancer is most often diagnosed at an early stage, with 28.4 per 100,000 diagnosed at Stage I, while lung cancer is most frequently diagnosed at Stage IV (29.1 per 100,000) (Statistics Canada, 2025c). This contrast illustrates how screening availability and biological accessibility of different cancer sites influence outcomes.

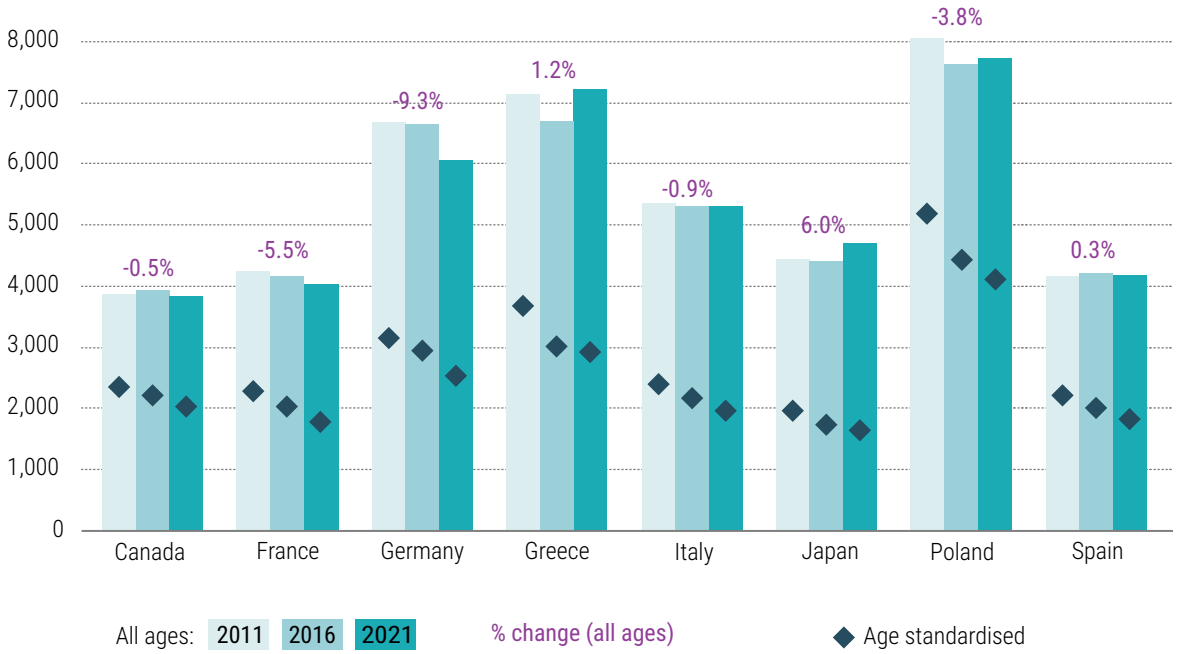
Cardiovascular disease, diabetes and kidney diseases

These three disease categories are strongly interconnected, with each condition serving as both risk factor and consequence for the others. Diabetes drives cardiovascular disease and kidney damage, hypertension accelerates both cardiovascular events and kidney decline, while chronic kidney disease independently increases cardiovascular risk and complicates diabetes management (Ndumele et al., 2023). This bidirectional causality creates cascading health impacts that current single-disease management approaches fail to address adequately.

Cardiovascular disease

Cardiovascular disease remains a major source of disability and death across all studied countries, though with striking variations that reveal both achievements and missed opportunities. As Figure 9 shows, age-adjusted DALYs declined significantly between 2011 and 2021 in all countries, while unadjusted rates were more variable, declining in Canada, France, Germany, and Poland, and remaining roughly flat in Spain and Italy. Japan alone experienced a notable increase. Greece's pattern was particularly volatile, with unadjusted DALYs falling 2011–2016 then rising 2016–2021, resulting in little net change. France achieved one of Europe's lowest unadjusted CVD burdens at 4,024 per 100,000 in 2021 (down from 4,259 in 2011), whilst Germany records 6053 unadjusted DALYs per 100,000 (down from 6,677 in 2011) despite having one of Europe's highest densities of cardiac catheterisation laboratories. Poland's unadjusted rate remains more than double Canada's.

Figure 9: Cardiovascular diseases – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



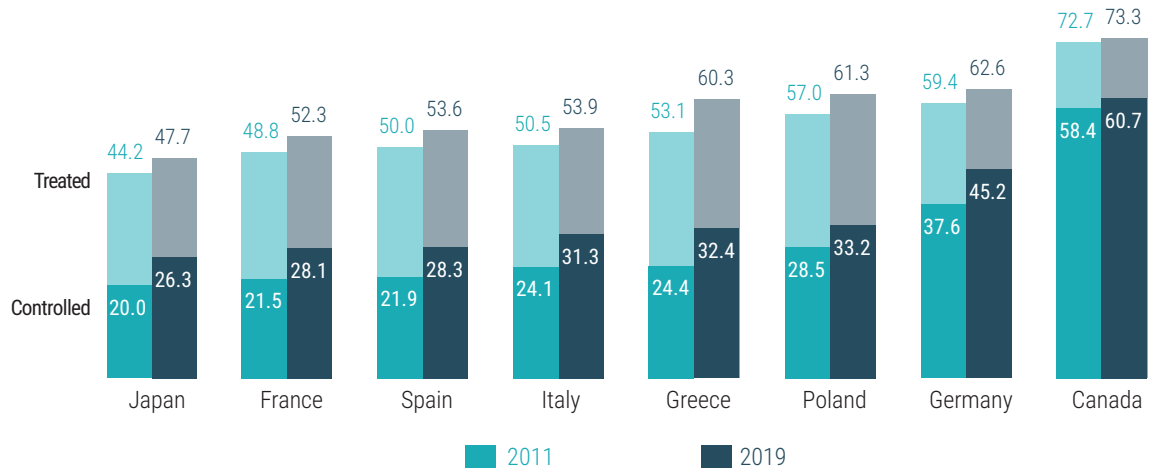
Source: IHME, 2023.

The fact that countries with substantial cardiovascular infrastructure still experience high disease burden, suggests that technology and specialist availability alone are insufficient without systematic prevention and coordinated risk management. The variation across countries indicates enormous potential for improvement through better implementation of proven interventions in blood pressure control, lipid management, smoking cessation, and acute coronary care.

Analysis of specific cardiovascular conditions reveals where the greatest progress has been achieved. Japan's 56% reduction in age-standardised ischaemic heart disease DALYs from 1990 to 2021 represents one of the most successful population-level cardiovascular interventions documented (IHME, 2023). Spain achieved similarly impressive results in cerebrovascular disease, with age-standardised stroke DALYs declining from 1,015.9 per 100,000 in 2000 to 483.6 in 2021, and age-standardised stroke mortality falling from 57.7 to 24.2 per 100,000 over the same period, positioning the country well below the OECD average (IHME, 2023). These dramatic improvements that targeted interventions, whether Japan's focus on salt reduction and blood pressure control or Spain's comprehensive stroke care networks, can achieve population-level impact.

As shown in Figure 10, WHO data on hypertension management illustrates both progress and persistent challenges. While treatment rates have improved across European countries, with Germany increasing from 59.4% to 62.6% between 2011 and 2019, critical gaps remain between treatment and control. Germany achieved only 45.2% control among hypertensive adults by 2019, meaning over half of those with hypertension remain at elevated cardiovascular risk despite the country's substantial healthcare resources. Spain's prevalence among adults aged 30–79 declined from 36% in 2000 to 27.2% in 2019, consistently maintaining rates below OECD averages (WHO, 2025d). Yet this still represents more than a quarter of the adult population living with a major cardiovascular risk factor. Moreover, Spain's control rates reached only 28.3% in 2019, despite 53.6% receiving treatment, suggesting many patients were subjected to suboptimal management strategies. Although, the reliability of these treatment and control indicators among countries is questionable and dependent upon frequency of measurement and data collection systems.

Figure 10: Treatment (taking medicine) and control of hypertension, prevalence among adults aged 30–79, 2011 and 2019

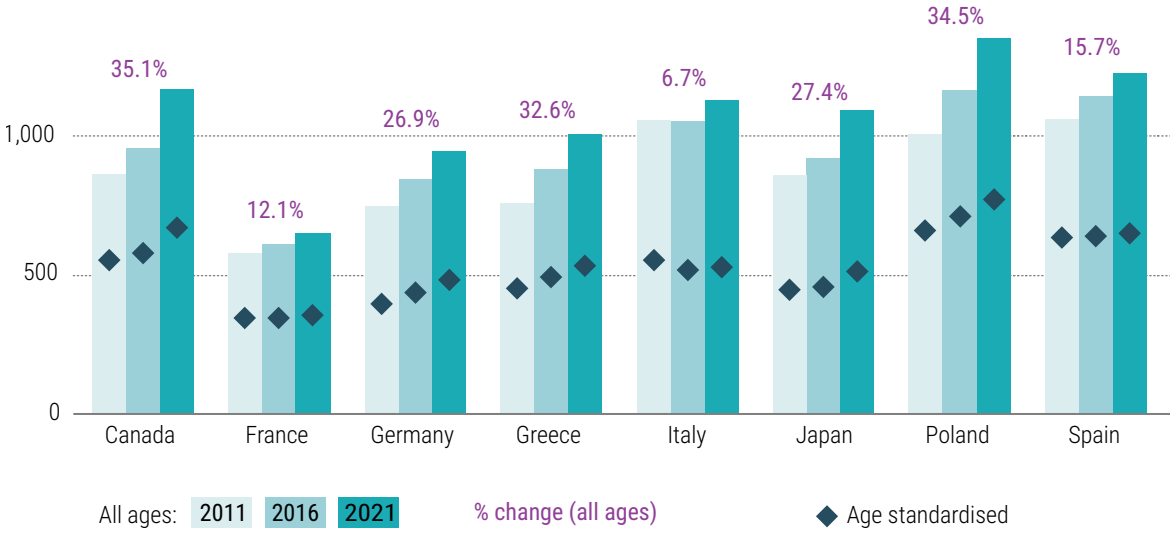


Source: WHO, 2025e.

Diabetes

Diabetes presents the most alarming trajectory among all NCDs. As Figure 11 shows, unadjusted diabetes DALYs increased universally between 2011 and 2021, with Canada experiencing the largest increase (+35.1%), followed by Poland (+34.5%), Greece (+32.6%), Japan (+27.4%) Germany (+26.9%), Spain (+15.7%), France (+12.1%), and Italy (+6.7%). More concerning still, age-adjusted rates also rose in seven of eight countries: Germany showed the largest age-adjusted increase (+22.5%), followed by Canada (+21.3%), Greece (+18.6%), Poland (+16.2%), Japan (+14.8%), Spain (+3.1%), and France (+2.4%).

Figure 11: Diabetes mellitus – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



Source: IHME, 2023.

Italy was the sole country achieving an age-adjusted decline (-4.7%), though its unadjusted DALYs still increased, falling slightly 2011–2016 then rising 2016–2021. This near-universal parallel increase in both unadjusted and adjusted rates, unlike the mixed trajectories seen in cancer and cardiovascular disease, confirms that the diabetes epidemic reflects genuine deterioration in metabolic health beyond demographic change alone, pointing to systemic failures in addressing the upstream determinants of metabolic disease.

The acceleration is particularly striking in countries that otherwise show strong NCD performance. Canada, despite having the lowest overall NCD burden, experienced one of the largest diabetes increases (+21.3% age-adjusted), suggesting that even well-resourced health systems struggle to counter the metabolic disease epidemic. Similarly, Germany's diabetes burden rose 22.5% on an age-adjusted basis despite its sophisticated healthcare infrastructure. Japan, despite its world-leading life expectancy, saw a 14.8% age-adjusted increase (IHME, 2023). Poland likewise demonstrates the interconnected nature of the metabolic crisis, documenting parallel rises in diabetes, obesity, and kidney disease.

Diabetes-related amputation rates ranged from 2.5 per 100,000 population in Italy to 8.5 in Germany in 2021 (OECD, 2023b). Between 2011–2021, most countries showed modest reductions, although the rate in Poland increased from 6.3 to 8.6 per 100,000 (OECD, 2023b). The persistent variation suggests differences in diabetes management quality and preventive foot care services. Poland likewise demonstrates the interconnected nature of the metabolic crisis, documenting parallel rises in diabetes, obesity, and kidney disease.

Indicators of metabolic health also highlight some concerning trends. The percentage of Japanese women aged 40–79 with total cholesterol levels of 240 mg/dL or higher increased from 22% in 2010 to 25% in 2019, a 13.6% relative increase (MHLW, 2024b). Daily salt intake among Japanese adults remains at 9.8g, nearly double the WHO recommended maximum of 5.0g, despite decades of public health messaging about sodium reduction (WHO, 2025f).

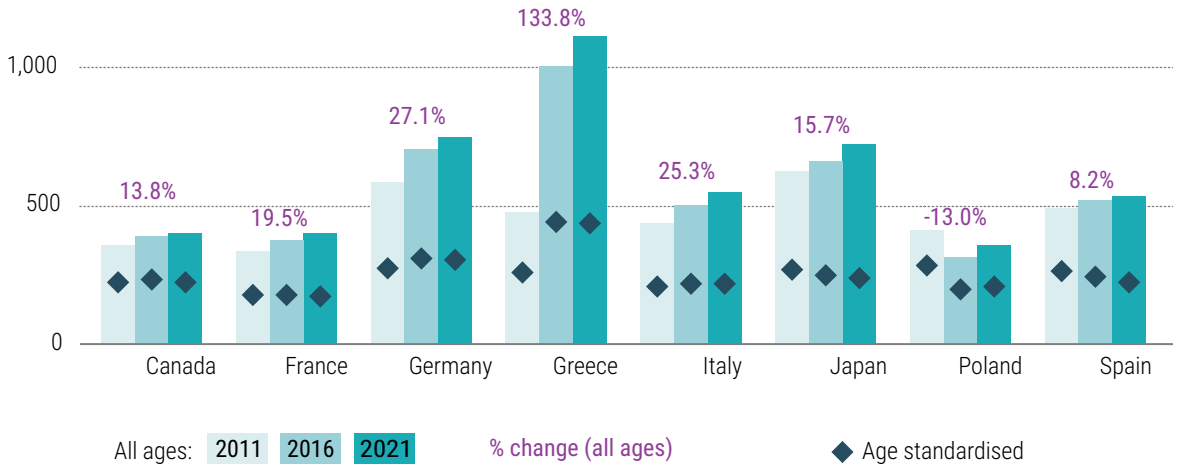
The early onset of metabolic dysfunction particularly concerns policymakers. Italy reports that among overweight and obese children, 30% show dyslipidaemia, 50% have hepatic steatosis, and 10% have hypertension (Italian Ministry of Health 2024). When metabolic disease processes begin early in life, they have implications for future disease burden that current adult-focused interventions cannot address.

Chronic kidney disease

Chronic kidney disease, often a consequence of longstanding diabetes and hypertension, presents a mixed picture that varies dramatically by country. As shown in Figure 12, unadjusted CKD DALYs increased in seven of eight countries between 2011 and 2021. Greece experienced the most extreme deterioration: a 134% unadjusted increase from 475 to 1,110 DALYs per 100,000, alongside a 68.6% age-adjusted increase, likely reflecting healthcare system strain during the economic crisis combined with improved diagnosis and reporting. France and Italy showed unadjusted increases with essentially flat age-adjusted rates (-1.6% and +3.4% respectively), suggesting demographic factors primarily drive their observed burden. Spain and Japan achieved age-adjusted declines (-14.1% and -10.3% respectively) despite unadjusted increases. Poland stands out as the sole success story, achieving both unadjusted decline and a substantial 26.8% age-adjusted reduction. Even countries with modest increases face mounting demands for dialysis and transplantation services that will strain health systems for decades.

Spain exemplifies the problem of CKD's lack of visibility: CKD affects approximately 15% of adults, yet over 50% of those affected remain unaware of their condition due to its asymptomatic early stages (Bernal-Delgado et al., 2024). This diagnostic gap is Europe-wide: France reports 95.5% of stage 3 CKD cases undiagnosed (Tangri et al., 2023), while Greece's patients present predominantly at advanced stages with high rates of self-referral, indicating systematic failures in primary care detection. The economic implications are staggering: France, despite lower CKD prevalence than its

Figure 12: Chronic kidney disease – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



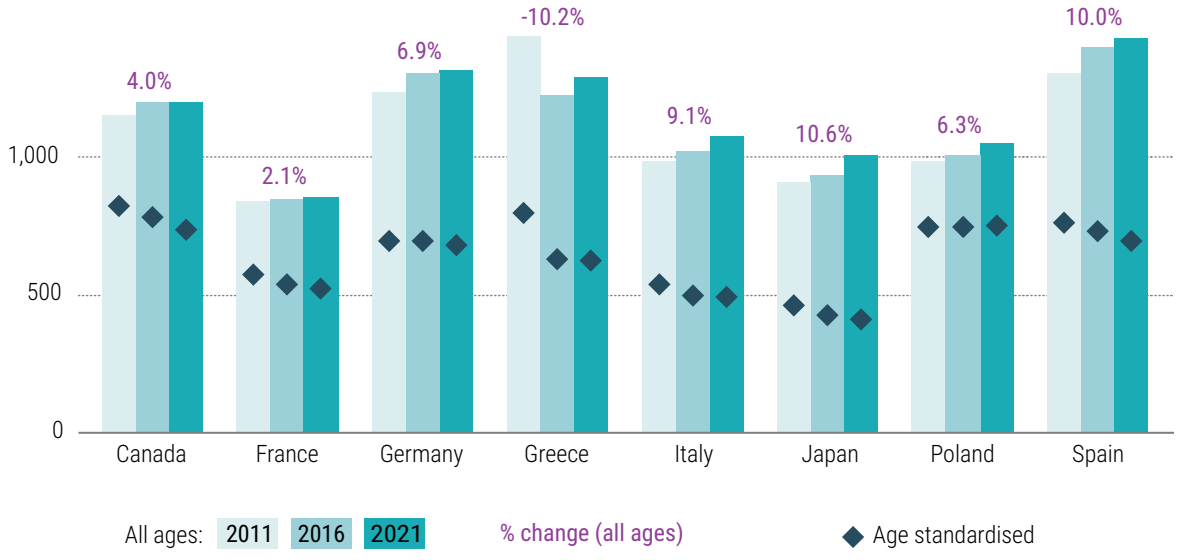
Source: IHME, 2023.

neighbours, maintains one of Europe's highest renal replacement therapy rates at 165 per million population (Thurlow et al., 2021). Earlier detection would prevent progression to end-stage disease, where treatment costs escalate dramatically. Without systematic screening integrated into diabetes and hypertension management, health systems will continue catching CKD at its most expensive and debilitating stages.

Chronic respiratory diseases

As shown in Figure 13, most countries showed increases in unadjusted DALYs from chronic respiratory diseases, between 2011 and 2021, with only Greece achieving a reduction (-10.2%). While all countries show reductions in age-adjusted terms. Spain carries the highest respiratory burden in our sample, potentially reflecting smoking patterns, air quality issues, or differences in COPD management.

Figure 13: Chronic respiratory diseases – DALYs (per 100,000), all ages and age-standardised, 2011, 2016 and 2021



Source: IHME, 2023.

The persistence of largely preventable respiratory burden suggests systematic suboptimal management of respiratory diseases such as COPD and asthma, environmental factors driving respiratory disease emergence and exacerbation, and limited access to pulmonary rehabilitation. Gender differences in respiratory disease trends mirror those seen in lung cancer, reflecting historical smoking patterns. Germany reports increased deaths from respiratory diseases including COPD particularly among women, contributing to the country's overall deceleration in life expectancy gains (IHME, 2023).

Hospital admissions for COPD and asthma ranged from 23 per 100,000 population in Italy to 193 in Germany in 2021 (OECD, 2023b). Between 2011–2021, Italy achieved a remarkable 79% reduction (from 109 to 23 per 100,000), while Poland decreased from 281 to 83 per 100,000 (OECD, 2023b). These admission rates are considered indicators of primary care effectiveness, as many respiratory exacerbations are potentially preventable through ambulatory management.

As with CKD, chronic respiratory diseases are heavily underdiagnosed: studies estimate two-thirds of people with airflow obstruction have no prior diagnosis (Delmas et al., 2021). Greece, despite having among Europe's highest smoking rates at 32.8% in 2022 (WHO, 2025g), lacks systematic tracking of asthma and COPD hospital admissions entirely. Japan reports COPD awareness at only 27.8% as of 2019, despite setting an 80% target, highlighting the global challenge of respiratory disease visibility (MHLW, 2022a). Without comprehensive smoking cessation programmes and improved air quality monitoring integrated with early detection strategies, the respiratory disease burden will continue growing as populations age and environmental exposures persist.

Risk factors and inequalities

The persistence of modifiable risk factors across diverse cultural contexts and policy environments reveals both the complexity of behaviour change and the powerful influence of environmental and commercial determinants on population health. These risk factors do not distribute randomly but cluster systematically along socioeconomic, educational, and geographic lines, creating and perpetuating health inequalities that universal healthcare coverage alone cannot overcome.

Behavioural risk factors

Physical inactivity and obesity demonstrate how behavioural risk factors intertwine with social disadvantage. Critically low activity levels persist across all studied countries despite vastly different urban designs and cultural contexts. Japan reports that only 36.2% of men and 28.6% of women over 20 engage in physical activity at least twice weekly, with daily step counts declining to just 6,628 for men and 5,659 for women (MHLW, 2024b).

These activity patterns map clearly onto socioeconomic position. In Germany, obesity affects 26.8% of individuals in the low educational group compared with 10.8% in the high educational group (Robert Koch-Institut, 2024a). France reveals similar disparities: 52% of factory workers were overweight or obese in 2020 compared to 35% of managers, while regional variations show obesity affecting 20% in northern regions versus 14% in the Paris region (Fontbonne et al., 2023). Italy's regional patterns further illuminate these dynamics: the prevalence of obesity is highest in Southern Italy, a disparity linked to declining Mediterranean diet adherence, increased processed food consumption, and more limited recreational infrastructure in economically disadvantaged areas (Epicentro, 2023).

Canada demonstrates a different but equally concerning pattern, with obesity prevalence increasing uniformly across all income quintiles from 23–24% in 2009/10 to 27–28% in 2019/20 (Canadian Community Health Survey, 2015). This unusual pattern of equal increase across socioeconomic groups suggests population-wide environmental changes that affect all segments of society, though the health consequences remain more severe for those with fewer resources to manage chronic conditions.

Tobacco control successes mask persistent inequalities that concentrate smoking among vulnerable populations. Canada reduced smoking prevalence from 27.1% in 2000 to a projected 10.1% by 2025, but there remain significant disparities in smoking rates: 16% of adults in the lowest income quintile smoke compared to 8.3% in the highest, with rates in northern territories and several eastern provinces exceeding national averages (WHO, 2025g). Germany shows tobacco use in low and middle educational groups nearly double that in the high educational group (Robert Koch-Institut, 2024c). As of 2022, Italy maintained a 22.4% age adjusted rate of tobacco use (WHO, 2025g), despite comprehensive advertising bans since 1983, suggesting a need for a renewed emphasis on tobacco control and smoking cessation.

Environmental and structural factors

Environmental risk factors compound social disadvantage through differential exposure and vulnerability. France's experience is particularly instructive: while air pollution causes approximately 48,000 deaths annually (Health Effects Institute, 2024), the most deprived areas have a ten-fold higher risk of being environmental hotspots, areas with cumulative exposure to heat, air pollutants, and lack of vegetation (Adélaïde et al., 2024). Critically, successful pollution reduction policies have disproportionately benefited high-income neighbourhoods, potentially widening rather than narrowing health disparities.

Italy documents clear associations between air pollution exposure and respiratory cancer mortality, with northern industrial regions showing higher rates that affect working-class populations despite generally better healthcare infrastructure in these areas. Climate change amplifies these disparities: deaths from heatstroke in Japan increased five-fold from 1995 to 2023, with 83.3% among those aged 65 and older, a population that clusters in areas with limited cooling infrastructure and faces financial constraints in adapting to extreme temperatures (MHLW, 2023a; Zanobetti et al,. 2012).

Rural and remote populations face compounding disadvantages that amplify NCD risk. Limited specialist access, long travel distances, and concentrated poverty create environments where risk factors flourish and early intervention remains inaccessible. Canada's territories exhibit significantly higher mortality rates from both preventable and treatable causes compared to provinces (CIHI). Italy's North-South divide produces 2–3 year life expectancy differences (WHO Regional Office for Europe, 2022), while France's overseas territory Mayotte shows life expectancy 9 years below the best-performing regions (INSEE, 2025a).

Socioeconomic gradients in risk factors

Educational gradients demonstrate how early disadvantage compounds over time. Analysis in Japan between 2010 and 2015 revealed mortality disparities of up to 40% by educational background, with corresponding gradients by educational-level in smoking rates, dietary quality, and physical activity (Tanaka et al., 2024). France's educational differences are associated with an 8-year life expectancy gap for men and a 5-year gap for women that has remained unchanged for three decades, suggesting that current interventions fail to interrupt the transmission of health disadvantage across generations. The poorest populations also face systematically higher disease risk: Germany's lowest income quintile has 1.6 times higher likelihood of developing chronic illness compared to those in the highest (OECD, 2023a), while France's poorest 10% are 1.4 times more likely to develop NCDs than the richest 10% (DREES, 2022).

Disparities are also evident in access to healthcare. In Spain, a study in Catalonia found that patients from very low socioeconomic status (SES) groups waited longer for cancer surgeries – 3.5 days more for prostate cancer and 2.3 days more for colorectal cancer – compared to patients from low SES backgrounds within the same hospitals (Bosque-Mercader et al., 2023).

France shows a 13-year life expectancy difference between the poorest and richest 5% of men, with an 8-year gap for women. Once disease develops, socioeconomic disparities widen further, with the life expectancy gap between the richest and poorest deciles increasing from 4 to 6 years after chronic disease develops (DREES, 2022). These gaps persist despite high rates of healthcare coverage, reinforcing that health systems must actively counter rather than inadvertently reinforce existing disadvantages.

It is important to acknowledge that inequalities in NCDs outcomes are also shaped by socioeconomic determinants outside the healthcare system including housing, education, and level of income. The most profound inequalities emerge where multiple disadvantages intersect. Indigenous Peoples in Canada face a disproportionate NCD burden shaped by socioeconomic deprivation, cultural marginalisation, and geographic isolation rooted in the enduring impacts of colonialism. This has produced significantly higher rates of kidney disease, end-stage renal disease, and rheumatic disease, particularly among First Nations communities.

Implications for health systems

The divergence between unadjusted and age-adjusted DALY trends reframes how we understand the NCD challenge. Population ageing does not cause these diseases but rather reveals the accumulated impact of risks acquired across the life course: decades of smoking, uncontrolled hypertension, and metabolic dysfunction that compound until manifesting clinically in later life. This understanding has important implications for health system organisation.

The evidence demonstrates that whilst many countries have reduced age-specific risks, particularly for cardiovascular disease and cancer, the actual burden on health systems continues rising as populations age. Since population ageing will continue inexorably in all studied countries, unadjusted burdens will keep rising unless the accumulation of risks across the life course is interrupted. The success of cardiovascular disease prevention, where adjusted rates fell enough to reduce even unadjusted burdens in most countries, proves this is achievable. Conversely, diabetes's parallel increase in both dimensions warns that without addressing root causes early in life, health systems will face unsustainable demands.

The substantial variation in outcomes across countries demonstrates that current performance gaps reflect implementation failures rather than knowledge deficits. The widespread treatment-control gaps and under-diagnosis of conditions revealed throughout this analysis point to systematic failures in applying existing knowledge. These are not problems requiring new scientific breakthroughs but rather better organisation of care delivery.

The shifting disease composition presents additional complexity. With cancer overtaking cardiovascular disease in most countries, combined with the universal surge in diabetes and increases in kidney disease, growing numbers of patients live with multiple, interacting conditions. Current health systems, organised around single-disease programmes and specialist silos, are poorly aligned with this reality. The bidirectional relationships between diabetes, cardiovascular disease, and kidney disease exemplify how single-disease approaches miss critical intervention points.

The achievements of countries that have successfully reduced specific cardiovascular conditions demonstrate that substantial improvement remains possible even from strong baselines. Yet the universal slowdown in mortality improvements suggests diminishing returns from treatment-focused strategies. The contrasts in cancer survival by stage of diagnosis highlight the potential of earlier detection and intervention.

The persistence of inequalities despite universal healthcare coverage reveals another dimension of the challenge. The concentration of risk factors along socioeconomic gradients, compounded by

environmental hazards in deprived areas, indicates that health systems often reinforce rather than mitigate existing disadvantages.

These findings have direct implications for how health systems should be organised. The subsequent chapters will examine:

- How **care delivery models** can better integrate services across the prevention-detection-treatment continuum, addressing the fragmentation that leaves conditions undiagnosed and poorly controlled
- How **governance and accountability mechanisms** can sustain long-term prevention efforts despite the temporal gap between intervention and outcome
- How **financing systems** currently oriented toward acute care can be restructured to incentivise early intervention and prevention
- How **workforce capacity** can be developed and deployed to reach populations with concentrated risk factors, particularly disadvantaged communities where NCDs cluster
- How **medicines and technologies** can be optimally utilised, moving beyond simple availability to systematic implementation
- How health systems can engage with **environmental and commercial determinants** that drive growth of NCDs

The ongoing gap between life expectancy and healthy life years across all countries indicates that while health systems have succeeded in preventing death, they have been less successful in preventing disability and maintaining quality of life. This reflects health systems that intervene too late in disease processes. Only by modifying risks decades before they manifest can health systems avoid being overwhelmed by demographic inevitability. The variation between countries in both outcomes and risk factor prevalence demonstrates that different approaches yield different results, offering opportunities for cross-country learning and systematic improvement.

PART II

The care continuum

2 Primary prevention and health promotion

Primary prevention initiatives for non-communicable diseases across the eight country reports examined reveal a complex landscape of policy approaches, ranging from comprehensive national frameworks to fragmented regional efforts. Whilst all nations have implemented various prevention strategies, the reports indicate that these vary considerably in scope, integration, and effectiveness.

Primary prevention of non-communicable diseases requires comprehensive action extending far beyond healthcare systems, encompassing fiscal policy, regulatory environments, commercial determinants, and the social conditions that shape health behaviours. While health systems cannot control all these factors, they play essential roles in advocacy, coordination, and delivery of prevention services such as vaccinations. The evidence from eight countries reveals striking contrasts between the acknowledged cost-effectiveness of health promotion at the population level and actual implementation, which remains fragmented, underfunded, and politically marginalised.

Fiscal levers and market interventions

The use of fiscal policies to discourage unhealthy behaviours and promote healthier choices represents one of the most widespread prevention strategies documented, though implementation varies significantly. The France report identifies the country as pioneering sugar-sweetened beverage taxation in 2012, subsequently refining it in 2018 to index tax rates to sugar content (Le Bodo et al., 2022), an approach that has influenced policy development across Europe. The Spain report documents a dramatic VAT increase on sugary drinks from 10% to 21% in 2021 (Martinez et al., 2022) whilst the Poland report describes its sweetened beverage tax introduction in 2020. The Germany report, however, notes the country opted for voluntary industry pledges through its National Reduction and Innovation Strategy for Sugar, Fats, and Salts, which research indicates has achieved only minimal reductions in dietary risk factors.

Tobacco taxation reveals even greater contrasts across the reports. The France report documents some of Europe's highest cigarette prices through aggressive taxation, supporting the goal of creating the first "smoke-free generation" by 2032. It would appear that this has not been particularly successful as smoking rates remain high, and the French report finds that cultural shift towards stigmatising smoking has yet to occur. Conversely, the Germany report indicates that tobacco tax represents the lowest proportion of retail price in the EU at 70.23% (Wissenschaftlicher Dienst des Bundestages, 2020), whilst the Poland report describes continuously increasing excise duties but struggles with enforcement. These fiscal approaches extend beyond simple revenue generation, and represent deliberate attempts to price unhealthy behaviours out of reach, particularly for young people who might otherwise initiate smoking.

Alcohol policies expose cultural and political tensions within prevention strategies according to the reports. The France report reveals that wine taxation remains conspicuously low to support the national wine industry despite otherwise comprehensive sin taxes. The Germany report documents that wine is entirely exempt from alcohol taxation with beer taxes maintained at the EU minimum, reflecting both cultural preferences and industry protection. The Canada report highlights the absence of a comprehensive federal alcohol policy framework, despite evidence that alcohol accounts for a substantially greater health and socioeconomic burden than both tobacco and cannabis, suggesting that political feasibility often trumps public health evidence in policy formulation.

Regulatory interventions

Beyond fiscal measures, the reports document various regulatory tools employed to shape environments that make healthy choices easier and unhealthy choices more difficult. Advertising restrictions represent a common approach, with the Spain report describing strict prohibitions on tobacco and vape advertising, whilst the Italy report references a 1983 law comprehensively banning all tobacco advertising. Germany was the last EU nation to implement tobacco billboard advertising bans in 2022, with the restriction extended to e-cigarettes in 2024.

The creation of smoke-free environments has proven one of the more successful regulatory interventions according to several reports. The Spain report correlates comprehensive smoking bans in public spaces with significant declines in smoking rates, whilst the Japan report describes the 2020 indoor smoking ban under the amended Health Promotion Act as representing a major cultural shift (Nakamura, 2024). The Greece report, however, demonstrates implementation challenges, noting that the 2019 anti-smoking law showed initial promise but "monitoring of smoking in public spaces became less strict" following COVID-19 lockdowns.

The Canada report describes the 2018 Cannabis Act, which embedded public health safeguards such as restricted youth access, mandatory health information provision, and compliance measures, showing how frameworks for potentially harmful substances can integrate prevention from the outset rather than retrofitting it later (Health Canada, 2024, Rosenberg, 2024). It also highlights the federal use of Gender-Based Analysis Plus (GBA+), an analytical tool to systematically incorporate equity considerations in policy and programme design, representing an effort to address the social determinants of health in a structured way (Government of Canada, 2025a).

Food environment regulations reveal varying approaches to making nutritional information accessible and encouraging healthier choices. The France report highlights the Nutri-score system, a front-of-pack five-colour rating system that has gained adoption across multiple European countries, demonstrating how well-designed interventions can spread beyond national borders. This contrasts sharply with the Germany report's documentation of reliance on voluntary industry pledges for food reformulation, which have produced disappointing results and highlight the limitations of non-mandatory approaches (Grea et al., 2024).

Education, literacy and life-course approaches

Health education initiatives documented in the reports reflect growing recognition that prevention must begin early and continue throughout life. The Poland report describes the introduction of health education as an optional school subject from 2025/2026, covering physical, mental, sexual, and environmental health. The Spain report mentions school-based education through its Strategy for Nutrition, Physical Activity, and Obesity Prevention as part of broader health promotion efforts.

Digital innovation in health literacy appears prominently in the Greece report, with "Healthflix" and "Health Advisor" platforms described as tools designed to enhance population health literacy through accessible, technology-based solutions. These initiatives aim to encourage engagement with early preventive services and also serve as a reminder calendar for medical and diagnostic appointments. The life-course perspective increasingly shapes prevention strategies according to the reports. The Japan report's description of the Community-Based Integrated Care System exemplifies this comprehensive thinking, providing integrated prevention, housing, and lifestyle support with flexibility for regional adaptation (MHLW, 2024c). The Spain report's documentation of the Active Ageing Strategy recognises that prevention needs differ across life stages, promoting physical and social engagement specifically tailored for older adults (Ministry of Health, Spain, 2022a). The Germany report notes its National Prevention Strategy includes specific focuses on "Health in childhood", "Health at work and in life", and "Health in old age".

Several country reports demonstrate approaches that push beyond traditional prevention paradigms. The Japan report describes social prescribing initiatives, particularly the Yabu City project, which connects medical care with community services, allowing patients to digitally self-assess and receive personalised support to improve lifestyle and wellbeing that extends beyond clinical interventions (Yabu City Health & Welfare Dept, n.d.). This represents a reimagining of prevention as something embedded in communities rather than confined to clinical settings.

The Greece report documents a novel "dentist pass" programme providing free preventive dental care for children aged 6–12, whilst the Poland report describes the evolution from "Profilaktyka 40+" (2021–2025) to "My Health – Adult Health Check-up" programmes, which attempts to provide comprehensive health assessments with follow-up Individual Health Plans, though participation remains challenging, as discussed in the following chapter of this report.

Vaccination programmes for NCDs

Vaccination programmes targeting HPV and hepatitis B represent established interventions to reduce prevalence of cervical and liver cancer. WHO guidelines recommend HPV vaccination for girls aged 9-14 years, with a global target of 90% coverage by age 15 as part of cervical cancer elimination objectives. For hepatitis B, WHO recommends universal infant vaccination beginning within 24 hours of birth, recognising that chronic infection acquired in infancy carries a 15-25% lifetime risk of hepatocellular carcinoma. Targeting at-risk populations such as certain healthcare workers with top-up hepatitis B vaccinations as adults can further reduce risk of contracting hepatitis B.

Achievement of these targets varies considerably across the eight countries studied. Whilst the Spain report documents free HPV vaccination at age 12 integrated into comprehensive cervical cancer prevention (Ministry of Health Spain, 2024a), the France report identifies one of the lowest rates of HPV vaccination coverage in the EU despite implementing school-based programmes. The Greece report's documentation of 35% coverage rate in 2019 for eligible girls (Naoum et al., 2022) similarly highlights the importance of adequate promotion and accessibility of screening programmes.

The Poland report notes declining childhood vaccination rates despite mandatory schedules,. These disparities underline that vaccine availability alone is insufficient: active promotion, convenience, and cultural acceptance all play crucial roles in achieving coverage targets.

POLICY LEVERS: PRIMARY PREVENTION

While all countries recognise prevention's cost-effectiveness and have developed policy frameworks to promote prevention, implementation remains fragmented and underfunded. Successful initiatives like Japan's comprehensive Health Japan 21 framework and France's sugar taxation demonstrate what is possible, yet some countries rely on voluntary measures and struggle with enforcement. The gap between policy design and effective implementation suggests that structural barriers, political economy factors, and misaligned incentives prevent health systems from prioritising upstream interventions that could reduce future disease burden.

Based on the evidence examined, countries should consider the following approaches:

■ Implement comprehensive fiscal measures to discourage unhealthy behaviours

Deploy evidence-based taxation on tobacco, alcohol, and sugar-sweetened beverages at levels that meaningfully influence purchasing behaviour, with regular adjustment for inflation and affordability. Ring-fence revenues generated from fiscal measures for prevention programmes and ensure coordination across jurisdictions to prevent cross-border purchasing that undermines policy effectiveness.

■ Create regulatory environments supporting healthy choices

Establish comprehensive marketing restrictions on unhealthy products, particularly targeting children across all media including digital platforms. Mandate reformulation targets for processed foods with clear timelines and penalties. Implement smoke-free environments with sustained enforcement, learning from countries where initial success deteriorated without consistent monitoring.

■ Develop life-course health promotion with systematic education

Integrate health education throughout educational curricula from early childhood, covering nutrition, physical activity, mental health, and substance use prevention. Ensure programmes adapt to different life stages, from school-based interventions through workplace health promotion to active ageing strategies, with particular focus on transition periods when health behaviours often deteriorate.

■ Strengthen vaccination programmes for NCD prevention

Achieve high coverage for HPV vaccination through school-based programmes with opt-out enrolment, catch-up campaigns for missed cohorts, and active promotion addressing vaccine hesitancy. Ensure hepatitis B vaccination and screening programmes are implemented for infants and at-risk populations such as certain healthcare workers. Monitor coverage by socioeconomic status and geography to ensure equity, addressing disparities in coverage.

3 Secondary prevention: Screening and early detection

Early detection of NCDs occurs through multiple pathways: organised population screening programmes, opportunistic case-finding during routine clinical encounters, and diagnostic testing when early symptoms emerge. Whilst systematic screening programmes represent the most visible and measurable approach, much early identification happens outside these formal structures: a primary care physician checking blood pressure during an unrelated visit, a pharmacist noting concerning symptoms whilst dispensing medication, or workplace health checks identifying previously unknown conditions. This window for early identification determines whether conditions remain manageable through lifestyle modification and simple treatments or progress to irreversible complications requiring complex interventions.

This chapter examines the full spectrum of early detection, from population-level risk assessment through organised screening programmes to the critical role of opportunistic detection and initial diagnosis in primary care settings.

Organised screening programmes

Systematic population screening represents the most visible component of early detection strategies, with all eight countries maintaining at least some organised programmes. These initiatives aim to identify disease before symptoms emerge, when treatment is most effective and often less intensive. Yet implementation reveals dramatic variations in coverage, quality, and equity that determine whether screening fulfils its promise of reducing disease burden or merely identifies disease without improving outcomes.

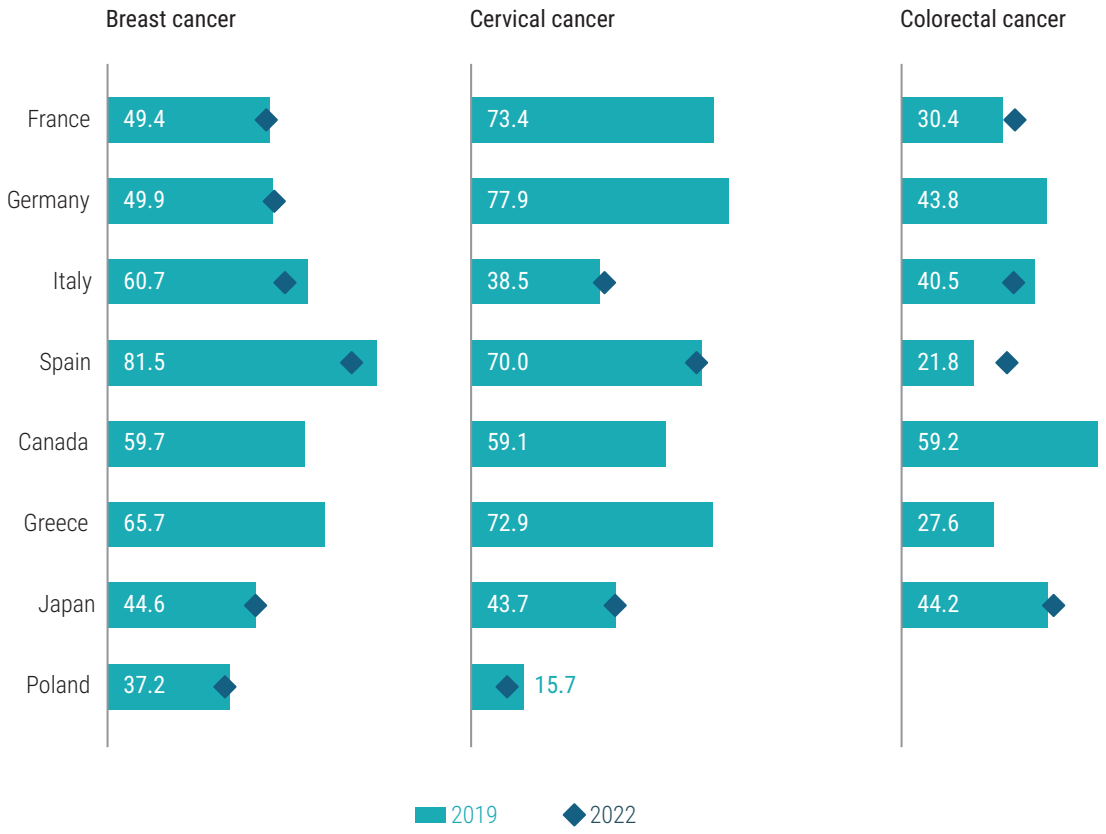
Cancer screening programmes

Cancer screening represents the most developed area, with all eight countries maintaining programmes for at least some cancers, though performance diverges sharply, as Figure 14 illustrates.

The WHO recommends organised, population-based screening programmes for cervical, colorectal, and breast cancers where resources and infrastructure allow. For cervical cancer, WHO recommends HPV DNA testing as the primary screening method for the general population of women starting at age 30, with regular testing every 5–10 years. For women living with HIV, screening should begin at age 25 with testing every 3–5 years (WHO, 2021). The WHO global strategy calls for 70% of women globally to be screened with a high-performance test by age 35 and again by age 45. While WHO provides frameworks for colorectal and lung cancer screening, specific global recommendations are less prescriptive, acknowledging varying resource availability and disease burden across countries.

Cervical cancer screening is available across all eight countries, with each having adopted HPV testing alongside cervical cytology. Most programmes use age-stratified approaches, typically reserving HPV testing and cervical cytology for women aged 30–65, although some countries have expanded their cervical screening programmes to younger ages.

Figure 14: Cancer screening (percentage of those in specified age range), 2019 and 2022



Notes: Breast cancer screening in past two years among women aged 50–69; Cervical cancer screening in past three years among women aged 20–69; Colorectal cancer screening in people aged 50–74 within the past two years.

Source: OECD, 2024.

Despite universal access to modern screening technology, coverage rates reveal dramatic disparities in programme reach. Spain achieved 70% cervical screening coverage of eligible women in 2022, well above the OECD average of 53%, while Poland reached only 15.7% – among the lowest rates in Europe (OECD, 2023a). The more than four-fold difference between Spain and Poland's coverage rates demonstrates the importance of programme and accessibility.

Colorectal cancer screening implementation varies from comprehensive to fragmentary. Canada reported a 59.2% screening rate in 2022 (MHLW, 2024e), while the report on Italy shows dramatic regional differences – from 62% in Veneto to just 4.4% in Calabria, a 14-fold variation within a single country. This regional disparity, exceeding differences between countries, reveals how implementation capacity matters more than programme existence. In 2022, France achieved 34.3% coverage despite organised programmes, suggesting persistent barriers to participation (WHO, 2024b).

Lung cancer screening remains less developed, reflecting both its relative newness and implementation complexity. Only Canada (in six provinces) and Japan (45.0% coverage) have established programmes (MHLW, 2024e). Italy has implemented a successful pilot screening programme in Tuscany, whilst screening in Spain has not yet met criteria for national implementation resulting in disparities in rates. Poland's COPD screening programme includes chest imaging but doesn't specifically target lung cancer. Greece lacks any lung cancer screening initiative despite its long-standing high smoking rates. The limited implementation reflects multiple

challenges: identifying high-risk populations requires sophisticated data systems, low-dose CT scanning demands significant infrastructure, and high false-positive rates create downstream costs. Yet lung cancer's lethality and potential to reduce mortality from targets screening programmes means that lung cancer screening programmes should be subjected to further piloting and evaluation.

Notably, lung cancer in never-smokers accounts for 10–25% of all lung cancers globally, with higher proportions observed in East Asian countries where approximately 32% of NSCLC patients are never-smokers (Cho et al., 2017). Women are disproportionately affected, comprising over 80% of never-smokers with non-small-cell lung cancer in some cohorts. Environmental factors including air pollution have been identified as potential risk factors (Zhang et al., 2021; Cho et al., 2017). This suggests a need to incorporate additional risk factors beyond smoking history into lung cancer screening policies.

Cardiovascular, kidney and metabolic disease screening

Screening for non-cancer NCDs shows even greater variation, from comprehensive national programmes to complete absence of systematic approaches.

The WHO's approach to cardiovascular disease screening emphasises total cardiovascular risk assessment rather than screening for individual risk factors. Through the HEARTS technical package, WHO recommends risk-based CVD management using validated risk prediction tools that incorporate age, sex, blood pressure, cholesterol, diabetes status, and smoking (WHO, 2020).

While WHO recognises chronic kidney disease as a major public health concern, specific global screening recommendations are limited, with most guidance coming from international nephrology organisations like KDIGO. However, there is increasing recognition that cardiovascular disease, kidney disease, and metabolic disorders are interconnected conditions that share common risk factors and pathophysiological pathways. This understanding has led to calls for more integrated screening approaches, exemplified by the 2023 US presidential advisory from the American Heart Association that defined cardiovascular-kidney-metabolic (CKM) syndrome and recommended coordinated screening strategies across these traditionally siloed conditions (Ndumele et al., 2023). Such integrated approaches acknowledge that screening for these conditions together, rather than in isolation, may improve early detection and enable more comprehensive risk stratification and management, but they have yet to translate into widespread practice.

Japan's Specific Health Checkups (since 2008) provides the most comprehensive approach, mandating screening for individuals aged 40–74 by health insurers. The programme includes blood pressure, lipids, glucose, metabolic syndrome assessment, and kidney screening through urinalysis. Despite universal coverage, participation reached only 58.1% in 2022 (30.17 million of 51.92 million eligible) (MHLW, 2023b). Germany's "Check-up" programme for cardiovascular and metabolic screening achieves only 24% annual participation despite full insurance coverage, demonstrating that removing financial barriers alone is insufficient for population engagement (dkfz, 2024; Tillmanns et al., 2022)

Poland transitioned from "Prevention 40 PLUS" (20% uptake by 2024) to "My Health" (May 2025), expanding eligibility to age 20+ with age-stratified intervals. The programme includes comprehensive blood tests, body measurements, and screening for cardiovascular disease, diabetes, kidney disease, thyroid disorders, and selected cancers. Yet the previous programme achieved only 20% uptake despite extensive promotion, raising questions about whether expansion without addressing participation barriers will improve coverage. The inclusion of mental health screening and vaccination status represents recognition that NCDs require holistic approaches.

Greece's PROLAMVANO programme, launched in 2024, targets 5.5 million individuals aged 30–70 with cardiovascular screening including lipid profiles and risk assessment. The use of digital prescriptions for accessing screening represents innovation in reducing administrative barriers. Spain implements screening through primary care with significant regional variation. Some autonomous communities have specific programmes – Madrid's PreveCardio for cardiovascular prevention, Catalonia's PAFES integrating physical activity prescription – while the national system uses electronic health records for risk stratification (Orueta et al., 2013). This decentralised approach enables local innovation but creates postcode lotteries where residents of different regions receive vastly different preventive services.

France, Italy, and Canada rely primarily on opportunistic testing rather than organised programmes. France's HAS has produced screening recommendations for cardiovascular and metabolic diseases but only for high-risk groups, missing opportunities for population-wide prevention. Italy includes NCDs in its National Prevention Plan 2020–2025 but regional resource disparities, a lack of intersectoral governance and poor IT interoperability all present significant challenges to national achievement of key indicators. Canada's fragmented provincial approaches mean some provinces have advanced screening whilst others lack basic programmes.

Despite affecting 10–15% of adults and often progressing silently until irreversible damage occurs, screening for CKD remains underdeveloped across all countries examined. Effective screening requires only simple, inexpensive tests – urine analysis for protein (albuminuria) and blood testing for creatinine to calculate estimated glomerular filtration rate (eGFR) – yet no country has achieved comprehensive systematic implementation.

Among the countries in our sample, Japan's Specific Health Checkups includes urinalysis for protein detection as part of standard examinations, though it notably lacks eGFR testing that would identify additional cases. Poland has recently integrated kidney function assessment into its "My Health" expanded from its national "Profilaktyka 40+" (2021–2025) preventive programme, which includes both creatinine and urine testing for adults, with screening intervals of every five years for those aged 20-49 and every three years for those over 49, but coverage remains uncertain, especially given the low uptake of its predecessor programme.

France has guidelines recommending risk-stratified screening and prevention programmes like "Mon Bilan Prévention" that include chronic disease risk assessment for specific age groups, yet approximately 25% of patients begin haemodialysis in emergency situations, indicating these patients are being missed by early diagnosis measures. A 2020 survey found only 20% of GPs engaged in organised prevention programmes for high-risk populations, though new prevention assessments introduced in 2024 may improve engagement.

Canada takes a targeted approach through its "Kidney Check" programme, which provides culturally safe screening for kidney health, diabetes, and blood pressure in high-risk Indigenous communities across Alberta, Manitoba, and British Columbia (Kidney Check, n.d.). While addressing populations with elevated CKD risk, Canada lacks a coordinated national screening strategy, and systematic early detection for other at-risk groups is still limited (Kidney Foundation of Canada, n.d.).

The remaining countries – Germany, Greece, Italy, and Spain – appear to have no organised CKD screening programmes, with the report on Greece noting that there is no systematic capture of CKD staging or kidney function tracking in electronic records, with studies showing delayed referral patterns.

This variation in approach to screening screening for CKD represents a critical missed opportunity for early intervention, particularly given that timely detection and management can slow progression, prevent cardiovascular complications, and delay or avoid the need for costly dialysis or transplantation.

Chronic respiratory disease screening

Unlike for other NCDs, WHO and the Global Initiative for Chronic Obstructive Lung Disease (GOLD) do not recommend population-based screening for COPD in asymptomatic individuals. GOLD guidelines recommend spirometry for diagnosis only in symptomatic patients with dyspnea, chronic cough, sputum production, or those with significant risk factor exposure (GOLD, 2024). The diagnosis requires post-bronchodilator FEV1/FVC ratio <0.70 confirmed by spirometry. This targeted approach reflects evidence that screening asymptomatic individuals does not alter disease outcomes or mortality.

Respiratory disease screening shows the most limited development. Only Poland operates a COPD screening programme using spirometry aligned with GOLD guidelines, though coverage remains limited. France restricts screening to high-risk groups with occupational or environmental exposures, missing the broader population of smokers and those with early symptoms. The remaining six countries lack systematic respiratory screening despite substantial disease burden.

This gap is particularly concerning given that spirometry – the key diagnostic test – is relatively simple and inexpensive compared to cancer screening technologies. The absence of respiratory screening likely reflects multiple factors: COPD's association with smoking may reduce political support, early disease has non-specific symptoms easily dismissed, and nihilism about treatment effectiveness persists despite evidence that early intervention improves outcomes.

Implementation challenges and coverage disparities

Within-country disparities often exceed between-country differences in all countries. Italy exemplifies this: cervical cancer screening coverage ranges from 78% in the autonomous province of Trento to just 16.9% in Calabria, a twelve-fold difference. Poland shows three-fold variations in cervical screening rates between regions in 2023, whilst Japan reports 20–30 percentage point differences in cancer screening participation between prefectures (MHLW, 2024e; Maria Skłodowska-Curie – National Research Institute). Rural access challenges are widespread. Greece's geography leaves 15 of 52 regions with less than half their population within 15-minute hospital access (Eurostat, 2025b). Spain, Italy, Canada, and France all report similar rural disadvantages.

Even well-funded programmes face engagement challenges. Japan's Specific health checkups achieve only 58.1% uptake despite universal coverage and no cost barriers. Poland's Prevention 40 PLUS reached just 20% of eligible individuals. These patterns repeat across all eight countries, suggesting systematic barriers beyond programme design.

Financial sustainability threatens programmes in at least three countries. Greece's PROLAMVANO programme depends entirely on temporary Recovery and Resilience Fund support ending in 2025. Spain's regional programmes are primarily funded through global budgets allocated to Autonomous regions, which receive fixed funding, whilst Poland's new "My Health" programme lacks confirmed long-term funding. This reliance on temporary financing affects nearly half the studied countries, undermining population trust in screening continuity.

Risk assessment and population targeting

Effective screening requires identifying who to screen, when, and how intensively. Traditional age-based criteria increasingly give way to sophisticated risk assessment that considers multiple factors: family history, biomarkers, environmental exposures, and social determinants. Yet the implementation of risk-stratified approaches reveals both promise and persistent challenges in moving from population-wide to precision prevention.

The foundation of risk-based screening lies in validated assessment tools that can reliably identify those most likely to benefit from early detection. These tools must balance sensitivity – capturing those who will develop disease – with specificity to avoid overwhelming health systems with false

positives. They must be feasible to implement at scale, acceptable to diverse populations, and regularly updated as evidence evolves. Most critically, they must address rather than exacerbate existing health inequities by ensuring that risk assessment captures social and environmental factors.

Current approaches

Several countries have integrated validated risk assessment tools into their screening programmes, though implementation depth and breadth vary considerably. Poland implements SCORE2 and SCORE2-OP for cardiovascular risk stratification within its prevention programmes, using these tools to determine screening intensity and follow-up schedules (Rzepka-Cholasińska et al., 2022). Patients identified as high-risk receive more frequent monitoring and aggressive risk factor modification, whilst those at lower risk avoid unnecessary medicalisation. Early evidence suggests this targeted approach improves efficiency without compromising outcomes.

Spain uses Adjusted Morbidity Groups to classify patients based on health status and risk level through electronic health records, enabling targeted preventive actions in primary care (Orueta et al., 2013). This system goes beyond simple risk scoring to create comprehensive patient profiles that account for multiple conditions, medications, and social factors. Primary care teams receive automated alerts for patients requiring screening or preventive interventions, though alert fatigue and time constraints limit response rates.

Italy's Emilia-Romagna region has developed a comprehensive risk stratification system that categorises individuals based on predicted hospitalisation or death risks using administrative data. The model divides the population aged 14 and above into four risk levels: Low, Moderate, High, and Very High, using statistical methods that integrate age, gender, and health history. High-risk groups, typically older adults with multiple health conditions on complex medication regimens, receive intensified monitoring and proactive care management. This approach has demonstrated strong predictive accuracy and represents a practical application of population health management principles, though like other regional initiatives in Italy, its implementation remains geographically limited rather than nationwide.

Japan's Specific health checkups programme incorporates metabolic syndrome criteria for risk assessment, identifying individuals requiring intensive lifestyle intervention versus routine monitoring (MHLW, 2024d). The programme's strength lies in its systematic data collection across the entire eligible population, creating a rich database for refining risk prediction. However, the focus on metabolic parameters may miss other important risk factors, particularly psychosocial determinants that profoundly influence disease development.

Greece utilises risk models in cardiovascular care through its PROLAMVANO programme but has not extended systematic risk assessment to other conditions. This disease-specific approach reflects common implementation patterns, cardiovascular risk assessment is most advanced given decades of research and validated tools, whilst risk stratification for other NCDs remains underdeveloped.

Despite these initiatives, limitations constrain risk-based screening effectiveness. Development of advanced risk prediction methods remains limited, and most countries continue relying on traditional clinical risk factors – age, sex, blood pressure, cholesterol – that explain only a portion of disease risk. For example, no country in our sample reported systematic incorporation of income, education, housing quality, or environmental exposures into risk stratification. This may be driven by inconsistently recording of socioeconomic factors within electronic healthcare records. Notably, one Japanese survey found that only 12.8% of prefectures were even aware of socioeconomic disparities in their populations (MHLW, 2022b).This omission means that risk assessment may systematically underestimate disease probability in disadvantaged populations, paradoxically directing resources away from those most in need.

Digital infrastructure to support sophisticated risk assessment appears under-developed across all eight countries. Only Greece and Poland mention beginning to use digital systems for population outreach, though neither has developed algorithms to personalise screening based on evolving risk profiles. The absence of integrated data systems means that risk assessment occurs in isolation – a cardiovascular risk score doesn't inform cancer screening intensity, despite shared risk factors. Dynamic risk assessment that updates as new information becomes available remains aspirational rather than operational.

Evidence for systematic use of validated risk tools is limited in the available documentation, suggesting that countries continue to rely more heavily on age-based criteria for screening programmes rather than standardised risk assessment protocols. This represents missed opportunities for efficiency and effectiveness, as blanket age-based screening may both over-screen low-risk individuals and under-screen younger people at elevated risk.

Opportunistic detection

While systematic screening programmes represent the most visible component of early detection strategies, much early identification happens outside these formal structures: every primary care encounter offers potential for early detection: checking blood pressure regardless of presentation, assessing cardiovascular risk during minor illness consultations, or noting early symptoms that patients haven not yet recognised as significant. For NCDs, where pathological changes are either ignored or develop silently over years before clinical presentation, it is vital that this broader opportunistic detection pathway reaches populations who do not participate in formal screening programmes. What matters most is not the pathway to testing but ensuring that all populations have equitable access to early detection, whether through organised programmes or routine care. This window for early identification determines whether conditions remain manageable through lifestyle modification and simple treatments or progress to irreversible complications requiring complex interventions.

The potential and scope of primary care diagnosis

Several countries have recognised the critical importance of expanding diagnostic capabilities in primary care settings. Poland's coordinated care initiative, implemented since 2018, represents a shift toward chronic disease management and early detection at the primary care level (Karasiewicz et al., 2020). As part of this reform, primary care physicians gained expanded competencies to use diagnostic tests that previously required specialist referral. This expansion acknowledges that primary care, as the first point of contact for most patients, is ideally positioned to identify NCDs early when interventions are most effective.

Japan emphasises the critical role of primary care physicians in conducting comprehensive risk assessments by combining regular health checkup results with risk assessment tools. Primary care physicians are particularly important for preventing and detecting lifestyle-related diseases such as diabetes and hypertension, determining when specialist referral is necessary (JDS, 2018; JPNHS, 2019). This gatekeeping and triage function ensures appropriate use of specialist resources whilst maintaining continuity of care.

Point-of-care testing plays a crucial role in primary care practices. The ability to conduct on-site diagnostics, such as blood sugar tests, cholesterol panels, and basic heart function evaluations, means patients can get their results and start treatment within a single appointment, eliminating the stress of waiting days or weeks for answers. This rapid turnaround is especially beneficial when managing conditions that require behavioural changes, as patients tend to be more motivated to modify their diet or exercise habits when they receive immediate feedback rather than delayed test results.

For many NCDs such as diabetes, hypertension, hypercholesteraemia, asthma, and COPD, the entire diagnostic and treatment journey can be overseen in primary care with appropriate support and resources. Hypertension requires multiple blood pressure readings over time. Type 2 diabetes needs fasting glucose or HbA1c confirmation. These conditions, once confirmed, can often be managed effectively in primary care settings with appropriate support and resources. However, not all conditions can be definitively diagnosed in primary care settings. Complex presentations, ambiguous test results, advanced disease progression. The critical challenge is ensuring primary care has both the capability to diagnose what it can manage and clear pathways for referring what it cannot, avoiding both unnecessary specialist referrals that overwhelm secondary care and delayed referrals that compromise outcomes.

Missed opportunities and implementation barriers

Despite this potential, multiple barriers limit opportunistic detection in practice. Germany's consultation times average under eight minutes, whilst Greece has only 6% of physicians in primary care versus the EU average of 21% (OECD/European Commission, 2024b). Payment systems that reward volume over comprehensive assessment and which do not reimburse preventive activities during illness visits create additional disincentives Critical gaps in access to timely diagnostics further limit detection capacity, with primary care physicians in many countries unable to access CT scans, MRI scans, and endoscopy without specialist referral. Digital infrastructure could support systematic opportunistic detection, but where digital systems exist, poor integration often reduces its effectiveness.

Even when patients present with relevant symptoms, evidence reveals systematic failures to capitalise on detection opportunities. Without clear protocols, elevated blood pressure or abnormal glucose readings during routine visits may be documented but not systematically followed up. Early warning signs may be missed when structured pathways linking opportunistic findings to diagnostic protocols are absent. This fragmentation becomes particularly problematic when conditions require specialist assessment. These issues are explored in greater depth in the following chapter of this report.

POLICY LEVERS: SCREENING AND EARLY DETECTION

Based on the evidence examined, countries should consider the following integrated approaches to strengthen early detection across all pathways:

The evidence reveals unfulfilled potential across both organised screening programmes and opportunistic detection in primary care. Coverage for the same screening programmes ranges from over 80% to under 10% across countries. Meanwhile, primary care, where most early detection could occur through routine encounters, often lacks timely access to appropriate diagnostics and authority to act on findings. These systematic failures mean early detection concentrates among populations who already engage with health services, potentially widening rather than narrowing health inequities.

Based on the evidence examined, countries should consider the following integrated approaches to strengthen early detection across all pathways:

■ Implement systematic risk stratification for screening programmes

To optimise screening programmes, implement systematic risk stratification using validated assessment tools such as SCORE2 for cardiovascular risk and polygenic risk scores where applicable, going beyond basic age-based eligibility. Accurate documentation of social determinants of health, such as income, occupation, education, and environment, is critical, as these factors

significantly influence disease risk but are frequently underrepresented in current risk models. Tailoring screening frequency, modality, and follow-up intensity based on comprehensive risk segmentation will enhance early detection and resource allocation, ensuring that high-risk populations are appropriately identified and managed.

■ Expand screening programmes with explicit equity targets

Since NCDs disproportionately affect underserved populations – including those in remote areas and lower socioeconomic groups – comprehensive screening programmes for cancer, cardiovascular-metabolic, kidney, and respiratory diseases must include mandatory coverage targets for these communities. Healthcare systems should implement opt-out enrolment with proactive recall systems, deploy mobile screening units to reach rural populations, and offer flexible scheduling including evenings and weekends. Regions should face financial consequences for failing to meet minimum participation thresholds among disadvantaged groups. While engaging underserved, high-risk populations requires additional health system resources, this investment is essential for detecting disease when interventions can still be curative or disease-modifying.

■ Strengthen primary care as the foundation for opportunistic detection

Expand primary care authority and capabilities to independently diagnose and initiate treatment for common NCDs such as diabetes, hypertension, and COPD that can be effectively managed at this level once confirmed. Clear protocols should specify which conditions primary care can diagnose independently versus those requiring specialist confirmation, ensuring appropriate use of specialist resources while maintaining continuity of care. Payment systems must recognise and reimburse opportunistic screening and diagnostic activities performed during routine visits.

■ Invest in diagnostic capacity to improve earlier diagnosis of NCDs

Improve access to essential diagnostic tool for major NCDs: spirometry for respiratory disease, CT scans, MRI scans, and endoscopy to improve early diagnosis of cancer, ECG capabilities for cardiovascular conditions, point of care blood glucose testing, and urine testing for proteinuria

■ Implement systematic protocols for opportunistic detection

Develop clear pathways for managing abnormal findings identified during routine encounters, with defined timeframes for follow-up and diagnostic confirmation, including fast-track referrals for suspected cancer symptoms. Protocols should specify which conditions primary care can diagnose independently versus those requiring specialist confirmation, avoiding both unnecessary referrals and dangerous delays.

■ Ensure sustainable financing for screening programmes

Move beyond temporary funding that undermines programme effectiveness and population trust. Establish dedicated, long-term funding integrated into regular health budgets rather than dependent on external or time-limited sources like Recovery and Resilience Funds. This includes covering not just screening tests but the full pathway from abnormal results to diagnosis and treatment initiation.

■ Address implementation barriers beyond programme design

The consistent gap between screening programme availability and population participation requires understanding and addressing specific barriers including convenience, cultural factors, and trust in healthcare systems. This means investing in awareness and education campaigns, simplifying patient pathways, community engagement, and systematic evaluation of why eligible populations do not participate, then adapting programmes based on findings rather than assuming availability equals access.

4 Tertiary prevention: Referral and access to specialist care

Following abnormal screening results, initial clinical suspicion, or the need for specialist expertise, patients must navigate complex pathways through health systems to reach appropriate specialist care. These transitions, from primary care to specialist services, between different specialists, and back to primary care, each represent potential delays that can alter disease outcomes. Significant inefficiencies are caused by duplication of tests and poor handover of care between different specialists and primary care. For NCDs, where treatment effectiveness often depends on disease stage and timely intervention, the cumulative impact of pathway delays can transform manageable conditions into advanced disease.

This chapter examines how health systems organise referral and access to specialist care for NCDs, recognising that not all conditions require specialist involvement. As discussed in Chapter 3, many NCDs can be effectively diagnosed and managed in primary care when appropriate resources and authority exist. This chapter focuses on situations where specialist input becomes necessary: for complex diagnosis, for treatment planning requiring specialist expertise, or for initial specialist assessment. It analyses referral mechanisms, waiting times for specialist consultation, coordination between providers, and the persistent challenge of ensuring continuity across separate services.

The specialist referral pathway

Initial referral to specialist services

The first critical transition, either from primary care to specialist services or direct presentation to a specialist, reveals important differences in health system organisation and their consequences for patient care. Countries demonstrate markedly different approaches to managing this initial contact, with important implications for both efficiency and equity.

Spain has positioned primary care as the foundation of its health system, with general practitioners serving as gatekeepers who determine when specialist input is needed. This system emphasises continuous coordination with specialised care through shared protocols and communication systems. The country has invested in strengthening this coordinating role, with primary care physicians managing initial investigations and determining appropriate referral timing. However, the effectiveness varies significantly by region, with wealthier autonomous communities such as Madrid and Catalonia maintaining more robust primary care infrastructure than regions like Extremadura or Andalusia (Instituto Nacional de Estadística, 2021).

Germany's approach combines gatekeeping with guaranteed access. The appointment scheduling system, operated by the Association of Statutory Health Insurance Physicians, requires that patients with referrals for diagnostic procedures are allocated specialist consultation within four weeks. This represents a structural attempt to address access delays through mandated timeframes. However, the system faces challenges in implementation, with significant variations in actual waiting times depending on specialty and region, and the four-week guarantee applying only to initial consultation rather than actual diagnostic procedures. Moreover, many patients continue to bypass primary care completely and directly present to specialists.

In contrast, Greece's healthcare system operates without effective gatekeeping mechanisms and the report documents insufficient primary care services, with only 6% of physicians working in general practice compared to the EU average of 21%. Hospital emergency departments struggle with

inappropriate utilisation as patients bypass primary care entirely, seeking specialist services directly from hospitals. This fragmentation is particularly evident in the Prolamvano screening programme, where despite providing initial screening services to millions of citizens, there is no formal coordinated pathway for patients with abnormal results to access diagnostic confirmation.

Japan operates without standardised criteria for referrals from primary to specialist services, a gap that creates significant variability in practice patterns. Individual providers make ad hoc decisions about when specialist input is needed, based on their own clinical judgement rather than evidence-based protocols. This leads to a dual problem: some providers refer too frequently for expensive diagnostic procedures, contributing to system inefficiency and cost escalation, whilst others delay necessary specialist consultation, potentially missing critical windows for early intervention. The absence of standardised referral criteria means that patient outcomes depend heavily on the individual physician's experience and risk tolerance rather than systematic, evidence-based pathways.

Canada's fragmented provincial and territorial systems create additional complexity, with each jurisdiction maintaining its own referral processes and criteria (Sussman et al., 2017; Marchildon et al., 2021; PHAC, 2021). The lack of interprovincial coordination means that patients moving between provinces may face repeated diagnostic workups or lost referrals (Marchildon et al., 2021). In addition, 17% of Canadians adults lack a regular healthcare provider, meaning they have no consistent point of entry for diagnostic referrals, often defaulting to walk-in clinics or emergency departments where continuity is absent (CIHI, 2024, Lofters et al., 2023; Weaver et al., 2014).

Specialist consultation and assessment

Once referred, patients encounter widely varying wait times for specialist consultation that reflect capacity constraints and distributional inequities. Urban-rural disparities in specialist availability contribute to large differences in access, with only about 13% of family physicians and 2% of specialists practicing in rural areas (CIHI, n.d.), leading to prolonged waits for residents outside major centres. Evidence also shows that emergency presentations account for 26–30% of cancer diagnoses in Canada, indicating failures in access to timely and planned diagnostic pathways (Lofters et al., 2019; Brenner et al., 2020). Greece exemplifies these challenges with median stroke-to-CT scan delays of 255 minutes and unmeasured multi-month waits for non-emergency consultations (Korompoki et al., 2024), whilst Poland's concentration of specialists in Warsaw, Kraków, and Gdańsk leaves rural voivodeships with less than half the specialist density.

The financing of specialist consultations creates additional barriers even within universal coverage systems. Greece's reliance on charitable funding for certain specialist assessments, France's co-payment requirements outside the ALD scheme, and regional variations in coverage all demonstrate how financial protection gaps compound access challenges. These barriers disproportionately affect populations already facing geographic and socioeconomic disadvantage, with Italy's evidence that 22% of southern cancer patients travel north for specialist care illustrating how multiple inequities compound throughout the specialist pathway (FAVO, 2024).

Onwards referral following specialist assessment

Following specialist assessment, patients requiring referral to treatment services face additional administrative and systemic barriers. Fast-track referral systems attempt to expedite onwards pathways for urgent cases, such as Poland's coordinated-care pathway programme, yet implementation remains inconsistent and coverage incomplete. In Canada, months-long delays can occur between specialist recommendations and treatment initiation, particularly for high-cost cancer therapies, where approval and funding decisions pass through multiple steps and differ by province (Judith Glennie & Associates Ltd., 2023; Marchildon et al., 2021). Provinces have different approaches: some have introduced streamlined pathways, while others require extensive documentation and multiple review stages, prolonging access. The administrative burden of

navigating these processes is compounded when patients and primary care providers must coordinate across fragmented systems of approval and service delivery (CIHI, 2023) (detailed analysis of treatment access and ongoing management appears in Chapter 5, whilst medicine access delays are examined in Chapter 9).

Systemic barriers across the pathway

Geographic inequities in specialist access

Rural and remote populations face compound disadvantages throughout specialist access pathways that transcend health system models and reflect fundamental challenges of service delivery in dispersed populations. The evidence consistently demonstrates how geographic distance interacts with specialist maldistribution to create cumulative delays: patients must travel further for initial referral, wait longer for consultation, and face additional barriers for any subsequent specialist care. Greece's island populations requiring air or sea travel to its mainland cities, Japan's disparities in access to specialties in rural prefectures specialties, and Poland's rural voivodeships with specialist density half that of urban centres all illustrate how geographical disparities shape.

These geographic disparities in specialist access extend beyond simple distance to encompass the full burden of accessing care. Patients face financial costs for travel and accommodation, disruption to work and family responsibilities, and the psychological stress of navigating unfamiliar urban healthcare systems – costs that fall disproportionately on populations already facing socioeconomic disadvantage. The evidence from Spain showing dramatic regional variations in specialist availability, combined with Italy's documentation of southern patients traveling north for specialist care, demonstrates how geographic inequality compounds existing health inequities (as examined in Chapter 1). Rural patients often require multiple trips for initial consultation, follow-up assessments, and coordination between specialists, with each journey representing time, cost, and potential delays that urban patients do not face.

Information flow and coordination failures

The interface between primary and specialist care represents a critical weakness across all studied health systems, with information flow failures creating discontinuities in care. Despite near-universal EMR adoption in some countries, the inability to share information between sectors means referrals proceed through paper documents, test results cannot be accessed across settings and are therefore duplicated, and specialists lack the primary care context essential for informed decision-making. Japan's 42% primary care EMR adoption compounds these challenges, whilst Spain's achievement of 99% primary care digitalisation is undermined by only 8 of 17 regions being able to share medical records (UOC, 2022).

These coordination failures extend beyond technical interoperability to reflect deeper systemic challenges examined elsewhere in this report. Payment systems that do not compensate for coordination activities (Chapter 7), governance structures that create incompatible regional systems (Chapter 6), and the absence of integrated care protocols for multimorbid patients (Chapter 5) all contribute to a disjointed experience where patients must navigate between separate providers, bearing responsibility for information transfer that health systems should provide.

Lost opportunities for system learning

Beyond the clinical coordination failures that affect individual patient journeys, health systems also fail to collect and analyse aggregate data that would enable system-wide learning and improvement. The systematic absence of comprehensive monitoring across specialist pathways creates institutional blindness to the very delays and failures that undermine NCD outcomes. Greece exemplifies this challenge with no national system for tracking specialist referral times, whilst

France's sophisticated health information infrastructure paradoxically lacks integrated tracking from referral through specialist assessment to treatment initiation. Spain's regional autonomy compounds the problem, with each autonomous community maintaining incompatible data systems that prevent national recognition of dramatic variations in specialist access (UOC, 2022).

Most critically, the inability to track cumulative delays across complete pathways means health systems systematically underestimate the true burden on patients. Current monitoring systems, where they exist, typically capture isolated metrics – initial referral time, diagnostic wait, treatment delay – without recognising that patients experience these sequentially. The measurement challenges and monitoring gaps documented throughout this report (see Chapter 6 on governance) mean that a patient's journey involving multiple weeks at each stage can accumulate to months of total delay, yet no indicator captures this complete pathway time. Without comprehensive pathway monitoring, health systems remain unable to learn from their failures or demonstrate whether reforms actually improve the patient experience of accessing specialist care.

POLICY LEVERS: REFERRAL AND ACCESS TO SPECIALIST CARE

The patient journey through specialist care pathways reveals multiple failure points that compound into significant delays. Countries lack standardised referral criteria, comprehensive pathway monitoring, and coordination mechanisms between primary and specialist care. With a large proportion of cancers diagnosed through emergency presentations in some countries, and regional variations in specialist access exceeding 100 days, the evidence demonstrates that poorly coordinated pathways undermine the benefits of early detection. The absence of integrated tracking systems means health systems remain blind to cumulative delays that can transform treatable conditions into advanced disease.

Based on the evidence examined, countries should consider the following integrated approaches to strengthen referral and specialist access:

■ Establish clear referral criteria with supporting infrastructure

Countries need evidence-based guidelines specifying when specialist referral adds value versus when primary care management is appropriate. These criteria should be embedded in clinical decision support systems and regularly updated based on emerging evidence. Critically, primary care must have the resources and authority to manage conditions within their scope, avoiding unnecessary referrals that fragment care.

■ Implement target maximum waiting times for specialist access

Countries need explicit timeframes for specialist consultation following referral, with enforcement mechanisms and consequences for non-compliance. These must cover the complete pathway from referral to initial specialist assessment, with operational capacity developed to meet standards consistently.

■ Create unified information systems for seamless coordination between sectors

Interoperable electronic systems must enable information sharing between primary and specialist care, eliminating the current reality where patients carry paper documents between providers. This requires not just technical standards but governance frameworks that mandate data sharing whilst protecting privacy, enabling specialists to access comprehensive patient histories and primary care to receive timely feedback.

■ Develop structured coordination protocols

Clear frameworks should specify responsibilities between primary and specialist care, including criteria for specialist referral, coordination arrangements, and back-referral to primary care once stable. These protocols should address common scenarios such as patients requiring multiple specialist opinions, ensuring coordination rather than fragmentation.

■ Address geographic disparities in specialist access

Solutions must recognise that rural populations face compound disadvantages at every stage. This requires hub-and-spoke models linking rural primary care to urban specialists, telemedicine for consultations that do not require physical examination, and mobile specialist services for underserved areas. Transport support and accommodation assistance may be necessary for those requiring in-person specialist care.

■ Build monitoring systems that track complete specialist pathways

Health systems need to measure not just individual waiting times but total time from initial referral to specialist assessment and onwards to treatment, disaggregated by condition, geography, and socioeconomic status. Regular public reporting of pathway performance can drive improvement through transparency whilst identifying where targeted interventions are most needed.

5 Tertiary prevention: Treatment and disease management

Once diagnosed, NCD patients require sustained, coordinated management over years or decades, fundamentally different from acute care's episodic interventions. Effective chronic disease management demands regular monitoring, medication optimisation, lifestyle support, and coordination across multiple providers – all whilst adapting to disease progression, emerging comorbidities, and changing life circumstances. For the growing population with multiple chronic conditions, this complexity multiplies as treatments interact and care plans conflict.

This chapter examines how health systems organise ongoing NCD management, from implementing clinical guidelines to coordinating multidisciplinary care, from supporting patient self-management to maintaining service continuity during crises. It analyses disease management programmes, medication adherence strategies, the challenge of multimorbidity, and the critical role of primary care in orchestrating long-term management. The evidence includes both routine care delivery and system resilience during disruptions, as revealed by the COVID-19 pandemic's impact on chronic disease services.

Evidence-based care

All studied countries have invested substantially in developing comprehensive, evidence-based clinical guidelines for major NCDs, yet the gap between guideline development and clinical implementation remains a persistent challenge across all health systems.

Guideline availability and quality

Spain's HealthGuide (GuíaSalud) programme exemplifies systematic guideline development, maintaining standardised guidelines for all major NCDs and risk factors with mandated revision cycles of at least every three years to ensure currency with evolving evidence. Germany's Association of Scientific Medical Societies (AWMF) publishes extensive condition-specific clinical guidelines; within oncology alone, the programme includes 30 guidelines covering the most common cancer types, demonstrating the depth of guideline development in specialised areas. Japan offers approximately 450 clinical guidelines through its Medical Information Distribution Service, representing one of the world's most comprehensive collections of clinical guidance (JCQHC, 2024).

A disconnect between guideline development and clinical application is a key weakness identified in several reports. Germany, despite extensive guideline infrastructure, lacks systematic mechanisms to monitor whether clinicians actually follow recommended practices. In France, low adherence to guidelines may be attributable to ineffective dissemination and suspicion amongst clinicians that guidelines undermine their autonomy. Japan lacks standardised cross-institutional monitoring systems to evaluate guidline-adherence , resulting in variations in care based on institutional experience and practitioner expertise (Japanese Medical Specialty Board, 2020).

The challenge of multiple long-term conditions (MLTCs)

A key limitation of current guidelines is their predominant focus on single diseases, which poorly serves the growing population with MLTCs and exacerbates the coordination challenges identified in disease management programmes. Patients with multiple conditions often receive conflicting recommendations, face unsustainable pill burdens, and encounter guidelines that fail to account for drug interactions or competing priorities.

Italy's 2022 National Report on Medicine Use documents that 68.1% of citizens aged 65 and over received prescriptions for at least five different substances, meeting the definition of polypharmacy. More concerning, 28.6% take ten or more different active ingredients, representing extreme polypharmacy associated with increased risks of adverse drug interactions, reduced adherence, and iatrogenic harm (Italian Medicines Agency, 2023). Japan explicitly identifies this challenge, noting that simply combining treatment guidelines for each condition can lead to excessive treatment that potentially harms rather than helps patients. The need for personalised medical care that considers overall treatment burden and prioritises interventions based on patient goals rather than disease-specific targets becomes essential.

Comprehensive guidelines for multimorbidity management remain notably absent across all studied countries. This gap means clinicians must navigate complex clinical decisions without evidence-based frameworks, often defaulting to treating each condition in isolation despite known interactions. The absence of multimorbidity guidelines particularly affects primary care providers, who provide generalist care to patients with MTLCs but lack support and specific recommendations for integrated decision-making.

Care coordination and disease management programmes

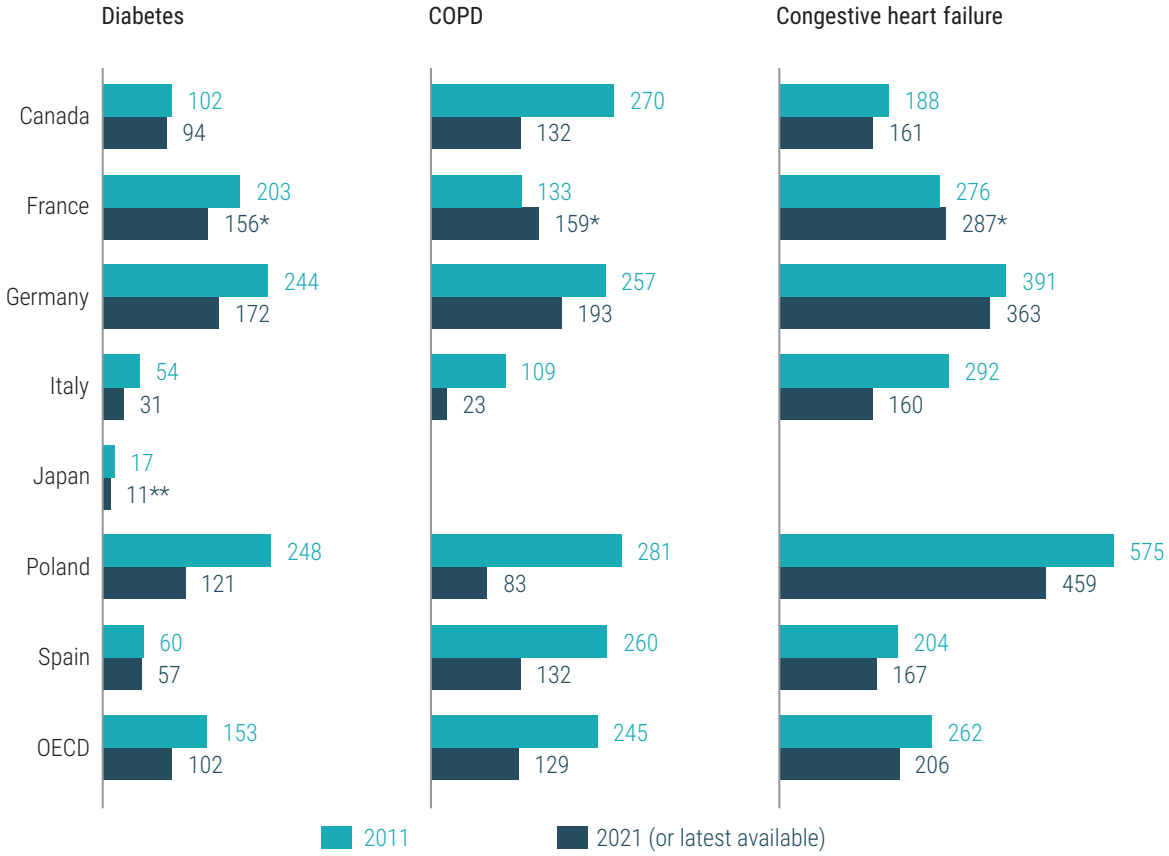
Effective NCD management requires sustained coordination across multiple providers, settings, and time periods. However, system fragmentation represents perhaps the most significant barrier to achieving this coordination, undermining the potential benefits of even excellent screening and diagnostic services that patients have successfully accessed.

The persistence of fragmentation

The persistence of poor outcomes despite substantial healthcare investments demonstrates that resource density alone does not guarantee effective chronic disease management. Germany, with very high density of physicians, medical technologies and infrastructure, reports avoidable hospitalisation rates for diabetes, COPD, heart failure, and hypertension that exceed OECD averages. More specifically, Germany recorded 363 congestive heart failure admissions per 100,000 population in 2021, 172 admissions for diabetes, and 193 for COPD/asthma – all higher than OECD averages (Figure 15). These indicators suggest that simply having abundant healthcare resources is insufficient without systematic approaches to organising and coordinating chronic disease care, and may also reflect incentives to maximise utilisation of existing infrastructure.

The absence of shared electronic health records across multiple countries has created information silos even within individual institutions, limiting development of holistic, patient-centred approaches. This technological gap prevents care teams from accessing complete patient information, leading to duplicated tests, medication conflicts, and missed opportunities for coordinated intervention. Italy's recent DM77 reform responds to this by promoting telemedicine as a tool for improving access to chronic care management, establishing community health centres as single access points where multidisciplinary teams provide integrated care. However, this framework is still in the early stages of implementation, and it will be some years before its full impact is realised.

Figure 15: Hospital admissions for congestive heart failure, diabetes and COPD (adults per 100,000 population), 2011 and 2021



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

Source: OECD, 2023a.

Disease management programmes at scale

Disease management programmes (DMPs) represent one of the most significant innovations in structured chronic care delivery, attempting to bridge the gaps created by system fragmentation and address the disconnect between healthcare resource availability and health outcomes. These programmes are systematic, population-based approaches to identifying and proactively managing high-risk patients with specific chronic conditions through coordinated care interventions that span the primary-secondary care interface. They typically include standardised clinical protocols, regular monitoring schedules, patient education components, and care coordination mechanisms designed to improve outcomes whilst reducing costs through prevention of complications and avoidable hospitalisations.

Germany provides perhaps the most prominent large-scale example of structured chronic disease management through its Disease Management Programmes (DMPs). Introduced in 2002 and now covering millions of patients, DMPs offer standardised care pathways for major NCDs (e.g. diabetes, cardiovascular disease, COPD, asthma) (Bundesamt für Soziale Sicherung, 2024; G-BA, 2025a; Bundesministerium für Gesundheit, 2025b). Key features include systematic enrolment, regular follow-up, patient education, and coordination across sectors. Providers receive extrabudgetary reimbursement linked to adherence with guideline-based care, and contracts are negotiated between sickness funds and physician associations (Bundesministerium für Gesundheit, 2025b).

Evaluations suggest that DMPs have improved process quality and intermediate outcomes, for example better control of HbA1c among diabetes patients and reduced hospitalisations for

cardiovascular disease (Gitt et al., 2016; Kostev et al., 2017; Mehring et al., 2017; Ose et al., 2011; Stark et al., 2011). At the same time, GPs and critics highlight challenges including administrative burden, limited flexibility for individualised treatment, and variable regional uptake (Wangler & Jansky, 2021). Overall, DMPs demonstrate both the potential and the trade-offs of scaling structured disease management through contractual and financial mechanisms.

Greece has implemented innovative home-based programmes that demonstrate alternative models for chronic disease management. The "OIKOTHEN" programme brings chemotherapy and nursing care directly to patients' homes, whilst the "FRONTIZO" programme provides integrated care for elderly patients with chronic diseases. These initiatives not only improve access but also enhance quality of life and reduce hospital burden. By bringing care to patients rather than requiring travel to facilities, these programmes address both coordination and access challenges simultaneously.

Japan's Community-Based Integrated Care System represents a comprehensive approach to chronic disease management, particularly for elderly populations. The system integrates medical care, long-term care, prevention, housing, and livelihood support within communities, recognising that effective chronic disease management extends beyond clinical services (MHLW, 2024c). However, implementation varies significantly between municipalities, with urban areas generally achieving better integration than rural regions.

Regional variations in approaches to care coordination demonstrate both opportunities and challenges for local adaptation. Spain's autonomous communities have developed diverse approaches: the Basque Country's Integrated Chronic Care Strategy promotes coordination among healthcare levels for cardiovascular diseases, diabetes, and chronic respiratory conditions (Gobierno Vasco, 2010), whilst Madrid's Programme for Complex Chronic Patients focuses on care continuity and telemedicine technologies (Consejería de Sanidad, 2013). However, implementation challenges reveal the complexity of translating structured care concepts into clinical practice.

Italy's regional disparities in chronic disease management are particularly striking. The implementation of care pathways for chronic diseases varies widely, with Northern regions consistently outperforming their Southern counterparts. The DM77 reform attempts to address these disparities by establishing uniform standards for community health centres, but implementation depends on regional capacity and political will.

Medication management and adherence

Once patients are receiving treatment, managing the complexity of multiple medications, monitoring requirements, and lifestyle modifications becomes a central challenge, particularly for those with multimorbidity.

The complexity of medication regimens for NCD patients creates substantial challenges for adherence and safety. Complex regimens increase the risk of errors, drug interactions, and non-adherence, yet most health systems lack systematic approaches to medication reconciliation and review.

Spain faces particular challenges with medication adherence in chronic disease management. The report notes that excessive workload means healthcare professionals have less time per patient, affecting proper medication counselling and follow-up. This time pressure prevents adequate patient education about medication purposes, side effects, and the importance of adherence, contributing to poorer disease control and increased complications (Bernal-Delgado et al., 2024).

Germany's experience with medication management in DMPs provides insights into structured approaches. Regular medication reviews are mandated within disease management programmes, with pharmacists increasingly involved in identifying potential interactions and optimisation opportunities. However, these reviews typically focus on single conditions, missing opportunities for comprehensive medication optimisation across all conditions.

Patient education and self-management support

Effective chronic disease management increasingly requires active patient participation in self-management, yet support for developing these capabilities remains limited across most countries. Disease management programmes typically include patient education and shared decision making components, but these often focus on information provision rather than skill development.

Canada's experience with diabetes self-management illustrates both needs and gaps. Despite the importance of self-monitoring and lifestyle modification, many patients face significant out-of-pocket costs for supplies and devices, and lack access to structured education programmes or ongoing community-based support (Diabetes Canada, 2023; Government of Canada, n.d.). Fragmentation between clinical care and community services contributes to inconsistent guidance and leaves many without adequate support for daily management decisions (Marchildon et al., 2021).

France's therapeutic patient education programmes (éducation thérapeutique du patient) represent a more systematic approach, with structured curricula and trained educators. However, these programmes reach only a fraction of eligible patients, with access varying by region and condition. The time-intensive nature of effective education programmes conflicts with productivity pressures in clinical settings.

Maintaining access during crises

The COVID-19 pandemic provided an unprecedented test of health system resilience, revealing how the coordination failures and implementation gaps identified during routine operations become magnified during crisis periods.

Several countries lacked specific plans for maintaining essential NCD services during the pandemic, leading to significant disruptions in routine chronic disease management. The Spain report finds that there was no specific national plan to ensure the continuity of NCD services during crises, though various regulations and health strategies indirectly addressed this issue, including Royal Decree 463/2020 and Law 2/2021 which established rules for prevention and containment during health emergencies.

The France report indicates that emergency preparedness proved insufficient for maintaining care continuity. The country's emergency White plan predominantly focused on increasing available human and material resources for treating Covid patients, mainly in hospitals, yet did not adequately consider the effect of interruptions to routine and chronic care. The French health authority (HAS) had to publish recommendations for maintaining NCD care a month into the first national lockdown (HAS, 2020a). Later, they stipulated that NCD patients be prioritised for vaccination (HAS, 2020b).

These gaps in preparedness resulted in widespread service disruptions. In Spain, many patients experienced suspended or delayed appointments for check-ups and diagnostic tests, affecting the early detection of diseases such as cancer and diabetes. France experienced severe impacts, with cancer screening, surgeries and other treatments severely affected by the first lockdown and to a lesser degree during the second (Le Bihan Benjamin et al., 2022). In Canada, diagnostic imaging wait times increased substantially, with MRI scan wait times at the 50th percentile rising from 42 days in 2019 to 57 days in 2024 (CIHI, 2025). The Italy report documents that delayed treatments, missed screenings, and postponed surgeries resulted in worsening health outcomes with an increase in preventable complications, hospitalisations, and mortality due to untreated chronic conditions.

The disruptions to cancer screening programmes created lasting consequences. In France, an excess mortality of between 1000-6000 is expected in coming years due to gaps in cancer screening and treatment during the pandemic (Blay et al., 2021). Even temporary service interruptions can have lasting impacts on population health, particularly for those with existing chronic conditions who depend on regular monitoring and treatment adjustment.

Some countries adapted their screening services during the crisis. The Spain report notes that some Autonomous Communities established protocols to maintain early detection of diseases such as cancer through home-based screenings or at specific centres separate from COVID-19 zones, though the lack of technological infrastructure in some regions limited its reach. The Spanish Ministry of Health also recognised increased mental health disorders, publishing a Mental Health Action Plan 2022-2024 to address this need. Moving forward, incorporating these lessons into contingency plans, enhancing digital infrastructure, and ensuring the integration of NCD services into emergency response frameworks will be essential to mitigate the impact of future crises on vulnerable populations.

Digital transformation under pressure

The pandemic demonstrated both the potential and limitations of digital health solutions for chronic disease management. Multiple countries' quick adoption of telemedicine showed that many perceived barriers to innovation reflect organisational inertia rather than genuine technical impossibility. Telemedicine utilisation increased dramatically across all countries, with some reporting 50-fold increases in virtual consultations during peak pandemic periods. Patients with chronic conditions demonstrated willingness and ability to engage with remote monitoring technologies, digital medication management platforms, and virtual education programmes when traditional in-person services were unavailable.

However, the digital divide meant that these innovations were not equally accessible. Japan reports that 50.9% of citizens aged over 70 do not use smartphones or tablets, effectively excluding them from mobile health applications and digital services (Cabinet Office Japan, 2023a). Spain documents that 78% of chronic patients over 70 lack autonomy with digital tools, requiring assistance for basic functions like accessing test results or booking appointments (Plataforma de Organizaciones de Pacientes, 2023). This digital divide is not simply a matter of device access but reflects deeper issues of digital literacy, interface design that ignores aging-related limitations, and assumptions about technological engagement that do not match the realities of older populations.

Building resilience for future disruptions

Despite clear evidence of NCD patients' vulnerability during the pandemic and the amplification of existing system weaknesses, the lessons learned have yet to be systematically incorporated into updated emergency preparedness protocols across most countries. Few countries have developed explicit plans for triaging essential NCD services during resource constraints, maintaining care coordination when in-person visits are limited, or ensuring equitable access to digital health solutions during system disruptions.

The development of crisis-resilient NCD care systems requires changes in how countries approach emergency preparedness, moving beyond acute care surge capacity to consider the full spectrum of health services needed to maintain population health during extended disruptions. This includes identifying essential services that must be maintained, developing protocols for remote management, ensuring medication supply chains, and creating communication strategies that reach vulnerable populations.

Some countries have begun developing more robust continuity plans. Spain is investing in digital infrastructure to enable rapid scaling of telemedicine when needed. However, these remain largely isolated initiatives rather than systematic preparedness strategies.

POLICY LEVERS: TREATMENT AND DISEASE MANAGEMENT

The evidence exposes a mismatch between single-disease guidelines and the reality of living with MTLCs: despite its prevalence, no country in our sample has developed a comprehensive MTLCs management framework. Disease management programmes demonstrate potential, but face criticism for inflexibility and administrative burden. The pandemic revealed extreme vulnerability, with major reductions in screening and substantial increases in preventable mortality, yet few countries have developed crisis-resilient NCD care plans. The gap between guideline availability and clinical implementation, combined with fragmented care coordination, means that even patients who access treatment struggle to achieve optimal outcomes.

Based on the evidence examined, countries should consider the following approaches to strengthen ongoing management:

■ Develop guidelines for patients with MTLCs with practical decision-support tools

Current guidelines that treat each condition in isolation become dangerous when applied to patients with multiple conditions, potentially creating unsustainable treatment burdens and harmful drug interactions. New guidelines must address common disease combinations explicitly, providing frameworks for prioritising interventions when recommendations conflict and protocols for deprescribing when risks exceed benefits. Clinical decision support tools should help reconcile competing guidelines whilst maintaining focus on what matters most to individual patients.

■ Scale disease management programmes with systematic enrolment and quality standards

Structured disease management programmes have proven effective but typically reach only motivated volunteers rather than those most in need. Shifting to opt-out enrolment ensures programmes reach their target populations whilst maintaining patient autonomy. Although, this must be combined with projections of demand for disease management programmes and corresponding investment to expand capacity. These programmes must demonstrate genuine impact through improved clinical outcomes and reduced emergency care, with funding contingent on achieving both high coverage and quality benchmarks that matter to patients.

■ Strengthen medication management systems

The complexity of medication regimens for multimorbid patients requires systematic approaches to reconciliation, review, and optimisation. This includes regular comprehensive medication reviews that consider all conditions together, involvement of pharmacists embedded within primary care multidisciplinary teams, and decision support tools that identify potentially harmful interactions or optimisation opportunities.

■ Invest in patient self-management support

Effective chronic disease management increasingly depends on patient capabilities that current systems do little to develop. Countries need structured education programmes that go beyond information provision to build practical skills in expert patients, ongoing support systems that help patients navigate daily management challenges, and recognition that self-management support is an essential clinical service rather than an optional extra.

■ Build crisis-resilient chronic disease care

Emergency preparedness must explicitly address NCD service continuity, with clear protocols for maintaining essential services, protecting vulnerable populations, and ensuring equitable access to alternative care modalities during disruptions. This requires identifying minimum service packages, developing remote management capabilities, and ensuring supply chain resilience for essential medications.

■ Implement continuous quality improvement built around the principles of a learning healthcare system

Beyond developing guidelines, countries need mechanisms to ensure implementation, including regular audits with feedback to providers, support for improvement initiatives, and quality indicators that reflect patient outcomes rather than just process measures. Quality improvement should be embedded in routine practice rather than treated as an additional burden, with continuous feedback on performance to healthcare providers.

PART III

System enablers

6 Governance and accountability

Effective NCD prevention and management requires governance structures that enable coordinated action across health system levels, government sectors, and diverse stakeholders. NCDs demand integration across ministries responsible for education, finance, agriculture, and urban planning, alongside mechanisms to hold multiple actors accountable for population health outcomes.

This chapter examines the institutional arrangements through which countries develop and implement NCD policies, including ministerial structures, cross-sectoral coordination mechanisms, strategic planning processes, and accountability frameworks. It analyses how health systems use data to inform policy, engage stakeholders in decision-making, and monitor implementation. The evidence covers both routine governance and crisis response, revealing how governance structures determine whether policies translate into improved outcomes.

Institutional arrangements

Governance structures for NCD management vary considerably across countries, reflecting different administrative traditions, constitutional arrangements, and health system organisations. These institutional differences profoundly shape how policies are developed, implemented, and monitored.

Japan operates through a highly structured approach with dedicated divisions within the Ministry of Health, Labour and Welfare for each major NCD category. These divisions are supported by expert committees that systematically integrate perspectives from medical professionals, patient representatives, and local government officials, ensuring that technical expertise, patient experience, and implementation capacity all inform policy development (MHLW, 2024f). This structured approach enables clear accountability lines and systematic policy development, though it may also create silos between disease categories that miss opportunities for integrated approaches.

Canada exemplifies the coordination challenges inherent to federal governance structures. Responsibilities for health are shared between the federal government which oversees pharmaceuticals, regulation, and health promotion, and the provinces and territories, which administer and deliver most health services (Health Canada, 2024; Marchildon et al., 2021). This division produces wide variability across Canada's 13 jurisdictions, with provinces and territories developing their own approaches to screening programmes, treatment protocols, and coverage decisions (NCCHPP-CCNPPS, 2018). Although mechanisms exist for intergovernmental coordination, such as First Ministers' Meetings, the annual Federal/Provincial/Territorial Health Ministers' Meeting, and the Pan-Canadian Public Health Network, their mandates are often broad and political, leaving implementation fragmented (Health Canada, 2025a; Pan-Canadian Public Health Network, 2025a). As a result, patients moving between provinces can encounter entirely different standards of care and eligibility rules for coverage.

Italy's approach centres on the Directorate for Health Prevention, which aims to provide centralised coordination designed to overcome the country's significant regional fragmentation. However, this strategy requires further strengthening, as implementation remains uneven across regions with varying capacities and political priorities, presenting a key challenge to achieving equity in the prevention and management of NCDs. Stronger national coordination mechanisms with concrete levers are needed to ensure more consistent delivery of services across the country. The tension between national standards and regional autonomy creates ongoing challenges, with some regions exceeding national requirements whilst others struggle to meet minimum standards.

Germany's governance structure reflects its federal system with strong Länder autonomy. Responsibility for strategic planning and implementation is decentralised and distributed across multiple levels of the health system. This arrangement engages a wide range of stakeholders but also leads to fragmentation and challenges in achieving national coherence. The Joint Federal Committee (Gemeinsamer Bundesausschuss) serves as a key decision-making body, bringing together representatives from physicians, hospitals, insurance funds, and patients, but its decisions often require lengthy consensus-building processes that delay policy implementation.

Cross-sectoral coordination

While some countries have experimented with coordination mechanisms and formal coordination bodies, true joint budgets between sectors remain elusive. Funding typically operates through parallel streams rather than genuinely integrated budgets across health, education, and other sectors, with these mechanisms operating within existing structures that reinforce sectoral divisions.

In addition to the challenges of coordination in Federal systems, Canada also faces challenges with cross-sectoral coordination. Despite pioneering health promotion concepts internationally (Raphael et al., 2020) and with provinces like Québec and Newfoundland and Labrador legislating Health Impact Assessment for decades (Bernier, 2023), no federal Health in All Policies framework currently exists to coordinate NCD prevention across government sectors (Public Health Agency of Canada, 2021). While federal instruments such as Gender-Based Analysis Plus (GBA+), the Quality of Life Framework (Government of Canada, 2025a; Statistics Canada, 2025b), and recent networking initiatives incorporate elements of cross-sectoral thinking, these are fragmented (INSPQ, n.d.), suggesting that Canada's reputation as a conceptual leader in health promotion has not translated into coherent operational coordination, and that this is difficult to do.

Indeed, Health in All Policies (HiAP) represents an aspirational goal more than operational reality across the studied countries. In Poland, the 2015 Public Health Act creates legally binding National Health Programmes with explicit requirements for multi-sectoral involvement, yet implementation remains primarily within health sector boundaries. The fundamental challenge extends beyond coordination mechanisms to how health is valued within government decision-making hierarchies. France has developed some cross-sectoral initiatives, particularly around nutrition and physical activity, but these remain limited in scope and impact. Greece's reactive healthcare system focuses on treating disease rather than investing in the broader determinants of health, despite evidence that upstream interventions offer greater population health impact. Spain's regional autonomy complicates cross-sectoral coordination, as different ministries at regional level may have conflicting priorities and limited mechanisms for alignment.

Strategy, planning and implementation

Systematic gaps in disease coverage reveal limitations in strategic planning for NCDs across the studied countries. These gaps often reflect political priorities and institutional capabilities rather than epidemiological burden.

In Spain, the national framework omits targeted approaches for several major disease categories despite their significant population impact: chronic kidney disease affects 15% of adults yet has no dedicated strategy; neurological diseases lack systematic policy attention; and rare diseases affecting 3 million citizens operate without coordinated response frameworks (Bernal-Delgado et al., 2024). These omissions suggest that strategic planning responds more to advocacy and political visibility than systematic assessment of disease burden.

Greece demonstrates particularly concerning strategic gaps, with no National Cancer Plan developed following the launch of Europe's Beating Cancer Plan, combined with an absence of

indicator-specific action plans or accountability mechanisms for major NCDs developed within the past decade. This suggests weaknesses in strategic planning capacity that go beyond resource constraints to reflect institutional limitations.

Canada illustrates both the potential and limitations in national NCD planning. The Canadian Strategy for Cancer Control (2019–2029) stands out as a comprehensive framework, developed through extensive consultation with stakeholders and supported by clear accountability and dedicated resources (Canadian Partnership Against Cancer, 2019). By contrast, other high-burden NCDs such as cardiovascular and respiratory diseases lack comparable national strategies. In some cases, civil society has attempted to fill these gaps, for example, the Heart Failure Policy Framework led by the HeartLife Foundation (HeartLife Foundation, 2024a, 2024b) demonstrates how non-governmental actors can drive strategic development in the absence of government leadership. Nevertheless, uneven presence of national frameworks leaves large segments of the patient population without systematic policy attention.

Where strategies do exist, their quality and implementation capacity vary substantially, determining their ultimate effectiveness. Japan has applied SMART criteria to establish numerical targets for both outcome evaluation and primary prevention. Currently, specific numerical targets for outcome evaluation and primary prevention are set for cancer, cardiovascular diseases, and CRD. The third term of Health Japan 21 also adopts key evaluation indicators such as age-adjusted mortality rates for cancer, cerebrovascular and heart diseases, and COPD, as well as the annual number of new dialysis patients due to diabetic nephropathy.

However, in several critical NCD areas, appropriately setting goals according to disease characteristics remains a challenge for Japan. In CKD, the focus is solely on dialysis initiation rates, with inadequate indicators for prevention and early detection. Additionally, asthma lacks sufficient indicators that reflect the quality of disease management, such as reducing emergency visits due to attacks and improving patient QOL. Furthermore, diabetes requires comprehensive indicators for preventing severe complications, such as blood glucose control status and incidence rates of complications. Establishing multidimensional evaluation indicators tailored to disease characteristics is crucial for implementing more effective measures (MHLW, 2024k).

Italy has incorporated comprehensive Key Performance Indicators spanning cancer screening, maternal and child health, chronic disease management, and health promotion into its strategic framework. However, there are persistent challenges to implementation, with poor IT interoperability and resource disparities between regions posing major obstacles. France's 2018–22 National Health Strategy, despite its comprehensive scope and ambitious objectives, had limited measurable impact due to the absence of specific monitoring mechanisms and unclear implementation pathways. These examples demonstrate that strategic planning without operational capacity, dedicated resources, and accountability mechanisms remains largely aspirational.

Data and evidence for policy making

The quality of strategic planning and implementation depends on the availability and use of evidence to guide decisions. The relationship between health data collection and policy development reveals important governance challenges across the studied countries.

Health information infrastructure

Countries have developed varied approaches to collecting population health data through registries and surveillance systems, each reflecting different stages of development and governance priorities.

Disease registries show considerable variation in coverage and maturity. Greece's National Cancer Registry, which became operational in 2025 following 2019 legislation, illustrates the implementation complexities health systems face. During this six-year transition, policy

development necessarily relied on alternative data sources of questionable quality and completeness. France's cancer registries through the Francim network provide detailed insights whilst covering approximately one-quarter of the population, acknowledging incomplete national representation but providing high-quality data for covered areas.

Spain has developed multiple disease-specific registries, including a National Registry of Type 1 Diabetes in 2022, though these currently operate without interoperability, limiting analysis of multimorbidity patterns. Most registries focus on hospitalised patients, offering important burden data though missing earlier disease stages relevant for prevention planning. The fragmentation of registry systems reflects broader governance challenges in creating unified approaches across autonomous regions.

National surveillance systems provide essential population health monitoring with varying sophistication. Canada's federal surveillance system successfully aggregates data from all provinces and territories to track 20 chronic diseases, demonstrating that comprehensive coverage across jurisdictions is achievable despite federal structures (Government of Canada, 2024a). Spain conducts regular surveys meeting WHO standards for NCD risk factors, documenting regional variations in service access. Poland's weather alert systems identify climate impacts on health but lack protocols for adjusting clinical management during extreme events, illustrating the gap between data collection and operational response.

Translating data into policy

The mechanisms for translating surveillance findings and data into policy action vary considerably across countries, with formal response pathways appearing critical for effective evidence use.

Canada's comprehensive cancer surveillance has informed the Canadian Strategy for Cancer Control (2019–2029), a national framework with defined priority areas, accountability mechanisms, and ongoing monitoring led by the Canadian Partnership Against Cancer (CPAC) (Canadian Partnership Against Cancer, 2019), demonstrating how surveillance can support comprehensive planning with defined accountability mechanisms. However, beyond cancer and more recently diabetes, most major NCDs still lack equivalent national frameworks, suggesting that the availability of surveillance data alone does not guarantee policy development (Public Health Agency of Canada, 2022; HeartLife Foundation, 2024b). Similarly, the relatively limited research use of Japan's comprehensive National Database of Health Insurance Claims and Specific Health Checkups, which had only 50 applications between 2018–2023, suggests that access barriers and data gaps may constrain policy utility even in sophisticated systems (MHLW, 2024g).

Countries generally lack formal requirements for policies to reference national data sources or respond to surveillance findings. Without mandatory links between evidence and policy, decision-making may reflect political priorities or stakeholder influence rather than epidemiological need. This creates a vicious cycle where prevention remains underfunded because its benefits cannot be demonstrated, whilst demonstration requires investments in evaluation infrastructure that seem unjustifiable without proven benefits.

Stakeholder engagement and inclusivity

Whilst robust data systems and evidence mechanisms provide the technical foundation for governance, the legitimacy and effectiveness of NCD policies ultimately depend on meaningful engagement with those affected by and implementing these policies.

Japan's expert evaluation committees provide a model for systematic multi-stakeholder engagement, with formal representation protocols ensuring that medical expertise, patient experience, and implementation capacity all contribute to decision-making processes (MHLW, 2024l). These committees include mandatory representation from patient organisations, creating

formal channels for lived experience to influence policy. However, the structured nature of these committees may also limit flexibility and responsiveness to emerging issues.

Poland's Public Health Council mandates comprehensive representation from professional chambers, employers' organisations, and NGOs, creating a broadly inclusive governance structure. The 2015 Public Health Act requires stakeholder consultation for all major health programmes, though the quality and influence of this consultation varies. Professional chambers maintain significant influence, potentially overshadowing patient and public voices.

Canada demonstrates sophisticated stakeholder engagement through patient-oriented research networks and strong advocacy organisations. The Strategy for Patient-Oriented Research (SPOR) networks embed lived experience into research and policy design (CIHR, 2021, 2023). Advocacy groups have directly shaped federal frameworks: Diabetes Canada drove the Framework for Diabetes in Canada (2022), while the HeartLife Foundation co-led the Heart Failure Policy Framework and supported the National Framework on Heart Failure Act in 2024 (Diabetes Canada, 2022; HeartLife Foundation, 2024a, 2024b). These outcomes highlight the effectiveness of government–civil society partnerships, but also reflect limited federal leadership where patient organisations have filled policy gaps.

The report on Germany describes how the country's Joint Federal Committee (G-BA), the highest decision-making body of self-government in healthcare, includes patient representatives in all sessions . They may propose agenda items and participate in deliberations, but voting rights rest with representatives of physicians, hospitals, and health insurance funds. This arrangement ensures patient perspectives are formally integrated into discussions.

Accountability mechanisms

Effective governance requires not just structures and processes but accountability mechanisms that ensure policies are implemented and objectives achieved. The evidence reveals systematic weaknesses in accountability across all studied countries.

Most countries lack systematic monitoring of policy implementation. Whilst strategies may include targets, regular assessment of progress is often absent. Greece's absence of indicator-specific action plans or accountability mechanisms means that strategic objectives remain aspirational. Spain's regional autonomy creates particular accountability challenges, with no mechanisms to ensure national standards are met across all autonomous communities (Bernal-Delgado et al., 2024).

Where monitoring exists, it rarely triggers corrective action. Italy's documentation of extreme regional disparities in screening coverage has not produced effective interventions to address these inequities. This suggests that monitoring without consequences becomes a bureaucratic exercise rather than a driver of improvement.

Financial accountability for NCD outcomes remains particularly weak. Despite NCDs representing the majority of healthcare expenditure, budget allocations rarely reflect performance in prevention or early intervention. Germany's high rates of avoidable hospitalisations do not trigger financial consequences for regions or providers failing to manage chronic conditions effectively.

Crisis preparedness plans

The COVID-19 pandemic revealed fundamental weaknesses in governance structures for maintaining NCD services during health system shocks. Most countries lacked explicit governance mechanisms for NCD service continuity, with emergency response structures focused primarily on acute care surge capacity.

The absence of clear governance for NCD services during the pandemic led to ad hoc decision-making that often deprioritised chronic disease management. Screening programmes were suspended without clear criteria for resumption, routine appointments cancelled without systematic triage of those most at risk, and treatment decisions delayed without accountability for consequences. NCD patients, despite representing the majority of those at risk from COVID-19 experienced the greatest service disruptions.

Few countries have since developed explicit governance structures for NCD services during future emergencies. Spain's regional autonomy complicated pandemic response, with different regions adopting conflicting approaches to NCD service continuity. The absence of national coordination mechanisms meant that learning from successful regional innovations was limited.

POLICY LEVERS: GOVERNANCE AND ACCOUNTABILITY

Despite diverse governance structures, all countries demonstrate similar weaknesses: absence of genuine cross-sectoral coordination, strategic planning gaps for major NCDs, and accountability mechanisms without consequences. The disconnect between comprehensive data collection and policy response, exemplified by persistent regional disparities despite systematic monitoring in many countries such as Italy and Spain, reveals that evidence alone doesn't drive change without enforceable accountability. Most concerning is the complete absence of governance frameworks for maintaining NCD services during emergencies, exposed catastrophically during COVID-19. These governance failures mean that even well-intentioned policies fail to translate into improved population health outcomes.

Based on the evidence examined, countries should consider the following approaches to strengthen governance and accountability:

■ Establish multi-sectoral coordination NCD prevention bodies

Countries should create cross-ministerial coordination bodies with clear mandates, adequate resources, and genuine authority to align policies across health, education, finance, agriculture, and urban planning sectors. Lessons can be learnt from national antimicrobial resistance (AMR) policy, where multi-sectoral coordination committees coordinate across human, animal, and environmental health. These bodies must move beyond advisory roles to have real influence over resource allocation and policy priorities, with formal accountability for achieving cross-sectoral objectives.

■ Develop comprehensive NCD registries to monitor progress and outcomes

Countries need integrated, interoperable systems and registries that can track NCD incidence, risk factors, treatment patterns, and outcomes across the entire care continuum. This requires not only technical investment in systems and standards but also governance frameworks that mandate data sharing whilst protecting privacy, enabling evidence-based decision-making at all levels.

■ Ensure investments in NCD policy are monitored and return on investment estimated

Countries should require that return on investment from NCD policies is monitored and evaluated ensuring that funding decisions explicitly reference national health data, burden of disease assessments, and effectiveness evidence. This includes strengthening health technology assessment for NCD interventions, and mandating evaluation of cost-effectiveness for existing and novel NCD programmes.

Implement robust monitoring and accountability frameworks for NCDs

National strategies require not just targets but clear implementation plans with specific responsibilities, timelines, and consequences for non-delivery. Independent monitoring bodies should assess progress with genuine authority to recommend course corrections, with their findings directly linked to budget cycles and policy decisions. Decision-making bodies must publicly document the evidence base for their choices, with regular audits to ensure funded interventions align with documented needs and proven effectiveness.

Institutionalise meaningful stakeholder engagement in NCD policy

Moving beyond consultation to genuine co-creation requires fundamental changes in how health systems involve stakeholders. This means creating formal mechanisms for patient and public involvement that provide real influence over policy development, with adequate resources for stakeholder organisations to participate effectively. However, countries must guard against creating additional veto points that could block necessary reforms. Stakeholder involvement should be structured to provide input and accountability without enabling special interests to obstruct evidence-based policies.

7 Health system financing

Financial flows shape every aspect of health system response to NCDs, determining what services are available, who can access them, and which interventions receive priority. Payment mechanisms create powerful incentives that either enable or obstruct prevention, early detection, and coordinated chronic disease management. For NCDs requiring sustained investment over long time horizons, financing arrangements fundamentally determine whether health systems can shift from reactive treatment to proactive prevention.

This chapter examines how countries finance NCD prevention and care, analysing overall health expenditure patterns, prevention investment levels, financial protection mechanisms, provider payment models, and resource allocation formulas. It encompasses both public and private financing, direct and indirect costs, and the critical challenge of aligning financial incentives with the long-term, coordinated care that NCDs require.

Health expenditure and prevention investment

The aftermath of the COVID-19 pandemic and the ensuing economic slowdown resulted in significant adjustments in the health expenditure to GDP ratio. Data from the OECD suggests that by 2021, countries were spending 9.7% of their GDP on healthcare. However, less than 5% of this is allocated to prevention in all of the countries in our sample. The disconnect between the acknowledged cost-effectiveness of prevention and actual investment levels persists across all countries studied, revealing fundamental structural biases in healthcare financing systems.

Germany's approach illustrates this in relation to health promotion specifically: the report highlights that, since 2019, statutory health insurance funds have been mandated to allocate €7.52 per insured person annually for health promotion activities, a specific and measurable commitment. Yet this accounts for only 1.2% of total health expenditure from all financing sources, a share that has not grown between 2012 to 2022. Whilst Germany's overall prevention expenditure is among the highest in Europe, the relatively small and static investment in health promotion reflects a broader tendency to prioritise treatment over upstream action.

Spain allocates 3% of its healthcare budget to primary and secondary prevention, with the vast majority of resources continuing to flow toward hospital and specialist services (Bernal-Delgado et al., 2024). This allocation persists despite evidence that prevention offers superior return on investment, suggesting that budget processes respond to institutional power rather than effectiveness evidence. The concentration of resources in hospital care reflects both political visibility (hospitals are tangible symbols of healthcare investment) and professional influence, with specialist societies maintaining greater political weight than public health advocates.

France dedicates only 2.3% to prevention, and within this limited allocation, over half (51%) is spent on disease monitoring at patient level, 20% goes to vaccination, 11% to early diagnosis, and 10% to health education and information campaigns, and 4% to population level surveillance. This distribution suggests that even within prevention budgets, resources flow toward activities that support the existing treatment-focused system rather than genuinely preventive interventions that might reduce future treatment demand.

Greece represents an interesting exception that proves the rule about political will and prevention investment. The country increased prevention expenditure from 1.30% of current health expenditure in 2019 to 4.50% in 2022, surpassing the EU27 average of 4.30% (OECD/European Commission,

2024b). This rapid increase demonstrates that significant reallocation is technically possible when political commitment aligns with institutional capacity. However, Greece's progress relies heavily on EU structural funds and recovery funding that may not be sustained beyond current programming periods, raising fundamental questions about the sustainability of prevention investments dependent on external support rather than domestic political consensus.

Structural barriers to investment in prevention

The challenge extends beyond the quantity of prevention spending to encompass how these limited funds are allocated and whether they achieve intended impacts. Prevention budgets often fragment across multiple agencies and programmes without coordination or systematic evaluation of effectiveness. Budget processes operating on annual cycles struggle to capture and value prevention benefits that accrue over decades. Professional payment systems continue to reward procedures and prescriptions rather than health maintenance activities. Political incentives favour visible, immediate interventions that voters can see and appreciate over gradual population health improvements that may only become apparent across electoral cycles.

The fragmentation of prevention funding creates particular challenges. In Canada, prevention activities are financed through a mix of federal transfers, provincial and territorial budgets, and municipal public health programmes, with limited coordination across levels (Marchildon et al., 2021; PHAC, 2021; NCCHPP-CCNPPS, 2018). This fragmentation means that comprehensive prevention strategies requiring action across multiple domains, such as addressing obesity through nutrition, physical activity, and environmental interventions, struggle to secure coherent and sustained funding. Each funding stream applies its own criteria, timelines, and accountability requirements, creating administrative burden that diverts resources from actual prevention activities.

Italy's experience with EU Recovery and Resilience Fund allocations illustrates both opportunities and limitations. The country allocated €524 million to health through Mission 6 of its Recovery and Resilience Plan with a strong focus on chronic disease prevention, including €324 million targeted at high-impact conditions. One-off initiatives have also been taken to address cardiovascular health, including CV-PREVITAL (€10 million allocated in 2018) and CVRISK-IT (€20 million over four years from 2025). This use of EU funds demonstrates that NCD care is considered an important element of improving countries' resilience across the EU. However, this injection of funding does not address structural imbalances in resource allocation within the Italian national healthcare budget or the need for a focus on reducing inequalities. Once funding ends, there is no clear mechanism for sustaining these investments through regular budget processes.

Financial protection

High levels of public insurance coverage, achieved through various models across the studied countries, have not eliminated financial barriers to NCD care, particularly for vulnerable populations with complex chronic conditions. Out-of-pocket payments create systematic disadvantages that disproportionately affect those with the greatest health needs and least financial capacity.

Direct financial barriers

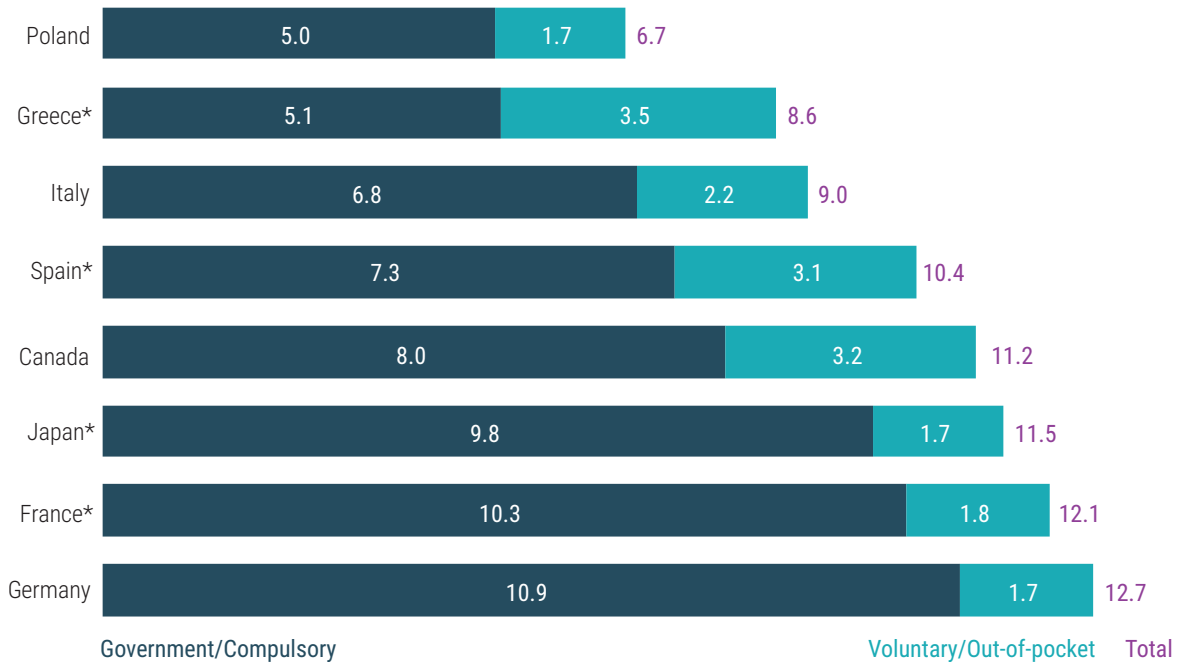
Spain's out-of-pocket payments represent 21% of total healthcare spending compared to the EU average of 15%, a gap that, despite coverage through voluntary health insurance (VHI), can present a significant financial barrier due to co-payments for medications, dental care, and other services not fully covered by the public system. These co-payments particularly affect chronic disease patients who require multiple medications and regular monitoring, with costs accumulating over time to create substantial financial burden (OECD/European Observatory on Health Systems and Policies, 2023a).

Greece faces the most severe challenges among studied countries, with 33% of health spending coming from out-of-pocket payments, among the highest proportions in Europe and a level that fundamentally undermines the principle of universal coverage (OECD/European Observatory on Health Systems and Policies, 2023b). The impact is starkly differentiated by income: 23% of the poorest quintile forgo necessary care due to cost compared to only 3.4% of the wealthiest quintile. The poorest households spend 9.0% of their total household expenses on medications alone, versus 2.7% for the wealthiest households. Most alarmingly, catastrophic health expenditure, defined as spending that threatens household financial stability, rose from 6.44% to 22.24% for Greece's poorest households between 2007 and 2015, a period coinciding with economic crisis and austerity measures that reduced public health coverage.

Italy recorded €40.6 billion in total household out-of-pocket expenditure in 2023 (ISTAT, 2024), showing steady annual increases that consistently outpace income growth, gradually eroding the financial protection that universal coverage is meant to provide. The phenomenon of "financial toxicity" documented in Italy, where patients experiencing financial hardship face 1.2 times greater mortality risk (FAVO, 2024), demonstrates how economic barriers translate directly into health outcomes through delayed care, medication non-adherence, and foregone treatments.

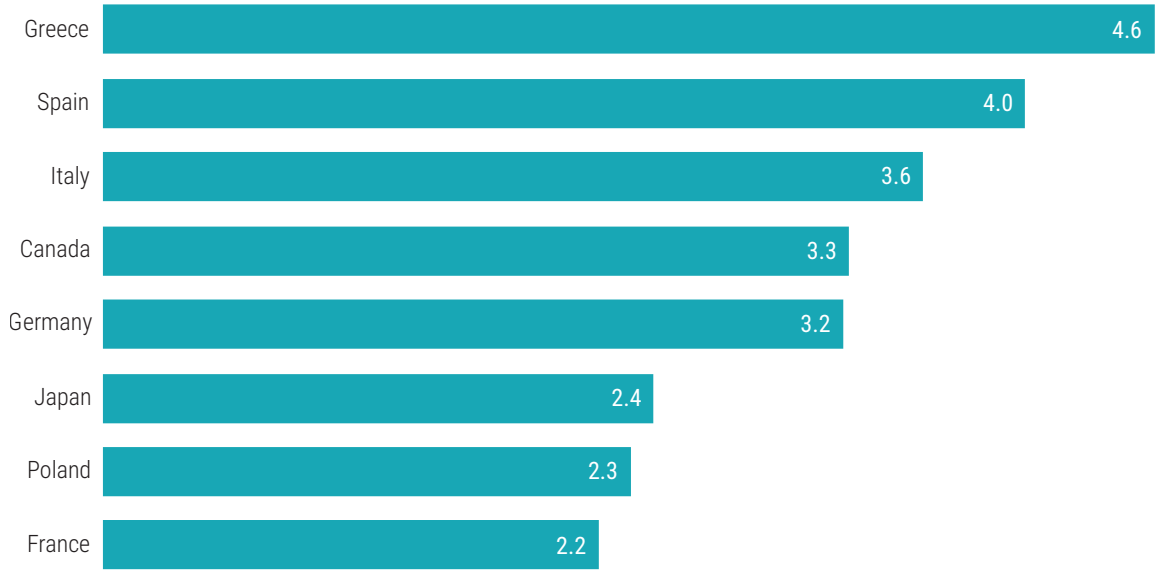
Canada illustrates how the design of benefits packages affects access to NCD care, with deep coverage for physician and hospital services contrasting sharply with limited coverage for pharmaceuticals and allied health services (Marchildon et al., 2021; PHAC, 2021) which constitute major components of NCD prevention and treatment. These gaps create particular hardship for people with chronic conditions. For example, in 2023, more than half of Canadians with type 1 diabetes, and many with type 2, either spent over 3% of their household income on care or were unable to follow their doctors' treatment recommendations because of costs (Diabetes Canada, 2023). Such shortfalls in pharmaceutical coverage force patients to make difficult trade-offs between adherence and financial stability.

Figure 16: Government/compulsory and out-of-pocket healthcare expenditure as a share of GDP, 2022 (or nearest year)



Note: * = OECD estimate for 2022.
Source: OECD, 2023a.

Figure 17: Out-of-pocket spending on health as share of final household consumption, 2021 (or nearest year)



Source: OECD, 2023a.

France has developed one of the most comprehensive approach to financial protection among studied countries, demonstrating how layered mechanisms can address different sources of financial vulnerability. The country's universal statutory health insurance provides base coverage for all residents. This is complemented by supplementary insurance held by 96% of the population, typically through employers or mutual societies. While the Long-Term Illness (ALD) scheme offers 100% reimbursement for thirty designated chronic conditions, patients are still required to pay deductibles and any additional charges resulting from overbilling, which is permitted in many cases. These out-of-pocket costs can accumulate for NCD patients requiring multiple medications, particularly for those without comprehensive complementary insurance. Low-income individuals receive additional protection through the Complémentaire Santé Solidaire, which provides free supplementary coverage.

However, there are concerns regarding the sustainability of the ALD system, as the list of included diseases and the number of beneficiaries is growing. A recent interministerial mission has recommended that, amongst other things, improving preventive strategies will be important to secure the long-term sustainability of the scheme. The tension between comprehensive coverage and fiscal sustainability reflects broader challenges facing all health systems as NCD prevalence increases, making evidence of cost-effectiveness paramount.

Indirect costs and hidden barriers

Financial barriers often operate indirectly through travel costs, lost wages from time off work, and informal payments that disproportionately affect vulnerable populations. Greece reports 9.0% unmet medical care needs compared to the 2.2% EU average, but this figure masks dramatic disparities: low-income households experience three times higher rates of unmet needs than wealthy households (OECD/European Observatory on Health Systems and Policies, 2023b). These indirect costs accumulate across the multiple appointments required for chronic disease management, creating barriers that may exceed direct medical costs.

Japan's experience illustrates how indirect costs affect access even in systems with comprehensive coverage. Rural populations often face substantial barriers when seeking specialist care which can results in associated costs and disruptions in continuity of care. These costs, not covered by

insurance, create systematic disadvantages for rural populations that compound geographic access barriers (MHLW, 2023e). Elderly patients on fixed incomes face particular challenges, as travel costs represent larger proportions of limited budgets.

Provider payment models and incentive alignment

Fee-for-service payment systems continue to dominate across studied countries, creating powerful incentives that directly contradict the requirements of effective NCD prevention and management. These payment models reward volume over value, acute interventions over prevention, and fragmented care over coordination.

The persistence of fee-for-service

Germany's fee-for-service system illustrates the perverse incentives created by volume-based payment. Providers are reimbursed for each discrete service but usually receive no compensation for time spent consulting with other providers or coordinating care across settings. This contributes to fragmented care and likely Germany's persistently high rates of avoidable hospitalisations for chronic conditions such as diabetes, COPD, and heart failure (Blümel et al., 2022; Busse et al., 2024; OECD, 2023a). Average consultation times under eight minutes reflect how providers respond to payment incentives by maximising volume, limiting opportunity for prevention counselling or comprehensive chronic disease management.

Canada's experience mirrors these challenges, with fee-for-service payment remaining dominant in primary care. Some provinces have experimented with alternative models including capitation-based funding arrangements, though uptake remains limited. Others have attempted payment reforms through bonus schemes – Ontario provides payments for reaching cancer screening targets, while British Columbia introduced bonuses for managing multiple chronic conditions. However, evidence shows these had 'no observable effects on these outcomes' (Lavergne et al., 2018), suggesting that bonus payments layered onto fee-for-service cannot overcome fundamental volume-based incentives.

France's fee-for-service model similarly encourages high service volumes over health outcomes, discouraging prevention activities and disease management interventions that are time consuming. Providers respond to low reimbursement rates by increasing volume to maintain income levels, creating a vicious cycle of supply-induced demand that drives up costs without improving outcomes. The France report finds that système du tiers payant, whilst reducing point-of-service barriers for patients, does not address underlying incentive misalignment that prioritises procedures over prevention.

Spain's payment systems vary by region but generally maintain fee-for-service for specialist care whilst using capitation or salaries for primary care. This creates incentive disparities between care levels, with specialists rewarded for activity whilst primary care providers managing most chronic disease receive fixed payments regardless of quality or outcomes (Bernal-Delgado et al., 2024). The misalignment contributes to the system's hospital-centricity, as payment flows follow patients to specialist settings rather than supporting comprehensive primary care management.

Innovations in payment reform

Some countries have introduced innovative payment approaches that begin to align financial incentives with NCD management objectives, though implementation remains limited and evidence of effectiveness mixed.

Germany's experience shows how payment reform can reinforce structured chronic care. Two integrated-care approaches operate outside the capped outpatient budget: nationwide Disease

Management Programmes (DMPs) (see Chapter 5) and regional selective contracts under §140a SGB V ("besondere Versorgung"). Both are reimbursed extra-budgetarily, creating incentives for providers to deliver services not otherwise rewarded in the standard fee-for-service catalogue.

Japan has incorporated lifestyle disease management fees and disease-specific treatment management fees into its medical reimbursement structure, explicitly recognising and valuing the coordination and comprehensive management required for effective chronic disease care (MHLW, 2024h). These supplementary payments provide modest incentives for prevention and coordination, though they remain small relative to procedure-based payments. The limited impact suggests the need for further improvements to promote prevention and outcome-based payments.

Greece has employed quality-based rebate systems for some private providers, with rebate levels for diagnostic services, such as CT and MRI scans, tied to meeting specific quality standards, creating financial incentives for quality improvement. This approach recognises that penalising poor quality may be more effective than rewarding good performance, though international evidence on rebate effectiveness is mixed.

Poland provides additional funding to primary healthcare clinics that participate in standardised preventive programmes and implementation of care coordination models, This approach links payment to process measures rather than outcomes, potentially easier to implement but with uncertain impact on patient health. The focus on process compliance may also increase administrative burden without necessarily improving care quality.

The limits of payment reform

Canada illustrates the difficulty of achieving meaningful change through small-scale financial incentives layered onto existing models. Primary care physicians are paid through a mix of fee-for-service and capitation, depending on the province, but neither approach has been designed to support comprehensive NCD management. Bonus schemes have been tried to fill this gap: Ontario offers payments for reaching cancer screening targets, and British Columbia introduced incentives for managing multiple chronic conditions. Yet evaluations show little impact, with Lavergne et al. (2018) finding "no observable effects" in BC. These experiences underline that bonus payments attached to volume-based models rarely overcome the underlying incentive misalignment (Lavergne et al., 2018).

Poland has taken a different route by linking additional funding to participation in standardised preventive programmes and care coordination models. This approach of linking payment to process measures (such as participation in preventive programmes) may be more feasible to implement than outcome-based schemes, though evidence suggests limited impact on actual health outcomes. Most studies of outcome-based payment demonstrate minimal effectiveness, with substantial transaction costs and administrative burdens of designing and operating complex payment systems frequently overlooked in policy discussions. Providers resist income volatility associated with performance payment, particularly when factors beyond their control affect outcomes. Public expectations regarding provider choice and access create political barriers to payment models that might limit service availability.

The persistence of traditional fee-for-service mechanisms across diverse health systems reflects not merely institutional inertia, but genuine structural challenges. Creating effective alternatives requires not just new payment models but supporting infrastructure including information systems to track performance, risk adjustment mechanisms to ensure fair comparison, and governance structures to manage complex contracts. These requirements may exceed the administrative capacity of many health systems, particularly those already struggling with basic service delivery.

Rather than pursuing technocratic payment reforms in isolation, countries may achieve greater impact by prioritising fundamental changes to care delivery models. This includes fostering organisational integration across care settings, implementing multidisciplinary team-based

approaches, and establishing evidence-based clinical pathways that guide patient journeys. Such reforms should be accompanied by payment mechanisms that, at minimum, avoid creating perverse incentives that fragment care or discourage coordination between providers and across care episodes.

Resource allocation and territorial equity

Most countries use formula-based allocation mechanisms that attempt to distribute resources based on population needs, but these formulas often fail to capture the complexity of NCD burden and the additional costs of serving disadvantaged populations. Simple age-weighted capitation formulas may account for demographic differences but 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.

Spain's regional allocation system produces spending that ranges from €1,500 to €2,000 per capita across autonomous communities, variations that exceed what demographic and epidemiological differences would predict (Instituto Nacional de Estadística, 2021). However, wealthier regions benefit from stronger tax bases that enable supplementary spending, whilst poorer regions depend more heavily on central transfers that may not fully compensate for local resource constraints.

Italy demonstrates how regional autonomy can exacerbate rather than address health inequities: more prosperous northern autonomous provinces allocate over €300 more per capita annually than southern regions, creating cumulative disadvantages in infrastructure, workforce, and service availability. Healthcare poverty rates, defined as a combination of economic burden of cancer care, travel burden, cultural and psychological barriers and systemic inequities (FAVO, 2024) in southern Italy reach 8%, twice the 4% rate in the northeast, with 22% of southern cancer patients travelling north for treatment, incurring substantial additional costs for travel, accommodation, and lost income. The national solidarity fund intended to address these disparities provides insufficient compensation, leaving southern regions structurally disadvantaged. These regional disparities create a form of "postal code lottery" where health outcomes depend as much on geography as on clinical need. However, significant inequalities can persist even in centralised health systems, suggesting that centralisation alone does not guarantee equity without additional mechanisms to address local needs and disparities.

Canada's federal transfer system helps support provincial health spending, but it does not eliminate differences across jurisdictions. The Canada Health Transfer provides equal per capita cash transfers that cover less than one-quarter of provincial health spending, with little adjustment for differences in population health needs (Marchildon et al., 2021). Provinces with stronger fiscal capacity can supplement federal transfers with their own revenues, while those with weaker capacity face greater difficulty maintaining comparable levels of service. This contributes to variation in coverage and access across the country.

Urban–rural disparities

Rural areas face systematic underfunding relative to the costs of service delivery, with formula-based allocations failing to account for the diseconomies of scale, travel requirements, and infrastructure needs of dispersed populations. For example, in Greece, resource allocation formulae do not take account of geographic disparities, despite the challenges faced by its dispersed island population in accessing care.

Japan's experience illustrates how standard allocation formulas disadvantage rural areas. Whilst urban areas benefit from economies of scale, rural areas face disparities in in access to basic services. The higher costs of attracting workforce to rural areas, maintaining equipment with lower utilisation rates, are not adequately reflected in payment rates based on urban costs. As a result, efforts are underway to optimise regional functional and resource allocation strategies (MHLW, 2024m).

Germany's morbidity based risk-adjustment system (Morbi-RSA) helps compensate sickness funds with sicker population, but in doing so it weakens incentives to invest in provention. Because reductions in morbidity can reduce compensation, insurers have little financial motivation to prioritise long-term prevention, especially given annual member switching and scepticism about cost-effectiveness (Medizinischer Dienst Bund & GKV-Spitzenverband, 2024; Reif et al., 2024). This illustrates the difficulty of designing allocation mechanisms that both ensure fair compensation and encourage sustained investment in prevention.

POLICY LEVERS: FINANCING

The persistent underinvestment in prevention, below 5% across all countries despite proven cost-effectiveness, reveals how budget processes respond to institutional power rather than evidence. Financial barriers remain substantial, while fee-for-service payment systems actively discourage the coordination that NCD management requires. Regional disparities in per capita spending that exceed demographic and epidemiological differences demonstrate how current allocation mechanisms perpetuate rather than address inequities. Without reforms to how health systems value prevention, eliminate financial barriers, and align payment incentives with chronic disease management needs, the economic burden of NCDs will continue escalating.

Based on the evidence examined, countries should consider the following approaches to align financing with early action on NCDs:

■ Increase prevention investment through structural reforms

Countries need to substantially increase prevention spending from current minimal levels, moving beyond marginal adjustments to meaningful reallocation. This requires transparent systems for tracking prevention investments across all sources rather than the fragmented reporting that currently obscures spending patterns. Prevention budgets should be protected from short-term political pressures through multi-year commitments that reflect the long-term nature of prevention benefits. Investment levels should be determined by population health needs and evidence of effectiveness rather than historical patterns or residual budgeting.

■ Reduce financial barriers to accessing healthcare services through comprehensive protection mechanisms

Financial protection must address the full costs of living with chronic conditions, not just basic medical expenses. Countries should minimise out-of-pocket healthcare costs and implement means-tested exemptions to provide enhanced protection for those with chronic conditions. The administrative burden of accessing financial protection needs simplification to avoid excluding those most in need. Regular monitoring of financial protection by socioeconomic status should trigger policy responses when unacceptable disparities emerge.

■ Reform resource allocation to ensure territorial equity

Resource allocation formulas need to 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 rather than merely equal funding. Central mechanisms should retain flexibility to address persistent inequities that formulaic approaches cannot resolve, recognising that geographic disparities often reflect deep structural disadvantages.

Embed prevention value in all resource decisions

The benefits of prevention must be systematically considered in resource allocation, using appropriate time horizons that capture long-term value. This might involve treating prevention as investment rather than expenditure, or developing mechanisms that allow health systems to benefit from the broader savings their prevention activities generate. Health technology assessment and budget processes should evolve to properly value interventions that prevent future disease rather than focusing solely on treating existing conditions.

Create financing mechanisms that reward coordination and integration

Payment systems should incentivise the coordination that effective NCD management requires, rather than perpetuating fragmentation through separate funding streams. This could involve population-based payments that encourage collaboration, bundled payments spanning multiple providers, or shared savings arrangements that reward collective achievement. Prevention and coordination activities need explicit recognition in payment systems rather than being expected as unfunded additions to clinical work.

Reform payment systems to align incentives with NCD management needs

Countries should transition primary care from fee-for-service toward capitation-based models that provide predictable funding for prevention and chronic disease management. Where pay-for-performance is considered, careful attention to design is essential – including incentive size, level of application, whether to reward improvement or absolute performance, and safeguards against unintended consequences. Given the mixed evidence and design complexity, priority should go to removing perverse incentives in current systems, such as ensuring adequate reimbursement for consultation time and team-based care.

8 Workforce capacity and development

Healthcare workers translate all other health system investments into patient care, making workforce capacity fundamental to NCD prevention and management. Yet NCDs demand different workforce competencies than acute care, emphasising prevention, behaviour change, care coordination, and long-term relationship building. The rising prevalence of patients with MTLCs requires workers comfortable managing complexity and uncertainty rather than following single-disease protocols.

This chapter examines healthcare workforce preparedness for NCDs, analysing overall supply and distribution, skill mix and professional roles, education and training, and strategies for addressing shortages. It covers both traditional health professions and emerging roles, the potential for task-shifting, and the critical challenge of making primary care and prevention attractive career choices when health systems systematically undervalue these fields.

Workforce supply and distribution

No studied country has developed adequate workforce planning that fully addresses future NCD care requirements, creating systematic imbalances that threaten health system sustainability. The absence of comprehensive planning manifests in severe mismatches between workforce composition and population health needs.

Quantitative shortages and imbalances

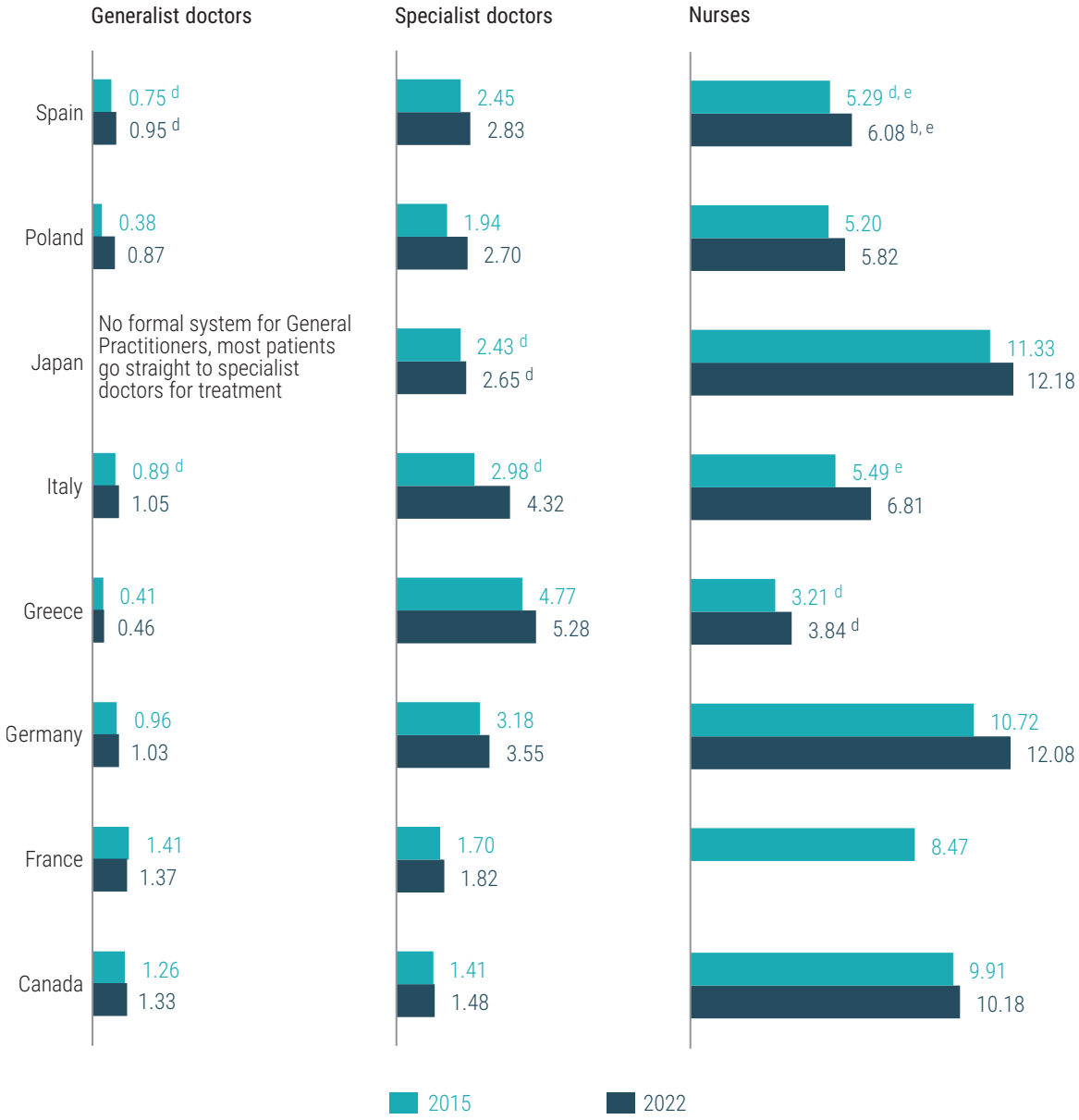
Greece exemplifies the workforce imbalance with the EU's highest physician density at 6.6 per 1,000 population coexisting with the lowest nursing density at 3.9 per 1,000 (OECD, 2019; OECD/European Commission, 2024a; OECD/European Union, 2014). This inverted skill-mix forces physicians to perform tasks that nurses undertake in other countries, reducing system efficiency and increasing costs without improving outcomes. The imbalance reflects historical emphasis on medical education without corresponding investment in nursing programmes, creating structural distortions that persist despite their recognised inefficiency.

Japan faces absolute shortages with only 2.6 physicians per 1,000 population, well below OECD averages, when its rapidly ageing population requires intensive chronic disease management (OECD, 2023a). The country's physician shortage is particularly acute in primary care and geriatrics, specialties essential for managing complex multimorbidity in ageing populations. Since 2008, regional quota medical school admissions and phased increases in admissions have generated approximately 3,500-4,000 new physicians annually (MHLW, 2022c). Despite these efforts to address workforce shortages, regional and specialty disparities will require targeted interventions beyond simply increasing overall supply.

Poland confronts some of the EU's most severe constraints with 3.5 doctors and 5.7 nurses per 1,000 population, levels insufficient to meet current needs let alone rising future demand (OECD, 2023a). The country has responded with dramatic action, increasing medical school admissions by 92.3% and introducing regulatory frameworks for 15 new medical professions including prevention specialists through its Act of 17 August 2023 (Kupis et al., 2024). However, these increases will take years to translate into practicing clinicians, and quality concerns arise from rapid expansion without corresponding investment in educational infrastructure.

Canada maintains a relatively balanced specialist-generalist ratio at approximately 53% specialists to 47% generalists (OECD, 2023a) yet still faces significant primary care access challenges. According to CIHI's reporting of the 2023 Commonwealth Fund survey, 86% of Canadian adults had a regular healthcare provider, leaving about 4 million people lacking a regular healthcare provider (CIHI, 2024). Aggregate workforce ratios mask distributional problems and that workforce planning must consider not just numbers but deployment and productivity.

Figure 18: Practising generalist doctors, specialist doctors and nurses per 1,000 population, 2015 and 2022



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

Source: OECD, 2023a.

Geographic maldistribution

Geographic maldistribution amplifies quantitative imbalances, creating access barriers that disproportionately affect rural and remote populations with often higher NCD burden. Japan's 1.8-fold difference in physician density between highest and lowest prefectures understates the problem, as specialist concentration in urban areas is even more extreme (MHLW, 2024i). Some rural prefectures lack entire specialties, forcing patients to travel hours or relocate temporarily for treatment.

In Greece, over 60% of physicians practice in just two regions, Attica and Central Macedonia, leaving only 10% serving insular areas (Hellenic Statistical Authority, 2024; OECD, 2023a; OECD/European Commission, 2024b). This geographic concentration reflects powerful urbanisation forces: professional preferences for urban amenities, career opportunities concentrated in cities, educational institutions located in metropolitan areas that retain graduates, and dual-career households requiring employment opportunities for spouses.

Poland shows dramatic urban-rural disparities, with Warsaw having physician density comparable to Western European capitals with over twice as many primary care facilities per 10,000 inhabitants compared to rural areas. The concentration of specialist training in major cities perpetuates this pattern, as it is increasingly difficult to attract residents who train in urban centres to rural practice. Rural areas also struggle to maintain the minimum patient volumes required for specialist practice viability, creating self-reinforcing cycles of workforce shortage (European Rural Development Fund Poland, 2022).

Spain's rural areas face particular challenges, with regions struggling to attract young healthcare workers as well as a pronounced rural-urban divide with limited specialist access due to workforce shortages and reluctance of specialists to practise in remote areas. Spain has introduced a range of incentive strategies to tackle workforce shortages in areas hardest hit. These include salary increases, ongoing training incentives, and job stability programmes, all designed to boost retention in the public healthcare system (Bernal-Delgado et al., 2024).

Professional imbalances

The imbalance between generalists and specialists compounds geographic disparities and directly undermines NCD prevention and management capacity. Primary care, which provides the optimal setting for chronic disease prevention, early detection, and coordinated management, faces critical shortages across all countries.

Germany exemplifies the specialist-generalist imbalance afflicting many health systems. Despite having one of Europe's highest specialist densities, it has the lowest GP density among neighbouring countries (OECD, 2023a). Only 35.9% of outpatient physicians worked in general practice in 2024, down from 37.6% in 2014 (KBV, 2024b). This reflects both the traditionally weaker gatekeeping role of GPs compared to other systems and the declining attractiveness of general practice (Wangler & Jansky, 2024). Average consultation times are under eight minutes, compared to 25 minutes in Scandinavian countries, severely limiting opportunities for meaningful preventive consultations essential for NCD management (Reif et al., 2023). The time pressure prevents comprehensive assessment, patient education, and the relationship building that underpins effective chronic disease management.

Greece's situation is particularly dire with merely 6% of physicians in general practice compared to the EU average of 21%, forcing patients to seek specialist care for conditions that could be managed more appropriately and cost-effectively in primary care settings. This creates system inefficiencies where expensive specialist resources are consumed for routine care whilst complex cases face delays. The absence of gatekeeping means specialists spend significant time on problems outside their expertise, reducing availability for cases genuinely requiring specialised input.

Italy has attempted to address imbalances through Ministerial Decree 77, which establishes new territorial care models positioning general practitioners at the centre of regional health systems. The decree provides infrastructure and support to make primary care practice more sustainable and attractive, including team-based models, administrative support, and modern facilities. However, implementation is still in the early stages, and faces challenges with respect to regional uptake, digital integration and workforce availability.

Demographic pressures and career attractiveness

The healthcare workforce faces an unprecedented demographic crisis as ageing professionals approach retirement without adequate replacement pipelines. This crisis coincides with dramatically increasing demand from ageing populations with complex multimorbidity.

The ageing workforce

Poland's situation illustrates the urgency: physicians average 50.8 years and nurses 50 years, with substantial proportions already exceeding normal retirement age but continuing to work due to replacement shortages (Health Needs Maps, 2025). Rural areas face particular challenges as older physicians retire without successors, leaving communities without medical care. The ageing workforce also struggles to adopt new technologies and care models, potentially limiting innovation in NCD management.

Canada exemplifies this demographic challenge with nearly 18% of healthcare workers aged 55+ in 2024 compared to 9.5% in 1998 (Statistics Canada, 2025). Rural areas face accelerating workforce decline with nurse practitioners dropping from 18% to 14% of the rural workforce between 2013-2022, alongside declines in nursing more broadly (CIHI, 2023; PHAC, 2021). The loss of experienced practitioners particularly affects chronic disease management, where long-term relationships and deep community knowledge enhance care quality.

Whilst experience benefits complex case management, physical demands of practice and resistance to new approaches may limit effectiveness. The concentration of older physicians in solo practices also impedes team-based care models essential for comprehensive NCD management.

Declining career attractiveness

The declining attractiveness of primary care and prevention specialties among medical graduates compounds demographic pressures. In Germany, younger doctors increasingly favour part-time work and better-paid, technology-oriented specialties such as radiology and ophthalmology, which benefit from high reimbursement for outpatient surgical procedures (Johna, 2024; Sachverständigenrat, 2024; Wangler & Jansky, 2024).

Greece sees only 6% of medical graduates choosing general medicine compared to the EU average of 26% (Ministry of Health Greece, 2023e, 2024d), a proportion that continues declining despite desperate need. This reflects multiple factors: income differentials favouring specialists, with specialists earning 2-3 times primary care incomes; limited career development opportunities in primary care; high administrative burden in general practice consuming up to 40% of working time; and lower prestige associated with prevention compared to acute care specialties.

Spain has implemented substantial annual salary increases for family medicine residents to improve the specialty's attractiveness, yet struggles to fill primary care positions (Bernal-Delgado et al., 2024). Medical students sometimes perceive primary care as providing fewer opportunities for professional fulfilment and the use of advanced clinical skills compared to other specialties. The overwhelming workload and time pressure in primary care deter graduates who observe burned-out mentors struggling with unsustainable patient loads.

France faces similar challenges despite introducing medical assistant positions to handle administrative tasks and care coordination. These assistants, prioritised for deployment in underserved areas, aim to free physician time for clinical care.

Training and competency development

Whilst countries maintain robust systems for general medical education that include chronic disease topics, the evidence suggests that preparation for comprehensive, integrated NCD management remains insufficient across studied health systems. Medical curricula typically address individual diseases but may not adequately prepare graduates for managing multimorbidity, prevention, and the psychosocial aspects of chronic care.

Gaps in NCD-focused training

Greece operates without national standards for how chronic disease management competencies should be integrated within medical curricula, leaving individual institutions to determine the depth and breadth of chronic disease training. The lack of any national policy focusing on training healthcare staff in the prevention, diagnosis and management of NCDs leads to inconsistent quality of care between regions, inadequate primary-care led services and increased pressure on hospitals. This compromises the health system's ability to tackle the growing burden of NCDs, and results in rising long-terms costs to the health system.

Poland's National Health Programme 2021–2025 prioritises health workforce planning based on NCD trends, stressing improved competencies in cardiovascular disease, diabetes, and cancer prevention. Postgraduate and continuing education in these areas is available through medical universities, professional chambers, and the Centre for Postgraduate Medical Education. However, regional disparities and limited funding often restrict access to these programmes.

The report from France suggests that while chronic disease management is incorporated within medical curricula, there may be insufficient focus on integrated management of multimorbidity. Communication skills, behaviour change counselling, and patient activation, which are essential for chronic disease management, receive less emphasis compared to diagnostic and procedural training.

The report from Japan describes how medical education maintains traditional emphases on acute care and technical excellence, with more limited focus on prevention, health promotion, and integrated chronic disease management compared to what the ageing population requires. Geriatrics and palliative care remain marginal in curricula despite the ageing population. Educational approaches to training would benefit from incorporating interdisciplinary collaboration, care coordination, or the social determinants which are inherently linked to NCD outcomes.

Task-shifting potential and barriers

Task-shifting represents one of the most promising yet underutilised strategies for addressing workforce constraints, enabling non-physician providers to deliver services traditionally restricted to doctors. However, implementation faces substantial professional, regulatory, and practical barriers.

In Canada, pharmacist prescribing authority has been expanded for minor ailments, particularly in Ontario and British Columbia, but the scope is limited, with few conditions relevant to NCDs (e.g., GERD, uncomplicated UTIs) (BC Ministry of Health, 2025; Ontario College of Pharmacists, n.d.). This highlights the challenge of extending task-shifting to chronic disease management, where clinical complexity is higher. Pharmacists themselves have noted that their training in medication management and chronic disease care is underutilised, yet regulatory restrictions and fee-for-service payment models limit their role (CIHI, 2023). Pilot programmes, including pharmacist-led diabetes management initiatives, have demonstrated outcomes equivalent to physician care, but

scaling remains slow due to inconsistent provincial regulation and resistance from some medical associations (Diabetes Canada, 2023; Lavergne et al., 2018).

Japan's initiative for "specified acts" training enables nurses to expand their scope of practice, potentially addressing workforce shortages through task-shifting (MHLW, 2024j). However, nurses report being unable to find colleagues to cover their regular duties during training periods, and workplace infrastructure often lacks protocols for utilising new skills after training completion. Without organisational support and clear role definitions, the initiative may not translate into an effective expansion of nursing roles and practices.

Germany has expanded the role of medical assistants (MFAs) through advanced training, enabling them to conduct home visits and take on delegated tasks such as spirometry, long-term ECGs, blood sampling, and selected cancer screening activities (KBV & GKV-Spitzenverband, 2015). Practices that employ certified MFAs receive supplementary reimbursement, creating incentives for task delegation in outpatient care and to overcome professional protectionism (KBV, 2023b; Mangiapane et al., 2022).

Poland has introduced regulatory frameworks for 15 medical professions including new roles such as prevention specialists, health promoters, and care coordinators. These roles aim to fill gaps in the current workforce, particularly in prevention and chronic disease management. However, educational programmes for these new professions remain underdeveloped, and integration into existing teams faces resistance from established professions protecting traditional boundaries.

Geographic disparities in training

Geographic disparities in training opportunities mirror and perpetuate workforce maldistribution. Japan's concentration of training infrastructure demonstrates this challenge starkly: Tokyo has 39 training facilities whilst most other prefectures have only 1-2, forcing healthcare workers from underserved areas to travel for professional development and further depleting local workforce capacity during training periods (MHLW, 2023d).

This geographic concentration of educational resources creates self-reinforcing cycles where areas with the greatest training needs have the least access to training opportunities. Rural practitioners miss advances in NCD management, perpetuating quality disparities. Given the lack of training opportunities, young professionals may avoid rural areas and other underserved regions. The concentration of academic medical centres in cities means that new care models and innovations rarely reach rural areas where needs may be greatest.

Canada's distributed medical education model attempts to address this through regional campuses and rural training sites (Health Canada, 2025; CIHI, n.d.). Evidence shows that students who complete rural rotations are more likely to practise in rural areas, though the overall supply of rural practitioners remains insufficient to meet population needs (Health Canada, 2025; CIHI, n.d.). The quality of rural training sites varies, with some offering excellent community-based experience whilst others struggle to provide adequate supervision and case variety.

Strategies for workforce development

Countries have introduced various targeted responses to address workforce imbalances, though most remain limited in scope and impact relative to the scale of challenges identified.

Educational reforms and capacity expansion

Germany's "rural doctor quotas" (Landarztquote) have been introduced in 11 of 16 federal states, reserving a portion of medical school places for applicants who commit to working as general practitioners in underserved rural areas for at least 10 years (Rottschäfer, 2024). In return, students

gain admission without meeting the usual highly competitive entry thresholds. This approach seeks to create a targeted pipeline to address rural workforce shortages. Some federal states also provide scholarships and stipends to medical students who specialise in general medicine or complete rural internships (KBV, 2025).

Poland's dramatic 92.3% increase in medical school admissions represents the most aggressive expansion documented, accompanied by introduction of new professional categories to extend workforce capacity (Kupis et al., 2024). However, rapid expansion strains educational infrastructure, with concerns about maintaining quality. Clinical training sites struggle to accommodate increased student numbers, potentially compromising practical experience essential for competent practice.

Spain has invested in developing projections of need for NCD-related professionals through its Report on Supply and Demand of Medical Specialists 2021–2035 (Barber Pérez & González López-Valcárcel, 2022). This systematic assessment provides vital data for workforce planning, projecting shortages of 4,000 family physicians by 2035 unless current trends reverse. The report influences medical school admissions and residency positions, though implementation faces regional variations and professional resistance.

Since 2008, Japan implemented regional quotas on medical school admissions which have generated approximately 3,500-4,000 new physicians annually nationwide (MHLW, 2022c).

Financial incentives and support systems

Financial incentives aimed at retention and redistribution show mixed results across countries. A notable example is the autonomous community of Catalonia in Spain, which offers substantial annual salary increases for family medicine residents aim to improve the specialty's attractiveness. Early evidence suggests modest increases in applicants, though whether these translate into sustained primary care careers remains uncertain. Income guarantees for rural practice provide security but may not overcome lifestyle concerns.

France has created medical assistant positions prioritised for deployment in underserved areas to maximise physician productivity. These assistants handle administrative tasks, basic clinical procedures, and care coordination, potentially increasing physician capacity .

Italy's Ministerial Decree 77 establishes new territorial care models with infrastructure and support to make primary care practice more sustainable. Under DM77 multidisciplinary community health centres will be established, acting as a single point of access for citizens, strengthening the role of primary care physicians and facilitating integrated care.

Canada offers financial incentives for rural practice, including signing bonuses, income guarantees, and loan forgiveness programmes (Health Canada, 2025b). These measures are designed to attract physicians to underserved communities and help address persistent gaps in access to care. While such incentives contribute to recruitment, questions remain about their effectiveness in ensuring longer-term retention, raising concerns about the sustainability and overall value of these investments.

POLICY LEVERS: WORKFORCE CAPACITY AND DEVELOPMENT

The evidence from all studied countries points to a fundamental sustainability crisis that current supply-side approaches cannot resolve. Despite varied interventions, from Germany's rural quotas to Poland's dramatic admission increases to Canada's financial incentives, no country demonstrates a pathway to meeting projected NCD care demands through workforce expansion alone. Whilst task-shifting initiatives like Germany's MFAs and Japan's specified acts training show promise for increasing effective workforce capacity, they remain limited in scope and face implementation barriers.

Equally concerning is that no country reports systematic demand-side efforts to enable patient self-management at scale, which could help reduce pressure on the healthcare workforce. This absence is particularly striking given that most NCD management occurs outside clinical encounters. Patients making daily decisions about medication, diet, exercise, and symptom monitoring, yet health systems invest minimally in supporting these capabilities. Digital health tools have potential to promote patient self-management, but require integration into care models and payment systems to promote their implementation by healthcare staff that current structures resist.

Based on the evidence examined, countries should consider the following approaches:

■ Develop comprehensive workforce planning models linked to NCD burden projections

Countries need long-term workforce strategies that genuinely reflect future population health needs rather than perpetuating historical patterns. This requires modelling demographic transitions and disease trends whilst considering how new care models and prevention investments might reduce traditional workforce demands. Such planning must integrate all health professions rather than treating each in isolation, with continuous monitoring systems that track whether workforce development aligns with evolving population needs.

■ Implement multi-component policies to address geographic and specialty maldistribution

Countries should create compelling reasons for practice in underserved areas through combinations of financial incentives, career development opportunities, and infrastructure support that makes rural practice genuinely attractive. This might include service obligations for publicly-funded education, rotational models that maintain urban connections, or regulatory approaches that limit further concentration in oversupplied areas.

■ Expand professional roles and scopes of practice to optimise skill-mix and promote evidence-based task shifting

Meeting growing NCD demands requires mobilising the full potential of all health professions. This means creating new roles specifically designed for chronic disease prevention and management whilst enabling existing professions to work at the full extent of their capabilities. Pharmacists and nurses, for instance, could manage stable chronic conditions within appropriate frameworks, but this requires aligned regulatory, legal, and payment systems that support rather than obstruct such practice changes, as well as a supportive professional culture.

■ Reform professional education with mandatory NCD competencies

Health professional education must shift from its traditional acute care focus to prepare graduates for the reality of chronic disease management. This means embedding prevention, behaviour change, and multimorbidity management throughout curricula whilst ensuring different professions learn to work together through interprofessional education. Digital health capabilities should become core competencies, with continuing professional development ensuring these skills remain current throughout careers.

■ Create sustainable career pathways that value prevention and primary care

The persistent shortage of primary care and prevention specialists reflects systemic undervaluation of these fields. Creating sustainable careers requires addressing income disparities with specialists whilst providing intellectual stimulation through research opportunities and academic positions. Infrastructure support that reduces administrative burden is essential, as is ensuring prevention activities are properly resourced within job plans rather than squeezed into already overwhelming workloads.

- **Invest in systematic demand reduction through prevention and self-management:**

Rather than assuming endless workforce expansion can meet growing NCD demands, countries must systematically reduce demand through effective prevention and supported self-management. This means developing evidence-based programmes that genuinely enable patients to manage their conditions whilst measuring the workforce time saved to justify continued investment. Group consultations, peer support, and validated digital tools can support patient self-management, but require careful implementation to avoid simply shifting burden to patients and digital exclusion, particularly those already facing disadvantage.

9 Medicines and technologies

Modern NCD management increasingly depends on sophisticated diagnostics, innovative therapeutics, and digital health technologies that enable precision medicine and remote care. Access to these innovations can dramatically alter disease trajectories: targeted cancer therapies, continuous glucose monitoring, advanced imaging, and AI-assisted diagnosis offer unprecedented opportunities for early intervention and personalised treatment. Yet the pathway from innovation to patient access remains complex and inequitable.

This chapter examines how health systems adopt and deploy technologies for NCDs, covering diagnostic infrastructure, pharmaceutical access and reimbursement, digital health implementation, and research capacity. It analyses both physical technologies and digital innovations, established interventions and emerging capabilities, and the persistent challenge of ensuring equitable access to innovations that could transform NCD outcomes.

Access to diagnostics

The importance of medical imaging infrastructure for NCD management has gained international recognition, as reflected in the World Health Assembly's 2025 resolution on strengthening medical imaging capacity (WHO, 2025h). The resolution emphasises that medical imaging is vital for diagnosis and treatment of numerous non-communicable diseases, and highlights the need to improve equitable access to safe and effective medical imaging globally, particularly for early detection, diagnosis, treatment, and monitoring of NCDs. However, access patterns reveal systematic disparities both between and within countries.

Greece's position as 5th among OECD countries for imaging equipment availability (CT, MRI, and PET scanners per capita) (OECD, 2023a and Italy's above-OECD-average diagnostic capacity demonstrates substantial capital investment in diagnostic infrastructure. However, the translation of this diagnostic capacity into improved patient outcomes remains uncertain, as equipment availability alone does not ensure appropriate utilisation, timely access, or integration with treatment pathways.

Geographic disparities in diagnostic technology access compound national challenges. Japan shows three-fold variations in imaging equipment availability between prefectures, with rural areas systematically lacking access to advanced diagnostics (MHLW, 2016). These substantial disparities in access to services forces patients to travel to urban centres for diagnostic procedures. This geographic inequality creates cascading delays through the care pathway, as initial diagnosis, staging, and treatment monitoring all require separate long-distance journeys.

Poland's concentration of MRI and CT scanners in major urban centres leaves most rural populations underserved. The concentration in Warsaw, Kraków, and Gdańsk creates a diagnostic desert in rural voivodeships, where patients may wait months for imaging that would be available within days in urban centres.

Equipment ageing and renewal present growing challenges that threaten to erode current diagnostic capacity. Italy reports that 37.3% of its diagnostic equipment exceeds 10 years in age, including 74% of gamma cameras and 44% of MRI units, raising concerns about reliability, image quality, and maintenance costs. Older equipment produces lower quality images that may miss early-stage disease, requires more frequent maintenance causing service interruptions, and consumes more

energy and resources. A lack of innovative financing mechanisms, such as service contracts, leasing agreements, or impact bonds for equipment and technology in Spain, has stifled diagnostic capacity in hospitals (Bernal-Delgado et al., 2024). Without sustained investment in renewal and upgrade programmes, current diagnostic advantages may disappear as equipment becomes obsolete.

Precision diagnostics and molecular testing

Precision diagnostics and molecular testing represent critical gaps in NCD care infrastructure, with access patterns revealing systematic inequities in who benefits from personalised medicine approaches.

Japan restricts insurance coverage for cancer gene panel testing to patients with advanced solid tumours who have exhausted standard treatment options, resulting in missed therapeutic opportunities when actionable mutations are identified too late for effective intervention (HGPI, 2023). This restriction reflects both cost concerns and capacity limitations, as the country has only a limited number of centres capable of performing and interpreting comprehensive genomic profiling. The policy of restricting access until standard treatments fail means that patients who might benefit from targeted therapies as first-line treatment never receive appropriate testing.

Canada has established molecular imaging Centers of Excellence, including the country's first centre at St. Joseph's Health Care in Ontario, featuring next-generation PET-CT scanners and integrated radiochemistry labs for personalised cancer treatment (St Joseph's Health Care London, n.d.). Access to such advanced diagnostics remains uneven across provinces, however, with high-end technologies concentrated in major centres while other regions lack comparable molecular imaging capacity.

Italy lacks systematic reimbursement for precision diagnostics in oncology despite their proven value in guiding treatment selection. Biomarker testing that could identify patients likely to respond to specific therapies remains unavailable to many in certain contexts, forcing oncologists to use trial-and-error approaches that delay effective treatment and expose patients to unnecessary toxicity. Some regions have developed local solutions, but the absence of national policy creates a postcode lottery for precision medicine access.

Spain's molecular testing capabilities are primarily located in major centres like Vall d'Hebron in Barcelona and 12 de Octubre Hospital in Madrid. As a result, patients from other regions may need to travel longer distances or wait longer for comprehensive genomic profiling compared to those in these main centres. The need for advanced equipment and specialised bioinformatics expertise means resources and services are often focused on these central locations, which can compound barriers in access for other areas.

Greece's approach to biomarker testing reveals another dimension of access inequality. Rather than systematic coverage, critical tests determining cancer treatment pathways are provided ad hoc through grants from patient associations, scientific societies, and pharmaceutical companies. This creates an inherently unstable system where access depends on charitable funding rather than clinical need, with testing availability varying unpredictably based on grant cycles and donor priorities.

Access to medicines

Despite evidence pointing to the crucial role that medicines have played in increasing longevity, research across countries demonstrates how access to innovative medicines reveals systemic dysfunctions in how health systems evaluate and adopt innovations, with lengthy delays between scientific advance and patient access.

Japan's experience illustrates that whilst achieving remarkably efficient drug approval timelines averaging 73 days from approval to reimbursement compared to 120 days in Germany, and 527 days in France, 72.4% of medications approved in the US and Europe remained unavailable to Japanese patients between 2016–2020 (Yoshida, 2022; Bujar & McAuslane, 2020). Moreover, the number of unapproved anticancer drugs doubled, from 21 to 44, during this period, directly limiting cancer treatment options (Yoshida et al., 2022).

This stems from Japan's stringent regulatory requirements for Japan-specific clinical data, aggressive price reduction policies including annual revisions since 2021, and market expansion re-evaluation mechanisms that reduce predictability for pharmaceutical companies, effectively deterring them from launching products despite fast reimbursement processes once submitted. The requirement for Japanese clinical trials adds years and millions in costs, whilst the certainty of price reductions undermines business cases for market entry.

Greece experiences extreme delays, with over 600 days from regulatory approval to formal public reimbursement for new cancer medicines (Hofmarcher et al., 2024), despite achieving over 75% reimbursement coverage for oncology precision medicines once they become available. These delays mean that Greek patients may wait nearly two years to access treatments already standard in other European countries, during which time disease progression may eliminate treatment options.

Spain reports below-average access to innovative oncology medicines compared to other EU countries, with additional waiting times of 5–17 months varying by region for the same medications. Even after national approval, regional budget processes and local formulary decisions create additional delays. Patients in Madrid may access innovative therapies months before those in Extremadura, creating inequality within a supposedly universal system (Muñoz-Sanjuan & Arce-Martínez, 2007).

Canada demonstrates how multi-layered approval processes compound delays, with an average of 29.8 months from regulatory approval to public formulary listing for all new drugs, nearly half of which is attributable to late manufacturer submissions (Gaudette et al., 2025). Fragmented funding models further create inequities between oral and intravenous medications, as take-home cancer drugs are often excluded from public cancer agency budgets, leaving patients to rely on hospital-based therapies despite the advantages of oral alternatives (Glennie et al., 2023; PDCI Market Access, 2021; Pott et al., 2025).

These alarming trends illustrating deteriorating access to innovative medicines are a cause of concern in most countries examined. Fast and concerted action to remove market barriers for access to novel effective technologies is crucial to safeguarding improvements in patient outcomes and economic growth.

Innovative funding mechanisms

Despite these challenges, some countries have developed innovative mechanisms to improve access to high-value therapies, demonstrating that creative financing can accelerate patient access whilst managing budget impact.

Italy established dual Innovative Drugs Funds with €500 million each for oncology and non-oncology medications, providing dedicated resources for breakthrough therapies. Currently, 37 products (47 indications) are designated as therapeutic innovations, with 95% targeting NCDs (Agenzia italiana del farmaco, 2025). This ring-fenced funding removes innovative therapies from regular budget competition, ensuring that breakthrough treatments reach patients without displacing existing services. The fund operates through performance-based agreements, with companies refunding costs for patients who do not respond, sharing financial risk between payers and manufacturers.

France implemented a 'direct access' pilot scheme (2023–25) allowing temporary reimbursement immediately following favourable HAS opinion for medicines with major therapeutic benefit, bridging the gap between regulatory approval and price negotiations. This approach recognises that price negotiations, whilst necessary for sustainability, should not delay access to transformative therapies. Early evidence suggests the scheme reduces access delays by 6–12 months for qualifying medicines.

Germany's early benefit assessment (AMNOG) process, whilst creating initial delays, provides structured pathways for innovative medicines with additional benefit. Medicines demonstrating superiority over existing treatments receive premium pricing, creating incentives for genuine innovation rather than marginal modifications. The transparent process provides predictability that encourages launch despite the assessment requirements.

Digital health implementation

Digital transformation of health systems offers unprecedented opportunities for improving NCD prevention and management, yet implementation reveals fundamental challenges in governance, interoperability, and equity.

Electronic health record adoption

Countries have achieved substantial progress in electronic medical record adoption, with Greece reporting 100% of primary care practices using EMR (OECD, 2023a) complemented by integrated patient mobile applications enabling access to health information. Spain achieved 99% primary care EHR adoption by 2021, demonstrating that comprehensive digitisation of clinical documentation is achievable even in diverse regional systems (OECD, 2023a).

However, these impressive adoption statistics are often hampered by interoperability challenges that results in limited digital infrastructure and coordinated care. Despite claims of full EHR interoperability, only 8 of Spain's 17 autonomous regions effectively share medical data (UOC, 2022). Italy faces similar fragmentation, with regional systems unable to exchange information between primary and secondary care providers, forcing patients to carry paper documents between providers despite universal EMR adoption. The absence of unique patient identifiers across regions means that the same patient may have multiple unlinked records, preventing comprehensive views of medical history. Canada exemplifies this interoperability challenge with 95% of physicians now using EMRs, yet only 1 in 3 sharing patient information electronically outside their practice (CIHI, 2024). Provincial access to EHRs also varies dramatically, ranging from 60% in Saskatchewan to just 14% in Manitoba and Newfoundland and Labrador (CIHI, 2024).

Japan's ambitious Medical DX Reiwa Vision 2030 outlines plans for nationwide healthcare information platforms, standardised EMRs across all institutions by 2030, and unified medical remuneration calculation programmes to reduce administrative burden (MHLW, 2023d). The vision recognises that technical standards alone are insufficient: success requires governance structures, change management, and alignment of incentives.

Germany's experience shows how progress in digital health implementation can stall. Gematik, established in 2005 to oversee national digital infrastructure, took 18 years to implement the electronic patient record (ePA), largely due to prolonged disputes among stakeholders over data governance, privacy, professional autonomy, and technical standards (BMG, 2019).

In 2018, Germany ranked second to last among 17 countries in a Digital Health Index evaluation, reflecting the slow pace of digitalisation. After years of limited uptake under an opt-in approach, the nationwide rollout of the ePA in April 2025 adopted an opt-out model, with only about 5% of patients declining participation (AOK, 2025). This outcome suggests that while privacy concerns had often been cited as a barrier, structural and organisational challenges played a greater role in constraining adoption.

France's Health Data Hub controversy illustrates different governance challenges. The platform, designed as a centralised resource for health data, has faced legal, political and technical difficulties since its inception in 2019, including numerous legal challenges over data sovereignty when using non-European cloud providers and long delays in researchers being granted access to the resource.

Digital therapeutics, devices and AI applications

Despite implementation challenges, several countries have pioneered innovative digital health applications that demonstrate potential for transforming NCD care.

Germany was the first country to introduce statutory reimbursement for digital therapeutics through its Digital Health Applications (DiGA) framework. DiGAs are class I–IIb medical products that must comply with technical and accessibility standards and demonstrate clinical benefit. By 2024, 44 DiGAs were permanently listed, 15 were in the testing phase and 10 had been removed for insufficient evidence (GKV-Spitzenverband, 2025a). Total spending reached around €110 million in 2024, covering 423,000 prescriptions, with prices of up to €2,077 for a 90-day period. DiGAs address conditions ranging from diabetes to depression, and new developments allow data transmission to the electronic patient record (ePA). Plans to link DiGAs with disease management programmes (DMPs) may further strengthen their role in structured NCD care.

At the same time, concerns remain about their effectiveness and integration into the health system. Although randomised controlled trials are often used as supporting evidence, they are not mandatory, and existing evaluations reveal a risk of bias, with many studies small in scale and limited in duration (Kolominsky-Rabas et al., 2022). Their design as standalone therapeutics may reduce pressure on the workforce but leaves limited scope for integration into existing care pathways or for tailoring to individual patient needs. Physicians also report uncertainty about when and how to prescribe DiGAs and how best to monitor their use. Finally, the relatively high costs raise questions about cost-effectiveness given the current evidence base (Kolominsky-Rabas et al., 2022).

Spain has developed multiple clinical AI applications including the ALMA project for haematological disease diagnosis using machine learning algorithms, DxGPT in Madrid for rare disease identification leveraging large language models trained on clinical literature, and Andalusia's automated medical record analysis system for early detection through pattern recognition. These applications demonstrate AI's potential to enhance diagnostic accuracy and efficiency, particularly for complex or rare conditions where expertise is limited.

The digital divide

The populations most affected by NCDs, namely older adults with multiple chronic conditions, face systematic barriers to digital health adoption that threaten to exclude them from potential benefits.

In Japan, 50.9% of citizens over 70 do not use smartphones or tablets, effectively excluding them from mobile health applications and digital services (Cabinet Office Japan, 2023a). Similarly, the report on Spain cites a study that found that 78% of chronic patients over 70 lack autonomy with digital tools, requiring assistance for basic functions like accessing test results or booking appointments (Plataforma de Organizaciones de Pacientes, 2023).

Digital exclusion is not simply about device ownership: many older adults own devices but lack confidence or skills to use health applications. Interface designs that assume digital fluency, small text requiring good vision, and complex navigation patterns create barriers that technical training alone cannot overcome. A dependence on others for digital access undermines privacy and autonomy, core principles of patient-centred care. Family members managing digital access for elderly relatives may filter information or make decisions without full patient involvement.

Rural populations face infrastructure barriers beyond individual digital literacy, for example unstable internet connections, which raise questions about clinical safety when digital systems fail. Even where infrastructure exists, the cost of devices and data plans may exceed limited budgets.

The Spain report finds that the concept of digital inclusion is not yet fully integrated into health policies, highlighting that the European Commission has repeatedly warned that Spain needs to strengthen its digital inclusion programmes, especially for vulnerable, rural, and aging populations (European Commission, 2022), a finding echoed in several of the country reports.

Research and innovation capacity

Countries continue investing in research infrastructure whilst losing competitive position in global innovation networks, revealing structural challenges that financial investment alone cannot overcome.

Declining research competitiveness

Japan's clinical trial ranking dropped precipitously from 4th to 14th globally over the past decade, with pharmaceutical companies' global market share eroding relative to the USA and China (WHO GOHRD, 2024). This decline reflects structural factors beyond funding: slow healthcare digitalisation limits real-world evidence generation capabilities essential for modern drug development; linguistic barriers constrain participation in international trials and collaboration networks; bureaucratic approval processes delay study initiation by months, making Japan unattractive for time-sensitive trials. Creating unified governance would reduce redundancy, improve data quality, and accelerate evidence generation for both domestic and global therapeutic development.

Spain maintains the 5th position globally with approximately 30,000 clinical trials conducted between 1999–2024, demonstrating substantial research infrastructure and scientific capability (WHO GOHRD, 2024). Yet this ranking masks deteriorating competitiveness: bureaucratic clinical trial approval processes significantly delay study initiation and increase costs compared to competing countries. Technology transfer offices struggle to bridge the gap between academic research and commercial development, with innovations often failing to progress beyond publication.

Germany, despite hosting eight German Centres for Health Research dedicated to major NCD areas (including cancer, cardiovascular, diabetes, and lung diseases), has seen a relative decline in commercial clinical trial activity over the past decade, attributed to administrative delays, complex approval processes, and restrictive data protection rules (NIH, 2025; Nimptsch & Mansky, 2017; vfa, 2024). The 2024 Medical Research Act was adopted to accelerate trial approvals, introduce binding model contracts, and streamline regulatory oversight (BMG, 2023b). Unlike Scandinavian countries where unique identifiers enable dataset linkage, Germany prohibits cross-dataset identifiers, limiting secondary health data use. While the new Health Research Data Centre (FDZ Gesundheit) will consolidate statutory insurer billing data for research, health datasets largely remain siloed and difficult to access (Bundesinstitut für Arzneimittel und Medizinprodukte, 2025).

Investment gaps and structural barriers

These investments pale in comparison to leading research nations. The United States National Institutes of Health alone invests over $48 billion annually in medical research, more than 100 times Italy's total commitment. Even adjusting for population and GDP differences, European investments remain fractional compared to global leaders. This funding gap reflects a fundamental challenge: countries recognise that domestic innovation capacity enables both economic development through life sciences sectors and health system advancement through locally-relevant research, yet commit resources insufficient to maintain competitive position.

Greece increased pharmaceutical R&D investment offsets from €150 million to €200 million, providing incentives for companies to invest in local research capacity (Government Gazette, 2024d). Italy committed €324 million for 311 research initiatives by 2025, supplemented by €8.7 million from the €95.5 million Joint Action Prevent NCD project (JA PreventNCD, 2024). However, these investments, whilst significant nationally, are marginal in global terms. A single large pharmaceutical company may invest more in R&D annually than entire countries, creating dependencies on commercial priorities that may not align with population health needs.

Canada faces clinical trial infrastructure challenges, with insufficient core funding forcing units to operate on cost-recovery basis and rely heavily on industry sponsorship, often prioritising commercially drive trials interests over investigator-led or academically valuable studies (Bentley et al., 2020). Patient recruitment is further hampered by the Government of Canada's Clinical Trials Database, which uses technical language inaccessible to the public and poses barriers for rural and Indigenous communities with limited internet access (Government of Canada, n.d.). Multi-site studies are additionally delayed by fragmented provincial systems, where redundant ethics reviews and regulatory requirements complicate coordination (Canadian Institutes of Health Research, n.d.).

POLICY LEVERS: MEDICINES AND TECHNOLOGIES

Access to innovative NCD medicines and technologies reveals systematic delays and inequities that undermine early intervention potential. Delays exceeding 600 days from approval to reimbursement, three-fold regional variations in diagnostic equipment, and molecular testing restricted to late-stage disease create barriers throughout the care pathway. Digital health adoption statistics mask fundamental interoperability failures that prevent care coordination. The evidence of countries losing competitive position in clinical trials despite strong infrastructure suggests structural barriers that investment alone cannot overcome. Without addressing these access delays, infrastructure gaps, and digital fragmentation, advances in precision medicine and digital therapeutics cannot benefit the populations who need them most.

Based on the evidence examined, countries should consider the following approaches:

■ Reduce market barriers to accelerate access to high-value innovations

Reform approval and reimbursement pathways to reduce lengthy delays between regulatory approval and patient access, which can exceed 600 days in some countries. This requires fast-track processes for breakthrough NCD therapies with clear timelines, early access programmes that bridge regulatory and reimbursement decisions, and dedicated innovation funds providing temporary coverage during price negotiations. Consider risk-sharing agreements for expensive therapies with uncertain benefits to balance access with sustainability, and to monitor for potential adverse events and safety concerns.

■ Invest in diagnostic infrastructure and sustainable renewal programmes to ensure equitable access

Address regional disparities in availability of imaging equipment. This requires minimum standards for technology availability, systematic equipment replacement programmes with dedicated funding protected from operational budgets, mobile diagnostic units for underserved areas, and hub-and-spoke models linking rural to urban facilities. Expand coverage for molecular testing and precision diagnostics when results influence treatment decisions, as current restrictions to late-stage disease miss opportunities for effective intervention.

Build interoperable digital health infrastructure with robust governance

Establish mandatory open interoperability standards that enable care coordination, addressing the current reality where countries with near-universal EMR adoption cannot share data between providers or regions. Create frameworks for health data secondary use that balance privacy protection with research needs, including provisions for trusted research environments and clear guidance on AI applications. Governance structures need authority to enforce standards and resolve the stakeholder disputes that have delayed progress in some countries for decades.

Reform clinical trial and innovation infrastructure

Address the barriers causing countries to lose competitive position in global research despite strong infrastructure. This includes unified ethics approval processes to replace fragmented regional systems, streamlined administrative requirements, and investment in clinical trial networks with sustainable funding. Develop real-world evidence capabilities leveraging electronic health records, and improve patient recruitment through accessible information rather than technical language that excludes participants.

Bridge the digital divide for older adults with NCDs

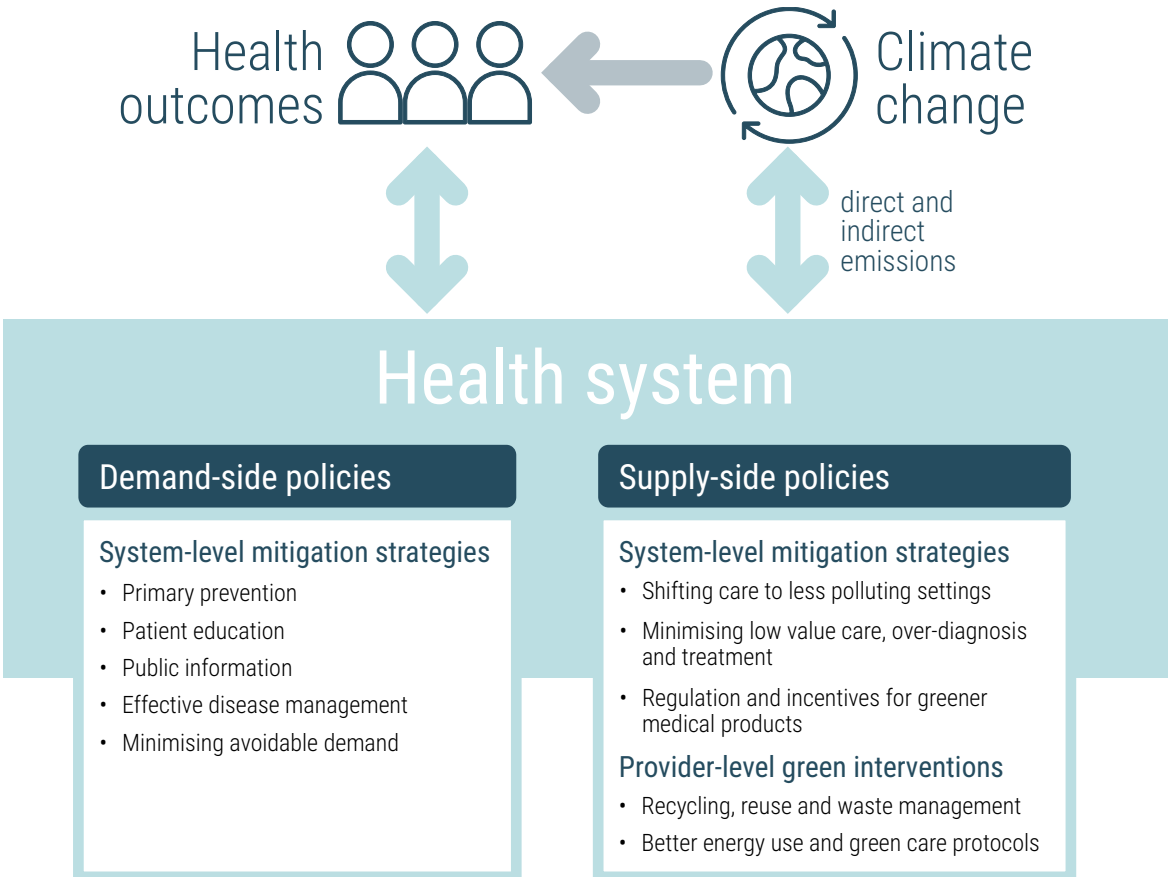
Ensure digital health solutions accommodate older adults, addressing evidence that half of citizens over 70 in some countries cannot use digital devices and most chronic patients over 70 lack autonomy with digital tools. This requires mandatory accessibility standards for health interfaces, support services including helplines and in-person assistance, and maintained non-digital alternatives to access healthcare. Digital literacy training should be integrated with chronic disease management programmes, recognising that the populations most affected by NCDs face systematic barriers to digital adoption.

10 Environmental sustainability

Climate change and environmental degradation increasingly shape NCD burden through heat stress, air pollution, extreme weather events, and disrupted food systems, whilst healthcare delivery itself carries a significant carbon footprint. This bidirectional relationship, with health systems contributing to environmental problems whilst managing their health consequences, creates new imperatives for sustainable, resilient care models.

Recent analysis provides a useful framework for understanding this challenge, as illustrated in Figure 19 (Or & Seppänen, 2024). Healthcare systems affect climate through both direct emissions (from facilities, transport, and medical gases) and indirect emissions (from energy generation and supply chains). Climate change, in turn, increases demand for NCD care through environmental health hazards. Interventions can target both supply-side changes (provider-level 'green interventions' like renewable energy and waste reduction) and demand-side policies (system-level strategies including prevention, care reorganisation, and reducing low-value care). The most effective approaches combine both dimensions, simultaneously reducing emissions while improving care quality and health outcomes.

Figure 19: Relationship between the healthcare system, climate change, and sustainability strategies and interventions

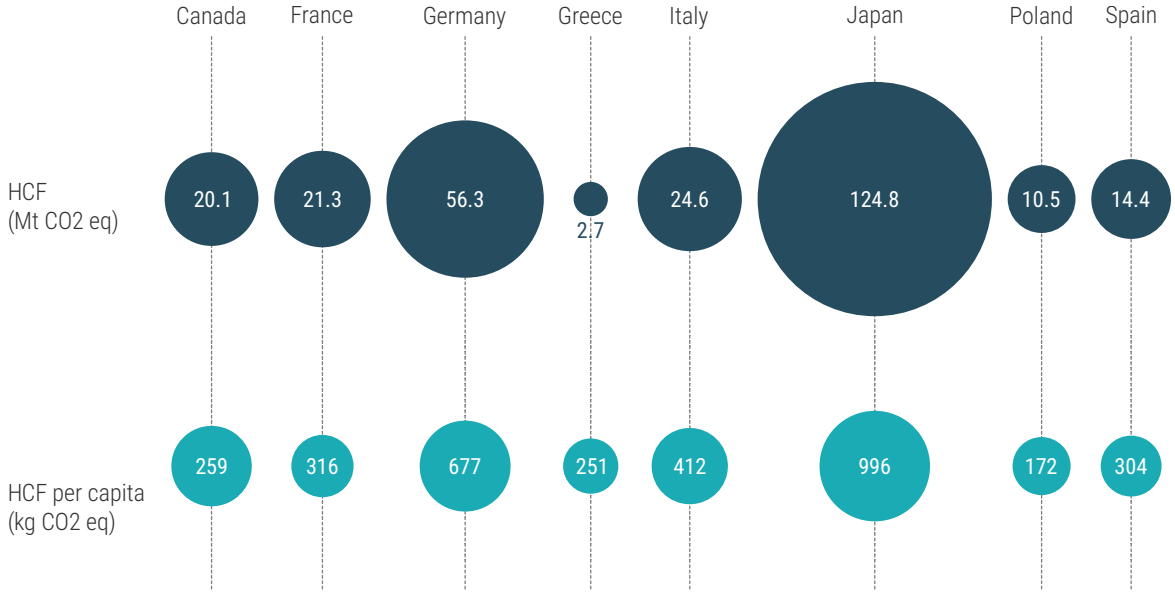


Source: Adapted from Or & Seppänen, 2024.

Healthcare's environmental footprint

Health systems across studied countries are beginning to recognise their substantial carbon footprint, though systematic measurement and management remain underdeveloped. Authoritative estimates reveal healthcare's carbon footprint ranges from 3.8% to 7.6% of national emissions across studied countries, with per capita emissions varying more than twofold, from 996 kg CO_2 equivalent in Japan to Greece to 172 kg in Poland (Romanello et al., 2024; Figure 20). These variations reflect fundamental differences in care delivery models, technology utilisation, and system efficiency rather than simply healthcare spending or quality.

Figure 20: Healthcare carbon footprints, total and per capita, 2022



Source: Romanello et al., 2024.

The higher emissions intensity in countries like Japan and Germany correlates with technology-intensive, hospital-centred care models (Quitmann et al., 2024; ExpertInnenrat Gesundheit & Resilienz, 2025), intensive resource use, and reliance on advanced medical technology.

By contrast, Southern European countries achieve lower emissions through greater reliance on community-based care and less intensive diagnostic technology use, though this may also reflect underinvestment in some areas. In Canada, hospital electricity consumption (~30%), pharmaceutical and medical device lifecycles (~25%), and environmental contamination from disposal together account for over half of healthcare emissions (Eckelman et al., 2018; Smith & Severn, 2023). However, the relative contributions vary with resource mixes.

This growing awareness has not yet translated into comprehensive measurement systems. Neither Greece nor Poland has developed frameworks for assessing the carbon footprint of specific diseases, treatments, or care pathways. Japan excludes healthcare from its otherwise comprehensive "Green Growth Strategy" for achieving carbon neutrality by 2050, despite the sector's substantial contribution to national emissions (Cabinet Secretariat et al., 2021). This exclusion reflects the perception that healthcare is too essential to constrain with environmental considerations, missing opportunities for efficiency improvements that could enhance rather than compromise care quality.

Policy frameworks

Several countries have developed sophisticated policy frameworks linking environmental and health objectives, demonstrating clear progress in recognising the interconnected nature of these challenges. Implementation remains uneven, but the foundations for systematic change are being established.

France's 2023 national roadmap for healthcare sustainability marks an important milestone as the country's first systematic approach to reducing the sector's environmental impact. The roadmap establishes policy goals for energy reduction, waste minimisation, and sustainable procurement practices, while the National Health Insurance Fund (CNAM) has integrated ecological transition as a strategic objective since 2024. These developments signal institutional commitment even as operational implementation varies across regions.

However, unless addressed, structural barriers may limit the impact of these positive developments. Admission-based healthcare reimbursement systems may inadvertently incentivise high-emission facility-based care over lower-emission community and home-based alternatives. While there is growing recognition that better health outcomes can significantly reduce healthcare's environmental footprint, for example, research shows that preventing CKD progression through guideline-directed care can halve the condition's CO_2 impact by avoiding years of resource-intensive dialysis (Zoccali et al., 2023), there are legitimate concerns about how to integrate these considerations without creating barriers to patient access.

While HTA bodies are considering including environmental considerations in HTA processes, there is currently no consensus on standardised methodologies for assessment of environmental footprint. Such policies must be approached with caution given the risk of further delaying or restricting access to needed care, and hence compromising health systems' capability to act early on disease, which as in the case of CKD, may itself have significant environmental benefits. Some jurisdictions are exploring approaches outside the core HTA process. For example, Germany's 2025 pharmaceutical rebate tender, launched by statutory health insurers TK, HEK, and hkk, operates as a procurement incentive offering bonus payments for certified environmentally friendly active ingredient production and compliance with wastewater limits in antibiotic manufacturing (Techniker Krankenkasse, 2025). The development of such policies must take into account whether incentives are better targeted at the corporate-level sustainability performance, rather than individual product level, for which there is a lack of standardised life cycle assessment frameworks and where patient outcomes remain of paramount importance.

Meanwhile, the development of comprehensive measurement systems that demonstrate how improved patient outcomes reduce environmental footprint through avoided disease progression, reduced hospitalisations, and less intensive treatments can help build the evidence base for future policy development. Professional training should also incorporate environmental sustainability, raising awareness amongst healthcare workers about opportunities to reduce environmental impact through better disease management and prevention, without compromising patient care or access.

Specific vulnerabilities of people with NCDs

People with NCDs face disproportionate climate risks through multiple pathways. Extreme heat exacerbates cardiovascular and respiratory conditions through dehydration, increased cardiac workload, and air pollution interactions. Patients with heart failure face particular risks as heat stress increases cardiac demand whilst dehydration from diuretics becomes dangerous. Respiratory patients struggle with heat-induced air quality deterioration, yet most heat plans provide generic rather than condition-specific guidance.

Where power infrastructure is unreliable, as in some of Greece's more remote island, this threatens medication storage and equipment operation. Power outages during extreme weather events

threaten patients dependent on refrigerated medications like insulin or powered medical devices for conditions like sleep apnoea. Yet few countries have protocols for ensuring medication security during outages or providing backup power for essential medical equipment.

Extreme weather events disrupt routine care for chronic conditions by preventing access to facilities, interrupting medication supplies, and displacing patients from their care networks. This leads to acute exacerbations of previously controlled conditions, creating surge demand precisely when health systems face weather-related disruptions.. It is thus vital that there are protocols in place for managing chronic diseases during environmental events, such as heatwaves or smog episodes.

Climate resilience and adaptation

Countries have made considerable advances in climate adaptation infrastructure and in understanding environmental health risks, particularly through early warning systems and comprehensive planning frameworks. These achievements provide important foundations for protecting populations from climate impacts.

Several countries have developed frameworks explicitly linking environmental risks to chronic disease. Italy's National System for Prevention of Health Risks (SNPS), launched in 2022, directly connects environmental and climate risks to chronic disease prevention through intervention models, capacity-building programmes, and strengthened surveillance systems. The country's Heat Health Watch Warning Systems enable 72-hour forecasts that allow healthcare facilities to prepare for increased demand and allow providers to proactively contact vulnerable patients (Ministry of Health Italy, 2023a, 2023c).

Spain's Strategic Plan for Health and Environment (PESMA) 2022–2026 addresses air quality, chemical exposures, and urban health impacts on NCDs, while its Health and Climate Observatory monitors environmental health indicators and provides early warning of climate-related health risks. Spain's heat warning system, operational since 2004 through its "National Plan for Preventive Actions Against Excessive Temperatures on Health", has achieved documented mortality reductions through timely interventions (Ministry of Health Spain, 2024b). The system triggers public health alerts and activates cooling centres.

Japan demonstrates innovation by combining its "Heatstroke Alert" system with housing thermal insulation subsidy programmes, recognising that effective adaptation requires action beyond healthcare facilities (Ministry of the Environment Japan, 2023; Tottori Prefecture, 2024.). The country's "Heat Illness Prevention Action Plan" aims to halve heatstroke fatalities by 2030 compared to 2022 levels through promoting awareness, conducting research and development, and implementing countermeasures for hot environments (Cabinet Office Japan, 2023b).

Germany's national approach similarly combines broad adaptation planning with health-specific strategies. The Federal Government's Climate Change Adaptation Strategy sets out 33 goals and 180 measures, including four under the "Human Health and Care" cluster (Bundesministerium für Umwelt, 2024). The Federal Ministry of Health's Heat Protection Plan builds on this framework with multi-level actions such as the systematic use and expansion of the German Weather Service's heat warning system, establishment of a national heat monitoring system by the Robert Koch Institute, and targeted protection of vulnerable groups.

Critical gaps in NCD-specific adaptation

Despite these advances, translation into NCD-specific protocols remains limited. Heat warnings rarely trigger modified care protocols for chronic disease patients, even though evidence shows cardiovascular medications require dosage adjustment during heat waves. Patients with heart failure face particular risks from the combination of heat stress and diuretic use, yet receive only generic heat advice rather than condition-specific guidance accounting for their particular

vulnerabilities. Coordination with chronic disease management remains weak, with NCD patients receiving generic heat advice rather than condition-specific guidance.

Poland exemplifies the gap between recognition and action: despite having functional weather alert systems and clear documentation of climate impacts on health, no mechanisms exist to translate meteorological warnings into adjusted clinical protocols for chronic disease management. Healthcare facilities continue operating standard procedures during heat waves rather than implementing evidence-based adaptations like adjusted medication dosing, enhanced monitoring of vulnerable patients, or modified appointment scheduling.

Germany's experience shows the same tension between ambitious national framework and local implementation. Responsibility for implementation largely lies with municipalities, many of which face resource constraints. By the end of 2024 only about 10% had developed formal adaptation strategies (Bundesregierung, 2024).

France's experience provides a sobering assessment of current adaptation capacity. Despite implementing comprehensive heat warning systems after the deadly 2003 heat wave that killed 15,000 people, the country experienced a 60% increase in heat-related deaths between 2000–04 and 2018–22 (Romanello et al., 2023). This increase, occurring despite improved warning systems and response protocols, suggests that current adaptation measures cannot keep pace with accelerating climate impacts. The health system's growing environmental footprint contributes to the very problem it struggles to address, creating a vicious cycle of climate impact and healthcare demand.

Infrastructure vulnerabilities pose additional challenges. Power outages threaten patients dependent on refrigerated medications like insulin or powered medical devices, with Greece's island populations facing particular risk from unreliable power infrastructure. It is essential for countries to develop protocols for medication security during outages and backup power provision for essential equipment. When extreme weather disrupts routine care, preventing facility access, interrupting medication supplies, or displacing patients, previously controlled conditions deteriorate precisely when systems face maximum stress.

Equity considerations: addressing differential impacts

Environmental health interventions show mixed results in addressing health inequities, with some initiatives successfully targeting vulnerable populations while others inadvertently widen disparities.

France's experience reveals how technically successful interventions can exacerbate inequalities: analysis shows air pollution control measures disproportionately benefit wealthier neighbourhoods, with clean air zones and green infrastructure concentrating in affluent areas while disadvantaged communities near industrial sites experience persistent exposure (Champalaune, 2020).

Canada demonstrates this challenge through significant adaptation gaps in rural, remote, and Indigenous communities, which face particular climate vulnerabilities but often lack formal adaptation plans and adequate cooling infrastructure (National Collaborating Centre for Environmental Health, 2025). These communities often experience the earliest and most severe climate impacts yet receive the least support for adaptation. Indigenous populations are especially affected by the loss of traditional food sources, which contributes both to nutritional transitions that increase NCD risk and to cultural disruption with adverse mental health effects (Public Health Agency of Canada, 2017).

This pattern, where populations with greater economic and political resources receive more environmental health protection, suggests that technical capacity alone cannot ensure equitable health outcomes. Environmental health interventions may inadvertently become another mechanism through which social advantage translates into health advantage.

Co-benefits: emerging recognition of aligned opportunities

Perhaps the most promising development is growing recognition that many interventions can simultaneously improve health outcomes and reduce environmental impact. While these co-benefits remain undervalued in formal decision-making, successful examples are multiplying and creating momentum for systematic change.

Prevention demonstrates the clearest co-benefits. Avoiding progression to end-stage renal disease eliminates years of resource-intensive dialysis. Community-based care models reduce emissions from both patient travel and facility operations while often achieving better outcomes than hospital-based alternatives. These dual benefits are beginning to influence policy discussions even if not yet formally incorporated into resource allocation decisions.

Digital transformation has delivered substantial if largely unintended environmental benefits. Canada's virtual care expansion avoided 1.2 billion kilometres of travel and 330,000 tonnes of CO_2 emissions in 2021 alone, equivalent to removing 72,000 cars from roads annually (Welk et al., 2022). While implemented primarily for access and convenience rather than environmental reasons, these results demonstrate the potential for technology-enabled care models to achieve multiple objectives simultaneously.

Yet such co-benefits typically remain unquantified and therefore unvalued in resource allocation decisions, perpetuating investment in high-emission care models even when lower-emission alternatives would improve both health outcomes and environmental sustainability.

ENVIRONMENTAL SUSTAINABILITY: POLICY LEVERS FOR ACTING EARLY ON NCDS

Healthcare system contributions to carbon emissions remain under-addressed in national policy. The absence of emissions measurement frameworks, exclusion of healthcare from climate strategies, and failure to value prevention's environmental co-benefits perpetuate high-emission care models. Climate adaptation efforts focus on acute events while ignoring specific NCD patient vulnerabilities: medication storage during power outages, adjusted protocols during heatwaves, and disrupted care continuity. Evidence that environmental health interventions disproportionately benefit affluent areas suggests climate responses may widen rather than narrow health inequities.

There must be genuine progress in addressing the environmental dimensions of healthcare. Without recognising the opportunities to improve both outcomes and environmental footprint in healthcare, health systems will increasingly struggle with the dual burden of contributing to and managing climate impacts.

■ Develop comprehensive emissions measurement systems across care pathways

Health systems need standardised methodologies for calculating emissions across the entire care continuum, from pharmaceutical and medical devices life-cycle assessment through service delivery to patient travel. These should demonstrate the impact that better patient outcomes can have on reducing the environmental footprint of healthcare, and support the case for care pathway improvement and treatment to guidelines. Better measurement tools will also allow industry to benchmark its progress in reducing the environmental impact of its products at-source via innovation.

■ Build climate-resilient care models for NCD populations

Healthcare systems need systematic assessment of climate vulnerabilities, particularly for NCD patients who face disproportionate risks from extreme weather. This includes developing adjusted clinical protocols for heat waves and other climate events, and ensuring medication security during power outages. Heat warning systems must also translate into modified care for chronic disease patients, for example by triggering advice to patients when extreme heat waves occur.

Quantify and value environmental co-benefits across NCD care

The environmental benefits of NCD interventions remain unquantified and therefore unvalued in resource allocation, despite evidence that many approaches reduce emissions while maintaining or improving outcomes. Countries should calculate emissions avoided through prevention programmes, access to guideline-based care, community-based care, and virtual consultations, incorporating these co-benefits into investment decisions. Success requires systematically pursuing co-benefits rather than managing assumed trade-offs.

Establish formal health-environment governance integration

Effective action requires formal mechanisms linking health and environmental agencies beyond current fragmented approaches. This includes joint planning for health and climate strategies, shared accountability frameworks, and coordinated response protocols for climate-related health events. While some countries have created observatories or strategic plans linking health and environment, deeper operational integration is needed to move from policy frameworks to implementation.

Address environmental health inequities in adaptation planning

Climate adaptation measures must explicitly address equity, as current approaches can disproportionately benefit populations with greater resources. Environmental health interventions, including air quality improvements and cooling infrastructure, should target vulnerable populations facing multiple disadvantages. Rural and remote communities often lack both formal adaptation plans and basic infrastructure despite facing particular climate vulnerabilities. Deliberate attention to benefit distribution is essential to prevent environmental health measures from widening existing health disparities.

PART IV

Conclusion

11 Acting early

Health systems have considerable knowledge about effective NCD intervention but face implementation challenges. Technical approaches exist, including validated screening programmes, evidence-based treatment pathways, and digital coordination platforms. The benefits manifest differently across prevention levels, with primary prevention strengthening economies through improved labour productivity even as people live longer and use more healthcare, while secondary and tertiary prevention generate direct healthcare savings.

Yet despite this extensive knowledge, translating evidence into practice remains profoundly uneven. This implementation gap between what we know works and what health systems actually deliver defines both the central challenge and the greatest opportunity for transformation. Health systems originally designed for acute, episodic care struggle to adapt to the continuous, coordinated management that chronic diseases require, with success varying dramatically both between and within countries.

This report has identified barriers that fragment and delay care at every stage of the pathway. Fragmented governance struggles to coordinate prevention across sectors. Payment systems that reward volume over outcomes leave little time for risk assessment or prevention counselling. Geographic disparities concentrate specialists and diagnostics in urban centres, while digital systems that cannot share data miss opportunities for proactive case-finding. These challenges affect populations living with NCDs already facing disadvantage most severely, as they often have least capacity to navigate fragmented systems or access concentrated resources.

The human and economic consequences of these delays are profound. Delayed diabetes diagnosis increases complication risk, with prevention opportunities often permanently lost. Cancer detected at later stages requires more intensive treatment, causes greater suffering, and has substantially worse outcomes than early-stage disease. Uncontrolled hypertension silently damages organs for years before causing strokes or heart failure that might have been entirely prevented. Beyond individual tragedies, the economic waste is significant: emergency admissions cost far more than structured management, while lost productivity from preventable disability creates substantial economic losses. These are not abstract future risks but current realities affecting millions across all eight countries studied.

Why common challenges persist

The persistence of these patterns across diverse health systems points to deeper structural forces. Two factors help explain why the mismatch between system design and chronic disease needs proves so resistant to change:

First, the temporal dynamics of NCDs differ from institutional planning horizons. The benefits of early intervention accrue over years or decades, while costs are immediate. Budget cycles operate annually and political cycles span 4–5 years, but preventing disease progression requires sustained investment over much longer timeframes. Prevention typically receives minimal budget allocation despite evidence of cost-effectiveness, and advanced diagnostics are often restricted to late-stage disease despite their potential value in guiding early treatment. Political and financial incentives favour visible, immediate responses over investments whose benefits materialise over longer timeframes.

Second, market forces and professional dynamics can reinforce structural misalignments. Across different health system models, healthcare workers often concentrate in urban centres where practice opportunities are greatest, diagnostic technologies cluster in wealthy regions, and incentives encourage a shift towards specialism and away from generalist medicine needed to manage patients living with MLTCs. These dynamics operate even within publicly-funded systems. The resulting disparities, with screening coverage varying substantially within countries and notable urban-rural gaps in specialist access, reflect how market forces can advantage those with greater resources.

The imperative for transformation

Continuing on current trajectories presents mounting challenges. Demographic changes guarantee increasing NCD prevalence. Healthcare spending that outpaces economic growth while outcomes plateau threatens sustainability. Workforce constraints make traditional responses of simply adding providers unfeasible. Environmental pressures, including healthcare's substantial carbon footprint, demand new approaches. Meanwhile, the development of innovative medicines and digital technologies offers unprecedented tools for improvement, though their potential remains constrained by outdated delivery structures.

The COVID-19 pandemic revealed both vulnerabilities and possibilities. Chronic disease management proved fragile under acute pressure, with widespread disruption to screening, diagnosis, and routine monitoring. Yet the crisis also demonstrated that rapid system transformation is possible when urgency demands it. Digital solutions previously stalled for years were implemented in weeks. Virtual care expanded from marginal experiment to mainstream delivery. These experiences proved that perceived barriers often reflect institutional inertia rather than genuine impossibility.

Breaking the cycle of inadequate NCD management requires fundamental restructuring. Care must shift from episodic interventions to continuous and integrated management with accountability for entire pathways. Information must flow seamlessly across providers, incorporating social determinants into risk assessment. Payment systems must reward outcomes and population health rather than service volume. Geographic and socioeconomic disparities cannot be accepted as inevitable but must be actively addressed through minimum standards and targeted investment. Prevention must move from rhetoric to reality through protected multi-year funding and health considerations embedded across all policy sectors.

The narrowing window

The opportunity for deliberate reform may be time-limited. Each year of delay compounds the challenge: more people develop preventable conditions, creating decades of future care needs; underinvestment in prevention increases disease burden; workforce trained in traditional models becomes harder to redirect; and health inequities become more entrenched. Countries that strengthen the entire care continuum, from primary prevention to improving early detection, reducing diagnostic delays, ensuring timely access to effective therapies, and managing established disease systematically, position themselves to manage future challenges. Those deferring action risk being overwhelmed by predictable but preventable disease burden.

The evidence is clear and the costs of inaction accumulate daily. For the millions living with NCDs and the millions more at risk, the difference between early action and delayed intervention determines quality of life, independence, and survival. The question is not whether health systems can afford to transform but whether they can afford not to. The choice made in this decade will determine whether NCDs remain an escalating crisis or become a manageable challenge. The path forward demands political courage, sustained commitment, and recognition that acting early is not just technically sound but morally imperative.

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Appendix: Research framework

Overview

This synthesis report draws from eight country reports examining health system capacity to act early on non-communicable diseases (NCDs) in Canada, France, Germany, Greece, Italy, Japan, Poland, and Spain. Each country report was developed using a structured research framework created by the London School of Economics and Political Science (LSE) through literature review of existing global frameworks and evidence, and validation by an expert panel of clinicians, policy experts, and patient advocates. The framework provided systematic guidance for assessing national performance across seven health system domains whilst maintaining flexibility for adaptation to different country contexts.

Methodology

Country research teams followed a common methodological approach:

Desk review of publicly available evidence on early NCD interventions, guided by framework indicators and questions

Stakeholder survey gathering opinions from key opinion leaders across disciplines on barriers to and opportunities for early intervention

Roundtable discussions with minimum 15 participants per country, including experts from public and private institutions, to identify challenges and explore policy solutions

Integration of survey and roundtable outputs into evidence-based country reports with specific policy recommendations

Framework structure

The research framework organised assessment across seven domains aligned with the Partnership for Health System Sustainability and Resilience (PHSSR) research framework:

Domain 1: Population health

This domain examined the epidemiological foundation for early intervention, analysing:

Burden of disease: Current NCD mortality and morbidity patterns, multimorbidity prevalence, stage at diagnosis, survival rates, and health inequalities across socioeconomic groups

Behavioural risk factors: Prevalence and distribution of tobacco use, alcohol consumption, physical inactivity, obesity, dietary patterns, and their social determinants

Environmental impact on NCDs: Air pollution effects, climate change impacts on NCD burden, heat-related mortality, and environmental health disparities

Primary prevention: National policies for NCD prevention including sin taxes, advertising restrictions, health literacy programmes, lifestyle interventions, and NCD-related vaccination programmes (HPV, hepatitis B)

Domain 2: Governance

This domain assessed institutional arrangements and accountability mechanisms for NCD policy, including:

Institutions: Roles and responsibilities of ministries, national committees, and regional authorities in NCD policy development and implementation

Expertise and inclusivity: Involvement of professional bodies, patient organisations, and advocacy groups in policy formation and decision-making processes

Data for policy formation: Availability and use of national health surveys, risk factor surveillance systems, and evidence-based policy development processes

Strategy and targets: Existence, specificity, and implementation of national NCD strategies with SMART targets for prevention, diagnosis, and treatment outcomes

Registries: Coverage, quality, and policy utility of disease-specific registries for cancer, cardiovascular diseases, diabetes, and respiratory conditions

Crisis preparedness and response: Contingency plans for maintaining NCD services during health system shocks, including lessons from COVID-19

Domain 3: Service delivery

This domain examined the organisation and delivery of NCD services across the care continuum:

Guidelines and protocols: Availability, quality, and implementation of evidence-based clinical guidelines for NCD prevention, diagnosis, and management

Risk assessment: Use of validated risk stratification tools, biomarkers, polygenic risk scores, and systematic identification of high-risk populations

Screening: Coverage and performance of organised screening programmes for cancer, cardiovascular-metabolic conditions, kidney disease, and respiratory diseases

Diagnosis and referral: Efficiency of referral systems, diagnostic capacity, waiting times for imaging and specialist assessment, and care coordination between levels

Secondary and tertiary prevention: Access to treatment following diagnosis, management of multimorbidity, integrated care pathways, and monitoring for disease progression

Domain 4: Financing

This domain analysed financial arrangements affecting NCD prevention and care:

Health spending: Overall healthcare expenditure levels, prevention spending as proportion of health budgets, and resource allocation across service types

Coverage and financial barriers: Gaps in public coverage for NCD services, out-of-pocket payments, catastrophic health expenditure, and mechanisms for financial protection

Financial incentives: Provider payment methods, their alignment with prevention and coordinated care objectives, and specific incentives for screening, early diagnosis, and quality improvement

Domain 5: Workforce

This domain assessed human resources for NCD prevention and management:

Workforce supply: Physician and nursing densities, generalist-specialist ratios, geographic distribution, workforce projections incorporating NCD burden, and strategies for addressing shortages

Training and workforce development: NCD-specific competencies in professional education, availability of specialised training programmes, task-shifting initiatives, and continuing professional development in prevention and chronic disease management

Domain 6: Medicines & technology

This domain examined access to and adoption of innovations for NCDs:

Access to diagnostics and therapeutics: Availability of imaging equipment, molecular diagnostics, precision medicines, time from regulatory approval to reimbursement, and geographic disparities in access

R&D capacity: National research strategies, clinical trial activity, public-private partnerships, patient recruitment capabilities, and domestic innovation capacity

Digital health and data: Electronic health record adoption, interoperability, telemedicine implementation, AI applications in diagnosis and treatment, digital therapeutics, and data governance frameworks

Domain 7: Environmental sustainability

This domain assessed the bidirectional relationship between environment and NCDs:

Environmental impact of NCDs: Healthcare system carbon footprint from NCD care, emissions from diagnostic equipment and patient travel, pharmaceutical waste, and consideration of environmental impacts in treatment decisions

Climate adaptation of NCD services: Heat warning systems, vulnerability assessments for NCD populations, resilience planning for essential services, and strategies addressing climate impacts on disease burden

Disease scope

The framework focused on four interrelated NCD categories that collectively account for over 80% of premature NCD deaths:

Cancer: Primary focus on lung, bowel, prostate, and breast cancers, plus two additional major cancers per country where early detection is possible

Cardiovascular, kidney and metabolic diseases: Chronic kidney disease (CKD), heart failure, ischaemic heart disease (IHD), diabetes, and stroke

Chronic respiratory diseases: Asthma and chronic obstructive pulmonary disease (COPD)

Related conditions: Where relevant, oral health and mental health comorbidities were considered given their interconnection with primary NCDs

Data and evidence

The framework incorporated both quantitative and qualitative indicators, drawing from internationally comparable sources to enable cross-country analysis whilst allowing use of national data to capture local contexts. Primary international data sources included:

- OECD Health at a Glance indicators
- WHO Global Health Observatory (GHO) indicators
- Institute for Health Metrics and Evaluation (IHME) Global Burden of Disease data
- International Agency for Research on Cancer statistics

Countries supplemented these with national health surveys, registry data, and administrative databases to provide comprehensive assessment of their health system capacity for early NCD intervention.