World Medical
Journal

From Precision Medicine to Precision Health: Preventive Care and Equity in an Ageing Society

Hamideh Frühwein

Precision medicine has become one of the defining ambitions of contemporary health policy: to refine diagnosis and treatment so that interventions are more effective, less toxic, and better aligned to individual biology. Its scientific achievements are real and impactful for patient care. Yet Europe's most consequential health pressures over the coming decades will be shaped less by insufficient therapeutic precision than by predictable demography, unequal exposure to modifiable risks, and persistent failures to deliver prevention at scale. A recurring problem in prevention policy is that failure is often attributed mainly to individuals. People may decline screening or laboratory tests, parents may withhold consent for childhood vaccination, and many do not follow health advice or change behaviours associated with higher risk.

This is the rationale for a shift toward precision health. Properly understood, precision health is an orientation of the health system towards anticipatory prevention and early action. In an ageing society, the sustainability of advanced treatment pathways may depend on whether preventive and early-detection systems can meaningfully reduce avoidable burden upstream [1,2].

Cancer prevention is a strong test of that approach. Cancer rates are shaped by ageing populations, unequal access to care, and the growing strain on health systems. At the same time, treatment costs are likely to rise as more people live longer and survive cancer, even though much of the cancer burden is still associated with risk factors that can be reduced or prevented. In 2019, risk factors included in the Global Burden of Disease analysis accounted for 44.4% of all cancer deaths globally, underlining how much burden is addressable upstream [3,4]. The decisive barrier is not ignorance of what works; it is the design and governance of delivery. Recent European Union (EU)'s modelling suggests that meeting tobacco reduction targets alone could prevent around 1.9 million new cancer cases in the EU between 2023 and 2050, illustrating the scale of preventable burden when prevention is treated as system infrastructure [4].

Why Ageing makes Prevention an Ethical and Operational Necessity

Europe is moving into a demographic configuration in which multimorbidity becomes the norm rather than the exception. Ageing increases cancer incidence even if age-specific risks remain stable, while improved survival expands the population living with cancer and requiring follow-up and long-term care. In such a context, the opportunity cost of prevention failure grows. When systems over-invest in late-stage rescue while under-building prevention capacity, they do not merely become inefficient. Instead, they institutionalise avoidable morbidity and distribute these rates along predictable lines of social advantage and disadvantage [5].

This distributional point matters significantly to health systems. Health equity is commonly framed as ensuring that everyone has a fair and just opportunity to be as healthy as possible; achieving it requires removing obstacles to health that are unequally distributed [5]. A recurring problem in prevention policy is that failure is often attributed mainly to individuals. People may decline screening or laboratory tests, parents may withhold consent for childhood vaccination, and many do not follow health advice or change behaviours associated with higher risk. This explanation is incomplete and, in policy terms, unhelpful. It obscures the fact that participation is shaped by predictable constraints – time scarcity, insecure employment, language barriers, administrative friction, fear or stigma, prior negative experiences, and mistrust – many of which are socially patterned. If a programme assumes that everyone is informed, confident, and able to make time, it will mostly benefit the people who already meet those conditions. The result is an equity failure produced by design [6]. Precision health, therefore, requires what can be called an ethics of design, where prevention is built in such a way that the most constrained individuals can still realistically participate.

Human papillomavirus (HPV) vaccination and cervical screening are well suited to illustrate the governance problem, with strong evidence bases, clear target groups, and measurable outcomes. The World Health Organization has

BACK TO CONTENTS

set explicit 90-70-90 targets for cervical cancer elimination by 2030: 90% HPV vaccination coverage among girls by age 15, 70% screening coverage with a high-performance test by age 35 and again by age 45, and 90% treatment for those with disease [7]. The existence of targets, however, does not guarantee delivery. When vaccination or screening rates remain low, the problem is usually not the clinical evidence. More commonly, it is one or more of the following: fragmented accountability (no single actor owns equitable coverage), weak data-to-action loops (under-uptake is measured but not actively corrected), insufficient integration with trusted delivery sites (schools, primary care, community services), and underestimation of trust and misinformation dynamics. Across many areas of prevention, services are available but participation is uneven, especially among the people who stand to benefit most.

Europe's Beating Cancer Plan represents an important recognition that prevention and early detection must sit at the core of cancer policy. As it emphasises prevention, screening, and equity as strategic priorities, it provides a European framework for national action [8]. A high-level plan, however, cannot substitute for local delivery capacity, stable financing, and practical access design, leading to the consideration of three operational implications.

First, equity cannot remain a post-hoc metric. If performance is reported only as a national average, inequities may remain invisible or politically tolerable. Precision health requires routine disaggregation (e.g., by deprivation, geography, and relevant sociodemographic indicators) and explicit accountability for closing gaps. Second, prevention capacity needs to be sustained over time. It is especially vulnerable to political change and budget pressure because its benefits emerge gradually and are often less visible than those of clinical care. Yet that is precisely why prevention must be financed and governed as infrastructure. Short-term campaigns and pilot programs do not create the institutional muscle needed for sustained uptake. Third, delivery must be designed around real behaviour. Booking complexity, inconvenient appointment times, low-quality risk communication, and lack of navigational support create friction that disproportionately affects disadvantaged groups. By contrast, participation often improves when access is made easier. Clear invitations, simple scheduling, reminders, and supportive follow-up can improve uptake without coercion while preserving respect for autonomy.

What Precision Health Requires in Practice

For precision health to work in practice, it needs a clear model for delivery, with clear responsibilities, measurable outcomes, and systems for feedback. Five requirements are especially important in real-world use: governance and accountability, infrastructure that can turn data into action, workforce and funding capacity, trust-building engagement, and service design that makes participation easy.

1. *Equity-sensitive accountability.* Health leaders should assess programmes not only by overall coverage, but also by whether they reduce gaps between groups. Prevention indicators should be published routinely by age, sex, geography, socioeconomic position, migration status, and other locally relevant factors. Responsibility for investigating low participation and addressing it should be clearly assigned, rather than limiting oversight to reporting alone.

2. *Data-to-action loops.* Where possible and legally permitted, health leaders can connect registries, immunisation records, screening data, and primary care systems to identify people who are overdue and contact them directly. Where that is not possible, they can rely on practical alternatives such as call-recall systems, prompts in primary care, and partnerships with community organisations. In either case, the process should be clear and complete: identify, contact, follow up, and record the result.

3. *Stable prevention financing and workforce capacity.* Prevention needs stable long-term funding and clear workforce planning. Capacity has to be planned, not assumed. Staffing, time, and task allocation, especially in primary care and community settings, should match the goals of the programme and the needs of the groups it is meant to reach. Asa service design and clinical issue, it should be taken seriously in commissioning and performance management.

4. *Trust as a governance outcome.* Health leaders can view trust as a key measure of effective governance. Trust affects prevention uptake and can be undermined by weak communication, low institutional credibility, or processes perceived as opaque. HPV vaccination

BACK TO CONTENTS

showed how easily participation can be affected by public controversy and concerns about how a programme is run. Trust is stronger when health authorities are open about benefits and harms, respond quickly to concerns, and adapt outreach to communities with lower access or lower trust in institutions.

5. *Behavioural and psycho-cognitive design as a quality domain.* Programme quality should include the cognitive and logistical demands placed on participants (e.g., number of steps, clarity of information, ease of rescheduling, privacy, stigma considerations). Behavioural interventions (reminders, prompts, navigation support, default scheduling) can improve uptake, but effects are context-dependent and should be implemented as testable components within a continuous quality-improvement approach rather than as a universally effective solution [9]. Ethical acceptability depends on transparent intent, proportionality, and easy opt-out/refusal processes – not on the absence of design.

The Role of Medical Associations

Medical associations and clinicians can strengthen precision health by aligning with how prevention works in practice and whether it reaches different groups fairly. First, they can help define and disseminate benchmarks for prevention delivery that include equity-sensitive indicators, not solely aggregate coverage. Second, they can advocate for prevention as enabling infrastructure: stable financing, interoperable information systems where feasible, and delivery capacity commensurate with stated targets. Third, they can support credible, evidence-based communication by equipping clinicians to address misinformation in a non-stigmatising manner and by promoting culturally competent approaches to consent and counselling. Fourth, they can normalise equity auditing as routine professional practice. Systematic prevention gaps are generally patterned rather than random; treating them as remediable performance issues links professional ethics with accountability mechanisms.

Conclusion

This text presents the case that prevention is one of the clearest ways to make precision health meaningful in practice. In ageing societies, this matters not only for sustainability, but also for equity. Cancer prevention brings this concept into focus because effective interventions already exist and progress can be measured. The central challenge is therefore not the absence of evidence, but whether health systems can deliver prevention in ways that people can realistically access and use. This approach requires trust, stable funding, sufficient workforce capacity, and services designed to reduce barriers to participation, especially for underserved groups. From this perspective, precision health should be judged by its ability to reduce preventable illness, death, and avoidable inequality.

References

1. OECD. Tackling the impact of cancer on health, the economy and society. OECD Health Policy Studies. Paris: OECD Publishing; 2024. Available from: https://www.oecd.org/en/publications/tackling-the-impact-of-cancer-on-health-the-economy-and-society_85e7c3ba-en.html
2. OECD & European Commission. Health at a glance: Europe 2024: state of health in the EU cycle. Paris: OECD Publishing; 2024. Available from: https://www.oecd.org/en/publications/health-at-a-glance-europe-2024_b3704e14-en.html
3. GBD 2019 Cancer Risk Factors Collaborators. The global burden of cancer attributable to risk factors, 2010–19: a systematic analysis for the Global Burden of Disease Study 2019. 2022;400(10352):563-91.
4. OECD & European Commission. EU country cancer profiles synthesis report 2025. EU Country Cancer Profiles. Paris: OECD Publishing; 2025. Available from: https://www.oecd.org/en/publications/eu-country-cancer-profiles-synthesis-report-2025_20ef03e1-en.html
5. Braveman P. Defining health equity. J Natl Med Assoc. 2022;114(6):593-600.
6. De Marchi C, Di Lullo F, Ferrari C, Pettinicchio V, Sinopoli A, Lombardo P, et al. Interventions to improve cancer screening adherence in migrants and ethnic minorities in the European Region: a systematic review. J Cancer Policy. 2025;47:100677.
7. World Health Organization. World cervical cancer elimination day 2025 [Internet]. 2025 [cited 2026 Jan 23]. Available from: https://www.who.int/campaigns/world-cervical-cancer-elimination-day/2025

World Medical Journal

8. European Commission. A cancer plan for Europe [Internet]. 2025 [cited 2026 Jan 23]. Available from: https://commission.europa.eu/topics/public-health/european-health-union/cancer-plan-europe_en

9. Wang F, Li Y, Zhang C, Arbing R, Chen WT, Huang F. Evaluating digital nudge interventions for the promotion of cancer screening behavior: a systematic review and meta-analysis. BMC Med. 2025;23(1):214.

AI Disclosure Statement

The author confirms that no artificial intelligence tools were used in the preparation of this manuscript.

Hamideh Frühwein*, PhD*
Institute for History, Philosophy
and Ethics of Medicine,
University Medical Center Mainz
Mainz, Germany
h.mahdiani@uni-mainz.de

BACK TO CONTENTS