Australia's National
Science Agency

Beyond tomorrow

Health megatrends anticipated to impact NSW and the healthcare workforce to 2040

August 2024

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Important disclaimer

Currency conversions

All dollar value figures denote Australian dollars unless otherwise specified.

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- clinical leaders
- government
- industry
- academic and not-for-profit representatives
- health consumers who participated in the stakeholder workshop conducted as part of this work.

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Abbreviations

3D	three-dimensional
AI	artificial intelligence
AMR	antimicrobial resistance
CALD	culturally and linguistically diverse
GP	general practitioner
LHD	Local Health District
LLM	large language model
NSW	New South Wales
OECD	Organisation for Economic Co-operation and Development
STEEP	social, technological, economic, environmental and (geo)political
USA	United States of America

Images: Getty.com and istock.com

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Foreword

The NSW Health system stands at the threshold of a profound transformation. The forces reshaping our world – including rapid technological advancements, shifting demographics and climate change – are converging to redefine the very nature of work, the workplace, and the workforce.

This report offers a comprehensive analysis of these transformative trends, detailing their influence on the health sector and workforce in NSW through to 2040. It explores the implications of these changes, aiming to provide decision makers and the workforce with a deeper understanding of the challenges and opportunities that lie ahead.

Navigating this evolving landscape requires a collaborative effort from all sectors – government, healthcare providers, researchers, and the community. The insights within this report are more than reflections on current shifts; they are a call to action to anticipate future needs and drive innovation to enhance community health and wellbeing.

I would like to extend my gratitude to the team behind this report for their dedication and expertise. Their work not only captures the essence of the critical trends but also provides valuable direction for understanding and navigating the potential futures for the NSW Health system. This report lays the foundational evidence for informed decision making and builds momentum for system wide workforce planning.

The future of work in healthcare will evolve based on the innovation and ingenuity of our people. It is a landscape where technology will act as a catalyst, unlocking new possibilities for productivity, efficiency and patient and staff wellbeing – all in a context where our workforce will be empowered to maximise their potential. As with all moments of great opportunity, there is also risk – with the potential for uncertainty that will demand of us adaptability, learning, and collaboration to keep working on the better solutions.

I encourage you to embark on this journey with an open mind, imagining a future filled with vast possibilities while seeking to identify the potential applications to your local context.

I hope this report inspires ongoing dialogue, debate and action as we work together to shape the future of healthcare in NSW.

Phil Minns
Deputy Secretary, People, Culture and Governance
NSW Ministry of Health

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Executive summary

The New South Wales (NSW) health system has a strong capacity to adapt and change, as demonstrated in response to the recent bushfires, flooding events and the COVID-19 pandemic. In particular, COVID-19 helped to fast-track the rollout and adoption of new and different models of care and streamline information sharing between healthcare providers. These periods have also shed light on what the future of healthcare in NSW could look like, and the opportunities to reimagine how healthcare services are delivered and how the healthcare workforce operates. There is an imperative to understand and plan for the emerging horizon for healthcare in NSW to ensure that the future healthcare workforce is best positioned to continue to deliver high-quality care and health outcomes.

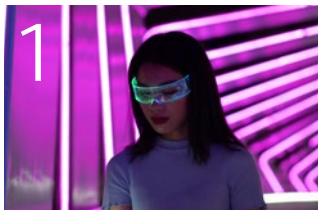
This report presents a set of emerging megatrends impacting healthcare in NSW out to 2040 and their strategic considerations for future workforce planning. It aims to align and stretch current thinking and inspire strategic conversations across the system around the future healthcare workforce, workflows, ways of working and the workplace. These megatrends point to a range of converging and compounding trends that could unlock new ways of operating across the NSW health system, with consideration for the risks that need to be managed. This work was informed by consultations with clinicians, health consumer representatives and stakeholders across government, industry, the not-for-profit sector and academia as well as a desktop review of published literature and datasets.

What is a megatrend?

Megatrends are a strategic foresight tool coined in the 1980s that is used by organisations to guide long-term decisions and planning. They reflect the intersection of multiple cross-domain trends and early signals that are likely to have a significant and transformative impact on individuals, organisations and societies in the coming years and decades.

Six emerging health megatrends

The six megatrends presented in this report reflect the major shifts shaping the future of the NSW health system and its workforce with the view to assist in planning for a workforce that is future-prepared and fit for purpose. While these megatrends are not designed to predict the future, they provide an evidence-based view of plausible ongoing and emerging trends and impacts. The megatrends are:



Limitless care

The traditional boundaries of the health system are expanding, giving rise to changes in how, where and who delivers healthcare services. These new models of care can improve the efficiency, access and convenience of care, cater to diverse needs and open new ways of working and workplace models.

Empowered consumers, engaged communities

The preferences, expectations and behaviours of health consumers and carers continue to evolve and shape how the health system operates. There are opportunities to leverage the healthcare workforce in improving health literacy, creating cultural safety and engaging communities to advance efforts towards health equity.

Mass personalisation

Precision medicine continues to expand opportunities to personalise the prediction, diagnosis and treatment of illness. It is also providing new channels to individualise preventative health efforts. To realise this full potential, public health systems will need to consider how these options can be sustainably and equitably incorporated into routine practice.

Augmented care

Artificial intelligence (AI), robotics and other digital solutions offer ways to meet rising healthcare demand and free up clinicians and administrative staff to focus on more complex tasks, while maintaining high-quality care and positive health outcomes. Supporting human connection, equity and safety will be critical in implementing these new augmented care approaches.

A volatile world

A range of external factors, including climate change, infectious disease outbreaks and global disruptions, are creating an increasingly uncertain and volatile operating environment for the health system. To minimise the impacts of these compounding events, there is an imperative for the health system and its workforce to build resilience to these external shocks.

The prevention potential

A significant systematic focus on prevention is more important than ever and there are early signs that the shift towards health promotion and health protection is underway. Stronger preventative approaches could help relieve the potentially avoidable strain placed on the NSW health system arising from a range of demand drivers.

MEGATREND	TRENDS	QUESTIONS FOR THE FUTURE
Limitless care	• Non-traditional healthcare companies • Increased uptake and evolution of virtual care • Virtual emergency care • Expanded scopes of practice	How could workplaces be designed to support different and more diverse models of care and what new workforce capabilities would be required?
Empowered consumers, engaged communities	• More sources of online health information • Consumer uptake of complementary medicine and overseas treatments • Community-focused approaches for culturally diverse populations	What innovative approaches could be considered to empower clinicians and other healthcare experts to share trusted health information online and improve consumers' online health literacy skills?
Mass personalisation	• National push towards data-driven health systems • Precision health approaches • Developments in bioengineering, genomics, artificial intelligence (AI) and 3D printing	What could be an appropriate model for embedding and strengthening research translation capabilities across the healthcare workforce?
Augmented care	• Uptake of service and surgical robots • Generative AI clinical tools • Growing research and development into AI for healthcare • Digital learning opportunities in medicine	How could future collaborative human–AI clinical workflows be designed to promote positive job satisfaction and provide sufficient time for clinicians to connect with patients, carers and other clinicians?
A volatile world	• Uncertainty around infectious disease outbreaks and global supply chains • Heightened cybercrime risks • Increased frequency and severity of extreme weather events • Healthcare advocating for climate action	How could the structure of the health system and its workforce be reimagined to become more resilient to external shocks?
The prevention potential	• Growing investment in health protection and promotion • Success of behavioural interventions • Increased mental health burden • Uptake of vaping in youth	How could the preventative health capacity and capability of all healthcare workers be boosted and shared across the healthcare workforce?

The megatrends presented in this report provide an evidence-based view of the future of healthcare and the healthcare workforce in NSW. While these megatrends point towards future risks or transitions that might be challenging to navigate, they also offer opportunities to transform the way healthcare services are delivered in NSW and position the workforce as a key driver and enabler of these changes. Exploring these future ways to improve how the health system and its workforce operate will need to be balanced with considerations for the future financial sustainability of the NSW health system.

Importantly, these megatrends are not mutually exclusive and will emerge in interactive ways. For example, the solutions or potential responses to the challenges posed by a given megatrend (e.g. the growing burden of preventable conditions) could be found by considering these shifts in parallel to other megatrends (e.g. digital solutions for personalising preventative care or the increasing empowerment of health consumers and carers). By understanding where these future opportunities, strategic considerations and risks lie, decision-makers can chart a future direction that ensures the NSW healthcare workforce is positioned to be fit for the future.

The health of NSW at a glance

Our journey to a healthier outlook **beyond tomorrow** begins with understanding where we stand today. This infographic illustrates the current state of health in NSW, exploring the current strengths and challenges as well as projected opportunities. It serves as a foundation on which to explore the future outlook for the NSW health system and its workforce out to 2040.

Population

2023 estimated resident population [1, 2]

8.3M
in total

5.4M
in Greater Sydney

2.9M
in the rest of NSW

2040 projected population [1]

10.5M
in total

6.9M
in Greater Sydney

3.6M
in the rest of NSW

Largest projected population size changes across all Local Health Districts (LHDs) by 2040 [4]

34.3% ↑
increase in Western Sydney LHD

23.5% ↓
decrease in Far West LHD

Population diversity in 2021 [3]

3.4% Aboriginal and Torres Strait Islander peoples

50.3% people having at least one of their parents born overseas

28.0% speaking a language other than English at home

Aging population

Population aged 65 years and over

17.7% **in 2023** [2]

21.3% **in 2040** [1]

Disability

Population with a need for assistance

5.8%
of population in 2021 [5]

Life expectancy

Aboriginal and Torres Strait Islander life expectancy
at birth for people born in 2020–2022 [6]

71.9 yrs
for males

75.6 yrs
for females

Non-Aboriginal and Torres Strait Islander life expectancy
at birth for people born in 2020–2022 [6]

80.6 yrs
for males

83.8 yrs
for females

Healthcare expenditure

$72.3B
in healthcare expenditure in 2021–22 [8]

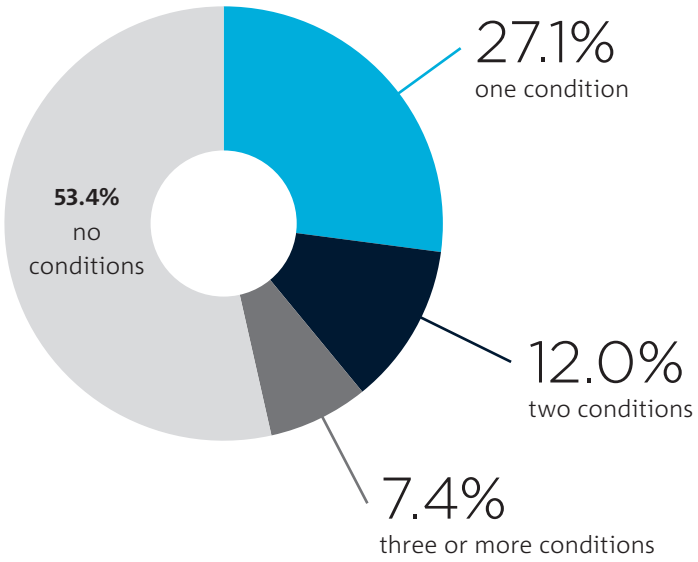
$21.9B spent on public hospitals

$25B spent on primary healthcare ($5.4B of which spent on health prevention, protection and promotion)

$8.9B spent on referred medical services

Chronic health conditions

Population with a chronic condition in 2022 [9]



Hospitals

215
public hospitals

207
private hospitals

As of 12 August 2024 [7]

Risk factors

Adults with specific risk factors in 2022 [9]

1 in 10 adults smoke daily

1 in 8 adults exceed lifetime risk guidelines for alcohol consumption

1 in 2 adults do not eat the recommended daily serves of fruit and vegetables

Almost 3 in 4 adults do not meet the weekly recommended guidelines for physical activity

Obesity

≈ 2 in 3
adults were overweight or obese in 2023 [4]

≈ 1 in 4
children were overweight or obese in 2023 [4]

Australia had the **8th highest rate of obesity** among OECD countries in 2020 [10]

Infectious diseases

538,714
cases of communicable disease reported in 2023 [11], including

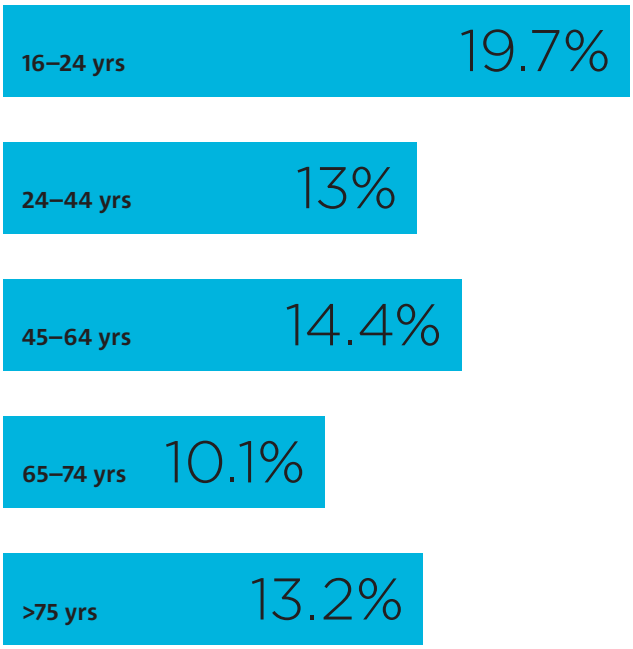
104,665 reported cases of influenza

310,489 reported cases of COVID-19

46,863 reported cases of sexually transmitted infections

Mental health

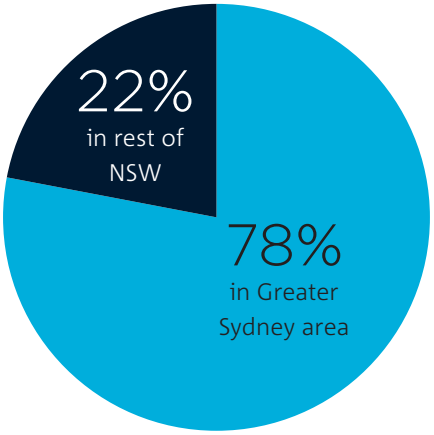
Population who experienced high/very high psychological distress in 2022 [9]

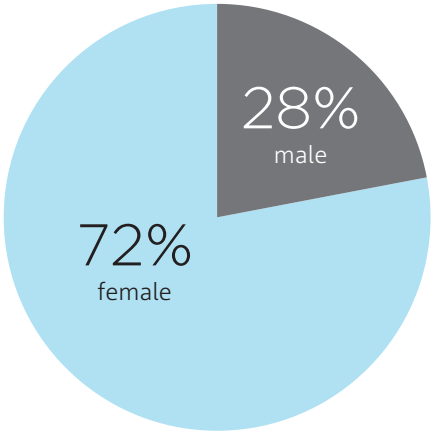


Health professionals

196,781

public and private healthcare professionals in 2022 [12], including





<1% gender not specified

Share of public and private healthcare professionals in 2022 [12]

101,061
nurses and midwives

34,322
medical practitioners

50,491
allied health professionals, including:

10,539 psychologists

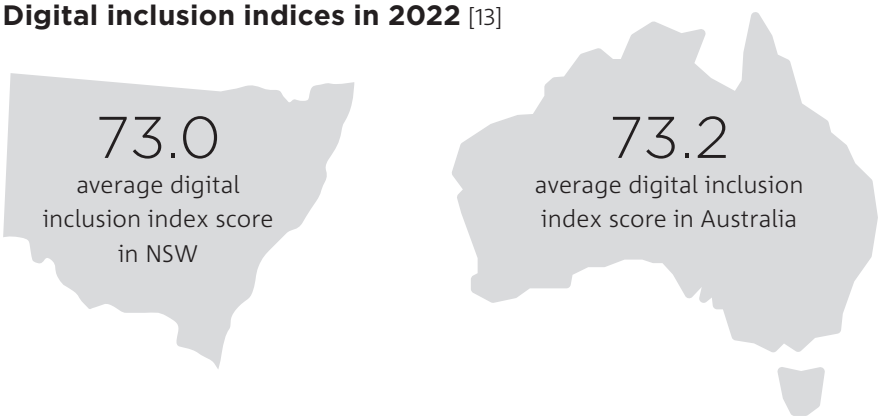
10,161 physiotherapists

8,328 pharmacists

170 Aboriginal and Torres Strait Islander health practitioners

Digital inclusion

Digital inclusion indices in 2022 [13]



Data sourced from the Australian Digital Inclusion Index, with scores ranging from 0 to 100. This index includes measures of digital access, affordability and ability, where higher scores indicate higher levels of digital inclusion.

Introduction

The changing health landscape

Australians are among the healthiest in the world, ranking on par or above average other OECD countries on key health status indicators (life expectancy, avoidable mortality, diabetes prevalence and self-rated health) [14]. As Australia's largest health system, hundreds of thousands of patients interact with the New South Wales (NSW) health system each year and benefit from access to high-quality healthcare services delivered by a high-performing workforce. But the NSW health system, like other national and international health systems and industries, is navigating an accelerated period of change and disruption that poses both challenges and opportunities for future ways of operating. Exploring the emerging patterns of change shaping the NSW health system can help position the healthcare workforce in navigating, preparing for and enabling these changes.

Identifying future ways to improve how healthcare is delivered in NSW needs to be balanced with financial sustainability. In line with national trends, the amount spent on healthcare per capita has been growing year on year in NSW [8], with health making up the leading share of the state budget (29% in 2018–19 and expected to reach 38% by 2060–61) [15]. This demand is driven by a range of factors, including the changing health needs of the population (e.g. an aging population, a growing incidence of chronic health and mental health conditions), greater expectations for high-quality care and advances in medicine and health technologies [15, 16]. Future workforce planning in healthcare presents an opportunity to explore how the NSW health system might expand its capacity to meet this increasing demand sustainably.

There are many emerging developments and innovations that present opportunities to improve the efficiency, quality and accessibility of healthcare services and keep people healthier across their life span. Ongoing developments in medical and digital technologies present new tools to prevent, predict, manage and treat illness in more personalised ways. These include developments in artificial intelligence (AI), genomics, precision medicine and virtual models of care. The traditional boundaries of the health system are also expanding, enabling health consumers and carers, community organisations and non-traditional healthcare companies to partner in healthcare solutions. While these transitions can be challenging, they provide possibilities to transform the way healthcare services are delivered and improve the overall health of the NSW population.

Leveraging the past to enable the future

The NSW health system demonstrated resilience and capacity to adapt and change in its response to recent bushfires, floods and the COVID-19 pandemic. During this time, the NSW health system responded swiftly, redeploying staff and increasing workforce capacity. It also accelerated the rollout and adoption of existing and new virtual models of care to meet healthcare needs and information sharing between healthcare providers. Although these periods were highly disruptive and placed significant strain on the NSW healthcare workforce, they also left a positive legacy around the acceptance of digitally enabled models of care across clinicians, consumers, carers and the global healthcare community. These capabilities will be critical in navigating the future opportunities and challenges facing the NSW health system.

Now is the time to take steps to ensure NSW can continue to deliver high-quality healthcare services in a sustainable, accessible and equitable manner and to maximise health outcomes for future generations. Although this report focuses on the NSW health system, many of the identified challenges and opportunities are faced by other health systems, both nationally and globally. This highlights the potential for shared solutions and collaborative approaches to improve healthcare outcomes on a broader scale.

The report aims to provide a common starting point for these future-focused conversations across NSW Health and its broader stakeholders across government, industry, current and emerging clinical leaders and healthcare staff, community organisations, health consumers and carers. It provides an evidence base of the emerging trends impacting the NSW health system out to 2040 through the lens of the NSW healthcare workforce. In doing so, it aims to align and stretch current thinking and inspire strategic conversations across the system around how to best position the future healthcare workforce, workflows, ways of working and the workplace.

About this report

This report, developed by CSIRO and commissioned by NSW Health, presents six megatrends shaping the future of healthcare in NSW and their strategic considerations for the future healthcare workforce. A megatrend reflects the intersection of multiple trends – unfolding in social, technological, economic, environmental and (geo)political (STEEP) domains – that are likely to have a significant and transformative impact on individuals, organisations and societies [17]. Megatrends differ from forecasts or predictions as they are designed to be the best guess at the future based on current data and expert insights or provide a lens through which organisations can understand, anticipate and plan for their future [17, 18].

The megatrends presented in the report aim to capture the long-term trajectories of current events expected to continue or accelerate, as well as novel, early-stage events or developments. They are prefaced by an appreciation for the broader healthcare workforce and how the workforce is driving – or has the potential to drive – change in the NSW health system. Each megatrend chapter presents a summary of the megatrend and how it relates to the workplace, workforce and work tasks, along with the supporting trends. These chapters also include 'early signals' which are more recent events, developments or isolated examples that are yet to be verified empirically, but which indicate how that megatrend could unfold in the future. These early signals are areas flagged for future monitoring. All the megatrends are expected to be highly impactful and the sequence in which they are presented does not reflect their priority or significance.

How to use this report

The report has been structured to provide a long-term view of the future through the megatrends. Immerse yourself in these narratives and the evidence-based trends that underpin them. These include representative samples of current and emerging trends and signals that point towards how these megatrends could unfold out to 2040. You may wish to use these as inspiration for considering additional trends that provide further context for how these megatrends apply to your organisation or workforce.

Importantly, these megatrends are not designed to be mutually exclusive or independent of each other but rather will unfold in intersectional ways. For example, some of the challenges posed by a given megatrend (e.g. the growing burden of preventable conditions, see *The prevention potential*) could be addressed or mitigated by solutions in other megatrends (e.g. digital solutions for personalising preventative care or the increasing empowerment of health consumers and carers, see *Mass personalisation* and *Empowered consumers, engaged communities*, respectively).

Next, consider how these megatrends could impact the future healthcare workforce. Each megatrend chapter concludes with a set of strategic questions designed to encourage you to think more broadly and deeply about the opportunities and actions required to harness the full potential of emerging trends, anticipate future challenges and implement innovative solutions. These 'Questions for the future healthcare workforce' sections are designed to stretch your thinking and inspire strategic conversations and planning across the system around the future healthcare workforce, workflows, ways of working and the workplace.

How we developed this report

The project approach, divided into six phases, was guided by best practice approaches to defining and validating megatrends [19] (Figure 1). The first phase served to scope the key topics and strategic research questions for the project. This phase focused on looking at the current state of the health system and the historical conditions and activities that have shaped it. The second phase consisted of a desktop review to gather insights on potentially relevant trends and early signals, drawing on a diverse range of information sources. Trends and early signals were classified by their STEEP domain to ensure the desktop review was representative of a diverse range of impacts and drivers.

In the third phase, a draft set of megatrends was identified as areas where clusters of trends and early signals are converging. These clusters are often driven by similar factors or reflect complementary or compounding areas of impact. The resulting megatrends point to deep-set trajectories of change that are expected to develop over the coming years out to 2040 and which will have a significant impact on the future of healthcare in NSW. Each megatrend was described in terms of the overarching pattern of change that it presents and the underpinning trends and early signals that provide evidence for how it is emerging and could continue in the future.

The fourth phase was designed to test and validate the draft megatrends to ensure they reflect a relevant and evidence-based view of the future of healthcare in NSW. This validation process was conducted through a workshop with a diverse cross-section of stakeholders across the NSW health landscape (36 in total), including clinicians, health consumer representatives and stakeholders across government, industry, the not-for-profit sector and academia. The workshop also served to explore the strategic considerations of these megatrends for the future healthcare workforce, workflows and ways of working, and the future healthcare workplace.

In the fifth phase, the outputs from the validation process were incorporated into the revised set of megatrends, which was prepared as part of this report. This report is designed to provide a common starting point for understanding the emerging trends and signals that are shaping healthcare in NSW and the healthcare workforce and detail the methodology used in generating these megatrends. The goal of the sixth phase is to use these insights to stress-test different plausible approaches and drive future strategic conversations around how NSW Health and its stakeholders can best respond to these emerging shifts.

Phase 1 Conduct background study and define project scope

- Undertake background study of historical conditions
- Determine project scope including key topics and strategic research questions

Phase 2 Undertake desktop review and identify trends and early signals

- Conduct broad desktop review of information sources to identify trends and early signals
- Categorise trends and early signals into domain categories (e.g. using STEEP framework)

Phase 3 Identify megatrends

- Group trends and early signals by area of impact and drivers
- Describe the pattern of change reflected by megatrends and their supporting evidence

Phase 4 Validate megatrends and explore their strategic considerations

- Test the relevance and plausibility of megatrends with a diverse range of stakeholders
- Explore strategic impacts posed by the megatrends on the future health workforce

Phase 5 Communicate future insights

- Report on the megatrends, supporting trends and early signals and strategic questions
- Detail the methodology used to define and validate the megatrends

Phase 6 Translate future insights into strategy, plans and action

- Apply future insights to inform and stress-test long-term workforce strategies and plans
- Identify strategic actions or activities needed to respond to future opportunities and risks

Figure 1. Megatrends process developed by CSIRO to explore the future of the NSW health system

Note: STEEP = social, technological, economic, environmental and (geo)political.

The workforce imperative

In envisioning the future of healthcare in NSW, the development and optimisation of the healthcare workforce is imperative. The ability of the health system to deliver innovative, person-centred care hinges on having the right people with the right skills in the right places. Through workforce planning, we can identify ways to capitalise on opportunities enabled by technology and new models of care, while also anticipating future challenges, such as an aging population and emerging diseases. This workforce imperative is not merely an operational necessity; it is a strategic cornerstone for building a resilient and sustainable health system that meets the evolving needs of the community.

The COVID-19 pandemic legacy has changed the appetite for flexible work arrangements and digital health products and services [19]. This shift is opening up new avenues to create a more flexible and responsive healthcare workforce and generate efficiencies across care teams. As healthcare workers' preferences and expectations of work, the workplace and their workforce continue to evolve, understanding these drivers is critical in effectively planning for the future health system in NSW. This chapter outlines the workforce drivers that intersect and influence how broader health megatrends are shaping the healthcare workforce. These workforce drivers are creating the imperative for change and the need to align future workforce plans with the emerging faces, behaviours and desires of the healthcare workforce.

Changing ways of working

Workforce demand for flexible working arrangements

The pandemic disrupted conventional ways of working across the Australian economy, accelerating the uptake of flexible work arrangements, including working from home, flexible shifts and reduced on-call or overtime work [20]. In many workplaces across Australia, preferences for flexible working arrangements have continued to grow since then [20]. This demand for flexibility is shared by healthcare workers too, including medical staff in training, particularly when it comes to flexible hours and changes in work patterns (e.g. working split shifts, job-sharing arrangements) [21].

The value of flexible work options for healthcare workers has been acknowledged in workforce attraction, retention and wellbeing efforts [22], and supported by policy, to include job or shift sharing as well as flexible rostering, hours and leave arrangements [23]. As virtual and digital care options expand, there will likely be greater opportunities to further broaden flexible working arrangements for healthcare workers [24, 25]. However, certain tasks (e.g. those requiring direct patient care) may constrain the types of flexible working arrangements that can be considered for clinical versus non-clinical workers.

New platform models of employment in healthcare

Like other industries, employment platforms have emerged in healthcare, creating opportunities for greater mobility and flexibility in when and where clinicians work. Australian-based examples include Go Locum, which provides a medical marketplace for locum work opportunities [26], and Mable, which flexibly connects disability and aged care support workers with clients [27]. Embracing and optimising the gig economy (i.e. the use of digital platforms, apps and websites to connect individuals providing services with consumers) could present opportunities to flexibly respond to fluctuations in demand across the NSW health system and support surge capacity during high-demand periods. While some stakeholders have concerns about the impacts of such practices on the quality and safety of care, this could be supported through greater standardisation of care across public health facilities [28].

Healthcare and social assistance is currently one of the top industries where workers are likely to hold multiple job positions (job stacking), and this has marginally increased over the past decade (Figure 2). Flexibility can be a motivator for job stacking, but cost-of-living pressures are also likely to be a contributing factor [29]. There could be opportunities to design new types of employment models, leveraging workforce flexibility, that enable staff to hold joint positions (e.g. clinical roles with system-level, policy or research translation roles) to improve connectivity across the health system and provide alternative employment opportunities.

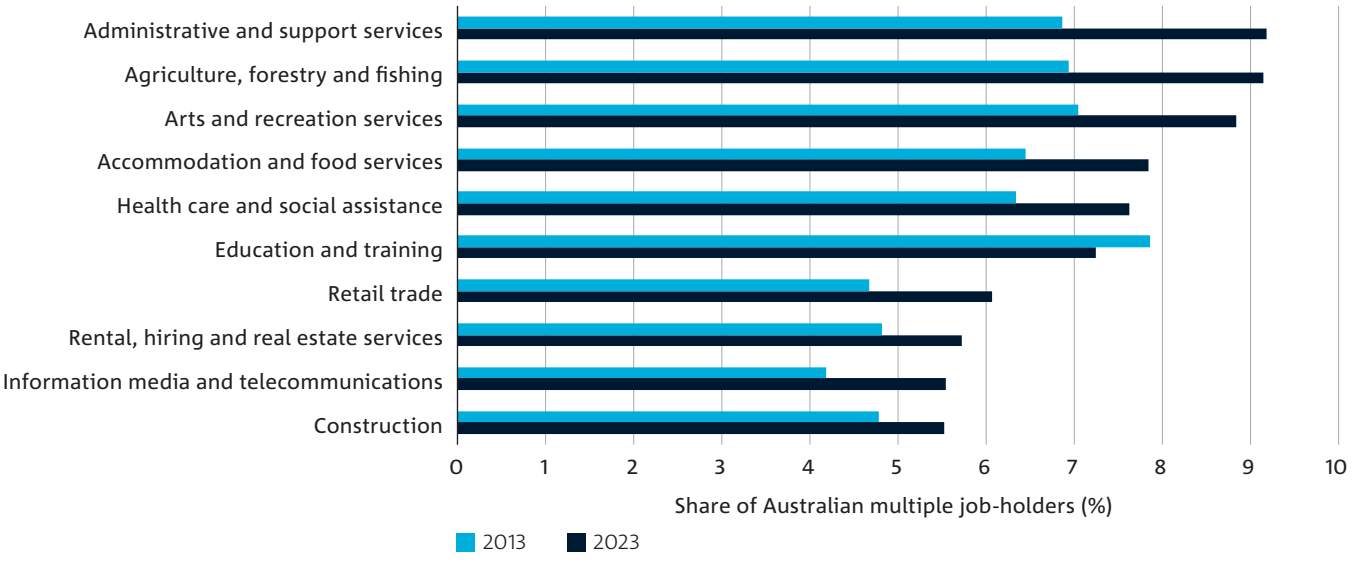


Figure 2. Share of Australian workers working more than one job across the top 10 multiple job-holding industries

Source: ABS [30]

Creating sustainable workloads and work environments

When considering new ways of working in healthcare, there are opportunities to tackle workforce wellbeing challenges. Addressing these challenges is important not only for worker satisfaction and retention but also for delivering high-quality patient care [31, 32]. Burnout is a persistent and prevalent issue in the healthcare workforce, impacted by heavy workloads, understaffing, limited resources, long hours and the emotional load of delivering patient care [33, 34]. Of healthcare workers surveyed in NSW in 2022, 42% reported feeling burned out [35]. In addition, the number of staff working unrostered overtime increased from 60% in 2021 to 72% in 2022 [36]. Workforce wellbeing is a challenge felt across Australian health systems, with other surveys suggesting that 83% of healthcare professionals feel burnt out, mentally exhausted or emotionally drained due to staff shortages in the last six months [37].

Responding to new capability requirements

Understanding and establishing new workforce roles

The health megatrends presented in this report identify several areas in which the workforce could play a key role in addressing a current challenge or mobilising a new opportunity. For instance, rapid advances in health-related scientific discovery and innovation are creating emerging and evolving roles within the health system [38]. There is a need for bottom-up approaches at the clinician level to enable safe, efficient and effective translation of health-related innovations and to close the gap between research and practice [39]. 'Research translators' are one example of the types of new roles that could support this increase in capability or these tasks could be elevated in existing roles [39] (see *Mass personalisation*).

Emerging digital capability uplift opportunities

As technology and other factors impact and change the way healthcare services are delivered, the skills and capabilities across the healthcare workforce must remain relevant. For example, as healthcare professionals are increasingly exposed to AI in their work [40], they will likely need to expand their digital and data capabilities to use, implement, interpret and improve these digital tools. Moreover, as clinicians are increasingly positioned as the interface between technology and patients, they may play a role in communicating how these digital tools are used in delivering care to patients and help in building patients' trust and confidence in these new approaches.

From a digital capability perspective, healthcare workers are generally starting at a lower baseline relative to other professions in terms of their proficiency in digital engagement (i.e. identifying and using technology confidently, creatively and critically; Figure 3) and the amount of time spent on tasks involving data, analytics and databases (Figure 4). To support digital capability uplift in the healthcare workforce, the Australian Digital Health Agency and the Australasian Institute of Digital Health have collaborated to design a capability framework to help organisations assess and prepare the healthcare workforce for an increasingly digital future [41].

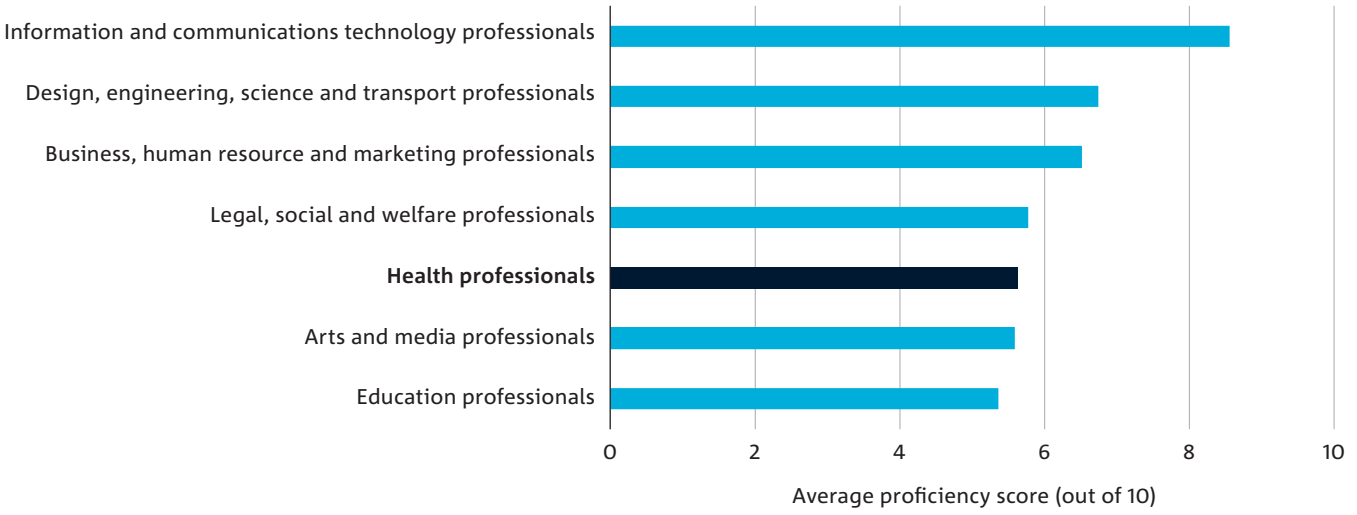


Figure 3. Average proficiency score for digital engagement across different types of Australian professionals

Note: Proficiency scores of 1–3 indicate basic proficiency in digital engagement (i.e. capacity to identify and use technology confidently, creatively and critically), 4–7 indicate intermediate proficiency and 8–10 indicate high proficiency.

Source. JSA [42]

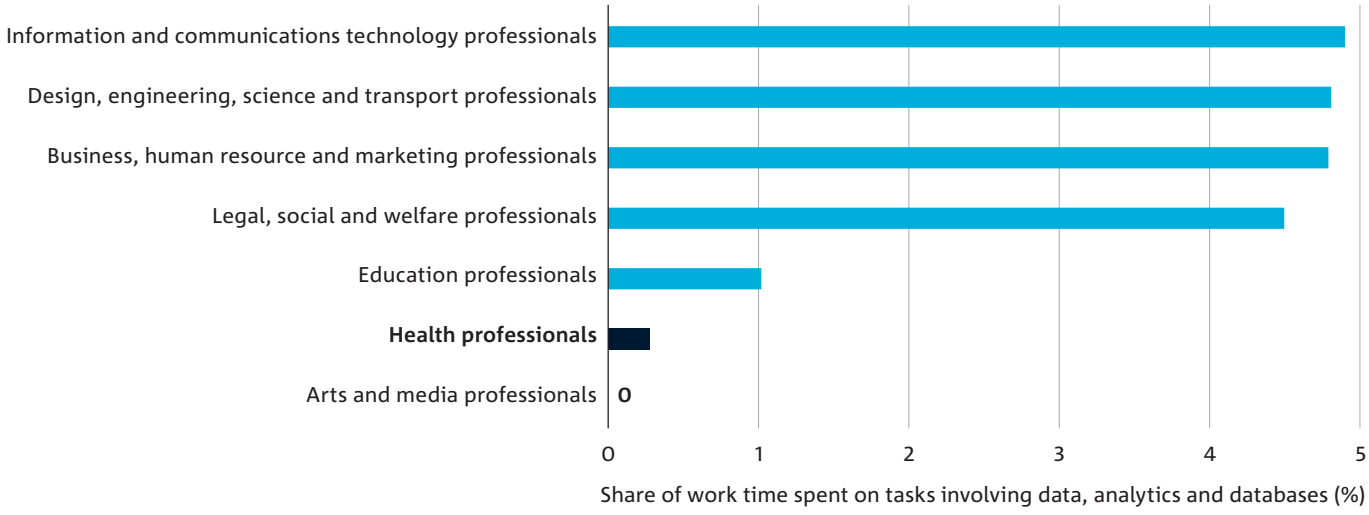


Figure 4. Share of work time spent on tasks involving data, analytics and databases across different types of Australian professionals

Source: JSA [42]

Shifting sources of workforce supply and demand

The changing demographics profile of the healthcare workforce

Demand for healthcare workers continues to increase, with healthcare making up a growing share of employed persons in NSW (Figure 5). The composition of the healthcare workforce in NSW is changing due to several factors. First, the ratio of non-working-age to working-age people is increasing in Australia, meaning that the relative pool of available people of working age is expected to decrease in the coming decades (Figure 6). Second, overseas migration, which has historically been a key driver of population and workforce growth in Australia, is expected to decline significantly in the next decade [43, 44]. In 2021, close to a third of Australian doctors (32.2%) and 18.0% of nurses were trained overseas and this share has remained relatively unchanged since 2013 [45].

These shifting dynamics of labour supply will need to be considered in future workforce plans to ensure the healthcare workforce is equipped to sustainably meet future needs. Initiatives that support healthcare professionals to work to the top of their scope of practice could provide new ways to meet community demand for healthcare services [46]. With workers also retiring later, developing incentives and organisational structures to support this or tapered retirement models could soften the impact of Australia's aging population [47]. Embracing and optimising emerging technologies could provide other avenues to increase workforce capacity and improve efficiencies across the health system [48].

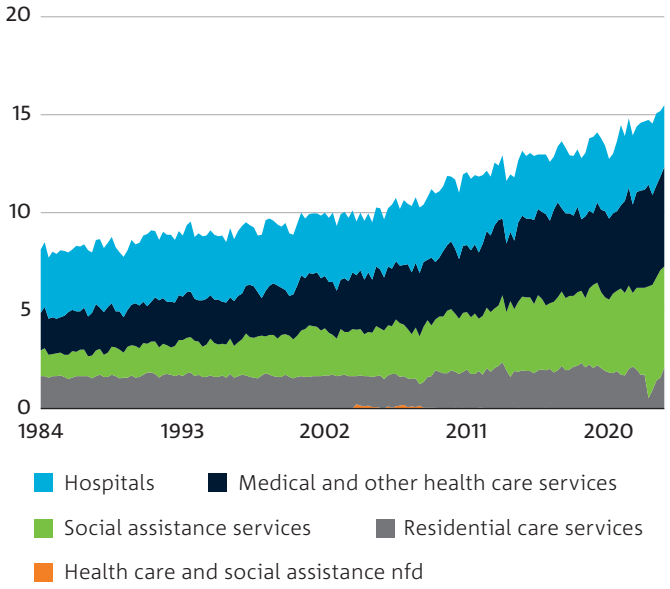


Figure 5. Share of the Australian labour force working in the health care and social assistance sector by subsector

Note: This figure displays the share of employed persons in Health Care and Social Assistance in NSW broken down by the 2-digit Australian and New Zealand Standard Industrial Classification (Hospitals, Medical and Other Health Care Services, Social Assistance Services and Residential Care Services. Health Care and Social Assistance nfd – which makes up a minor share of employed persons in the health care and social assistance sector – incorporates additional sources of employment across the Health Care and Social Assistance industry that are not further defined.

Source: ABS [49]

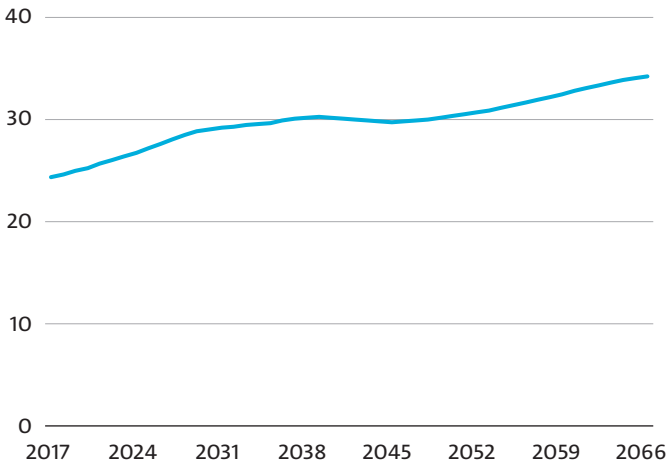


Figure 6. Projected age dependency ratio in NSW

Note: The age dependency ratio is the number of persons aged 65 years and over as a percentage of the working-age population (15–64). A higher age dependency ratio reflects more people of non-working age relative to those of working age. The age dependency ratio is increasing in Australia, meaning that the relative pool of available workers of working age to those of non-working age is expected to decrease in the coming decades.

Source: ABS [50]

Calibrating future workforce supply and demand

The National Medical Workforce Strategy highlights the need to optimise the healthcare workforce to ensure the community has timely access to care and that healthcare workers are supported in rewarding careers [51]. Although the number of medical school graduates has increased nationally, there are maldistributions in the medical workforce [51]. For instance, in line with the geographical distribution of the NSW population, medical practitioners are concentrated in major cities and inner regional areas (Figure 7). This distribution can contribute to access and health disparities; for example, in rural and remote regions, where the proportion of Aboriginal and Torres Strait Islander populations is greater than in capital cities [52].

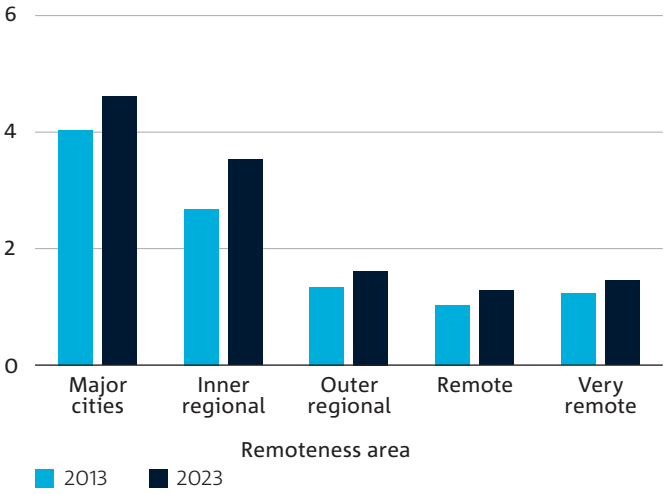


Figure 7. Number of medical practitioners per 1,000 population in NSW by remoteness area

Sources: Department of Health and Aged Care [12] and ABS [54]

In addition to delivering healthcare in the right place, ensuring the right balance of generalist and specialist professionals is also essential. Currently, some specialities are oversupplied (e.g. emergency medicine, cardiothoracic surgery) while others are on track to become undersupplied (e.g. psychiatrists, dermatologists) [51]. Improving access to care in undersupplied areas has long been a driver of virtual models of care, including programs such as the Virtual Rural Generalist Service in the Western NSW LHD [53] (see also *Limitless care*). Understanding how the emerging megatrends shaping the NSW health system will impact future sources of supply and demand will provide an important context for calibrating the future workforce.

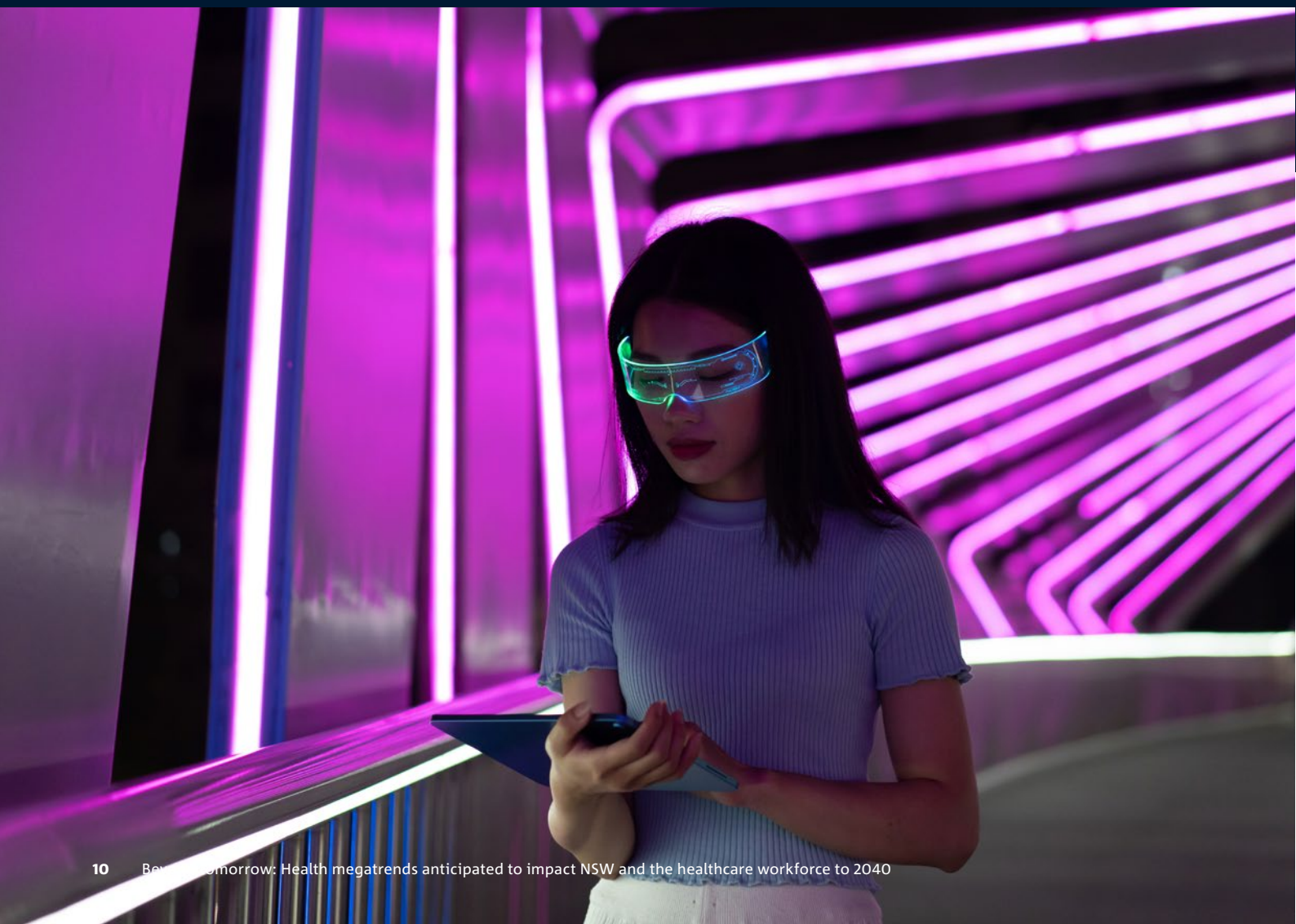
Planning for the future healthcare workforce

These workforce drivers are considered in the context of the broader megatrends shaping the future of healthcare in NSW. When we look at the forthcoming megatrends in light of the workforce imperative, the delivery of care can be planned with to ensure care is delivered to the patients by the right people with the right skills in the right places. Future healthcare workforce plans can be leveraged to prepare for how the healthcare workforce could be impacted by broader system-level changes, but also how the workforce can enable and support the uptake of new healthcare opportunities.

Megatrend 1:
Limitless care

The expanding boundaries of the health system

The traditional boundaries of the health system and clinical spheres are increasingly blurring. Non-traditional healthcare companies are entering the health landscape, catering for diverse healthcare needs and preferences. The uptake of virtual and other digital models of care also continues to expand opportunities to improve access for people unable to travel or who live outside of major cities. These models of care also provide alternative ways of managing chronic conditions or lower urgency needs outside of hospitals. Ensuring these new care models are designed and structured to improve access for historically underserviced and disadvantaged populations will be key to the success of this transition. As the boundaries around the who, where and how care is delivered widens, there are opportunities to reimagine how care is delivered outside of hospitals, medical clinics and aged care facilities and to devise new ways to unlock efficiencies across healthcare teams. The following sections detail examples of trends that form the evidence base for this megatrend.



Corporatisation of health is growing, as is the influence of commercial determinants of health

There is a long-running trend towards the corporatisation of primary care in Australia given the quality, efficiency and accessibility gains it can provide [55, 56]. Beyond primary care, private companies are increasingly investing in healthcare in response to consumer demand for same-day appointments and online delivery models for medicines and other health products [57, 58]. Australian retailers Wesfarmers and Woolworths have acquired and developed bricks-and-mortar pharmacies, health insurers, telehealth service providers and digital diagnostic businesses [59]; however, the reverse is true for Walmart in the United States of America (USA) [60]. Another example includes Uber Health, which supports patients and carers to attend in-person healthcare appointments [61]. Alongside this investment is an increasing recognition of the commercial determinants of health, which refers to the role the private sector plays in directly and indirectly impacting population health factors (e.g. targeted marketing of products that can lead to disease) [62]. This is a topic of active policy discussions [62, 63] and additional research is needed to understand ways to encourage positive commercial determinants of health [57].

Virtual care is accelerating and continually expanding, making healthcare more accessible and convenient

Virtual care services can take many forms, improving the access, convenience and, in some cases, cost of care. Although telehealth services have been available for decades, the COVID-19 pandemic triggered a significant extension of these services in Australia and demonstrated the value they bring to healthcare delivery [64, 65]. More recently, emerging forms of virtual care include app-based monitoring for cardiovascular patients [66, 67], hospital-in-the-home programs for acute care [68] and AI-enabled diagnostic tools to triage patients for specialist care [69]. In addition to the clinical value of AI-enabled diagnostic tools like MoleMap, which can diagnose a skin lesion as effectively as a teledermatologist [70], anecdotal evidence suggests that patients value the convenience they deliver. Health equity needs to be a key consideration in the design and implementation of virtual models of care to ensure they do not compound existing health disparities [71, 72]. Moreover, virtual care may not be suitable for all patients, so it should be considered complementary to, rather than a substitute for, in-person services.

Clinical scopes of practice are broadening to better meet demand

Supporting healthcare professionals to work to the top of their scope of practice could provide new ways to meet community care needs [46] and create efficiencies across healthcare teams. Pharmacists in NSW and other Australian jurisdictions can now administer a wider selection of vaccinations [73] and current trials are underway for pharmacists to prescribe selected medications [73, 74]. Other examples of expanded clinical scopes are seen in imaging, where radiographers [75, 76] and emergency department physicians [77, 78] can support the interpretation of imaging results, noting that additional training may be required for the latter. AI-enabled imaging technologies could also support expanded scopes of practice [79]. Future decisions around clinical scopes of practice will likely be influenced by the Australian Government's current consultation into the scopes of practice [46] along with the service preferences of health consumers and carers.

Uptake of remote-monitoring systems and the Internet of Things is increasing

Enabled by the Internet of Things (networks of connected physical and digital objects), clinicians can use remote-monitoring systems to assess, monitor, communicate with and care for patients virtually between visits. When implemented well, these approaches can enable more proactive health management, improve the management of chronic conditions, detect emergencies, reduce hospitalisation rates and provide real-time information to clinicians. Current and local examples include the remote in-home monitoring programs set up by the Western NSW Local Health District (LHD) [80] and eHealth NSW [81]. Advances in connected devices and ambient and wearable sensors can enable more sophisticated remote-monitoring systems that track health and lifestyle metrics. AI can also extend these services by predicting patient behaviour and clinical deterioration [82]. These expansions to remote-monitoring capabilities require new considerations (e.g. data privacy, explainability of AI-driven recommendations [82]) and these systems work best when they are effectively integrated into clinical workflows to minimise burnout and safety risks.

Alternatives are emerging for managing low-urgency care outside of hospitals

Community-based urgent care clinics and all-hours (24/7) health advice hotlines provide supplementary services and alternative entry points for emergency care outside of hospitals. These include the Healthdirect Australia helpline, which provides 24/7 support from registered nurses who can direct callers to a virtual general practitioner (GP) for advice and e-prescriptions [83], and NSW Ambulance's Virtual Clinical Care Centre as a secondary triage for triple zero (emergency) calls to reduce ambulance and emergency department demand [84]. Virtual emergency care is effective in treating people outside of physical emergency departments, with around 70% of the patients able to be effectively managed through the former model [85, 86]. The national COVID-19-dedicated Healthdirect helpline also resulted in a 42–54% reduction in the average treatment cost per patient [87]. The Mount Sinai Virtual Hospital program in the USA extends virtual treatment even further, with nurses providing hospital-level subacute care to patients in their homes and doctors remotely monitoring patients' health condition [88]. These virtual care models provide new ways for cost-effectively treating low-urgency cases and provide alternative employment opportunities for the workforce outside of a traditional hospital setting.

Demand for aged care services delivered in the home is set to increase as the population ages

There has been a marked increase in the number of people using aged care services in a home-based setting since 2017 (Figure 8), when the Australian Government implemented reforms that gave aged care recipients more choice about how they access aged care services [89]. This shift has impacted the demand for healthcare services, with people aged 85 and over who lived outside of residential care in their last year of life using more hospital and Medicare Benefits Schedule (MBS) services, but fewer prescription services under the Pharmaceutical Benefits Scheme (PBS), than those who died at the same age living in residential aged care [90]. As the population ages and this demand continues to grow, there will be the need to scale existing and new home-based aged care services cost-effectively along with the healthcare workforce required to support this. New approaches are already emerging to help hospitals and healthcare services to work collaboratively with home care providers.

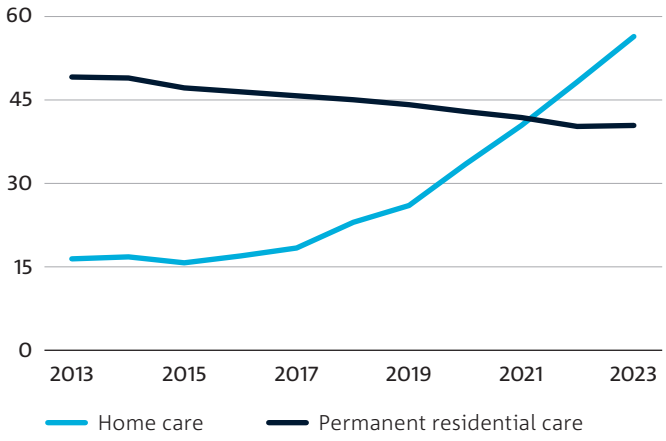


Figure 8. Number of people per 1,000 population using aged care services in NSW by care type

Source: AIHW [91]

Early signals of change to monitor

- **Community-based care models for aged care:** There is a range of local and global examples of models of care that aim to strengthen the interface between the health system and aged care providers. Examples include the USA-based Program of All-Inclusive Care for the Elderly (PACE) developed by community-based organisation On Lok [92], the CAPABLE (Community Aging in Place – Advancing Better Living for Elders) program by John Hopkins University [93] and the Mercy Virtual Care Program [94] as well as the Virtual Rural Generalist Service of the Western NSW LHD [53]. Future programs implemented in NSW should consider impacts on healthcare and community care settings and workforce capacity [95].

Questions for the future healthcare workforce

WORK

How will existing clinical workflows need to be redesigned to sustainably accommodate new virtual care and remote-monitoring capabilities?

How might teams review virtual and face-to-face work tasks to prioritise or redistribute work to the available clinical and clinical support roles?

How can public healthcare services and employment models be structured alongside private-sector options to best cater for consumers' diverse needs while maximising the coordination of care across sectors?

WORKPLACE

How could workplaces be designed to support different and more innovative models of care and what new workforce capabilities would be required?

How could virtual models of care and supporting digital technologies be leveraged to expand the scope of training opportunities outside of capital cities and regional centres?

How can a positive workplace culture and social connections between clinicians, patients and carers be maintained over distributed work and care environments?

WORKFORCE

What new roles and capabilities will be needed to support consumers outside of traditional healthcare settings as existing and emerging virtual, digital and community-based models of care gain momentum?

How could the contemporary employee value proposition for working in the NSW public health system be reimagined in line with emerging workforce drivers and community needs?

Megatrend 2: Empowered consumers, engaged communities

Leveraging consumer empowerment and community engagement in care

The expectations, preferences and behaviours of health consumers and carers continue to evolve, and they are more than ever central to the design and delivery of integrated, person-centred healthcare. These shifts mean that consumers and carers can play a more informed and proactive role in their health. With increasing access to health information and data, there are emerging opportunities to further expand consumers' access, use and control around how their health data are shared. There is a role for the healthcare workforce in improving health literacy, creating cultural safety and helping consumers make informed decisions in areas like complementary medicine and seeking treatment overseas. There is also the potential to expand the consumer focus through community-focused approaches, particularly in advancing health equities across socially disadvantaged, culturally and linguistically diverse (CALD) and Aboriginal and Torres Strait Islander populations.
The following sections detail example trends that form the evidence base for this megatrend.

Health literacy levels have shown signs of improvement but remain low in vulnerable groups

Health literacy refers to an individual's ability to access, understand and use health information to make decisions that will impact their health [96]. The latest national survey of health literacy found that Australians have good health literacy across several dimensions (Figure 9). While measures of health literacy have not been consistent over time, this 2018 assessment indicated an improvement from 2006, when 40.5% of Australians aged 15–74 rated their health literacy as adequate or more than adequate [97]. Health literacy tends to be lower in people who live alone or have multiple comorbidities and those of low socioeconomic status or from an Aboriginal and Torres Strait Islander or other CALD population [98–100]. Continued efforts to improve health literacy in more vulnerable groups will help improve engagement and navigation of the health system and ensure that all consumers and carers feel empowered in the decisions they make around their health.

Sources of online health information continue to expand, requiring consumers to know how to discern credible sources

Electronic medical records, internet search engines, social media and AI-enabled chatbots continue to expand the range of online health information, with two-thirds of Australians turning online before seeing a doctor or pharmacist [101]. While these online channels can be used by evidence-backed health organisations to rapidly disseminate information to the public, they also be used to spread health misinformation [102]. This potential risk can be overcome by supporting health consumers and carers – particularly those with lower health literacy levels – to engage with and identify credible sources of health information [103]. The healthcare workforce can play a role in health education and sharing credible health information online, including support around managing privacy and legal concerns [104]. User-generated content and influencer marketing can also be leveraged to curb harmful health behaviours, as is being trialled through the Australian Government's anti-vaping social media campaign [105].

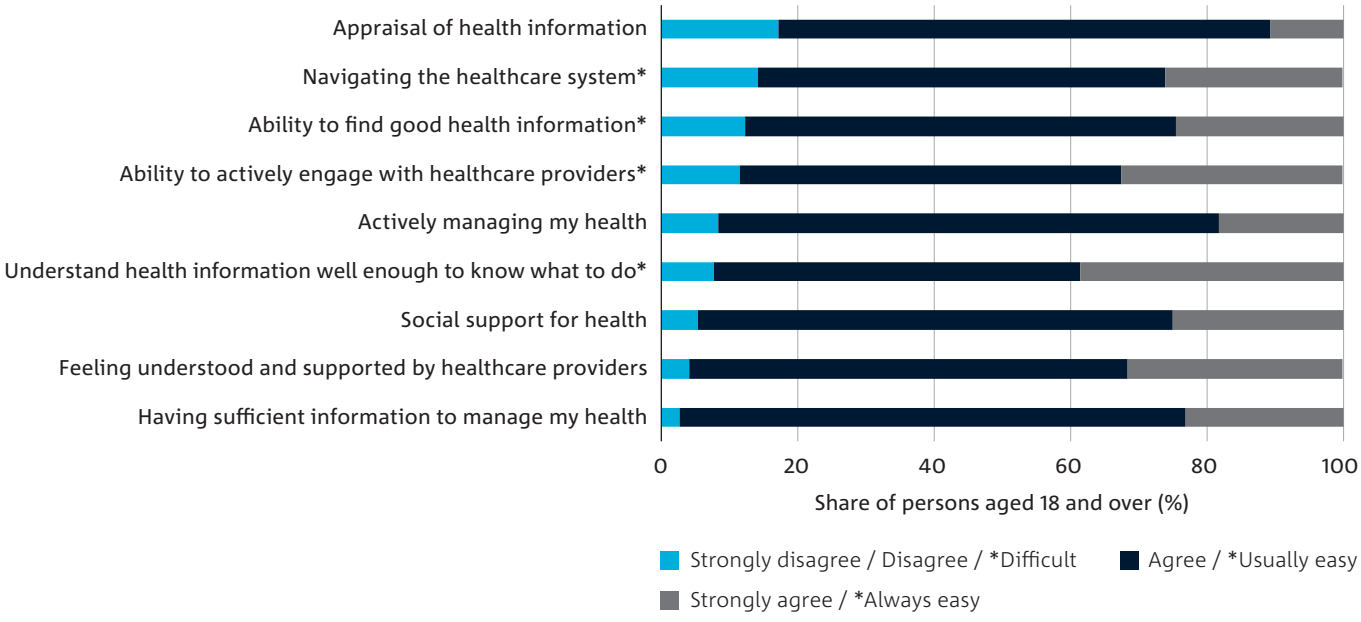


Figure 9. Share of the Australian population by nine health literacy domains, 2018

Note: Two different response scales were used across these nine health literacy domains. Asterisks denote domains that were responded to on a scale with the options 'Difficult', 'Usually easy' or 'Always easy'. The remaining items were responded to using a scale ranging from 'Strongly disagree' to 'Strongly agree'.

Source: ABS [98]

Use of complementary medicine is showing a sustained rise alongside Western medicine

Engaging in complementary and alternative medicine and healthcare practices can include taking vitamin supplements or minerals, herbal supplements, or receiving Chinese medicine or naturopathic treatments [106]. There is also a growing community of people in Australia and overseas who engage in 'biohacking', whereby they experiment with novel diet or lifestyle changes to improve personal health [107]. Two-thirds of Australians use some form of complementary medicine, and this is more prevalent in people with a chronic disease diagnosis (70%) [108]. Pharmaceutical companies are responding to this demand for alternative, natural treatments. For example, Haleon (the company behind Panadol) has released a plant-based, non-paracetamol-based pain relief medication PanaNatra [109]. While some Australian hospitals provide complementary medicine services in areas such as cancer treatment, this is low (25%) and only 16% have policies for patient-initiated complementary medicine [110], even though these treatments can interact with prescribed medicines. Boosting engagement between complementary medicine and traditional healthcare providers could support the coordination of care and minimise adverse or inappropriate therapies [111].

Uptake of private health insurance remains low in younger consumers

Private health insurance coverage rates in NSW vary significantly by age group, with people aged 70 years and over being the only age groups that have seen increased uptake over the past decade (Figure 10). Coverage in younger age groups (39 years and younger) was on the decline before the COVID-19 pandemic and has largely stabilised since. Low uptake of private health insurance is likely driven by a perceived lack of value for money, with younger individuals using fewer healthcare services than those in later years of life. Rises in the cost of living are likely reinforcing this trend: 81% of respondents to a Finder survey changed their health insurance in the last 12 months due to cost-of-living pressures [112]. If younger generations of health consumers choose to forgo private health insurance in later years of life, this could place more pressure on the NSW public health system and its workforce.

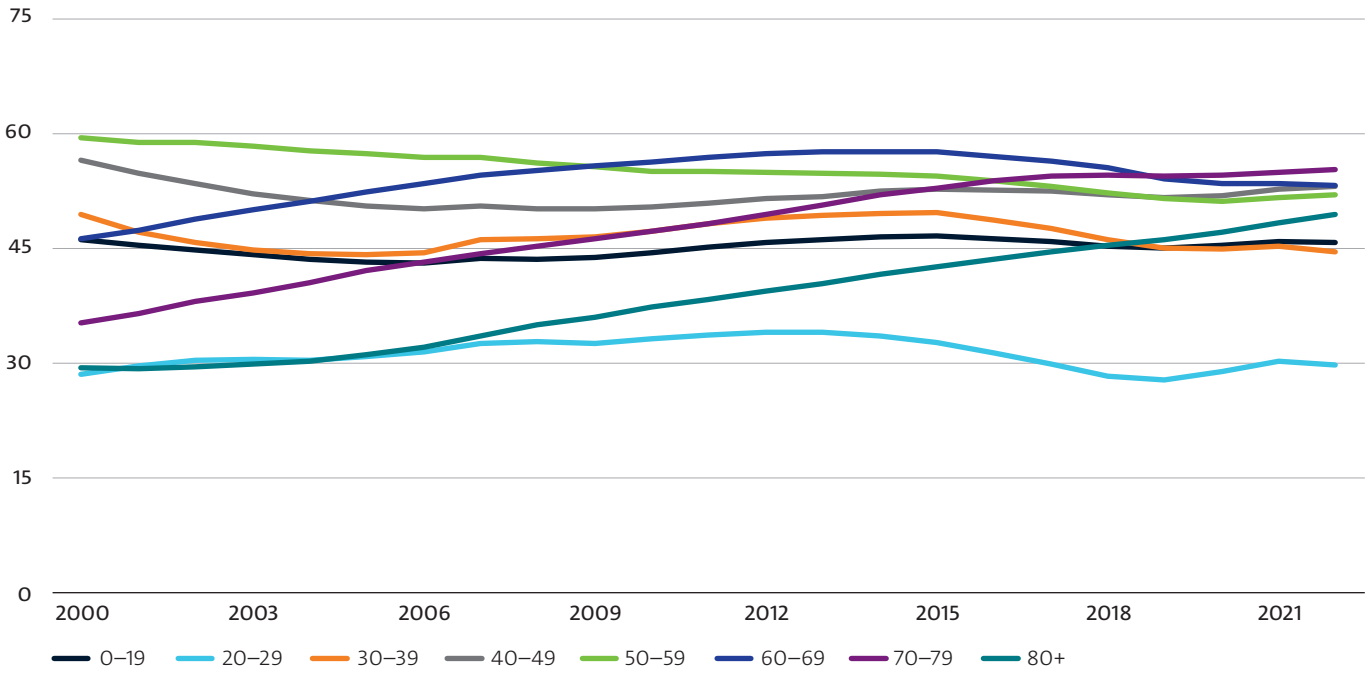


Figure 10. Percentage of NSW population with health insurance membership by age group (in years)

Sources: APRA [113] and ABS [114]

Consumers are seeking healthcare services overseas

Health consumers may seek healthcare services overseas (known as medical tourism) to reduce costs or waiting times or gain access to services that are not available in Australia [115, 116]. Although there are government-supported programs for Australians requiring life-saving treatment not available locally [117], cosmetic surgery, dentistry, heart surgery, fertility treatments, surrogacy, gender-affirming surgery, stem-cell therapy and cancer treatments are the most common procedures for which Australians go overseas [118]. Medical tourism can be risky in cases where treatments are not regulated or evidence-based and these procedures can lead to significant complications and adverse effects [119], which may fall on the NSW health system to manage. With an estimated 15,000 Australians seeking medical treatments overseas each year [120], there is a need to better understand how this impacts the NSW health system. The healthcare workforce will need to be prepared for these varying presentations and the shifts in consumers looking for global, cost-efficient solutions for their healthcare needs.

Increasingly diverse communities require a diverse healthcare workforce and community-based approaches

NSW is one of the most culturally diverse states globally, with 50.3% of people having at least one of their parents born overseas in 2021 (44.7% in 2011) and 28.0% speaking a language other than English at home (27.5% in 2011) [3, 121]. As demand for healthcare grows in CALD populations in NSW, there will be an increasing need to consider ways to support clinicians in providing culturally appropriate care [122]. Recruitment strategies that ensure the diversity of the community is reflected in the healthcare workforce can improve cultural safety in the health system and support patients in engaging with healthcare services and broader transitions into Australian society [122]. This could include new roles, such as cultural mentors, which have been shown to improve CALD patient experiences and confidence and knowledge in managing health-related tasks [123]. Community-focused approaches are also commonly used in health promotion and prevention for CALD populations [122, 124]. These approaches present opportunities to overcome the challenges that can arise in providing culturally appropriate care to CALD populations [122].

Increasing efforts are essential to improve the health outcomes for socially disadvantaged populations and communities

Australians living in the most disadvantaged socioeconomic fifth of the population experience a higher burden of disease than those in other socioeconomic groups [125] and are more likely to engage in poorer health behaviours, including smoking, risky alcohol consumption and insufficient physical activity [125]. The growing cost-of-living pressures are also impacting consumer health decisions, such as delaying or skipping care, which could further exacerbate these socioeconomic challenges [126]. Significant health disparities also exist between Aboriginal and Torres Strait Islander and non-Aboriginal and Torres Strait Islander Australians [127]. Overseas programs such as the United Kingdom's National Health Service (NHS) Health Check program – where individuals are periodically invited for a health check by their GP or local council – have been effective in detecting chronic health conditions and reducing longer term multimorbidity in socially disadvantaged populations [128, 129]. The Aboriginal and Torres Strait Islander Australian healthcare workforce and Aboriginal and Torres Strait Islander community-controlled organisations are also fundamental in advancing Aboriginal and Torres Strait Islander health equity, along with Aboriginal and Torres Strait Islander community engagement [130, 131] and strengths-based approaches [132].

Early signals of change to monitor

- **Legislative changes on consumer data use:** In the USA, the 21st Century Cures Act allows patients to choose how their health information is shared [133], and the State of Washington passed the My Health My Data Act which also allows consumers to confirm with whom their health data can be shared or sold or have their data deleted [134]. These legislative changes empower consumers to play a stronger role in managing their health data and decisions relating to their health.
- **AI-powered consumer health devices:** Consumers have access to a plethora of mobile apps and wearables for monitoring their health, including smartwatches and rings, health-tracking apps, e-patches, e-textiles and e-tattoos. Digital health applications are also leveraging AI to analyse user activity levels, nutrition intake and sleep patterns for personalised health and fitness advice [135] or to predict fluctuations in glucose levels in people with diabetes [136].
- **Unhealthy health-tracking behaviours:** For some consumers, the obsession with their health data has given rise to emerging conditions, such as orthosomnia (an unhealthy preoccupation with sleep-tracker data and the 'perfect' sleep [137]). There is the risk that this preoccupation with sleep-tracking data can lead to insomnia, a diagnosable sleep disorder characterised by symptoms such as struggling to fall asleep at night, waking throughout the night or drowsiness after a night's sleep [137]. These societal phenomena will need to be monitored, particularly in more technology-savvy cohorts.

Questions for the future healthcare workforce

WORK

What innovative approaches could be considered to empower clinicians and other healthcare experts to share trusted health information online and improve consumers' online health literacy skills?

As consumers and carers seek greater access and control over their health data and bring their own data to health appointments, how will these health insights be accommodated and leveraged in existing clinical workflows and systems?

WORKPLACE

How could the knowledge and capabilities of staff from diverse backgrounds be leveraged to enhance culturally safe care environments and capability uplift across the healthcare workforce?

WORKFORCE

What new roles and capabilities should be considered to support coordination of care across existing and emerging person-centred and community-based models of care?

What novel recruitment strategies and partnerships (e.g. conjoint positions) could be considered to attract diverse candidates to ensure that the healthcare workforce reflects the diversity of the community?

Megatrend 3:
Mass personalisation

Expanding opportunities to personalise health prevention and treatment

Bioengineering, genomics, AI and other precision medicine technologies continue to provide new ways to personalise treatment, monitor health conditions and predict the risk of disease. These technologies are fuelled by the ever-growing big data in healthcare, giving rise to data-driven health systems that support more individualised approaches to acute and preventive care. For instance, 3D printing is already being used to create personalised implants and prosthetics and this could be expanded to more advanced bioprinted materials in the future. As precision medicine is scaled beyond clinical trials and embedded into routine practice, it will be important to consider the costs associated with these new therapeutics to ensure they are financially sustainable and equitable. The healthcare workforce can play a key role in translation from research to practice. The following sections detail example trends that form the evidence base for this megatrend.

Momentum is growing towards personalised and effective data-driven health systems

The strong uptake of digital healthcare services and electronic medical records (Figure 11), genomics, imaging, sensors and wearables is generating a growing volume, velocity and variety of healthcare data [138]. Siloed health data systems have limited the full utilisation of these data, but new standards for clinical terminology – for example, SNOMED CT-AU (Systematized Nomenclature of Medicine – Clinical Terms, Australia) and Australian Medicines Terminology – and health data interoperability standards (e.g. Fast Healthcare Interoperability Resources) provide new avenues to harmonise data and help clinicians and researchers engage with health data more effectively [139]. The National Healthcare Interoperability Plan is also underway [139]. The creation of data-driven health systems will help enable greater adoption of personalised and effective clinical decision-making and tailored population health campaigns, including those focused on specific populations.

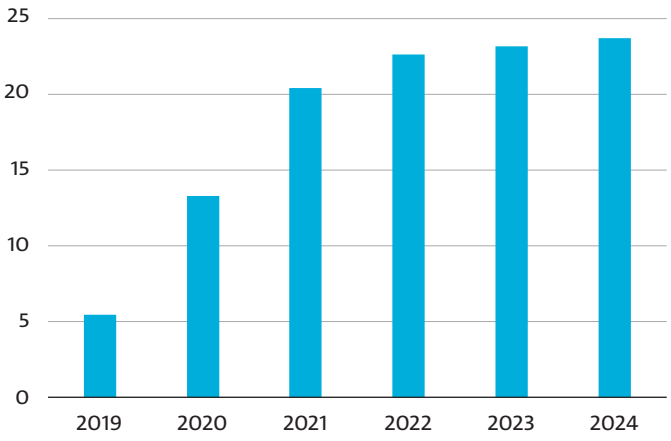


Figure 11. Number of My Health Records in Australia (in millions) as of January of each year

Source: ADHA [140]

New frontiers for precision medicine are emerging alongside expanding initiatives to embed it into routine practice

Precision medicine uses variability in genetics and the environment and lifestyle of people to predict responses to treatment and prevention strategies [141, 142]. Precision medicine 'search engines' have also been developed to help clinicians find treatments that match an individual's genetics among a vast body of literature and clinical trials [143], along with 'knowledge graphs' that provide a multimodal view of diseases [144]. The next frontier of precision medicine could include multi-omics technologies: when 'omics' is applied to a molecular term (e.g. genomics, proteomics, microbiomics), it implies a comprehensive assessment of a set of molecules or a molecular process [145]. However, data leveraged from various omics methods have greater computational requirements [146]. Future advances in computing power could come from ongoing advances in existing technologies (e.g. graphical processing units and cloud computing) or quantum computing, which has the potential to perform calculations exponentially faster than modern computers [147]. Various state and federal initiatives in Australia have been introduced to make genomic diagnostic testing part of routine practice [148–151]. In implementing precision medicine approaches, it is important to consider the financial, equity, capability, infrastructure, social acceptance, and regulatory dimensions of these therapeutic approaches [142, 152–154].

Precision medicine is expanding to include precision health

Precision health uses the same techniques as precision medicine to predict future disease risks or detect early signs of illness and identify personalised, proactive health interventions [155]. In addition to genomic, physiological and biochemical data, precision health also draws upon behavioural, psychological, environmental and lifestyle data to build a complete picture of a person's health and wellbeing [156]. Technologies that collect and aggregate meaningful data from real-world environments – including smart sensors and smart homes, wearable devices and ambient assisted living systems that continuously monitor health-related variables and detect abnormal events – enable further advances in precision health [155]. The 'All of Us' Research Program in the USA aims to collect comprehensive health data from over one million people to create a data repository that enables researchers to leverage these big data to individual differences in the development, prevention and treatment of disease [157]. The growing popularity of personalised health could involve a greater role of wearable devices and other technologies in the monitoring, screening, detection and prediction of health outcomes in the future [158].

Bioengineering is opening new ways to diagnose, treat and monitor injuries and illness

Real-time monitoring of acute and chronic diseases via implantable, wearable and ingestible medical devices is a powerful tool for personalised disease and illness management [159]. For example, cardiac implantable electronic devices are widely used to monitor, detect and treat various heart conditions [160, 161]. Many of these applications can also be used to predict and prevent deterioration and hospital admissions and increase engagement in healthy activities for those with chronic conditions [160, 161]. Emerging innovations can provide an oral insulin alternative for people with diabetes [162] and micro-wearable sensors for monitoring key health signals [163]. Cost will be a key consideration for public health systems in rolling out these types of technologies across different NSW LHDs [153], along with how to best integrate these new tools into current clinical workflows.

Bioprinted human tissue and organs are presenting new avenues for personalising treatment

Breakthroughs in 3D printing technologies are expected to transform treatment across a range of conditions and diseases [164]. Many Australian hospitals, research centres and universities have established 3D printing facilities to service the healthcare sector [165–168]. Currently, 3D printing and scanning technology can be used to create personalised implants, prosthetics and assistive devices [169]. In the future, this could be expanded to bioprinted human tissues and organs to treat injuries and diseases ranging from burns to heart disease [170].

Recently, researchers have been able to print heart chambers that can beat on their own [171]. There are still various technical challenges associated with using bioprinted materials in humans, as well as consideration of the broader affordability, moral and ethical concerns, and legal and governance considerations of these technologies [169, 170]. Like other areas of precision medicine, these factors will need to be considered in realising the full potential of 3D printing for healthcare.

There is a growing need for research translation capability in the healthcare workforce

The process of translating health innovations from initial discovery into clinical practice takes an average of 17 years [172, 173]. The healthcare workforce is a key driver behind research translation, but health professionals often lack the knowledge and skills to organise, examine and utilise research literature, as well as the time or authority to put learnings into practice [174, 175]. Implementation science has been a key focus in closing the gap between discovery and practice in healthcare. The Australian Health Research Alliance has highlighted the important role of ‘research translators’ as a key workforce capability that could help close the gap between research and practice [39]. These are frontline healthcare professionals who drive the integration of evidence and innovation into healthcare delivery. Jurisdictions like the United Kingdom, USA and Singapore have invested in research translator capabilities to close this translation gap [39].

Early signals of change to monitor

- **Leveraging electronic medical records for precision health:** Electronic medical records provide a rich longitudinal record of a patient's health, consisting of both structured and unstructured data that can be used to predict health conditions. Example applications include 'Foresight' (not to be confused with the discipline of strategic foresight), a generative-AI-powered tool that is trained on electronic medical record data to forecast future medical events and simulate different interventions [176]. Such applications could reflect the next frontier of personalised clinical decision support tools that utilise electronic medical record data, including the Single Digital Patient Record introduced in NSW [177].
- **Best practice models of value-based personalised healthcare:** Value-based healthcare presents an alternative mechanism for personalising care, while mitigating against unnecessary, low-value or unsustainable healthcare [178]. NSW Health has trialed and evaluated a range of value-based models of care programs [179]. The USA-based Intermountain Health network is an internationally recognised example of a successful transition to value-based precision care [180], which could provide further learning. The not-for-profit organisation has reduced the cost of care by US$700 million in 2016 (while improving patient outcomes) by directing complex cases to multi-specialty clinics, using health data to identify and proactively care for high-risk patients and introducing health prevention into primary care plans [181–183].

Questions for the future healthcare workforce

WORK

What is the appropriate model for embedding and strengthening research translation capabilities across the healthcare workforce (e.g. through dedicated 'research translator' roles or scaled as a key capability across the healthcare workforce)?

How could existing workforce capabilities that support research translation activities be amplified?

What other capabilities (e.g. cloud or quantum computing, AI, 3D printing, etc.) will the healthcare workforce need to effectively use precision medicine approaches as part of routine practice?

How can the NSW health system build upon the learnings and gains across value-based healthcare trials conducted in NSW and in other jurisdictions and embed a thriving culture of adoption and adaptation?

WORKPLACE

How might precision medicine approaches change care environments and where and how treatment is provided to patients?

WORKFORCE

What new roles and collaborative partnerships could be introduced to help close the translation gap for precision health innovations? What are the synergies between precision health and predictive workforce planning?

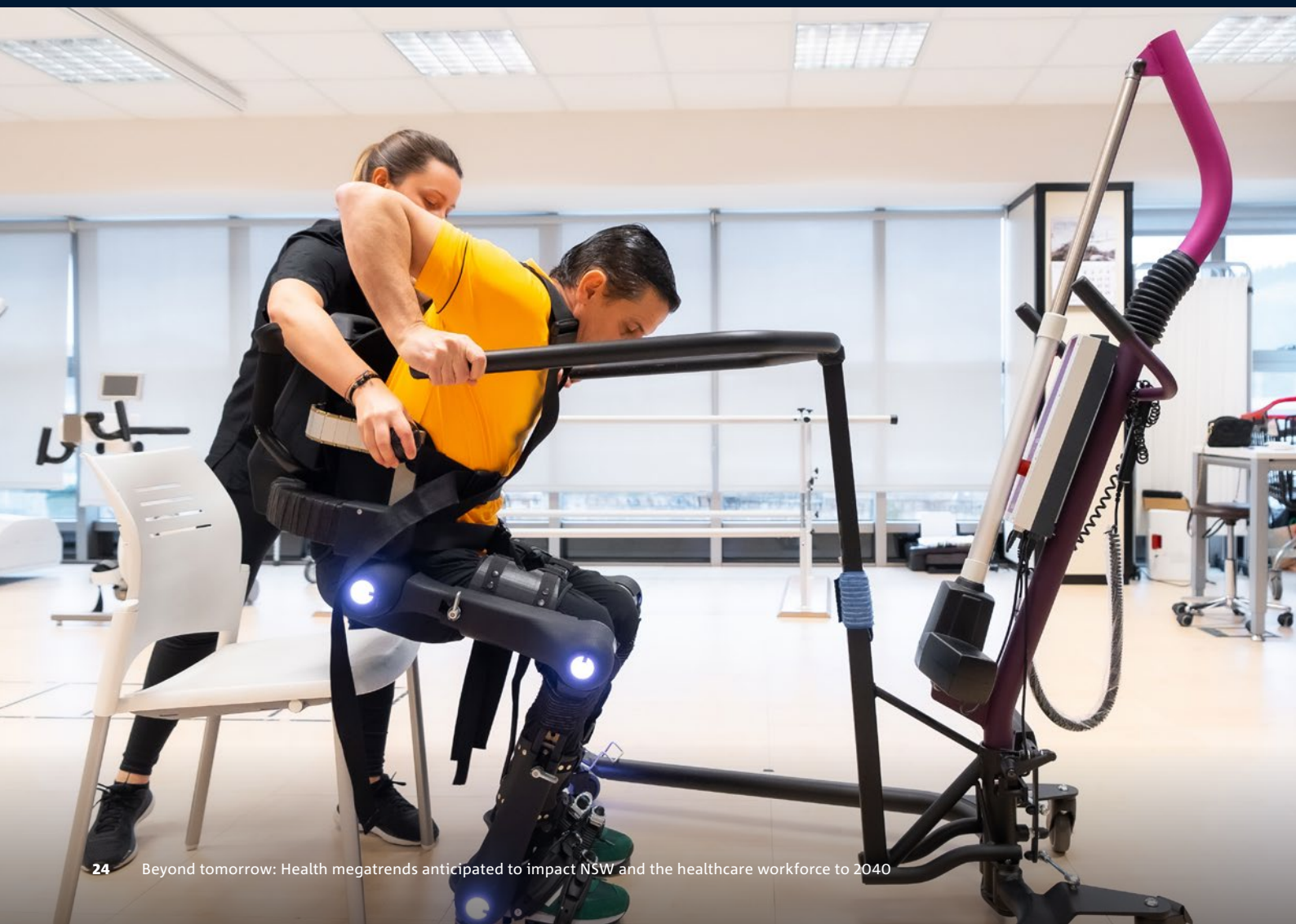
What is required to ensure access to precision medicine and other emerging therapeutics is equitable for the healthcare workforce across NSW LHDs?

How can 3D printing and other precision medicine models be leveraged to support rural and remote workforce opportunities, both for education and training but also as part of models of care?

Megatrend 4: Augmented care

Collaborating with AI and other digital technologies in healthcare

Advances in AI, robotics, digital twins and platform technologies are providing new ways to improve the efficiency of healthcare services and administration, support clinical decision-making and enhance patient experiences and health outcomes. These emerging innovations open opportunities for the health system to increase its capacity to respond to the growing demand for healthcare services via an augmented healthcare workforce in which clinicians, administrative staff and other healthcare staff work collaboratively with technology. A key component of this transition will be ensuring that care remains safe, equitable and high-quality and that the human connection between patients and clinicians is maintained. The following sections detail example trends that form the evidence base for this megatrend.



Generative AI is unlocking new companion tools for clinicians and consumers

The introduction of OpenAI's ChatGPT in 2022 sparked a significant surge in interest in generative AI and large language models (LLMs, Figure 12) [184], enabling new companion tools for clinicians and consumers.
For consumers, the World Health Organization's generative AI assistant, S.A.R.A.H. (Smart AI Resource Assistant for Health), can support the dissemination of public health information [185] and Thrive AI Health plans to develop a personalised AI-driven health coach [186]. Other use cases for generative AI include virtual assistants to help clinicians streamline clinical documentation and other administrative tasks, source up-to-date evidence and personalise treatment at the point of care [187]. Suki AI and Lyrebird AI are examples of voice-based AI assistants that leverage voice-to-text tools to interpret the clinician's voice commands and patient conversations to create clinical notes [138, 188]. As LLM capabilities continue to expand, they have the potential to revolutionise clinical decision-making and redesign clinical workflows.

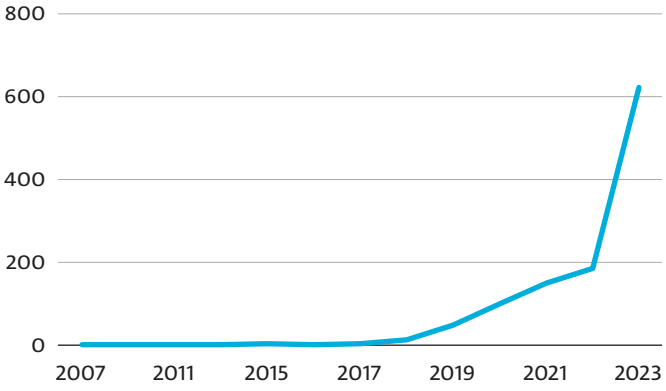


Figure 12. Number of search results published in the biomedical literature database PubMed that refer to chatbots, June 2023

Source: National Library of Medicine [189]

Hospitals, pharmacies and medical laboratories are embracing robotics

Service robots (e.g. pharmacy dispensing, laboratory automation and sanitation) and surgical robotics are currently the most common types of robotic applications in healthcare [190]. For example, robotic pharmacies have been implemented at the Hornsby Ku-ring-gai Hospital in Sydney [191] and other Australian hospitals [192, 193]. While the cost of robotic-assisted surgery is not currently offset by improved patient or system-level outcomes [194], it is expected to become more cost-effective with ongoing technological developments [190]. Emerging robotic developments, combined with advances in AI, are also improving how robots interact with humans and their environment [190]. These advances are enabling new logistics robots, wearable robotics for rehabilitation or to support people with a physical disability (e.g. exoskeletons, robotic limbs and bionics), robot companions, micro- and nanorobotics and telepresence robots that can be used via telehealth [190]. Recent progress in AI and related technologies could also enable the development of robots that provide care and companionship to the elderly [195].

Opportunities are emerging to use digital twins to improve clinical and operational decision-making

A 'digital twin' is a virtual model of a real-world artefact, whether that be a system, object, person, place or process [196]. Digital twins of the human body can be used to model the effects of different therapeutic interventions, medications or lifestyle choices. CSIRO is developing a methodology to develop patient- and cohort-level digital twins [197] and Telstra Health is developing Australia's first digital-twin-enabled chronic disease registry in the Pilbara region of Western Australia to test new healthcare strategies and interventions [198]. Digital twins can also be used to simulate and optimise decision-making across administrative departments and clinical workflows.
CSIRO is developing a digital twin of the Queensland Health statewide patient flow control room [199] and Health Infrastructure NSW has used a digital twin to redesign a major hospital emergency department to align with future demand and community needs [200]. Digital twins could increasingly be used to support the NSW health system in augmenting the future design of care, workforce roles, clinical environments and workflows.

Use of platforms and predictive analytics to streamline health administration is growing

Predictive analytics and simulation approaches are increasingly being deployed in healthcare settings to improve health system administration and support precise decision-making at the point of care. Examples include the use of time series models to predict demand for services [201] and simulation models to improve hospital flow [202], theatre management [203] and outpatient clinical management [204]. Digital health platforms are also being used to support appointment scheduling, billing and connecting health consumers and carers with healthcare providers [205]. These platforms can help reduce the healthcare administrative load and provide a more streamlined patient experience. AI can also help with recruitment processes [206] and inventory management for supplies and equipment [205]. Finally, blockchain technologies have been proposed as a potential solution for tracing medical supply chains [207]. These digital applications present opportunities to support and augment the operational side of healthcare.

There is a growing focus on safe, equitable and responsible AI applications in healthcare

Ensuring AI in healthcare is safe, trustworthy, effective and responsible is a critical requirement of current and future applications. These are core features of AI in healthcare roadmaps in Australia [208] and overseas [209, 210], including the increasing need for governance, safety and quality standards and ethical and risk-based safety frameworks for AI in healthcare. With only 44% of Australians feeling that the benefits of AI will outweigh the risks, AI applications in healthcare need to be implemented in a way that builds trust and acceptance among health consumers, carers and clinicians [211]. A promising avenue to achieving this is by improving the explainability, transparency and interpretability of these models [212]. To this end, there have been increasing efforts in using explainable AI for clinical applications to improve the transparency of AI outputs and clarify how decisions are made using these insights [213].

AI is predicted to increasingly augment, but not automate, the healthcare workforce

Automation can make repetitive or routine tasks safer or more efficient. For example, AI can assist radiologists in faster and more accurate extraction, analysis and interpretation of medical images, while reducing scanning time and clinician burnout [138]. Given the amount of time healthcare workers spend caring for and assisting others, many current and emerging AI applications will likely form part of collaborative clinical workflows. Healthcare professionals will probably have a medium-to-high level of AI exposure (Figure 13), meaning that most roles will be augmented by AI. While technology and innovations can enhance healthcare service capabilities, human interaction will remain a key element of patient wellbeing [214]. The effective integration of AI and other digital technologies into clinical and non-clinical workflows will depend on understanding how current ways of working could be augmented and co-designed in collaboration with clinicians, technology providers and consumers.

Early signals of change to monitor

- **Multimodal AI for richer patient insights:** AI-powered tools are increasingly capable of detecting, diagnosing and predicting early signs of illness and are likely to have an increasingly critical role in healthcare [215]. Multimodal AI is in the early stages of being used in healthcare; this combines multidimensional biomedical data and makes it easier for clinicians to interpret [216]. These approaches present opportunities to gain a deeper understanding of an individual's biology and health [216].
- **Augmenting medical training using technology:** Virtual and augmented reality technologies are increasingly used in Australian tertiary hospitals to practise procedures in a psychologically immersive and clinically safe environment [217, 218]. Generative AI can expand this further, allowing medical students to interact with, and treat, virtual patients [187]. These applications present dual opportunities to develop digital capabilities in using AI and other digital health systems while maximising these technologies to provide more immersive learning experiences.

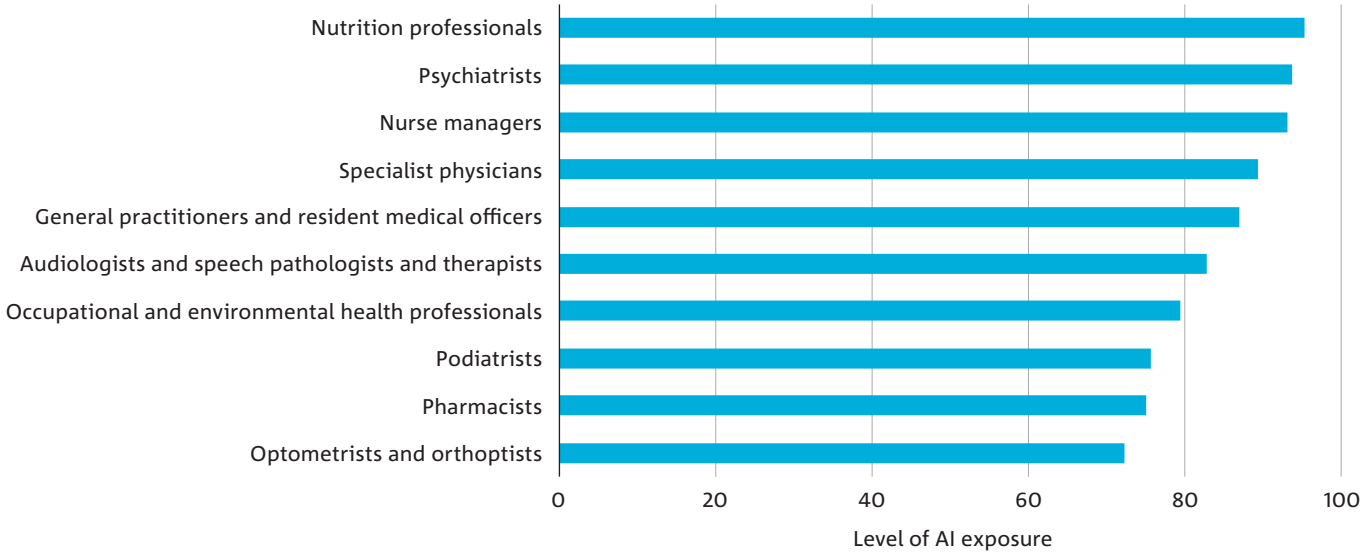


Figure 13. Level of exposure to AI in the healthcare industry by the top 10 most-impacted healthcare professions

Note: The level of AI exposure measure ranges from 0 (no AI exposure) to 100 (high AI exposure).

Source: Felten et al. [40]

Questions for the future healthcare workforce

WORK

How might AI and other digital solutions change the skill and capability requirements across the NSW public healthcare workforce? How can these be introduced, updated and prioritised?

What professional frameworks or mechanisms could bolster clinicians' awareness, knowledge and trust in AI and help build consumers' trust when AI is used as part of healthcare service delivery?

If predictive analytics increases consumer demand for preventative health approaches and early indicators of health degradation, how ready is the healthcare workforce to respond to this need?

WORKPLACE

What infrastructure is required to support the healthcare workforce and consumers to use AI and emerging digital solutions?

What systems need to be employed to monitor and track the current and emerging impacts of using AI and other digital solutions in healthcare?

How can workforce planners leverage digital twins and other immersive technologies to explore and test different workplace designs to ensure they align with future workplaces and care needs?

WORKFORCE

How could future collaborative human–AI clinical workflows be designed to promote positive job satisfaction and provide sufficient time for clinicians to connect with patients, carers and other clinicians?

How can the NSW public health system work with education and training providers to identify emerging roles and capabilities and co-design future learning and professional development pathways?

Megatrend 5:
A volatile world

The impact of external disruptions on the health system

Unprecedented impacts of climate change, infectious disease outbreaks, global disruptions and heightened cybersecurity risks present a high degree of volatility and uncertainty for the NSW health system. From a climate perspective, increasingly frequent and more extreme weather events can have significant and acute impacts on the health system. From a trade perspective, global disruptions to Australia's existing medical supply chains can halt or slow access to critical goods. Any one of these events can be highly disruptive, but increasingly these events are occurring in parallel or close succession, creating an imperative for the health system and its workforce to build resilience to these external shocks. The following sections detail example trends that form the evidence base for this megatrend.

A more volatile climate could heighten the strain on public healthcare services

Severe weather events can strain public health systems, leading to more ambulance callouts, hospital visits and admissions, deaths and long-term mental health impacts [219, 220]. Regions such as the Northern NSW and Western Sydney LHDs are disproportionately impacted by these events (known hotspots for climate disaster declarations and extreme heat, respectively) [220–222], along with more vulnerable populations (rural and remote populations, older adults, people with disabilities and chronic illness) [223]. Health prevention campaigns (e.g. NSW Health's 'Beat the heat' initiative [224]) can be used to mitigate the impact of extreme weather on the community and data analytics can map heat stress vulnerabilities to reduce hospital demand and better manage risks [225–227]. Climate-related impacts on the healthcare workforce need to be factored into future workforce plans, both given the impact they have on demand for acute hospital services and long-term mental health impacts, and the capacity to attract healthcare workers to disaster-prone areas [228].

The healthcare sector has a growing role in climate action

The Australian healthcare sector accounts for 5.3% of national greenhouse gas emissions [223]. Most of these emissions come from the production and transportation of medicines and machinery used in healthcare [229, 230], the energy used to run healthcare facilities, staff commutes and business travel, and the use of certain anaesthetic gases and metric inhalers [229]. Promising options for the healthcare sector to reduce emissions include procurement practices [231], reducing unnecessary and energy-intensive diagnostic imaging [232] and opting for lower-emission anaesthetic gases and inhalers. The Australian Government has joined the USA and United Kingdom in committing to decarbonising global medical supply chains [233], which account for roughly 75% of the sector's carbon footprint. Proactive climate mitigation and adaptation efforts in healthcare are important in managing acute and long-term health demands placed on healthcare workers. Aligning with emerging employee values around environmental, social and governance organisational initiatives could also support future workforce attraction efforts [234].

The need is growing to build in healthcare workforce flexibility to support infectious disease responses

Infectious disease outbreaks can be influenced by changing demographic patterns, climatic conditions, increasing migration and air travel, urbanisation, the potential for bioterrorism, and intensification of plant and animal trade [235–238]. Hospitalisations and deaths associated with infectious diseases vary significantly [239, 240] and can create workforce shortages during peak periods. Building a stronger, flexible healthcare workforce is critical to building health system resilience to these external shocks [241]. This could include aligning training opportunities with forward demand, monitoring and improving working conditions to strengthen retention, and increasing the flexibility of clinicians to respond to surges in demand [241]. There are also opportunities to learn from past pandemics through the Commonwealth Government COVID-19 Response Inquiry, which is examining a range of workforce factors (e.g. the effectiveness of pandemic response measures, provision of health support services and labour shortages) [242].

Interventions are emerging for tackling the global challenge of antimicrobial resistance

Decades of excessive and inappropriate use of antimicrobials have contributed to the emergence of highly resistant strains of bacteria, parasites, viruses and fungi, a phenomenon known as antimicrobial resistance (AMR). AMR contributed to 4.95 million deaths globally in 2019 [243], and the proportion of infections caused by antimicrobial-resistant bacteria is projected to increase from 9.9% in 2015 to 12.3% by 2030 [244]. While AMR is a complex and growing challenge, a range of interventions have been proposed for reducing its burden. These include improving the appropriateness of antimicrobial prescribing in human and animal health sectors and effective infection prevention and control [245, 246]. The use of immunotherapies is also being explored as an alternative to antibiotics, with clinical trials showing positive results for this as a viable alternative to antibiotics [247–249]. As the healthcare sector takes on new approaches to curb the spread of AMR, clinicians will need to recalibrate their treatment approaches.

Australia's dependence on global medical supply chains poses ongoing uncertainty

Australia is highly reliant on global supply chains for medical supplies, with $5.40 worth of medicinal and pharmaceutical products imported for every $1.00 worth of these products produced in Australia in 2022 [250, 251]. These dependencies were highlighted during the COVID-19 pandemic, when increased demand for vaccines, personal protective equipment and medical tests coincided with changes to international trade patterns [252]. Some local companies pivoted in response to this need (e.g. from gin to hand sanitiser production), but this is not possible for medical supplies that are strictly regulated, nor is it feasible or efficient to produce all essential medical supplies in Australia [253]. Systems for monitoring and managing medical shortages (such as the Therapeutic Goods Administration's mandatory reporting scheme for shortages of medicines [254]) could be used to help mitigate future shocks to critical medical supplies in the NSW health system and their impact on healthcare workers' capacity to continue delivering high-quality care.

There is a growing imperative to build resilience to increasing cybercrime risks in healthcare

There were nearly 94,000 cybercrime reports in Australia in 2022–23, an increase of 23% from the previous year [255]. The healthcare and social assistance sector is among the top targets of cybersecurity incidents (5.9% of incidents) along with state and local government (12.9%) [255]. A Medibank data breach in October 2022 compromised the personal health information of 9.7 million Australians [256] and, more recently, a similar breach involving e-scripts provider MediSecure affected over 12.9 million Australians [257]. Overseas, the French health system had to shut down its hospital computer systems in 2022 to isolate several cybersecurity incidents [255] and USA-based genetic testing company 23andMe encountered a security breach that impacted the personal information of 7 million customers in October 2023 [258]. These events act as salient reminders of the importance of robust cybersecurity safeguards, including cyber-resilient information and communications technology (ICT) systems and cyber awareness training for healthcare workers.

Early signals of change to monitor

- **Caring for an influx of climate refugees:** Rising sea levels put Pacific Island nations, such as Tuvalu and Kiribati, at risk of submersion this century [259] and the Australian Government has already agreed to resettle up to 280 climate refugees from Tuvalu per year [260]. Several Pacific Island countries (the Cook Islands, Kiribati, Samoa, Tonga and Tuvalu) are also facing challenges around food security and are highly reliant on imported food, which tends to result in higher calorie consumption [261]. As a result, these populations tend to have high levels of chronic disease, including cardiovascular disease and diabetes [262]. There is a need to prepare the NSW health system to care for climate refugees, particularly in metropolitan LHDs.
- **Supporting people fleeing from conflict:** NSW Health and with other state and territory government health departments have temporarily offered free healthcare to those who have fled the Israel–Gaza conflict [263]. Like the emerging signal around climate refugees, an influx of conflict-related refugees could have an acute impact on the demand for healthcare services. Community healthcare workers will also be needed to help conflict-related (and climate-related) migrants adapt to using the NSW health system (e.g. using primary care services for non-urgent conditions).

Questions for the future healthcare workforce

WORK

How can the structure of the health system and its workforce be re-imagined to become more resilient to external shocks?

What education and training initiatives are required to ensure staff feel empowered to recognise and respond, where appropriate, to cybersecurity incidents?

How can tools to improve prescribing decisions and workforce-driven approaches be leveraged to curb the growing AMR public health risk?

WORKPLACE

What new cybersecurity measures need to be implemented to support work across more diverse healthcare work environments?

WORKFORCE

How can climate change be factored into future healthcare workforce attraction and retention strategies to ensure that it does not exacerbate existing workforce shortages?

How can NSW Health's climate mitigation efforts be leveraged to attract emerging environmentally conscious talent?

Megatrend 6:
The prevention potential

A renewed prioritisation of preventative care

Preventative health is critical to achieving more positive health outcomes in NSW. Promisingly, there has been an increased focus on investment in health prevention and social determinants of health, along with a national focus on building systemic change to support long-term, sustainable improvements in the health and wellbeing of the Australian population. Contemporary approaches to health prevention that leverage personalised digital health solutions, nudge-based interventions, multidisciplinary approaches and consumer wellness trends could provide further opportunities to drive healthy behavioural change. This emerging horizon provides a brighter outlook for navigating the changing healthcare needs of the population and current challenges around health disparities, vaping and poor mental health outcomes. The following sections detail example trends that form the evidence base for this megatrend.

Health prevention and protection is attracting a growing share of investment

There has been a significant increase in the share of healthcare funding dedicated to health promotion, prevention and protection in NSW since the COVID-19 pandemic (7.5% in 2021–22 compared with 1.5% in 2018–19 [8, 264]), noting that the COVID-19 vaccination program was likely a key driver of this growth. The Australian Government has also set a vision for prevention where the responsibility to create positive change is shared across all sectors [265]. A long-term systemic focus on health prevention will be required to drive long-term, sustainable improvements in the health and wellbeing of the NSW population [265] and, consequentially, limit the strain placed on its health system and workforce. International preventative health initiatives include the Singaporean Government's Healthier SG program, in which citizens develop a health prevention plan with their doctor and receive community support in following the plan [266]. Denmark has also substantially reduced the size of its hospital sector and made primary care the central element of the health system [267].

Investment in efforts to reduce violence against women is increasing

In 2022, 23.0% of Australian women had experienced violence by an intimate partner since the age of 15 years (down from 28.0% in 2012) and 1.5% in the last 12 months (2.1% in 2012) [268, 269]. Despite this recorded decrease, violence against women remains a significant problem in Australia and has a substantial health burden (Figure 14). Women who experience violence from an intimate partner also face barriers in seeking advice or support about the violence [270]. The Australian Government has announced plans to invest $925 million in the Leaving Violence Program to help victim-survivors escape a violent partner [271]. In addition, NSW Health has implemented several programs to improve the health outcomes and safety of victim-survivors and support for non-government community-based men's behaviour-change programs [272]. These investments reflect positive steps towards reducing the prevalence of domestic violence, along with other programs aimed at improving social attitudes and norms around violence against women.

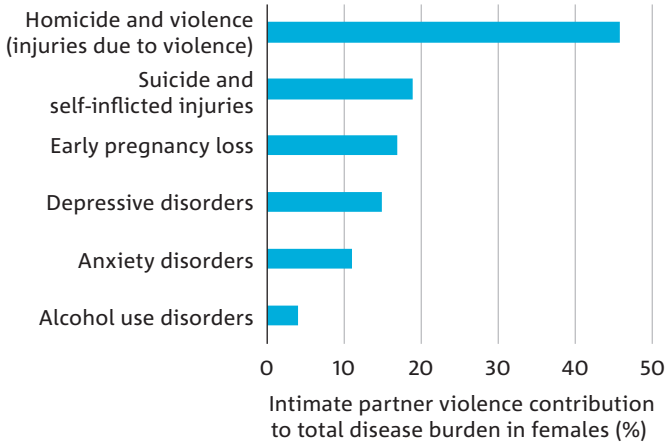


Figure 14. Contribution of intimate partner violence to the total disease burden in females for six health conditions that are causally linked to this violence

Source: AIHW [270]

Behavioural and technology-supported interventions are increasingly being used to nudge healthy behaviours

Nudge-based behavioural interventions have been a popular tool for changing people's behaviour in line with better policy and population health outcomes [273]. These approaches have been increasingly applied in healthcare, such as sending reminders to encourage people to get vaccinated [274, 275] or to self-manage their chronic disease [276] and placing hand sanitisers at hospital entries to improve hand hygiene [277]. Nudging has also been shown to be effective in shaping healthcare workers' prescribing practices, hand hygiene and vaccination behaviours [273]. Nudges can be simple, low-cost ways to improve health outcomes and healthcare service delivery [278, 279]. To lead to sustained change, it is best to use multi-nudge approaches and complement nudging with an educational component [273, 277]. There are emerging efforts to use AI to deliver personalised behavioural nudges via a wearable device [136, 186].

There is increasing need for multidisciplinary approaches and care teams to address rising youth mental health challenges

The prevalence of mental health disorders has increased across the board in Australia, particularly in people aged 16–24 years (Figure 15). Rates of high or very high psychological distress are also highest in this age group relative to older age groups [9], and self-reported loneliness in Australians aged 15–24 years has increased over the past decade [280]. Mission Australia found that 28% of young people in NSW experienced mental health challenges such as low self-esteem, stress, self-harm, anxiety and depression in 2023 [281]. A range of factors has been attributed to poor youth mental health, including unemployment, inadequate housing, exposure to trauma, academic pressures, climate anxiety and social media influences [281, 282]. Given the range of factors impacting youth mental health, future wellbeing promotion and mental health care responses will need to consider youth-focused multidisciplinary approaches that are tailored to specific cohorts and involve mental health, primary care and social care teams [283].

The rapid rise in vaping among young Australians is prompting novel approaches to prevent harm

There has been rapid uptake of vaping in Australia in recent years, including NSW, particularly in younger age groups (Figure 16). A study of young people in NSW aged 14–17 years found that a third had vaped despite more than half having never smoked before [286]. In addition, of those who had vaped, only 53% knew that the vape contained nicotine [286]. An analysis of vape stores in Western Australia found that 88% were located within a kilometre of a school, making them accessible to young people [287]. The Australian Government is looking to tackle this problem in several ways, including conducting anti-vaping social media campaigns [105], introducing new laws that will restrict the sale of vapes to pharmacies [288] and appointing an Illicit Tobacco and E-cigarette Commissioner [289]. Evaluating the efficacy of these initiatives will be important in guiding further actions to curb current trends in youth vaping and future product developments that could pose new nicotine-related health risks.

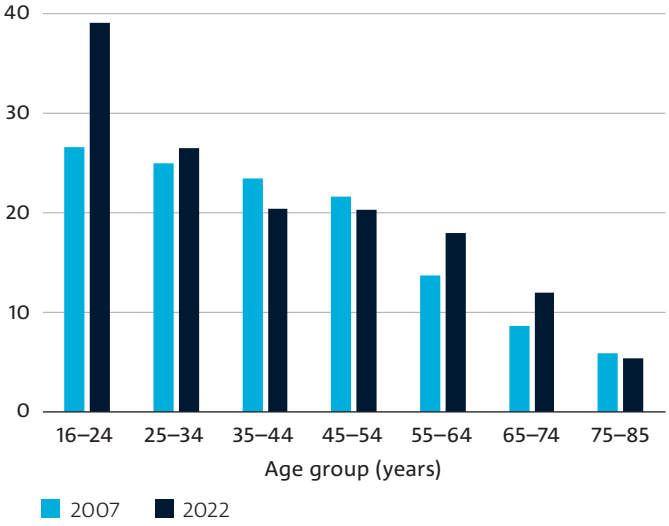


Figure 15. Percentage of people who had experienced a 12-month mental disorder in Australia by age group

Source: ABS [284, 285]

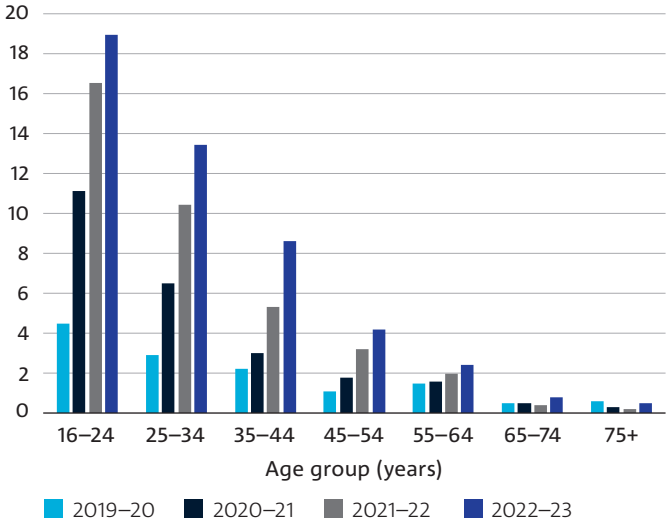


Figure 16. Percentage of people in NSW who currently use e-cigarettes, by age group

Source: NSW Government [4]

Early signals of change to monitor

- **Optimising community health and wellbeing:** There are emerging opportunities for public health campaigns to expand the focus from prevention to the optimisation of community health and wellbeing. Global discussions have acknowledged that gross domestic product does not account for human wellbeing, non-market services or care and the need to develop a comprehensive measure of long-term wellbeing [290]. In Wales, the Well-being of Future Generations (Wales) Act 2015 puts forward a legally binding set of goals to encourage public bodies to think about the long term, prevent problems and work with communities for a more integrated approach [291].
- **Younger generations' spending on wellness:** Research from McKinsey & Company estimates the global wellness market at US$1.8 trillion in 2024, with spending on health and wellness in the USA more prevalent in younger generations (Gen Z and Millennial consumers) than older cohorts [292]. A growing proportion of Australians own a fitness tracker to monitor health indicators such as physical activity levels and sleep patterns, with ownership rates highest in those aged 18–44 years [293]. The stronger focus on wellness in younger cohorts could suggest stronger receptiveness to health prevention and promotion measures, but this requires further exploration.

Questions for the future healthcare workforce

WORK

How can consumers, carers, communities and multidisciplinary care teams be leveraged in the design and implementation of innovative health prevention and promotion programs?

How can the healthcare workforce be supported to utilise and experiment with emerging digital tools as part of preventative care approaches across the NSW public health system?

What are the potential use cases for trialling nudge-based interventions in shaping healthy behaviours across the healthcare workforce and in the community?

WORKPLACE

How can efforts to address the social determinants of health be better coordinated across the NSW health system?

How can engagement with other sectors contribute to relieving the potentially avoidable burden on the health system?

WORKFORCE

How can the preventative health capacity and capability of all healthcare workers be boosted and shared across the healthcare workforce?

How can the role of GPs in preventative care be supported by other health professions and clinical support services?

Conclusion

The future of our world and health in 2040 will likely be vastly different from today. This *Beyond tomorrow* report outlines the transformative megatrends – and the evidence-based trends and early signals underpinning them – that are shaping the future of health and the healthcare workforce in NSW. These six megatrends demonstrate the complex and interconnected combination of STEEP shifts that are already starting to emerge and are predicted to continue, change or accelerate in the years and decades to come.

Among these emerging patterns of change sits immense opportunity. Megatrends such as *Augmented care* and *Mass personalisation* demonstrate the growing breadth of innovations and technological advances that provide increasing opportunities to personalise care and improve clinical decision-making and patient experiences. Other megatrends like *The prevention potential* explore the reinvigorated shift to preventative care, enabled by increased investment in health prevention and promotion and a systemic national focus on improving the health and wellbeing of the Australian population.

The emerging future of healthcare in NSW is not without its challenges, which will need to be factored into future planning activities. These include prioritising the financial sustainability and equity of care across the NSW health system. But critically, this report points to a range of ways in which the healthcare workforce can enable and support the uptake of new healthcare opportunities or tackle existing barriers. Examples include creating cultural safety in care through a more diverse workforce and leveraging new and existing research translation capabilities to close the research-to-practice gap for healthcare innovations.

The NSW health system must adapt and evolve to remain at the forefront of healthcare delivery. Success will depend on its ability to stay flexible, informed, creative and proactive. This report is intended to encourage conversations and stretch your thinking, leveraging strategic foresight approaches like megatrends to plan for future impacts on the healthcare workforce, workflows, ways of working and the workplace. As you look towards future horizons, we invite you to consider the questions posed in this report and continue this conversation around ways that those in the health system can work together to shape the future of health and the healthcare workforce of NSW.

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Note: For brevity, minimal reference details are provided. However, most reports can be readily accessed by copying the information provided into a search engine. All online publications were accessible as of 30 June 2024.

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