

1 Signals of Change: Horizon Scanning for Saudi Arabia's Health System

Value in Health

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1.0 Executive Summary

This document explores the ongoing transformation of the Saudi health system, driven by the goals of Vision 2030 that focus on enhancing healthcare efficiency and accessibility while ensuring improved outcomes for the population. Policymakers often use traditional methods in health system planning and overlook “weak signals” that could significantly impact future health needs. To address these challenges, this paper advocates for the adoption of horizon scanning as a systematic approach for detecting and interpreting early signals of change. Successful international examples, such as the UK’s NHS and New Zealand’s health system planning, demonstrate the effectiveness of embedding horizon scanning into national health strategies to support innovative investment and cross-ministerial coordination. The document identifies three critical signals that require immediate attention from Saudi policymakers: demographic and social patterns, chronic disease burdens, and technological innovations highlighting the importance of each signal. It argues for preparing the health system to adapt swiftly to transforming population needs and system pressures. By integrating horizon scanning into policymaking processes, Saudi Arabia can enhance resilience and ensure that its healthcare system meets both current challenges and future demands.

2.0 Introduction

Currently, the Saudi health system is undergoing significant strides in its transformation, driven by the goals outlined in Vision 2030. At the heart of this reform is a commitment to make healthcare efficient and accessible to achieve high outcomes for its population (Hevolution Foundation Report 2023). Therefore, health policy settings are forced to adopt accountability, integration, and sustainability. However, this transformation unfolds in a world defined by uncertainty and accelerating change in different domains, including demographic shifts, technological disruption, and chronic disease burdens, which are emerging in ways that challenge current linear planning models.

Despite the existence of strategic health reforms, current health system planning may be reactive and driven by short-term pressures. As a result, policymakers may be blindsided by emerging drivers, including inequities and digital trends. These trends are known to be “weak signals”: seemingly minor events that may appear marginal today but frequently escalate into high-impact and, sometimes, disruptive events if ignored (National Academies of Sciences, Engineering, and Medicine 2020, 233-272). Ignoring the significance of integrating such tools in the policy-making process, Saudi Arabia may risk misaligned decision-making for future health needs by wasting precious resources and delaying critical interventions.

How can Saudi Arabia ensure its health system is equipped not only to respond to current challenges, but to adapt to long-term shifts in population needs, technology, and system pressures?

Horizon scanning offers a systematic method to detect, interpret, and act on early signals of change that could impact the future of the population's health. Unlike traditional planning tools, it is designed to look beyond prominent trends and consider discontinuities and weak signals across-sectoral influences (National Academies of Sciences, Engineering, and Medicine 2020, 233-272).

There are promising international examples that have shown the significant impact of horizon scanning when embedded into national health planning. Horizons Scanning supports strategic investments, guides innovation adoption, and enables cross-ministerial coordination. For instance, in the United Kingdom, the NHS is employing forecasting to prioritize national investments, including designing long-term strategies for workforce planning and technological interventions (The Health Foundation 2019). Another example: in New Zealand, horizon scanning is institutionalized under the Department of the

Prime Minister and Cabinet, to enable anticipatory design future health system resilience, equity, and service delivery planning (Horizon Scanning in New Zealand 2021). The OECD has also recommended that member states establish foresight functions to inform budgeting cycles and risk management frameworks (National Academies of Sciences, Engineering, and Medicine 2020, 233-272). By embedding horizon scanning into policy cycles, Saudi health policymakers can move from reactive problem-solving to anticipatory governance. This policy note provides a snapshot of the high impact signals to enable earlier interventions, better spending on future demand, and more resilient policy design in the Saudi health system.

3.0 What is Horizon Scanning?

The terminology for relevant tools in horizon scanning has yet to be standardized. In some cases, it is termed “foresight” or “future thinking”. Horizon scanning is a tool focused on the early detection for indicators of potential change in the future through a systematic examination to search for weak signals, e.g. new technologies and their effects on current issues, to prepare for possible opportunities and threats. This tool helps ensure policies are resilient to different future environments if integrated into a broader futures thinking framework outlining the overall process of evaluating policy implications of significant developments to identify specific policy to achieve specific outcomes (National Academies of Sciences, Engineering, and Medicine 2020, 233-272).

4.0 Three Signals Shaping the Future of Health in Saudi Arabia

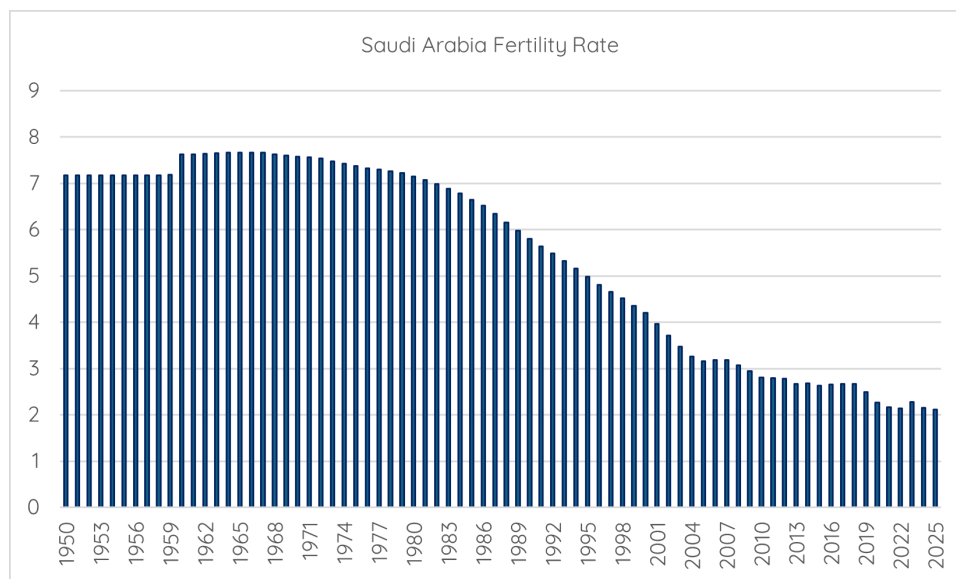
Improving the population's health is one of the underpinning health reform goals for the next decade. However, the crucial question is whether our health systems can evolve swiftly enough to keep pace with this change. Three critical signals of systemic transformation require policymakers' immediate attention: demographics and social patterns, chronic disease burden, and technological innovations

4.1 Demographics and Social Patterns

This section highlights vital signals for Saudi Arabia's future planning and policy development. The demographic shift presents both challenges and opportunities for the nation's health and social systems. Major signals in this section include longevity, urbanization versus rurality, and the impact of social determinants of health on both citizens and the large expatriate workforce.

i. Longevity: As A Signal of Demographic Shift

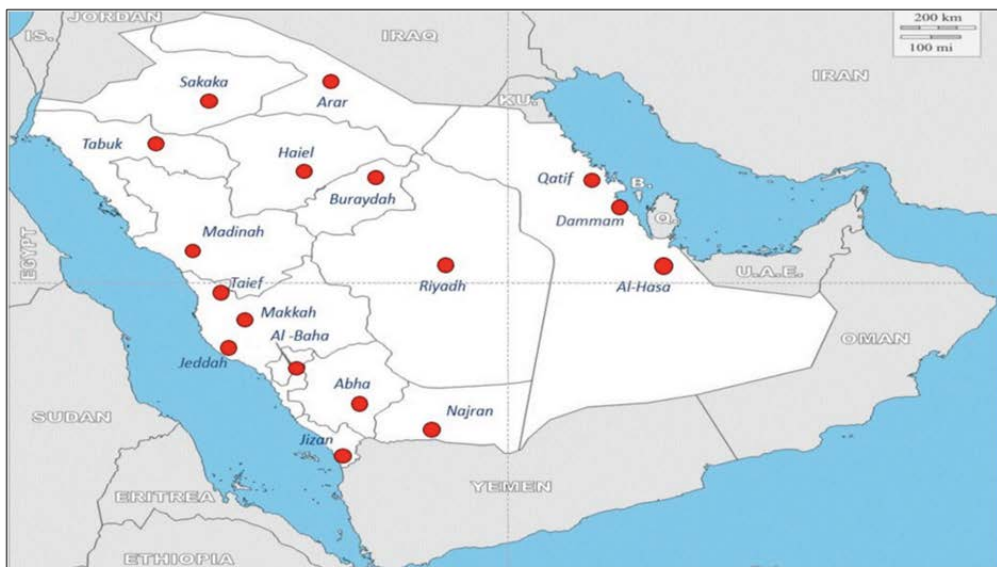
Saudi Arabia is experiencing a significant demographic shift marked by longer life expectancy and lower fertility rates. Between 2022 and 2042, the proportion of the population aged 65 years and older is expected to rise from 2.8% to 14%. Moreover, historical data show a drop in fertility rates from 7 births per woman in early 2000s to 2.1 by 2025 (Figure 1). As a result, the country will shift into a new demographic era from a youthful to an ageing demographic, posing policy urgency due to rise in multimorbidity, increasing health care demand for long-term care, and pressure on the pension system. On the other hand, there are opportunities for this era, such as investing in preventive medicine, enhancing healthy lifestyles, and building infrastructure that meets the needs of this segment (Hevolution Foundation 2023, 9; Salam 2023).



(Figure 1) The chart presents a historical trend of the total fertility rate in Saudi Arabia from 1950 to 2025, with the x-axis showing years (in descending order from right to left) and the y-axis indicating the average number of children per woman (Salam 2023)

ii. Urbanization and Rurality: The Equity Challenge

Saudi Arabia is expanding its major cities as a result of the ongoing economic growth, therefore, experiencing a rapid shift to urbanization with approximately 82.1% of the total population concentrated in the main cities, particularly in Riyadh, Jeddah, and Dammam, and, is expected to increase to reach up to 97.6 % by the year 2030 (Figure 2), (United Nations Human Settlements Program 2016). This shift enabled several advancements in healthcare delivery and digital connectivity within metropolitan regions, behind these advancements lies a growing divide, leaving the remaining 18% of the population living in rural areas. The geographic isolation presents significant inadequacies of primary health facilities, transportation, and in trained health professionals. These factors limit healthcare access, resulting in the potential for vulnerable populations to experience inadequate care, particularly those with multiple comorbidities (AlZahrani et al. 2023, 1540). This situation presents an opportunity to bridge the longstanding urban-rural divide, which poses equity challenges, by emphasizing strategies that strengthen digital health adoption and enhance the effectiveness of universal health coverage in rural communities.



(Figure 2) represents the Future Saudi Cities Program (FSCP), the plan to develop for a sustainable urban future in the Kingdom of Saudi Arabia that follows international standards and fully aligned with the Municipalities New Strategy (United Nations Human Settlements Program 2016).

iii. Social Determinants of Health for Citizens and Foreigners

The role of social determinants of health (SDH) for both Saudi citizens and foreigners, living on its territory, is a powerful yet under-leveraged signal in shaping long-term health outcomes and cost burdens. These determinants range between income, education, housing security, gender, old age, health literacy, and migration status. SDH inequalities contribute to the development of chronic diseases, yet they often remain invisible within the health system's data, design, and delivery structures. There are multi factor influencing chronic diseases in this segment, including (1) physiological factors, such as chronic stress; (2) behavioral factors, like a sedentary lifestyle; and (3) access factors, which include the quality and affordability of healthcare. These elements can worsen the progression of chronic diseases and increase reliance on secondary care, ultimately leading to higher health expenditures (Bakhtiari et.al, 2025). A study conducted research on Saudi citizens following up in primary healthcare clinics. The study showed clinicians encountered re-peated scenarios where medical complaints masked profound social suffering, such as domestic violence, poverty, elder neglect, and social isolation. The study also highlighted several barriers, including time constraints, a lack of social service coordination, the absence of national SDH reporting systems, and the fear of stigma, which, today, seems an opportunity for improvement (Almujadidi et al. 2022, 6–7).

A significant proportion of the Saudi population consists of expatriates working primarily in the private sector. In 2024, the expatriate population reached approximately 15.7 million, equivalent to 44.4% of the total population in Saudi Arabia (General Authority for Statistics, 2024). Although Saudi Arabia mandates that the private sector provide medical insurance for its workers and their dependents through the Compulsory Employment-Based Health Insurance (CEBH), the extent of medical coverage varies depending on the expatriates' qualifications. Elite plans provide access to all types of healthcare providers, whilst basic plans offer limited access to a select list of hospitals and services (AlNemer 2018). A study conducted on 2,123 expatriates in Saudi Arabia, including low-income workers, found that the likelihood of having two or more chronic diseases increased significantly with age and length of stay in the country. The study argued that participants who spend an extended period in a host country are most likely to adopt that country's unhealthy lifestyles, which are contributing factors to chronic diseases (Juliann Saquib et al., 2025). These findings underscore the need for tailored health policy plans for low-educated expatriate workers to enhance health equity and outcomes.

Refugees are no exception to the impact of social determinants of health (SDH). Although Saudi Arabia maintains humanitarian arrangements that allow many individuals from conflict-affected countries to remain within its borders, they face overlapping social determinants of health (SDH) challenges. Statistics revealed that Saudi Arabia hosted 512 registered refugees as of February 2024, with a broader population of 1,062 refugees across Saudi Arabia, Bahrain, and Oman. The Kingdom also reported 335 refugees and over 13,000 asylum seekers in 2022 (UNHCR 2024). Considering the presence of unregistered refugees, the impact of SDH accumulated in the system is evident and resulting in lower life expectancy and higher expenditure on health services (World Health Organization, 2022). An urgent call to integrate the entire Saudi Arabian population into national health strategies is crucial to achieving optimal health outcomes.

4.2 The Growing Burden of Chronic Diseases

Chronic diseases have become a significant concern in Saudi Arabia due to their increasing prevalence. As the elderly population continues to grow and the number of risk factors for non-communicable diseases (NCDs) rises, the incidence of NCDs in the Kingdom is expected to increase. This growth will lead to a corresponding rise in demand for medical services.

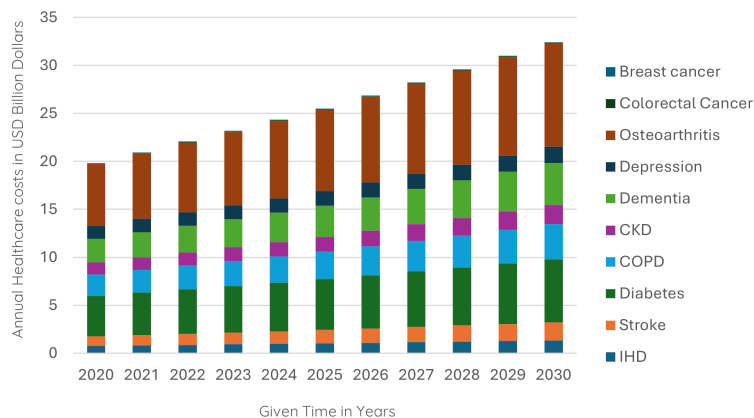
i. Non-communicable Diseases: A System Under Pressure

A report generated in 2023 stated that over 40% of adults over 45 years of age in Saudi Arabia are already living with at least one chronic condition, and the prevalence is growing with senior age groups (Hevolution Foundation 2023, 8). This number is expected to increase substantially over the next decade as life expectancy continues to rise. The current and projected prevalence of NCDs is illustrated in Table 1 (Boettiger et.al, 2023).

Table 1: Current and Projected Prevalence of NCDs

NCDs / Year	2024	2030
Ischemic heart disease	1,269,947 (4.5%)	1,737,471 (5.6%)
Stroke	694,989 (2.5%)	992,177 (3.2%)
Diabetes	3,242,481 (11.6%)	4,211,007 (13.6%)
Chronic obstructive pulmonary disease	578,685 (2.1%)	772,528 (2.5%)
Chronic kidney disease	3,731,887 (13.3%)	4,949,633 (16.0%)

While the clinical burden of chronic disease is significant, the economic costs cascade across health delivery, workforce, and retirement systems. As a result, Saudi Arabia will face the highest annual impact on its national budget due to the direct costs of NCDs, as shown in Figure 3. It is estimated that the total cost of managing NCDs in KSA will increase from USD 19.8 billion in 2020 to USD 32.4 billion in 2030 (Boettiger et al., 2023).



(Figure 3) Annual budget impact assessment for NCDs (Boettiger et.al, 2023).

In addition to the indirect costs of economic productivity loss due to NCDs, a projected 9.7% de-cline in national GDP is anticipated by 2030, as shown in Table 2 (Rasmussen, Sweeney, and Shee-han, 2015). A study pinpoints the indirect impact of the economic burden of NCDs among several countries, including Brazil, China, Colombia, India, Japan, Mexico, Poland, Singapore, South Africa, Turkey, the United States, and Saudi Arabia. Saudi Arabia reported that nearly 7.0% of GDP is at-tributed to absenteeism and presenteeism, and 2.7% of GDP is attributed to early retirement due to illness. Its high burden of disease, rapid workforce ageing, and elevated prevalence of NCDs, such as diabetes and cardiovascular disease, are factors that have resulted in greater productiv-ity losses compared to other countries in the study (Rasmussen, Sweeney, and Sheehan 2015). A call for policymakers to consider both types of economic impact of NCDs, as illustrated in Table 3 (HealthTechX, 2024).

Table 2: Economic and Health Impact of NCDs in Saudi Arabia (2010–2030)

Category	2010	2015	2030 (Projected)
Total economic impact of indirect costs (% of GDP)	-	6.7%	9.7%
Presenteeism & absenteeism (% of GDP)	-	6.0%	7.0%
Early retirement (% of GDP)	-	1.7%	2.7%
Economic loss due to NCDs (% of GDP)	6.0%	-	7.0%
Proportion of workforce aged 50-64	8.3%	12.3%	19.4%

Table 3: Accounting for the Economic Impact of Chronic Disease

Direct Costs	Indirect Costs
Direct health care costs refer to the expenses incurred for the diagnosis, treatment, and management of chronic diseases. These costs include hospitalizations, physician consultations, medications, medical tests, and other health care services. Chronic diseases often require ongoing and long-term medical care, contributing substantially to health care expenditure	Chronic diseases have a considerable impact on workforce productivity due to absenteeism, reduced work hours, and impaired job performance. Indirect costs related to lost productivity can be significant.
• Hospitalizations: Chronic diseases such as heart disease, stroke, and cancer, frequently lead to hospital admissions for acute exacerbations or disease-related complications.	• Absenteeism: Individuals with chronic diseases may require time off work to manage their conditions, attend medical appointments, or recover from illness-related complications. In the European Union, it is estimated that productivity losses due to absenteeism from chronic diseases cost an estimated 2.5% of GDP annually.
• Medications: The continuous use of medications for managing chronic conditions, such as diabetes, hypertension, and asthma, is another major contributor to direct costs.	• Presenteeism: Although many individuals with chronic diseases are physically present at work, their productivity may be affected due to reduced concentration, fatigue, and impaired cognitive function - a phenomenon known as presenteeism.
• Medical Procedures and Tests: Regular medical consultations, diagnostic tests, and therapeutic interventions are common for individuals living with chronic diseases.	• Reduced Quality of Life: Chronic diseases can worsen an individual's quality of life, leading to diminished well-being, social isolation, and decreased participation in various activities. While challenging to quantify directly, the reduced quality of life experienced by individuals and their families represents an important aspect of the economic burden of chronic diseases.

4.3 Technological Innovations

Horizon scanning in the context of digital transformation and health technology in Saudi Arabia reveals a rich landscape of opportunities and challenges. Currently, the Kingdom is progressing in digital infrastructure, which is propelled by Vision 2030 and accelerated in the COVID-19 pandemic era. The main aim of digital transformation is to improve access, advance and enhance the quality of healthcare services and lower any costs incurred (AlWatban et al., 2024).

i. Mobile Health Monitoring: Mobile Apps and Telemedicine

In terms of internet accessibility, residents in Saudi Arabia have high-speed mobile networks through wireless and fiber optic connectivity. Hence, internet users exceed 98%, and mobile subscriptions surpass the total population, creating fertile ground for the adoption of digital health. Moreover, the current status of mobile health (mhealth) platforms such as Sehhaty, Mawid, Tawakkalna, and Wasfaty shows a significant leap toward integrated and efficient healthcare delivery. As of 2022, Saudi Arabia had administered 80% of the total COVID-19 vaccine doses through the Sehaty mobile application, highlighting a strong acceptance of mobile apps. Telemedicine plays a vital role in the country's digital health strategy, reflecting its institutionalization and scaling efforts. Notably, the Seha Virtual Hospital exemplifies this commitment, with the capacity to accommodate up to 400,000 patients annually and support approximately 152 hospitals across the Kingdom. Despite progress in digital health preparedness, it is crucial to acknowledge the existing disparities in digital participation, where specific demographics continue to face adoption barriers. A key future opportunity to unify the progress of digital health implementation among providers nationwide, paving the way for improved health services and outcomes for all (AlWatban et al., 2024).

ii. AI Applications: The Next Frontier in Value-Based Care

Digital health transformation efforts explicitly prioritized AI, data mining, genomics, and bioinformatics within the healthcare sector, positioning digital health as a cornerstone. There are numerous applications of technology within the system. For instance, the use of Blockchain, a technology utilized by the Saudi Food and Drug Authority (SFDA) to ensure the safe handling of sensitive patient data, adheres to strict privacy rules. The future is promising as the National Strategy for Data & AI aims to attract \$20 billion in local and foreign investments by 2030, thereby committing to Saudi Arabia's future as a global hub for Data and AI, to improve health outcomes (AlWatban et al., 2024). The promising field of genomics, particularly through initiatives like the

Saudi Human Genome Program, serves as a case in point for the successful implementation of Alin genomic diagnostics. AI contributes to the growth of precision medicine by supporting stream-lined processes, enabling quicker diagnosis and treatment plans (Alderada, 2024). This suggests that the future of healthcare in Saudi Arabia could be increasingly predictive, preventive, and personalized. However, these advancements are combined with challenges, such as governance frameworks that need to evolve to accommodate the complexities introduced by AI and genomic data. Alongside data privacy concerns, algorithmic transparency, and trust in AI decision-making, there are also considerations related to religious beliefs. All of which must be addressed through robust regulations and ethical guidelines (AlWatban et al. 2024; Alderada 2024).

The strategic integration of digital transformation yields significant benefits, including outcome reporting within digital health platforms, which aligns reimbursement structures with value-based care models. Utilizing such data will ensure that digital health transformations translate into tangible benefits for the population.

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