REVIEW ARTICLE



Advancing Health Through Sustainable Development Goals–Saudi Arabia's Mid-Journey Progress and Insights

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Abstract

A critical component of Saudi Arabia's Vision 2030 reform agenda is its alignment with the Sustainable Development Goals (SDGs), particularly SDG 3, which is dedicated to the promotion of health and well-being for all. This narrative review offers a mid-term assessment of Saudi Arabia's progress in attaining these objectives, with a particular emphasis on the public health initiatives and comprehensive healthcare reforms that have been implemented as part of this vision. The Kingdom has accomplished substantial reductions in maternal and neonatal mortality rates, with skilled birth attendance reaching nearly universal levels. Saudi Arabia is a regional leader in the field of infectious diseases, having achieved the 95-95-95 HIV targets and significantly reduced the incidences of tuberculosis and malaria. Additionally, the rates of premature mortality from conditions such as cancer, diabetes, and cardiovascular diseases have decreased as a result of efforts to combat non-communicable diseases. Mental health services have been substantially expanded, which has resulted in one of the lowest suicide rates reported worldwide. Substantial investments have collectively improved the universality and quality of healthcare services in health infrastructure, such as the expansion of primary healthcare centers and the integration of digital health solutions, which have supported these health achievements. Saudi Arabia continues to confront persistent obstacles, including the management of the increase in non-communicable diseases, the mitigation of environmental health risks, and the reconciliation of healthcare access disparities, despite these accomplishments. The review recommends that the social determinants of health be addressed through a sustained commitment to cross-sectoral collaboration, enhanced data collection and utilization for health policy-making, and further integration of technology in healthcare delivery. This review not only emphasizes the Kingdom's successes but also the intricate challenges it has encountered, providing valuable insights into the strategic planning required to maintain health gains and achieve SDG 3 by 2030. Saudi Arabia's innovative approach and robust policy implementation serve as a model for the integration of health priorities into national development frameworks, thereby improving health outcomes and contributing to sustainable development.

Keywords Sustainable development goals · SDG 3 · Saudi Arabia · Vision 2030 · Healthcare reforms · United Nation

1 Introduction

The Sustainable Development Goals (SDGs) adopted in 2015 represent a comprehensive blueprint for addressing critical global challenges, ranging from poverty and

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inequality to environmental sustainability and health [1]. Among these, *SDG 3: Good Health and Well-being*, stands out as a cornerstone for ensuring healthy lives and promoting well-being for all at every age [2]. This goal encompasses a wide array of targets, including reducing maternal and child mortality, combating communicable and non-communicable diseases, and ensuring universal health coverage [3]. The interdependence of SDG 3 with other goals, such as poverty eradication (SDG 1), gender equality (SDG 5), and climate action (SDG 13), underscores its central role in fostering sustainable development [2]. Improvements in health outcomes not only enhance individual well-being but

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also catalyze progress in economic stability, education, and social equality [4].

Saudi Arabia's Vision 2030 is a transformative framework that aligns closely with the SDGs, integrating their principles into the Kingdom's development agenda [5]. Launched in 2016, this ambitious initiative aims to diversify the economy and reduce dependency on oil, emphasizing the creation of a thriving society, a vibrant economy, and an ambitious nation [5]. While significant progress in various health indicators-such as maternal and child health, infectious disease control, and healthcare infrastructurepredates both Vision 2030 and the SDGs, the introduction of this national strategy has reinforced and accelerated efforts through targeted reforms, increased investments, and enhanced policy integration [6]. Therefore, while many of these achievements were already underway, Vision 2030 has played a crucial role in sustaining and expanding them [7]. The Saudi vision includes reforms aimed at revitalizing the healthcare system, ensuring equitable access to quality care, and promoting preventive and public health measures [8]. These efforts highlight the Kingdom's recognition of health as a vital component of sustainable development and as a prerequisite for achieving broader socioeconomic goals.

Saudi Arabia faces unique health challenges and opportunities shaped by rapid demographic shifts, lifestyle transitions, and economic transformations [9]. The growing prevalence of lifestyle-related diseases, such as obesity and diabetes, poses a significant health burden, while the increasing life expectancy and urbanization offer opportunities to implement modern, efficient healthcare solutions [10]. The Kingdom's approach combines investments in healthcare infrastructure, advancements in digital health, and public health initiatives to address these challenges and leverage opportunities [11].

This review evaluates Saudi Arabia's mid-journey progress in achieving SDG 3 targets, focusing on key health indicators such as maternal and child health, non-communicable diseases, and universal health coverage. By analyzing achievements and identifying persistent challenges, the review aims to provide actionable, evidence-based recommendations to strengthen sustainable health development. The findings contribute to understanding Saudi Arabia's role as a regional leader in health innovation and sustainability while offering insights for future policy directions that align with global health priorities and the transformative vision of 2030.

2 Methods

This narrative review evaluates Saudi Arabia's mid-journey progress toward achieving Sustainable Development Goal 3 (SDG 3) by synthesizing data from multiple authoritative sources. The study employs a comprehensive approach to assess key health indicators, policy interventions, and public health initiatives within the framework of Saudi Arabia's Vision 2030.

2.1 Data Sources and Selection Criteria

Health-related data were primarily obtained from two globally recognized databases:

- II. World Bank Sustainable Development Goals Database [13]-This source was used to cross-reference economic and demographic data related to healthcare financing, infrastructure, and social determinants of health.

To complement these quantitative data, a systematic search was conducted across multiple scientific literature databases, including PubMed, Scopus, and Web of Science. This search aimed to identify peer-reviewed studies, systematic reviews, and meta-analyses that addressed Saudi Arabia's health sector performance, policy frameworks, and emerging challenges. The search strategy used a combination of Medical Subject Headings (MeSH) terms and keywords related to SDG 3, including "Saudi Arabia," "public health," "universal health coverage," "maternal and child health," "non-communicable diseases," and "infectious disease control."

Additionally, government and institutional reports were retrieved through targeted searches on Google and official Saudi health platforms, such as:

- I. Saudi Ministry of Health (MOH) reports detailing healthcare reforms and digital health advancements [14].
- II. Saudi General Authority for Statistics (GASTAT) publications providing demographic health indicators [15].
- III. Reports from the Saudi Vision 2030 program outlining strategic initiatives and progress toward health goals [16].

2.2 Data Analysis and Interpretation

Given the descriptive nature of this review, data were analyzed through thematic categorization, grouping health indicators according to their respective Sustainable Development Goal 3 (SDG 3) targets. This structured approach facilitated an in-depth assessment of Saudi Arabia's progress in key areas, including maternal and child health, infectious disease control, non-communicable diseases, healthcare access, mental health, and environmental health factors.

To contextualize Saudi Arabia's performance, a benchmarking analysis was conducted by comparing key health indicators with both high-income countries (e.g., the United States, United Kingdom) and regional counterparts within the Gulf Cooperation Council (GCC), such as the United Arab Emirates (UAE). Additionally, the analysis included Egypt and Iran, two major countries in the Middle East, to provide a broader regional perspective on healthcare progress. This comparison highlights areas where Saudi Arabia has made notable advancements and identifies gaps requiring further policy intervention. Additionally, trend analysis was performed to distinguish health improvements directly linked to Vision 2030 reforms from pre-existing progress observed prior to the initiative.

This methodological approach ensures a comprehensive, evidence-based assessment of Saudi Arabia's progress toward SDG 3, facilitating the identification of both achievements and areas requiring further strategic intervention to enhance public health outcomes.

2.3 Framework and Key Health Indicators of SDG 3: A Comprehensive Assessment of Saudi Arabia's midjourney Progress

SDG 3 aims to ensure healthy lives and promote well-being for all through a comprehensive set of indicators that track progress across diverse health priorities [17]. These indicators span key areas such as maternal and child health, infectious diseases, non-communicable diseases, and environmental health, offering a structured framework for assessing progress. For clarity, the indicators are thematically grouped to facilitate a focused examination of Saudi Arabia's progress. For instance, the section on maternal and child health includes the maternal mortality ratio (SDG 3.1.1), proportion of births attended by skilled health personnel (SDG 3.1.2), under-five mortality rate (SDG 3.2.1), and neonatal mortality rate (SDG 3.2.2). By analyzing related indicators together, this review highlights the collective efforts adopted by Saudi Arabia to improve health outcomes in this critical area. Figure 1 highlights the key health achievements in Saudi Arabia's progress toward achieving the Sustainable Development Goal (SDG) 3 targets.

2.4 Progress in Achieving Maternal and Child Health Indicators

Saudi Arabia has made significant progress in maternal and child health, positioning itself as a regional leader. One of the most notable achievements is the reduction in the maternal mortality ratio (MMR) (SDG 3.1.1), which has decreased substantially over the past several decades. While the global MMR dropped from 441 deaths per 100,000 live births in 1985 to 223 in 2020, Saudi Arabia's MMR declined more dramatically, from 35.8 in 1985 to 16.2 in 2020 [18]. This progress can be attributed to targeted policy interventions and structural improvements in healthcare [19]. The expansion of universal healthcare coverage, investments in maternal and neonatal care infrastructure, and the integration of evidence-based clinical guidelines have collectively contributed to this decline [20]. Under the Vision 2030 framework, Saudi Arabia has prioritized maternal and child health through increased access to prenatal and postnatal care, mandatory maternal health screenings, and advancements in obstetric emergency response systems [21]. Additionally, the nationwide deployment of highly trained healthcare professionals, including midwives and obstetricians, has played a critical role in reducing maternal mortality.

When compared regionally, Saudi Arabia's MMR of 16.2 per 100,000 live births in 2020 is lower than Egypt's 17 per 100,000, demonstrating its strong healthcare infrastructure relative to the broader Middle East. It also performs better than Iran, which recorded an MMR of 22 per 100,000 in the same year. However, it remains higher than that of the United Arab Emirates, which reported an MMR of 9 per 100,000. On a global scale, Saudi Arabia outperforms the United Kingdom, which had an MMR of 21 per 100,000 in 2020, but still lags behind high-income countries such as the United States, where the MMR stood at 10 per 100,000 in the same period [18]. These comparisons underscore Saudi Arabia's progress while highlighting the potential for further improvements in maternal healthcare.

Global efforts to ensure safe childbirth have made significant headway, particularly in underserved regions, and Saudi Arabia has been no exception. With the global rate rising from 61% in 2000 to 86% in 2023, Saudi Arabia has not only kept pace but excelled, reaching an impressive 99.8% in 2023 in skilled birth attendance (*SDG 3.1.2*) [22]. This places Saudi Arabia on par with other Gulf nations, as the UAE achieved a 100% skilled birth attendance rate in 2022. It also surpasses Egypt, where skilled birth attendance stands at 97%, and Iran, which reports 99%, indicating high but slightly variable access to maternal healthcare services in the region. On a global level, Saudi Arabia's rate is comparable to the United States, which reported 99% skilled birth attendance in 2021 [22]. The combination of high



Saudi key achievements in SDG 3 targets

Fig. 1 Key health-related achievements in Saudi Arabia's progress toward SDG 3 targets. Note: Data presented in this figure were sourced from authoritative reference to ensure comprehensiveness and reliability. The primary source for the graphs is WHO| The Global Health Observatory

coverage and widespread, affordable access to all births in Saudi Arabia constitutes a major advancement in maternal health.

Saudi Arabia has made remarkable progress in child health in reducing under-five mortality (*SDG 3.2.1*). While the global rate dropped from 43.1 per 1,000 live births in 2015 to 37.1 in 2020, Saudi Arabia's rate decreased from 9.1 in 2015 to 6.4 in 2022 [22]. This progress is driven by public health initiatives like vaccination programs, improved pediatric care, and Vision 2030's focus on child health equity, ensuring access to quality care nationwide [19]. When compared regionally, Saudi Arabia's under-five mortality rate of

6.4 per 1,000 live births in 2022 is significantly lower than Egypt's 18.1 per 1,000 and Iran's 12 per 1,000, demonstrating the Kingdom's strong investments in child healthcare infrastructure. However, it remains slightly higher than the UAE's rate of 5.3 per 1,000, indicating room for further improvement. On a global scale, Saudi Arabia performs comparably to high-income countries such as the United States, which reported 6.3 per 1,000, but still lags behind the United Kingdom, which had the lowest rate at 4.1 per 1,000 in the same year [22]. These comparisons highlight Saudi Arabia's achievements while emphasizing opportunities to further reduce child mortality rates through continued healthcare advancements.

Regarding neonatal health, Saudi Arabia has reduced neonatal mortality to exceptional levels (SDG 3.2.2). While the global neonatal mortality rate decreased from 36.8 per 1,000 live births in 1990 to 17.3 in 2022, Saudi Arabia's rate fell dramatically from 23.3 in 1989 to just 3.1 in 2022 [23]. This success is largely due to the establishment of many advanced neonatal intensive care units (NICUs), comprehensive antenatal and postnatal care, and universal access to skilled care during childbirth [24]. In a regional comparison, Saudi Arabia's neonatal mortality rate of 3.1 per 1,000 live births in 2022 is significantly lower than Egypt's (9 per 1,000) and Iran's (8 per 1,000), underscoring its advanced perinatal care system [23]. Meanwhile, Saudi Arabia is nearly on par with the UAE, which recorded a neonatal mortality rate of 3 per 1,000, and aligns with high-income nations such as the United States and the United Kingdom. both of which also reported 3 per 1,000 [23]. These figures position Saudi Arabia among the global leaders in neonatal healthcare, reflecting the Kingdom's success in reducing infant deaths through high-quality maternal and neonatal care services.

2.5 Progress in Addressing Key Communicable Diseases

Saudi Arabia is one of nine countries on track for the global 95-95-95 target for HIV worldwide (SDG 3.3.1) [25]. The Kingdom's achievement in HIV management is particularly notable, as it maintains one of the lowest HIV incidence rates globally, with just 0.04 cases per 1,000 uninfected individuals in 2022-significantly lower than the global average of 0.17. Since 2015, the incidence rate has remained stable among females, while there has been a slight increase among males, from 0.05 to 0.06 [26]. In a regional context, Saudi Arabia's HIV incidence rate of 0.04 per 1,000 uninfected individuals in 2022 is notably lower than Egypt and the UAE, both of which reported a rate of 0.13 per 1,000. On a global scale, Saudi Arabia outperforms high-income countries such as the United States (0.096 per 1,000) and the United Kingdom (0.095 per 1,000) in terms of maintaining low transmission rates [25]. These figures highlight the Kingdom's success in HIV prevention and control, reinforcing its position as a leader in HIV management within both the Middle East and globally. This progress reflects Saudi Arabia's proactive and comprehensive strategies, including a near-universal coverage of antiretroviral therapy (ART), with 94% of diagnosed individuals receiving treatmentwell above global benchmarks [27]. Through the National AIDS program and the Saudi initiative to combat AIDS in GCC countries, the Kingdom continues to lead efforts in addressing HIV [28]. However, challenges persist, including stigma and discrimination towards people living with HIV, mandatory HIV testing, travel restrictions, and gender inequalities [29]. These obstacles hinder the effectiveness of the region's response to HIV. To overcome these challenges, expanding self-testing options, improving access to services for migrant workers, and raising awareness through culturally sensitive campaigns will be crucial in further strengthening the Kingdom's leadership in this area [30].

In the fight against tuberculosis (SDG 3.3.2), Saudi Arabia has made remarkable progress. The country's tuberculosis incidence has drastically fallen from 243 per 100,000 in the 1970s to just 8.2 per 100,000 in 2021, marking a 93.2% reduction over five decades [31]. When compared regionally. Saudi Arabia's TB incidence rate of 8.2 per 100,000 in 2022 is lower than both Iran (11 per 100,000) and Egypt (9.2 per 100,000), reflecting the effectiveness of its national TB control strategies [31]. However, it remains significantly higher than the UAE, which reported an exceptionally low incidence of 0.8 per 100,000, indicating an opportunity for further improvement. On a global scale, Saudi Arabia outperforms high-income countries such as the United Kingdom (7.6 per 100,000) but still has a higher rate than the United States (3.1 per 100,000), suggesting that further refinements in TB elimination strategies could help bridge this gap [31]. This success is largely attributed to the National Tuberculosis Program (NTP) and the adoption of the World Health Organization's DOTS strategy in 2000 [32]. With a TB treatment success rate of 89.9%, which exceeds the global average, Saudi Arabia is on track to eliminate TB by 2035 [33]. The Kingdom's approach includes enhanced early detection, comprehensive treatment, and targeted surveillance, which position Saudi Arabia as a leader in regional TB control.

Saudi Arabia has made remarkable progress in malaria elimination (SDG 3.3.3), transitioning from a malariaendemic country to one nearing complete eradication [34]. The incidence of malaria dropped from 0.076 per 1,000 in 2016 to zero indigenous cases in 2021, 2022, and 2023 [35]. This achievement is the result of decades of dedicated public health efforts, including comprehensive vector control strategies such as residential spraying, larvicide application, and prompt case treatment [36]. In collaboration with the World Health Organization (WHO), the Ministry of Health published Progress towards Malaria Elimination in the Kingdom of Saudi Arabia: A Success Story in 2019, which highlights the strategies and milestones leading to the elimination of malaria across much of the Kingdom. This book outlines the extensive efforts of the National Malaria Control Programme (NMCP), supported by robust government commitment and financial investment [34, 36]. Given its status as a major global pilgrimage and travel hub, Saudi

In response to the global outbreak of COVID-19, Saudi

Arabia has also implemented stringent border controls to prevent the reintroduction of malaria, particularly from neighboring Yemen. Saudi Arabia's malaria elimination program stands as a global model for disease control, based on evidence-based interventions and sustained public health investments [34].

In hepatitis B control (*SDG 3.3.4*), Saudi Arabia achieved a major public health milestone with the prevalence of the virus significantly reduced. A particularly remarkable success is the reduction of hepatitis B prevalence among children under five to 0% by 2020, following the introduction of universal vaccination programs in 1989 [37, 38]. This achievement builds on the Kingdom's broader efforts to control hepatitis B, with the overall prevalence decreasing from 3.2% in the past to 1.3% by 2019 [37].

Saudi Arabia has made significant progress in addressing neglected tropical diseases (NTDs) (SDG 3.3.5), with major achievements in disease control and elimination. One of the Kingdom's key milestones was the World Health Organization's (WHO) validation on January 26, 2022, confirming Saudi Arabia's elimination of trachoma as a public health problem [39]. This achievement places Saudi Arabia as the fourth country in the WHO's Eastern Mediterranean Region to reach this goal. In addition, Saudi Arabia has successfully eliminated visceral leishmaniasis (VL), reducing reported cases from hundreds in the 1980s and 1990s to zero by 2019 [40]. Although visceral leishmaniasis is no longer a concern, cutaneous leishmaniasis remains endemic in several regions, notably in Al-Qaseem, Riyadh, Al-Hassa, Aseer, Ha'il, and Al-Madinah [41].

The Kingdom has also achieved remarkable success in rabies control, with no human cases reported since 2010 [42]. However, animal-related injuries, particularly from wild dogs, continue to present challenges for public health. Despite these successes, Saudi Arabia has seen a significant rise in dengue fever cases recently [43]. This increase is largely attributed to changing climate conditions, which have created favorable environments for mosquito breeding.

Saudi Arabia has demonstrated significant advancements in the prevention and control of acute respiratory infections, contributing to the progress of SDG 3. Notably, the country has shown resilience and innovation in managing outbreaks of SARS, MERS-CoV, COVID-19, and seasonal influenza. Since the emergence of MERS-CoV in 2012, Saudi Arabia has reported 2,205 cases, accounting for 84% of global cases, with a mortality rate of approximately 36% among confirmed cases [44]. In 2024 alone, the country reported five cases, including four deaths, as of September [44]. The decline in MERS-CoV cases during the COVID-19 pandemic was attributed to public health measures such as mask-wearing, hand hygiene, and physical distancing, which reduced human-to-human transmission. Arabia implemented comprehensive strategies that included widespread testing, contact tracing, vaccination campaigns, and dynamic public health guidelines. A total of 392 cases of COVID-19 recorded on March 21, 2020, increased to 549,518 cases by November 22, 2021, demonstrating a rapid spread in a population of 35.3 million —a challenge that placed immense pressure on the public health system [45]. However, through effective interventions, there were notable reductions in daily infections, decreasing from 4,757 cases per day on June 18, 2020, to 220 cases on November 28, 2020, 328 cases on February 28, 2021, 1,161 cases on June 7, 2021, and eventually stabilizing at 39 cases on November 22, 2021 [45]. These figures highlight the success of Saudi Arabia's adaptive approach to managing the pandemic.

For seasonal influenza, Saudi Arabia has prioritized vaccination as a cornerstone of its public health strategy. For instance, influenza vaccination coverage for renal patients increased from 86.8% in the 2018–2019 season to an impressive 100% in the 2021–2022 season, reflecting the country's commitment to protecting vulnerable populations [46]. Additionally, Saudi Arabia uses both trivalent inactivated vaccines (TIV) and quadrivalent inactivated vaccines (QIV), with recent data indicating the introduction of split variant vaccine types to improve efficacy [6]. The Kingdom ensures free access to influenza vaccines for high-risk groups, including older adults, healthcare workers, pregnant women, and individuals with underlying health conditions, aligning with WHO recommendations [46].

Despite these achievements, challenges remain, such as vaccine hesitancy, limited collaboration among stakeholders, and suboptimal uptake of influenza vaccines in the Eastern Mediterranean Region (EMR) [47, 48]. To address these gaps, Saudi Arabia has updated its national influenza vaccination policy within the last five years, emphasizing additional priority groups and increasing vaccine coverage [46]. Furthermore, the country delivers influenza vaccines primarily through primary healthcare centers, hospitals, outpatient clinics, and innovative methods like mobile units and drive-through systems.

These efforts underscore Saudi Arabia's dedication to safeguarding public health, leveraging advanced technologies, strategic partnerships, and evidence-based interventions. By maintaining strong collaboration with international organizations like WHO, Saudi Arabia continues to serve as a regional leader in disease prevention and control, ensuring sustainable progress toward achieving SDG 3 targets and being on the top countries in terms of Global Health Security Index (GHSI) in the Middle East and Arab countries exceeding UAE, Egypt and Kuwait ranked 61/195 and an index of 44.9 Score [49].

2.6 Progress in Reducing Non-communicable Diseases, Enhancing Mental Health, and Addressing Road Traffic Injurie

In its pursuit of SDG 3.4, Saudi Arabia has achieved significant progress in reducing premature mortality from non-communicable diseases (NCDs) while also advancing mental health outcomes and addressing road traffic accidents. Saudi Arabia has made significant strides in reducing road traffic fatalities, an area of critical public health concern (SDG 3.6.1). The Kingdom has achieved a remarkable 54% decline in road traffic fatalities since 2016, reducing the fatality rate from 28.41 deaths per 100,000 in 2016 to 13.06 per 100,000 in 2023, surpassing the targeted 2023 rate of 13.23 deaths [50]. This significant reduction highlights the Kingdom's commitment to road safety and its progress in improving life-sustaining indicators, outperforming many other countries in this regard [36]. This reduction was achieved through comprehensive road safety measures, including infrastructure improvements, stricter law enforcement, enhanced emergency response services, and datadriven strategies to inform policymaking [51]. Despite the progress, road traffic injuries still account for a substantial economic cost, approximately USD 3.75 billion annually, or 2% of GDP [52]. Continuing to focus on urban planning, driver education, and leveraging emerging technologies like AI for traffic management will be crucial to further reduce road traffic mortality [53].

NCDs, including cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases, are leading causes of premature mortality, accounting for approximately 28% of all deaths in the Kingdom. In 2022, Saudi Arabia recorded 49,439 deaths due to NCDs, decrease from the 83,100 deaths reported in 2016. This substantial reduction in NCDrelated mortality reflects significant progress in addressing the NCD epidemic, though challenges persist. The probability of dying from these diseases between the ages of 30 and 70 has significantly decreased, dropping from 23% in 2015 to 14% in 2019. Men continue to have a higher probability of dying prematurely (15%) compared to women (13%) [54]. Lifestyle factors, such as poor diets, physical inactivity, and tobacco use, remain significant contributors to this disparity. This progress reflects continued efforts to reduce premature mortality, though challenges remain in further closing the gap.

The decline in NCD-related mortality in Saudi Arabia can be attributed to several factors. First, the government has implemented comprehensive public health initiatives focusing on NCD prevention and management, including national campaigns promoting healthier diets, physical activity, and smoking cessation [55, 56]. Second, increased healthcare investment has expanded access to early diagnosis, specialized treatment, and improved management of chronic conditions [19]. Advances in medical technology and enhanced healthcare workforce training have also contributed to better patient outcomes [57].

These diseases impose a significant economic burden, costing the Kingdom approximately SAR 91.6 billion (US\$ 24.4 billion) annually, or about 3.08% of GDP. However, it is important to consider the accuracy of mortality data. Studies have highlighted challenges in the death certification process within Saudi Arabia [58]. A study conducted at King Khalid University Hospital in Riyadh found that 62.2% of death certificates had an inappropriate first reported cause of death [59]. Additionally, inconsistent adoption of the International Classification of Diseases (ICD) across healthcare institutions may impact the reliability of mortality statistics. The comparison of crude NCD mortality between 2016 and 2022 underscores the positive impact of public health interventions, although ongoing efforts are needed to further reduce NCD-related mortality.

To address the growing burden of NCDs, Saudi Arabia has implemented several preventative and treatment measures. The National Executive Plan for Diabetes Control, for example, promotes early detection and glycemic management, supported by over 400,000 blood glucose meters distributed across the Kingdom [60]. Public health campaigns, encourage physical activity and healthier lifestyles, engaging millions of residents [61]. For acute and chronic conditions, the Kingdom follows evidence-based protocols, ensuring that 96% of patients with acute myocardial infarction receive aspirin within 24 h of hospital admission [60, 61]. Additionally, essential medicines for NCDs, including those for diabetes, hypertension, and heart disease, are widely available, though further efforts are needed to enhance stroke management [61].

Cancer prevention is another priority, with significant initiatives targeting liver cancer reduction through hepatitis B vaccination programs. The "324 Plan" further supports these efforts by integrating multisectoral strategies to reduce the standardized mortality rate (SMR) for NCDs from 510 to 324 per 100,000 by 2030, emphasizing early screening, treatment adherence, and community wellness programs targeting tobacco use, obesity, and sedentary lifestyles [62]. Through this framework, Saudi Arabia aims to achieve a sustainable reduction in NCD-related mortality by 2030. In terms of mental health, Saudi Arabia has successfully reduced suicide rates, one of the lowest in the world, from 0.5 per 100,000 in 2015 to 0.4 per 100,000 in recent years (SDG 3.4.2) [63]. The country's national mental health policy, which began in 2006, has expanded mental health services significantly, establishing specialized psychiatric care in over 20 hospitals and more than 150 primary healthcare centers [64]. A key achievement has been the integration of mental health services into primary healthcare, a shift that has enhanced early detection and intervention for mental disorders [65]. Family physicians now play a pivotal role in identifying and managing mental health conditions, helping to bridge the gap between primary and specialized psychiatric care [65, 66]. This integration has been instrumental in reducing stigma, improving access to treatment, and ensuring timely mental health interventions at the community level.

The National Center for Mental Health Promotion (NCMHP) leads suicide prevention efforts through awareness campaigns, a 24/7 mental health helpline, and psychosocial support programs in schools [67]. The Kingdom's commitment to mental health is further reflected in its allocation of approximately 4% of total healthcare spending to mental health services, well above the global average of less than 2% [68]. While significant progress has been made, continued efforts are required to enhance mental health training for primary care physicians and further integrate psychiatric services into routine healthcare delivery to ensure a holistic approach to mental well-being [66].

In addition to NCDs and mental health, Saudi Arabia has also made progress in addressing tobacco use, although challenges remain. Tobacco use in Saudi Arabia has increased from 12.2% in 2013 (National Survey) to 19.8% in 2019 (GATS), with 30.0% of men and 4.2% of women using tobacco [69, 70]. This is up from 14.4% in 2015 and 14.9% in 2022 (SDG 3.a.1). The rise is particularly notable among men, with 17.9% of adults smoking, and 15.2% smoking daily [70]. Despite tobacco control measures such as plain packaging, public health campaigns, and taxation in line with the WHO Framework Convention, the growing use of e-cigarettes and heated tobacco products, especially among youth—remains a challenge.

Despite efforts to address tobacco use as part of its commitment to achieve SDG 3, Saudi Arabia continues to face challenges in curbing smoking prevalence. Data indicates an increase in tobacco use from 12.2% in 2013 (National Survey) to 19.8% in 2019 (GATS), with significant disparities between genders-30.0% of men versus 4.2% of women using tobacco products [69, 70]. This upward trend persists, with figures rising from 14.4% in 2015 to 14.9% in 2022 (SDG 3.a.1). Among adults, 17.9% smoke, and 15.2% do so daily, highlighting the growing concern among male populations [70]. To combat this issue, the government has implemented several strategies aligned with the WHO Framework Convention on Tobacco Control (WHO FCTC), including plain packaging, public health awareness campaigns, and increased taxation on tobacco products [71]. However, the emergence of e-cigarettes and heated tobacco products, particularly popular among youth, poses new challenges to these efforts. In response, the Ministry of Health has introduced regulations to restrict their sale and marketing, alongside targeted educational initiatives to inform the public about their associated health risks. While these measures are important, sustained monitoring and adaptive policies are essential to reversing current trends and achieving long-term reductions in tobacco use.

2.7 Addressing Substance Use Disorders and Alcohol Consumption

Saudi Arabia has successfully achieved 100% coverage for treatment interventions targeting substance use disorders *(SDG 3.5.1)*, demonstrating its commitment to addressing this critical public health issue. Both males and females have access to a range of services, including pharmacological treatments, psychological counseling, rehabilitation, and aftercare, ensuring equitable access to care across the population [72]. The Kingdom's approach integrates substance use disorder programs into the broader healthcare system while working to destigmatize treatment. Alcohol consumption is effectively non-existent in Saudi society, primarily due to Islamic values and cultural norms, rather than formal government regulations (SDG 3.5.2) [73]. However, the healthcare system is well-prepared to address any future cases of alcohol or drug abuse.

2.8 Advancing Reproductive Healthcare, Family Planning and HPV Prevention

Saudi Arabia has made significant progress toward *SDG 3.7* by improving access to reproductive healthcare services and effectively reducing adolescent birth rates. These efforts are part of the Kingdom's broader strategy to enhance family planning services, ensuring equitable access to contraception and maternal healthcare across the population.

Efforts to meet family planning needs under indicator 3.7.1 reveal mixed progress. Utilization of modern contraceptives is reported at 46% according to the WHO UHC Report (2023), while GASTAT (2022) data indicates that 60.1% of married women of reproductive age have their need for family planning satisfied with a modern method [74, 75]. Despite this progress, challenges such as cultural norms, misconceptions about contraceptives, and limited healthcare access in certain areas underscore the need for targeted interventions [76]. In terms of adolescent birth rates, Saudi Arabia has consistently outperformed global averages. The rate declined from 8.65 per 1,000 in 2009 to 8.28 in 2021, reflecting investments in education, youth empowerment, and strong cultural norms discouraging adolescent pregnancies [77]. Efforts by the Ministry of Health, including training programs and the Family Planning Guide, have played a significant role in addressing these challenges [57].

However, expanding access to reproductive health education, particularly in less urbanized areas, remains critical for maintaining progress. With the introduction of regulatory laws prohibiting marriage under the age of 18, the rate is poised for further decline, reflecting a growing commitment to safeguarding adolescent well-being.

2.9 Universal Health Coverage and Financial Protection

Universal Health Coverage (UHC) has witnessed notable strides, as reflected in the increase of its service coverage index from 65 in 2000 to 74 in 2021 (SDG 3.8.1) [78]. The Kingdom's investments in primary healthcare (PHC) have been key to this progress, helping to reduce disparities in access, particularly in rural areas [6]. By focusing on preventive care and early intervention, Saudi Arabia has strengthened its healthcare foundation [79]. In parallel, the expansion of healthcare infrastructure—such as new hospitals, specialized centers, and digital health platforms like Seha—has significantly improved service availability [79].

Additionally, Saudi Arabia's commitment to universal coverage is evidenced by a report from the National Health Survey and the Woman and Child Health Survey, which revealed that 100% of Saudis had coverage for their basic healthcare expenses in 2024 [80, 81]. Moreover, the Kingdom has made great strides in minimizing the financial burden on its population. Saudi Arabia's ability to keep the proportion of households facing catastrophic health expenditures low (1.31% in 2018, down from 1.73% in 2013) is a testament to its strong public health financing model (*SDG 3.8.2*) [82]. Initiatives like compulsory health insurance for expatriates and the establishment of the Saudi Health Insurance Council have diversified funding sources and reduced financial barriers to healthcare [83].

2.10 Environmental and Policy-driven Health

Saudi Arabia has made significant progress in reducing health risks associated with environmental factors in alignment with *SDG 3.9.1*. Mortality rates from household and ambient air pollution decreased from 101 per 100,000 in 2015 to 91.2 per 100,000 in 2019, reflecting effective mitigation strategies [84]. While the reduction is notable, ambient particulate matter (PM2.5) continues to be a challenge. In 2017, exposure levels to PM2.5 were still higher than recommended thresholds, contributing to an estimated 8,536 deaths and 315,200 disability-adjusted life years (DALYs) [85]. In response, Saudi Arabia has implemented stricter environmental regulations, invested in cleaner energy solutions, and improved air quality monitoring systems [85].

In addition, Saudi Arabia has achieved remarkable improvements in reducing mortality related to unsafe water, sanitation, and hygiene (WASH) services (*SDG 3.9.2*). Mortality rates attributed to unsafe WASH services dropped dramatically from 11.54 deaths per 100,000 in 2016 to just 1.9 in 2019, underscoring the effectiveness of policy interventions and infrastructure investments [86]. Furthermore, unintentional poisoning has also emerged as a significant area for focus, with efforts underway to reduce associated mortality through stronger regulations and public health campaigns [87].

2.11 Advancing Immunization Coverage

Immunization coverage in Saudi Arabia has reached impressive levels, with vaccination rates for key vaccines exceeding 96% as of 2023 [88]. For example, Bacillus Calmette–Guérin (BCG) coverage has risen from 33% in 1980 to 96%, while Diphtheria, Tetanus, and Pertussis (DTP) coverage stands at 97% [89]. Hepatitis B vaccination for newborns and the third dose for infants have also reached 97% [89].

In addition to its robust compulsory immunization schemes targeting infants and young children, Saudi Arabia has implemented comprehensive vaccination programs tailored to other vulnerable populations, including pregnant women, the elderly, and travelers. A Royal decree was issued mandating that COVID-19 vaccines should be provided to all Saudi citizens and residents, including illegal residents, equally and at no cost to the individual [90]. This policy underscores the Kingdom's commitment to equitable healthcare access and universal protection against infectious diseases.

The Kingdom's national influenza vaccination policy, which applies to both public and private sectors, was last updated in 2023, underscoring its commitment to protecting all segments of society [91]. During the 2022-2023 season, Saudi Arabia distributed 5 million doses of influenza vaccine, with 95% administered through the public sector, ensuring broad accessibility [46]. Influenza vaccination is recommended for all high-risk groups, including older adults, healthcare workers, pregnant women, individuals with chronic conditions, residents in long-term care facilities, and travelers (e.g., Hajj pilgrims) [92]. For instance, influenza vaccination coverage for renal patients increased from 86.8% in the 2018–2019 season to an impressive 100% in the 2021–2022 season, highlighting targeted efforts to protect vulnerable populations [46]. Furthermore, Saudi Arabia provides free influenza vaccines to certain groups, enhancing equity in healthcare delivery.

These achievements have contributed to the near elimination of diseases like neonatal tetanus, diphtheria, and yellow fever, with measles, mumps, and rubella now seen only in isolated outbreaks, in line with the targets of SDG 3.b.1.

2.12 Saudi Arabia's Strategic Efforts in Strengthening Global Health Systems and Tackling Health Challenges

Saudi Arabia's commitment to global health development is evident through its increasing official development assistance (ODA) for health, in alignment with SDG 3.b.2 (Official Development Assistance for Health). His Excellency Saudi Minister of Health, Fahd Al-Jalajel, recently announced healthcare investments surpassing SAR 50 billion, reinforcing the Kingdom's dedication to addressing global health challenges and strengthening public health infrastructure [93]. The Kingdom's leadership in pharmaceutical governance is further demonstrated by the Saudi Food and Drug Authority's (SFDA) achievement of the World Health Organization's (WHO) maturity level four (ML4) for medicines and vaccine regulation [94]. In addition, the private sector's contribution to health financing has grown significantly, with the number of insured individuals increasing from 3 million in 2011 to over 12 million by the end of 2023 [83, 93]. The market is projected to double by 2030, reflecting the Kingdom's strategy to promote private sector participation in health financing [57]. Furthermore, Saudi Arabia was honored with the Excellence Award at the 2024 World Health Assembly for its achievements in improving the quality of its mortality data registry [95]. This prestigious award recognizes the Kingdom's significant progress in enhancing the completeness and accuracy of the National Death Registry System. The award highlights the effectiveness of Saudi Arabia's efforts in strengthening public health planning, policy formulation, and evidence-based decision-making, which are crucial for achieving international health goals.

Healthcare innovation has been accelerated through initiatives like the Saudi Research, Development and Innovation Authority (RDIA) and Saudi National Institute of Health (NIH), which fosters applied sciences research and encourages cross-sector partnerships to align with national priorities [96]. This initiative has positioned Saudi Arabia as a leader in scientific development. The pharmaceutical sector, growing at nearly 10% annually, is expected to exceed SAR 72 billion by 2030, making it the fastest-growing sector among G20 countries [97]. Investments in healthcare talent through expanded Saudi Board training seats and localization programs further strengthen the Kingdom's healthcare capacity, enabling it to meet both domestic and global health needs [57].

Saudi Arabia has significantly expanded its healthcare workforce, aligning with SDG 3.c (Health Worker Density

and Distribution). From 2018 to 2023, the number of physicians per 10,000 population grew from 28.99 to 34.06, and the number of nursing and midwifery personnel rose from 60.79 to 65.57 [98]. Addressing disparities in workforce distribution remains a priority to ensure access to essential healthcare services across all regions [76–78].

In terms of health emergency preparedness, Saudi Arabia has excelled, achieving a 95% score in the 2023 International Health Regulations (IHR) core capacity assessment, in line with SDG 3.d (Health Emergency Preparedness) [99]. The Kingdom's proactive response to the COVID-19 pandemic, enhanced by digital health innovations and lessons learned from past outbreaks like MERS-CoV, underscores its leadership in health security [100]. The integration of a One Health approach further strengthens Saudi Arabia's capacity to manage zoonotic diseases and emerging health threats.

Antimicrobial resistance (AMR) has emerged as a growing concern in Saudi Arabia, particularly with alarming trends in bloodstream infections. The percentage of Escherichia coli bloodstream infections resistant to third-generation cephalosporins rose from 50.9% in 2017 to 53.0% in 2021, highlighting the increasing challenge of resistance to critical antibiotics. Similarly, methicillin-resistant Staphylococcus aureus (MRSA) bloodstream infections surged significantly, jumping from 33.1% in 2017 to 50.4% in 2021 [101].

3 Impact of SDGS Achievement on Life Expectancy in Saudi Arabia

Life expectancy at birth is a key overarching indicator of a population's health and well-being. Saudi Arabia's remarkable progress in public health reflects a holistic approach that tackles both communicable and non-communicable diseases [50]. Landmark achievements, such as the elimination of malaria and polio, alongside significant strides in addressing diabetes, cardiovascular diseases, and cancer, have been key milestones. The Kingdom's success in achieving the 95-95-95 targets for HIV programs and advancing treatment coverage for tuberculosis further demonstrates its commitment to eradicating major health challenges.

In parallel, comprehensive health initiatives have driven a significant reduction in car accidents, expanded immunization coverage, and ensured access to robust healthcare services. This multifaceted effort, guided by the principle of health promotion across all policies and sectors, has led to a steady rise in life expectancy, reaching 77.6 years in 2023 with an ambitious target of 80 years by 2030, surpassing the global average of 71.4 years (2021) [6]. These achievements underscore Saudi Arabia's vision for a healthier, longer-living population, where investments in public health continue to transform lives and set global benchmarks [82].

4 Healthcare Privatization in Saudi Arabia

Saudi Arabia's shift towards healthcare privatization is driven by economic, demographic, and policy factors, reflecting a strategic move to enhance efficiency, quality, and financial sustainability [102]. Historically, the country relied on a publicly funded healthcare system, largely supported by oil revenues, ensuring universal access to free medical services [9]. However, rising healthcare costs, an aging population, and an increasing prevalence of non-communicable diseases (NCDs) have placed financial strain on the government. As a response, the Vision 2030 initiative has accelerated private sector participation through publicprivate partnerships (PPPs), the expansion of private insurance schemes, and the privatization of hospitals and primary healthcare centers [9]. Between 2010 and 2016, the private sector's share of outpatient care increased from 31 to 37%, while its contribution to inpatient services grew from 32 to 35% [102]. These shifts indicate a growing reliance on private healthcare providers to meet the rising demand for specialized services, reduce public expenditure, and improve healthcare quality.

While privatization has enhanced service quality and technological advancements, concerns regarding equity and accessibility remain. Studies indicate that higher-income groups have benefited more from privatized healthcare services, as private hospitals tend to cluster in urban areas, leaving rural populations with limited access [102]. Furthermore, rising out-of-pocket expenses for medical care have sparked concerns about affordability, particularly for middle- and low-income citizens [102]. Despite compulsory private health insurance schemes introduced for expatriates and employees in the private sector, gaps in coverage persist. The government has emphasized the need for robust regulation to prevent cost inflation and ensure service affordability, aligning with successful models seen in countries like Singapore and Germany. Moving forward, Saudi Arabia must strike a balance between expanding private healthcare services and maintaining equitable access, ensuring that privatization does not compromise universal health coverage (UHC) goals under SDG 3 [83].

5 Limitations

While this narrative review provides a comprehensive assessment of Saudi Arabia's progress toward SDG 3, it has several limitations. First, the reliance on secondary data sources may introduce reporting biases or variations in data collection methodologies across different institutions. Second, while benchmarking with regional and high-income countries provides context, differences in healthcare policies and socio-economic factors may limit direct comparability. Third, some indicators, particularly HIV prevalence and NCD mortality rates, may be subject to underreporting or data inconsistencies. Lastly, while we analyze policy impacts, establishing direct causal relationships between interventions and health outcomes remains challenging. Future research utilizing longitudinal studies and primary

data collection would provide a more robust evaluation of

6 Recommendations for Accelerating Progress

progress and policy effectiveness.

To sustain progress toward health-related SDGs, Saudi Arabia should implement evidence-based strategies across key areas. These recommendations are informed by successful international models and global best practices to ensure impactful and sustainable healthcare transformation.

6.1 Strengthening Cross-Sectoral Collaboration

Health outcomes are influenced by social determinants such as education, housing, and employment [103]. The World Health Organization (WHO) estimates that these factors account for up to 50% of health outcomes [103]. Saudi Arabia should integrate health impact assessments (HIA) into policymaking, similar to Finland's intersectoral health equity initiatives, ensuring that urban planning, education, and labor policies support public health [104].

6.2 Enhancing National Health Data and Surveillance

Expanding national health surveys, particularly for NCDs and mental health, will strengthen data-driven policymaking. Models like the U.S. NHANES and the UK's Health Survey for England demonstrate how regular health data collection aids early disease detection and targeted interventions [105, 106]. Saudi Arabia could:

- I. Establish chronic disease surveillance programs with real-time monitoring through the Saudi Health Information Exchange (SHIE) [107].
- II. Launch a National Mental Health Index to track trends and improve service allocation [107].

6.3 Implementing a Digital Health Expansion Framework

Telemedicine and IoMT (Internet of Medical Things) are critical for improving healthcare access. South Korea's Smart Health program and Estonia's eHealth system provide models for expanding digital healthcare securely and efficiently. Saudi Arabia could:

- I. Scale up Seha and Mawid platforms for specialist consultations and chronic disease management [107, 108].
- II. Expand wearable IoT devices for diabetes, hypertension, and mental health tracking, reducing the burden on hospitals [109].

6.4 Promoting Sustainable Healthcare Infrastructure

Healthcare contributes 5% of global CO₂ emissions [110]. Saudi Arabia could:

- I. Implement mandatory energy audits for hospitals [111].
- II. Expand solar-powered healthcare facilities, following Germany's Green Hospital Program [112, 113].
- III. Establish medical waste reduction programs to cut waste by 30% by 2030 [114].

6.5 Strengthening NCD Prevention and Health Promotion

Preventive strategies are essential. Inspired by Singapore's Health Promotion Board [115], Saudi Arabia could:

- I. Implement salt and sugar reduction policies, reducing sodium intake by 15%.
- II. Strengthen workplace wellness programs and youthfocused anti-smoking campaigns.

By integrating technology, cross-sector collaboration, sustainability, and prevention-focused policies, Saudi Arabia can accelerate its progress toward SDG health targets and position itself as a global leader in innovative, data-driven healthcare.

7 Conclusion

Saudi Arabia has made significant strides in achieving SDG 3, particularly in maternal and child health, infectious disease control, non-communicable disease management, and digital health integration. Key reforms under Vision 2030 have strengthened healthcare access, infrastructure, and

policy frameworks, contributing to improved health indicators and life expectancy. However, challenges remain, including rising NCD prevalence, tobacco use, healthcare accessibility disparities, and environmental health risks. Addressing these requires continued investment in preventive care, cross-sectoral collaboration, and digital health advancements. By leveraging data-driven policies and innovative healthcare models, Saudi Arabia is well-positioned to achieve its 2030 health targets and emerge as a model for sustainable healthcare development in the region and beyond.

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