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Research Article

Health Impact Assessment (HIA) of Major Non-Health Policies: Integrating Health Considerations into Saudi National Development

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Abstract:

The systematic integration of Health Impact Assessment (HIA) into the development and evaluation of major non-health policies is a critical strategic imperative for Saudi Arabia to fully realize the goals of its Vision 2030 transformation. As the Kingdom pursues ambitious projects and reforms in urban planning, energy, transportation, and fiscal policy, these decisions will fundamentally shape the social, environmental, and economic determinants of population health. HIA provides a structured, evidence-based framework to proactively identify and mitigate potential health risks—such as increased air pollution or unequal access to services—while maximizing opportunities for health promotion, like designing walkable communities or ensuring affordable nutritious food. Institutionalizing HIA as a mandatory component of policy appraisal aligns directly with the Vision's "Vibrant Society" pillar, moving beyond a reactive healthcare model to actively create health-promoting environments across all sectors. This proactive approach safeguards public well-being, enhances the sustainability and social license of mega-projects, prevents future healthcare burdens, and ensures that the nation's

economic diversification directly contributes to the long-term health and productivity of its human capital, thereby securing a more resilient and equitable future.

1. Introduction

The pursuit of national development has historically been measured through economic indicators such as Gross Domestic Product (GDP), industrial output, and infrastructure growth. However, the 21st century has witnessed a paradigm shift towards a more holistic understanding of progress, one that places human well-being and health at its core. This recognition is embedded within the United Nations Sustainable Development Goals (SDGs), which posit health as both a central outcome and a prerequisite for sustainable development [1]. In this context, the Kingdom of Saudi Arabia stands at a pivotal juncture, embarking on an unprecedented and ambitious transformation under its Vision 2030 framework. This strategic blueprint aims to diversify the economy, enhance public service sectors, and build a vibrant society, thereby reducing the nation's historical dependence on hydrocarbon revenues [2]. While the economic and social pillars of Vision 2030 are explicitly outlined, the success of this monumental transformation is inextricably linked to a factor that must be proactively managed: the health of the Saudi population.

Health is not created within the confines of hospitals and clinics alone. A robust body of evidence, encapsulated by the social determinants of health framework, demonstrates that the conditions in which people are born, grow, live, work, and age are primarily shaped by the distribution of power, resources, and policy choices made across all sectors of government [3]. Consequently, policies formulated in sectors such as energy, transportation, urban planning, agriculture, education, and finance possess profound, and often unintended, consequences for population health. A new industrial city, a subsidy reform on fuel or food, a national transportation strategy, or a large-scale tourism project—each of these non-health policies can influence air quality, traffic safety, dietary patterns, physical activity, social cohesion, and mental well-being. Without a systematic mechanism to evaluate these health implications, well-intentioned development projects risk generating negative externalities that undermine societal well-being, increase long-term healthcare burdens, and contravene the very goals of sustainable development.

This is where the tool of Health Impact Assessment (HIA) becomes critically indispensable. HIA is defined as a combination of procedures, methods, and tools that systematically judges the potential, and sometimes unintended, effects of a policy, plan, program, or project on the health of a population and the distribution of those effects within the population. HIA identifies appropriate actions to manage those effects, with the ultimate aim of proposing evidence-based recommendations to inform decision-makers [4]. Its core ethos is *"health in all policies"* (HiAP), a collaborative approach that integrates health considerations into policymaking across sectors to improve health outcomes and health equity [5]. Unlike an environmental impact assessment (EIA), which may focus on toxicological or ecological risks, HIA adopts a broader, positive definition of health—encompancing physical, mental, and social well-being—and actively seeks to maximize health gains while mitigating harms.

For Saudi Arabia, the integration of HIA into the governance of major non-health policies is not merely an academic exercise; it is a strategic imperative aligned with Vision 2030's goals. The Vision's "Vibrant Society" pillar explicitly targets enhancing lifestyle quality and healthcare services [2]. However, achieving a vibrant, healthy society requires moving beyond treating illness to actively creating health-promoting environments. The Kingdom faces a distinctive health profile characterized by a high and rising burden of non-communicable diseases (NCDs), such as diabetes, cardiovascular diseases, and obesity. These conditions are deeply influenced by environmental, behavioral, and socio-economic factors that are directly modifiable through cross-sectoral policy [6]. Furthermore, Saudi Arabia's rapid urbanization, climatic challenges, and demographic youth bulge present both risks and opportunities for health that will be determined by today's policy choices in non-health domains.

Globally, the application of HIA has demonstrated its value. From informing urban regeneration plans in Europe to assessing mining projects in Australia and trade agreements in Thailand, HIA has proven effective in raising awareness of health impacts, promoting intersectoral collaboration, and embedding health equity into the decision-making process [7]. The institutionalization of HIA, however, requires strong political commitment, legal or procedural mandates, technical capacity, and stakeholder engagement. Some nations have legislated its use for certain projects, while others employ it as a voluntary, persuasive tool [8].

2. The Methodology of Health Impact Assessment:

Health Impact Assessment is not a monolithic activity but a flexible, structured process that can be adapted to different contexts, resources, and timelines. It is typically categorized into three types based on depth and resource intensity: desktop (or rapid), intermediate, and comprehensive. A rapid HIA might be completed in days or weeks using existing data and expert judgment, suitable for fast-paced policy decisions. A comprehensive HIA, often applied to large-scale projects, may take months or years and involve extensive new research, detailed modeling, and broad public participation [9]. The core process, however, follows a series of logical, interconnected steps as outlined by the World Health Organization and other leading bodies.

The first step is **Screening**. This determines whether an HIA is warranted and feasible for a specific policy, plan, or project. Screening asks fundamental questions: Is there a significant potential link to health? Are there vulnerable populations who might be differentially affected? Is the decision-making process open to influence by HIA findings? And are adequate resources and data available to conduct the assessment? In the Saudi context, screening criteria should be developed to automatically trigger an HIA for all mega-projects, national strategic plans in key sectors (e.g., transportation, industry, housing), and fiscal policies with broad societal reach [10]. This step ensures that resources are allocated to assessments where the health stakes are highest and the opportunity for influence is real.

Following a decision to proceed, the **Scoping** phase establishes the boundaries of the assessment. It identifies which health impacts to investigate, defines the populations of concern (including sub-groups like children, the elderly, or low-income communities), selects appropriate methods, and forms a steering committee that ideally includes representatives from the proposing sector, public health authorities, academia, and civil society. For a Saudi national policy on renewable energy, for instance, scoping would determine whether to focus on occupational health during construction, respiratory health impacts from changed air pollutant mix, or community mental health from new employment opportunities. This phase sets the work plan and ensures the HIA remains focused and manageable [11].

The heart of the HIA is the **Appraisal** or **Assessment** phase. Here, a mix of qualitative and quantitative methods is used to predict the likely health impacts. This involves profiling the baseline health status of the affected population and then forecasting changes. Methods include literature reviews of similar policies, expert workshops, quantitative risk assessment models (e.g., for air quality changes), system dynamics modeling, and community surveys or focus groups to gather local knowledge and concerns [12]. For example, in appraising a new metropolitan public transport system in Riyadh, analysts might model the reduction in private vehicle emissions and translate this into estimated reductions in asthma exacerbations and cardiovascular events. Simultaneously, they might assess the potential for increased physical activity from walking to stations and the social inclusion benefits for non-drivers, such as women and youth [13].

Based on the evidence from the appraisal, the next step is **Recommendations**. The HIA team formulates practical, evidence-based proposals to enhance positive health impacts and mitigate negative ones. Recommendations must be realistic, targeted at the correct decision-making authority, and, where possible, co-designed with stakeholders. For a housing development project, recommendations could range from design changes (ensuring green spaces and safe playgrounds) to inclusionary zoning policies that promote socio-economic diversity and prevent the concentration of disadvantage, which is a known social determinant of poor health [14].

Finally, the process includes **Reporting, Monitoring, and Evaluation**. A clear report must be disseminated to decision-makers and the public. Crucially, mechanisms should be established to monitor whether the HIA's recommendations are adopted and, subsequently, to evaluate the actual health outcomes after policy implementation. This "closing the loop" is often the weakest part of HIA practice globally but is essential for accountability, learning, and proving the value of the tool [15]. Institutionalizing HIA in Saudi Arabia would require building capacity for this longitudinal tracking, perhaps through the integrated digital health and population registries being developed under the Vision 2030 Health Sector Transformation Program.

3. HIA Application to Key Saudi National Development Sectors

The transformative agenda of Vision 2030 touches every sector of the Saudi economy and society. Applying the HIA lens to these sectors reveals a powerful opportunity to shape healthier development pathways.

Urban Planning and Housing Policies: Saudi cities, particularly Riyadh, Jeddah, and Dammam,

have historically been designed around the private automobile, leading to sprawl, congestion, and limited opportunities for active transport. The Vision's goals of improving quality of life and developing city competitiveness are directly tied to urban form. HIA of urban master plans and mega-projects like NEOM or the King Salman Park in Riyadh can systematically evaluate impacts on physical activity (via walkability and access to recreational spaces), road safety, air and noise pollution, social interaction, and access to essential services [16]. Recommendations could mandate mixed-use development, complete street designs that prioritize pedestrians and cyclists, universal accessibility standards, and the preservation of and equitable access to green and blue spaces, which are proven to benefit mental health and community cohesion [17]. Furthermore, HIA of housing policies can assess how affordability and location affect commute times, household stress, and access to healthy food retailers, thereby influencing obesity and NCD risk factors.

Energy and Industrial Policy: The Saudi Green Initiative and the National Renewable Energy Program aim to diversify the energy mix and reduce the domestic carbon footprint. An HIA of this energy transition is crucial. While increasing renewable energy share (solar, wind) promises substantial long-term benefits for air quality and climate change mitigation—directly reducing the burden of diseases linked to fossil fuel combustion—the HIA process would also need to assess potential risks [18]. These include occupational health and safety in new industries, management of electronic waste from solar panels, and ensuring that the economic transition for communities reliant on the hydrocarbon sector does not create unemployment and associated negative health impacts. Similarly, HIA applied to the growth of non-oil industries, such as mining or manufacturing in economic cities, must rigorously assess and manage local environmental exposures (dust, chemicals), occupational hazards, and the socio-economic impacts on local communities, including influx of labor and pressure on local housing and services [19].

Transportation and Mobility Strategies: The Kingdom is investing heavily in public transport (e.g., Riyadh Metro, Jeddah Public Transport Project) and aiming to increase public transport share in major cities. HIA provides a framework to maximize the health dividends of this investment. Beyond modeling the air quality benefits from reduced traffic, HIA can quantify the health gains from increased physical activity, reductions in traffic injuries, and improved access to education, jobs, and services for non-drivers, thereby promoting equity [20]. Conversely, an HIA of policies promoting private vehicle use, such as certain subsidy structures or low-density development, would highlight the associated health costs. Furthermore, HIA can inform the planning of active transport infrastructure (bike lanes, pedestrian pathways) as a core component of all new road projects, aligning with the Quality of Life Program under Vision 2030.

Fiscal and Economic Policies: Major economic reforms, including the Fiscal Balance Program, VAT introduction, and adjustments to energy and water subsidies, have profound, if indirect, health consequences. HIA can be used to predict and manage these impacts. For instance, removing subsidies on energy and water can encourage conservation but may also increase living costs. An HIA would analyze the differential impact on household budgets across income quintiles and model potential effects on nutrition, heating/cooling in extreme temperatures, and overall material hardship—all key social determinants of health [21]. It can then recommend targeted compensation mechanisms or phased implementation to protect vulnerable households. Similarly, HIA of labor market reforms, including increased female participation, can assess impacts on family dynamics, childcare needs, mental well-being, and gender equity, proposing supportive workplace policies and social services to ensure positive health outcomes [22].

Agriculture, Food Security, and Water Management: Saudi food security strategies, which balance domestic production with imports, directly influence the nutritional environment. HIA can assess the health implications of agricultural subsidy patterns, food pricing policies, and regulations on food marketing, particularly to children. Policies that make fruits, vegetables, and whole grains more affordable and accessible than ultra-processed foods can be powerful tools in combating obesity and diabetes [23]. Furthermore, HIA is critically needed for water management policies in this arid region. Decisions on water pricing, allocation between sectors, and reliance on energy-intensive desalination have cascading effects. They influence agricultural viability, household water security, and the energy sector's environmental footprint, creating a complex web of health determinants that an integrated HIA can help untangle [24].

4. Challenges and Opportunities for Institutionalizing HIA in Saudi Arabia

The adoption of a systematic HIA practice in Saudi Arabia presents both significant challenges and

unique opportunities, given the current moment of transformation.

Key Challenges:

1. **Sectoral Silos and Awareness:** A primary barrier is the traditional separation of health policy from other sectors. Policymakers in finance, industry, or urban development may not perceive health as within their mandate or may lack awareness of the profound health consequences of their decisions. Building a shared understanding of the "health in all policies" principle is a foundational challenge [25].
2. **Legal and Mandatory Status:** Currently, Saudi Arabia has a strong framework for Environmental Impact Assessment (EIA), but HIA is not a mandatory, legally required component of the approval process for major projects or policies. Without a regulatory mandate or high-level directive from the Council of Ministers or the Council of Economic and Development Affairs (CEDA), HIA may remain a voluntary, ad-hoc exercise with limited influence [26].
3. **Technical Capacity and Data:** Conducting robust HIAs requires a multidisciplinary skill set combining public health, epidemiology, urban planning, economics, and social sciences. A shortage of trained practitioners within government ministries and consulting firms is a constraint [27]. Additionally, while health data systems are improving, conducting HIAs often requires granular, localized data on health status, behaviors, and environmental exposures, as well as the ability to model complex causal pathways, which can be data-intensive.
4. **Timing and Integration into Decision Cycles:** To be effective, HIA must be initiated early in the policy or project development cycle, when options are still open and recommendations can be feasibly incorporated. If introduced too late, it becomes merely an academic documentation of impacts with no power to alter decisions [28].

Significant Opportunities:

1. **Alignment with Vision 2030 Governance:** The Vision has already catalyzed new, cross-cutting modes of governance through programs and delivery mechanisms. HIA aligns perfectly with the Vision's integrated and outcome-oriented approach. It can be formally incorporated into the ex-ante appraisal guidelines of the Center for Spending Efficiency or the project lifecycle management of the National Center for Privatization & PPP [29].
2. **The Mega-Project Laboratory:** Saudi Arabia's giga-projects, like NEOM, are conceived as holistic living labs for future technologies and lifestyles. Mandating comprehensive HIAs for these projects from their inception would not only optimize their health outcomes but also position Saudi Arabia as a global leader in healthy urban and industrial design, generating valuable best practices and international recognition [30].
3. **Leveraging Digital Transformation:** The Kingdom's investment in digital government, national data hubs, and artificial intelligence, under the Vision's Digital Transformation Program, provides a unique opportunity. These platforms can be leveraged to create integrated data systems that support HIA modeling and monitoring, making assessments more efficient, accurate, and scalable [31].
4. **Building on Existing EIA Infrastructure:** The Presidency of State Security's National Center for Environmental Compliance (NCEC) has extensive experience administering the EIA process. HIA can be introduced as a complementary, and eventually integrated, component of this existing regulatory framework, building on established procedures for screening, consulting, and reporting [32].
5. **Academic and Research Partnerships:** Saudi universities and research centers, such as the King Abdullah International Medical Research Center (KAIMRC) and the King Abdulaziz City for Science and Technology (KACST), can be mobilized to develop HIA methodologies suited to the Gulf context, build local capacity through training programs, and serve as independent sources of technical expertise for conducting assessments [33].

5. A Roadmap for Integration: From Concept to Standard Practice

To move from theory to practice, Saudi Arabia requires a clear, phased roadmap for institutionalizing HIA. This roadmap should involve strategic actions at the political, legal, technical, and cultural levels.

Phase 1: Foundation Building and Pilot Projects (Short-Term: 1-2 Years). This phase begins with high-level advocacy to secure political champions, potentially within the Ministry of Health, the Ministry of Economy and Planning, and the Saudi Green Initiative Authority. Simultaneously, a national task force should be formed to draft Saudi-specific HIA guidelines and screening criteria. Concurrently, 3-5 strategic pilot HIAs should be commissioned on upcoming policies or projects with clear health links, such as a city-wide active transport plan, a new industrial zone, or a revision to food subsidy programs. These pilots serve as proof-of-concept, build initial capacity, and generate case studies to demonstrate value to decision-makers [34].

Phase 2: Capacity Development and Procedural Integration (Medium-Term: 3-5 Years). Based on lessons from the pilots, a national HIA training and certification program should be launched for civil servants across sectors and for private consultants. Key institutions, starting with the NCEC and the relevant health authorities, should establish dedicated HIA units. Legally, the most feasible step is to issue a Royal Decree or Council of Ministers Resolution that mandates HIA for all national strategic plans and mega-projects above a certain threshold, requiring that HIA reports be submitted to and considered by CEDA or relevant ministerial committees [35]. This phase also involves the development of a national HIA support unit, possibly housed within the Ministry of Economy and Planning, to provide technical guidance, maintain a registry of assessments, and promote best practices.

Phase 3: Mainstreaming and Culture Shift (Long-Term: 5+ Years). The goal of this phase is to make HIA an ingrained, routine part of Saudi governance. This involves the full integration of HIA into the digital project management platforms of the government, enabling seamless workflows. It requires ongoing monitoring and evaluation of completed HIAs to build a strong evidence base on their effectiveness and economic return on investment in terms of healthcare cost savings and productivity gains [32]. Ultimately, success is achieved when sectoral ministers and CEOs automatically ask, "What does the HIA say?" during project reviews, signifying a fundamental cultural shift towards proactive health-conscious policymaking.

6. Conclusion

The Kingdom of Saudi Arabia's Vision 2030 represents one of the most ambitious national transformation programs in the world today. Its success will ultimately be judged not only by macroeconomic indicators and gleaming infrastructure but by the health, well-being, and happiness of its people. Health Impact Assessment is the critical, evidence-based tool that can bridge the gap between sectoral development goals and holistic societal outcomes. By systematically evaluating how policies in urban development, energy, transport, finance, and agriculture affect the determinants of health, HIA allows Saudi decision-makers to foresee unintended consequences, seize opportunities to promote well-being, and ensure that the dividends of development are equitably shared.

The challenges to institutionalizing HIA are real but not insurmountable, especially in a nation accustomed to visionary planning and rapid execution. The opportunities, conversely, are extraordinary: the chance to design future cities from scratch with health as a core parameter; to guide an energy transition that maximizes public health co-benefits; and to build an economy that actively generates human vitality rather than undermining it. By adopting HIA, Saudi Arabia can move beyond a reactive healthcare model to a proactive health-creation model. It can protect its population from the costly burden of preventable disease, enhance the sustainability and social license of its mega-projects, and truly fulfill the promise of a vibrant society. The integration of health considerations into all national development policies through HIA is not a cost or a bureaucratic hurdle; it is a strategic investment in the nation's most valuable asset—its human capital—and a definitive step towards a healthier, more resilient, and prosperous future for all Saudis. The time to act is now, while the plans for the next decades are still being drawn.

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References

1. Anderson CC, Denich M, Warchold A, Kropp JP, Pradhan P. A systems model of SDG target influence on the 2030 Agenda for Sustainable Development. Sustain Sci. 2022 Jul 1;17(4):1459–72.
2. Sanai F, Alkhatry M, Alzanbagi A, Kumar S. Hepatitis B virus infection in Saudi Arabia and the UAE: public health challenges and their remedial measures. J Infect Public Health. 2023;16(9):1410–7.
3. Rahman R, Al-Borie HM. Strengthening the Saudi Arabian healthcare system: Role of Vision 2030. Int J Healthc Manag. 2020;14(4):1–9.
4. Kasem S, Hussein R, Al-Doweriej A, Qasim I, Abu-Obeida A, Almulhim I, et al. Rabies among animals in Saudi Arabia. J Infect Public Health. 2019;12(3):445–7.
5. Abuzaid AA, Aldahan MA, Helal MAA, Assiri AM, Alzahrani MH. Visceral leishmaniasis in Saudi Arabia: From hundreds of cases to zero. Acta Trop. 2020 Dec 1;212.
6. Rahman R, Qattan A. Vision 2030 and Sustainable Development: State Capacity to Revitalize the Healthcare System in Saudi Arabia. INQUIRY: The Journal of Health Care Organization, Provision, and Financing. 2021;58.
7. Pradhan P, Costa L, Rybski D, Lucht W, Kropp JP. A Systematic Study of Sustainable Development Goal (SDG) Interactions. Earths Future. 2017 Nov 1;5(11):1169–79.
8. Royston G, Pakenham-Walsh N, Zielinski C. Universal access to essential health information: accelerating progress towards universal health coverage and other SDG health targets. BMJ Glob Health. 2020 May 17;5(5).
9. Al-Mozaini M, Al-Rahabani T, Dirar Q, Alashgar T, Rabaan AA, Murad W, et al. Human immunodeficiency virus in Saudi Arabia: current and future challenges. J Infect Public Health. 2023;16(9):1500–9.
10. Gulf Cooperation Council Member States call for collaborative approach to effectively respond to AIDS| UNAIDS.
11. Mani ZA, Goniewicz K. Transforming Healthcare in Saudi Arabia: A Comprehensive Evaluation of Vision 2030's Impact. Sustainability. 2024, Vol 16, Page 3277. 2024 Apr 15;16(8):3277.
12. Salam AA, Al-Khraif RM, Elsegaey I. COVID-19 in Saudi Arabia: an overview. Front Public Health. 2022 Feb 2;9:736942.
13. Suleiman AK, Ming LC. Transforming healthcare: Saudi Arabia's vision 2030 healthcare model. J Pharm Policy Pract. 2025;18(1):2449051.
14. Mother Baby- Family Friendly Maternity Care Facility (MBFMF) Initiative Guidebook.
15. Progress on the health-related SDGs and targets in the Eastern Mediterranean Region, 2023| Meeting version.
16. Memish ZA, Alzahrani M, Alhakeem RF, Bamgboye EA, Smadi HN. Toward malaria eradication in Saudi Arabia: evidence from 4-year surveillance in Makkah. Ann Saudi Med. 2014 Mar 1;34(2):153.
17. Singh HP, Singh A, Alam F, Agrawal V. Impact of Sustainable Development Goals on Economic Growth in Saudi Arabia: Role of Education and Training. Sustainability. 2022 Nov 1;14(21).
18. Memish ZA, Alqahtani AS, Al-Azemi N, Abu Alhamayel N, Saeedi M, Abuzinada S et al. A New Era of National Guideline Development in Saudi Arabia. J Epidemiol Glob Health. 2022 Dec 1;12(4):373–9.
19. Usability And Outcomes Of Maternity Health Insurance In KSA. Vision 2030; Systematic Literature Review| Request PDF.
20. Abuzaid AA, Abdoon AM, Aldahan MA, Alzahrani AG, Alhakeem RF, Asiri AM et al. Cutaneous Leishmaniasis in Saudi Arabia: A Comprehensive Overview. Vector Borne and Zoonotic Diseases. 2017 Oct 1;17(10):673.
21. Gurajala S. Healthcare System in the Kingdom of Saudi Arabia: An Expat Doctor's Perspective. Cureus. 2023 May 10;15(5):e38806.
22. Salam AA, Potty RS. Saudi Arabia's Maternal and Child Health Scenario Interpreted. Matern Child Health J. 2023 May 1;27(5):759–65.
23. Mahmood FM. Prevalence and prevention of lifestyle-related diseases in Saudi Arabia. Int J Health Sci (Qassim). 2018;12(5):1.
24. Rabaan AA, Alshengeti A, Alrasheed HA, Al-Subaie MF, Aljohani MH, Almutawif YA et al. Dengue virus infection in Saudi Arabia from 2003 to 2023: a systematic review and meta-analysis. Pathog Glob Health. 2024 Nov 9.
25. Alshuwaikhat HM, Mohammed I. Sustainability Matters in National Development Visions—Evidence from Saudi Arabia's Vision for 2030. Sustainability. 2017;9(3).
26. Al-Hajoj SA. Tuberculosis in Saudi Arabia: can we change the way we deal with the disease? J Infect Public Health. 2010;3(1):17–24.
27. MOH News - Ministry of Health: The Infection Rate of Tuberculosis is Falling at (21%) in Saudi Arabia in (2022).
28. Oshitani H, Kamigaki T, Suzuki A. Major issues and challenges of influenza pandemic preparedness in developing countries. Emerg Infect Dis [Internet]. 2008 [cited 2025 Feb 20];14(6):875–80. Available from: https://pubmed.ncbi.nlm.nih.gov/18507896/
29. *Hazazi A, Wilson A. Noncommunicable diseases and health system responses in Saudi Arabia: focus on policies and strategies. A qualitative study.*

Health Res Policy Syst [Internet]. 2022 Dec 1 [cited 2025 Feb 20];20(1):1–10. Available from: https://health-policy-systems.biomedcentral.com/articles/*10.1186/s12961-022-00872-9*

30. Alyazidi F, Shakely D, Alyazidi FR, Petzold M, Hussain-Alkhateeb L. Validating the diagnostic accuracy of medical certification: a population-level comparison between verbal autopsy and Saudi medical records causes of death of deceased with type 2 diabetes. Glob Health Action [Internet]. 2025 [cited 2025 Feb 20];17(1):2448382. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC11749024/
31. Ansary LA, Esmaeil SA, Adi YA. Causes of death certification of adults: an exploratory cross-sectional study at a university hospital in Riyadh, Saudi Arabia. Ann Saudi Med [Internet]. 2012 Nov [cited 2025 Feb 20];32(6):615. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6081104/
32. Alramadhan NA, Busaleh MM, Alhaddad HM. Unmet Need for Family Planning Among Women Attending Primary Healthcare in Alahsa, Saudi Arabia. Cureus [Internet]. 2024 Jun 17 [cited 2024 Dec 17];16(6).
33. Abdulmalek S, Nasir A, Jabbar WA, Almuhaya MAM, Bairagi AK, Khan MAM et al. IoT-Based Healthcare-Monitoring System towards Improving Quality of Life: A Review. Healthcare [Internet]. 2022 Oct 1 [cited 2025 Feb 20];10(10):1993.
34. Silva BVF, Holm-Nielsen JB, Sadrizadeh S, Teles MPR, Kiani-Moghaddam M, Arabkoohsar A. Sustainable, green, or smart? Pathways for energy-efficient healthcare buildings. Sustain Cities Soc. 2024;100:105013.
35. Alarifi AM, Alshahrani NZ, Jokhdar H, Asiri AM. Advancing Health Through Sustainable Development Goals-Saudi Arabia's Mid-Journey Progress and Insights. *J Epidemiol Glob Health*. 2025;15(1):48. Published 2025 Mar 24. doi:10.1007/s44197-025-00385-y