

Mahmoud Alyamani - Health & Well-Being Sector Head, NEOM



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Dr Mahmoud Alyamani, Health & Well-Being Sector Head at NEOM, the sustainable region taking shape in northwest Saudi Arabia. He discusses NEOM's innovative healthcare vision, emphasizing a proactive, data-driven approach using digital twins and AI. He also highlights the importance of global partnerships to co-create advanced health solutions and NEOM's commitment to integrating research and cutting-edge technologies.

What are the vision and ambitions for healthcare within the NEOM megaproject?

Our vision involves establishing a new healthcare ecosystem. This requires 'out of the box' thinking, visionary leadership, and the implementation of cutting-edge technology and innovative healthcare ideas. Taking incremental steps now will bear fruit when NEOM is complete and fully operational.

There are various models of healthcare systems: private insurance-based systems like in the United States, where profitability and innovation is a key focus; public systems like the NHS in the UK, where the state provides healthcare; and mixed systems. Each of these systems come with their own challenges and opportunities. NEOM's healthcare system is designed to be innovative, efficient, and sustainable. We aim to integrate the best practices from both commercial and public healthcare systems while addressing their inherent inefficiencies. Our 4P (Personalized, Predictive,

Proactive and Preventative) healthcare approach focuses on preventing disease rather than just treating it. This will significantly reduce the need for ongoing medical interventions, enabling NEOM to provide high-quality personalized care to all residents.

How do you plan to address the inefficiencies and financial losses in commercial healthcare systems?

We want to avoid inefficiencies by building a commercial system where entities are accountable to their P&L sheets but eliminate the fight over payments. Our innovative approach involves creating a seamless process where payers and providers use the same digital platform. This ensures that every intervention is pre-approved and part of an agreed plan, eliminating delays and disputes. This solution has been implemented on a small scale elsewhere but scaling it to an entire ecosystem is where the opportunity lies. By using a unified digital platform, we can reduce administrative costs and ensure that healthcare dollars are spent on patient care rather than bureaucratic processes. Furthermore, we aim to create a system that rewards both providers and clients for healthy behaviors. By incentivizing preventive care and healthy lifestyles, we can reduce the incidence of chronic diseases and lower overall healthcare costs. Our goal is to create a healthcare system that not only treats illnesses but also promotes wellness and prevents diseases. This proactive approach will lead to better health outcomes and a more sustainable healthcare system.

What are the key components of NEOM's healthcare system that will ensure its success?

One major component is the physical footprint of healthcare. Advanced interventions are costly, and a large portion of healthcare expenses are concentrated on a small percentage of the population. To change this, we need to focus on preventing diseases rather than reacting to them. This involves identifying risk factors early and using AI for more accurate predictions. We are developing individual digital twins by combining genome sequences with physical examinations, imaging, and blood tests to create a comprehensive health profile for each patient. This allows us to predict and prevent diseases based on a combination of genetic, lifestyle, and environmental factors. By doing so, we can reduce the need for advanced interventions and lower healthcare costs.

Another key component is our modular design approach for healthcare facilities. We are designing healthcare assets that can adapt to changing needs, allowing us to scale up or down without waste. This modular design ensures that we can efficiently manage resources and provide high-quality care. Additionally, we are focusing on building state-of-the-art hospitals and clinics to address current healthcare needs. These facilities will be equipped with the latest medical technologies and designed to be flexible, allowing us to adapt to future needs and innovations. By integrating advanced technologies and modular designs, we can create a healthcare system that is both efficient and responsive to the evolving needs of our population.

How does the digital twin concept work, and what benefits does it offer?

The digital twin concept involves creating a digital replica of an individual by integrating their genome sequence with various health data. AI analyzes this data to predict disease risks and recommend preventive measures. This proactive approach reduces the burden on healthcare facilities by preventing diseases before they occur. The digital twin allows us to create a personalized health profile for each individual, which can be continuously updated with new data.

This profile helps in identifying potential health risks and implementing preventive measures tailored to each person's unique needs. By predicting diseases before they occur, we can intervene early and reduce the need for costly treatments and hospitalizations. Furthermore, the digital twin can be used to simulate the effects of different interventions on an individual's health. This allows us to test various treatment options and preventive measures in a virtual environment before applying them in real life. By doing so, we can optimize healthcare strategies and ensure that each patient receives the most effective and personalized care possible.

What innovations are you incorporating into the design and operation of healthcare facilities at NEOM?

One important innovation is the modular design of our healthcare assets, as mentioned previously, which can rapidly adapt to changing needs.

Our facilities will focus on diseases prevalent in the region, such as diabetes, musculoskeletal disorders, and metabolic problems. By concentrating on these areas, we can develop specialized expertise and provide the best possible care for our population.

Additionally, we are incorporating advanced technologies such as AI and quantum computing to enhance our healthcare system. AI can analyze vast amounts of data to identify patterns and predict health risks, while quantum computing can process complex algorithms and simulations to optimize healthcare strategies. These technologies will enable us to provide personalized, efficient, and effective care for our patients. By leveraging the latest scientific advancements, we can create innovative treatments and preventive measures that improve health outcomes and enhance the quality of life for our residents.

How will these innovations impact the overall economy and productivity at NEOM?

A healthier population reduces healthcare costs and improves productivity. When people are healthier, they take sick leave less often and can work longer. This cumulative experience and productivity add significant value to the economy. This not only benefits individuals but also enhances the productivity and economic output of our society. Healthier people are more capable of contributing to the workforce, and their cumulative experience and skills add significant value to the economy.

Our digital system ensures seamless interactions between payers and providers, eliminating the fight over healthcare dollars and saving significant costs. This system not only reduces the need for subsidies but also contributes positively to the GDP by enhancing productivity and extending the working life of individuals. Healthier individuals are more likely to remain active and engaged in the workforce, leading to increased economic output and overall prosperity.

Moreover, by extending the healthy working life of individuals, we can retain valuable experience and expertise in the workforce. Older individuals who remain healthy and active can continue to contribute to the economy while providing mentorship and leadership to younger generations. This intergenerational transfer of knowledge and skills is crucial for sustaining economic growth and development. In addition to economic benefits, a healthier population also leads to a better quality of life and overall well-being. By focusing on prevention and early intervention, we can reduce the burden of disease and improve the health and happiness of our residents. This, in turn, creates a more vibrant and thriving community, attracting talent and investment to NEOM.

What is the ultimate goal for NEOM's healthcare system, and how does it benefit the broader world?

Our ultimate goal is to create a sustainable, efficient healthcare system. For the broader world, NEOM serves as a model for how to implement cutting-edge healthcare solutions on a large scale. Our smaller, rapidly growing population allows us to trial and refine these innovations, potentially providing a blueprint for larger nations to follow. By rewarding both patients and providers for healthy behaviors and effective interventions, we create a system that incentivizes proactive health management and overall well-being.

We believe that our approach to healthcare can have a profound impact on the global healthcare landscape. By demonstrating the effectiveness of preventive care, digital health solutions, and personalized medicine, we can inspire other countries to adopt similar strategies. Our goal is to share our knowledge and innovations with the world, contributing to the global effort to improve health outcomes and reduce healthcare costs.

Additionally, our focus on sustainability and efficiency aligns with global goals for healthcare systems. By creating a model that minimizes waste, reduces costs, and maximizes health outcomes, we can help other nations achieve their health and economic objectives. NEOM's healthcare system serves as a living laboratory for innovation, providing valuable insights and lessons that can be applied worldwide.

Ultimately, our vision is to create a healthcare system that not only benefits NEOM's residents but also serves as a beacon of innovation and excellence for the global community. By fostering collaboration and sharing our advancements, we can contribute to a healthier, more prosperous world for all.

How will NEOM's healthcare solutions work on a global scale, considering you mentioned during the Abu Dhabi Global Healthcare Week that these solutions are designed to be global?

NEOM's healthcare model is indeed designed to be global. We can implement this model effectively in NEOM due to our relatively small and rapidly growing population. As our population grows, every resident who decides to opt in, genome sequencing and receive personalized interventions, keeping in mind that NEOM is currently working on the data architecture and its predictability while ensuring data security. This approach might seem challenging for established systems with millions of people, but our scalable model addresses this issue. Even if you don't live in NEOM, you can subscribe to our digital twin platform, provide your data, and benefit from personalized health insights and interventions. This platform can cater to individuals and healthcare providers

worldwide, offering a version for personal use and another for professional use.

How can NEOM's digital platform benefit individuals and healthcare providers globally, particularly in regions with less developed healthcare systems, and what are its potential long-term impacts on global health research?

NEOM's digital platform offers global healthcare solutions by providing personalized health insights based on individual data. In areas like Africa, where many providers lack comprehensive electronic health records, our affordable subscription can help manage patient data effectively. The platform guides providers on patient needs based on personalized data, making high-quality healthcare accessible even in remote settings. With just a satellite connection or Wi-Fi, providers can use our system to deliver care comparable to NEOM. This allows for tailored interventions considering unique genetic, lifestyle, and environmental factors. Instead of a one-size-fits-all approach, we determine the best care for each person. Long-term, this platform can significantly impact global health research. Accumulating data from millions over decades creates the richest longitudinal study on Earth, surpassing existing studies like the Framingham Heart Study. NEOM's study, involving a fast-growing population, will provide extensive data on interventions over time, informing global healthcare practices and leading to numerous scientific publications. This data-driven approach will enhance our understanding of health and disease, driving innovation and improving health outcomes globally.

How does NEOM's healthcare vision align with its broader goals, and what are the implications for global health innovation?

NEOM's healthcare vision aligns with broader goals of innovation, sustainability, and creating a future model region. By integrating advanced technologies and personalized approaches, we aim to provide high-quality care while reducing costs and improving efficiency. This model benefits NEOM's residents and serves as a blueprint for global health innovation. Our focus on preventive care, early intervention, and personalized treatment reduces the burden of chronic diseases and improves outcomes. Demonstrating these strategies' effectiveness can inspire other regions to adopt similar models, driving global health innovation forward. Making our digital platform accessible worldwide democratizes advanced healthcare solutions, significantly impacting regions with limited infrastructure and reducing health disparities globally.

How is NEOM addressing the challenge of advancing R&D and innovation within such a large project, given the Kingdom's ambitious aims in this area?

We are building our healthcare system from scratch, which itself is a significant innovation. This involves substantial investment and partnerships with major entities, including hyperscalers who see both commercial and humanitarian value. We're constructing hospitals and a biobank to digitize biological data, feeding it into our digital health platform. We're also collaborating with startups on innovative projects like brain-computer interfaces for paralyzed individuals and conducting digital twin-based trials. These in silico trials simulate medication effects on digital replicas before human testing, making treatments safer and more effective.

Additionally, we're creating a 'healthy community' using smart technologies. This includes smart beds to monitor sleep, wearables for activity tracking, and smart fridges to measure food consumption. These devices collect data for personalized health insights. For instance, to address regional vitamin D deficiencies, we're installing ultraviolet lights in showers. Smart mirrors assess emotional states and suggest activities based on correlated data. We're currently trialling this with 100 individuals to refine these technologies.

What are your final thoughts or calls to action for our international readers, especially regarding partnerships?

We are actively seeking partners to collaborate on building our digital twin and other innovative projects. We need partners who can help develop a fully automated, reward-based, and gamified health financing system. Gamification is integral to our approach as it makes processes engaging and rewarding. We're looking for partners in all aspects of healthcare, from provision to financing and digital technology to process engineering. Our goal is to co-create, not copy existing systems. We want to leverage the experience of established large-scale healthcare systems while innovating together.

Additionally, we've created a Next Gen Advisory Board consisting of young, diverse individuals from around the world. This group provides feedback on our designs and plans, ensuring they align with the needs and preferences of the next generation. Their input influences everything from intervention pathways to facility design and user interaction with applications. We believe in a collaborative approach, sharing intellectual property and co-creating solutions that are futuristic and globally relevant. We invite partners who share this vision to join us in shaping the future of

healthcare at NEOM.

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