

EMPOWERING LEBANON'S HEALTHCARE
SYSTEM: A **VISION** FOR DIGITAL HEALTH
TRANSFORMATION



REPUBLIC OF LEBANON
MINISTRY OF PUBLIC HEALTH

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I. LIST OF ABBREVIATIONS

Abbreviation	Definition
<i>MOPH</i>	Ministry of Public Health
<i>ESA</i>	Ecole Superieure des Affaires
<i>ICT</i>	Information, Communication & Technology
<i>WHO</i>	World Health Organization
<i>UNICEF</i>	United Nations Children's Fund
<i>EHR</i>	Electronic Health Record
<i>EMR</i>	Electronic Medical Records
<i>DHIS</i>	District Health Information System Software
<i>AMAN</i>	Web-based software for MoPH to request subsidized medicine
<i>Meditrack</i>	A software application for MOPH to track and trace medicine
<i>UHID</i>	Unique Health ID
<i>ERP</i>	Enterprise Resource Planning
<i>LMS</i>	Logistics Management System for MoPH in Karentina
<i>POS</i>	Point of Sale
<i>ERP</i>	Enterprise Resource Planning
<i>PHC</i>	Primary Healthcare Center
<i>OMSAR</i>	Office of the Minister of State for Administrative Reform
<i>Telehealth</i>	The use of digital information and communication technologies to access health care services remotely
<i>AI</i>	Artificial Intelligence
<i>Big Data</i>	Data that is so large, fast or complex that it's difficult or impossible to process using traditional methods
<i>USF</i>	Universal Service Fund
<i>API</i>	Application Programming Interface
<i>GIS</i>	Geographic Information System
<i>IoT</i>	Internet of Things
<i>USSD</i>	Unstructured Supplementary Service Data
<i>DH</i>	Digital Health
<i>APN</i>	Access Point Names
<i>SMART</i>	Specific, Measurable, Achievable, Relevant, and Time-Bound
<i>M&E</i>	Monitoring & Evaluation
<i>Phenics</i>	Digital Platform for PHCs owned by MoPH

BDD

HIS

DHA

EPP

GDPR

Beirut Digital District

Health Information System

Digital Health Atlas

Electronic Prescription Platforms

General Data Protection Regulation

II. EXECUTIVE SUMMARY

This document presents a comprehensive vision for the digital health transformation in Lebanon, with the primary goal of empowering the healthcare system and improving healthcare outcomes. The MoPH in Lebanon took a proactive approach in driving this transformation by organizing a Digital Health Retreat on May 18th 2023 at ESA. The retreat brought together various digital health stakeholders, creating a forum for crucial discussions concerning the current state of digital health in Lebanon. Key topics, including governance, data management with an emphasis on privacy and interoperability, and user-centeredness, were addressed during the retreat. The discussions revolved around existing digital initiatives, identifying challenges, exploring opportunities, and establishing a clear path forward for digital health in Lebanon. All stakeholders recognized the importance of this event and acknowledged the need for a unified vision for digital health in the country. Building on the insights and outcomes from the retreat, the vision for digital health was developed, ensuring a collaborative and comprehensive development process that involved strategic experts and stakeholders from Lebanon.

The vision also outlines the current state of the Lebanese healthcare sector, highlighting the challenges that necessitate digital transformation. Despite significant investments made by the MoPH in home-grown digital health systems, obstacles persist, including inadequate infrastructure and connectivity, financial implications of implementing and maintaining technological solutions, data governance issues, low digital literacy rates among healthcare professionals and the general population, the absence of standardized protocols and interoperability frameworks, which hinders data sharing and collaboration among healthcare providers.

The proposed vision places a strong emphasis on leveraging digital solutions to enhance healthcare outcomes, to improve efficiency, enhance care coordination, better patient safety and healthcare quality, increase access to healthcare services, and improved population health outcomes, reducing health services costs and strengthening preparedness for emerging health challenges. The vision stresses on the importance of collaboration, international partnerships, and the creation of an interconnected ecosystem that integrates healthcare providers and end-users both healthy and sick individuals, and other stakeholders, including funders and regulators. By connecting Lebanon's healthcare system to the regional and international healthcare landscape, the vision aims to promote knowledge exchange, innovation, and best practices for the mutual benefit of all parties involved. Key guiding principles to achieve the vision are outlined in the document, which include implementing people-centered digital platforms and mobile applications, promoting digital health literacy, establishing health information exchange systems, encouraging the adoption of interoperable electronic health records, investing in improving digital infrastructure, fostering innovative research and technological advancements, facilitating regulatory frameworks, and engaging in local and international collaborations.

Overall, the proposed vision serves as a guiding framework for developing Lebanon's comprehensive digital health strategy. It involves engaging stakeholders to formulate and execute an action plan with a robust result framework and proper monitoring and evaluation schemes that align with the needs and priorities of the healthcare ecosystem.

III. FOREWORD BY THE MINISTER OF HEALTH



In the following pages, we reveal a compelling vision for the future of digital health in Lebanon—an innovative blueprint developed through collaborative, forward-thinking, and inclusive efforts. With the recognition of digital technology as an integral driver of healthcare improvement, the MoPH has been at the forefront, rallying essential stakeholders and orchestrating strategic discussions aimed at redefining our healthcare landscape.

This grand vision is grounded in the National Health Strategy, launched by the MoPH in January 2023. Recognizing the importance of digital health transformation, this strategy identified it as a crucial pillar. From this sturdy foundation, the Digital Health Retreat was organized on May 18th 2023. This retreat acted as a catalyst, creating an arena for stakeholders to identify the challenges and opportunities present in Lebanon's digital health ecosystem. A consensus was reached, emphasizing the pressing need for a consolidated vision that enables our healthcare system and augments health outcomes for our people.

Our healthcare sector, while resilient, faces its fair share of hurdles. With this understanding, and building upon the significant investments in digital health stipulated by the National Health Strategy, our vision aims to utilize digital solutions to overcome these barriers, thereby enriching healthcare outcomes. This is a vision of synergy, empowerment, and readiness for the evolving landscape of healthcare.

Our transformative vision transcends policy constraints. It establishes a detailed blueprint for developing a resilient digital health infrastructure. These strategies encompass a multitude of aspects—from digital platforms and mobile applications to health information exchange systems and more.

The implications of this digital health transformation are immense. From improved care coordination to enhanced population health outcomes, this vision for digital health, inherent in the National Health Strategy, is poised to serve as a guiding beacon for our future. Our journey begins here, and we invite you to join us as we map the pathway for a healthier Lebanon. Together, we can transform this vision into reality.

Dr. Firass Abiad

Minister of Public Health

July 26th, 2023

IV. BACKGROUND: STRATEGIC CONTEXT FOR DIGITAL HEALTH

A. Digital Health: A Global Overview

The worldwide adoption of ICT to enhance national healthcare services is rapidly expanding and becoming increasingly essential. This is particularly significant as healthcare systems globally face economic limitations and mounting pressures to provide improved and extended care, especially to vulnerable populations. It has been observed that the implementation of digital health initiatives can be strengthened, expedited, or aligned through a national strategic planning process. The initial step in this planning process involves leveraging existing capacity while establishing a solid foundation for investment and innovation. Defining the key directions, desired outcomes and planning detailed steps are crucial for achieving long-term goals such as universal health coverage, enhanced health sector efficiency, and fundamental transformation.

In the context of a country's national plan, it is important to advocate for digital health, create awareness on a common vision, and establish the necessary groundwork for investment, workforce education, and the adoption of digital health in priority systems and services. Countries can quickly progress to the advanced use of digital health systems in healthcare, however, without concurrently creating an enabling environment, ICT innovations will remain isolated and have limited impact on health outcomes.¹

There is a regional direction towards digitalizing the health care sector. As shown by the regional WHO Survey 2021-2022, 68% of the countries reported having national digital health policies or strategies or being “in the process” of creating strategies, and 64% of the countries reported having legislation on data security and citizen privacy issues, in addition to 55% reported having common digital health terminologies and reported having introduced electronic medical records systems. Accordingly, a study by WHO on the effective implementation of digital health technologies is increasingly recognized as being crucial to efficient national and subnational health systems. Countries across the world are looking for evidence-based solutions and optimal investments in digital health to address national and subnational health priorities.¹ This is particularly important in the Eastern Mediterranean Region, given the socioeconomic inequalities and ongoing emergencies in several of its countries.² Therefore, WHO global strategy for Digital Health: 2020-2025³ aiming to foster digital health in the Eastern Mediterranean Region urges countries and stakeholders to direct their efforts towards creating a consistent DH vision in line with the country's health priorities and resources. The vision aims to strengthen and improve the accessibility, quality, efficiency and cost-effectiveness of national health systems. The goal of the vision is to enhance health care delivery and systems through seamless connectivity and access to health information; better accessibility, delivery, coverage and quality of health care services, including in remote, rural and migrant settings; and enhanced emergency response and monitoring of processes and outcomes. Consequently, developing a strategy and action plan to deliver the proposed vision, and creating a framework for the monitoring and evaluating of digital health implementation and progress.

The development of a digital health vision for the healthcare sector in Lebanon acts as a stepping stone within the strategic planning and implementation of digital health initiatives within the country, focusing on maximizing benefits, addressing challenges, and creating a supportive environment for sustainable digital transformation in the healthcare sector.

B. LEBANESE DIGITAL HEALTH ECOSYSTEM: CURRENT STATE

1. LEBANESE HEALTHCARE SECTOR & DIGITAL ECOSYSTEM

The healthcare system in Lebanon is fragmented and has been in a strained state for years. Recent crises such as the Syrian refugee situation, the Beirut port explosion, the COVID-19 pandemic, and sociopolitical challenges have intensified the burden on the system. This multifaceted and unprecedented crisis is significantly impacting both the development of the healthcare system and the overall well-being of the population. The devaluation of the Lebanese pound against the US dollar has further compounded the challenges of health financing, resulting in a surge in out-of-pocket healthcare expenses, particularly for vulnerable groups.⁴

In response to the ongoing crises, the Lebanese Health strategy 2030 was developed and included immediate relief actions and five strategic directions for sector recovery. A key direction is to enhance the resilience and adaptability of the health system by strengthening the National Health Information System.⁵ Building upon this premise, the vision is currently developed to highlight the significance of gathering support and commitment from key stakeholders, as well as the crucial role of unwavering political determination at the highest level, in order to achieve the desired restructuring of the health sector.

To successfully implement a strategy for healthcare sector digital transformation, it is essential to create an enabling ecosystem within the healthcare sector that fosters and facilitates the effective utilization of ICT. Taking this perspective into consideration, it becomes evident that there is a pressing need to establish a solid foundation for the vision of digital health in Lebanon, laying the groundwork for future opportunities and advancements.

The Ministry of Public Health in Lebanon took a proactive approach in driving digital health transformation by uniting digital health stakeholders in a Digital Health Retreat in May 2023. This retreat served as a forum for key stakeholders to convene and engage in crucial discussions surrounding the current landscape of digital health in Lebanon. The retreat focused on various important topics such as governance, data management including privacy and interoperability, as well as user-centeredness. The discussions revolved around current digital initiatives, identifying challenges, exploring opportunities, and setting a clear path forward for digital health in Lebanon. The stakeholders involved in the retreat collectively recognized the significance of the event and acknowledged the need for a cohesive vision for digital health in Lebanon. Building upon the outcomes and insights gathered from the retreat, ongoing efforts are being made to develop and refine the digital health vision. There is a shared interest and understanding by stakeholders of the value and need for a collaborative effort to digital transformation within the healthcare sector.

Despite the difficulties, the MoPH, under the National E-Health Program, has been able to make significant investments in developing home-grown digital health systems (UNICEF 2022). The journey of MoPH towards digitalization started early in mid-90's. In fact, the MoPH was among the first Lebanese public administrations to automate its processes where several applications and information systems were put in place. In 2001, the IT department was established and in 2013 the National E-health Program was launched in MoPH. Currently, Lebanon utilizes around 22 digital health tools, of which 21 tools are implemented at the national level and one at the sub-national level. These tools are predominantly custom-made to meet specific needs and are considered a global digital public good. The MoPH is committed to digital health interventions in the public sector and actively promotes the development and adoption of such technologies. Most of these tools are developed domestically, tailored to local requirements, and interoperable with one another.⁵

The current initiatives remain limited with specific purposes and do not cover a holistic approach that meets the needs of the different stakeholders. A review by WHO and MoPH of the HIS in Lebanon have found that the current Lebanese healthcare system is fragmented, its ICT infrastructure sparse and inconsistent. The HIS lacks unique patient identifiers and variety of basic EMR systems currently implemented in the country will require further evaluations soon, based on international standards. The study also reported that there is lack of governance and legislations to support healthcare modernization initiatives in the country e.g., e-signature approval to support EMR or EHR implementations. In addition, medical information is very difficult to be shared and clinical decision support with current solutions is challenging.⁶ The MoPH have conducted some regulatory activities which included the usage of the automated DHIS2 surveillance and barcoding of medicines.⁷ Nonetheless there is still an urgent need for proper planning regarding the digital transformation in the healthcare sector of Lebanon.

C. Vision Statement

The ultimate vision is through an interoperable digital health system, individuals in Lebanon can have improved accessibility to high-quality care that is personalized, convenient, and responsive to their unique needs. By leveraging innovative technologies and approaches, such as EHR, telehealth, artificial intelligence, and data analytics etc., the aim is to enhance the efficiency and effectiveness of healthcare delivery, enabling healthcare providers to make informed decisions and deliver targeted interventions.

V. GUIDING PRINCIPLES

The vision of digital health transformation in Lebanon is providing strong governance and fostering a dynamic ecosystem that prioritizes sustainability, inclusivity, and interoperability. By adopting a people-centered approach, the aim is to empower beneficiaries and ensure their active participation in their healthcare journey. Through secured systems, the purpose is to enable data sharing among healthcare stakeholders, driving informed decision-making and improving health outcomes through proper regulatory and monitoring frameworks. With a focus on sustainability and inclusivity, the vision seeks to adopt digital technologies to bridge gaps in healthcare access and provide equitable /universal health services to all.

Additionally, the goal is to foster collaborations at local, regional, and international levels by adhering to international standards and regulations. The vision emphasizes the significance of international partnerships in driving digital health innovation and progress, as well as seeking collaboration with stakeholders across borders, sharing knowledge, exchanging best practices, and harnessing state-of-the-art technologies. The aim is to enhance the Lebanese healthcare sector and support meeting its evolving needs through adopting key strategic directions that include empowering users (healthcare providers and healthcare beneficiaries), strengthening healthcare infrastructure and interoperability, fostering sustainable, scalable and inclusive innovation and entrepreneurship, governance, and regional and international partnerships.

A. EMPOWERING BENEFICIARIES & HEALTHCARE WORKFORCE

1. Implementing People Centered Digital Platforms and Mobile Applications

The aim is to actively involve healthcare providers and beneficiaries in the healthcare journey and empower them to make informed decisions using a human-centered design approach in the development of digital platforms. A priority is to promote and enhance the usability of existing digital platforms and mobile applications offered by the

Ministry of Public Health, such as AMAN (an application to obtain a Unique Health ID), Meditrack (to track and trace medicines), and the Medical Device Registration application, ensuring not only the highest standards of privacy but also continuous improvement in usability. There is a strong commitment to implementing sustainability plans and a clear roadmap to scale up current initiatives, fostering a people-centered approach that involves end-users in the design and improvement processes of future initiatives while addressing current challenges and enhancing the overall experience using user focus groups, audit mechanisms specific to user-design, utilizing feedback systems, etc. Additionally, the focus is on supporting digital solutions tailored to the specific needs of the Lebanese healthcare system, with an emphasis on solutions that significantly improve the quality of care and reduce costs, like Meditrack, which aims to reform and modernize the pharmaceutical sector, ensuring patient safety through legislative review, process modernization, and enhanced supply chain efficiency.

2. Promoting Digital Health Literacy Among End-Users (Beneficiaries & Healthcare Workforce)

Enhancing digital literacy and technology awareness among individuals in Lebanon is a critical aspect of the vision. To accomplish this goal, a priority is placed on coordinating with the Office of the Minister of State for Administrative Reform-OMSAR to develop the Human Capital Development Plan, incorporating skills that facilitate the adoption of digital health practices. Additionally, partnerships with the Ministry of Education, Telecommunication, and Media will be fostered to support future endeavors. Furthermore, well-defined communication strategies will be established, while existing digital campaigns by the MoPH will be enhanced and expanded to create a comprehensive Digital Learning Platform. These platforms will provide individuals (beneficiaries and healthcare providers) with the necessary knowledge and skills to effectively utilize current digital health tools implemented by the MoPH and facilitate easier access to future digital health platforms. Through educational programs, workshops, and accessible information, the healthcare beneficiaries will gain the ability to navigate digital platforms, interpret health data, and make informed decisions regarding their well-being. This empowerment will enable patients to actively participate in their care, healthcare professionals to utilize digital tools for improved patient management, and contribute to a more informed and engaged community. Adopting digital competency frameworks for improving the digital skills of the healthcare workforce can be one step towards capacity building.

B. STRENGTHENING HEALTHCARE INFRASTRUCTURE AND INTEROPERABILITY

The aim is to create a robust digital infrastructure that facilitates seamless data exchange, collaboration, and interoperability among healthcare providers and institutions.

1. Standardized and Interoperable Electronic Health Records

The objective is to establish robust national health information exchange systems that enable secure sharing of patient data across diverse healthcare settings while adhering to strict privacy and security regulations. Including healthcare providers and beneficiaries in the development such as focus groups, approval boards, common testing plans, etc. This will be achieved by integrating existing initiatives like Meditrack and AMAN, and leveraging the usage of the UHID to enhance data exchange. The primary goal is to enforce the adherence of these systems to international standards to achieve interoperability and scaling up these initiatives to encompass the entire Lebanese population. This expansion will improve seamless integration within the healthcare ecosystem, leading to standardized and enhanced data sharing and integration. The enhancement of data sharing capabilities and dashboards at the MoPH is crucial for evidence-

based policy-making, generating valuable insights, and promoting transparency. By facilitating data exchange among relevant stakeholders, the objective is to inform policy decisions with accurate and timely information. The enhancement of comprehensive dashboards that visually represent key indicators, will enable effective monitoring and evaluation of healthcare initiatives. These efforts aim to foster a transparent and data-driven approach to policy-making, ensuring decisions are based on reliable evidence and promoting accountability in the healthcare sector. This data can feed into the digital preparedness assessment to identify essential digital components required for effective preparedness in various domains.

The main objective is to support and expand current initiatives aimed at enhancing the interoperability of the Ministry's Digital Health program by connecting various systems, including pharmacy POS, the MoPH website, Phenics for PHCs, AMAN to generate the UHID, LMS, and ERP importers. Furthermore, there is a focus on establishing policies to standardize the development of health initiatives through the implementation of robust software accreditation standards, terminology, code sets, and data structures. This involves creating comprehensive guidelines and criteria that outline the requirements for accrediting future healthcare software systems, encompassing data security, interoperability, usability, performance, and regulatory compliance. Regular assessments and audits of healthcare software systems in hospitals and the private sector will be conducted to ensure compliance with these accreditation standards based on a proper M&E mechanism.

Efforts will be made to establish regulatory frameworks that strike a balance between patient experience and innovation, allowing for the timely introduction of new digital health technologies. By implementing agile, adaptable, and innovation-supportive regulatory frameworks, healthcare systems can promote the continuous improvement and advancement of healthcare services. By assessing the current needs and challenges, engaging stakeholders and starting with manageable pilot projects beneficiaries can benefit from the latest technological advancements while upholding high standards of safety and quality.

The approach involves providing support and training to healthcare organizations, offering resources such as guidelines, educational programs, and access to technical expertise to help them meet accreditation standards. Monitoring and auditing compliance with international standards, data structures, and software accreditation standards will be carried out for newly established EHRs. Exploring open-source platforms, shared infrastructure, and cloud-based solutions is encouraged to reduce upfront costs and ongoing maintenance expenses. Collaboration between governmental agencies and health insurance providers will be sought to explore funding options and reimbursement models that can facilitate EHR adoption.

2. Networks and Broadband Connectivity

Advocating for and collaborating with the Ministry of Telecommunication is of paramount importance to realize the digital health vision. It is critical to establish robust telecommunication networks and ensure broadband connectivity, particularly in underserved regions. Working in collaboration with relevant stakeholders, efforts will be directed towards building strong networks and broadband infrastructure for healthcare facilities. This entails guaranteeing reliable and high-speed internet connections across hospitals, clinics, and remote health centers. Furthermore, there will be a focus on prioritizing the enhancement of connectivity in remote or underserved areas, aiming to bridge the digital divide and promote equitable access to healthcare resources. The utilization of sustainable and renewable energy resources will be prioritized to ensure the sustainability of networks and connectivity. By implementing green energy solutions, similar to the successful initiatives carried out for primary healthcare centers, dependable networks for digital health services can be ensured. Progressive network reforms or regulations related to white-listing health data services like telemedicine, APNs, APIs for accessing EHRs, or other digital health services can also be considered.

White-listing health data services could be an approach to prioritize and secure certain healthcare-related traffic, ensuring the confidentiality and integrity of sensitive health information. A regulatory environment will affect its implementation, as well as the technology infrastructure and security measures. In addition to the provisioning or requirements to carry non-revenue hotline numbers, USSD codes, emergency numbers, etc., some countries have implemented laws or regulations mandating telecom operators to provide access to emergency services and other essential numbers. These measures are aimed at ensuring public safety and accessibility to critical services.

As for the utilization of USF or other telecom sector ways to reduce costs, augment services, or promote adoption for digital health services, such strategies could be valuable in promoting the accessibility and affordability of digital health services, particularly in underserved areas. The USF is typically established to subsidize the costs of deploying and maintaining communication infrastructure in remote or economically disadvantaged regions. Expanding its scope to support digital health initiatives could enhance healthcare access in those areas.

Additionally, telecom operators and digital health service providers may collaborate to offer affordable data plans or specialized services for healthcare purposes, fostering adoption among the population. Such partnerships could be beneficial in encouraging the use of digital health solutions and bridging the digital divide in the healthcare.

C. FOSTERING SUSTAINABLE, SCALABLE AND INCLUSIVE INNOVATION AND ENTREPRENEURSHIP

To promote the growth of the digital health ecosystem, the vision aims to foster an environment that supports innovation, research, and entrepreneurship.

1. Digital Health Incubation Centers and Multi-Donor Financing

Establishing *digital health incubation centers* and *multi-donor funding programs* to nurture startups and facilitate the development of innovative digital health solutions in Lebanon will be encouraged and sought. By building a supporting environment within the Lebanese academic area and collaborating with existing innovation hubs such as ESA, Berytech, Flat6Labs, BDD and others, the ministry aims for designing funding programs with multiple donors specifically tailored for digital health startups, providing financial support to nurture their growth and mentorship.

In addition, supporting multi-donor funded initiatives, that promote harmonization and alignment with the MoPH national digital health strategic objectives and the future roadmap which will strengthen the ownership and the capacity of the ministry to fulfill its vision, will be prioritized.

2. Foster Scientific Research and Innovation in Digital Health

The utilization of data from digital health platforms plays a pivotal role in advancing research within academia and guiding evidence-based policy making. By harnessing the wealth of information generated through digital health systems, researchers have the opportunity to gain insights into population health trends, disease patterns, and the effectiveness of various healthcare interventions. This valuable data can inform policy decisions, enabling the development of targeted strategies and allocate resources more efficiently. Therefore, collaboration between the MoPH, academic institutions and research centers to support the research in the field of digital health will be encouraged. By investigating in the implementation of digital health solutions, researchers can identify barriers and challenges, propose solutions, and refine strategies to optimize the adoption and integration of digital technologies.

This collaborative approach between academia and digital health practitioners would foster a cycle of learning and experience exchange, where research findings inform the implementation of digital solutions, and in turn, the real-world implementation provides valuable data for further research. Ultimately, this synergy between academia and digital health stakeholders would promote a comprehensive and evidence-driven approach to digital transformation, enhancing the quality, accessibility, and effectiveness of healthcare services.

D. GOVERNANCE: IMPROVING DATA MANAGEMENT, PRIVACY, SECURITY, AND ETHICAL USE

1. Data Protection and Privacy Regulations

The development of robust data protection and privacy regulations that align with international standards is a key priority, ensuring secure handling, storage, and sharing of patient information. This will involve a coordinated effort among multiple government agencies, including the MoPH, Central Inspection, OMSAR, Ministry of Telecommunication, and the Lebanese Data Protection Authority. Regulations, standards, policies, and guidelines will be reviewed and established to address the secure handling, storage, and sharing of patient data in the context of new technologies. Existing laws and regulations, such as the “Law on the Protection of Personal Data (Law No. 81/2017)”, provide a foundation for data protection and privacy across various sectors, including health. These laws define principles, requirements, and individuals' rights regarding the collection, processing, and storage of personal information, imposing obligations on data controllers and processors.

In order to ensure the success and uniformity of the digital transformation project, coordination with OMSAR is necessary, as their centralized law program can provide a comprehensive framework for the implementation of data protection laws related to digital health. Furthermore, close coordination with OMSAR is needed for coordination on various platforms such as the Visa Billing System for Meditrack inquiries, GIS Hospital Platform, mapping for health facilities, and e-Services Platforms. Continuous monitoring of the status of these platforms will also be essential.

Moreover, cybersecurity measures will be prioritized to safeguard digital health systems against potential threats and unauthorized access. By implementing robust cybersecurity practices, the integrity and confidentiality of digital health systems can be ensured, protecting sensitive patient data and maintaining the trust of individuals using these systems.

In addition, collaboration with insurance providers and regulators to *align reimbursement models with digital health services*, encouraging their adoption and sustainability will be needed. Such collaboration would encourage the adoption and sustainability of digital health solutions by providing financial incentives, ensuring regulatory compliance, and addressing reimbursement barriers.

2. Adherence to International Guidelines for the Responsible Use of Emerging Technologies

The goal is to establish comprehensive ethical guidelines for the responsible use of emerging technologies, including AI, ML, and the IoT in the healthcare sector. This will be achieved through coordinated efforts with OMSAR, working together to address and mitigate potential risks that these technologies may pose on the health sector. Furthermore, a strong emphasis will be placed on ensuring transparency, fairness, and accountability by adopting international standards such as GDPR and best practices. By incorporating these ethical guidelines and standards, the healthcare sector can foster the responsible and ethical utilization of emerging technologies, ultimately leading to improved patient care and positive health outcomes. Recent international examples include WHO's guidance on “ethics and governance of artificial intelligence in health”.⁸

3. Public-Private Collaboration

The vision for digital health in Lebanon emphasizes the importance of collaboration among various stakeholders. It is crucial to foster partnerships with international organizations, technology companies, and other countries to facilitate the exchange of knowledge, expertise, and best practices in digital health implementation. By engaging in public-private partnerships, the transformation of digital health can be effectively promoted at a national level, leveraging the combined resources, expertise, and collaboration of both sectors. The successful collaboration between the MoPH and private sector entities such as SIREN, POTECH, and Oummal has played a pivotal role in implementing current applications like Meditrak and MedLeb. Studies have demonstrated that fostering alliances between public sector entities and private sector companies, through public-private partnerships, is instrumental in addressing public management issues and achieving social, environmental, and economic goals, thereby advancing individual and collective well-being.⁹ The WHO assembly has also recognized the crucial role of the private sector in the digital transformation of the healthcare sector.¹⁰

4. Engaging Healthcare Professionals, Patient Advocacy Groups, and Civil Society Organizations

When the civil society starts pursuing some health-related issues and starts communicating them, then the theories of health, communication, and social sciences begin operating together for a shared objective. Thus, engaging the civil society in active decision-making process and prioritizing a user-centered approach which involves users in the development using focus groups, approval boards and common testing plans will ensure the alignment of digital initiatives to the specific needs of the population. The effectiveness and adoption of digital tools can be enhanced by continuously assessing how well they meet the needs of the population and can be done through collaborating with civil society and patient advocacy groups.

5. Regional and International Partnerships

The recent Covid-19 pandemic has underscored the necessity of innovation and collaboration among governments and global organizations to effectively address this unprecedented health crisis. In this context, regional and international collaboration and participation are crucial for Lebanon to stay updated and effectively manage the rapid growth of digital health. Collaborating on a regional level facilitates the harmonization of health policies, regulations, standards and resource optimization. This alignment helps to streamline processes, ensure consistency in healthcare delivery, and improve coordination in emergency response and disease control measures. It also supports the creation of a unified regional health agenda that reflects the specific needs and priorities of the member countries.

In addition, an example of such collaboration is the utilization of global initiatives such as the DHA developed by WHO which serves as an open-source web platform specifically designed to facilitate the coordination of global digital health activities. It provides governments, technologists, implementers, and donors with valuable information to enhance the planning, coordination, and utilization of digital health information systems. Additionally, the DHA supports implementers in assessing the progress of their digital health projects and offers access to global resources that highlight current best practices in the field of digital health. By adopting such collaborative platforms, Lebanon can harness the power of shared knowledge and expertise to advance its digital health agenda and effectively respond to evolving healthcare needs.

VI. IMPROVED HEALTH OUTCOMES THROUGH DIGITAL TRANSFORMATION

The digital transformation of healthcare has ushered in a new era of improved health outcomes. Through the integration of innovative technologies and digital solutions, healthcare systems have witnessed significant advancements in efficiency, patient engagement, and care coordination. These transformations have paved the way for better decision-making, enhanced access to services, and optimized resource allocation, ultimately leading to improved health outcomes for individuals and communities alike.

A. BETTER PATIENT SAFETY AND QUALITY OF CARE

Digital health solutions contribute to improved patient safety by reducing medication errors, enhancing medication management, and minimizing adverse events.¹¹ Decision support systems embedded in EHRs can provide real-time alerts and reminders to healthcare professionals, ensuring adherence to best practices and evidence-based guidelines, thus enhancing the quality of care delivered.¹²

1. Pharmaceuticals & Medical Devices Management and Adherence

Lebanon heavily relies on pharmaceutical imports, and the impact of the ongoing economic crisis has led to a significant challenge in ensuring the availability and accessibility of essential medicines, particularly for individuals with chronic diseases. In addressing this issue, digital health tools play a crucial role in enhancing medication management and adherence, ultimately leading to improved patient safety and health outcomes. These tools contribute to the reduction of medication errors by enabling better tracking, monitoring, and management of medication usage. They ensure that patients have access to the necessary medications, promoting accountability, transparency, and efficiency in the healthcare system. For example, the implementation of digital health solutions like Meditrack and MedReg by MoPH has enhanced supply chain visibility, safeguard product integrity, and streamline the recall process when required. It enabled the effective identification, verification, tracking, tracing, and reporting of medical devices and pharmaceuticals, ensuring compliance with regulatory standards and enhancing overall patient safety.

By utilizing such technologies, healthcare systems can enhance medication management, increase adherence, and minimize the occurrence of adverse events. The integration of digital tools into healthcare systems promotes a patient-centered approach, fostering a safer and more efficient medication management process. These advancements in digital health not only address the challenges faced by Lebanon's healthcare system but also contribute to improving overall healthcare outcomes for individuals with chronic diseases.

2. Enhanced Care Coordination

Digital health tools enable seamless sharing of patient information among healthcare providers, facilitating better care coordination, harmonizing services (through better linkages) and enhancing referral systems (through the use of eConsult platforms) to support the continuity of care across health facilities and providers.² EHRs, HIEP, and interoperable platforms ensure that relevant patient data is available to healthcare professionals, enabling them to make informed decisions and provide coordinated care across different settings and providers.¹³

3. Higher Accessibility to Healthcare Services

Telemedicine and remote monitoring solutions enable virtual consultations, remote patient monitoring, and home-based care, expanding access to healthcare services, particularly for individuals in remote or underserved areas. This can reduce travel and wait times, reducing the carbon footprint of healthcare¹⁴ and improving timely access to care.

4. Empowered Patients and Improved Patient Engagement

Digital health tools empower patients to actively participate in their healthcare. Patient portals, mobile apps, and wearable devices provide individuals with access to their health information, personalized health education, self-management tools, and communication channels with healthcare providers. This fosters patient engagement, shared decision-making, and better adherence to treatment plans.¹⁵

B. IMPROVED EFFICIENCY: COST SAVINGS AND RESOURCE OPTIMIZATION

In Lebanon, the continued reliance on paper-based prescriptions and reports in healthcare organizations leads to increased costs. The manual handling of paper documents not only consumes time but also requires additional resources for printing, storage and retrieval. With the adoption of digital health solutions such as electronic prescribing systems and electronic medical records, healthcare providers can reduce the need for paper-based documentation, resulting in cost savings.

Furthermore, digital health solutions enable better management of healthcare resources. By leveraging technologies such as telemedicine, remote patient monitoring, and health information exchange systems, healthcare providers can optimize the allocation of resources. For instance, remote consultations can reduce the need for physical visits, leading to lower transportation costs and more efficient use of healthcare professionals' time.

Digital health solutions revolutionize healthcare processes, offering numerous advantages such as streamlined workflows, reduced administrative burdens, and automated tasks.¹² By implementing technologies like the UHID in systems like AMAN and MediTrack, the healthcare sector in Lebanon can unlock a host of benefits. One of the primary advantages is the assurance of patient uniqueness across both systems, laying the foundation for a cohesive and comprehensive approach to healthcare management. This paves the way for further advancements and improvements in patient identification, data integration, and care coordination. The integration of these digital tools sets the stage for a more efficient and patient-centered healthcare system, where information flows seamlessly, enabling better decision-making and improved health outcomes.

C. POPULATION HEALTH MANAGEMENT

Digital health solutions enable population health management by collecting and analyzing health data on a larger scale. This allows healthcare systems to identify health trends, risk factors, and disease patterns in the population, facilitating targeted interventions, preventive care strategies, and resource allocation based on the specific health needs of different groups.

VII. CHALLENGES, RISKS AND BARRIERS

The implementation of a digital transformation plan within the healthcare sector in Lebanon faces challenges and imposes risks which might affect and hinder the digital transformation. Some of these challenges are explained below:

1. **INFRASTRUCTURE AND CONNECTIVITY:** Insufficient technological infrastructure and regulatory support and limited access to reliable internet connectivity pose a significant challenge to the digital transformation of the

healthcare sector. This can hinder the implementation of digital solutions and the seamless exchange of information between healthcare providers.

2. **COST AND FINANCIAL CONSTRAINTS:** The financial implications of implementing digital solutions and maintaining technological infrastructure can be a significant barrier. Limited financial resources in Lebanon and budget constraints may hinder the Ministry's ability to invest in the necessary technologies and sustain the digital transformation efforts.
3. **DATA PRIVACY AND SECURITY:** Ensuring the privacy and security of sensitive patient data is a critical concern in the digital transformation process. The risk of data breaches, unauthorized access, and potential misuse of patient information creates a barrier to the adoption of digital health solutions.
4. **DIGITAL LITERACY AND ADOPTION:** Low digital literacy rates among healthcare professionals and the general population can impede the successful implementation of digital transformation initiatives. A study in Lebanon have shown that healthcare providers recognized the value of EPP and expressed a high intention to use them. However, the intention to use EPP among patients was comparatively lower than what has been observed in developed countries.¹⁶
5. **RESISTANCE TO CHANGE & LACK OF AWARENESS:** may hinder the adoption and utilization of digital products. A study has shown that Tele-Health among Lebanese have not gained popularity yet due to the strong preference for human interaction in healthcare.¹⁷
6. **INTEROPERABILITY AND STANDARDIZATION:** Achieving interoperability between different healthcare systems, applications, and devices is a challenge. Lack of standardized protocols and interoperability frameworks can impede data sharing and collaboration among healthcare providers, limiting the potential benefits of digital transformation. Establishing national digital architecture plans and using standards to achieve interoperability of systems is challenging and requires a collaborative approach from different parties which can delay the process.
7. **RISKS OF AN INCREASE IN THE DIGITAL DIVIDE:** disparities in access to internet connectivity, digital devices, and digital literacy skills among populations increases the *digital divide*¹⁸, which means that the gap between those who have access to digital resources and those who do not might grow, exacerbating existing inequalities in within the Lebanese. The financial disparities between the private and public sectors can contribute to a more rapid adoption of digital solutions in the private sector compared to the public sector which can also impact the *digital divide*.

VIII. NEXT STEPS

This vision serves as a guiding framework, laying the foundation for the formulation and execution of a comprehensive digital health strategy, accompanied by a detailed action plan, results framework and M&E scheme. To visualize the proposed next steps in developing Lebanon's Digital Health Strategy, refer to the GANTT chart below in Figure 1. The initial phase of the strategy development involves the establishment of committees responsible for leading the process. The **Digital Health Strategy Steering Committee** will consist of key stakeholders in the health sector, including representatives from ministries and other relevant organizations. Their role is to provide direction, guidance, and oversight in the development of the national digital health strategy and action plan with a results framework. The Committee would make decisions regarding the acceptance of the strategy, progression of its recommendations, and overall strategic directions. The committee addresses risks, assesses issues and conflicts, and approves changes to scope or approach as needed and provide guidance to the technical committee.

The **Digital Health Strategy Technical Committee**, will be composed of academics, leaders, and representatives from the health sector who possess expertise in digital health. This committee provides guidance on the development of outcomes and recommendations, supports the formulation of the national digital health strategy and action plan, identifies existing components for potential reuse or sharing, contributes to the development of the governance

model, offers insights on the implications of strategic objectives/directions, reviews and provides feedback on the research findings and conclusions, and draft deliverables.

In addition to the committees, the **core workgroup** will be responsible for planning and managing the strategy development process. The core workgroup will be involved in information gathering, analysis, and drafting of the national DH strategy. The workgroup conducts stakeholder research and engages in organizing the workshops with key stakeholders. The activities of the group form the foundation for shaping the strategy and ensuring its alignment with the needs and priorities of the healthcare ecosystem in Lebanon. The core workgroup will report to the steering committee.

Various stakeholders will be invited to the **workshops**, including members of advocacy groups, patient associations, health agency executives, and representatives from health committees and programs. They will delve into the government’s stated priorities for addressing digital health sector challenges and examine the national health strategy, its development timeline, and identified goals and targets. They will explore commitments made towards achieving international health goals, as well as existing international obligations, partnerships, or programs. Timeframes for delivering the health strategy, results framework, and M&E mechanisms will be developed, along with ongoing or planned major health system improvements, transformations, or reforms. The implications for future financing will be examined during the workshops for the implementation of each strategic objective through proper workplans and key activities and a results framework to monitor outcomes.

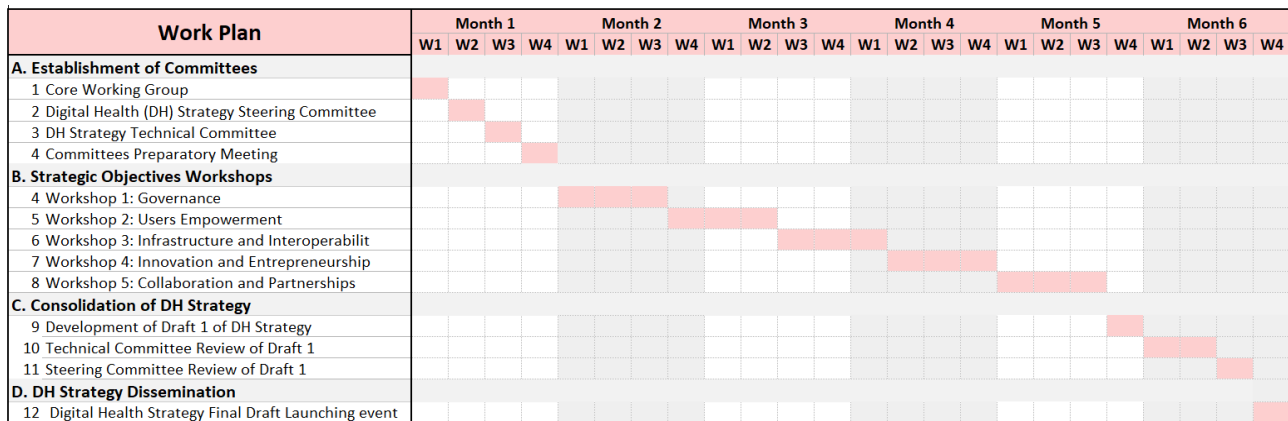


Figure 1: GANTT Chart for the Development of the Digital Health Strategy

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