



Contents lists available at ScienceDirect

# International Journal of Medical Informatics

journal homepage: [www.elsevier.com/locate/ijmedinf](http://www.elsevier.com/locate/ijmedinf)

## The role of digital health in supporting the achievement of the Sustainable Development Goals (SDGs)



On September 2015, the 193 United Nations member states agreed to continue their progress towards the Millennium Development Goals (MDG), started in the year 2000. According to the World Health Organization (WHO), major challenges remain in terms of reducing maternal and child mortality and in the need to continue the fight against transmissible and chronic diseases, including their risk factors. It is also clear that work is still required on water, sanitation and air quality, as well as on continuing to strengthen health systems to achieve universal health coverage [1]. All these challenges were included under the Sustainable Development Goals (SDGs), mainly under the goal #3: “Ensure healthy lives and promote well-being for all at all ages” [2].

Since the year 2000 – when the MDGs were launched – numerous changes have been introduced into people’s daily lives, ranging from how we communicate and obtain data and information, to how we consume or purchase content, to how we move or do our work, among many other routines. A common factor uniting all these changes is the spread and uptake of innovation and of information and communication technologies (ICT), which is also reflected in how countries approach the scope of the SDGs. For example, back in 2000, technology played a minor role in the text of the MDGs – it was hardly mentioned – but, today, practically all the SDGs have a digital component included.

While recognizing the existence of inequalities between different countries in this sector, it is also true that the telecommunications sector made significant advances between 2000 and 2015. Specifically, the number of global mobile phone subscriptions rose from 738 million to 7 billion, global Internet penetration grew sevenfold from 6.5% to 43%, and the proportion of the population covered by a 2G mobile-cellular network grew from 58% in 2001 to 95% in 2015 [3]. All these changes have helped us go about our routines in a different way, which has also had a direct impact on the health sector, affecting how we approach our health throughout life, how we communicate with health professionals, and how we access and receive health services at different levels of healthcare. New developments in wireless technologies are creating opportunities to revolutionize the health sector. In a scenario in which healthcare is evolving from an individual approach (care for acute health problems) to a population-based approach (managing prevention and the disease), these new technologies help solve problems of geographic access, facilitate the provision of appropriate interventions, reduce intervention costs, and even help raise public awareness on how to approach health problems and promote healthy lifestyles, thus contributing to patient empowerment.

A number of examples of how to work towards achieving the SDGs through digital health solutions are included in this special edition

titled “The role of digital health in supporting the achievement of the Sustainable Development Goals (SDGs).” Specifically, this edition proposes a mobile solution for cost-effective data collection, thus enabling information to be gathered in areas where unsafe abortion has a large impact on maternal mortality. Another experience using mobile applications in this special edition involves the use of mobile phone cameras and image recognition technologies in low- and middle-income country (LMIC) settings for automatic data from rubber stamp templates, which contribute to quality improvement of clinical care. Digital health solutions have boosted the development of clinical decision support systems such as ALMANACH (ALgorithms for the MANagement of Acute CHILDhood illness), which analyses medical data to help providers make clinical decisions at the point of care. In the areas where the tool was piloted, for instance, antibiotic prescription decreased from 63% to 21.8%. Another topic of interest included in this special edition is the use of artificial intelligence and social media in humanitarian and global health as an approach to the current situation and existing challenges, and the use of digital health as the ideal way of tackling health challenges associated with conflict-affected environments. Finally, this work concludes with a study on the use of recommender systems (machine learning tools) to improve the drafting and distribution of public health messages that contribute to promoting health.

These and other digital healthcare initiatives to achieve the SDGs share challenges that go beyond the implementation of technology to include social, cultural and organizational factors, as identified by the WHO and its regional office in the Americas, the Pan American Health Organization [4,5]. These include the need for a trained workforce skilled in using digital health solutions and the need for proper governance and funding, among others. To overcome these barriers, work needs to take an interdisciplinary and inter-sectoral approach, bringing together all the main actors in the digital health ecosystem: governments, international organizations, health service institutions, academia, research centres, and public and private industry.

Firstly, countries have to define and implement governance mechanisms in digital health for and by the public. To do this, national strategies and policies need to be developed to illustrate possible forms of inter-sectoral cooperation – a vision of state – involving healthcare professionals right from the start, seeking sources of necessary funding, and adapting academic curricula to the changes associated with introducing ICTs. They should also tackle the required legal reforms regarding regulatory aspects related to digital health (data protection, data privacy and confidentiality, as well as patients’ individual rights, and aspects relating to data responsibility). Finally, possible digital

<https://doi.org/10.1016/j.ijmedinf.2018.03.011>

health approaches and solutions should be aligned with the specific needs of the country's health system and culture and should be technologically appropriate and within the limits of the social, cultural, environmental, and economic conditions of the area to which they are applied, promoting self-sufficiency and including medium-term goals.

International organizations, mainly the United Nations, should continue working to promote sustainability and efficiency in health systems by unlocking innovation and promoting changes in healthcare organizations. To do this, they need to understand current situations and continue developing lines in digital health, while facilitating the search for solutions and knowledge exchange between countries. This also includes convincing decision makers that their legacy should be a governance model that is thought-out in 10 years, and not the latest "gadget" that still needs testing.

Health service institutions should place greater emphasis on continual learning for healthcare professionals, the organizational dimension and the new role of empowerment for patients. Digital health will only broaden results if it is combined with specific training and new practices in work organization and human resource management. It should also include flexible working systems that enable healthcare professionals to use technology to replace routine tasks and thus provide greater value for their organizations.

Academia and research centres and institutions face the challenge of continuing to develop and produce primary evidence that helps decision makers identify the best, most cost-effective solutions from the wide range of options available in digital health. Each intervention must be assessed in a local, national, regional, or global context to generate evidence. Systematic assessment of these services should help demonstrate progress in achieving national health-related goals under SDG #3 and show the benefits for patients. This evidence should be used actively to support investment and for decision-making and execution. At the same time, it should help generate appropriate training plans for digital health innovation, where the roles of healthcare professionals will necessarily be different, training them in new disciplines in the curricula of health science faculties.

Finally, public and private industry, which is revolutionizing the telecommunications sector, should consider national and global health realities and priorities, and offer sustainable needs-oriented solutions in specific sociocultural and social health realities in line with resources available in the context, so we can look towards a better future. This underlines the urgency required in adapting digital health technologies dynamically to the context of the specific country to help propel progress towards SDG #3.

This interdisciplinary and inter-sectoral approach will require partnerships that make use of the best ideas, share the most relevant knowledge and adopt evidence-based and informed digital health interventions to achieve the SDGs cost-effectively and sustainably.

Finally, the guest editors would like to thank the IJMI Editorial Committee for the opportunity to work on this special edition. They would also like to thank the team that has provided support to make this possible and everyone who sent in contributions to this special edition, regardless of how they were eventually used. Furthermore, the

editors would like to dedicate this work to Dr. Lorena Enebral Perez, a marvellous and humanitarian woman who actively participated in one of the studies published here, who passed away while it was in production, and to her family and loved ones, reminding us that life is too short, and we must make every contribution a change, and every change a step to a better world.

#### Authors' contributions

David Novillo-Ortiz, Heimar De Fátima Marin and Francesc Saigí-Rubió contributed equally to this paper.

#### Conflicts of interest

The authors declare that they have no competing interests.

#### Disclaimer

David Novillo-Ortiz is a staff member of the Pan American Health Organization/World Health Organization (PAHO/WHO) and is himself alone responsible for the views expressed in the paper, which do not necessarily represent the views, decisions, or policies of the PAHO/WHO.

#### Acknowledgments

We have not received any funding for conducting this paper.

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