SIEMENS Healthineers

Cross-industry cooperation on Access to Care challenges in Colombia and Latin America

January 2024

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Abstract

The Latin American and Colombian healthcare markets have seen significant growth in recent years due to a rise in healthcare expenditure in pursuit of Universal Healthcare Coverage. However, despite the continuous growth of the healthcare systems in the region, many challenges remain in terms of access to care, equality, and technology. To face such challenges, it is essential to promote and establish social innovation in healthcare initiatives and Public Private Partnerships that drive resources and discussions towards innovative ways of attaining access to care and the Sustainable Development Goals.

To fill this role, the Innovation Think Tank (ITT), as part of Siemens Healthineers, has started to actively engage academic and healthcare institutions in the region, like the Universidad Nacional de Colombia (UNAL), to develop local innovation infrastructure. ITT has conducted its 169th program in Colombia to capture and validate healthcare and hospital trends relevant to access to care in the country and the region. This program involved 72 diverse participants with the background of healthcare professionals, engineers, professors, students, researchers, among others. Multidisciplinary teams throughout this program were trained to develop solutions for local healthcare challenges using the ITT methodology.

By using the ITT Healthcare System Framework (ITT HSF), the data was captured and validated in the following categories: 1) Key current trends that will transform healthcare delivery and improve access to care in Colombia and Latin America; 2) Institutional challenges and goals for access to care in Colombia and Latin America; 3) the Colombian Healthcare System; 4) challenges and potential solutions for Colombia's access to care, all rated with their degree of impact and importance. The consolidated data provide inputs for future co-creation and solution developments in Colombia and LAM.

Keywords: Colombia, Latin America, Healthcare System Framework, Access to Care, Innovation Think Tank, Siemens Healthineers, Universidad Nacional de Colombia, Co-creation, Cross-industry cooperation

Introduction

The Latin American healthcare market has seen significant growth in recent years due to several factors. Some of these factors are the rise in healthcare expenditure, a growing aging population, and the increasing incidence of chronic diseases. In fact, over the past decades, the governments in Latin America have implemented new policies and interventions aimed at achieving Universal Healthcare Coverage (UHC) [1]. For instance, in Colombia, coverage has increased from having only around 20% of the population covered in 1990, to almost having 95% covered by 2022 [2].

In recent analysis from the Organization for Economic Cooperation and Development (OECD), it was reported that, although the overall population health status in the region has in fact improved, progress remains unequal and within countries: improvements in non-communicable diseases outcomes have been slow; communicable diseases and injuries persist as relevant health issues; quality of care remains a big concern; and, bottlenecks of human and physical resources still prevent an effective response to people's health care needs [3].

Moreover, as reported by the Latin America Healthcare System Overview from the London School of Economics and Political Science (LSE), many countries in the region are experiencing rising healthcare costs. These are driven by technological advances, resource inefficiencies, income growth

and the disproportionate rise of labor costs compared to productivity growth.

Conversely, current trends in population aging may contribute to a declining revenue for healthcare because, while aging may not be a driver for higher healthcare related costs by itself, the declining proportion of active workforce may result in less income generated for health, social security, and other public services [4].

With such challenges in mind and aiming towards attaining the Sustainable Development Goals (SDGs) in relation to access to care, the maintenance of good health, and prevention of disease, needs to be addressed from an integrative perspective.

Governments and societies should not aim only to reduce disease transmission and severity, but also identify and tackle potential causes. Given this emphasis on the social determinants of health, states and international organizations should align to promote and assume innovative strategies to achieve health and development goals [5]. For example, initiatives that bring together academia and industry should be promoted because they build mechanisms and bridges to boost training and innovation processes for the benefit of creating capacities to generate solutions to current challenges in Latin America and Colombia. Hence, social innovation in health and healthcare public-private partnerships have become an attractive option in the region for key healthcare stakeholders to expand their networks and services [6].

On this subject, the Innovation Think Tank (ITT), as part of the Chief Technology Office at Siemens Healthineers (SHS), and driven by the need for developing interdisciplinary and self-sufficient innovation infrastructures, decided to engage with healthcare and academic institutions in the Latin American region to start developing local innovation infrastructure along with the local SHS organization. The global ITT network and experience includes more than 170 innovation and co-creation labs and programs in different countries around the world, like Portugal [7], Egypt [8], India [9], Turkey [10], Canada [11], United States [11], United Arab Emirates [12] and United Kingdom [13].

Such activities include a variety of training and networking opportunities that are held on an annual basis for students and professionals, thus building a global innovation ecosystem. ITT's vision is to proactively drive innovation to improve human life, while its mission is to use self-sustaining global innovation infrastructures to accelerate the identification and implementation of new business opportunities. The success and recognition of the program has led to the establishment of ITT sites at prestigious universities and healthcare institutions such as the Imperial College London [13].

Along with SHS Colombia, ITT has managed to establish a partnership with the Universidad Nacional de Colombia (UNAL) and its Directorate of Research and Extension - Bogotá (DIEB), a strategic and planning unit that promotes and accompanies the generation, transfer, and social appropriation of knowledge to contribute for development of the Nation and communities. To carry out this task, one of the mechanisms that the DIEB has is *Mentor*, an articulating center of talent and knowledge that promotes, disseminates, and accelerates high impact science, innovation, and technology, providing solutions to the economic, social, and environmental challenges of Bogota region.

As a result of the described partnership, ITT has conducted its 169th program in Colombia to capture, contemplate, and validate healthcare and hospital trends relevant to the access to care in the country and the region. That constitutes a unique cross-industry cooperation opportunity. The purpose of the program was to act as a capacity building door to address and bring together key local healthcare institutions towards a common goal: improving Access to care in Colombia and Latin America.

Material and methods

Programs like the Innovation Think Tank Capacity Building Program serve as an inspiration for the upcoming generation of creative thinkers. Through June 5th to 9th, 2023, ITT, SHS Colombia and UNAL held a Capacity Building Program in Colombia with a focus on “Access to Care”.

The enthusiasm for innovation from interdisciplinary participants was also a key driver of the program. Throughout the program, Colombia´s healthcare system's stakeholders—including technology users, researchers, students, and business professionals—met both in person and online to co-create by learning the ITT methodology and applying it to the workstreams:

- Apply social appropriation of knowledge,
- Improve rural healthcare services,
- Reduce costs of current health service,
- Achieve electronic health record (EHR) interoperability at a national level,
- Integrate ancestral knowledge into the current healthcare workflow.

The program gathered a total of 72 participants coming from 26 institutions in Colombia, Mexico, Peru, and Argentina, and 33 disciplines including engineering, healthcare sciences, social sciences, natural sciences, and economic sciences, amongst others. Impulse speeches from key opinion leaders (KOLs) within the Colombian healthcare system and SHS initiated discussions on sustainable innovation infrastructure, followed by a survey on healthcare system framework for capturing and validating trends for access to care in Colombia.

For the purposes of capturing, analyzing, and validating data regarding trends and challenges related to the Colombian healthcare system and Access to Care in Latin America, the Innovation Think Tank Healthcare System Framework (ITT HSF) was integrated [Figure 1]. ITT HSF uses three processes:

1) Need-analysis by capturing stakeholder process.
2) Co-ideation by global transdisciplinary ITT teams.
3) Co-implementation with stakeholders in the healthcare system by local ITT programs [14].

The template for ITT HSF, shown below, was adapted by taking inputs from previous surveys and customized to the specific requirements for capturing and validating Colombian healthcare system trends and access to care challenges in the region.

The survey consisted of sections investigating sociodemographic challenges, healthcare, technological & business model trends, institutional challenges, an overall healthcare system analysis, and the factors impacting access to care provision. On the final day, outcomes from the program were presented to the jury, where the solution proposals were rated.

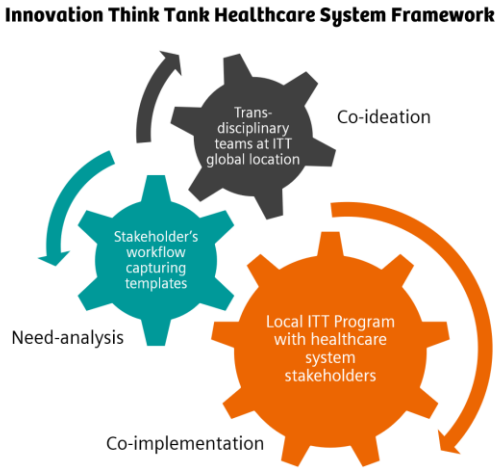

Figure 1: Innovation Think Tank Healthcare System Framework for capturing and validating trends

Results

Program outcomes

The 5-day certification program at UNAL in Colombia was successfully conducted between June 5th and 9th 2023. A total of 7 teams comprising of 72 participants from more than 30 disciplines and 26 institutions in 5 countries, presented their final outcomes on June 9th, 2023, at the facilities of the Camara de Comercio de Bogota. Overall, 200+ trends, 100+ KOL voices, 100+ stakeholders, 450+ pain points, 100+ solutions, and 20+ solution clusters were identified and proposed by the participants due to the program.

In addition to these outcomes, three key highlights made this program a successful story. First, it was co-hosted as a cross-industry cooperation between the local SHS organization, the UNAL and the support of ITT, which involved establishing a new partnership framework for both institutions to cooperate on a political, legal, and financial basis. Second, it was the first program conducted in a hybrid format in terms of language; on behalf of promoting inclusion and participation, the hosting institutions adopted a Spanish-English approach where all the activities could be performed by everyone, including non-English speakers. Third, due to the commitment of the 10 KOLs involved, it was the first program where they also supported as mentors during the whole program week, advising

the groups on how to better tackle the challenges to be worked on.

Survey findings

To consolidate and validate the information gathered regarding the comprehensive access to care trends and challenges, the following categories were created:

Category 1: Sociodemographic challenges that will affect healthcare delivery and their degree of impact on the healthcare services of the future.

Participants were asked to rank several regional sociodemographic challenges according to their perceived impact, as shown in Figure 2. The analysis of the results indicates that 56% believe the most impactful sociodemographic challenge is "Inequality or inequity in access to healthcare and sanitary services". This is followed by "Geographic location of care centers", "Urban and rural violence/ insecurity", and "Voluntary or forced migration from rural to urban areas", each ranking with 28% agreement among the sample group. Finally, "Aging population", "Climate change" and "Digital literacy in healthcare" were placed in the last 3 positions, meaning these challenges are considered to have the least impact, with 17%, 33% and 39% agreement, respectively.

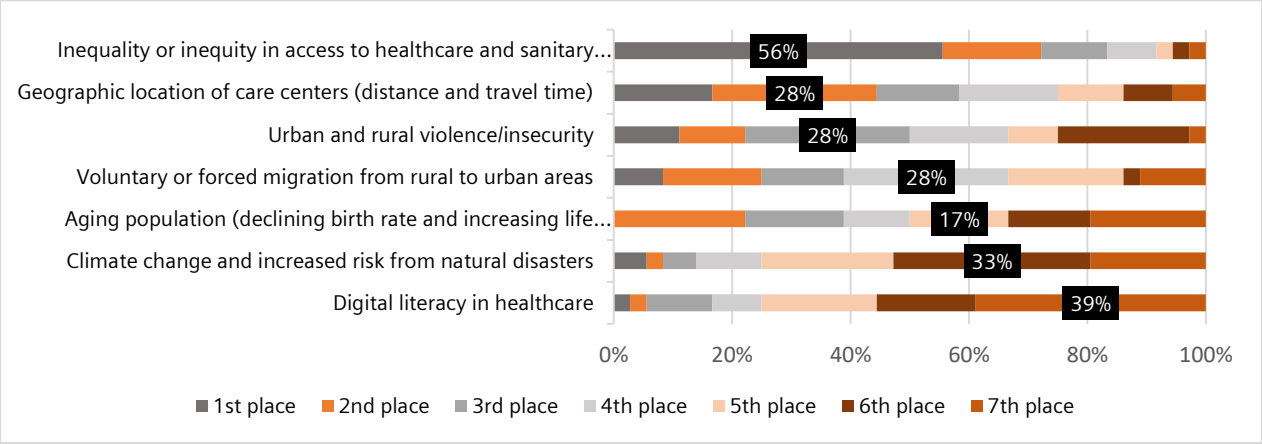

Figure 2: Sociodemographic challenges affecting healthcare delivery ordered from most impactful (top) to least impactful (bottom), and the percentage of agreement within the participant group

Category 2: The key current trends that will transform healthcare delivery and the degree of their impact on its healthcare system.

Healthcare trends

Multiple healthcare trends were evaluated by the participants and ranked according to their perceived degree of impact, as displayed in Figure 3. Results show that, with 81% agreement, "Preventive medicine and early diagnosis" is a trend with high impact. The trends "Increase in telehealth services", "Digitalization and automation", "Patient-centered and personalized care" and "Decentralization of the healthcare system" are also considered to be of high impact, with agreement ranging from 70% to 56%. The trends "Home and self-diagnostic services" and "Integration of climate change perspective" are seen as having a moderate impact with 47% and 44% agreement, respectively.

Technology trends

Figure 4 depicts the comparison of different technological trends based on their degree of impact according to the participants. The trend "Mobile medical units" is perceived as having high impact according to 80% of the sample group. Following the latter, other high impact trends are "AI support for predictions and diagnostics" with 72% agreement, "Interoperability and cloud storage" (64% consensus), "Digital twins for health monitoring" (50% consensus) and "Use of digital platforms in healthcare" (47% consensus). The final two listed trends, "Use of VR/AR and 3D printing in the hospital" and "Distribution of health supplies using

drones", are considered to be of moderate impact with 44% and 50% agreement, respectively.

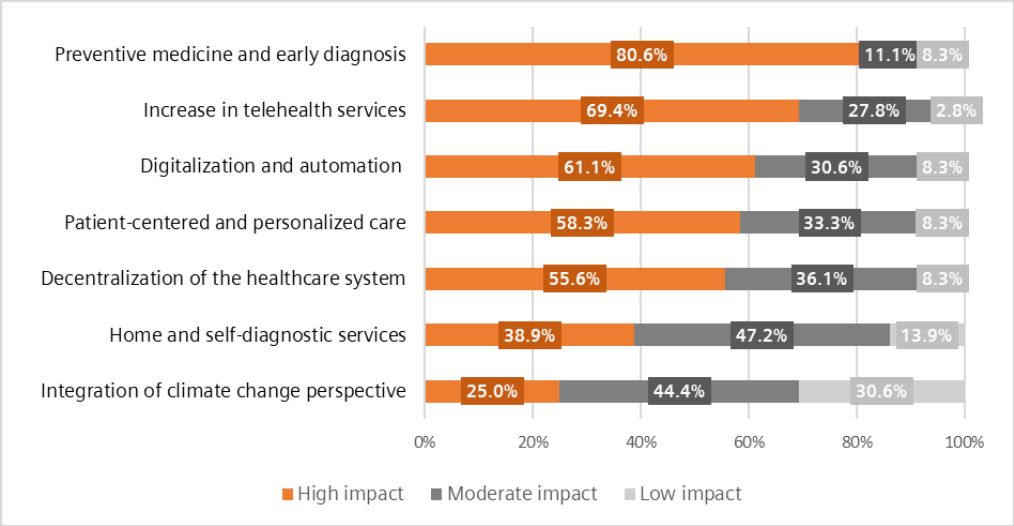

Figure 3: Degree of impact of healthcare trends and their percentage of agreement among the participants

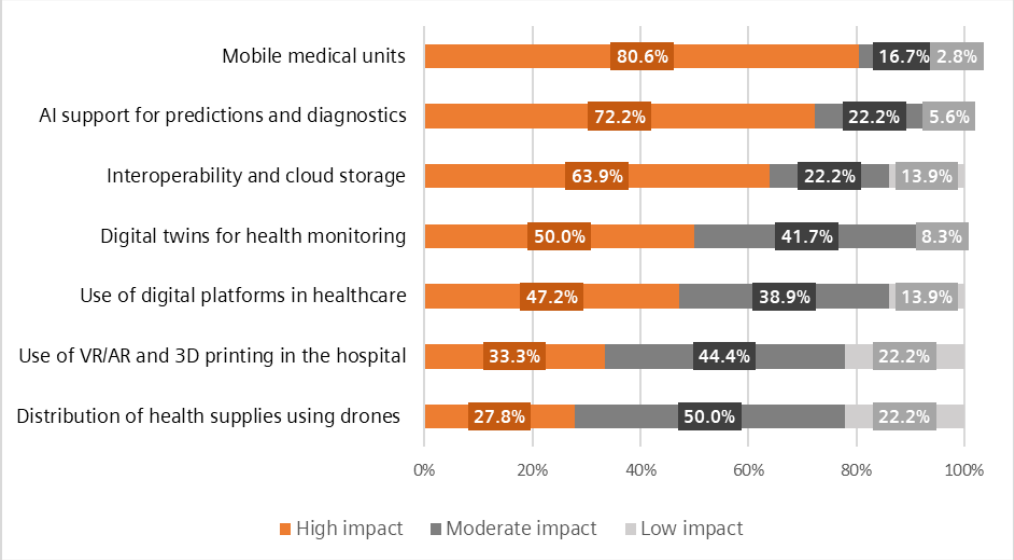

Figure 4: Degree of impact of technology trends and their percentage of agreement among the participants

Business trends

The last cluster of trends are shown in Figure 5. Following the previous methodology, these were analyzed based on the perceived degree of impact by the sample group. With 75% of consensus within the participants, "Cross-industry cooperation initiatives" is of high impact, as well as "Shared use of devices in rural areas" and "Software freemium", with 64% and 53% agreement, respectively. The remaining trends, "Pay-per-use", "Value-based care" and "Subscription services" are believed to be of moderate impact with 53%, 58% and 47% consensus, respectively.

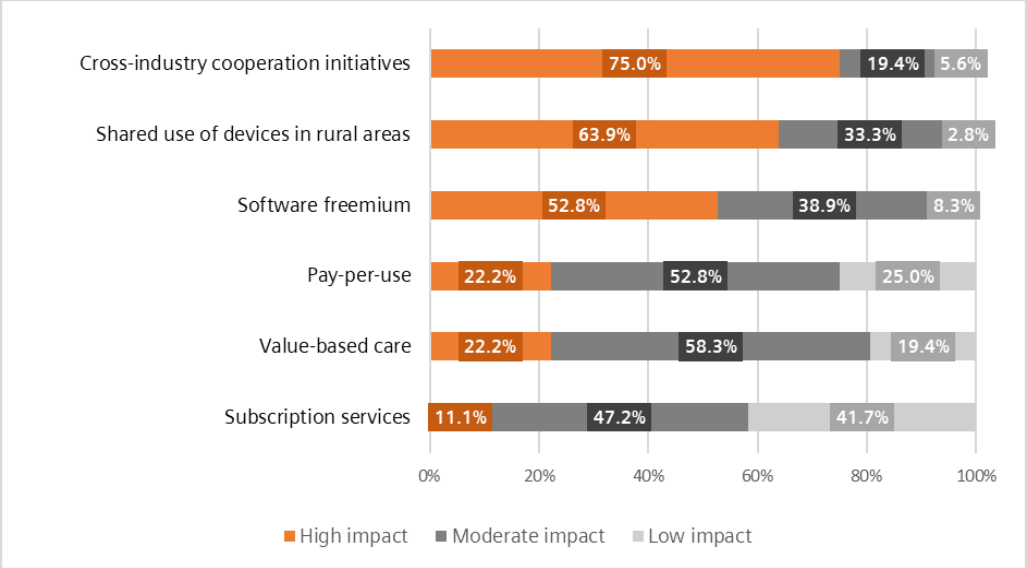

Figure 5: Degree of impact of business trends and their percentage of agreement among the participants

Category 3: Institutional challenges regarding access to care and their degrees of importance.

The sample group proceeded to evaluate the degree of impact of different institutional factors influencing access to care. The results are shown on Figure 6. As an overview of the outcome, all the listed challenges are considered to be of high impact by the majority of the participants, with "Operational efficiency" as the factor with the highest consensus among the group (86%), followed by "Geographic and transportation barriers" (75%), and "Quality of service and insurance coverage" (69%).

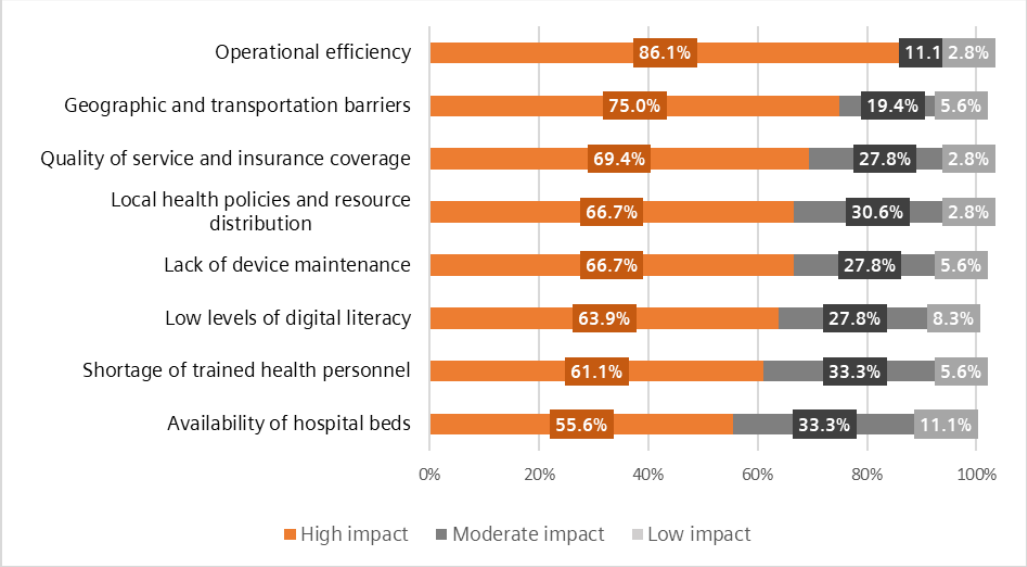

Figure 6: Degree of impact of institutional challenges and their percentage of agreement among the participants

Category 4: Impact of key factors on the participant's region access to care and healthcare system.

In this category, participants were requested to analyze the degree of impact (from very high to very low) of three key factors affecting access to care and healthcare system of the region: "Difference

between healthcare access in rural and urban communities", "Impact of income disparity on healthcare access" and "Impact of online platforms on remote care", as shown in Figure 7 a), b) and c). Both the first and second key factors are considered to be of a very high impact, with 83% and 63% of agreement among the group, respectively. The last key factor generated less consensus between the participants, with only 39% rating as very high, and 28% rating as high.

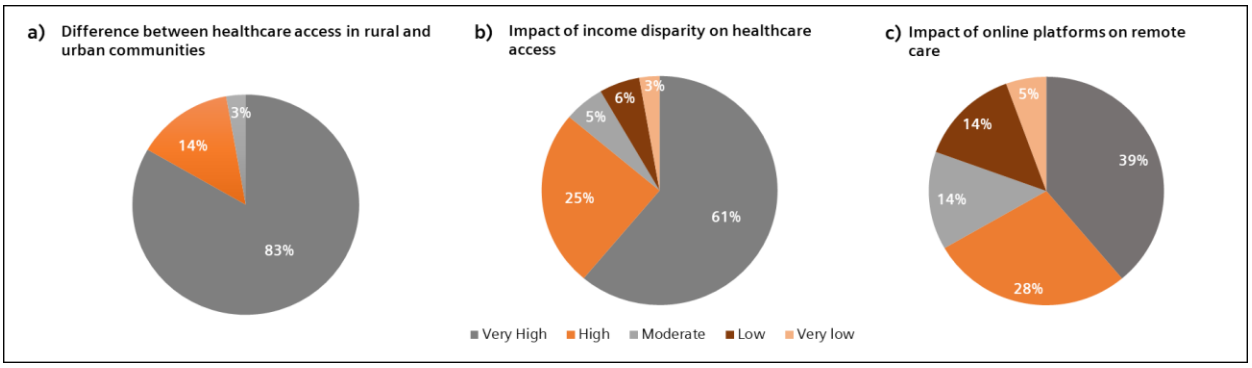

Figure 7*:* Degree of impact of three key factors (a, b, c) affecting regional access to care and healthcare system according to the participants

Category 5: Colombian healthcare system

The healthcare system in Colombia can be used as an example to better understand the healthcare landscape in Latin America. In this sense, a concept visualization was co-created and validated with the participants and the result is displayed on Figure 8.

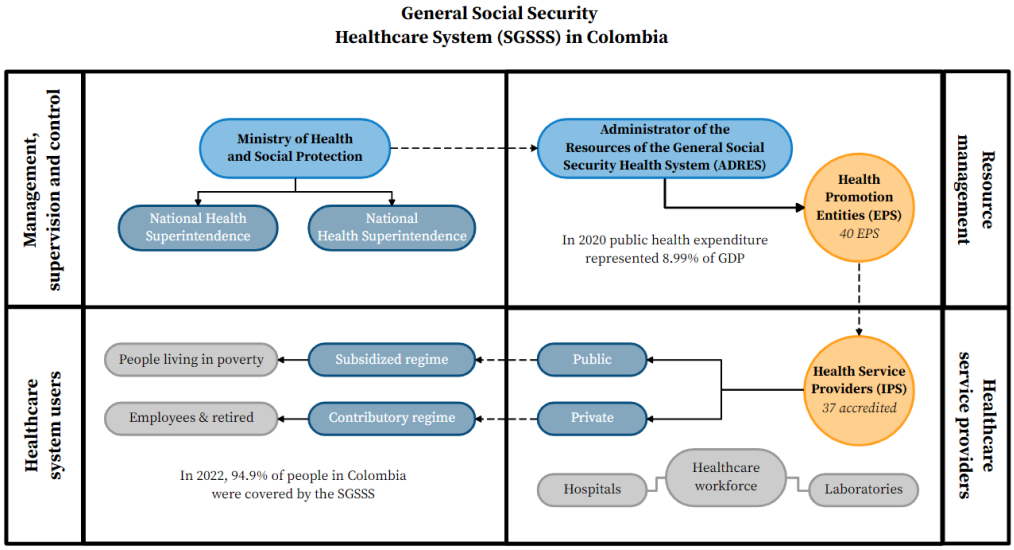

Figure 8*:* Simplified schematic of the healthcare system in Colombia

As shown on the image above, the healthcare system in Colombia is also known as "General Social Security Healthcare System" or SGSSS. This system is comprised of four main pillars: management, supervision and control, resource management, healthcare service providers, and healthcare system users. The first pillar, represented on the upper left corner, is the responsibility of the Ministry of Health and Social Protection, which can be further divided into the National Health Procurator and the National Health Institute. The Ministry of Health and Social Protection is then connected to the second pillar (on the upper right corner), the Administrator of the Resources of the General Social Security Health System (ADRES), which is further divided into the Health Promotion Entities (EPS). Despite the name, the EPS act as a form of insurance service for the users, and it is the responsible entity to finance the

healthcare service providers (the third pillar, on the lower right corner). In this pillar, the Health Service Providers (IPS) are the group of health institutions, hospitals, laboratories, and healthcare workforce, either in the public or private sectors. Finally, these sectors are assigned to the fourth pillar of SGSSS – the users. The public sector is mainly acting on the population living in poverty, since it is a subsidized regime, whereas the private sector is mostly used by the employed and retired population, due to its contributory nature.

Category 6: Challenges and potential solutions for Colombia's and Latin America's future for access to care

Finally, the results obtained from the program highlight the relevance of the problems addressed in the current context of the healthcare system in Colombia and other Latin American countries. In particular, the teams chose to explore issues such as diabetes, Alzheimer's disease, pregnancy in urban and rural communities, Human immunodeficiency virus (HIV), breast cancer and sex education from different perspectives and strategies. Out of the 100+ solutions identified and 20+ clusters created, each group selected their top solution scenarios (3 to 4 per group), which are categorized in Figure 9. It is possible to observe that the three top categories are digital health literacy (with 20% of the proposed solution scenarios), Information and Communication Technologies (ICTs) integration to create digital platforms (16%), and the generation of self-care practices in rural communities (16%).

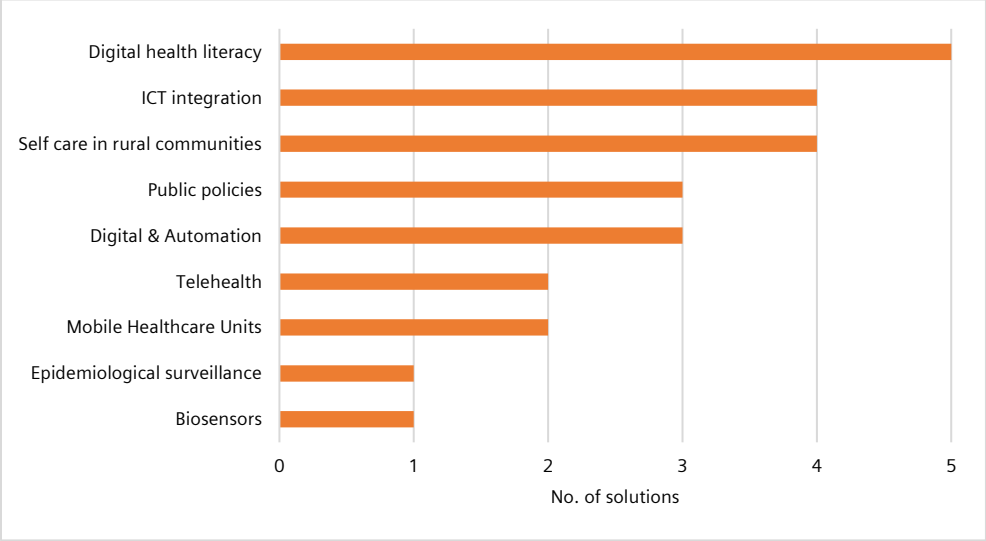

Figure 9: Number of potential solution scenarios proposed by the groups per category

Discussion

The integration of key healthcare stakeholders (i.e., government, industry, and academia) within the innovation context is imperative. It is through these cooperations that enough resources can be conveyed to develop successful initiatives and improve access to care in Colombia and Latin America. Considering and integrating these healthcare pillars allow the formulation and development of robust solutions through the holistic understanding of current healthcare trends, challenges, and key stakeholders. For this reason, by developing a local self-sustaining healthcare innovation infrastructure, priorities can be oriented towards identifying challenges in the Colombian and Latin American healthcare context, and thus implementing more targeted strategies such as the social appropriation of knowledge to address the most pressing issues.

As an example of how the ITT methodology and the HSF can help in such work, after analyzing the sections of the survey related to the most agreed impactful problem trend, the institutional challenges and the impact of key factors affecting access to care, it is possible to start establishing some possible

workstreams and problem statements. For instance, inequality or inequity in access to healthcare and sanitary services (especially between urban and rural areas), income disparity on healthcare access and operational efficiency of services are some of the most relevant issues perceived by the participants.

Moreover, looking at the most agreed impactful solution trends, some insights can be gathered on what healthcare, technological and business trends participants deem as more relevant to solve the issues previously described. As such, preventive medicine, and diagnosis, along with an increase in telehealth services, mobile medical units, and artificial intelligence (AI) supported diagnosis has been identified as a key solution scenario. Also, cross-industry cooperation initiatives, along with the shared use of devices in rural areas has also been selected as a matter of high relevance.

These results were not only theoretically studied as part of the survey, but participants showed how in practice, when given the opportunity to freely work on an access to care project, they would orient towards the forementioned challenges and trends. As explained in Category 6 of the results section, most of the proposed solution scenarios focused on: digital health literacy projects, which is related to income disparities, inequity, and preventive medicine; Information and Communication Technologies (ICTs) integration, which is related to operational efficiency of services, telehealth services and AI supported diagnosis; and the generation of self-care practices in rural communities, which is related to access to healthcare services in rural areas, preventive medicine and cross-industry cooperation initiatives.

With the understanding of how the ITT methodology can help to further consolidate local innovation infrastructure, the ITT Capacity Building program performed at UNAL did not only have an impact during the week of participation, with respect to proposals, discussions, and networking spaces, but it is expected to constitute the first step towards establishing a strategic alliance between the parties. This alliance could reach a second phase, in which the ITT methodology could be used daily in the execution of interdisciplinary projects through the establishment of an ITT Social Healthcare Innovation laboratory together with the Universidad Nacional de Colombia. This laboratory could constitute a new node in the innovation ecosystem at the local and global level that would be, in turn, a meeting point between industry and academia, as a space for researchers and entrepreneurs to develop innovative solutions that have a significant impact on improving access to health care in Colombia.

Conclusion

While Colombia and Latin America move towards healthcare improvement initiatives, it is vital to ensure that the access to these improvements embraces the wider population of the country. Innovation Think Tank as a part of Siemens Healthineers in cooperation with the Universidad Nacional de Colombia and Siemens Healthineers Colombia have gathered the insights of multidisciplinary experts and participants on the diversity of impact of the different clinical, technological, and business trends that contribute to enhancing access to care in the region.

Now, to ensure that these trends efficiently achieve access to care and to create a sustainable local innovate infrastructure, it is vital to advance the promotion of cross-industry cooperation that embrace social appropriation of knowledge, social innovation in healthcare, and transdisciplinary work to engage the most relevant stakeholders, key opinion leaders, and decision makers to help shape and define the steps forward for implementation.

Authors contributions

SH has established and confirmed the paper's framework as well as guided and initiated the paper's context. All authors have provided crucial insights and aspirations for the frugal innovation context. All authors contributed to the paper’s drafting and approved the final version. The authors do not state any competing interests.

Acknowledgements

The development of the Innovation Think Tank certification program was achieved thanks to the articulation between the Universidad Nacional de Colombia, with the leadership of the Director of Research and Extension (DIEB) and Director of the Center Méntor Olga Janeth Goméz Ramírez and Jose Ismael Peña Vice Rector of the Bogotá campus of the

UNAL; and Siemens Healthineers headed by Francisco Vélez as Executive Director of SHS Colombia, Peru and Ecuador, and Prof. Sultan Haider as founder and head of the Innovation Think Tank in Erlangen, Germany. The program had excellent collaborators who, from the role of inspirational speaker, mentor or jury, enhanced the learning and results of each of the projects. We also acknowledge the strategic and logistical support from Centro Méntor, headed by Nicolás Mora, as operational director and his entire team: Ana Murillo, Sara Vera, Laura García, Nataly Rodríguez and Cristián Parra. We also acknowledge the support from the DIEB of Emily Mejia, Vanessa Burbano, Karen Reyes and the group of student assistants who were present during the development of the program. Finally, we acknowledge the work of the members of Siemens Healthineers who were fundamental for this articulation, among whom we highlight Jorge Espinoza as Strategy & Business Development Manager, Harry Avila and Julian Reyes on behalf of SHS Colombia and Sebastian Schroth as Technology Manager, Fareha Naqvi, John Hernandez, Mariana Coutinho and Maria Espinal on behalf of SHS.

On the other hand, we recognize the work of the invited experts in the three modalities of inspirational speakers, mentors and jurors. As inspirational speakers we had the valuable participation of: Gloria Maribel Carrillo, Dean of the Faculty of Nursing, UNAL; Miguel Rivas, Head of Diagnostic Imaging and Digital Automation (Col, Ecu, Per); Sebastian Schroth, Chief Technology Officer of the Innovation Think Tank Siemens Healthineers, Germany; Carlos A. Cifuentes, Head of Biomechatronics Center; Álvaro Ríos, Poveda co-founder and CEO Human Assistive Technologies; Susan Benavides, Director of Science, Technology and Innovation Management, Universidad de América; Sara Vera Aguirre, Advisor at Méntor UNAL; Roberto Bolullo Carames, Founder and CEO of Co-creadora and Boldinn; Ángela Caro Rojas, President of the Colombian Association of Pharmacovigilance and member of the Board of Directors of the International Society of Pharmacovigilance and Antonio Higor F. de Morais, Associate Coordinator of the Center for Advanced Technological Innovation of the Federal Institute of Education, Science and Technology of Rio Grande do Norte.

While, from the role of mentor we highlight the advice of: Alejandro Cardozo, expert in Diagnostic Imaging and Digital Automation (Colombia, Ecuador, Peru) Siemens Healthineers; Mónica Hernández, CEO and Business Designer Colombia; Hernando Guillermo Gaitán Duarte, Professor at the Faculty of Medicine of the UNAL; Ana Carolina Murillo Calderón, Communications Leader at the Méntor Center of the National University of Colombia and Rodrigo Gómez Martínez, Coordinator Tecnoparque Node National Learning Service (SENA). Continuing with the high-value collaborators, in the ITT program award ceremony, the jurors who decided the winners were: Olga Janneth Gómez Ramírez, Director of Research and Extension Bogotá UNAL Headquarters; Nicolás Mora Parra, Operational Director of Centro Méntor UNAL; María Alejandra Guzmán, Dean Faculty of Engineering, Universidad Nacional de Colombia Bogotá Headquarters; Mónica Hernández, CEO and Business Designer Colombia; Susan Benavides, Director of Science, Technology and Innovation Management at Universidad de América in Colombia; Jorge Manuel Espinoza Rojas, Strategy and Business Development Manager at Siemens Healthineers, Colombia; Ángela Caro Rojas, President of the Colombian Association of Pharmacovigilance and member of the Board of Directors of the International Society of Pharmacovigilance; Antonio Higor F. de Morais, Associate Coordinator of the Center for Advanced Technological Innovation of the Federal Institute of Education, Science and Technology of Rio Grande do Norte and Rodrigo Gómez Martínez, Technopark Coordinator of the National Learning Service (SENA).

Finally, we would like to acknowledge the 72 participants who were present throughout the week, who with their discussions and proposals made this experience a success story.

Disclaimer

The information shared in this paper is not an all-inclusive or comprehensive picture of the Latin American and Colombian healthcare system and is a result of data collection received through surveys and Innovation Think Tank Capacity Building programs. Some statements in this paper may be forward-looking statements that are based on trusted source research. Survey data may differ factually based on the subjectivity of the surveyors. Large language models were utilized for paraphrasing purposes only.

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Siemens Healthineers Headquarters
Siemens Healthineers AG
Siemensstr. 3
91301 Forchheim, Germany

Published by
Siemens Healthineers AG
Technology Excellence
Innovation Strategy and Ecosystem
Innovation Think Tank Global Headquarters
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91058 Erlangen, Germany
Contact:innovationthinktank.team@siemens-healthineers.com
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